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DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
CHARLES D. WALCOTT, DIRECTOR

REPORT

OF

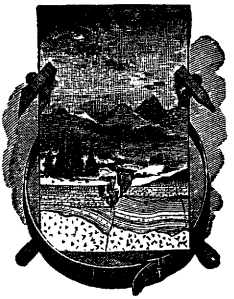
PROGRESS OF STREAM MEASUREMENTS

FOR

THE CALENDAR YEAR 1904

PREPARED UNDER THE DIRECTION OF F. H. NEWELL
BY
W. B. CLAPP

PART XI.—The Great Basin and Pacific Ocean Drainage in California.



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1905

CONTENTS.

ILLUSTRATIONS.

LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
UNITED STATES GEOLOGICAL SURVEY,
HYDROGRAPHIC BRANCH,
Washington, D. C., April 15, 1905.

SIR: I transmit herewith the manuscript of Part XI of a series of twelve papers which compose the Report of Progress of Stream Measurements for the Calendar Year 1904. Parts I to VI of this report contain the results of the data collected in the territory east of Mississippi River. Parts VII to XII are devoted to the data collected in the territory west of Mississippi River.

The original data for this report were collected in cooperation with the State of California under the direction of J. B. Lippincott, supervising engineer for that State. The field operations were under the immediate direction of W. B. Clapp. The assembling of the data and their preparation for publication were done under the direction of Mr. Clapp. The original manuscript contained all the data collected in California during 1903 and 1904. As the 1903 data were published in Water-Supply Paper No. 100, they have, with a few exceptions, been omitted from this report.

I request that this manuscript be published as one of the series of Water-Supply and Irrigation Papers.

Very respectfully,

F. H. NEWELL,
Chief Engineer.

Hon. CHARLES D. WALCOTT,
Director United States Geological Survey.

PROGRESS REPORT OF STREAM MEASUREMENTS FOR THE CALENDAR YEAR 1904.

PART XI.

By W. B. CLAPP.

INTRODUCTION.

The hydrographic work of the United States Geological Survey includes the collection of facts concerning and the study of conditions affecting the behavior of water from the time it reaches the earth as rain or snow until it joins the oceans or great navigable rivers. These investigations became a distinct feature of the work of the Survey in the fall of 1888, when an instruction camp was established at Embudo, N. Mex. Since that date the work has been continually and gradually extended as larger funds became available. The first distinctive appropriation for gaging streams was made by the act of August 18, 1894, which contained an item of $12,500, "for gaging the streams and determining the water supply of the United States, including the investigation of underground currents and artesian wells in the arid and semiarid sections." (Digest of Appropriations for 1895, p. 270.)

Since that time a similar act has been passed each year and the appropriations have gradually increased, as shown in the following table:

Annual appropriations for hydrographic surveys.

Year ending June 30, 1895	$12,500
Year ending June 30, 1896	25,000
Year ending June 30, 1897	50,000
Year ending June 30, 1898	50,000
Year ending June 30, 1899	50,000
Year ending June 30, 1900	50,000
Year ending June 30, 1901	100,000
Year ending June 30, 1902	100,000
Year ending June 30, 1903	200,000
Year ending June 30, 1904	200,000
Year ending June 30, 1905	200,000
Year ending June 30, 1906	200,000

The chief feature of the work of the hydrographic division is the systematic study of the flow of the surface waters and the conditions affecting the same. In this connection other information that may be of use to the engineer or others in hydrographic studies, such as river profiles, duration and extent of damage by floods, water-power data, etc., is collected. Furthermore, the work has been so directed that the information collected will be of direct value in the commercial and agricultural development of the country.

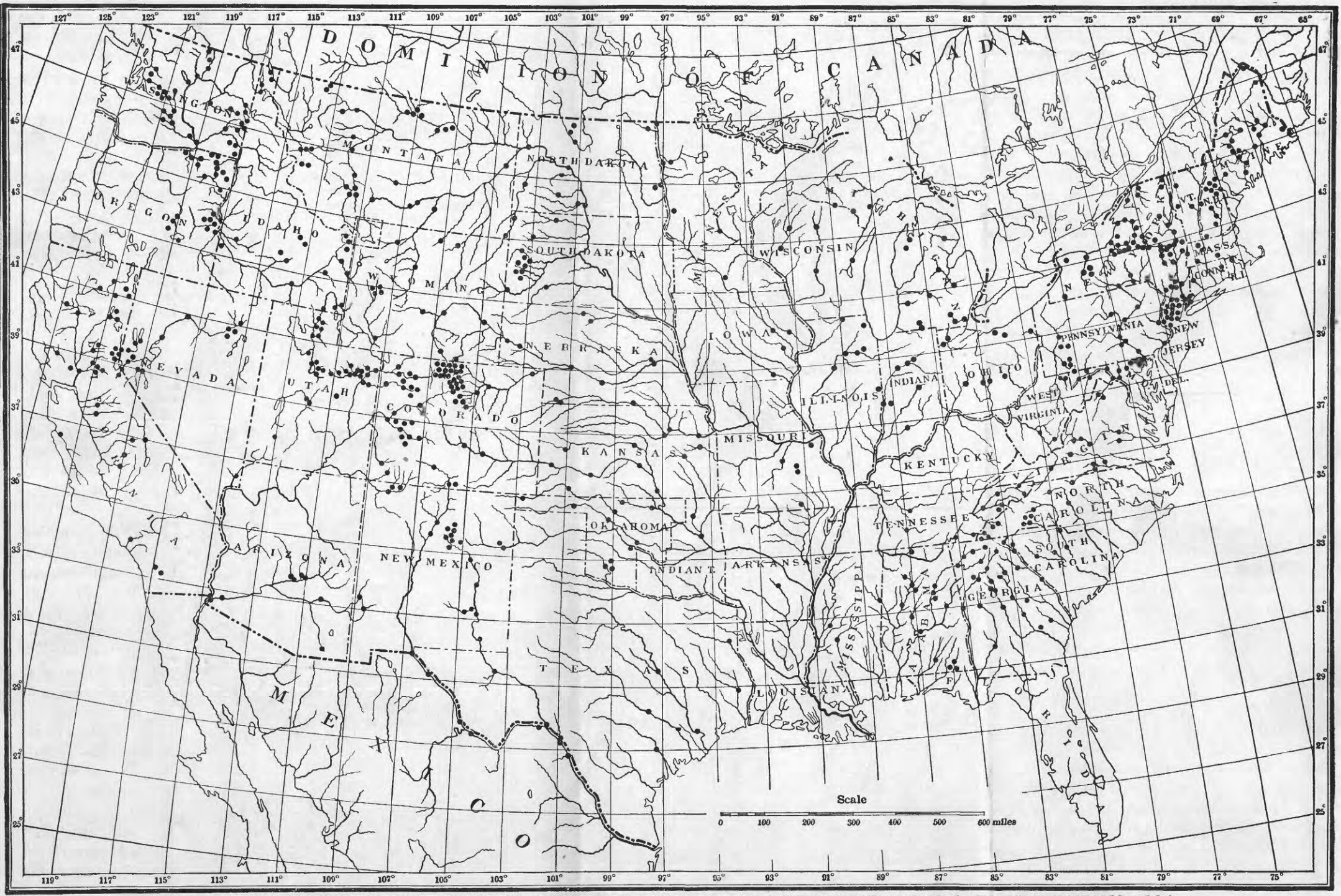
As a result of the increased appropriations since June 30, 1902, the work has been largely extended and thoroughly systemized. The various States have been grouped into districts, each of which is under the supervision of a district hydrographer who, with a corps of assistants, devotes his whole time to the study of the hydrographic resources of his district.

The methods used in the collection of these data and in their preparation for publication are given in detail in Water-Supply Paper No. 94. (Hydrographic Manual, U. S. Geol. Survey.)

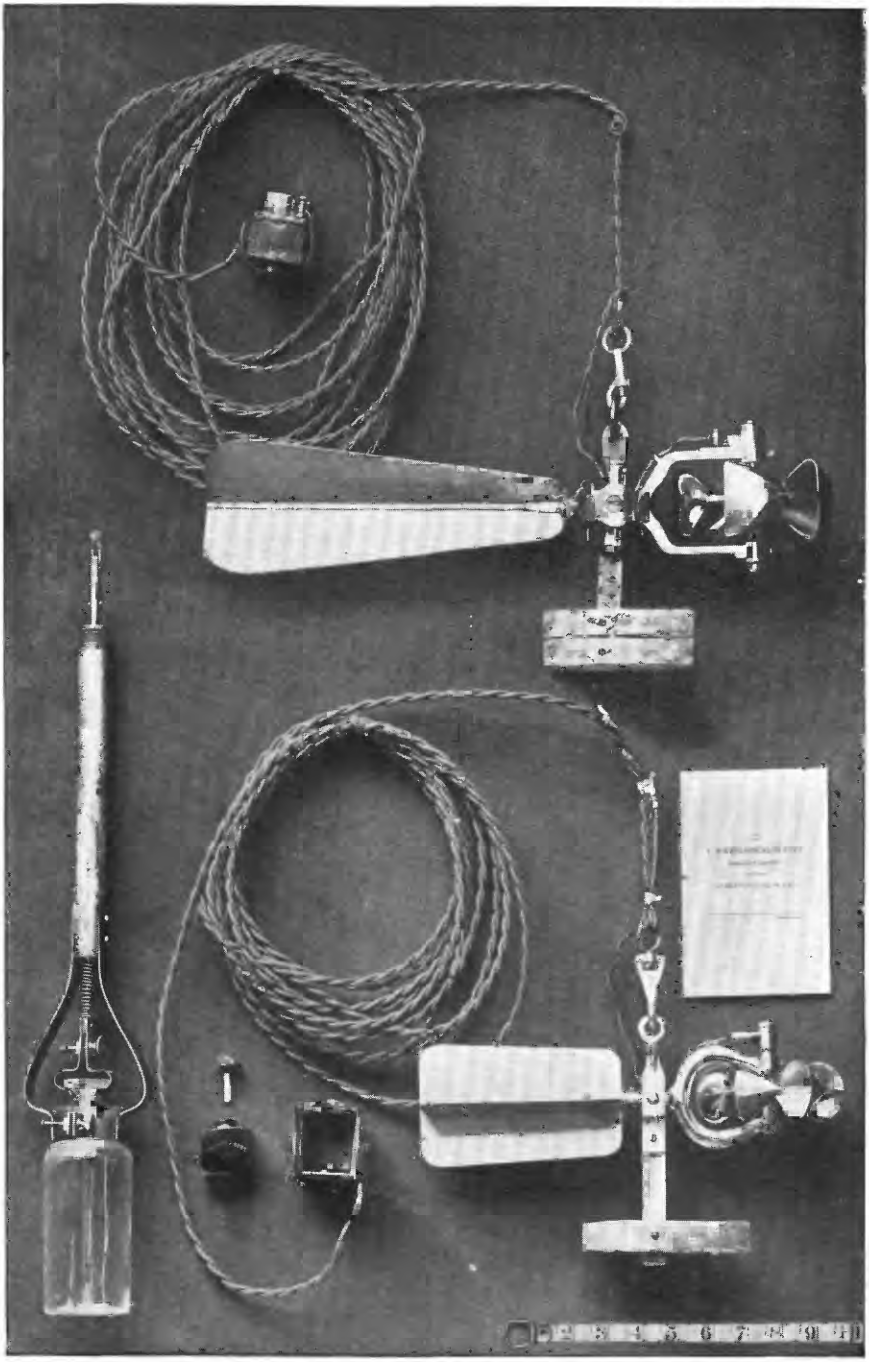
The general plan of stream gaging which has been developed is to obtain eventually data in regard to the flow of all the important streams in the United States. With this in view gaging stations are established at points where the data will be of greatest commercial value. At these stations discharge measurements are taken from time to time at typical river stages, and the daily surface fluctuation is obtained by means of gage readings. From these two factors it is possible to estimate both the total flow and its distribution through the period of observation.

The selection of the site for a gaging station and the length of time the station is maintained depend largely upon the needs of each locality. If the stream is to be used for water power, special efforts are made to obtain information concerning the low-water flow. If water is to be stored, the high waters are given special attention. In all sections certain permanent stations are maintained for general statistical purposes to show the conditions which exist through long periods. They also act as primary stations, and are used in connection with short series of measurements to determine the flow in particular portions of the drainage basin.

Gaging stations are divided into two general classes: First, current-meter stations, and, second, weir stations. The former class is subdivided as to location into bridge, cable, boat, and wading stations. Fig. 1 shows a cable station with car, tag line, inclined gage, etc. In addition to the bridge, cable, or boat, the equipment of a current-meter gaging station consists in a gage for determining the daily fluctuations of the water surface, bench marks to which the zero of the gage is referred, and permanent marks on the bridge or a tagged line indicating the points of measurement. Where the current is swift



MAP OF THE UNITED STATES, SHOWING LOCATION OF PRINCIPAL RIVER STATIONS MAINTAINED DURING 1904.



PRICE CURRENT METERS, WITH BUZZERS.

some appliance, generally a secondary cable, is necessary to hold the meter below the surface.

Gaging stations are generally located at bridges, if the channel conditions are satisfactory, as from them the meter can be easily manipulated, and the cost of the equipment is comparatively small. The stations are located as far as possible at points where the channel is straight, both above and below the gaging section, and where there are no cross currents, backwater, or boils. The bed of the stream should be as clear as possible from large projections and of a permanent character. The banks should be high, and should overflow at high stages only. At stations with shifting beds more measurements are made, and special methods of computing daily discharges are employed. Great care is taken in the selection and equipment of gaging stations in order that the data may have the required degree of accuracy.

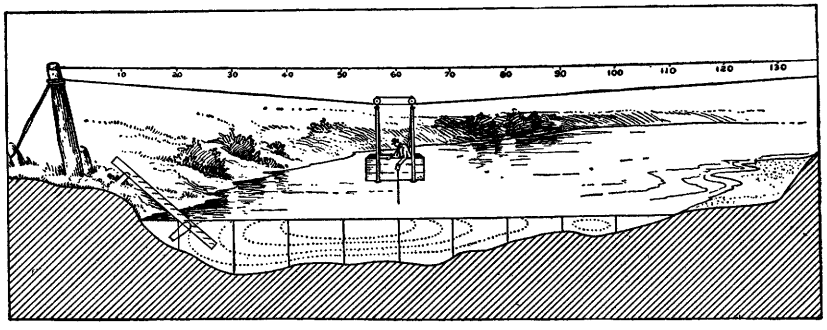


FIG. 1.—Cable station, showing section of river, car, gage, etc.

On many of the larger rivers, where water power is developed by dams, estimates of flow are obtained by observing the head on the crest and using a weir formula. On the smaller streams sharp-crested weirs are in some cases erected.

The principal instrument used in stream-measurement work is the current meter, by which the velocity of the flow of water is determined. After years of experience the Survey has adopted the Price current meter for general work. This meter, as is shown on Pl. II, is made in two sizes, known as the large and small Price. The small Price has been largely developed by the officers of the Survey, using the Price acoustic meter as a basis.

A discharge measurement is the determination of the quantity of water flowing past a certain point at a given time. This quantity is the product of two factors: (1) The mean velocity, which is the function of the cross section, surface slope, wetted perimeter, and roughness of bed; (2) the area, which depends upon the permanency of the bed and the fluctuations of the surface, which govern the depth.

In making the measurement an arbitrary number of points are laid off perpendicular to the thread of the stream (see fig. 1). These points are usually at regular intervals varying from 2 to 20 feet, depending upon the size and conditions of the stream. They are known as measuring points, and at them the observed data, the velocities and soundings, are taken. The perpendiculars dropped from the measuring points divide the gaging section into strips, and for each strip or pair of strips the mean velocity, area, and discharge are determined independently; thus conditions existing in one part of the stream are not distributed to parts where they do not apply.

The methods of obtaining velocity with the current meters which are in general use may be grouped into three classes: Single point, multiple point, and integration.

The single-point method consists in holding the meter either at the depth of the thread of mean velocity, or at an arbitrary depth for which the coefficient for reducing to mean velocity has been determined. Extensive experiments by vertical velocity-curves show that the thread of mean velocity lies at from 0.5 to 0.7 of the total depth. In general practice the thread of mean velocity is considered to be at 0.6 depth, and it is at this depth that the meter is held in the majority of the measurements, this being known as the six-tenth depth method. It is found by a large number of vertical velocity-curve measurements, taken on various streams and under various conditions, that the coefficient for reducing the velocity obtained at six-tenths depth to mean velocity is practically unity, ranging, in a series of 910 measurements made at 39 gaging stations, between .94 and 1.04, with a mean for the 910 observations of 1.00. In the other principal single-point method the meter is held near the surface, usually 1 foot below, or low enough to be out of the action of the wind or other disturbing influences. This is known as the subsurface method. The coefficient for reducing the velocities taken at the subsurface has been found by repeated experiments with vertical velocity-curves to be from .85 to .95, depending upon the depth of the stream and velocity and channel conditions. This method is specially adapted for flood measurements, or when the velocity is so great that the meter can not be kept at 0.6 depth.

The three principal multiple-point methods in general use are: The vertical velocity-curve; top and bottom; and top, bottom, and mid depth. In the vertical velocity-curve method a series of velocity determinations are taken in the vertical at regular intervals, usually from 0.5 to 1 foot apart. By platting these velocities as abscissas and their depths as ordinates, and drawing a smooth curve through these points, the vertical velocity-curve is produced, which shows the change in velocity from the surface to the bottom of the stream. The mean velocity in the vertical is then obtained by dividing the depth

into the area bounded by this mean velocity-curve and the initial line. Owing to the length of time it takes to make these measurements they are seldom used except for determining coefficients for purposes of comparison and for measurements under ice.

In the second multiple-point method the meter is held from 0.5 to 1 foot below the surface and about 0.5 foot above the bottom, and the mean of the velocities at these two points is taken as the mean velocity for that vertical. This method is not well adapted for general work, as the roughness of the bottom disturbs the velocity at that point. For shallow streams with comparatively smooth beds good results are obtained by this method. In the third multiple-point method the meter is held at mid depth, 0.5 foot below the surface, and 0.5 foot above the bottom, and the mean velocity is determined by dividing the sum of the top velocity, twice the mid-depth velocity, and the bottom velocity by 4.

The vertical-integration method consists in moving the meter at a slow, uniform speed from the surface to the bottom and back again to the surface. The number of revolutions and the time taken in the operation is noted, and the mean velocity is found by dividing the number of revolutions by the number of seconds taken in the run. This method has the advantage, in that the velocity at each point of the vertical is measured twice. It is well adapted for measurements under ice and as a check on the point methods.

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

In computing the discharge measurements from the observed velocities and depths at the various points of measurements 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 double strip. The total discharge and 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 volume of water flowing in a stream is known as run-off. In expressing it various units are used, depending upon the kind of work for which the data are needed. Those used in this report are "second-

feet," "acre-feet," "run-off per square mile," and "run-off in depth in inches," and may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second, and is the body of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second.

The "acre-foot" is the unit of capacity used in connection with storage for irrigation work, and is equivalent to 43,560 cubic feet. It is the quantity required to cover an acre to a depth of 1 foot. There is a convenient relation between the second-foot and the acre-foot; 1 second-foot flowing for twenty-four hours will deliver 86,400 cubic feet, which equals 1.9835 acre-feet, or, approximately, 2 acre-feet.

The expression "second-feet per square mile" means the average number of cubic feet of water flowing each second from every square mile of drainage area on the assumption that the run-off is uniformly distributed.

"Depth in inches" means the depth of water in inches that would have covered the drainage area, uniformly distributed, if all the water could have accumulated on the surface. This quantity is used for comparing run-off with rainfall, which quantity is usually given in depth in inches.

It should be noticed that "acre-feet" and "depth in inches" represent the actual quantities of water which are produced during the periods in question, while "second-feet," on the contrary, is merely a rate of flow per second.

The base data for computing the daily discharge of a stream are the daily gage heights and the various discharge measurements, of which there should be sufficient number to cover the range of stage. The fundamental laws upon which these computations are based are the following:

(1) The discharge will remain constant so long as the conditions at or near the gaging station remain constant;

(2) Neglecting the change of slope due to the rise and fall of the stream, the discharge will be the same whenever the stream is at a given stage; and

(3) The discharge is both a function of, and increases gradually with, the gage heights. (2 and 3 depend on 1.)

As the beds of many streams are changeable, the problem divides itself into two classes: (1) Those of streams with permanent, or practically permanent, beds, and (2) those of streams with changeable beds. The base data and methods of obtaining them are the same for either class, and it is only in the computation of the mean daily flow that different methods are necessary.

In determining the daily discharge of streams with permanent beds the results of the discharge measurements are plotted on cross-section paper, with gage heights as ordinates and discharges as abscissas.

Through these points a smooth curve is drawn, which shows the discharge for any gage height, and from which a rating table is prepared. Aside from plotting the discharge, the mean velocity and area determined for each discharge measurement are plotted. Through these points the curves of mean velocity and of area are drawn, and the rating curve is largely determined by taking the product of the mean velocity and the area at various stages as determined by these curves. These curves of mean velocity and area are of special value to determine the location of the rating curve for stages at which actual discharge measurements are not available and for extending the discharge curve outside the limits of the measurements. In the preparation of the rating table the discharge for each tenth or half tenth on the gage is found from the curve. The first and second differences of these discharges are then taken and adjusted according to the law that they shall either be constant or increasing, never decreasing. The discharges in the table are then changed in accordance with these adjusted differences. In making up the station-rating curve the individual discharge measurements and the conditions under which they were taken are carefully studied in order that proper weight shall be given to each measurement. Rating curves in general take the form of a parabola, and as a rule the high-water portion of the curve approaches a straight line. For stations of permanent character the results of the measurements from year to year should be within 5 per cent of the curve, with the exception of those taken during high water, when the probable error may be as high as 10 per cent.

The determination of the daily discharge of streams with changeable beds is difficult, and unless frequent discharge measurements are made the results obtained are only roughly approximate. For streams with continually shifting beds, such as Colorado River and the Rio Grande, discharge measurements are made every two or three days, and the discharges for the intervening days are obtained by interpolation, modified by the gage heights for these days. For stations with beds which shift slowly, or are only materially changed during floods, station-rating curves and tables can be prepared for the periods between changes, and satisfactory results can be obtained with two or three measurements a month, providing measurements are taken soon after the changes take place.

In determining the flow for periods when the streams are frozen, special rating curves and tables have to be prepared from measurements taken under these conditions. The methods of constructing these curves and tables are the same as for open sections. The discharge measurements, however, are either taken by integration in verticals or by the vertical velocity-curve method, as sufficient experiments have not been made on ice-covered streams to determine the laws which govern the position of the thread of mean velocity.

The Report of Progress of Stream Measurements for the Calendar Year 1904, of which this is Part XI, is published in a series of twelve Water-Supply Papers, Nos. 124–135, inclusive, under the following subtitles:

Part 1. Atlantic coast of New England drainage.
Part 2. Hudson, Passaic, Raritan, and Delaware River drainages.
Part 3. Susquehanna, Patapsco, Potomac, James, Roanoke, Cape Fear, and Yadkin River drainages.
Part 4. Santee, Savannah, Ogeechee, Altamaha Rivers, and Eastern Gulf of Mexico drainages.
Part 5. Eastern Mississippi River drainage.
Part 6. Great Lakes and St. Lawrence River drainage.
Part 7. Hudson Bay, Minnesota, Wapsipinicon, Iowa, Des Moines, and Missouri River drainages.
Part 8. Platte, Kansas, Meramec, Arkansas, and Red River drainages.
Part 9. Western Gulf of Mexico drainage.
Part 10. Colorado River and the Great Basin drainage.
Part 11. The Great Basin and Pacific Ocean drainages in California.
Part 12. Columbia River and Puget Sound drainage.

The territory covered by each paper is given in the subtitle, and the larger drainages are, for convenience in arrangement, subdivided into smaller ones, under which the data are arranged, as far as practicable, geographically.

These papers contain the data that have been collected at the regular gaging stations, the results of the computations based upon the observations, and such other information that has been collected that has a direct bearing on these data including, as far as practicable, descriptions of the drainage areas and the streams draining them.

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

1. Description of station.
2. List of discharge measurements.
3. Gage-height table.
4. Rating table.
5. Table of estimated monthly and yearly discharges and run-off.

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

The discharge-measurement table gives the results of the discharge measurements made during the year. This includes the date, the hydrographer's name, the gage height, and the discharge in second-feet. The table of daily gage heights gives for each day the mean height of the surface of the river as found from the mean of the gage readings taken on that day. At most of the stations the gage is read in the morning and in the evening.

The rating table gives discharges in second-feet corresponding to each stage of the river as given by the gage heights.

In the table of estimated run-off the column headed "Maximum" gives the mean flow for the day when the mean gage height was the 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" gives the average flow for each second during the month. Upon this mean the computations for the three remaining columns which are defined on page 14 are based.

The results of stream measurements made during previous years by the United States Geological Survey can be found in the following Survey publications. A detailed index of these reports (1888–1903) is given in 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, and Sixteenth Annual Report, Part II.
1895. Bulletin No. 140, and Seventeenth Annual Report, Part II.
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 to 39, inclusive; Twenty-first Annual Report, Part IV.
1900. Water-Supply Papers, Nos. 47 to 52, inclusive; 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 to 129, inclusive. West of Mississippi River, Water-Supply Papers Nos. 130 to 135, inclusive.

A limited number of these are for free distribution, and as long as the supply lasts the same may be obtained by application to the Director, United States Geological Survey. Aside from these, other copies are filed with the Superintendent of Public Documents, Washington, D. C., from whom they may be had at prices little above cost. Copies of Government publications are, as a rule, furnished to the public libraries in our large cities, where they may be consulted by those interested.

COOPERATION AND ACKNOWLEDGMENTS.

Most of the measurements presented in this paper have been obtained through local hydrographers. Acknowledgment is due to each of these persons, and thanks are extended to other persons and corporations who have assisted local hydrographers or have cooperated in any way, either by furnishing records of the height of water or by assisting in transportation.

The hydrographic work of the United States Geological Survey in California has been carried on in cooperation with the State, in accordance with an act of the State legislature approved March 16, 1903, which is in substance as follows:

> The State board of examiners are hereby empowered to enter into contracts with the Director of the United States Geological Survey for the purpose of making topographic maps, to the extent of twenty thousand dollars; also for the purpose of gaging streams, surveying reservoir sites and canal locations, for the conservation and utilization of the flood of storm waters of the State to the extent of fifteen thousand dollars, etc.

The State board of examiners is composed of the following members, viz: George C. Pardee, governor; C. F. Curry, secretary of State; U. S. Webb, attorney-general.

Although the portion of the new bill referring to hydrographic work provides for making surveys of reservoir sites and canal locations none of the State money has been expended for this purpose; the Geological Survey has made these investigations on Puta Creek, Sacramento River, Pit River and tributaries, Owens River, and Colorado River, and has paid the entire expense from its own funds.

The State appropriation, $7,500 of which became available July 1, 1903, has been used exclusively for gathering general stream-flow data; the Survey also apportioned $10,400 for the same purpose for the fiscal year beginning July 1, 1903. At this time 28 gaging stations were being maintained in California; other stations were added, and on December 31, 1904, 72 stations were being maintained. The data being accumulated for each of these stations have a specific value in connection with the future development of the resources of the State. The information will be invaluable in designing and making estimates of cost for storage, irrigation, power and drainage works, and for use in litigation.

The work in California is under the direction of Supervising Engineer J. B. Lippincott,[a] assisted by Hydrographers Samuel G. Bennett and W. B. Clapp. Acknowledgments are also due to the following individuals and corporations for assistance rendered and data furnished: To J. C. Pierson, city surveyor of Sacramento, Cal., for river stage and turbidity records of Sacramento River at Sacramento for 1904;

[a] The office of the supervising engineer is 1108 Braly Building, Los Angeles, Cal.

to the Kern County Land Company, through A. K. Warren, engineer in charge of water measurements, for the record of Kern River; to the McCloud River Power Company for river stage records during 1903 of McCloud River at Johns Camp; to the city of Santa Barbara for cooperation in gaging Santa Ynez River and Mono Creek; to the Southern Pacific Company through its chief engineer, William Hood, for river stage records of San Joaquin River at Herndon and King River at Kingsburg, Cal., and for transportation furnished the supervising engineer and assistants, and to the officials of the Santa Fe route for transportation furnished to the supervising engineer and assistants.

COLORADO RIVER DRAINAGE BASIN.

Topographically considered, this is the largest hydrographic basin lying wholly within the arid region, having a total area above the town of Yuma, Ariz., of over 225,000 square miles. It is situated in Wyoming, Utah, Colorado, Arizona, New Mexico, Nevada, and California, but the principal water supply comes from the melting snows of the high mountains of Wyoming, Utah, and Colorado. The minimum flow is less than 3,000 second-feet. The maximum reaches more than 75,000 second-feet. This stream has been called the Nile of America. Like the Nile, the Colorado is subject to an annual summer rise, which comes at a time when it is most needful for irrigation. Its waters carry a large amount of sediment, reaching as high as 2,000 parts of sediment to 100,000 parts of water. The minimum amount is carried during the winter months, and probably is never less than 60 parts of sediment to 100,000 parts of water.

Prof. R. H. Forbes, in Bulletin No. 44, University of Arizona agricultural experiment station, says:

> On the basis of the profile constructed from available data for the volume of flow of the Colorado and of the year's silt determinations made in this laboratory, it is estimated conservatively that the river during 1900 brought down about 61,000,000 tons of sedimentary material, which, condensed to the form of solid rock, is enough to cover 26.4 square miles 1 foot deep, or to make 53 square miles of dry, alluvial soil 1 foot deep, or to make about 164 square miles of recently settled, submerged mud 1 foot deep, reckoning the whole amount of mud for the year to average 6.2 times the bulk of the solid sediment.

A comparatively small amount of land is irrigated by the waters of Colorado River, owing to the fact that the main stream and both of its tributaries are situated so far below the level of the irrigable lands as to render their diversion extremely difficult or impracticable.

There are two pumping plants that lift water for irrigation at Yuma and several at other points on the river above Yuma. The Imperial canal diverts water at a point on the right bank of the river 10 miles, by river, below Yuma.

During December, 1901, and January, 1902, a reconnaissance of

Colorado River and Valley was made from The Needles and Yuma by J. B. Lippincott and others. In October, 1902, a reconnaissance was made by Mr. Lippincott, beginning at a point called Greggs Ferry, Mohave County, Ariz., and extending to The Needles, Cal.

Numerous dam and reservoir sites and diversion points for canals were discovered, together with large tracts of fertile land capable of being irrigated. In November, 1902, extensive topographic, soil, and hydrographic surveys were begun in the Colorado River Valley by the Reclamation Service of the United States Geological Survey.

The following is a list of the stations in the lower portion of Colorado River drainage basin: Colorado River at Yuma, Ariz.; Gila River at Yuma, Ariz.; Gila River at Gila City, Ariz.; Imperial canal at heading near Yuma, Ariz.; canals entering Imperial Valley; Colorado River at Bulls Head, Ariz.

COLORADO RIVER AT YUMA, ARIZ.

This station is located in the town of Yuma, Ariz., 1½ miles below the mouth of Gila River, and 10 miles, by river, above the Mexican boundary. Records of the river height have been kept by the Southern Pacific Railway Company since April 1, 1878, on the gage which was established by Arthur Brown, superintendent of the bridge and building department of the Southern Pacific Railway Company, during the summer of 1876. The lower section of the rod, reading from 10 to 22 feet, is nailed to the pile protection on the right bank of the Southern Pacific Railway bridge. The upper section, reading above 22 feet, is fastened on the lower side of the first bridge pier from the left bank. This gage height, plus 100 feet, is the Southern Pacific elevation above the sea level. At a later date the Southern Pacific Railway Company established a vertical gage rod (the old rod still remaining), fastened to the pile protection on the left bank of the river just below the railway bridge. This gage has been used continuously since it was established (date unknown) and is the one used by the United States Geological Survey at present. It corresponds in elevation to the old gage established in 1876. The gage is read twice a day by W. D. Smith, who is employed as local hydrographer for the stations in this vicinity.

Discharge measurements are made by means of a ¾-inch cable supported on masts. At low water measurements are made from a boat held in place by a cable. A car is used at flood stages. The initial point for soundings is the cable support on the south bank, about 20 feet from the water's edge at high water. The cable has a span of 650 feet. At low water the channel has a width of 325 feet. During floods a large part of the water flows through an old channel and does not pass under the cable. It is measured at the point where it passes under the railway trestle. The channel of the main river is

straight for 600 feet above and 5,000 feet below the station. The current is swift and the gaging section regular. The right bank is low, wooded, and liable to overflow. The left bank is not subject to overflow. The bed of the stream is composed of silt and sand and is very unstable. At low water a sand bar forms, which divides the channel into two parts. The bench mark is located on the first pier from the left bank. It is a standard bronze cap United States Geological Survey bench mark and has an elevation of 137 feet above sea level, as determined by the topographic branch of the Geological Survey. Its elevation above the zero of the gage is 35.31 feet.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Colorado River at Yuma, Ariz., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 2	W. D. Smith	18.92	3,981
January 5	do	18.84	4,007
January 8	do	18.75	3,677
January 11	do	18.60	3,494
January 14	do	18.55	3,418
January 16	do	18.70	3,512
January 19	do	18.60	3,407
January 21	do	18.75	3,694
January 23	do	18.75	3,586
January 26	do	18.70	3,511
January 28	do	18.75	3,595
January 30	do	18.80	3,622
February 1	do	18.85	3,649
February 4	do	18.90	3,812
February 6	do	18.90	3,736
February 9	do	18.75	3,484
February 11	do	18.70	3,342
February 13	do	18.75	3,540
February 16	do	18.75	3,490
February 18	do	18.95	3,753
February 20	do	19.05	3,794
February 22	do	19.20	4,162
February 25	do	19.35	4,229
February 27	do	19.25	4,247
March 1	do	19.45	4,446
March 3	do	19.50	4,627
March 5	do	19.55	4,725

Discharge measurements of Colorado River at Yuma, Ariz., in 1904—Continued.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
March 8	W. D. Smith	19.70	4,943
March 10	do	19.90	5,526
March 12	do	20.00	5,720
March 14	do	20.55	9,320
March 15	do	20.25	8,141
March 17	do	19.90	7,111
March 19	do	19.85	6,645
March 22	do	19.80	5,795
March 25	do	19.95	5,861
March 29	do	20.15	6,250
March 31	do	20.05	5,971
April 2	do	20.00	5,926
April 5	do	20.15	6,046
April 7	do	20.50	7,033
April 9	do	20.40	6,984
April 11	do	20.05	6,430
April 14	do	19.95	5,847
April 16	do	19.95	5,823
April 19	do	20.15	6,323
April 21	do	20.25	5,964
April 23	do	20.30	6,173
April 26	do	21.30	13,534
April 28	do	21.80	17,605
April 29	do	22.00	19,204
May 2	do	21.70	17,838
May 4	do	21.70	17,959
May 6	do	21.50	17,046
May 7	J. N. Johannsen	21.85	18,407
May 9	W. D. Smith	22.30	20,916
May 10	do	22.95	26,036
May 11	do	22.85	25,605
May 14	do	22.50	22,854
May 16	do	22.60	23,123
May 19	do	22.90	25,083
May 21	do	23.55	32,200
May 23	do	23.95	32,523
May 25	do	24.10	35,653
May 27	J. N. Johannsen	24.70	40,839
May 31	do	25.40	46,677
June 2	do	25.95	46,956

Discharge measurements of Colorado River at Yuma, Ariz., in 1904—Continued.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
June 5	W. D. Smith	26.25	49,485
June 7	do	26.00	51,170
June 9	do	25.90	49,183
June 11	do	25.50	45,820
June 13	N. J. Johannsen	24.90	42,295
June 15	W. D. Smith	24.70	34,256
June 17	do	24.80	38,192
June 20	do	25.00	38,981
June 22	do	25.40	43,202
June 24	do	25.70	45,435
June 27	do	25.65	43,706
June 29	do	25.55	44,909
July 2	J. N. Johannsen	25.15	35,701
July 5	do	24.25	32,421
July 7	W. D. Smith	24.00	32,186
July 9	S. M. Smith	23.80	27,608
July 11	do	23.40	23,675
July 13	do	23.00	22,761
July 15	do	23.05	22,269
July 18	do	22.85	21,050
July 21	do	22.55	18,681
July 22	do	22.50	18,178
July 25	do	22.20	15,269
July 28	do	22.25	16,044
July 30	do	21.90	13,939
August 1	do	22.20	16,193
August 4	do	22.25	15,973
August 6	do	21.85	15,427
August 8	do	22.15	16,357
August 12	W. D. Smith	21.95	17,686
August 16	do	21.95	16,660
August 18	do	21.65	14,636
August 20	do	21.50	14,199
August 23	do	21.30	12,957
August 24	do	23.00	23,652
August 26	do	22.25	18,740
August 30	S. M. Smith	22.80	23,185
September 1	do	22.10	18,358
September 5	do	22.00	18,060
September 7	do	22.40	18,351

Discharge measurements of Colorado River at Yuma, Ariz., in 1904—Continued.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
September 9	S. M. Smith	21.80	15,773
September 13	do	21.00	12,940
September 15	do	20.90	11,772
September 19	do	20.35	8,063
September 22	W. D. Smith	20.10	7,682
September 26	do	19.60	6,508
September 28	do	19.45	5,984
September 30	do	19.30	5,538
October 4	do	19.30	6,014
October 6	do	20.95	12,408
October 10	do	20.90	11,193
October 14	do	21.85	19,134
October 17	do	22.35	21,603
October 19	do	21.15	14,579
October 22	do	20.60	11,476
October 25	do	20.20	10,055
October 29	do	19.95	8,825
November 1	do	20.00	7,964
November 5	do	19.85	6,955
November 8	do	19.65	6,544
November 12	do	19.65	6,430
November 15	do	19.65	6,423
November 19	do	19.50	5,948
November 23	do	19.30	5,269
November 26	do	19.10	5,156
November 30	do	19.05	4,754
December 3	do	19.10	5,080
December 6	do	19.05	4,797
December 10	do	19.00	4,819
December 13	do	18.85	4,696
December 17	do	18.85	4,756
December 19	do	19.10	4,822
December 24	do	18.40	3,641
December 29	do	18.40	3,933

Mean daily gage height, in feet, of Colorado River at Yuma, Ariz., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	18.92	18.85	19.45	20.05	22.00	25.70	25.30	22.25	22.10	19.30	20.00	19.10
2	18.92	18.85	19.50	20.00	21.75	25.90	25.15	22.20	22.00	19.30	20.00	19.10
3	18.88	18.90	19.50	20.00	21.80	26.10	24.90	22.20	22.10	19.30	20.00	19.10
4	18.84	18.90	19.55	20.00	21.70	26.25	24.45	22.25	22.40	19.30	19.90	19.05
5	18.84	18.90	19.55	20.15	21.50	26.25	24.25	21.95	21.95	19.55	19.85	19.00
6	18.84	18.90	19.55	20.20	21.50	26.20	24.05	21.85	22.25	20.95	19.80	19.00
7	18.79	18.85	19.60	20.50	21.85	26.00	24.00	22.10	22.30	20.30	19.70	19.05
8	18.75	18.80	19.70	20.60	22.10	25.90	23.95	22.10	22.00	20.20	19.65	19.05
9	18.74	18.75	19.80	20.40	22.30	25.90	23.80	22.25	21.75	20.30	19.60	19.00
10	18.65	18.75	19.90	20.20	22.80	25.70	23.50	22.20	21.45	20.90	19.60	19.00
11	18.60	18.70	20.00	20.05	22.90	25.50	23.40	22.20	21.10	20.60	19.60	18.90
12	18.51	18.70	20.00	20.00	22.65	25.30	23.15	21.95	21.00	20.70	19.65	18.90
13	18.47	18.75	20.40	20.00	22.65	24.90	23.00	22.10	20.95	21.40	19.65	18.85
14	18.55	18.75	20.55	19.95	22.50	24.70	23.00	21.95	20.90	21 85	19.65	18.85
15	18.64	18.75	20.25	19.90	22.40	24.70	23.05	21.95	20.90	22.30	19.65	18.80
16	18.70	18.75	19.95	19.95	22.60	24.70	22.90	21.95	20.60	22.80	19.60	18.80
17	18.70	18.85	19.90	19.90	22.70	24.80	22.85	22.00	20.50	22.35	19.50	18.85
18	18.70	18.95	19.85	19.95	22.70	24.55	22.85	21.75	20.50	22.00	19.50	19.05
19	18.60	19.00	19.85	20.15	22.90	24.80	22.75	21.40	20.30	21.15	19.50	19.10
20	18.70	19.05	19.85	20.30	23.25	25.10	22.55	21.50	20.25	21.00	19.50	19.00
21	18.75	19.10	19.85	20.25	23.60	25.30	22.50	21.30	20.10	20.75	19.40	18.85
22	18.75	19.20	19.80	20.30	23.90	25.40	22.40	21.30	20.10	20.60	19.30	18.70
23	18.75	19.15	19.80	20.30	23.95	25.50	22.30	21.30	19.95	20.40	19.30	18.50
24	18.75	19.20	19.90	20.30	24.05	25.70	22.25	23.00	19.85	20.30	19.30	18.40
25	18.75	19.30	19.95	20.50	24.10	25.70	22.10	23.00	19.70	20.20	19.20	18.35
26	18.70	19.35	19.95	21.30	24.40	25.60	22.10	22.25	19.60	20.10	19.10	18.30
27	18.70	19.25	19.95	21.60	24.70	25.65	22.05	22.10	19.55	20.10	19.10	18.30
28	18.75	19.25	20.10	21.80	24.95	25.55	22.25	22.10	19.45	20.10	19.05	18.30
29	18.75	19.30	20.15	22.00	25.00	25.55	22.00	22.40	19.35	19.95	19.05	18.40
30	18.80	.....	20.15	22.00	25.05	25.50	22.00	22.90	19.30	19.95	19.05	18.60
31	18.80	.....	20.05	.....	25.30	.....	22.30	22.25	.....	19.95	.....	18.50

Estimated monthly discharge of Colorado River at Yuma, Ariz., for 1904.[a]

[Drainage area, 225,049 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	4,007	3,350	3,635	223,507	0.016	0.018
February	4,310	3,342	3,797	218,406	.017	.018
March	9,320	4,446	5,978	367,573	.027	.031
April	19,400	5,600	8,058	479,484	.036	.040
May	45,900	17,040	27,697	1,703,022	.123	.142
June	51,170	32,846	43,814	2,607,114	.195	.218
July	38,930	14,580	23,047	1,417,105	.102	.118
August	24,000	12,950	17,144	1,054,143	.076	.088
September	18,500	5,538	11,621	691,497	.052	.058
October	23,200	5,660	11,642	715,839	.052	.060
November	7,964	4,754	6,151	366,009	.027	.030
December	5,079	3,480	4,477	275,305	.020	.023
The year	51,170	3,342	13,922	10,119,004	.062	.844

[a] Computed by indirect method devised by W. B. Clapp. See article in Engineering News, April 21, 1904.

Summary of evaporation record at Yuma, Ariz., for 1904.

Month.	Evaporation.	Temperature.						Rain.	Net evaporation.
		Evaporation pan.		Reservoir.		River.			
		7 a. m.	6 p. m.	7 a. m.	6 p. m.	7 a. m.	6 p. m.		
January	3.60	49.4	53.3	50.6	54.3	47.9	49.8	0.00	3.60
February	3.90	58.2	62.7	59.7	63.3	56.1	60.0	.00	3.90
March	6.47	63.8	68.8	65.9	69.8	61.8	62.3	.28	6.19
April	9.37	65.7	72.5	68.2	73.3	65.1	69.2	.00	9.37
May	10.01	72.2	77.7	74.1	78.0	70.0	73.8	.07	9.94
June	10.11	79.3	84.0	81.4	84.1	77.2	80.8	.00	10.11
July	10.24	83.6	83.1	85.6	89.4	81.8	82.7	.05	10.19
August	8.56	86.8	91.7	88.9	92.5	85.5	89.6	.69	7.87
September	6.62	80.6	86.5	81.4	86.3	80.2	83.4	.24	6.38
October	7.02	66.5	71.3	86.7	72.0	65.3	68.4	.00	7.02
November	4.41	56.4	60.7	59.2	62.1	54.8	57.7	.00	4.41
December	2.01	49.9	53.2	52.2	54.3	48.2	49.9	.10	1.91
Total	82.32	.....	.....	.....	.....	.....	.....	1.43	80.89
Mean	.....	67.7	72.5	69.7	73.3	66.2	69.0	.....	.....

IMPERIAL CANAL AT CALIFORNIA-MEXICO BOUNDARY LINE.

Imperial canal heads about 10 miles, by river, below Yuma, Ariz., on the California side. The station is located a half mile from the river and 600 feet below the wooden head-gates. It was established October 24, 1903, by W. D. Smith. The vertical gage is located just above the boundary line on the right bank. It is read twice each day by J. S. Carter, the storekeeper. Discharge measurements are made by means of a boat and cable. The initial point for soundings is a charred post at the southeast corner of the corral about 150 feet west of the right bank. The channel is straight for 600 feet above and 300 feet below the cable and has a width of 70 feet. The velocity is moderate. There is but one channel at all stages, but when the gage at Yuma reads about 26 feet the river overflows into the channel below the gaging section. The bed of the canal is composed of silt and sand, free from vegetation, and is very unstable. The right bank is low and is liable to overflow. The left bank has an elevation of 6 feet above high water. Bench mark No. 1 is a standard United States Geological Survey iron bench-mark post. It is located near monument 207 of the United States and Mexico boundary line, on a hill

about half a mile west of the gaging station. Its elevation is 52.41 feet above the zero of the gage and 155 feet above sea level. Bench mark No. 2 is a nail in a tree on the right bank. Its elevation is 15.20 feet above the zero of the gage. Bench mark No. 3 is a nail in a post near the ground on the right bank near the corral. Its elevation is 14.90 feet above the zero of the gage.

On October 6, 1904, a new heading was opened on Mexican territory 4 miles below the original station for the diversion of additional water from Colorado River. Measurements were made in the canal below this heading, in order to obtain the total diversion.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Imperial canal at California-Mexico boundary line, head of canal (old gaging station), in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 1	W. D. Smith	8.60	455
January 15	do	8.30	410
January 27	do	8.30	408
February 12	do	8.30	438
February 26	do	8.82	551
March 16	do	10.16	780
Do	do	10.14	751
April 6	do	9.80	704
April 20	do	10.00	725
May 8	do	12.75	1,377
May 24	do	12.20	1,331
June 4	do	10.80	1,011
June 10	do	14.10	2,097
June 16	do	13.95	1,776
August 3	do	13.40	1,646
August 9	S. M. Smith	13.60	1,626
August 17	W. D. Smith	13.35	1,752
August 27	do	13.30	1,679
September 3	S. M. Smith	13.30	1,691
September 10	do	12.50	1,642
September 17	do	12.00	1,271
September 24	W. D. Smith	11.10	868
October 1	do	10.90	762

Mean daily gage height, in feet, of Imperial canal at California-Mexico boundary line, for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.60	8.50	8.90	9.60	12.85	11.05	14.70	13.60	13.30	10.90	.....	.....
2	8.60	8.50	9.00	9.60	12.70	11.00	14.70	13.50	13.20	10.90	.....	.....
3	8.55	8.50	9.00	9.60	12.70	11.00	14.65	13.40	13.20	10.85	.....	.....
4	8.50	8.50	9.05	9.60	12.60	10.95	14.60	13.35	13.55	10.85	.....	.....
5	8.55	8.50	9.10	9.60	12.30	10.80	14.55	13.10	13.10	12.70	.....	.....
6	8.50	8.45	9.05	9.75	12.25	11.30	(a)	13.00	13.45	12.10	.....	.....
7	8.50	8.40	9.05	9.95	12.60	11.80	.....	13.40	13.55	.....	.....	.....
8	8.50	8.35	9.10	10.15	12.85	13.10	.....	13.20	13.20	.....	.....	.....
9	8.45	8.30	9.20	10.00	13.00	13.80	.....	13.70	12.95	.....	.....	.....
10	8.40	8.20	9.30	10.00	13.35	14.00	.....	13.60	12.55	12.60	.....	.....
11	8.35	8.35	9.45	9.90	13.50	13.95	.....	13.65	12.10	.....	.....	.....
12	8.30	8.35	9.55	9.90	13.00	14.10	.....	13.45	12.05	.....	.....	.....
13	8.20	8.35	9.95	9.80	12.70	b14.20	.....	13.45	12.10	.....	.....	.....
14	b8.25	8.40	10.70	9.85	12.00	14.30	.....	13.40	12.05	.....	.....	.....
15	b8.25	8.40	10.50	9.90	11.90	14.10	.....	13.20	12.10	14.15	.....	.....
16	b8.25	8.40	10.20	9.90	12.15	14.00	.....	13.30	11.90	(c)	.....	.....
17	b8.25	8.50	10.05	9.95	12.30	14.05	.....	13.25	11.95	.....	.....	.....
18	8.30	8.60	9.95	9.80	12.45	14.10	.....	12.85	11.80	.....	.....	.....
19	8.30	8.60	9.85	9.85	12.70	14.25	.....	12.70	11.65	.....	.....	.....
20	8.30	8.60	9.80	10.00	12.70	14.45	.....	12.70	11.55	.....	.....	.....
21	8.40	8.60	9.60	10.10	12.55	14.60	.....	12.60	11.30	.....	.....	.....
22	8.40	8.70	9.60	10.10	12.25	14.60	.....	12.55	11.20	.....	.....	.....
23	8.40	8.70	9.50	10.15	12.20	14.60	.....	12.50	11.20	.....	.....	.....
24	8.45	8.70	9.50	10.10	12.20	14.60	.....	13.85	11.20	.....	.....	.....
25	8.35	8.70	9.60	10.20	12.15	14.60	.....	14.10	11.15	.....	.....	.....
26	8.35	8.80	9.60	11.85	11.80	14.70	.....	13.50	11.15	.....	.....	.....
27	8.30	8.80	9.65	12.50	11.00	14.75	13.10	13.20	11.20	.....	.....	.....
28	8.40	8.80	9.65	12.80	11.15	14.70	13.05	13.30	11.10	.....	.....	.....
29	8.40	8.80	9.65	12.80	11.15	14.70	13.00	13.55	11.05	.....	.....	.....
30	8.40	.....	9.70	12.80	11.00	14.70	13.40	14.10	10.90	.....	.....	.....
31	8.40	.....	9.80	.....	10.50	.....	13.55	13.50	.....	.....	.....	.....

a Gage destroyed. Replaced July 27. b Estimated. c Station discontinued.

Discharge measurements of Imperial canal at heading in Mexico, 4 miles below the International boundary line (new gaging station), in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
October 7	W. D. Smith	10.60	1,213
October 15	do	12.75	1,976
October 21	do	10.60	1,356
October 28	do	9.35	1,016
November 4	do	9.30	898
November 11	do	9.20	937
November 18	do	8.95	954
November 25	do	8.85	886
December 2	do	8.60	826
December 9	do	8.85	879
December 20	do	8.90	899
December 28	do	8.00	607

IMPERIAL VALLEY CANALS.

In July, 1904, stations were established on all canals entering the Imperial Valley as follows: Holt canal, Hemlock canal, Alamo channel, Alamitos canal, Main canal, and Boundary canal. These stations are located on United States territory and in each case near the California-Mexico boundary line. Discharge measurements are made from footbridges constructed at each station. The gages are vertical rods fastened to 4 by 4 inch timbers substantially imbedded in the ground. Automatic water-stage registers, from which the daily gage height record is compiled, were placed at the first five stations mentioned above. These canals enter the valley east of Calexico, Cal. In October a canal, known as Canal No. 6, was completed, which enters the valley west of Calexico, Cal. A station was constructed on this canal in November, and weekly discharge measurements are being made. A large quantity of waste water was discharging from the Imperial Valley, below all irrigated lands, into the Salton Basin. To determine this waste, discharge measurements were made on New River at Brawley, on Alamo channel at Rockwood, and on Canal No. 5 at Bernice.

The observations at these stations during 1904 have been made under the direction of W. B. Clapp, district hydrographer.

Discharge measurements of Holt canal near Calexico, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
July 14	W. V. Hardy	2.02	62.0
July 23	do	1.79	53.6
July 26	do	1.75	48.4
July 29	do	1.72	44.0
August 2	do	1.70	43.0
August 5	do	1.70	41.8
August 10	do	1.88	50.0
August 17	do	2.03	59.0
August 23	do	1.96	56.0
August 26	do	1.97	56.0
September 3	W. V. Hardy and E. C. La Rue	2.03	60.0
September 10	do	2.14	61.0
September 18	do	1.63	37.0
September 24	S. M. Smith	1.60	36.0
September 27	do	1.55	33.0
October 1	do	1.90	49.0
October 5	do	1.73	41.0
October 8	do	2.03	56.0

Discharge measurements of Holt canal near Calexico, Cal., in 1904—Continued.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
October 15	S. M. Smith	1.97	48.0
October 22	do	1.98	47.0
October 29	do	1.61	30.0
November 4	do	1.62	36.3
November 11	W. V. Hardy and S. M. Smith	1.95	54.0
November 18	W. V. Hardy	1.92	50.0
November 25	do	1.72	40.0
December 2	do	1.52	32.0
December 8	do	1.65	37.0
December 15	do	1.46	27.0
December 22	do	1.58	32.0

Mean daily gage height, in feet, of Holt canal near Calexico, Cal., for 1904.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.85	2.00	1.90	1.60	1.60
2	.....	1.70	2.10	1.80	1.55	1.55
3	.....	1.70	2.00	1.80	1.55	1.50
4	.....	1.70	2.00	1.80	1.60	1.55
5	.....	1.70	2.00	1.75	1.70	1.60
6	.....	1.65	1.90	1.70	1.80	1.75
7	.....	1.60	1.90	1.80	1.65	1.65
8	.....	1.80	2.10	2.00	2.15	1.65
9	.....	1.85	2.10	2.00	2.15	1.60
10	.....	1.90	2.15	1.85	2.05	1.60
11	.....	1.90	2.15	1.80	2.00	1.65
12	.....	1.90	2.10	1.85	1.90	1.65
13	.....	1.95	1.90	1.90	1.90	1.65
14	.....	1.95	1.70	1.85	1.90	1.60
15	.....	2.00	1 65	1.80	1.85	1.50
16	.....	2.00	1.60	1.90	1.85	1.50
17	.....	2.05	1.55	1.90	1.90	1.45
18	.....	2.05	1.60	1.95	1.90	1.50
19	.....	2.05	1.60	1.95	1.90	1.50
20	.....	(2.05)	1.60	1.95	1.90	1.45
21	.....	(2.05)	1.65	2.00	1.85	1.55
22	1.80	(2.00)	1.55	1.95	1.85	1.55
23	1.80	1.95	1.55	1.85	1.80	1.45
24	1.75	(1.95)	1.55	1.75	1.75	1.25
25	1.70	(1.95)	1.55	1.60	1.75	1.20
26	1.75	1.95	1.50	1.65	1.75	1.05
27	1.80	2.00	1.55	1.70	1.75	1.10
28	1.75	2.05	1.50	1.65	1.70	1.05
29	1.70	2.00	1.50	1.60	1.70	(1.05)
30	1.35	1.90	1.70	1.60	1.65	(1.05)
31	1.90	2.00	.....	1.60	.....	(1.05)

NOTE.—Gage heights in parenthesis are estimated.

Discharge measurements of Hemlock canal near Calexico, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
July 23	W. V. Hardy	0.95	4.4
July 26	do	1.15	6.4
July 29	do	1.14	6.0
August 2	do	.92	3.6
August 5	do	1.20	7.3
August 10	do	1.00	4.4
August 17	do	1.08	5.7
August 23	do	1.03	5.0
August 26	do	1.02	4.9
September 3	W. V. Hardy and E. C. La Rue	1.02	4.3
September 10	do	1.07	4.6
September 18	do	1.44	11.5
September 24	S. M. Smith	1.10	3.9
September 27	do	1.10	4.5
October 1	do	1.79	14.5
October 5	do	1.15	5.4
October 8	do	1.31	8.2
October 15	do	1.45	8.8
October 22	do	1.50	10.6
October 29	do	.98	3.1
November 4	do	1.13	6.4
November 11	W. V. Hardy and S. M. Smith	1.29	8.0
November 18	W. V. Hardy	1.31	8.2
November 25	do	1.28	8.0
December 2	do	1.39	9.5
December 8	do	1.13	6.3
December 15	do	1.04	3.3
December 22	do	.88	1.8

Mean daily gage height, in feet, of Hemlock canal near Calexico, Cal., for 1904.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	0.95	0.95	1.70	1.05	1.20
2	.....	.90	.95	1.50	1.10	1.40
3	.....	.95	1.00	1.40	1.15	1.40
4	.....	1.10	1.05	1.35	1.15	1.40
5	.....	1.20	1.05	1.15	1.20	1.30
6	.....	1.30	1.05	1.05	1.25	.95
7	.....	(a)	1.05	1.05	1.35	1.15
8	.....	(a)	1.05	1.15	1.40	1.15
9	.....	.90	1.05	.85	1.35	1.10
10	.....	1.00	1.10	.80	1.30	1.10
11	.....	1.00	1.10	.75	1.30	1.10
12	.....	.80	1.05	.65	1.30	1.10
13	.....	.90	1.05	.95	1.30	1.10
14	.....	1.05	1.00	1.30	1.30	1.10
15	.....	1.05	1.05	1.45	1.35	1.00
16	.....	1.05	1.10	1.45	1.45	1.00
17	.....	1.10	1.05	1.45	1.45	.95
18	.....	1.05	1.20	1.45	1.35	.95
19	.....	1.10	1.65	1.45	1.30	.90
20	.....	(1.05)	1.35	1.50	1.30	.90
21	.....	(1.05)	1.10	1.50	1.30	.90
22	1.00	(1.05)	1.00	1.50	1.30	.90
23	.95	1.05	1.00	1.45	1.30	.85
24	1.00	(1.05)	1.00	1.35	1.30	.80
25	1.05	(1.00)	1.05	1.25	1.30	.80
26	1.15	1.00	1.10	1.15	1.30	.65
27	1.15	(1.05)	1.25	1.05	1.30	.60
28	.75	(1.05)	1.45	1.00	1.30	.75
29	1.15	(1.20)	1.35	1.00	1.25	(.75)
30	1.15	(1.25)	1.35	1.05	1.20	(.75)
31	1.00	(1.05)	.....	1.05	.....	(.75)

a Dry.

Note.—Gage heights in parenthesis are estimated.

Discharge measurements of Alamo channel near Calexico, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
July 14	W. V. Hardy	3.20	144
July 23	do	2.80	115
July 26	do	3.09	138
July 29	do	3.51	177
August 2	do	1.63	39
August 5	do	1.61	36.5
August 10	do	3.38	163
August 17	do	3.82	219
August 23	do	3.67	200
August 26	do	3.68	197
September 3	W. V. Hardy and E. C. La Rue	4.00	239
September 10	do	4.00	256
September 18	do	2.95	136
September 24	S. M. Smith	2.77	124
September 27	do	2.80	135
October 1	do	3.79	240
October 5	do	2.65	123
October 8	do	3.55	205
October 15	do	3.40	182
October 22	do	3.82	228
October 29	do	3.05	157
November 4	do	2.97	146
November 11	W. V. Hardy and S. M. Smith	3.04	152
November 18	W. V. Hardy	2.43	97
November 25	do	2.22	86
December 2	do	2.14	80
December 8	do	2.56	107
December 15	do	2.55	111
December 22	do	2.32	80

Mean daily gage height, in feet, of Alamo channel near Calexico, Cal., for 1904.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.80	(3.90)	3.75	2.95	2.10
2	.....	1.65	(3.90)	3.35	2.95	2.15
3	.....	1.65	4.00	3.00	2.95	2.15
4	.....	1.60	4.00	(2.70)	3.00	2.20
5	.....	1.60	4.00	2.65	2.70	2.30
6	.....	1.80	4.00	3.55	2.50	2.35
7	.....	2.50	4.00	2.75	2.50	2.55
8	.....	2.65	4.00	3.25	(3.00)	2.55
9	.....	2.85	4.00	3.50	(3.00)	2.55
10	.....	3.40	4.00	3.45	(3.00)	2.60
11	.....	3.60	4.00	3.40	3.00	2.60
12	.....	3.60	3.95	3.40	2.75	2.60
13	.....	3.50	3.65	3.40	2.50	2.60
14	.....	3.65	3.35	3.35	(2.40)	2.55
15	.....	3.65	(3.00)	3.40	(2.40)	2.55
16	.....	3.75	(2.90)	3.45	(2.40)	(2.55)
17	.....	3.80	(2.90)	3.40	(2.40)	(2.55)
18	.....	3.80	2.90	3.50	2.40	(2.50)
19	.....	3.80	2.90	3.75	2.40	(2.50)
20	.....	3.80	2.90	3.80	3.40	(2.40)
21	.....	3.80	2.80	3.85	2.35	(2.35)
22	3.25	3.80	2.70	3.80	2.30	2.30
23	2.80	3.65	2.75	3.70	2.25	2.15
24	2.90	3.65	2.75	3.25	2.25	2.00
25	2.95	3.70	2.80	3.20	2.20	(2.00)
26	3.10	3.70	2.75	3.25	2.25	(2.00)
27	3.30	3.80	2.80	3.15	2.25	(1.90)
28	3.40	3.80	2.75	3.05	2.20	(1.80)
29	3.50	3.80	2.95	3.00	2.15	1.75
30	3.60	3.80	3.40	3.00	2.10	(1.75)
31	3.80	3.80	.....	2.95	.....	(1.75)

NOTE.—Gage heights in parenthesis are estimated.

Discharge measurements of Alamitos canal near Calexico, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
July 14	W. V. Hardy	1.40	26.6
July 23	do	1.48	24.3
July 26	do	1.30	18.4
July 29	do	1.50	26.3
August 2	do	1.08	8.2
August 5	do	1.04	13.3
August 10	do	.81	3.0
August 17	do	1.20	17.7
August 23	do	1.17	17.4
August 26	do	1.13	15.6
September 3	do	1.10	16.3
September 10	do	1.15	21.0
September 18	do	1.39	31.0
September 24	S. M. Smith	.87	8.3
September 27	do	1.02	13.7
October 1	do	1.10	8.4
October 5	do	1.19	18.7
October 8	do	1.54	36.0
October 15	do	1.50	35.0
October 22	do	1.30	26.0
October 29	do	1.24	25.0
November 4	do	1.21	23.0
November 11	S. M. Smith and W. V. Hardy	1.37	30.0
November 18	W. V. Hardy	1.48	35.0
November 25	do	1.48	26.0
December 2	do	1.34	22.0
December 8	do	1.41	25.0
December 15	do	1.43	26.0
December 22	do	1.46	29.0

Mean daily gage height, in feet, of Alamitos canal near Calexico, Cal., for 1904.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.00	(1.10)	1.10	1.25	1.35
2	.....	1.10	(1.10)	.65	1.25	1.35
3	.....	1.10	1.10	.90	1.25	1.35
4	.....	1.05	1.05	1.15	1.25	1.35
5	.....	1.05	1.10	1.25	1.30	1.35
6	.....	1.00	1.10	1.30	1.35	1.40
7	.....	1.00	(1.10)	1.40	1.25	1.40
8	.....	.90	1.15	1.45	1.20	1.40
9	.....	1.00	1.15	1.35	1.25	1.50
10	.....	.80	1.15	1.35	1.30	1.60
11	.....	.90	1.15	1.35	1.35	1.45
12	.....	.85	1.20	1.35	1.45	1.40
13	.....	.95	1.15	1.40	1.45	1.45
14	.....	1.00	1.15	1.45	1.45	1.45
15	.....	1.10	1.10	1.50	1.45	1.45
16	.....	1.15	1.15	1.55	1.45	1.45
17	.....	1.20	1.25	1.10	1.45	1.45
18	.....	1.20	1.40	.90	1.50	1.45
19	.....	1.20	1.30	.80	1.45	1.45
20	.....	(1.20)	1.25	1.15	(a)	1.50
21	.....	1.15	1.15	1.35	(a)	1.50
22	1.40	(1.10)	1.10	1.30	1.35	1.45
23	1.50	1.10	1.00	1.30	1.40	1.40
24	1.40	(1.05)	.95	1.25	1.40	1.35
25	1.35	(1.05)	1.10	1.25	1.40	1.25
26	1.30	1.05	1.05	1.25	1.40	1.20
27	1.35	1.05	1.05	1.25	1.40	1.30
28	1.40	(1.05)	1.10	1.25	1.40	1.40
29	1.50	(1.05)	1.15	1.25	1.40	(1.40)
30	1.50	(1.00)	1.00	1.25	1.40	(1.40)
31	1.65	(1.00)	.....	1.25	.....	(1.40)

[a] Dry.

NOTE.—Gage heights in parenthesis are estimated.

Discharge measurements of Imperial canal (main) near Calexico, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
July 14	W. V. Hardy	4.60	615
July 21	do	4.60	642
July 23	do	4.53	625
July 26	do	4.32	598
July 29	do	4.03	519
August 2	do	4.73	652
August 5	do	4.83	677
August 10	do	4.16	556
August 17	do	4.72	644
August 23	do	4.74	669
August 26	do	4.76	696
September 3	do	4.93	717
September 10	do	4.91	682
September 18	do	4.62	662
September 24	do	4.27	573
September 27	S. M. Smith	4.10	560
October 1	do	3.11	249
October 5	do	3.97	474
October 8	do	4.13	548
October 15	do	4.59	642
October 22	do	4.70	639
October 29	do	4.63	656
November 4	S. M. Smith and W. V. Hardy	4.45	598
November 11	do	4.41	601
November 18	W. V. Hardy	4.62	620
November 25	do	4.54	602
December 2	do	4.48	586
December 8	do	4.45	573
December 15	do	4.42	561
December 22	do	4.40	563

Mean daily gage height, in feet, of Imperial canal (main) near Calexico, Cal., for 1904.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	4.60	4.85	2.90	4.50	4.50
2	.....	4.75	4.90	3.50	4.50	4.45
3	.....	4.70	4.95	3.80	4.45	4.45
4	.....	4.85	4.90	4.05	4.45	4.45
5	.....	4.80	4.90	4.00	4.50	4.50
6	.....	4.80	4.90	3.95	4.55	4.50
7	.....	4.70	4.90	4.00	4.25	4.45
8	.....	4.55	4.90	4.15	4.25	4.45
9	.....	4.40	4.90	4.25	4.30	4.45
10	.....	4.15	4.90	4.40	4.35	4.40
11	.....	4.20	4.90	4.40	4.40	4.45
12	.....	4.30	4.85	4.40	4.50	4.45
13	.....	4.40	4.80	4.40	4.55	4.45
14	4.60	4.55	4.75	4.55	4.55	4.40
15	4.60	4.65	4.75	4.60	4.55	4.40
16	4.70	4.65	4.75	4.60	4.60	(4.40)
17	4.60	4.70	4.65	4.70	4.60	(4.40)
18	4.60	4.75	4.60	4.75	4.60	(4.40)
19	4.60	4.90	4.60	4.80	4.65	(4.40)
20	4.60	4.75	4.55	4.75	4.70	(4.40)
21	4.60	4.75	4.55	4.70	4.70	(4.40)
22	4.55	4.75	4.50	4.70	4.60	4.40
23	4.55	4.75	4.35	4.65	4.55	4.35
24	4.50	4.75	4.15	4.65	4.55	4.30
25	4.45	4.75	4.10	4.60	4.55	4.20
26	4.30	4.75	4.10	4.65	4.55	4.15
27	4.25	4.80	4.15	4.60	4.60	4.10
28	4.00	4.80	4.15	4.60	4.55	4.00
29	4.00	4.85	4.10	4.65	4.55	(4.00)
30	4.00	4.85	3.30	4.60	4.50	(4.00)
31	4.10	4.85	.....	4.55	.....	(4.00)

NOTE.—Gage heights in parenthesis are estimated.

Discharge measurements of Boundary canal near Calexico, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
July 23	W. V. Hardy	1.20	10.0
July 26	do	1.20	10.0
July 29	do	1.15	9.1
August 2	do	1.65	12.7
August 5	do	1.10	13.0
August 10	do	1.06	10.5
August 17	do	.91	8.3
August 23	do	.85	11.9
August 26	do	1.10	15.6
September 3	W. V. Hardy and E. C. LaRue	1.07	13.2
September 10	do	1.08	12.9
September 18	do	.85	7.5
September 24	S. M. Smith	.99	11.0
September 27	do	.90	9.9
October 1	do	1.00	10.8
October 5	do	1.00	10.0
October 8	do	1.00	9.4
October 15	do	.90	5.9
October 22	do	.10	7.0
October 29	do	.10	7.0
November 4	W. V. Hardy	.78	6.2
November 11	S. M. Smith and W. V. Hardy	.85	6.6
November 18	W. V. Hardy	.82	6.3
November 25	do	.82	6.2
December 2	do	.84	7.0
December 8	do	.65	4.8
December 15	do	.74	5.5
December 22	do	.46	4.0

Waste measurements in Imperial Valley in 1904.

Date.	Hydrographer.	Stream.	Location.	Discharge.
October 10	W. V. Hardy and S. M. Smith.	New River	Brawley, Cal	208
October 11	do	Alamo channel	Rockwood, Cal.	43
		Canal No. 5	Bernice, Cal	(a)
October 18	S. M. Smith	New River	Brawley, Cal	380
October 18	do	Alamo channel	Rockwood, Cal.	45
October 19	do	Canal No. 5	Bernice, Cal	77
		Total waste		502
October 31	W. V. Hardy and S. M. Smith.	New River	Brawley, Cal	381
November 1	do	Alamo channel	Rockwood, Cal.	59
November 1	do	Canal No. 5	Bernice, Cal	58
		Total waste		498
November 9	W. V. Hardy	New River	Brawley, Cal	318
November 9	do	Alamo channel	Rockwood, Cal.	49
November 9	do	Canal No. 5	Bernice, Cal	0
		Total waste		367
November 16	do	New River	Brawley, Cal	270
November 15	do	Alamo channel	Rockwood, Cal.	117
November 15	do	Canal No. 5	Bernice, Cal.	1
		Total waste		388
November 24	do	New River	Brawley, Cal	311
November 22	do	Alamo channel	Rockwood, Cal.	81
November 22	do	Canal No. 5	Bernice, Cal	3
		Total waste		395
November 30	do	New River	Brawley, Cal	231
November 30	do	Alamo channel	Rockwood, Cal.	73
November 30	do	Canal No. 5	Bernice, Cal	0
		Total waste		304
December 6	do	New River	Brawley, Cal	257
December 6	do	Alamo channel	Rockwood, Cal.	46
December 6	do	Canal No. 5	Bernice, Cal	0
		Total waste		303
December 13	do	New River	Brawley, Cal	301
December 13	do	Alamo channel	Rockwood, Cal.	52
December 13	do	Canal No. 5	Bernice, Cal	0
		Total waste		353
December 24	W. V. Hardy	New River	Brawley, Cal	254
December 24	do	Alamo channel	Rockwood, Cal.	39
December 24	do	Canal No. 5	Bernice, Cal	0
		Total waste		293

(a) No measurement made.

Miscellaneous measurements in Colorado River drainage basin in 1904.

Date.	Hydrographer.	Stream.	Location.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
February 22	W. D. Smith and S. M. Woodward.	Colorado Valley Pumping and Irrigation Company canal.	At heading.	1.11	19.8
February 22	do	do	do		9.9
February 23	do	do	do	.89	11.5
February 23	do	do	do		11.8
February 23	do	do	do		11.8
February 23	do	do	do		11.2
May 8	W. D. Smith	Ludy canal	do		50
May 24	do	do	do		59
June 4	do	do	do		158
June 16	do	do	do		92
July 27	do	do	do		185
May 8	do	Farmers canal	do		63
May 24	do	do	do		97
June 4	do	do	do		56
June 16	do	do	do		35
July 27	do	do	do		47
August 9	S. M. Smith	do	do		70
August 4	W. D. Smith	Imperial canal.	Junction with Carter River, Mexico.		309
August 3	do	Main channel Imperial canal.	Below Best's Camp, Mexico.		525
August 3	do	Padrone River diversion (waste from Imperial canal.)	Best's Camp, Mexico.		609
October 12	S. M. Smith	New River	Calexico, Cal.		154
November 2	W. V. Hardy and S. M. Smith.	do	do		52
November 10	S. M. Smith	do	do		28
November 17	W. V. Hardy	do	do		24
November 23	do	do	do		20
December 1	do	do	do		18.6
December 7	do	do	do		16.7
December 14	do	do	do		22
December 21	do	do	do		10.2

DUTY OF WATER AND SEEPAGE INVESTIGATIONS NEAR YUMA, ARIZ.

[By W. D. Smith.]

The following is a statement of the investigations made on the duty of water for mixed crops under the right and left branches of the Colorado Valley Pumping and Irrigation Company canal, the duty of water for alfalfa on the Laselle and Rose ranches, and the seepage loss in the left branch of the Colorado Valley Pumping and Irrigation Company canal (commonly known as the Ives ditch). All of these lands lie in the upper part of the Yuma Valley, within 6 miles of Yuma, where the pumping plant is located. The results are representative of the Yuma project as a whole, with the exception of the seepage loss, which is believed to be somewhat high.

The climatic conditions have been normal. At the end of the year the zanjero, Mr. S. P. Huss, was asked if he thought the amount of water used was more or less than usual, and he said, "Probably a little less, for the following reasons: Colorado River during the months of August, September, and October has carried an abnormal amount of fine light mud, due to the heavy discharge of Gila River and other Arizona streams. This was carried through the canals to the lands irrigated and prevented the water from soaking in readily. In the same way seepage in the ditches was reduced." Mr. Huss states that he observed a marked difference in the amount of time it required to irrigate the same acreage with a given head of water, and that this was not entirely offset by more frequent irrigations. The alfalfa crop appears to have been slightly reduced from this cause. The water costs the irrigators $1 or more per acre-foot and is, therefore, not wasted, but the scattering location of the farms and the slow velocity of water in the canals and laterals increases the amount lost by seepage. The areas were obtained from the best available sources. The Laselle and Rose ranches were surveyed by the writer.

Four measuring flumes were used, on which nilometer records were kept. Weir measurements would have been unsatisfactory on account of the large amount of sediment carried in the water. The rating of these flumes was constantly changing by the steady filling of the canals with silt. This necessitated frequent ratings, or single-meter measurements, and at the end of the year, or just before the cleaning of the canal of silt, tables were constructed for periods of from two weeks to two or three months, according to conditions.

Another serious difficulty was the light grade of the canals and the fact that they were discharging nearly their full capacity. This made it almost impossible to locate the flumes where the rating would not be affected by check gates in the canal. In the case of flumes Nos. 2 and 4 this might have been overcome by locating them above the company's weirs, but the advantages would have been offset by the

fact that here the canals are more often cleaned of silt. The flumes were rated with the check gates removed and with them in place, designated as "rating *a*" and "rating *b*," respectively. This would not have been a complete success without the hearty cooperation of Mr. S. P. Huss, the zanjero, in operating the check gates and keeping a record of the same when requested; also the cooperation of Messrs. J. M. Boxley and John Lamar, managers of the Laselle and Rose ranches, respectively.

By the kindness of the engineer, Mr. H. Alexander, another check was obtained on the "*a*" and "*b*" ratings and on the clock records as a whole. Mr. Alexander kept an accurate record for the whole year of the number of hours the pump was in operation each day and the number of irrigating heads pumped. An irrigating head is about 12 second-feet.

Flume No. 4 is the property of the agricultural experiment station at Tucson, Ariz. The nilometer on this flume is of French make. The other three were manufactured by Julian P. Friez, of Baltimore, Md. The French machine gave much better results than the latter. In carrying out this work no impossible degree of accuracy has been attempted, but no pains have been spared to make the results absolutely reliable and reasonably accurate.

Monthly duty of water of right branch of Colorado Valley Pumping and Irrigation Company canal at Yuma, Ariz.

Month.	Acre-feet.	
	Total.	Per acre.
January	356.0	0.20
February	517.9	.29
March	1,188.5	.66
April	966.2	.54
May	966.3	.54
June	1,284.6	.71
July	1,033.1	.57
August	576.9	.32
September	794.0	.44
October	748.4	.41
November	0.0	.00
December	316.0	.18
Total	8,747.8	4.86

NOTE.—The above includes seepage losses. Crops, mixed. Net area, 1,800 acres.

Monthly duty of water of left branch of Colorado Valley Pumping and Irrigation Company canal at Yuma, Ariz.

Month.	Acre-feet.	
	Total.	Per acre.
January	100.7	0.22
February	105.5	.23
March	174.5	.39
April	249.6	.55
May	243.8	.54
June	398.0	.88
July	330.8	.73
August	245.8	.55
September	204.0	.45
October	223.9	.50
November	0.0	.00
December	51.5	.11
Total	2,328.1	5.15

NOTE.—The above includes seepage losses. Crops, mixed. Net area, 450 acres.

Monthly duty of water at Laselle ranch, Yuma, Ariz.

Month.	Acre-feet.	
	Total.	Per acre alfalfa.
January	76.0	0.58
February	48.5	.37
March	64.3	.49
April	66.9	.51
May	109.1	.83
June	53.3	.40
July	140.7	1.07
August	65.3	.49
September	80.9	.61
October	74.9	.57
November	0.0	.00
December	0.0	.00
Total	779.9	5.92

NOTE.—Acreage, net: Alfalfa, 128 acres; wheat, 17 acres; total, 145 acres; which is equivalent to 132 acres of alfalfa.

REMARKS.—The measuring flume is 1,100 feet above the first lateral, so that the loss by seepage after passing the flume and before reaching the ranch is probably about 1 per cent. The soil is very sandy. Most of the alfalfa was cut, but a part was used as pasture. Plenty of water was used, but apparently none was wasted.

Monthly duty of water at Rose ranch, Yuma, Ariz.

Month.	Acre-feet.	
	Total.	Per acre.
January	0.0	0.00
February	0.0	.00
March	13.8	.72
April	15.2	.79
May	10.0	.52
June	14.9	.77
July	12.3	.64
August	8.0	.42
September	8.2	.43
October	13.8	.72
November	0.0	.00
December	2.2	.11
Total	98.4	5.12

NOTE.—Acreage, net: Alfalfa, 19.26 acres.

REMARKS.—7.19 acres of above was wheat and young alfalfa so irrigated as to make total equivalent to 17.7 acres of old alfalfa. These measurements were made at the ranch and do not include loss by seepage.

Monthly duty of water of Colorado Valley Pumping and Irrigation Company canal at Yuma, Ariz.

	Acre-feet.		
	Total.	Per acre gross area.	Per acre net area.
January	456.7	0.07	0.20
February	623.4	.10	.28
March	1,363.0	.21	.60
April	1,215.0	.19	.54
May	1,210.1	.19	.54
June	1,682.6	.26	.75
July	1,363.9	.21	.60
August	822.7	.13	.37
September	998.0	.15	.44
October	972.2	.15	.43
November	0.0	.00	.00
December	367.5	.06	.16
Total	11,075.9	1.72	4.91

NOTE.—The above includes loss by seepage.

REMARKS.—Mixed crops: Alfalfa, 1,365 acres; grain, 475 acres; corn and sorghum, 245 acres; miscellaneous, 165 acres. Total net area, 2,250 acres; total gross area, 6,500 acres. Number of irrigators, 75.

Cost of pumping, Colorado Valley Pumping and Irrigation Company canal, at Yuma, Ariz.

Irrigation No.	Month.	Hours pumping.	Acre-feet pumped.	Average lift.	Expense.	Cost per acre-foot.	Cost per foot of raising 1 acre-foot.
1	January	156	457	11.5	$240	$0.53	$0.046
2	February	342	1,173	10.8	564	.48	.044
3	March	230	816	10.5	411	.50	.048
4	April	380	1,216	10.1	607	.50	.050
5	May	183	582	8.7	312	.54	.062
6	May	213	628	7.5	310	.50	.067
7	June	200	623	5.1	271	.43	.084
8	June	220	685	6.4	311	.45	.070
9	June	240	718	6.3	330	.46	.073
10	July	220	706	8.3	362	.51	.061
11	August	300	644	8.9	345	.54	.061
12	August	200	439	8.9	260	.59	.066
13	September	180	480	8.9	340	.71	.080
14	September	175	572	10.7	354	.62	.058
15	October	200	574	9.7	310	.54	.056
16	October	200	456	10.1	302	.66	.065
17	December	180	368	11.4	315	.86	.075
	Total.	3,819	11,079	9.05	5,944	.54	.060

Note.—The engineer's salary is $100 per month, and this increased the cost per acre-foot in the months when little water was pumped.

Monthly expense.

Month.	Labor.	Wood.	Oil.	Miscellaneous.	Total.
January	$88	$126	$0	$17	$231
February	132	4	170	27	333
March	174	91	320	45	630
April	180	88	312	26	606
May	172	91	305	32	600
June	188	130	340	32	690
July	190	140	328	36	694
August	174	10	352	30	566
September	158	63	280	35	536
October	172	80	288	51	591
November	100	0	0	9	109
December	134	70	80	74	358
Total	1,862	893	2,775	414	5,944

Seepage loss of Ives ditch (Left Branch Colorado Valley Pumping and Irrigation Company canal) at Yuma, Ariz.

[Distance, 4.26 miles.]

	Per cent.
March 21	10
April 18	17
May 9	14
May 23	18
July 2	19
July 17, a. m.	16
July 17, p. m.	18
Mean	16

REMARKS.—This is the loss between flumes No. 2 and No. 3. The water travels this distance in four and one-half hours. In each case the register records show a constant head, and meter gagings were made in flume No. 3 (the lower one). In addition to this, meter gagings were made in flume No. 2 on May 9, May 23, and July 17, a. m. For the remaining determinations the discharge at flume No. 2 was taken from the rating tables. In each case search was made along the ditch for leaks, and there was a very small loss from this source, which was estimated to be about 2 per cent, making the actual loss by seepage about 14 per cent. The ditch has not been cleaned for several years and is heavily silted, but it passes through a sandy part of the valley.

SOUTHERN CALIFORNIA DRAINAGE.

Under the head of southern California drainage have been included data concerning the streams of that part of the State south of San Joaquin basin. There are thus included the Mohave, which flows from the mountains north of San Bernardino into the Mohave Desert, a portion of the great Interior Basin, as well as those flowing toward the south or southwest, whose waters, in times of flood at least, reach the Pacific Ocean.

Arroyo Seco rises on the eastern slope of the Santa Lucia Mountains and flows east and empties into Salinas River at Soledad, Cal.

Santa Maria River drains the northern and western slopes of the San Rafael Mountains and enters the Pacific Ocean at Guadalupe about 25 miles below San Luis Obispo. Its principal tributary is Sisquoc River which joins the Santa Maria about 12 miles above the town of Santa Maria. No water is diverted from either of these streams for irrigation.

Santa Ynez River drains the northern slope of the Santa Ynez and the southern slope of the San Rafael Mountains, and enters the Pacific Ocean below Lompoc, Cal., about 75 miles above Santa Barbara. The principal tributary of Santa Ynez River is Mono Creek, which rises on the southern slope of the San Rafael Mountains. There are several good reservoir and dam sites on these streams.

Malibu Creek rises in the Santa Monica Mountains and enters the Pacific Ocean about 15 miles above the town of Santa Monica. Truimfo

Creek is the principal tributary of Malibu Creek. Several storage reservoir and dam sites exist on these streams.

The drainage basin of San Gabriel River lies on the southern slope of the Sierra Madre, being included in Los Angeles County, Cal. The various tributaries join the river before it enters its lowest canyon, whence it appears finally on the plain in the vicinity of Azusa. The seepage waters of this valley appear lower down in the river and finally enter the Pacific Ocean not far from the mouth of Los Angeles River. All of the surplus waters of this stream are now used for irrigation purposes, and it is only an occasional flood that passes the gaging station.

Santa Ana River has its source on the southern slope of the San Bernardino Mountains and flows southerly, appearing from its canyon 4 miles north of Redlands. Its waters are completely used in San Bernardino Valley. At the lower part of the valley the water appears again in the vicinity of Rincon, where the river passes through a comparatively narrow gorge; thence the general direction of the stream is southwesterly, emptying into the Pacific Ocean.

The headwaters of Mohave River have their source on the northern slopes of the San Bernardino Mountains. The river flows north, finally disappearing in the sands of the Mohave Desert.

San Luis Rey River rises on the western slope of the Coast Range and enters the Pacific Ocean at the town of Oceanside, San Diego County, Cal. The water is diverted at several points along this stream for irrigation.

The following pages give the results of data collected in southern California drainage during 1904:

ARROYO SECO NEAR SOLEDAD, CAL.

A gaging station was established by W. W. Cockins, jr., in December, 1900, at Foster's ranch, near Piney post-office, Cal. The high water of January, 1901, enlarged an old channel, and the gaging station was removed to Pettitt's ranch, 4 miles below. The purpose of establishing these gaging stations was to get the maximum flood discharge and the amount of water available for storage. The total area of the basin drained above Pettitt's ranch is 215 square miles. The observer is Mrs. Charles Pettitt.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Arroyo Seco near Soledad, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 22	F. R. S. Buttemer	5.52	24
February 5	F. W. Huber	6.08	150
February 13	W. B. Newhall	6.65	372
March 11	do	6.85	470
March 16	do	6.08	184
March 20	do	7.02	600
March 23	do	8.40	1,514
March 23	do	7.80	1,117
May 12	F. W. Huber	5.85	103
July 29	O. W. Peterson	5.20	1.1

Mean daily gage height, in feet, of Arroyo Seco near Soledad, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.45	5.50	6.10	6.60	6.10	5.60	5.35	5.15	4.55	5.40	5.50	5.50
2	5.50	5.50	6.00	6.50	6.00	5.60	5.35	5.20	4.50	5.40	5.50	5.45
3	5.50	5.50	5.90	6.35	5.95	5.60	5.35	5.15	4.50	5.35	5.50	5.45
4	5.50	5.45	5.90	6.30	5.90	5.60	5.35	5.15	4.40	5.35	5.50	5.45
5	5.50	6.10	5.85	6.20	5.90	5.60	5.35	5.20	4.35	5.35	5.50	5.45
6	5.50	5.80	5.80	6.15	5.85	5.55	5.30	5.20	4.30	5.35	5.50	5.45
7	5.50	5.75	5.75	6.10	5.85	5.55	5.30	5.15	4.30	5.40	5.45	5.45
8	5.50	5.70	5.70	6.10	5.80	5.50	5.30	5.15	4.25	5.40	5.45	5.45
9	5.50	5.70	5.70	6.00	5.80	5.50	5.30	5.10	4.15	6.10	5.45	5.45
10	5.50	5.70	8.15	6.00	5.80	5.50	5.30	5.10	4.10	6.20	5.45	5.50
11	5.50	5.70	7.00	6.00	5.80	5.50	5.30	5.10	4.00	7.00	5.45	5.45
12	5.45	6.90	6.55	5.90	5.80	5.50	5.30	5.10	4.00	6.10	5.45	5.45
13	5.45	6.60	6.30	5.90	5.75	5.45	5.30	5.10	4.00	5.85	5.45	5.45
14	5.45	6.00	6.20	5.90	5.70	5.45	5.30	5.05	3.95	5.75	5.40	5.45
15	5.45	5.90	6.20	5.90	5.70	5.45	5.30	5.05	3.95	5.70	5.50	5.45
16	5.45	8.40	6.10	5.85	5.70	5.45	5.30	5.05	3.90	5.65	5.55	5.45
17	5.45	6.45	6.15	5.80	5.70	5.45	5.30	5.05	3.85	5.60	5.50	5.45
18	5.50	6.10	6.85	8.00	5.70	5.45	5.30	5.00	3.80	5.60	5.50	5.45
19	5.60	5.90	6.50	6.80	5.70	5.45	5.30	5.00	3.75	5.55	5.50	5.45
20	5.60	6.00	7.00	6.45	5.70	5.40	5.30	5.00	3.70	5.55	5.50	5.45
21	5.55	5.80	6.70	6.30	5.70	5.40	5.25	5.00	3.70	5.55	5.50	5.45
22	5.55	5.75	6.50	6.20	5.70	5.40	5.25	5.00	3.70	5.50	5.50	5.45
23	5.50	5.70	8.50	6.10	5.70	5.40	5.25	4.95	4.05	5.50	5.50	5.45
24	5.50	5.70	7.75	6.10	5.65	5.40	5.25	4.90	5.80	5.50	5.45	5.45
25	5.50	5.75	7.10	6.10	5.65	5.40	5.20	4.90	5.60	5.50	5.45	5.75
26	5.50	5.80	6.80	6.10	5.60	5.40	5.20	4.85	5.80	5.50	5.50	5.55
27	5.50	6.80	6.55	6.10	5.60	5.40	5.20	4.80	5.60	5.50	5.50	5.50
28	5.50	6.60	6.50	6.10	5.60	5.35	5.20	4.80	5.50	5.50	5.50	5.50
29	5.50	6.25	7.35	6.05	5.60	5.35	5.20	4.70	5.50	5.50	5.50	5.50
30	5.50	.....	7.00	6.00	5.60	5.35	5.20	4.65	5.40	5.50	5.50	5.50
31	5.50	.....	6.80	.....	5.60	.....	5.20	4.60	.....	5.50	.....	7.40

Rating table for Arroyo Seco River near Soledad, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
5.00	0	6.30	230	7.60	930	8.90	1,960
5.10	0.5	6.40	270	7.70	1,000	9.00	2,050
5.20	1	6.50	310	7.80	1,070	9.20	2,250
5.30	3	6.60	360	7.90	1,140	9.40	2,460
5.40	9	6.70	410	8.00	1,210	9.60	2,680
5.50	18	6.80	460	8.10	1,290	9.80	2,900
5.60	30	6.90	510	8.20	1,370	10.00	3,140
5.70	48	7.00	560	8.30	1,450	10.20	3,380
5.80	71	7.10	620	8.40	1,530	10.40	3,620
5.90	100	7.20	680	8.50	1,610	10.60	3,880
6.00	130	7.30	740	8.60	1,690	10.80	4,140
6.10	160	7.40	800	8.70	1,780	11.00	4,410
6.20	195	7.50	860	8.80	1,870	11.50	5,150

Estimated monthly discharge of Arroya Seco near Soledad, Cal., for 1904.

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	30	14	18	1,107	0.08	0.09
February	510	14	181	10,411	.83	.90
March	1,610	48	394	24,226	1.82	2.10
April	1,210	71	214	12,734	.99	1.10
May	160	30	62	3,812	.29	.33
June	30	6	16	952	.07	.08
July	6	1	3	184	.01	.01
August	1	0	0	0	.00	.00
September	71	0	8	476	.04	.04
October	560	6	54	3,320	.25	.29
November	24	9	17	1,012	.08	.09
December	800	14	42	2,582	.19	.22
The year	1,610	0	84	60,816	.39	5.25

SANTA YNEZ RIVER NEAR SANTA BARBARA, CAL.

The original station at which measurements were made during the greater part of 1903 is located about 1 mile above the mouth of Mono Creek. It was established November 21, 1902, by W. B. Clapp, assisted by Howard Rankin. The gage is an inclined rod on the right bank. From January 25 to June 20, 1903, daily discharge measurements were made by means of a cable and car. The channel is straight for 400 feet above and for 600 feet below the cable. The current is sluggish at low stages. The right bank is low, but will overflow for only a short distance. There is an overflow channel on the left bank. The bed of the stream is composed of gravel and is permanent. The bench mark is a nail in the root of the poplar tree on the left bank to which the cable is attached. Its elevation is 7.18 feet above the zero of the gage. On November 1, 1903, a new station was established at the Gibraltar dam site by L. M. Hyde, assisted by H. W. Muzzall. It is located 5 miles below the original station and is below the mouth of Mono Creek. It is 9 miles above the San Marcus ranch and halfway between the old quicksilver mines. The gage is a 4 by 4 inch inclined timber, spiked to a cottonwood tree on the right bank. The tree is blazed above the gage rod for recording stages above the gage. Discharge measurements are made at high water by means of a cable 20 feet above the gage. Measurements can usually be made by wading. Weir measurements of the discharge were made daily from December 20 to 31, 1903. At the cable the initial point for soundings is a blaze at the base of the cottonwood tree on the right bank, to which the cable is attached. The channel is straight for 700 feet above and for 600 feet below the station. The right bank is low, but is not liable to overflow. The left bank rises abruptly about 20 feet beyond the alder tree to which the cable is attached. It is not liable to overflow. The bed of the stream is composed of sandy gravel, free from vegetation and bowlders. The cross section is regular, and is permanent. The current is swift. The bench mark is a cross on a bench of a ledge on the left bank, about 100 feet below the cable. Its elevation is 13.54 feet above the zero of the gage. The approximate elevation above sea level, as estimated from topographic maps, is 1,200 feet.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Santa Ynez River near Santa Barbara, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 18	R. L. North	2.20	4.32
January 19	do	2.07	1.77
February 5	do	2.28	3.44
February 6	do	.....	3.27
February 7	do	2.15	2.35
February 8	do	2.15	2.27
February 9	do	2.10	2.17
February 10	do	2.08	1.74
February 16	do	.....	6.89
February 17	do	.....	4.49
February 18	do	.....	2.74
February 19	do	.....	2.53
February 20	do	.....	2.11
February 27	do	.....	45.00
February 28	do	3.00	96.00
February 29	do	2.32	16.20
March 1	do	.....	7.00
March 2	do	.....	5.28
March 3	do	.....	4.33
March 4	do	.....	2.70
March 5	do	.....	2.95
March 6	do	.....	2.88
March 7	do	.....	2.43
March 8	do	.....	2.33
March 9	do	.....	2.60
March 10	do	.....	2.35
March 11	do	3.08	135.00
March 12	do	2.44	27.00
March 13	do	2.36	16.40
March 14	do	2.32	11.90
March 15	do	2.28	10.20
March 19	do	2.20	7.24
March 20	do	2.20	6.96
March 21	do	2.18	6.41
March 23	do	3.88	442.00
March 24	do	2.82	70.00
March 25	do	2.68	49.00
March 26	do	2.52	30.00
March 27	do	2.46	26.00
March 28	do	2.43	24.00
March 29	do	2.47	26.00
March 30	do	2.45	25.00

Discharge measurements of Santa Ynez River near Santa Barbara, Cal., in 1904—Contd.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
March 31	R. L. North	2.42	23.00
April 1	do	2.37	16.30
April 2	do	2.35	14.50
April 3	do	2.33	14.20
April 4	do	2.31	11.20
April 5	do	2.32	12.40
April 6	do	2.27	10.10
April 7	do	2.26	9.64
April 8	do	2.25	8.87
April 12	do	2.20	6.80
April 13	do	2.20	6.87
April 14	do	2.19	5.32
April 15	do	2.19	5.24
April 16	do	2.21	5.93
April 17	do	2.20	5.61
April 18	do	2.20	5.64
April 19	do	3.03	101.00
April 20	do	2.83	74.00
April 21	do	2.52	30.00
April 22	do	2.47	25.00
April 24	do	2.39	17.10
April 25	do	2.37	16.60
April 27	do	2.47	24.00
April 28	do	2.46	23.00
April 29	do	2.43	21.00
April 30	do	2.43	20.00
May 2	do	2.38	17.20
May 5	do	2.32	11.40
May 6	do	2.29	10.50
May 7	do	2.28	10.20
May 8	do	2.23	7.90
May 9	do	2.23	8.05
May 10	do	2.22	7.69
May 14	do	2.19	5.89
May 15	do	2.19	6.40
May 16	do	2.15	4.28
May 17	do	2.13	4.05
May 18	do	2.16	4.43
May 19	do	2.12	3.60
May 21	do	2.12	3.29
May 22	do	2.12	3.34

Discharge measurements of Santa Ynez River near Santa Barbara, Cal., in 1904—Cont'd.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
May 23	R. L. North	2.11	3.13
May 24	do	2.11	3.19
May 25	do	2.16	4.43
May 26	do	2.14	4.41
May 27	do	2.12	3.32
May 30	do	2.09	2.99
May 31	do	2.09	3.12
June 1	do	2.09	2.94
June 2	do	2.07	2.60
June 3	do	2.06	2.50
June 4	do	2.05	2.28
June 5	do	2.05	2.28
June 6	do	2.03	2.06
June 10	do	2.01	.94

Mean daily gage height, in feet, of Santa Ynez River near Santa Barbara, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	(a)	.....	2.21	2.36	2.40	2.09	.....	.....	.....	2.37	2.18	2.20
2	.....	.....	2.13	2.34	2.38	2.08	.....	.....	.....	2.32	2.19	2.20
3	.....	.....	2.12	2.32	2.33	2.06	.....	.....	.....	2.30	2.19	2.21
4	.....	.....	2.09	2.31	2.34	2.05	.....	.....	.....	2.27	2.19	2.21
5	.....	2.28	2.09	2.31	2.32	2.05	.....	.....	.....	2.26	2.19	2.21
6	.....	2.27	2.09	2.27	2.30	2.03	.....	.....	.....	2.27	2.19	2.20
7	.....	2.15	2.08	2.26	2.27	2.02	.....	.....	.....	2.36	2.19	2.21
8	.....	2.15	2.08	2.25	2.24	2.02	.....	.....	.....	2.38	2.19	2.20
9	.....	2.10	2.09	2.25	2.23	2.02	.....	.....	.....	2.34	2.19	2.21
10	.....	2.08	2.70	b2.23	2.22	2.01	.....	.....	.....	2.32	2.19	2.21
11	.....	.....	2.70	2.21	2.21	2.00	.....	.....	.....	2.29	2.19	2.21
12	.....	.....	2.44	2.20	2.20	2.00	.....	.....	.....	2.26	2.19	2.21
13	.....	.....	2.36	2.20	2.20	.....	.....	.....	.....	2.26	2.19	2.21
14	.....	.....	2.30	2.20	2.19	.....	.....	.....	.....	2.24	2.20	2.20
15	.....	.....	2.28	2.19	2.20	.....	(c)	.....	.....	2.22	2.20	2.20
16	.....	.....	2.40	2.26	2.20	2.16	.....	.....	.....	2.21	2.20	2.20
17	.....	2.32	2.23	2.20	2.13	.....	.....	.....	.....	2.20	2.20	2.21
18	2.20	2.24	2.21	2.20	2.15	.....	.....	.....	.....	2.20	2.20	2.21
19	2.07	2.22	2.20	3.08	2.12	.....	.....	.....	.....	2.20	2.20	2.21
20	.....	2.21	2.20	2.78	2.13	.....	.....	.....	.....	2.20	2.22	2.21
21	.....	2.05	2.18	2.56	2.12	.....	.....	.....	.....	2.19	2.22	2.21
22	.....	.....	2.18	2.47	2.12	.....	.....	.....	.....	2.19	2.21	2.21
23	.....	.....	3.89	2.44	2.12	.....	.....	.....	.....	2.18	2.21	2.21
24	.....	.....	2.83	2.39	2.11	.....	.....	.....	3.00	2.18	2.21	2.21
25	.....	.....	2.66	2.37	2.15	.....	.....	.....	8.20	2.18	2.21	2.21
26	.....	.....	2.52	2.40	2.14	.....	.....	.....	3.00	2.18	2.21	2.21
27	.....	3.12	2.45	2.47	2.12	.....	.....	.....	2.60	2.18	2.21	2.21
28	.....	3.00	2.44	2.42	2.10	.....	.....	.....	2.50	2.18	2.21	2.21
29	.....	2.30	2.47	2.46	b2.10	.....	.....	.....	2.45	2.18	2.20	2.21
30	.....	.....	2.44	2.43	2.09	.....	.....	.....	2.40	2.18	2.20	2.21
31	.....	.....	2.40	.....	2.09	.....	.....	.....	.....	2.18	.....	2.32

a Measured over weir: January 1–17, 20–31; February 1–4, 11–15, 22–26; June 13–30; July 1–14.
b Estimated.
c Dry: July 15 to September 23.

Rating table for Santa Ynez River near Santa Barbara, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
2.00	0.4	2.35	14.7	2.90	82	3.60	306
2.05	1.6	2.40	18.5	3.00	103	3.70	353
2.10	2.8	2.45	23	3.10	126	3.80	401
2.15	4.5	2.50	28	3.20	154	3.90	451
2.20	6.4	2.60	38	3.30	186	4.00	502
2.25	8.8	2.70	50	3.40	222		
2.30	11.6	2.80	65	3.50	263		

Estimated monthly discharge of Santa Ynez River near Santa Barbara, Cal., for 1904.

[Drainage area, 207 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January 7–31	6.4	0.5	0.9	45	0.004	0.004
February	131.0	.6	12.0	690	.058	.063
March	445.0	2.3	30.2	1,857	.146	.168
April	121.0	6.0	18.9	1,125	.091	.102
May	18.5	2.6	6.8	418	.033	.038
June	2.6	.1	.7	42	.003	.003
July	.1	.0	.034	2	.000	.000
August	.0	.0	.000	0	.000	.000
September	5,450	.0	193.	11,484	.832	1.040
October	17.0	5.6	8.7	535	.042	.048
November	7.4	5.6	6.4	381	.031	.035
December	12.8	6.4	7.0	430	.034	.039
The period				17,009		

MONO CREEK AT MONO DAM SITE, CALIFORNIA.

This station was established November 22, 1902, by W. B. Clapp, assisted by Howard Rankin. It is located about one-half mile above the junction of Mono Creek and Santa Ynez River, 15 miles above the San Marcus ranch and 17 miles by trail from Santa Barbara. The river at this point traverses Mono flat. The gage is an inclined timber hewn from a 4-inch sapling. It is spiked to a willow tree on the right bank. The tree has been blazed above the gage for use in recording flood stages above the gage rod. Discharge measurements are

made by means of a cable and by wading. The cable is located about 500 feet below the dam site and is just above the gage. The initial point for soundings is a blaze at the base of the tree to which the cable is fastened on the left bank. The channel is slightly curved for about 500 feet above and below the station. Both banks are high and are not liable to overflow. The bed of the stream is composed of sandy gravel, free from vegetation, and is not liable to shift. The bench mark is a standard United States Geological Survey bench-mark disk on a sandstone rock 100 feet south of the large oak tree on the left bank. Its elevation is 20.92 feet above the zero of the gage and 1,410 feet above sea level. The record of the discharge, kept by means of a weir, from November 1 to December 31, 1903, showed a constant discharge for this period of 0.05 second-foot.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Mono Creek at Mono dam site, California, in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
February 28	R. L. North	1.89	30.0
February 29	do	1.41	3.5
March 11	do	1.90	32.0
March 12	do	1.48	8.0
March 13	do	1.35	2.6
March 14	do	1.33	2.3
March 25	do	1.71	18.2
March 27	do	1.52	8.2
March 29	do	1.48	7.9
April 1	do	1.52	8.1
April 3	do	1.43	4.1
April 19	do	1.95	34.0
April 20	do	1.77	19.4
April 21	do	1.64	9.7
April 24	do	1.45	5.4
April 25	do	1.42	4.0
April 26	do	1.63	8.9
April 27	do	1.63	8.8
April 29	do	1.62	8.2
May 1	do	1.46	6.4
May 5	do	1.43	4.2
May 7	do	1.32	2.1
May 9	do	1.32	2.0
May 11	do	1.32	2.0

Mean daily gage height, in feet, of Mono Creek at Mono dam site, California, for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	(a)	.....	.....	1.52	1.46	(1.29)	(b)
2	.....	.....	.....	(1.47)	(1.47)	1.29	.....
3	.....	.....	.....	1.43	(1.48)	1.29	.....
4	.....	.....	.....	1.38	1.49	(1.29)	.....
5	.....	.....	.....	1.38	1.43	1.29	.....
6	.....	.....	.....	(1.38)	(1.37)	(1.29)	.....
7	.....	.....	.....	1.37	1.32	1.29	.....
8	.....	.....	.....	1.35	(1.32)	1.28	.....
9	.....	.....	.....	(1.35)	1.32	1.25	.....
10	.....	.....	.....	(1.35)	(1.32)	1.28	.....
11	.....	.....	1.90	(1.35)	1.32	1.28	.....
12	.....	.....	1.48	1.35	1.39	1.26	.....
13	.....	.....	1.35	1.35	(1.38)	1.26	.....
14	.....	.....	1.33	1.35	(1.38)	1.25	.....
15	.....	.....	(1.33)	1.35	1.37	1.25	.....
16	.....	.....	(1.32)	(1.35)	(1.37)	1.25	.....
17	.....	.....	(1.31)	1.36	1.36	1.25	.....
18	.....	.....	(1.30)	(1.36)	(1.35)	(1.25)	.....
19	.....	.....	.....	1.95	1.34	1.25	.....
20	.....	.....	.....	1.77	(1.34)	1.25	.....
21	.....	.....	.....	1.64	(1.35)	1.25	.....
22	.....	.....	.....	1.58	1.35	1.25	.....
23	.....	.....	.....	1.52	(1.34)	1.25	.....
24	.....	.....	2.21	1.45	1.33	1.25	.....
25	.....	.....	1.71	1.42	(1.34)	(1.25)	.....
26	.....	.....	(1.60)	1.63	1.35	(1.24)	.....
27	.....	3.05	1.52	1.63	1.34	(1.23)	.....
28	.....	1.89	(1.50)	(1.63)	(1.33)	1.22	.....
29	.....	1.41	1.48	1.62	(1.32)	1.21	.....
30	.....	.....	(1.50)	(1.60)	(1.31)	(1.21)	.....
31	.....	.....	1.52	.....	1.30	.....	.....

a Where gage heights are not given measurements were made over weir.
b Record stopped for the summer.

Gage heights in parenthesis are estimated.

Rating table for Mono Creek at Mono dam site, California, from January 1 to June 30, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.10	0.0	1.50	6.6	1.90	31	2.60	162
1.15	0.2	1.55	8.6	1.95	35	2.70	188
1.20	0.5	1.60	11.2	2.00	40	2.80	214
1.25	1.0	1.65	13.8	2.10	54	2.90	242
1.30	1.5	1.70	16.8	2.20	73	3.00	270
1.35	2.4	1.75	20	2.30	93	3.10	300
1.40	3.5	1.80	23.5	2.40	114	3.20	330
1.45	5.0	1.85	27	2.50	137		

Estimated monthly discharge of Mono Creek at Mono dam site, California, for 1904.

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	0.07	0.04	0.04	2	T.	T.
February	285	.03	11	633	0.09	0.10
March	76	.06	6.3	387	.05	.06
April	35	2.4	7.1	422	.06	.07
May	6.3	1.5	2.8	172	.02	.02
June	1.4	.6	1.1	65	.01	.01
The period				1,681		

MALIBU AND TRIUMFO CREEKS NEAR CALABASAS, CAL.

These stations were established at Chapman's ranch November 29, 1901, by S. G. Bennett. They are 40 miles from Los Angeles by wagon road and 8 miles southwest of Calabasas. Malibu Creek is formed by Triumfo and Las Virgines creeks, and is a short stream flowing through the Santa Monica Mountains and discharging into the Pacific Ocean about 15 miles above the city of Santa Monica, Cal. Sites for good storage reservoirs exist in both of these drainage basins, one on Malibu Creek a short distance below its gaging station, and one on Triumfo Creek above its gaging station. The water from these streams could be used for irrigation on the valuable land lying along the base of the mountains between the city of Los Angeles and Santa Monica, where it is greatly needed.

The channels of both streams are poor and subject to change during high water. They are located, however, at the only point where an observer could be secured. The excessive cost of visiting these stations has made it impossible to obtain as many meter measurements as desired, but the observer is instructed to take float velocities during floods at various gage heights, and these data, with cross sections and grade of stream, are used in addition to meter measurements for computing discharges for use in constructing rating curves and tables. The gage rods for both stations are vertical 2 by 6 inch wooden rods graduated to feet and tenths.

The gaging station on Malibu Creek is located about one-fourth mile below the mouth of Las Virgines Creek. The channel above the station is straight for about 600 feet, and below the station is curved for about 300 feet, and the water is swift. Both banks are high. The right bank is rocky, and the bed of the stream is composed of rock and gravel. The initial point for soundings is on the right

bank. The bench mark is a cross on a small projection on a rock bluff about 10 feet southwest of the gage rod. The assumed elevation of the bench mark is 530.00 feet. The zero of the gage rod is 524.57 feet elevation.

The gaging station on Triumfo Creek is about one-half mile above the mouth of Las Virgines Creek. The channel is straight for about 400 feet above and 800 feet below the station, and the water is swift. Both banks are high and rocky. The bed of the stream is composed of gravel and sand and is shifting. The initial point for soundings is on the right bank. The bench mark is a cross on a point of rock 3.5 feet above the bed of the creek. The assumed elevation is 550.00 feet. The zero of the gage rod is 545.47 feet elevation. The observer for both stations is J. G. Chapman.

The observations at these stations during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Mean daily gage height, in feet, of Malibu Creek near Calabasas, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Oct.	Nov.	Dec.
1	1.20	1.20	1.20	1.20	1.15	1.05	1.05	.....	1.00	1.15
2	1.20	1.20	1.20	1.20	1.15	1.05	1.05	.....	1.00	1.15
3	1.20	1.20	1.20	1.20	1.15	1.05	(a)	.....	1.00	1.20
4	1.20	1.20	1.20	1.20	1.15	1.05	.....	.....	1.00	1.20
5	1.20	1.20	1.20	1.10	1.15	1.05	.....	.....	1.00	1.20
6	1.20	1.20	1.20	1.10	1.15	1.05	.....	.....	1.00	1.20
7	1.20	1.20	1.20	1.10	1.15	1.05	.....	.....	1.00	1.20
8	1.20	1.20	1.20	1.05	1.15	1.05	.....	.....	1.00	1.20
9	1.20	1.20	1.20	1.00	1.15	1.05	.....	.....	1.00	1.20
10	1.20	1.20	1.60	1.00	1.15	1.05	.....	.....	1.00	1.20
11	1.20	1.20	1.45	1.05	1.10	1.05	.....	.....	1.00	1.20
12	1.20	1.20	1.25	1.05	1.10	1.05	.....	.....	1.00	1.20
13	1.20	1.20	1.15	1.05	1.10	1.05	.....	.....	1.00	1.20
14	1.20	1.20	1.15	1.05	1.05	1.05	.....	.....	1.00	1.20
15	1.20	1.20	1.15	1.05	1.05	1.05	.....	1.00	1.00	1.20
16	1.20	1.30	1.15	1.05	1.05	1.05	.....	1.00	1.00	1.20
17	1.20	1.25	1.15	1.05	1.05	1.05	.....	1.00	1.00	1.20
18	1.20	1.25	1.15	1.05	1.05	1.05	.....	1.00	1.00	1.20
19	1.20	1.20	1.15	1.15	1.05	1.05	.....	1.00	1.00	1.20
20	1.20	1.20	1.15	1.15	1.05	1.05	.....	1.00	1.00	1.20
21	1.20	1.20	1.15	1.15	1.00	1.05	.....	1.00	1.00	1.20
22	1.20	1.20	1.15	1.15	1.00	1.05	.....	1.00	1.00	1.20
23	1.20	1.20	1.50	1.15	1.00	1.05	.....	1.00	1.00	1.20
24	1.20	1.20	1.25	1.15	1.00	1.05	.....	1.00	1.00	1.20
25	1.20	1.20	1 20	1.15	1.00	1.05	.....	1.00	1.00	1.20
26	1.20	1.20	1.20	1.15	1.00	1.05	.....	1.00	1.00	1.20
27	1.20	1.25	1.20	1.15	1.00	1.05	.....	1.00	1.10	1.20
28	1.20	1.20	1.20	1.15	1.05	1.05	.....	1.00	1.10	1.20
29	1.20	1.20	1.20	1.15	1.05	1.05	.....	1.00	1.10	1.20
30	1.20	.....	1.20	1.15	1.05	1.05	.....	1.00	1.15	1.20
31	1.20	.....	1.20	.....	1.05	.....	.....	1.00	.....	1.20

(a) July 3, record stopped for summer.

Rating table for Malibu Creek near Calabasas, Cal., from March 31, 1903, to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.00	1	1.70	44	2.40	265	3.10	720
1.10	2	1.80	57	2.50	330	3.20	785
1.20	5	1.90	72	2.60	395	3.30	850
1.30	10	2.00	95	2.70	460	3.40	915
1.40	16	2.10	128	2.80	525	3.50	980
1.50	24	2.20	165	2.90	590		
1.60	33	2.30	210	3.00	655		

Estimated monthly discharge of Malibu Creek near Calabasas, Cal., for 1904.

[Drainage area, 97 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	5	5	5.0	307	0.05	0.06
February	10	5	5.5	316	.06	.06
March	33	4	6.9	424	.07	.08
April	5	1	3.0	179	.03	.03
May	4	1	2.2	135	.02	.02
June	1.5	1.5	1.5	89	.02	.02
October 15–31	1	1	1.0	[a]61	.01	.01
November	4	1	1.2	71	.01	.01
December	5	4	4.9	301	.05	.06
The period				1,883		

[a] Mean for 17 days taken as mean for month.

Mean daily gage height, in feet, of Triumfo Creek near Calabasas, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.
1	0.45	0.45	0.45	0.45	0.40
2	.45	.45	.45	.40	.40
3	.45	.45	.45	.40	.40
4	.45	.45	.45	.40	.40
5	.45	.55	.45	.40	.40
6	.45	.50	.45	.40	.40
7	.45	.50	.45	.40	.40
8	.45	.45	.40	.35	.40
9	.45	.45	.40	.30	.35
10	.45	.45	1.00	.30	.35
11	.45	.45	.80	.30	.30
12	.45	.45	.50	.30	.25
13	.45	.45	.45	.30	.20
14	.45	.45	.45	.35	.15
15	.45	.55	.45	.40	.15
16	.45	.65	.45	.40	.10
17	.45	.60	.45	.45	.10
18	.45	.60	.45	.45	.10
19	.45	.55	.45	.50	.10
20	.45	.50	.45	.40	.10
21	.45	.50	.45	.40	*a*.00
22	.45	.50	.45	.40	.....
23	.45	.50	.90	.40	.....
24	.45	.50	.60	.40	.....
25	.45	.50	.55	.40	.....
26	.45	.50	.50	.40	.....
27	.45	.60	.50	.40	.....
28	.45	.50	.50	.40	.....
29	.45	.50	.45	.40	.....
30	.45	.....	.45	.40	.....
31	.45	.....	.45	.....	.....

a Stream entirely dry for remainder of the year.

Rating table for Triumfo Creek near Calabasas, Cal., from March 31, 1903, to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.30	0.5	0.9	19	1.50	101	2.10	373
.40	2	1.00	26	1.60	129	2.20	450
.50	4	1.10	35	1.70	162	2.30	550
.60	6	1.20	46	1.80	200	2.40	670
.70	9	1.30	60	1.90	250		
.80	14	1.40	78	2.00	305		

Estimated monthly discharge of Triumfo Creek near Calabasas, Cal., for 1904.

[Drainage area, 72 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	3	3	3	184	0.04	0.05
February	8	3	4.1	236	.06	.06
March	26	2	4.8	295	.07	.08
April	4	0.5	1.8	107	.02	.02
May	2	0	.6	37	.01	.01
The period				859		

SAN GABRIEL RIVER AND CANALS NEAR AZUSA, CAL.

Owing to the numerous diversions it has been difficult to obtain accurate discharge measurements at Azusa; but during 1898 the San Gabriel Electric Company completed its system, and measurements are now obtained with greater ease and hence with greater accuracy. The headworks of this company are located about 6 miles above the mouth of the canyon; the water is carried along the left side by a series of tunnels and conduits, and a head of 400 feet is obtained where the electric power is generated. Weirs are placed on the conduit of the electric company, and the water is measured at this point. The capacity of the conduit is 80 second-feet.

The cable and gage are located about 1 mile from Azusa. During the season of low water for a period of from six to eight months the canals above the station divert the entire flow, and there is no running water at the station. The gage is a vertical 4 by 4 inch timber. Discharge measurements are made by means of a cable. The channel is straight for 150 feet above and for 500 feet below the cable, and has a width of 280 feet at high water. At low stages there are two channels having different elevations, and accurate measurements are difficult to obtain. The bed of the stream is composed of cobblestones and bowlders, and the current is swift.

The total flow of the river is obtained by adding the daily discharge for the river to the figures for the corresponding dates for the canals. The observer is H. F. Parkinson.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurement of San Gabriel River and canals near Azusa, Cal., for 1904.

Date.	Hydrographer.	Gage height.	Discharge.	Remarks.
		Feet.	*Second-feet.*	
March 18	E. C. Murphy	00	00	River.
	W. B. Clapp	Weir.	43	Canal.
			43	Total.
April 8	W. B. Clapp	1.30	14	River.
		Weir.	68	Canal.
			82	Total.
April 19	W. B. Clapp	1.58	38	River.
	R. P. Webb	Weir.	66	Canal.
			104	Total.

Mean daily gage height, in feet, of San Gabriel River near Azusa, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.
1	[a]0.00	0.00	1.30	1.70	1.50
2	.00	.00	1.10	1.60	1.50
3	.00	.00	[a].00	1.55	1.45
4	.00	.00	.00	1.50	1.40
5	.00	.00	.00	1.40	1.40
6	.00	.00	.00	1.40	1.35
7	.00	.00	.00	1.35	1.30
8	.00	.00	.00	1.30	1.25
9	.00	.00	.00	1.20	1.20
10	.00	.00	.00	1.10	1.15
11	.00	.00	1.85	.90	1.10
12	.00	.00	1.20	.75	1.00
13	.00	.00	.90	[a].00	.80
14	.00	.00	[a].00	.00	[b].00
15	.00	.00	.00	.00	.00
16	.00	.00	.00	.00	.00
17	.00	.00	.00	.00	.00
18	.00	.00	.0	.00	.00
19	.00	.00	.00	1.65	.00
20	.00	.00	.00	1.70	.00
21	.00	.00	.00	1.50	.00
22	.00	.00	.00	1.40	.00
23	.00	.00	4.15	1.35	.00
24	.00	.00	2.40	1.30	.00
25	.00	.00	2.00	1.20	.00
26	.00	.00	1.80	1.50	.00
27	.00	.00	1.70	1.45	.00
28	.00	3.20	1.70	1.40	.00
29	.00	1.70	2.00	1.40	.00
30	.00	.....	1.90	1.40	.00
31	.00	.....	1.80	.....	.00

[a] River dry at rod: Jan. 1–Feb. 27; Mar 3–10; Mar. 14–22; Apr. 13–18.
[b] River dry at rod remainder of the year. (See canals.)

Mean daily discharge, in second-feet, of San Gabriel canals near Azusa, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	24.0	23.0	47.0	66.0	67.0	38.0	18.0	10.0	11.0	10.5	12.5	15.0
2	24.0	23.5	51.5	66.0	67.0	36.5	17.5	9.5	10.8	9.0	12.5	15.3
3	24.0	23.5	47.0	66.0	67.0	35.5	17.0	10.0	10.5	10.0	12.5	15.3
4	24.0	23.5	42.0	66.0	67.0	32.5	17.0	10.0	10.5	10.0	12.5	15.3
5	24.0	59.0	40.0	66.0	67.0	32.0	16.5	10.0	10.0	11.0	12.5	15.3
6	23.5	37.0	38.0	66.0	67.0	31.0	16.0	10.0	9.0	12.0	12.5	14.7
7	23.3	31.5	37.5	66.0	67.0	30.0	16.0	12.0	8.5	12.5	12.5	15.2
8	24.0	31.0	35.5	68.0	67.0	30.0	15.7	12.7	7.5	15.0	12.0	15.3
9	24.5	30.0	35.0	68.0	67.0	29.0	15.5	11.5	8.5	15.5	11.0	16.0
10	24.5	30.0	35.5	68.0	67.0	28.0	15.0	11.5	9.5	15.5	11.0	16.0
11	24.5	30.0	60.0	68.0	67.0	26.5	13.8	11.0	9.5	15.5	11.5	16.0
12	24.0	28.0	60.0	68.0	66.0	25.2	14.0	10.0	9.5	14.5	12.0	16.0
13	24.0	28.0	56.0	66.0	65.0	25.2	14.3	29.0	12.5	13.5	12.5	16.0
14	23.5	28.0	51.0	64.0	64.0	23.0	15.5	15.0	11.5	13.0	12.5	16.0
15	23.5	28.0	49.0	64.0	61.0	24.0	15.0	14.5	11.0	13.5	12.5	16.0
16	23.5	40.0	46.0	61.0	59.0	23.0	15.0	14.0	10.0	13.5	12.5	16.0
17	23.5	41.0	44.5	58.0	56.0	22.5	14.0	14.0	11.0	12.0	12.6	16.0
18	28.2	38.0	42.6	57.0	55.0	22.0	14.0	13.7	12.0	11.5	13.3	16.0
19	27.4	34.5	41.5	66.0	53.0	22.0	13.0	13.7	12.0	10.5	13.0	16.0
20	27.4	33.0	50.0	66.0	51.0	22.0	12.5	13.7	12.0	9.5	13.5	15.5
21	25.5	31.4	48.0	66.0	49.0	25.0	11.8	13.5	12.0	10.0	13.5	15.7
22	25.2	30.8	46.0	66.0	48.0	23.0	12.0	15.0	12.0	10.5	13.5	16.3
23	24.6	30.0	62.0	67.0	44.5	23.0	12.0	15.0	11.0	11.0	13.5	16.8
24	24.5	29.5	62.0	67.0	44.5	23.0	11.1	14.5	12.0	11.0	13.0	17.0
25	24.5	29.5	62.0	67.0	46.0	22.0	11.0	14.5	12.7	11.0	13.0	16.7
26	24.5	29.5	62.0	67.0	51.0	19.0	11.0	13.0	13.5	11.5	13.5	16.0
27	24.0	30.0	62.0	67.0	46.5	18.5	12.0	12.5	12.5	11.5	14.0	16.7
28	23.5	00.0	62.0	67.0	40.0	18.5	11.5	11.5	12.0	11.5	14.0	16.5
29	23.5	38.0	66.0	67.0	40.0	18.5	12.0	11.3	10.5	12.0	14.5	16.0
30	23.5	.....	66.0	67.0	37.0	17.5	12.0	11.0	10.5	12.5	14.5	16.0
31	23.0	.....	66.0	.....	38.0	.....	11.0	11.0	.....	12.5	.....	48.0

Rating table for San Gabriel River near Azusa, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.60	1	2.00	92	3.40	535	5.60	2,855
.70	2	2.10	107	3.50	590	5.80	3,180
.80	4	2.20	125	3.60	652	6.00	3,525
.90	7	2.30	144	3.70	720	6.20	3,890
1.00	10	2.40	164	3.80	792	6.40	4,275
1.10	13	2.50	186	3.90	867	6.60	4,683
1.20	18	2.60	211	4.00	945	6.80	5,120
1.30	24	2.70	240	4.20	1,110	7.00	5,580
1.40	30	2.80	273	4.40	1,295	7.20	6,072
1.50	37	2.90	310	4.60	1,500	7.40	6,610
1.60	45	3.00	350	4.80	1,728	7.60	7,205
1.70	54	3.10	393	5.00	1,980	7.80	7,870
1.80	65	3.20	438	5.20	2,254	8.00	8,600
1.90	78	3.30	485	5.40	2,549		

Estimated monthly discharge of San Gabriel River and canals near Azusa, Cal., for 1904.[a]

[Drainage area, 222 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	28.2	23	24.4	1,500	0.11	0.13
February	438	23	47.7	2,744	.21	.23
March	1,130	35	110.8	6,813	.50	.58
April	120	57	89.7	5,337	.40	.45
May	104	37	66.5	4,089	.30	.35
June	38	17.5	25.5	1,517	.11	.12
July	18	11.0	14.0	861	.06	.07
August	29	9.5	12.9	793	.06	.07
September	13.5	7.5	10.8	643	.05	.06
October	15.5	9.0	12.0	738	.05	.06
November	14.5	11.0	12.8	762	.06	.07
December	48	14.7	16.9	1,039	.08	.09
The year	1,130	7.5	37	26,836	.17	2.28

[a] Includes water in canals.

SAN LUIS REY RIVER NEAR PALA, CAL.

This station was established October 9, 1903, by W. B. Clapp. It is located at Sickler's mill, 4 miles above Pala, Cal. It is reached by driving from Fallbrook or Escondido, stations on the Southern California Railway, 18 and 25 miles distant, respectively. The gage is an inclined 2 by 4 inch rod, graduated to feet and tenths, spiked to tree stumps and stakes at the left bank of the river. It is read once each day by M. M. Sickler. Discharge measurements are usually made by wading. During high water they are made from a car suspended from a ¾-inch galvanized iron wire cable stretched across the river at the gage. The initial point for soundings is the base of the oak tree to which the left end of the cable is fastened. The channel is straight for about 800 feet above and for 2,000 feet below the station. The grade of the stream is 0.60 feet in 100 feet. The current is swift. The right bank rises abruptly about 15 feet beyond the oak tree to which the cable is fastened and is not liable to overflow. The left bank is low, but is not liable to overflow. It was once a portion of the river channel, but is now well above high-water marks. The bed of the stream is rocky in portions of the flood channel, but the low-water channel is clear of rocks. There is a considerable growth of small timber in the channel, but this has been cleared the entire width

of the cross section for a distance of 100 feet above and 50 feet below the station. This timber growth is not permanent, being washed out by floods every few years. The bench mark is a United States standard bronze-capped iron post set flush with the ground on the right bank of the river and the north side of the wagon road, and about 50 feet west from the line of the cable prolonged. Its elevation is 557 feet above mean sea level, and 26.98 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Mean daily gage height, in feet, of San Luis Rey River near Pala, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Sept.	Oct.	Nov.	Dec.
1	1.74	1.74	1.87	2.32	1.80	1.68	.....	.....	1.40	1.45
2	1.74	1.74	1.84	2.28	1.90	1.68	.....	.....	1.40	1.55
3	1.74	1.74	1.82	2.24	1.85	1.68	.....	.....	1.41	1.55
4	1.74	1.74	1.79	2.20	1.80	1.68	.....	.....	1.40	1.55
5	1.74	1.86	1.77	2.18	1.78	1.69	.....	.....	1.40	1.55
6	1.74	1.80	1.77	2.10	1.75	1.69	.....	.....	1.40	1.55
7	1.74	1.80	1.77	2.08	1.75	1.69	.....	.....	1.39	1.55
8	1.74	1.80	1.77	2.05	1.74	1.68	.....	.....	1.39	1.55
9	1.74	1.79	1.77	2.05	1.74	1.67	2.03	.....	1.39	1.55
10	1.74	1.78	1.77	2.05	1.73	1.67	.....	1.70	1.39	1.55
11	1.74	1.78	1.95	2.04	1.73	1.67	.....	1.52	1.39	1.55
12	1.74	1.78	1.82	2.00	1.72	1.66	.....	1.40	1.39	1.55
13	1.74	1.78	1.80	1.95	1.72	1.66	.....	1.40	1.39	1.50
14	1.74	1.78	1.77	1.90	1.72	1.65	.....	1.40	1.39	1.45
15	1.74	1.78	1.75	1.85	1.71	1.65	.....	1.40	1.39	1.40
16	1.74	1.80	1.75	1.80	1.71	1.64	.....	1.41	1.40	1.40
17	1.74	1.82	1.75	1.78	1.71	1.64	.....	1.40	1.41	1.40
18	1.75	1.80	1.75	1.78	1.71	1.65	.....	1.40	1.42	1.40
19	1.75	1.80	1.77	1.78	1.71	1.65	.....	1.40	1.43	1.40
20	1.75	1.80	1.82	1.85	1.71	1.66	.....	1.40	1.45	1.40
21	1.75	1.80	1.77	1.85	1.71	1.66	.....	1.40	1.45	1.40
22	1.75	1.79	1.77	1.80	1.71	1.65	.....	1.41	1.45	1.40
23	1.75	1.79	3.50	1.80	1.71	1.65	.....	1.40	1.45	1.45
24	1.75	1.78	2.61	1.80	1.71	1.65	.....	1.39	1.45	1.45
25	1.74	1.78	2.31	1.79	1.71	1.65	.....	1.39	1.45	1.45
26	1.74	1.78	2.22	1.82	1.70	1.66	.....	1.40	1.45	1.45
27	1.74	1.78	2.18	1.82	1.70	1.65	.....	1.39	1.45	1.45
28	1.74	1.78	2.10	1.80	1.70	1.65	.....	1.40	1.45	1.45
29	1.74	1.88	2.52	1.80	1.69	1.66	.....	1.41	1.45	1.45
30	1.74	.....	2.50	1.80	1.69	[a]1.65	.....	1.41	1.45	1.45
31	1.74	.....	2.50	.....	1.68	.....	.....	1.40	.....	1.50

[a] Gage observations discontinued until October 10.

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 of 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 gage is an inclined 4 by 6 inch timber fastened to a large bowlder on the left bank. The channel was deepened by a flood March 31, 1903, and the gage was accordingly lowered to reach low-water stages June 30, 1903. The gage is read once each day by A. Laird. Discharge measurements are made by means of a cable and car, 100 feet below the gage. The initial point for soundings is the bench-mark spike set in the north side of a cottonwood tree on the left bank, 30 feet west of the tree to which the cable is fastened. The channel is straight for 100 feet above and below the station, and has a width of 22 feet at low and 125 feet at high stages. The current is swift at all stages. At flood stages the velocity is so high that measurements can be made only by means of floats. The right bank is low and is liable to overflow at flood stages for about 100 feet. The left bank is low, but is not liable to overflow. Both banks are overgrown with alders. The bed of the stream is composed of firm sand and small bowlders; it is subject to considerable change during flood stages. The bench mark, which is also used as the initial point for soundings, is a spike in the north side of the cottonwood tree on the left bank, 30 feet west of the tree to which the cable is fastened. Its elevation is 7.29 feet above the zero of the gage.

The observations of this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Santa Ana River near Mentone, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.	Remarks.
		Feet.	*Second-feet.*	
January 29	W. B. Clapp	Weir	26	Mentone Power Co.'s canal; total for river.
March 4	do	1.15	21	River.
		Weir.	12	Mentone Power Co.'s canal.
			33	Total for river.
March 12	do	1.25	26	River.
		Weir.	17	Mentone Power Co.'s canal.
			43	Total for river.
March 22	W. B. Clapp	1.10	20	River.
	E. C. Murphy	Weir.	19	Mentone Power Co.'s canal.
			39	Total for river.
April 20	W. B. Clapp	1.65	49	River.
		Weir.	19	Mentone Power Co.'s canal.
			68	Total for river.
April 21	do	1.38	24	River.
		Weir.	35	Mentone Power Co.'s canal.
			59	Total for river.
May 14	do	1.25	16	River.
		Weir.	20	Mentone Power Co.'s canal.
			36	Total for river.
May 28	do	1.40	21	River.
		Weir.	18	Mentone Power Co.'s canal.
			39	Total for river.
June 29	do	1.45	24	River.
		Weir.	22	Mentone Power Co.'s canal.
			46	Total for river.
September 21	do	.....	2	River.
		.....	56	Mentone Power Co.'s canal.
			58	Total for river.
November 11	E. C. La Rue	.83	1	River.
		Weir.	18	Mentone Power Co.'s canal.
			19	Total for river.

Rating table for Santa Ana River near Mentone, Cal., from January 1 to March 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.35	0	0.80	10	1.50	43	2.40	144
.40	1	.85	11	1.60	51	2.50	161
.45	2	.90	13	1.70	60	2.60	179
.50	3	.95	15	1.80	69	2.70	199
.55	4	1.00	16	1.90	79	2.80	221
.60	5	1.10	20	2.00	91	2.90	245
.65	6	1.20	24	2.10	102	3.00	280
.70	7	1.30	30	2.20	114		
.75	9	1.40	36	2.30	129		

Rating table for Santa Ana River near Mentone, Cal., from April 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.80	1	1.10	9	1.60	37	2.10	93
.85	1.5	1.20	12	1.70	47	2.20	106
.90	2	1.30	17	1.80	57	2.30	122
.95	3	1.40	23	1.90	68		
1.00	5	1.50	29	2.00	80		

Two tables were necessary on account of change in channel on April 1, 1904.

Estimated monthly discharge of Santa Ana River[a] near Mentone, Cal., for 1904.[b]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	28	24	26	1,599	0.14	0.16
February	94	26	33	1,898	.18	.19
March	280	28	64	3,935	.35	.40
April	106	36	53	3,154	.29	.32
May	48	34	41	2,521	.23	.27
June	50	37	44	2,618	.24	.27
July	52	37	45	2,767	.25	.29
August	56	35	46	2,828	.25	.29
September	58	40	50	2,975	.27	.30
October	56	22	48	2,951	.26	.30
November	22	17.7	20	1,190	.11	.12
December	23	18.4	20	1,230	.11	.13
The year	280	17.7	41	29,666	.22	3.04

[a] Estimated monthly discharge includes Mentone Power Company's canal.
[b] River received water from Bear Valley reservoir to October 31, 1904.

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 gage is an inclined 2 by 6 inch timber graduated to feet and tenths and fastened to a rock ledge at the right bank. It is read once each day by Joseph A. Thompson. At low and medium water, discharge measurements are made with meter by wading. During high water, velocities are measured by means of floats. For this purpose two wires are stretched across the stream 254 feet apart. The measuring stations are marked on each wire. The initial points for soundings are blazes on the poplar trees on the left bank, to which the wires are attached. The channel is slightly curved for 300 feet above, and curved for 1,000 feet below the station. The water is swift at medium and flood stages. The rise in the channel above the upper wire is 0.40 foot in 100 feet, and below the upper wire it is 0.57 foot in 100 feet. The right bank is high and rocky, and not liable to overflow. The left bank is low, covered with scattering poplar trees, but not liable to overflow. The bed of the stream is composed of sand and gravel. A portion of the bed is covered with a light growth of low brush. The channel is not liable to much change. The bench mark is a spike driven, near the ground, into the south side of the poplar tree to which the upper wire is fastened on the left bank of the stream. Its elevation is 9.65 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Santa Maria River near Santa Maria, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
February 18	W. B. Clapp	2.65	15.5
March 12	J. A. Thompson	3.60	[a] 220
March 24	do	4.00	[a] 499

[a] Float measurements.

Mean daily gage height, in feet, of Santa Maria River near Santa Maria, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Oct.	Nov.	Dec.
1	2.30	2.38	2.60	2.63	2.20	1.80	3.95	2.50	2.53
2	2.30	2.38	2.57	2.60	2.20	1.80	3.50	2.50	2.55
3	2.30	2.38	2.55	2.45	2.20	1.80	3.50	2.50	2.57
4	2.30	2.38	2.50	2.30	2.18	1.80	3.50	2.50	2.60
5	2.30	2.50	2.45	2.27	2.15	1.80	3.50	2.51	2.60
6	2.30	2.50	2.40	2.20	2.15	1.80	3.50	2.51	2.62
7	2.30	2.50	2.38	2.15	2.15	1.80	3.65	2.50	2.62
8	2.30	2.50	2.36	2.11	2.15	1.80	3.80	2.49	2.63
9	2.30	2.45	2.35	2.05	2.10	1.80	3.83	2.49	2.61
10	2.30	2.43	2.35	2.05	2.05	1.80	3.85	2.49	2.60
11	2.30	2.41	2.70	2.05	2.00	1.80	3.90	2.51	2.63
12	2.30	2.41	3.60	2.05	2.00	1.80	3.50	2.54	2.65
13	2.30	2.50	3.00	2.05	2.00	1.80	3.00	2.55	2.66
14	2.30	2.40	3.40	2.05	1.90	1.80	2.50	2.55	2.68
15	2.30	2.48	2.80	2.05	1.90	1.80	2.49	2.54	2.68
16	2.30	3.10	2.65	2.05	1.87	1.80	2.48	2.54	2.68
17	2.30	2.70	2.60	2.05	1.85	1.80	2.48	2.53	2.68
18	2.40	2.65	2.50	2.05	1.80	1.80	2.48	2.53	2.69
19	2.40	2.60	2.40	2.20	1.80	1.80	2.47	2.53	2.68
20	2.40	2.58	2.50	2.40	1.85	1.80	2.46	2.53	2.69
21	2.40	2.50	2.45	2.30	1.85	1.80	2.46	2.53	2.70
22	2.40	2.50	2.43	2.30	1.85	1.80	2.45	2.53	2.70
23	2.39	2.48	3.00	2.20	1.85	1.80	2.45	2.53	2.71
24	2.38	2.45	2.80	2.20	1.85	1.80	2.45	2.53	2.70
25	2.38	2.40	3.00	2.20	1.85	1.80	2.45	2.53	2.71
26	2.38	2.40	2.70	2.30	1.85	1.80	2.46	2.53	2.72
27	2.38	2.40	2.75	2.40	1.82	1.80	2.48	2.53	2.72
28	2.38	2.80	2.60	2.35	1.80	1.80	2.48	2.53	2.70
29	2.38	2.60	2.90	2.20	1.80	1.80	2.49	2.53	2.70
30	2.38	.....	2.70	2.20	1.80	1.80	2.50	2.53	2.70
31	2.38	.....	2.60	.....	1.80	(a)	2.50	.....	3.00

a No gage record during July, August, and September.

Rating table for Santa Maria River near Santa Maria, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.75	0.0	2.20	3	2.90	40	3.60	220
1.80	.2	2.30	5	3.00	53	3.70	265
1.85	.3	2.40	7	3.10	70	3.80	325
1.90	.5	2.50	10	3.20	90	3.90	400
1.95	.7	2.60	13	3.30	115	4.00	500
2.00	1	2.70	18	3.40	140		
2.10	2	2.80	27	3.50	175		

Estimated monthly discharge of Santa Maria River near Santa Maria, Cal., for 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	7	5	5.9	363
February	70	7	12.2	702
March	220	6	28.2	1,734
April	14	1.5	4.0	238
May	3	.2	1.1	68
June	.2	.2	.2	12
October	450	8	109.0	6,702
November	12	10	10.7	637
December	53	11	17.3	1,064
The period				11,520

MOHAVE RIVER AT VICTORVILLE, CAL.

At Victorville, a station on the Atchison, Topeka and Santa Fe Railway, the river passes through a narrow gorge, locally known as The Narrows. This place has been under investigation as a possible dam site, and soundings for the depth of bed rock were made by the United States Geological Survey during the season of 1899. The greatest depth of bed rock was found to be 54 feet. The diamond drill showed the rock to be a fine granite. A more detailed account of this exploration will be found in the Twenty-first Annual Report, part 4. Above The Narrows the valley broadens into a large reservoir site, but as no surveys of it have been made the capacity is unknown. In order to determine the amount of water available for storage for this reservoir a gaging station was established February 27, 1899. The channel is in sand, which is constantly shifting. The rod readings are of little value during low stages. Between January 1, 1902, and May 3, 1902, the discharge varied from 47 to 67 cubic feet per second, though the gage reading was 0.9 for the entire time. At the latter date the rod readings were discontinued. The mean estimated discharge for each month has been obtained by averaging the discharge as obtained by meter measurements made during the month.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Mohave River at Victorville, Cal., in 1904.[a]

Date.	Hydrographer.	Discharge.	Date.	Hydrographer.	Discharge.
		Sec.-ft.			*Sec.-ft.*
January 7	P. H. Leahy	62	August 23	P. H. Leahy	42
January 16	do	67	August 26	do	35
January 23	do	58	August 30	do	33
January 28	do	45	September 3	do	36
January 30	do	62	September 6	do	36
February 7	do	57	September 9	do	34
February 15	do	62	September 15	do	31
February 20	do	52	September 17	do	33
February 29	do	54	September 20	do	32
March 5	do	68	September 26	do	39
March 14	do	51	September 30	do	34
March 28	do	60	October 4	do	41
April 6	do	49	October 7	do	47
April 16	do	41	October 11	do	49
April 25	do	42	October 15	do	49
April 30	do	40	October 18	do	48
May 8	do	46	October 22	do	53
May 16	do	48	October 25	do	51
May 23	do	51	October 28	do	52
May 31	do	44	November 1	do	54
June 6	do	43	November 4	do	48
June 14	do	40	November 8	do	47
June 21	do	30	November 11	do	49
June 27	do	37	November 15	do	47
June 28	W. B. Clapp	28	November 18	do	47
July 2	P. H. Leahy	36	November 22	do	51
July 12	do	29	November 25	do	52
July 15	do	30	November 29	do	53
July 18	do	32	December 2	do	53
July 22	do	32	December 6	do	53
July 26	do	40	December 9	do	66
July 29	do	34	December 13	do	70
August 2	do	34	December 16	do	56
August 5	do	31	December 20	do	59
August 9	do	32	December 23	do	59
August 12	do	33	December 27	do	59
August 16	do	31	December 30	do	58
August 19	do	46			

[a] Small flood discharge on March 23, of which measurement was not obtained on account of poor conditions. Estimated discharge 500 second-feet for short period. Stream soon assumed natural conditions.

Estimated monthly discharge of Mohave River at Victorville, Cal., for 1904.[a]

[Drainage area, 400 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	67	45	60	3,689	0.15	0.17
February	62	52	57	3,279	.14	.15
March	68	51	58	3,566	.14	.16
April	55	40	45	2,678	.11	.12
May	51	41	47	2,890	.12	.14
June	44	28	38	2,261	.10	.11
July	40	29	33	2,029	.08	.09
August	46	31	35	2,152	.09	.10
September	39	31	34	2,023	.08	.09
October	54	36	48	2,951	.12	.14
November	54	47	50	2,975	.12	.13
December	70	53	59	3,628	.15	.17
The year	70	28	47	34,121	.12	1.57

[a] Daily discharge obtained by interpolation between discharge measurements.

MISCELLANEOUS DISCHARGE MEASUREMENTS IN SOUTHERN CALIFORNIA.

The following miscellaneous measurements were made in southern California drainage:

Miscellaneous discharge measurements in southern California.

SANTA MARIA RIVER DRAINAGE.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Second-ft.*
Aug. 25	W. B. Clapp	Sisquoc River	Sisquoc ranch	1.1
Oct. 23	do	do	do	0.0

VENTURA RIVER DRAINAGE.

1903.				
Sept. 19	W. B. Clapp	Ventura River	Ventura Light and Power Co. Upper diversion city supply.	7.0
Sept. 19	do	do	Below upper diversion	3.7
		Total river		10.7
Sept. 19	do	Power ditch	At old mill	3.3

Miscellaneous discharge measurements in southern California—Continued.

SANTA CLARA RIVER DRAINAGE.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Second-ft.*
June 16	W. B. Clapp	Newhall ditch	Southern Pacific Rwy. bridge, 3 miles below Saugus.	1.7
Sept. 16	do	do	do	1.8
Apr. 30	do	Santa Clara River	Road crossing Newhall ranch.	8.0
June 16	do	do	do	6.2
Sept. 16	do	do	do	5.4
Apr. 30	do	San Francisquito Creek	do	2.0
June 16	do	do	do	2.4
Sept. 16	do	do	do	2.0
Apr. 30	do	Santa Clara River	Opposite head of Camulas ditch.	25.0
June 17	do	do	do	21.1
		Camulas ditch	At head	7.6
		Total Santa Clara River.		28.7
Sept. 16	do	Santa Clara River	Camulas ditch	5.1
		Camulas ditch	At head	11.6
		Total Santa Clara River.		16.7
May 3	do	Santa Clara River	1 mile above Santa Paula.	127.0
June 22	do	do	do	22.0
		Richardson ditch	do	4.2
		Grees ditch	do	11.0
		Farmer's ditch	do	7.8
		Total Santa Clara River.		45.0
July 16	do	Santa Clara River	1 mile above Santa Paula.	23.4
		Richardson ditch	do	2.3
		Grees ditch	do	5.8
		Farmer's ditch	do	8.4
		Total Santa Clara River.		39.9
Aug. 13	J. B. Lippincott and G. S. Power.	Santa Clara River	1 mile above Santa Paula.	20.8
		Richardson ditch	do	1.2
		Grees ditch	do	11.1
		Farmer's ditch	do	8.6
		Total Santa Clara River.		41.7

Miscellaneous discharge measurements in southern California—Continued.

SANTA CLARA RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge
1903.				*Second-ft.*
Sept. 18	W. B. Clapp	Santa Clara River	1 mile above Santa Paula.	18.2
		Richardson ditch	do	1.2
		Grees ditch	do	7.4
		Farmer's ditch	do	8.6
		Total Santa Clara River.		35.4
July 15	W. B. Clapp and G. S. Power.	Santa Clara Water and Irrigation Co.'s canal.	At head	30
July 16	do	do	do	33
Aug. 14	J. B. Lippincott and G. S. Power.	do	do	31.6
		Santa Clara River	Below head of canal	3.3
		Total river		34.9
Sept. 18	W. B. Clapp	Santa Clara Water and Irrigation Co.'s canal.	Heading	26.7
		River	Below canal heading	3.9
		Total river		30.6
May 1	do	Piru Creek	Dunton ranch	57
		do	Southern Pacific Rwy. bridge.	55
June 17	do	do	Upper diversion Piru Land and Water Co.	1.8
		do	1 mile above Esperanza	3.9
		Total Piru Creek		5.7
Sept. 17	do	Upper diversion	1 mile above Esperanza	1.2
		Lower diversion	Southern Pacific Rwy. bridge.	1.0
		Piru Creek	do	.1
		Total Piru Creek		1.1
June 17	do	Lower diversion	Southern Pacific Rwy. bridge.	3.7
		Piru Creek	do	2.7
		Total Piru Creek		6.4

Miscellaneous discharge measurements in southern California—Continued.

SANTA CLARA RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Second-ft.*
May 2	W. B. Clapp	Sespe Creek	Southern Pacific Rwy. bridge.	89
Sept. 17	do	Sespe Land and Water Co's. canal.	½ mile below head	4.6
		Sespe Creek	Below canal heading	.1
		Total Sespe Creek.		4.7
May 3	do	Santa Paula Creek	5 miles above Santa Paula.	.28
		do	At Santa Paula	19.0
		Santa Paula Water Co's. ditch.	At Heading	5.6
June 22	do	do	do	10.1
Sept. 18	do	do	do	2.7

SANTA YNEZ RIVER DRAINAGE.

1903.				
Apr. 11	Howard Rankin	Amagusa Creek	At mouth	6.2
Apr. 15	do	do	do	4.5
Apr. 21	do	do	do	7.6
Apr. 23	do	do	do	6.9
Apr. 28	do	do	do	6.3
Apr. 10	do	Blue Canyon Creek	do	11.1
Apr. 22	do	do	do	11.7
Apr. 29	do	do	do	6.3
Apr. 10	do	Trail Creek	do	1.4
Apr. 22	do	do	do	2.0
Apr. 11	do	Ruiz Creek	do	5.4
Apr. 15	do	do	do	4.3
Apr. 21	do	do	do	7.0
Apr. 23	do	do	do	5.7
Apr. 28	do	do	do	4.5

Miscellaneous discharge measurements in southern California—Continued.

SAN LUIS REY RIVER DRAINAGE.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Second-ft.*
Aug. 15	W. B. Clapp	San Louis Rey River	Dam site, Warner's ranch reservoir.	2.8
Aug. 14	do	do	Above head of Escondido canal.	.5
Aug. 16	do	do	Pala, Cal	1.1
Aug. 15	do	Sickler's canal	Sickler's ranch	2.1
Oct. 9	do	do	do	2.1

LOS ANGELES RIVER DRAINAGE.

1903.				
Apr. 9	J. C. Clausen	Pacoima Creek	Mouth of canyon	47
Apr. 18	do	do	do	98
May 5	do	do	do	24
June 5	W. B. Clapp	do	do	8.0
Sept. 26	do	do	do	0.0
Apr. 9	J. C. Clausen	do	Southern Pacific Rwy.	32
Apr. 19	do	do	do	57
May 5	do	do	do	16.0
June 5	W. B. Clapp	do	do	0.0
Apr. 18	J. C. Clausen	do	3¼ miles below Southern Pacific Rwy.	0.0
May 5	do	do	1½ miles below Southern Pacific Rwy.	0.0
Apr. 10	do	Little Tejunga Creek	Mouth of canyon	10.0
Apr. 17	do	do	do	27
May 5	do	do	do	4.0
June 4	W. B. Clapp	do	do	1.0
Sept. 26	do	do	do	0.0
Apr. 10	J. C. Clausen	Big Tejunga Creek	do	59
Apr. 17	do	do	do	157
May 5	do	do	do	37
June 4	W. B. Clapp	do	do	12.0
Sept. 26	do	do	do	.1
Apr. 9	J. C. Clausen	do	Southern Pacific Rwy.	2.0
Apr. 17	do	do	do	124
May 5	do	do	do	0.0
June 4	W. B. Clapp	do	do	0.0
Apr. 17	J. C. Clausen	do	1½ miles below Southern Pacific Rwy.	0.0
Mar. 25	J. F. Danforth	Los Angeles River	Los Feliz Bridge	109

Miscellaneous discharge measurements in southern California—Continued.

LOS ANGELES RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Second-ft.*
Apr. 8	J. C. Clausen	Los Angeles River	Los Feliz Bridge	37
Apr. 13	O. W. Peterson	do	do	28
Apr. 17	do	do	do	64
Jan. 28	C. A. Miller	do	Aliso Street Bridge	66
Apr. 11	J. C. Clausen	do	Ninth Street Bridge	20
Apr. 18	O. W. Peterson	do	do	106
Apr. 18	do	do	Boyle avenue	75
Apr. 18	do	do	Opposite Bell station	73
Apr. 20	do	do	Above junction of Rio Hondo.	25
Apr. 20	do	do	Below junction of Rio Hondo.	54
Apr. 20	O. W. Peterson	do	One-half mile above Compton and Clearwater road.	82
Apr. 20	do	do	Opposite Clearwater	53
Apr. 21	do	do	One-half mile above Cerritos road.	39
Apr. 21	do	do	1½ miles below Cerritos road.	77
Apr. 21	do	do	Opposite Seabright	78
Apr. 13	W. B. Clapp	Arroyo Seco	At mouth of canyon	24
Apr. 17	do	do	do	100
May 21	do	do	do	10.0
Apr. 13	do	do	At Devils Gate	17.0
May 21	do	do	do	2.0
May 21	do	do	1 mile below Devils Gate.	0.0
Apr. 13	do	do	At Sheep Corral Spring, Pasadena.	4.0
Apr. 17	do	do	do	80
Apr. 13	do	do	Garvanza wagon bridge.	0.0
Jan. 28	C. A. Miller	do	At Avenue 26, Los Angeles.	274
Mar. 25	J. F. Danforth	do	do	128
Apr. 17	O. W. Peterson	do	do	77

Los Angeles River at Los Angeles, Cal.

LOS ANGELES RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Discharge.	Remarks.
1904.		*Sec.-feet.*	
April 15	F. B. Cook	42.3	44-inch conduit.
		4.5	Main-supply ditch.
		46.8	Total diversion Los Angeles River.
May 25	W. B. Clapp, F. B. Cook	40.0	44-inch conduit.
		8.0	Main-supply conduit.
		48.0	Total diversion Los Angeles River.
June 18	F. B. Cook	29.2	44-inch conduit.
		10.8	Main-supply conduit.
		40.0	Total diversion Los Angeles River.
June 27	W. B. Clapp, E. C. LaRue	34.2	44-inch conduit.
		8.6	Main-supply conduit.
		3.7	River at Huron street.
		46.5	Total Los Angeles River.
June 24	F. B. Cook	31.7	44-inch conduit.
		8.6	Main-supply conduit.
		40.3	Total diversion Los Angeles River.
July 19	E. C. LaRue, F. B. Cook	33.1	44-inch conduit.
		10.2	Main-supply conduit.
		5.3	River at Huron street.
		48.6	Total Los Angeles River.
August 9	F. B. Cook	29.9	44-inch conduit.
		10 4	Main-supply conduit.
		40.3	Total diversion Los Angeles River.
August 18	E. C. LaRue, F. B. Cook	30.5	44-inch conduit.
		10.8	Main-supply conduit.
		3.6	River at Huron street.
		44.9	Total Los Angeles River.
September 7	F. B. Cook	29.7	44-inch conduit.
		10.4	Main-supply conduit.
		40.1	Total diversion Los Angeles River.

Los Angeles River at Los Angeles, Cal.—Continued.

LOS ANGELES RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Discharge.	Remarks.
1904.		*Sec.-feet.*	
September 20	E. C. LaRue	31.1	44-inch conduit.
		11.0	Main-supply conduit.
		3.4	River at Huron street.
		45.5	Total Los Angeles River.
October 20	do	31.9	44-inch conduit.
		11.6	Main-supply conduit.
		8.2	River at Huron street.
		51.7	Total Los Angeles River.
October 25	F. B. Cook	31.4	44-inch conduit.
		11.6	Main-supply conduit.
		43.0	Total diversion Los Angeles River.
November 18	E. C. LaRue	33.3	44-inch conduit.
	F. B. Cook	11.8	Main-supply conduit.
		8.4	River at Huron street.
		53.5	Total Los Angeles River.
December 28	E. C. LaRue	27.7	44-inch conduit.
		10.0	Main-supply conduit.
		22.2	River at Huron street.
		59.9	Total Los Angeles River.

Miscellaneous discharge measurements in southern California.

SAN GABRIEL RIVER DRAINAGE.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Sec.-feet.*
Apr. 20	W. B. Clapp and J. C. Clausen.	Dalton Creek	At mouth of canyon	9.0
May 22	W. B. Clapp	do	do	2.7
Sept. 14	do	do	do	0.0
May 22	do	do	1 mile below mouth of canyon.	0.0
Apr. 20	do	do	Southern California Rwy.	0.0

Miscellaneous discharge measurements in southern California—Continued.

SAN GABRIEL RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Second-ft.*
Apr. 20	W. B. Clapp and J. C. Clausen.	San Dimas Creek	Mouth of canyon	19.0
May 22	W. B. Clapp	do	do	2.5
Sept. 14	do	do	do	0.0
Apr. 20	do	do	Base Line avenue	0.0
Apr. 18	do	Santa Anita Creek	Mouth of canyon	35.0
1903.				
May 23	W. B. Clapp	Santa Anita Creek	Mouth of canyon	10
		Baldwin diversion heading.		3
		Total creek		13
Sept. 9	do	Baldwin diversion heading.		1.4
1902.				
July 29	J. A. Worthen	Baldwin ditch	Point (1)	3.2
Aug. 18	do	do	do	3.7
Sept. 8	do	do	do	.91
Sept. 27	do	do	do	2.0
Oct. 15	do	do	do	1.6
1904.				
June 15	J. A. Worthen	Baldwin ditch	Point (1)	3.0
July 8	do	do	do	3.4
Aug. 31	do	do	do	3.0
Sept. 24	do	do	do	2.8
Oct. 5	W. B. Clapp	do	do	2.9
Oct. 15	J. A. Worthen	do	do	[a].2
1902.				
July 20	J. A. Worthen	Baldwin ditch	Point (3)	1.2
Aug. 18	do	do	do	.70
Sept. 8	do	do	do	.72
Sept. 27	do	do	do	.63
Oct. 11	do	do	do	.75
1904.				
June 15	J. A. Worthen	Baldwin ditch	Point (3)	1.4
June 8	do	do	do	.96
Aug. 31	do	do	do	.80

[a] Estimated. Main stream flowing through waste gate into old channel.

Miscellaneous discharge measurements in southern California—Continued.

SAN GABRIEL RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Second-ft.*
Sept. 24	J. A. Worthen.	Baldwin ditch	Point (3)	0.94
Oct. 15	do	do	do	.78
1902.				
July 29	J. A. Worthen.	Baldwin ditch	Point (4)	1.9
Aug. 18	do	do	do	1.2
Sept. 8	do	do	do	.99
Sept. 27	do	do	do	.52
Oct. 11	do	do	do	.81
1904.				
June 15	J. A. Worthen.	Baldwin ditch	Point (4)	[a].00
July 8	do	do	do	.00
Aug. 31	do	do	do	.62
Oct. 15	do	do	do	[b].00
1903.				
Apr. 18	W. B. Clapp.	Santa Anita Creek	Southern Pacific Railway, Monrovia Branch.	0
May 23	do	do	White Oak avenue	0
Apr. 18	do	Little Santa Anita Creek.	Above Santa Anita Creek.	5
Apr. 18	do	Eaton Canyon Creek.	Mouth of canyon	29
May 21	do	do	do	3
		do	Water company's diversion at heading, mouth of canyon.	3
		Total creek		6
Sept. 9	do	Eaton Canyon Creek.	Mouth of canyon	0
Apr. 18	do	do	At Southern California Railway.	0
May 21	do	do	1 mile above Southern California Railway.	0
Apr. 14	do	San Gabriel River	At upper road crossing, Duarte to Azusa.	264
May 26	do	do	Below head of Lexington wash.	29
		do	Diversion below head of Lexington wash.	37
		Total river at same place.		66

[a] No diversion. Ditch not kept up.

[b] No water used.

Miscellaneous discharge measurements in southern California—Continued.

SAN GABRIEL RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Second-ft.*
Apr. 15	W. B. Clapp	San Gabriel River	At El Monte Bridge	50
Apr. 15	do	do	Lexington wash at El Monte.	3
Apr. 26	O. W. Peterson	do	At El Monte Bridge	229
May 26	W. B. Clapp	do	do	0
Apr. 25	O. W. Peterson	do	At road crossing east of Durfee's ranch.	264
Apr. 25	do	do	Whittier road crossing	361
Apr. 24	do	do	Southern California Railway at Rivera.	365
Apr. 24	do	do	Southern Pacific Railway at Studebaker.	364
Apr. 23	do	do	Opposite Alamitos	311.
1902.				
Aug. 18	J. A. Worthen	Rio Hondo	Old Mission Bridge	24.3
Sept. 8	do	do	do	25.6
Sept. 27	do	do	do	21.5
Oct. 11	do	do	do	24.7
1903.				
Apr. 27	O. W. Peterson	Rio Hondo	Old Mission Bridge	36
Oct. 2	W. B. Clapp	do	do	29
1904.				
June 15	J. A. Worthen	Rio Hondo	Old Mission Bridge	22
July 8	do	do	do	24.1
Aug. 31	do	do	do	22.2
Sept. 24	do	do	do	21.7
Oct. 5	W. B. Clapp	do	do	22
Oct. 15	J. A. Worthen	do	do	27
1903.				
Apr. 27	O. W. Peterson	Rio Hondo	Whittier road crossing	17
Apr. 27	do	do	Road crossing west of Rivera.	12
Apr. 27	do	do	Southern Pacific Railway west of Downey.	12
Apr. 20	do	do	At S. P., L. A. & S.L. Railroad, above Workman.	29
Apr. 25	do	San Jose Creek	Whittier and Puente road.	8
Oct. 3	W. B. Clapp	Sheep Creek ditch	Whittier flume crossing.	4.6

Miscellaneous discharge measurements in southern California—Continued.

SAN GABRIEL RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1904.				*Second-ft.*
Oct. 5	W. B. Clapp	Sheep Creek ditch	Whittier flume crossing.	1.4
1903.				
Oct. 3	W. B. Clapp	Rincon ditch	Rincon road crossing	3.4
1904.				
Oct. 5	W. B. Clapp	Rincon ditch	Rincon road crossing	1.5
1903.				
Oct. 3	W. B. Clapp	Durfee ditch	Road crossing above ranch house.	1.6
1904.				
Oct 5	W. B. Clapp	Durfee ditch	Road crossing above ranch house.	0
1903.				
Oct. 2	W. B. Clapp	Los Nietos or Banta ditch.	At heading	28.0
1904.				
Oct. 5	W. B. Clapp	Los Nietos or Banta ditch.	100 feet below division box.	19.5
1903.				
Oct. 2	W. B. Clapp	Ranchito or Standeferd ditch.	At heading	14
1904.				
Oct. 5	W. B. Clapp	Ranchito or Standeferd ditch.	At heading	12.9
1903.				
Oct. 2	W. B. Clapp	Cate ditch	In flume at road crossing.	5.5
1904.				
Oct. 11	W. B. Clapp	Cate ditch	In flume at road crossing.	11.1
1902.				
July 25	J. A. Worthen	Arroyo ditch	At dam	21.7
1904.				
June 15	J. A. Worthen	Arroyo ditch	At dam	20.6
July 8	do	do	do	19.7
Aug. 31	do	do	do	18.6
Sept. 24	do	do	do	17.9
Oct. 15	do	do	do	20.8
1902.				
Sept. 27	J. A. Worthen	Arroyo ditch	At intake	24.6
Oct. 11	do	do	do	24.2

Miscellaneous discharge measurements in southern California—Continued.

SAN GABRIEL RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1904.				*Second-ft.*
June 21	W. B. Clapp and O. K. Parker.	Arroyo ditch	At intake	21.7
1902.				
Sept. 8	J. A. Worthen.	Arroyo ditch	At Salt Lake Railway.	19.6
Oct. 11	do	do	do	20.5
1904.				
June 15	J. A. Worthen.	Arroyo ditch	At Salt Lake Railway.	17.5
July 8	do	do	do	17.9
Aug. 18	do	do	do	20.6
Aug. 31	do	do	do	16.4
Sept. 24	do	do	do	17.0
Sept. 27	do	do	do	18.8
Oct. 15	do	do	do	18.5
June 21	W. B. Clapp and O. K. Parker.	do	do	19.4
1902.				
Aug. 18	J. A. Worthen.	Arroyo ditch	At point of diversion	23.7
Sept. 8	do	do	do	23.2
1904.				
June 21	W. B. Clapp and O. K. Parker.	Arroyo ditch	At head of flume	16.7
Aug. 31	J. A. Worthen.	do	do	16.2
Sept. 24	do	do	do	15.5
Oct. 10	do	do	do	18.6
1903.				
Apr. 25	J. B. Lippincott	Arroyo ditch	Southern California Railway, Rivera.	21
Oct. 3	W. B. Clapp	Whittier ditch	Pumping plant east of El Monte—developed water—discharge varies as needed.	5.1

SANTA ANA RIVER DRAINAGE.

1903.				
Apr. 1	W. B. Clapp	San Antonio Creek	Ontario Power Co.'s power house, mouth of canyon.	854
1904.				
Sept. 23	W. B. Clapp	San Antonio Creek	At power house, waste weir. Total creek.	6.4

Miscellaneous discharge measurements in southern California—Continued.

SANTA ANA RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Second-ft.*
Apr. 21	W. B. Clapp and J. C. Clausen.	San Antonio Creek	At power house, mouth of canyon.	42
		do	San Antonio Water Co.'s diversion, mouth of canyon.	15
		Total creek		57
1903.				
May 25	W. B. Clapp	San Antonio Creek	At power house, mouth of canyon.	14
		do	San Antonio Water Co.'s diversion mouth of canyon.	20
		Total creek		34
July 3	do	San Antonio Creek	At power house, mouth of canyon. Total creek.	19.5
Sept. 13	do	do	do	11
Apr. 21	W. B. Clapp and J. C. Clausen.	do	1 mile below Southern Pacific Rwy.	.0
May 25	W. B. Clapp	do	Southern Pacific Rwy.	.0
Apr. 21	W. B. Clapp and J. C. Clausen.	Cucamonga Creek	Mouth of canyon	15
May 25	W. B. Clapp	do	do	5.5
1904.				
Sept. 23	W. B. Clapp	Cucamonga Creek	At point of diversion of Cucamonga Water Co.	1.8
1903.				
Sept. 13	W. B. Clapp	Cucamonga Creek	Above head works Hermosa Water Co.	3.6
Apr. 21	W. B. Clapp and J. C. Clausen.	do	Southern California Rwy.	.0
May 25	W. B. Clapp	do	Base line avenue	.0
Apr. 1	do	Lytle Creek	At mouth of canyon	1,790
Apr. 22	W. B. Clapp and J. C. Clausen.	do	do	56
		Rialto canal	Weir at head works	7
		Total creek		63

Miscellaneous discharge measurements in southern California—Continued.

SANTA ANA RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Second-ft.*
May 19	W. B. Clapp	Lytle Creek	Mouth of canyon	14.6
		Rialto canal	Weir at head works	14.9
		Total creek		29.5
July 2	do	Lytle Creek	Weir at head works Rialto canal. Total creek.	16.5
Sept. 12	do	do	do	14.7
1904.				
Sept. 22	W. B. Clapp	Lytle Creek	At mouth of canyon. Total creek.	9.2
1903.				
Apr. 22	W. B. Clapp	Lytle Creek	Highland avenue	.0
May 19	do	do	do	.0
Apr. 23	W. B. Clapp and J. C. Clausen.	West Twin Creek	Mouth of canyon	8.6
May 18	W. B. Clapp	do	do	2.1
		do	Ditch diversion	2.3
		Total creek		4.4
Sept. 11	do	West Twin Creek	Mouth of canyon. Total creek.	0.3
1904.				
Sept. 21	W. B. Clapp	West Twin Creek ditch	Head of pipe line	0.4
1903.				
Apr. 23	W. B. Clapp	West Twin Creek	Southern California Rwy.	.0
May 18	do	do	1 mile above Southern California Rwy.	.0
Apr. 23	W. B. Clapp and J. C. Clausen.	East Twin Creek	Mouth of canyon	10.0
May 17	W. B. Clapp	do	do	3.2
		do	Ditch diversion	1.6
		Total creek		4.8
Sept. 11	do	East Twin Creek	Ditch diversion. Total creek.	.4
1904.				
Sept. 22	W. B. Clapp	East Twin Creek	Wier at head of pipe line.	0.6

Miscellaneous discharge measurements in southern California—Continued.

SANTA ANA RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Second-ft.*
Apr. 23	W. B. Clapp	East Twin Creek	1 mile above Southern California Rwy.	.0
May 17	do	do	do	.0
Apr. 23	W. B. Clapp and J. C. Clausen.	City Creek	Mouth of canyon	22
May 17	W. B. Clapp	do	do	4.4
		do	Canal diversion	6.8
		Total creek		11.2
Sept. 11	do	City Creek	Mouth of canyon. Total creek.	.2
1904.				
Sept. 22	W. B. Clapp	City Creek	Mouth of canyon. Total creek.	0.5
1903.				
Apr. 23	W. B. Clapp	City Creek	Road crossing south Harlem Springs.	.0
May 17	do	do	Base line avenue	.0
Apr. 23	W. B. Clapp and J. C. Clausen.	Plunge Creek	Mouth of canyon	23
May 17	W. B. Clapp	do	do	3
		do	Diversion mouth of canyon.	6
		Total creek		9
Sept. 11	do	Plunge Creek	Mouth of canyon. Total creek.	.6
1904.				
Sept. 21	W. B. Clapp	Plunge Creek	Above Highland canal.	0.6
1903.				
Apr. 23	W. B. Clapp	Plunge Creek	Orange avenue	.0
May 17	do	do	do	.0
1904.				
Mar. 22	W. B. Clapp and E. C. Murphy.	Mill Creek	Wier at Edison electric power house, Nos. 2 and 3.	17.6
Sept. 21	W. B. Clapp	do	do	14.1
Nov. 11	E. C. La Rue	do	do	11.2
1903.				
Apr. 1	W. B. Clapp	Mill Creek	Head of Crafton zanja.	1,280

Miscellaneous discharge measurements in southern California—Continued.

SANTA ANA RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1904.				*Second-ft.*
Sept. 21	W. B. Clapp...	Crafton zanja	.....	15.2
Nov. 11	E. C. La Rue ..	.....do	.....	14.1
1903.				
Apr. 24	W. B. Clapp and J. C. Clausen.	Mill Creek.....	Head of Crafton zanja.	34
		Crafton zanja	.....do.....	5
		Total Mill Creek.	.....do.....	39
May 16	W. B. Clapp...	Mill Creek.....	.....do.....	19
		Crafton zanja	.....do.....	49
		Total Mill Creek.	.....do.....	68
June 9	.....do	Mill Creek.....	.....do.....	2
		Crafton zanja	.....do.....	44
		Total Mill Creek.	.....do.....	46
July 1	.....do	Crafton zanja	At head; total Mill Creek.	29
Sept. 1	.....do	.....do	.....do.....	22
Aug. 31	.....do	Morton Canyon.....	Mouth of canyon	.2
1904.				
May 28	W. B. Clapp...	Morton Canyon.....	Mouth of canyon	.13
Sept. 21	.....do	.....do	.....do.....	.14
1903.				
Aug. 31	W. B. Clapp...	Redlands tunnel	At outlet.....	1.8
1904.				
May 28	W. B. Clapp...	Redlands tunnel	At outlet.....	1.59
June 29	.....do	.....do	.....do.....	1.55
Sept. 21	.....do	.....do	.....do.....	1.04
1903.				
Aug. 31	W. B. Clapp...	Green Spot pipe line..	Weir at head	6.3
1904.				
Jan. 29	W. B. Clapp...	Green Spot pipe line..	Weir at head	4.2
May 14	.....do	.....do	.....do.....	1.8
May 28	.....do	.....do	.....do.....	4.9
June 29	.....do	.....do	.....do.....	7.3
Sept. 21	.....do	.....do	.....do.....	6.0
Nov. 11	E. C. La Rue...	.....do	.....do.....	1.1

Miscellaneous discharge measurements in southern California—Continued.

SANTA ANA RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Second-ft.*
Apr. 24	W. B. Clapp	Highland canal	Weir at head	6
May 16	do	do	do	18
Aug. 31	do	do	do	15.6
1904.				
Jan. 29	W. B. Clapp	Highland canal	Weir at head	10.7
May 14	do	do	do	11.4
May 28	do	do	do	12.0
June 29	do	do	do	13.5
Sept. 21	do	do	do	16.4
Nov. 11	E. C. La Rue	do	do	7.8
1903.				
Apr. 24	W. B. Clapp	Redlands canal	Sand-box weir	9.6
May 16	do	do	do	29.0
Aug. 31	do	do	do	28.0
1904.				
Jan. 29	W. B. Clapp	Redlands canal	Sand-box weir	12.3
May 14	do	do	do	23.8
May 28	do	do	do	26.0
June 29	do	do	do	22.0
Nov. 11	E. C. La Rue	do	do	9.6
1903.				
Sept. 5	K. Sanborn	Castile ditch	1,000 feet below heading.	3
1904.				
May 15	K. Sanborn	Castile ditch	1,000 feet below heading.	.0
Aug. 18	do	do	do	.0
1903.				
Sept. 5	K. Sanborn	Wilbur ditch	At Rogers' pipe trestle crossing.	1.7
1904.				
May 15	K. Sanborn	Wilbur ditch	At Rogers' pipe trestle crossing.	2.54
Aug. 20	do	do	do	2.13
1903.				
Sept. 5	K. Sanborn	Newton ditch	West line section 28	4.1
1904.				
May 15	K. Sanborn	Newton ditch	West line section 28	4.7
Aug. 20	do	do	do	7.7

Miscellaneous discharge measurements in southern California—Continued.

SANTA ANA RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Second-ft.*
Sept. 5	K. Sanborn	Fuller ditch	At heading	13.4
1904.				
May 15	K. Sanborn	Fuller ditch	1 mile below intake	11.2
Aug. 20	do	do	do	4.6
1903.				
Sept. 5	K. Sanborn	Roberts ditch	At heading	2.6
1904.				
May 15	K. Sanborn	Roberts ditch	At heading	2.2
Aug. 20	do	do	do	1.4
1903.				
Sept. 23	W. B. Clapp	Newberry ditch	Auburndale Bridge	3.3
1904.				
May 15	K. Sanborn	Newberry ditch	Auburndale Bridge	.94
Aug. 20	do	do	do	2.7
1903.				
Sept. 23	W. B. Clapp	Durkee ditch	Auburndale Bridge	3.4
1904.				
May 15	K. Sanborn	Durkee ditch	Auburndale Bridge	.0
Aug. 20	do	do	do	.0
1903.				
Sept. 23	W. B. Clapp	Gilliland ditch	Auburndale Bridge	1.2
1904.				
May 15	K. Sanborn	Gilliland ditch	Auburndale Bridge	.61
Aug. 20	do	do	do	.42
1903.				
Apr. 30	O. W. Peterson	Santa Ana canal	1 mile below heading	43
Sept. 23	W. B. Clapp	do	do	34
Apr. 29	O. W. Peterson	Anaheim and Fullerton canal.	Heading	2.8
Sept. 25	W. B. Clapp	do	At Esperanza	32
Sept. 25	do	Yorba ditch	do	.6
May 15	W. B. Clapp and J. M. Mylne.	Santa Ana River	At Orange avenue	30
May 15	do	do	½ mile below Orange avenue.	.0
Apr. 22	W. B. Clapp and J. C. Clausen.	do	Colton Bridge	13

Miscellaneous discharge measurements in southern California—Continued.

SANTA ANA RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Second-ft.*
May 18	W. B. Clapp	Santa Ana River	Colton Bridge	.0
Sept. 23	do	do	Auburndale Bridge	58
Mar. 31	do	do	Rincon wagon bridge	400
Apr. 29	O. W. Peterson	do	do	193
May 18	W. B. Clapp	do	do	108
June 12	do	do	do	85
July 23	do	do	do	59
Aug. 19	do	do	do	60
Sept. 23	do	do	do	78
Oct. 30	do	do	do	93
Nov. 25	do	do	do	102
1904.				
Jan. 26	W. B. Clapp	Santa Ana River	Rincon wagon bridge	109
Feb. 29	do	do	do	162
Mar. 21	W. B. Clapp and E. C. Murphy.	do	do	107
Apr. 29	W. B. Clapp	do	do	96
May 23	do	do	do	82
June 20	W. B. Clapp and W. V. Hardy.	do	do	63
July 23	E. C. La Rue	do	do	62
Aug. 20	do	do	do	69
Sept. 20	W. B. Clapp	do	do	74
Sept. 28	E. C. La Rue	do	do	75
Oct. 22	do	do	do	73
Nov. 19	do	do	do	103
Dec. 10	do	do	do	110
1903.				
Apr. 29	O. W. Peterson	Santa Ana River	1 mile above heading of Santa Ana and Anaheim canals.	214
Sept. 23	W. B. Clapp	do	Heading Santa Ana and Anaheim canals.	72
1904.				
Sept. 28	E. C. La Rue	Santa Ana River	Heading Santa Ana and Anaheim canals.	66
1903.				
Apr. 29	O. W. Peterson	Santa Ana River	2 miles below heading Santa Ana and Anaheim canals.	185
Apr. 30	do	do	2 miles above Yorba	130
Apr. 30	do	do	½ mile above Yorba	141

Miscellaneous discharge measurements in southern California—Continued.

SANTA ANA RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Second-ft.*
May 1	O. W. Peterson	Santa Ana River	¾ mile above Southern California Rwy. crossing at Olive.	51
May 1	do	do	¾ mile below Southern California Rwy. crossing at Olive.	.0
Mar. 31	W. B. Clapp	Chino Creek	At Rincon wagon bridge.	146
Apr. 29	O. W. Peterson	do	do	23
May 18	W. B. Clapp	do	do	15
June 12	do	do	do	6.5
July 23	do	do	do	3.4
Aug. 19	do	do	do	2.4
Sept. 23	do	do	do	3.3
Oct. 30	do	do	do	6
Nov. 25	do	do	do	9.2
1904.				
Jan. 26	W. B. Clapp	Chino Creek	At Rincon wagon bridge.	14.7
Feb. 29	do	do	do	24
Mar. 21	W. B. Clapp and E. C. Murphy.	do	do	16.0
Apr. 29	W. B. Clapp	do	do	15.0
May 23	do	do	do	4.3
June 20	W. B. Clapp and W. V. Hardy.	do	do	2.0
July 23	E. C. La Rue	do	do	1.5
Aug. 20	do	do	do	1.6
Sept. 20	W. B. Clapp	do	do	2.8
Sept. 28	E. C. La Rue	do	do	3.6
Oct. 22	do	do	do	5.6
Nov. 19	do	do	do	8.3
Dec. 10	do	do	do	8.7

Weir measurements of San Antonio Creek at division dam, California, 1889–1891.

[Measurements by F. E. Trask.]

Date.	Discharge.	Date.	Discharge.
1889.	*Second-feet.*	1890.	*Second-feet.*
July 15	20.56	August 1	32.08
August 1	18.00	August 15	26.76
August 15	16.40	September 1	22.14
September 2	16.24	September 15	18.92
September 16	13.96	1891.	
October 1	13.32	July 15	20.10
October 17	13.94	August 1	16.67
November 2	23.70	August 15	16.26
December 2	33.02	September 13	12.26
1890.			
July 15	37.71		

Weir measurements at San Antonio Creek at division box, California, 1892–1903.

[Measurements by F. E. Trask.]

Date.	Discharge.	Date.	Discharge.
1892.	*Second-feet.*	1897.	*Second-feet.*
July 15	12.50	September 20	9.24
September 15	8.16	1898.	
November 19	7.09	July 5	5.24
1893.		August 1	4.72
August 14	14.30	September 5	4.24
August 30	12.72	1899.	
September 25	12.16	July 3	2.98
October 25	10.84	August 7	3.88
1894.		September 3	4.06
July 16	6.00	1900.	
1895.		July 1	4.36
July 15	18.48	August 6	3.54
August 22	16.78	September 1	3.22
September 7	14.20	1902.	
1896.		July 21	5.30
June 25	6.58	August 16	4.22
July 15	5.20	September 13	3.40
September 15	5.44	1903.	
1897.		August 10	9.40
July 6	17.24	August 16	7.66
August 16	10.82		

July 18, 1888, float measurement by F. E. Trask showed 22.12 second-feet discharge for entire creek above division. (Excludes Gurd water=0.4 second-feet. Gurd water purchased by the San Antonio Water Company, May, 1896, and diverted above division weir.)

Discharge measurements of San Antonio tunnel at the Portal, California, 1888–1904.

[Measurements by F. E. Trask.]

Date.	Discharge.	Date.	Discharge.
	Second-feet.		*Second-feet.*
1888.		1897.	
April 2	4.84	October 4	1.19
April 15	2.32	1898.	
October 10	.73	March 16	1.30
1889.		April 4	1.30
January 10	1.61	May 4	1.21
May 31	1.33	June 6	1 42
June 17	1.26	July 5	1.23
July 15	.91	August 1	1.12
August 15	.61	September 5	1.06
September 2	.61	October 2	.97
October 1	.57	November 6	1.02
November 2	.86	December 5	1.05
December 2	.81	1899.	
1890.		January 3	1.08
January 27	5.58	May 1	1.09
June 12	2.57	July 3	.97
July 15	2.49	August 7	.95
August 15	2.23	December 31	1.24
September 15	1.36	1900.	
1891.		February 1	1.14
July 15	4.93	March 5	1.07
August 15	3.55	April 1	1.01
September 15	2.74	May 7	1.00
1892.		July 1	1.00
July 16	3.49	October 8	1.00
September 15	2.98	1902.	
1893.		June 28	1.35
July 15	5.03	July 5	1.32
1894.		August 2	1.19
May 11	2.72	September 6	1.14
July 16	2.75	October 4	1.08
1895.		1903.	
July 15	1.79	January 19	.92
August 22	1.53	March 16	1.29
September 7	1.45	April 24	4.86
1896.		July 29	1.51
June 25	1.62	August 24	1.25
July 15	1.52	October 6	.99
September 15	1.19	December 1	1.07
1897.		1904.	
January 25	1.93	January 22	1.07
July 19	2.08	February 8	1.07
August 2	1.72	April 6	2.32
September 6	1.32	May 28	1.60
		June 4	1.47

Natural flow of return water to Santa Ana River, in second-feet, compared with developed water in San Bernardino Valley above Colton, Cal., 1903–4.

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

Date.	Location.	Developed.	Natural.	Total.
1903.		*Second-ft.*	*Second-ft.*	*Second-ft.*
September 9	Brown tract, artesian well	0.11	.....	0.11
September 4	Barnhill pumping plant	.80	.....	.80
1904.				
May 12	Barnhill pumping plant	.85	.....	.85
August 15	do	.77	.....	.77
1903.				
September 4	Bloomington pumping plant	8.82	.....	8.82
1904.				
May 12	Bloomington pumping plant	.00	.....	.00
August 17	do	5.61	.....	5.61
1903.				
August 17	Beam ditch	.....	0.08	.08
1904.				
June 4	Beam ditch	.....	.02	.02
August 20	do	.....	.00	.00
1903.				
September 4	City of Colton pumping plant	3.17	.....	3.17
1904.				
May 12	City of Colton (total all pumps)	3.00	.....	3.00
August 19	do	2.06	.....	2.06
1903.				
September 7	Cooley tract, artesian well	2.70	.....	2.70
August 22	Camp Carlton ditch	2.20	.....	2.20
1904.				
June 4	Camp Carlton ditch	2.50	.....	2.50
August 19	do	2.60	.....	2.60
1903.				
September 9	Daley ditch	.....	.00	.00
1904.				
June 4	Daley ditch	.....	.00	.00
August 20	do	.....	.00	.00
1903.				
August 18	Flume pump No. 1, Riverside Water Co.	4.08	.....	4.08

Natural flow of return water to Santa Ana River, in second-feet, etc.—Continued.

Date.	Location.	Developed.	Natural.	Total.
1904.		*Second-ft.*	*Second-ft.*	*Second-ft.*
May 31	Flume pump No. 1, Riverside Water Co.	1.79		1.79
July 29	do	2.99		2.99
1903.				
August 18	Flume pump No. 2, Riverside Water Co.	2.63		2.63
1904.				
May 31	Flume pump No. 2, Riverside Water Co.	1.76		1.76
July 29	do	2.52		2.52
1903.				
September 9	Garner tract, artesian well	.77		.77
August 21	Gage canal diversion		0.00	.00
1904.				
May 31	Gage canal diversion		.00	.00
August 15	do		.00	.00
1903.				
August 21	Gage canal, Palm avenue weir	30.82		30.82
1904.				
May 31	Gage canal, Palm avenue weir	27.80		27.80
August 19	do	31.96		31.96
1903.				
September 9	Hurd tract, artesian wells	.21		.21
September 4	H. T. Hunter pumping plant	1.79		1.79
1904.				
June 2	H. T. Hunter pumping plant	1.82		1.82
August 17	do	1.54		1.54
1903.				
August 17	Haws & Talmadge ditch		.00	.00
1904.				
May 13	Haws & Talmadge ditch		.00	.00
August 15	do		.00	.00
1903.				
September 4	Johnson & Hubbard pumping plant	.42		.42
1904.				
June 2	Johnson & Hubbard pumping plant	.67		.67
August 17	do	.39		.39
1903.				
September 4	Lawson Well Co. pumping plant	.59		.59

Natural flow of return water to Santa Ana River, in second-feet, etc.—Continued.

Date.	Location.	Developed.	Natural.	Total.
1904.		*Second-ft.*	*Second-ft.*	*Second-ft.*
June 12	Lawson Well Co. pumping plant	0.65		0.65
August 15	do	.50		.50
1903.				
September 4	Lamb pumping plant	.24		.24
1904.				
May 12	Lamb pumping plant	.25		.25
August 15	do	.25		.25
1903.				
August 22	Logsden & Farrell ditch		0.00	.00
1904.				
June 4	Logsden & Farrell ditch		.00	.00
August 3	do		.00	.00
1903.				
September 1	Meeks & Daley ditch		12.87	12.87
1904.				
May 31	Meeks & Daley ditch		16.30	16.30
August 3	do		16.75	16.75
1903.				
September 9	McIntyre ditch		.00	.00
1904.				
August 15	McIntyre ditch		.00	.00
1903.				
August 17	McKenzie ditch		.00	.00
1904.				
May 13	McKenzie ditch	.67		.67
August 12	do	.58		.58
1903.				
August 18	Riverside Water Co., mill flume		.00	.00
1904.				
May 31	Riverside Water Co., mill flume		2.68	2.68
July 29	do		.00	.00
1903.				
September 4	Orange Land and Water Co	1.08		1.08
1904.				
May 12	Orange Land and Water Co	1.14		1.14
August 17	do	1.12		1.12

Natural flow of return water to Santa Ana River, in second-feet, etc.—Continued.

Date.	Location.	Developed.	Natural.	Total.
1903.		*Second-ft.*	*Second-ft.*	*Second-ft.*
September 7	Rancheria pumping plant	1.09		1.09
1904.				
May 12	Rancheria pumping plant	1.46		1.46
August 17	do	1.30		1.30
1903.				
September 1	Riverside Water Co., upper canal	23.89	32.01	55.90
1904.				
May 31	Riverside Water Co., upper canal	29.44	12.96	42.40
July 29	do	19.85	18.28	38.13
1903.				
September 4	Riverside Highland Water Co.'s pumping plant, Lytle Creek.	8.98		8.98
1904.				
May 12	Riverside Highland Water Co.'s pumping plant, Lytle Creek.	7.92		7.92
August 17	do	2.00		2.00
May 12	Riverside Highland Water Co., Santa Ana River.	.00		.00
August 19	do	6.43	.42	6.85
1903.				
August 17	Rabel dam ditch		.00	.00
1904.				
May 13	Rabel dam ditch		.00	.00
August 15	do		.00	.00
1903.				
August 19	River ditch pump, Riverside Water Co.	5.79		5.79
1904.				
May 21	River ditch pump (pumps Nos. 1 and 2)	9.33		9.33
August 23	River ditch pump	9.14		9.14
1903.				
August 19	C. W. Rogers pumping plant	4.44		4.44
1904.				
May 31	C. W. Rogers pumping plant	.00		.00
August 15	do	.00		.00
1903.				
August 17	Shay & Stout ditch	.00		.00
1904.				
May 13	Shay & Stout ditch	.00		.00
August 15	do	.00		.00

Natural flow of return water to Santa Ana River, in second-feet, etc.—Continued.

Date.	Location.	Developed.	Natural.	Total.
1903.		*Second-ft.*	*Second-ft.*	*Second-ft.*
September 7	Swamp ditch		0.42	0.42
1904.				
June 4	Swamp ditch		.51	.51
August 12	do		.47	.47
1903.				
September 9	Wozencraft tract, artesian well	0.23		.23
August 22	Whitlock ditch		.00	.00
1904.				
June 4	Whitlock ditch		.00	.00
August 20	do		.00	.00
1903.				
August 21	Ward & Warren ditch	1.44	.17	1.61
1904.				
June 4	Ward & Warren ditch		.00	.00
August 20	do		.00	.00
1903.				
August 17	Whiting ditch		.00	.00
1904.				
June 4	Whiting ditch		.00	.00
August 20	do		.00	.00
1903.				
August 19	West Riverside, 350-Inch Water Co	3.41		3.41
1904.				
May 21	West Riverside, 350-Inch Water Co	6.52		6.52
August 19	do	5.35		5.35
May 12	Merryfield pumping plant	.90		.90
August 5	do	.80		.80
May 12	Grand Terrace Pumping Co. pumping plant.	.34		.34
August 17	do	.34		.34
May 31	Riverside Water Co. mill pump, Colton.	1.32		1.32
July 29	do	1.38		1.38
May 31	City of San Bernardino	.82	1.87	2.69
August 17	do	1.02	1.79	2.81
May 21	Rosedale Water Co	.60		.60
August 12	do	.50		.50
August 12	Carr pumping plant	.72		.72
August 17	Lytle Creek Water and Improvement Co.	4.00		4.00
May 21	Mount Vernon Water Co		.91	.91
August 17	do		.91	.91

Return waters in San Bernardino Valley below Slover Mountain and above Riverside Narrows, 1903 and 1904.

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

Date.	Location.	Developed.	Natural.	Total.
1903.		*Second-ft.*	*Second-ft.*	*Second-ft.*
August 20	Alvitriz ditch at intake, West Riverside Bridge.	.....	3.10	3.10
1904.				
May 13	Alvitriz ditch at intake, West Riverside Bridge.	.....	1.63	1.63
August 8	....do.....	.....	2.23	2.23
1903.				
August 21	Evans ditch No. 1 at intake, Riverside County line.	.....	.81	.81
1904.				
May 16	Evans ditch No. 1 at intake, Riverside County line.	.....	2.53	2.53
August 11	....do.....	.....	.00	.00
1903.				
August 22	Evans ditch No. 2 at intake, 1 mile below Riverside County line.	.....	.70	.70
1904.				
May 16	Evans ditch No. 2 at intake, 1 mile below Riverside County line.	.....	2.03	2.03
August 11	....do.....	.....	1.31	1.31
1903.				
August 20	Evans Island ditch under west end of West Riverside Bridge.	.....	4.71	4.71
1904.				
May 13	Evans Island ditch under west end of West Riverside Bridge.	.....	3.43	3.43
August 8	....do.....	.....	.00	.00
June 2	Evans well ditch, Santa Ana street.....	0.51	.....	.51
August 8	....do.....	.04	.....	.04
June 3	Evans pipe line to Chino Gardens, at headworks.	.....	1.41	1.41
August 8	....do.....	.....	.00	.00
August 8	Evans pumping plant, 1,000 feet south of west end of West Riverside Bridge.	3.03	.....	3.03
August 18	Evans Jurupa pumping-plant weir, end of force main.	2.00	.....	2.00
1903.				
August 21	Lower canal Riverside Water Co., at head.	.....	2.05	2.05
1904.				
May 21	Lower canal Riverside Water Co., at head.	.....	3.15	3.15
August 11	....do.....	.....	.39	.39

Return waters in San Bernardino Valley below Slover Mountain, etc.—Continued.

Date.	Location.	Developed.	Natural.	Total.
1903.		*Second-ft.*	*Second-ft.*	*Second-ft.*
August 21	Rubidoux canal at head	1.74	4.78	6.52
1904.				
May 16	Rubidoux canal at head		6.49	6.49
August 8	do		2.82	2.82
June 3	Ferris Gallagher ditch near head		1.72	1.72
August 8	do		1.71	1.71
June 3	Gallagher ditch near headworks		.86	.86
August 18	do		.92	.92
August 18	Cuttle's pumping-plant weir at end of force main.	2.45		2.45
June 3	Jurupa pumping plant to supply Rubidoux ditch.	.00		.00
August 11	do	4.35		4.35
May 16	Riverside Power Co.'s canal near River Narrows.		38.30	38.30
August 18	do		29.50	29.50
August 8	Soquel ditch		1.49	1.49
August 8	Spanishtown pumping-plant weir at end of force main.	3.22		3.22
August 8	Spring Brook pumping-plant weir at end of force main.		4.84	4.84
June 3	Zimmerman pipe line at intake, near dam.		.00	.00
August 8	do		1.08	1.08
1903.				
August 25	Santa Ana River at Narrows		40.70	40.70

SAN FRANCISCO BAY DRAINAGE BASIN.

Sacramento River, rising in northern California and flowing south, and San Joaquin River, rising in the southern Sierras and flowing northeast, drain the western slope of the Sierra Nevada, traverse what is often called the Valley of California, and meet near Suisum Bay, finally discharging their waters into the Pacific Ocean through San Francisco Bay.

Sacramento River derives its water supply largely from Mount Shasta and the surrounding high ranges in the extreme northern portion of California. The stream does not have the same regular annual fluctuations that characterize the rivers discharging from the higher Sierra Nevada, since a large part of its basin is not at an elevation sufficient to cause the winter snows to remain unmelted until the sum-

mer months. The greatest floods of this basin usually occur in January and February, when the snow is accompanied or followed by rain.

San Joaquin River is divided into two distinct parts. The valley portion forms the central drainage line of San Joaquin Valley, and during the spring is navigable for a hundred miles or more. Stanislaus, Tuolumne, and King rivers are the largest affluents of this portion of the stream. Its valley is fertile and almost destitute of timber. The mountainous portion of the stream drains the western slopes of the Sierra Nevada between Yosemite National Park and Mount Goddard, the crest of its divide reaching on the north an elevation of 13,000 feet in Mount Lyell, and an elevation of 14,000 feet in Mount Goddard. The resulting steep grades of this river offer exceptional opportunities for water-power developments, and the high elevations of the basin insure a well-sustained summer flow from perpetual snow banks.

The following streams are tributary to either Sacramento or San Joaquin rivers:

Cache Creek is the outlet of Clear Lake, in Lake County, Cal. Flowing southeasterly, its flood waters find their way into Sacramento River between the mouths of Feather and American rivers. In 1889 Clear Lake was segregated as a reservoir site, as described in the Thirteenth Annual Report, part 3, pages 405–409. During 1900 a hydrographic examination of the entire basin of Cache Creek was made by A. E. Chandler, whose detailed report has been published as Water-Supply Paper No. 45.

Feather River is the second largest tributary of Sacramento River, Pit River being the first. Its basin line follows the crest of the Sierra Nevada for about 130 miles. The rainfall in this basin is large; the mean for nineteen years at Mumfords Hill, Plumas County, is 71.64 inches; the rainfall for the year 1889–90 at this point reached 138.85 inches. The water collected by the river when rains are general sometimes causes tremendous freshets, usually of short duration. The river has at such times overtopped its right bank and overflowed the plain lands to the north of Sutter Buttes. This occurred even before the great reduction of waterway below the mouth of Yuba River. The channel of the river below its junction with the Yuba has become the repository of so much mining débris that its bed has become nearly filled. Its bottom is almost at the heights of its former banks, and levees have been built to prevent overflowing. Only a comparatively small portion of the summer flow of this stream is used for irrigation, though the possibilities of irrigation and power development are great.

There are some excellent reservoir sites on the upper tributaries of the North Fork of the Feather. This stream is fed in part by large

springs, one of which, in Big Meadows, was flowing 109 cubic feet per second in September, 1902, and another 64 cubic feet per second.

Stony Creek drains 760 square miles of the eastern slopes of the Coast Range. After reaching the Sacramento Valley it flows north for a number of miles, contrary to the general drainage, and then turns east and enters Sacramento River below Vina, Cal. A large portion of the basin near the heads of the stream is heavily covered with commercial timber. There are a number of good reservoir sites on this stream and its tributaries.

Tuolumne River rises on the western slope of the Sierra Nevada in California and drains the country between Stanislaus River on the north and Merced River on the south. The northern half of Yosemite National Park includes a portion of the drainage basin of this stream. The river is fed largely from small mountain lakes occurring high in the drainage basin, where the snow remains on the mountain slopes throughout the year, thus insuring a large run-off. The stream has a heavy fall, and the opportunities for power development are numerous. There are also a number of reservoir sites in the basin where flood water could be stored for use during the irrigation season. The Tuolumne is an important tributary of the San Joaquin.

Merced River above Merced Falls drains approximately 1,090 square miles of the western slopes of the Sierra Nevada. There are included in the eastern portion of its drainage area a large number of high peaks, the highest, Mount Lyell, reaching an elevation of 13,042 feet. Its basin lies south of that of the Tuolumne, the courses of the two streams being nearly parallel.

King River rises on the western slope of the Sierra Nevada, in Fresno County, Cal. The waters coming from the high catchment basin are probably of greater value for irrigation purposes than those of any other stream in central California, being used for raising grapes and deciduous fruits in the neighborhood of Fresno, Selma, and Hanford. The summer flow of the river is now entirely diverted, and during the dry season of the last few years the scarcity of water has caused many hardships. In the spring there is a large surplus, due to the melting of snows, which, if stored in suitable reservoirs, would bring larger areas under cultivation. The river has a relatively gentle grade, affording little opportunity for power development.

Tule River drains a portion of the western slope of the Sierra Nevada. Its basin has somewhat less run-off than that of Kaweah River, which joins it on the north, and is much less elevated and snow-covered than King River basin. The water of this stream is all appropriated during the irrigation season, and a portion is used in irrigating valuable orange lands in the vicinity of Portersville, Cal.

Kern River flows from the southern end of the Sierra Nevada, being formed by two large tributaries, known as North and South forks.

These have a general southerly and parallel course and unite a short distance below the town of Kernville. The run-off from the drainage basin as a whole is notably less than that from the catchment areas to the north. This is probably due to the fact that a portion of the basin is to the east of the high crest, and is sheltered by the mountain mass from the rain-bearing winds. The waters of Kern River are almost completely used for irrigation by the large canals in the southern end of the San Joaquin Valley. The greater part of the land is included in large holdings owned by the Kern County Land Company or by the Miller and Lux estate. The winter waters are in part stored by the Miller and Lux estate in Buena Vista Lake, into which the river naturally discharges. The waters of this lake are controlled by a system of levees, so that they can be used during the following summer to irrigate lands lying to the northwest. This lake is very broad and shallow, and there is great loss by evaporation, so that as a matter of economy it would be desirable to hold this water in the upper mountain valleys. This would afford also a large supply for water power.

The fall of Kern River is sufficiently large for the development of a considerable amount of water power.

The following pages give the results of data collected in the San Francisco Bay drainage basin during 1904:

PUTA CREEK NEAR GUENOC, CAL.

This station was established on February 12, 1904. It is located about 1 mile below the town of Guenoc and at the Guenoc dam site. The gage is made of 2 by 6 inch plank, and is graduated to feet and tenths. There are two sections of the gage, both being fastened to trees. These gages are about 500 feet upstream from the station, and are read once a day at ordinary stages of the creek and twice each day, in times of high water, by Mrs. Irene Asbill, the observer. Discharge measurements are made from a car and cable. An auxiliary cable has been placed 150 feet downstream parallel to the large one, so that float measurements can be easily made in times of very high water. The initial point for soundings is the eyebolt to which the cable is fastened on the left bank. The channel is straight for 250 feet above and below the station. At ordinary and low-water stages the velocity is moderate. The left bank is high and is not subject to overflow. For gage readings above 20 feet the water spreads over a bench on the right side, but does not overflow the bank. The bed of the stream is composed of gravel and is not subject to any material change. The bench mark is a spike driven in the root of the tree to which the upper section of the gage is fastened, and its elevation is 16.44 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Puta Creek near Guenoc, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
February 12	S. G. Bennett	12.0	12,721
February 12	do	13.7	14,536
July 12	W. B. Clapp	3.62	14.7
August 22	do	3.50	9.5
November 15	O. W. Peterson	4.27	107

Mean daily gage height, in feet, of Puta Creek near Guenoc, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	5.70	5.65	4.60	3.90	3.70	(3.60)	(3.50)	3.60	3.70	3.90
2	.....	.....	5.55	5.45	4.50	(3.90)	3.70	3.60	3.50	3.60	3.70	4.00
3	.....	.....	5.35	5.35	4.50	3.90	3.70	3.60	3.50	3.60	3.80	4.00
4	.....	.....	5.15	5.20	4.50	3.90	(3.70)	(3.60)	3.50	3.60	3.80	4.10
5	.....	.....	5.10	5.10	4.40	3.90	3.70	3.60	3.50	3.50	3.80	4.10
6	.....	.....	5.05	5.00	4.40	(3.90)	3.70	(3.60)	3.50	3.50	3.90	4.10
7	.....	.....	5.15	4.90	4.30	(3.90)	(3.70)	3.60	3.50	3.50	3.90	4.00
8	.....	.....	5.45	4.80	4.30	3.90	3.70	(3.60)	3.50	3.70	3.80	4.00
9	.....	.....	5.35	4.80	4.30	3.80	3.70	3.50	(3.50)	4.70	3.80	3.90
10	.....	.....	16.65	4.70	4.20	3.80	3.60	(3.50)	3.50	5.40	3.80	3.90
11	.....	.....	8.00	4.70	4.20	(3.80)	3.60	(3.50)	3.50	5.00	3.80	3.90
12	.....	9.20	6.45	4.60	4.20	3.80	(3.60)	3.50	(3.50)	4.50	3.80	3.90
13	.....	6.50	5.85	4.60	4.20	(3.80)	3.60	3.50	3.50	4.30	3.80	4.00
14	.....	5.80	7.20	4.70	4.20	3.80	3.60	(3.50)	3.50	4.20	3.80	4.00
15	.....	14.40	6.20	4.70	4.10	3.70	(3.60)	(3.50)	3.50	4.20	4.20	4.00
16	.....	9.10	5.65	4.60	4.10	3.70	3.60	(3.50)	3.50	4.20	4.10	3.90
17	.....	6.60	9.70	4.60	4.10	3.70	3.60	(3.50)	3.50	4.20	4.00	3.90
18	.....	5.85	7.85	(5.10)	4.10	(3.70)	3.60	(3.50)	3.50	4.20	4.00	3.90
19	.....	5.50	8.75	5.60	4.00	3.70	3.60	(3.50)	3.50	4.10	4.00	4.00
20	.....	5.25	6.90	5.10	4.00	3.70	3.60	(3.50)	3.50	4.10	3.90	4.00
21	.....	5.30	6.20	4.80	4.00	3.70	3.50	(3.50)	3.50	4.10	3.90	4.00
22	.....	6.95	6.00	4.80	4.00	3.70	3.60	3.50	3.50	4.00	3.90	4.10
23	.....	5.75	6.35	4.70	4.00	(3.70)	3.60	3.50	3.50	4.00	3.90	4.10
24	.....	13.35	6.05	4.60	4.00	(3.70)	3.60	(3.50)	3.80	3.90	3.80	4.10
25	.....	6.85	5.80	4.60	4.00	3.70	(3.60)	3.50	3.90	3.90	3.80	4.10
26	.....	9.25	5.95	4.70	(4.00)	3.70	(3.60)	3.50	3.80	3.80	3.80	4.20
27	.....	7.45	6.80	4.70	(4.00)	(3.70)	3.60	3.50	3.60	3.80	3.80	4.20
28	.....	6.25	9.10	4.80	4.00	(3.70)	3.60	3.50	3.60	3.80	3.80	4.20
29	.....	6.00	7.25	4.70	4.00	3.70	3.60	(3.50)	(3.60)	3.80	3.80	4.20
30	.....	.....	6.25	4.60	4.00	3.70	3.60	3.50	3.60	3.80	3.90	12.75
31	.....	.....	5.85	.....	4.00	.....	3.60	3.50	.....	3.70	.....	11.25

NOTE.—Gage heights in parenthesis are estimated.

Rating table for Puta Creek near Guenoe, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
3.50	9.5	5.00	310	6.50	1,200	9.00	5,000
3.60	14	5.10	350	6.60	1,300	9.20	5,400
3.70	22	5.20	400	6.70	1,400	9.40	5,800
3.80	34	5.30	450	6.80	1,500	9.60	6,230
3.90	47	5.40	500	6.90	1,600	9.80	6,690
4.00	60	5.50	550	7.00	1,700	10.00	7,150
4.10	75	5.60	600	7.20	1,950	10.50	8,300
4.20	90	5.70	660	7.40	2,200	11.00	9,450
4.30	110	5.80	720	7.60	2,490	11.50	10,600
4.40	130	5.90	780	7.80	2,800	12.00	11,800
4.50	155	6.00	840	8.00	3,120	13.00	14,200
4.60	180	6.10	900	8.20	3,440	14.00	16,700
4.70	205	6.20	960	8.40	3,800		
4.80	240	6.30	1,040	8.60	4,200		
4.90	275	6.40	1,120	8.80	4,600		

Estimated monthly discharge of Puta Creek near Guenoc, Cal., for 1904.

[Drainage area, 91 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	60	60	[a]60	3,689	0.66	0.76
February	17,700	60	2,515	144,664	27.64	29.81
March	23,325	330	2,168	133,305	23.18	27.46
April	630	180	279	16,602	3.07	3.43
May	180	60	89	5,472	.98	1.13
June	47	22	31	1,845	.34	.38
July	22	14	16	984	.18	.21
August	14	9.5	11	676	.12	.14
September	47	9.5	13	774	.14	.16
October	500	9.5	80	4,919	.88	1.01
November	90	22	42	2,499	.46	.51
December	13,600	47	821	50,481	9.02	10.40
The year	23,325	9.5	510	365,910	5.61	75.40

[a] Estimated.

Evaporation record of Clear Lake at Lakeport, Cal., 1901–1904.

[D. C. Rumsey, observer.]

Month.	1901.		1902.		1903.		1904.	
	Evaporation in inches.		Evaporation in inches.		Evaporation in inches.		Evaporation in inches.	
	Lake.	Land.	Lake.	Land.	Lake.	Land.	Lake.	Land.
January	0.85	.....	0.85	0.85	0.50	0.60	0.95	0.85
February	.95	.....	.25	.30	.80	.75	.35	.35
March	2.40	.....	1.60	1.55	.65	.65	.50	.50
April	3.05	.....	2.60	2.35	2.18	2.36	1.95	2.10
May	3.70	.....	4.00	3.70	5.12	5.74	4.60	5.05
June	3.95	.....	4.65	5.15	5.25	7.56	7.00	7.40
July	5.15	.....	6.65	7.40	6.33	8.37	7.45	8.60
August	5.00	.....	4.40	4.95	7.00	7.77	7.15	7.85
September	3.35	[a]1.6	4.10	4.40	5.12	5.09	4.85	5.05
October	2.30	2.45	1.95	1.85	2.65	2.45	2.05	2.30
November	.85	1.05	.45	.45	1.07	1.05	1.25	1.35
December	1.30	.95	.40	.45	.92	.79	.75	.75
Annual	32.85	6.05	31.90	33.40	37.59	43.18	38.85	42.15

[a] September 15 to 29.

CACHE CREEK AT LOWER LAKE, CAL.

This station was established January 1, 1900, by S. G. Bennett. The original gage was located at the wagon bridge, from which discharge measurements were made. On March 26, 1903, a cable was installed 300 feet above the bridge, and a new gage was established 100 feet above the cable. The present gage is a vertical 1 by 3 inch plank nailed to a 6 by 6 inch timber driven into the bed of the river and fastened to a large willow tree on the left bank. On March 26, when the new gage was put in place, the reading was 5.7 feet. The old gage read 4.4 feet on the same date. The gage is read once each day by Mrs. J. R. Anderson. The initial point for soundings is a small tree in line with the cable on the left bank, 28 feet from the tree to which the cable is attached. The channel is straight for 150 feet above and for 300 feet below the station. The current has a moderate velocity at ordinary stages. The right bank is low and will overflow at a gage height of about 10 feet. It is covered with a thick growth of willow and oak trees for 100 feet back from the water's edge. The left bank is high and rocky and is not liable to overflow. The bed of the stream is composed of firm gravel and changes only slightly. Gravel is sometimes washed in from Siegler Creek, 300 feet below the cable. The bench mark is a nail in the root of the oak tree to which cable is fastened on the left bank. Its elevation is 8.32 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Cache Creek at Lower Lake, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 2	J. R. Anderson	3.50	194
January 9	do	3.60	206
January 16	do	3.60	210
January 23	do	3.70	238
January 31	do	3.70	239
February 6	do	3.80	250
February 12	do	4.48	277
February 13	do	4.30	363
February 21	do	5.30	633
February 24	do	7.58	281
February 27	do	7.40	1,108
March 5	do	7.90	1,286
March 12	do	10.50	2,412
March 19	do	11.40	2,759
March 23	do	11.60	3,275
March 26	do	11.50	3,009
March 28	do	12.00	2,700
April 17	do	10.50	2,631
April 24	do	10.00	2,363
May 2	do	9.50	2,008
May 7	do	8.80	1,774
May 14	do	8.20	1,550
May 20	do	7.20	1,238
May 28	do	6.55	1,026
June 4	do	6.15	924
June 11	do	5.80	842
June 18	do	5.60	780
June 27	do	5.30	678
July 4	do	5.10	598
July 9	do	4.85	500
July 16	do	4.70	473
July 23	do	4.50	419
July 30	do	4.35	407
August 6	do	4.20	359
August 13	do	4.10	325
August 21	W. B. Clapp	3.90	287
August 20	J. R. Anderson	3.90	282
August 27	do	3.80	260
September 3	do	3.60	231

Discharge measurements of Cache Creek at Lower Lake, Cal., in 1904—Continued.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
September 10	J. R. Anderson	3.55	201
September 17	do	3.45	180
September 24	do	3.35	160
October 1	do	3.40	166
October 8	do	3.30	149
October 15	do	3.50	191
October 23	do	3.40	168
October 30	do	3.40	164
November 5	do	3.30	145
November 13	do	3.25	137
November 20	do	3.30	142
November 26	do	3.20	128
December 4	do	3.25	129
December 11	do	3.25	122
December 17	do	3.30	130

Mean daily gage height, in feet, of Cache Creek at Lower Lake, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.50	3.70	7.80	12.10	9.50	6.30	5.15	4.30	3.70	3.40	3.30	3.30
2	3.50	3.70	7.90	12.10	9.40	6.25	5.15	4.25	3.65	3.40	3.30	3.30
3	3.50	3.70	7.95	12.00	9.30	6.30	5.10	4.25	3.65	3.40	3.30	3.30
4	3.60	3.80	7.95	11.90	9.20	6.15	5.10	4.20	3.60	3.35	3.30	3.25
5	3.55	3.75	a7.90	11.85	9.15	6.10	5.05	4.20	3.60	3.35	3.30	3.25
6	3.55	3.80	8.05	11.70	9.00	6.20	5.05	4.20	3.60	3.40	3.30	3.25
7	3.55	3.80	8.10	11.60	8.80	6.10	5.00	4.20	3.60	3.30	3.35	3.25
8	3.55	3.85	8.45	11.45	8.75	6.00	5.00	4.15	3.60	3.30	3.35	3.25
9	3.60	3.80	8.20	11.40	8.65	6.00	4.90	4.15	3.55	3.35	3.35	3.25
10	3.55	3.80	10.15	11.25	8.55	5.90	4.85	4.10	3.55	3.35	3.30	3.25
11	3.60	3.80	10.25	11.20	8.50	5.80	4.85	4.10	3.55	3.55	3.30	3.25
12	3.55	a4.55	a10.50	11.10	8.40	5.80	4.80	4.10	3.50	3.50	3.25	3.25
13	3.55	4.30	10.60	10.95	8.30	5.70	4.80	4.10	3.50	3.45	3.25	3.25
14	3.60	4.40	10.75	10.80	8.20	5.70	4.80	4.05	3.50	3.40	3.35	3.30
15	3.60	5.10	10.80	10.75	8.10	5.70	4.75	4.05	3.50	3.50	3.30	3.30
16	3.60	5.00	10.75	10.60	7.90	5.65	4.70	4.00	3.45	3.50	3.25	3.30
17	3.70	5.00	11.00	10.50	7.70	5.60	4.65	4.00	3.45	3.45	3.25	3.30
18	3.65	5.05	11.20	10.35	7.70	5.55	4.65	4.00	3.40	3.45	3.25	3.30
19	3.70	5.10	a11.40	10.50	7.40	5.50	4.60	3.90	3.40	3.45	3.25	3.30
20	3.70	5.20	11.65	10.45	7.25	5.50	4.60	3.90	3.40	3.40	3.25	3.30
21	3.70	5.30	11.55	10.25	7.10	5.50	4.55	3.90	3.40	3.40	3.25	3.30
22	3.70	5.45	11.60	10.30	7.00	5.50	4.55	3.90	3.40	3.40	3.25	3.30
23	3.70	5.60	11.60	10.10	6.90	5.40	4.50	3.85	3.40	3.40	3.25	3.30
24	3.70	a7.10	11.80	10.00	6.90	5.35	4.50	3.85	3.35	3.40	3.25	3.40
25	3.70	6.45	11.65	9.85	6.80	5.35	4.50	3.80	3.45	3.35	3.20	3.30
26	3.70	a7.40	a11.50	9.85	6.70	5.30	4.50	3.80	3.45	3.35	3.20	3.30
27	3.70	7.40	11.60	9.70	6.65	5.30	4.45	3.80	3.45	3.35	3.30	3.30
28	3.70	7.60	a12.80	9.70	6.55	5.25	4.45	3.80	3.45	3.35	3.30	3.25
29	3.70	7.70	12.00	9.60	6.50	5.20	4.40	3.75	3.40	3.35	3.30	3.30
30	3.70	.....	12.00	9.55	6.50	5.20	4.35	3.75	3.40	3.40	3.35	5.30
31	3.70	.....	12.00	.....	6.40	.....	4.30	3.70	.....	3.35	.....	4.10

a Gage height increased by backwater. Rating table not used. Discharge for day determined by meter measurement.

Rating table for Cache Creek at Lower Lake, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
3.20	126	4.70	475	6.20	910	8.40	1,640
3.30	147	4.80	500	6.30	940	8.60	1,710
3.40	168	4.90	525	6.40	970	8.80	1,780
3.50	189	5.00	550	6.50	1,000	9.00	1,850
3.60	210	5.10	580	6.60	1,030	9.20	1,930
3.70	231	5.20	610	6.70	1,060	9.40	2,010
3.80	253	5.30	640	6.80	1,090	9.60	2,100
3.90	276	5.40	670	6.90	1,120	9.80	2,200
4.00	300	5.50	700	7.00	1,150	10.00	2,300
4.10	325	5.60	730	7.20	1,220	10.50	2,600
4.20	350	5.70	760	7.40	1,290	11.00	2,900
4.30	375	5.80	790	7.60	1,360	11.50	3,250
4.40	400	5.90	820	7.80	1,430	12.00	3,600
4.50	425	6.00	850	8.00	1,500		
4.60	450	6.10	880	8.20	1,570		

Estimated monthly discharge of Cache Creek at Lower Lake, Cal., for 1904.

[Drainage area, 500 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1904.						
January	231	189	216	13,281	0.43	0.50
February	1,395	231	541	31,119	1.08	1.16
March	3,600	1,286	2,588	159,130	5.18	5.97
April	3,680	2,075	2,801	166,671	5.60	6.25
May	2,050	970	1,460	89,772	2.92	3.37
June	940	610	762	45,342	1.52	1.70
July	595	375	483	29,699	.97	1.12
August	375	231	302	18,569	.60	.69
September	231	158	188	11,187	.38	.42
October	200	147	168	10,330	.34	.39
November	158	126	143	8,509	.29	.32
December	640	136	165	10,145	.33	.38
The year	3,680	126	818	593,754	1.64	22.27

CACHE CREEK NEAR YOLO, CAL.

This station was established January 1, 1903, by S. G. Bennett. It is located at the wagon bridge on the road from Woodland to Yolo, about 1,000 feet above the Southern Pacific Railway bridge. The gage is a 2 by 12 inch vertical plank nailed to the upstream side of the right abutment. It is read twice each day by John Woodard. Discharge measurements are made from the downstream side of the bridge, to which the gage is attached. The initial point for soundings is the end of the bridge on the right bank. The channel is straight for 1,000 feet above and below the station. The current is swift at ordinary and high stages. The banks are steep and wooded and their height has been increased by levees. They are said to overflow at extreme high water. The bed of the stream is composed of earth and gravel, with a little sand, and is not subject to any material change. On December 4, 1904, this station was reestablished by O. W. Peterson. A new bridge which has been erected greatly improves the conditions. The gage is in four sections, three of which are above the bridge and the fourth is bolted to the face of the concrete abutment on the right bank. The gages are made of 3 by 8-inch timber, painted white and graduated to feet and tenths. The gage datum remains the same as before.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Cache Creek near Yolo, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 28	W. B. Newhall	2.40	283
February 10	F. W. Huber	2.50	371
February 16	do	14.25	8,770
February 17	do	9.65	4,782
February 17	do	8.25	4,124
February 18	do	6.35	3,514
February 19	do	5.55	2,772
March 11	S. G. Bennett	17.80	8,300
March 12	do	12.10	5,195
April 9	W. B. Newhall	8.20	3,714
June 17	O. W. Peterson	3.75	724
July 13	do	2.90	435
August 10	do	2.30	210
October 4	do	1.80	111
December 4	do	2.05	148
December 10	do	2.05	150

Mean daily gage height, in feet, of Cache Creek near Yolo, for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.10	2.30	7.85	9.70	6.50	4.30	3.00	2.20	1.50	(1.80)	2.00	2.15
2	2.10	2.35	7.30	9.45	6.40	4.20	3.00	2.20	1.50	1.80	2.00	2.10
3	2.10	2.45	7.05	9.15	6.35	4.15	3.00	2.10	1.50	1.80	2.00	2.10
4	2.10	2.50	6.85	8.90	6.30	4.10	2.95	2.10	1.50	1.80	1.90	2.05
5	2.10	2.60	6.65	8.65	6.20	4.00	2.90	2.10	1.50	1.80	1.90	2.05
6	2.10	2.60	6.45	8.45	6.15	3.95	2.90	2.00	1.50	1.80	1.90	2.05
7	2.10	2.60	6.35	8.30	6.05	3.90	2.90	2.00	1.50	1.70	1.90	2.05
8	2.10	2.55	6.30	8.20	6.00	3.80	2.90	2.00	1.50	1.70	1.90	2.05
9	2.10	2.50	6.20	8.10	5.85	3.75	2.80	2.00	1.50	1.70	1.90	2.05
10	2.10	2.50	14.75	8.00	5.80	3.70	2.80	1.90	1.50	3.00	1.90	2.05
11	2.10	2.50	20.75	7.90	5.70	3.60	2.80	1.90	[a](1.50)	5.05	1.80	2.05
12	2.10	5.95	12.00	7.80	5.65	3.55	2.80	1.90	(1.50)	4.10	1.80	2.15
13	2.10	9.25	10.75	7.70	5.60	3.50	2.70	1.90	(1.50)	3.45	1.80	2.15
14	2.10	5.50	10.60	7.60	5.50	3.50	2.70	1.80	(1.50)	3.00	1.80	2.15
15	2.10	5.25	10.50	7.50	5.40	3.50	2.65	1.80	(1.50)	2.65	1.80	2.10
16	2.10	16.75	10.40	7.40	5.35	3.40	2.60	1.80	(1.50)	2.45	1.70	2.10
17	2.10	8.75	11.65	7.40	5.30	3.40	2.60	1.70	(1.50)	2.30	1.70	2.10
18	2.10	7.00	16.50	7.30	5.20	3.40	2.60	1.70	(1.50)	2.30	1.70	2.10
19	2.50	5.80	11.75	7.20	5.15	3.40	2.55	1.70	(1.50)	2.20	1.70	2.10
20	2.40	5.10	10.55	7.10	5.10	3.30	2.50	1.70	(1.50)	2.20	1.70	2.10
21	2.40	4.90	10.25	7.00	5.00	3.30	2.50	1.70	(1.50)	2.20	1.70	2.10
22	2.40	11.00	10.10	6.90	4.95	3.30	2.40	1.70	(1.60)	2.10	1.70	2.10
23	2.40	14.75	11.00	6.85	4.90	3.20	2.40	1.70	(1.70)	2.10	1.70	2.15
24	2.30	16.50	9.80	6.80	4.80	3.20	2.40	1.70	(1.70)	2.10	1.90	2.15
25	2.30	7.50	9.80	6.80	4.75	3.20	2.40	1.70	(1.90)	2.10	1.90	2.15
26	2.30	13.00	9.65	6.70	4.70	3.20	2.35	1.70	(1.90)	2.10	1.90	2.10
27	2.30	16.50	9.50	6.70	4.60	3.10	2.30	1.70	(1.90)	2.10	1.90	2.10
28	2.30	9.60	16.75	6.60	4.55	3.10	2.30	1.70	(1.80)	2.00	1.90	2.10
29	2.30	8.60	14.50	6.60	4.50	3.10	2.30	1.60	(1.80)	2.00	2.20	2.05
30	2.20	.....	11.70	6.50	4.40	3.10	2.30	1.60	(1.80)	2.00	2.20	2.30
31	2.20	.....	10.40	.....	4.35	.....	2.20	1.60	.....	2.00	.....	15.20

[a] Gage destroyed. From September 11 to October 1 gage heights determined by comparison with those on Stony Creek.

Rating table for Cache Creek near Yolo, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.00	22	2.60	305	4.20	980	6.60	2,420
1.10	30	2.70	340	4.30	1,030	6.80	2,560
1.20	40	2.80	375	4.40	1,080	7.00	2,700
1.30	50	2.90	410	4.50	1,130	7.20	2,850
1.40	60	3.00	445	4.60	1,185	7.40	3,000
1.50	70	3.10	495	4.70	1,240	7.60	3,150
1.60	82	3.20	535	4.80	1,295	7.80	3,300
1.70	96	3.30	575	4.90	1,350	8.00	3,450
1.80	110	3.40	615	5.00	1,405	8.50	3,825
1.90	125	3.50	655	5.20	1,525	9.00	4,200
2.00	140	3.60	700	5.40	1,645	9.50	4,600
2.10	160	3.70	745	5.60	1,770	10.00	5,000
2.20	180	3.80	790	5.80	1,900	11.00	5,900
2.30	205	3.90	835	6.00	2,030	12.00	6,800
2.40	235	4.00	880	6.20	2,160	14.00	8,600
2.50	270	4.10	930	6.40	2,290	16.00	10,500

Estimated monthly discharge of Cache Creek near Yolo, Cal., for 1904.

[Drainage area, 1,280 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	270	160	183	11,252	0.14	0.16
February	11,250	205	3,166	182,110	2.47	2.66
March	15,250	2,160	5,591	343,777	4.37	5.04
April	4,760	2,355	3,188	189,699	2.49	2.78
May	2,355	1,055	1,656	101,824	1.29	1.49
June	1,030	495	681	40,522	.53	.59
July	445	180	316	19,430	.25	.29
August	180	82	117	7,194	.09	.10
September	125	70	82	4,879	.06	.07
October	1,435	96	254	15,618	.20	.23
November	180	96	120	7,140	.09	.10
December	9,700	150	469	28,838	.37	.43
The year	15,250	70	1,319	952,283	1.03	13.94

STONY CREEK NEAR FRUTO, CAL.

This station was established on January 30, 1901, by Burt Cole. It is located at Julian's ranch, 6 miles northwest of Fruto, and 1¾ miles above the proposed Mill Site dam. The gage is in two sections. The low-water gage, which is bolted to the rock, is a 2 by 8 inch plank and is graduated to feet and tenths. The high-water gage is a 6 by 6 inch timber painted white and graduated to feet and tenths. The gage is read twice each day by W. H. Julian. Discharge measurements are made from a car and cable. The initial point for soundings is the eye-bolt on the left bank to which the cable is attached. The channel is straight for 200 feet above and 200 feet below the cable. The current is very swift at high water and sluggish at low water. Neither bank is subject to overflow, but at high stages of the creek the water spreads to the right for several hundred feet. The bed of the stream is of gravel and is subject to some change. The bench mark is the head of an iron bolt set in the rock near the upper gage at an elevation of 14.00 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Stony Creek near Fruto, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 27	W. B. Newhall	4.25	321
February 10	F. W. Huber	4.2	293
February 18	W. B. Newhall	7.25	2,507
February 25	F. W. Huber	10.15	7,001
February 26	do	8.85	5,387
February 26	do	11.35	12,447
April 8	A. C. Lootz	6.6	2,050
April 8	do	6.6	2,009
April 9	do	6.6	1,943
April 10	do	6.5	1,986
April 11	do	6.5	2,069
June 15	O. W. Peterson	4.2	202
July 13	do	3.63	63
August 9	do	3.5	16
October 3	do	3.5	44

Mean daily gage height, in feet, of Stony Creek near Fruto, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.20	4.10	7.20	7.35	5.50	4.50	3.50	3.30	3.20	3.40	3.50	3.90
2	4.20	4.10	7.20	7.25	5.50	4.50	3.50	3.30	3.20	3.40	3.50	3.90
3	4.20	4.10	7.10	7.00	5.50	4.50	3.50	3.30	3.20	3.50	3.50	3.90
4	4.20	4.10	7.05	6.80	5.50	4.40	3.50	3.30	3.20	3.50	3.50	3.90
5	4.20	4.60	6.75	6.70	5.40	4.40	3.50	3.30	3.20	3.50	3.50	3.90
6	4.20	4.35	6.85	6.60	5.40	4.40	3.50	3.30	3.20	3.50	3.50	3.90
7	4.20	4.30	7.55	6.50	5.40	4.30	3.50	3.30	3.20	3.50	3.50	3.90
8	4.20	4.30	7.65	6.60	5.30	4.30	3.50	3.30	3.20	3.50	3.50	3.90
9	4.20	4.30	7.25	6.60	5.30	4.30	3.50	3.30	3.20	3.60	3.50	4.10
10	4.20	4.20	13.25	6.60	5.30	4.20	3.50	3.30	3.20	3.60	3.50	4.20
11	4.40	4.20	9.25	6.60	5.30	4.20	3.50	3.30	3.20	6.55	3.50	4.30
12	4.30	9.00	7.85	6.50	5.30	4.10	3.50	3.30	3.20	5.50	3.50	4.30
13	4.20	6.25	7.35	6.40	5.30	4.10	3.50	3.30	3.20	5.00	3.50	4.50
14	4.20	5.45	8.65	6.30	5.20	4.00	3.50	3.30	3.20	4.00	3.50	4.50
15	4.20	8.25	8.00	6.20	5.20	4.00	3.50	3.30	3.20	3.80	3.60	4.30
16	4.20	12.25	7.60	6.00	5.20	3.90	3.50	3.30	3.20	3.80	3.60	4.20
17	4.40	8.25	10.50	5.90	5.10	3.90	3.40	3.30	3.20	3.70	3.70	4.10
18	4.40	7.20	9.75	5.80	5.10	3.90	3.40	3.30	3.20	3.70	3.70	4.00
19	4.40	6.65	8.85	6.10	5.10	3.80	3.40	3.30	3.20	3.70	3.70	4.00
20	4.40	5.85	8.90	5.80	5.00	3.80	3.40	3.30	3.20	3.60	3.70	4.00
21	4.30	7.85	8.00	5.70	5.00	3.80	3.40	3.20	3.20	3.60	3.70	3.90
22	4.30	11.75	7.45	5.70	4.90	3.70	3.40	3.20	3.30	3.60	3.70	3.90
23	4.30	8.85	7.20	5.60	4.90	3.70	3.40	3.20	3.40	3.60	3.70	3.90
24	4.30	13.50	6.95	5.50	4.90	3.60	3.30	3.20	3.40	3.50	3.70	4.30
25	4.30	10.00	6.80	5.50	4.80	3.60	3.30	3.20	3.60	3.50	3.70	4.20
26	4.30	10.00	6.65	5.50	4.80	3.50	3.30	3.20	3.60	3.50	3.70	4.20
27	4.20	9.05	8.35	5.60	4.80	3.50	3.30	3.20	3.60	3.50	4.10	4.20
28	4.20	7.90	10.50	5.60	4.80	3.50	3.30	3.20	3.50	3.50	4.00	4.10
29	4.20	7.40	9.35	5.60	4.70	3.50	3.30	3.20	3.50	3.50	3.90	4.10
30	4.20	.....	8.55	5.60	4.70	3.50	3.30	3.20	3.40	3.50	3.90	9.35
31	4.20	.....	7.30	.....	4.60	.....	3.30	3.20	.....	3.50	.....	7.40

Rating table for Stony Creek near Fruto, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
3.20	9	4.80	500	6.30	1,680	8.60	4,600
3.30	16	4.90	560	6.40	1,780	8.80	4,930
3.40	30	5.00	620	6.50	1,880	9.00	5,270
3.50	45	5.10	685	6.60	1,980	9.20	5,630
3.60	60	5.20	755	6.70	2,090	9.40	6,000
3.70	80	5.30	830	6.80	2,200	9.60	6,400
3.80	100	5.40	905	6.90	2,310	9.80	6,800
3.90	120	5.50	980	7.00	2,420	10.00	7,280
4.00	150	5.60	1,060	7.20	2,660	10.50	8,560
4.10	180	5.70	1,140	7.40	2,900	11.00	10,200
4.20	210	5.80	1,220	7.60	3,150	11.50	12,200
4.30	250	5.90	1,310	7.80	3,410	12.00	14,200
4.40	300	6.00	1,400	8.00	3,690	12.50	16,700
4.50	350	6.10	1,490	8.20	3,980	13.00	19,200
4.60	400	6.20	1,580	8.40	4,280	13.50	22,200
4.70	450						

Estimated monthly discharge of Stony Creek near Fruto, Cal., for 1904.

[Drainage area, 760 square miles.]

Month.	Discharge in second-feet			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	300	210	234	14,388	0.31	0.36
February	22,220	180	3,800	218,578	5.00	5.39
March	20,700	2,035	4,364	268,332	5.74	6.62
April	2,840	980	1,604	95,445	2.11	2.35
May	980	400	715	43,964	.94	1.08
June	350	45	165	9,818	.22	.25
July	45	16	34	2,091	.04	.05
August	16	9	14	861	.02	.02
September	60	9	19	1,131	.02	.02
October	1,930	30	167	10,268	.22	.25
November	180	45	71	4,225	.09	.10
December	5,905	120	453	27,854	.60	.69
The year	22,220	9	970	696,955	1.28	17.18

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 would 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 river stage rod used by commissioner of public works was still in place and has been used in making river height observations since January 28, 1902, the date upon which the observations were begun. A second set of gage rods were placed on the right bank 3,200 feet below the gaging station January 1, 1904, as no observer could be obtained to continue readings of the station gage. By synchronous readings of the lower gages and the station gage the actual gage readings for this lower gage have been converted into equivalent readings for the station gage. Frank Wilcox read the gage once each day. On September 28, 1904, it was necessary to move the lower gage rods to the left bank about 4,000 feet below the gaging station. The actual readings of this set of gage rods have also been converted into

equivalent readings for the station gage. The gage is read twice each day by Fred Weeks. All reported gage heights are those determined for the station gage. The river at this point in lower portion of Iron Canyon, 4 miles above Red Bluff, has a direct course for 2 or 3 miles. The width between banks at low water is about 500 feet. The depth of water at low stages averages 6 feet, with a maximum depth of 9 feet. The banks are steep and firm. The river flows in a bed of coarse gravel and cobbles, with here and there a small bowlder. The bed rock is lava. Discharge measurements are made from a cable 600 feet in span, which is anchored in a lava rock which forms the wall of the canyon.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Sacramento River near Red Bluff, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 23	W. B. Newhall	3.15	10,584
February 8	F. W. Huber	2.8	10,674
February 17	S. G. Bennett	15.2	72,400
February 29	A. C. Lootz	12.3	57,381
March 30	S. G. Bennett	15.08	66,657
April 1	A. C. Lootz	11.75	44,429
April 1	do	11.6	43,843
April 2	A. Buffinger	10.55	42,759
April 2	A. C. Lootz	10.7	42,329
April 4	do	10.98	46,231
April 4	do	10.94	44,665
April 5	do	10.2	39,509
April 6	do	10.18	39,671
April 6	do	9.8	39,053
June 13	O. W. Peterson	3.72	12,450
July 15	do	2.25	7,846
August 10	W. B. Clapp	1.7	6,055
September 27	O. W. Peterson	2.15	7,460
December 7	do	2.48	8,055

Mean daily gage height, in feet, of Sacramento River near Red Bluff, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.60	2.80	13.10	11.90	8.50	5.05	2.80	2.20	1.50	1.70	2.20	3.75
2	3.50	2.50	15.55	10.50	8.40	4.80	2.80	2.20	1.50	1.55	2.70	3.15
3	3.40	2.40	14.40	10.70	8.30	4.70	2.80	2.05	1.50	1.65	2.50	2.95
4	3.40	2.30	15.80	10.70	8.20	4.50	2.80	2.05	1.50	1.65	2.20	2.80
5	3.15	2.50	14.70	10.60	8.05	4.40	2.80	2.05	1.50	1.65	2.20	2.70
6	3.00	3.30	13.10	10.50	7.95	4.30	2.80	1.90	1.50	1.55	2.20	2.55
7	2.90	3.30	16.30	10.10	7.75	4.30	2.70	1.90	1.50	1.70	2.20	2.50
8	3.40	3.30	24.40	9.90	7.60	4.20	2.70	1.90	1.50	2.15	2.20	2.50
9	3.40	3.30	18.95	9.80	7.50	4.30	2.65	1.90	1.50	4.10	2.20	2.60
10	3.40	3.30	17.90	9.65	7.40	4.20	2.65	1.80	1.50	7.45	2.20	3.15
11	3.40	3.30	15.80	9.60	7.30	3.95	2.65	1.80	1.50	11.20	2.15	2.75
12	3.15	3.30	14.70	9.65	7.20	3.85	2.65	1.80	1.50	7.25	2.15	3.25
13	3.00	6.30	13.30	9.65	7.10	3.75	2.65	1.80	1.50	4.60	2.15	3.85
14	2.90	6.30	15.80	9.80	7.00	3.60	2.65	1.80	1.50	3.80	2.15	3.65
15	2.80	17.35	17.25	9.90	6.90	3.60	2.65	1.80	1.50	4.15	2.75	3.25
16	3.00	[a]28.00	18.30	9.80	6.80	3.60	2.65	1.80	1.50	3.55	3.40	3.15
17	3.40	15.20	(18.85)	9.90	6.65	3.60	2.50	1.65	1.50	3.35	2.80	2.90
18	5.25	11.20	19.40	10.60	6.55	3.50	2.50	1.65	1.50	2.95	3.15	2.90
19	5.25	9.55	18.30	10.95	6.30	3.40	2.50	1.65	1.50	2.75	3.00	3.00
20	4.30	9.90	19.40	10.40	6.10	3.40	2.40	1.65	1.50	2.60	3.00	3.10
21	3.95	12.50	16.20	10.40	6.20	3.40	2.40	1.65	1.50	2.50	2.90	3.20
22	3.70	20.30	13.50	9.35	6.30	3.15	2.40	1.65	1.50	2.45	2.75	(2.90)
23	3.50	16.60	12.40	8.80	6.45	3.00	2.40	1.65	3.40	2.35	2.60	2.55
24	3.40	19.15	11.50	8.30	6.30	2.90	2.40	1.65	4.30	2.20	2.50	5.70
25	3.15	19.15	10.40	8.20	6.20	2.80	2.40	1.50	3.30	2.20	2.50	5.65
26	3.15	16.80	8.80	8.30	6.10	2.80	2.30	1.50	2.30	2.20	2.50	3.80
27	3.15	17.80	11.50	10.40	6.00	2.80	2.30	1.50	2.05	2.15	3.70	3.35
28	3.15	12.85	14.70	10.70	5.90	2.80	2.30	1.50	1.90	2.10	3.35	3.20
29	3.15	13.40	18.20	10.30	5.70	2.80	2.30	1.50	1.80	2.10	2.90	3.35
30	3.15	.....	14.80	8.80	5.60	2.80	2.30	1.50	1.80	2.15	3.70	12.50
31	3.00	.....	13.00	.....	5.50	.....	2.20	1.50	.....	2.30	.....	13.70

[a] Gage height 9 a. m. Highest known gage height 31.00 same night.

NOTE.—Gage heights in parenthesis are estimated.

Rating table for Sacramento River near Red Bluff, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.00	4,450	3.50	11,700	6.00	21,100	12.50	52,600
1.10	4,690	3.60	12,040	6.20	21,940	13.00	55,600
1.20	4,930	3.70	12,380	6.40	22,780	13.50	58,600
1.30	5,170	3.80	12,720	6.60	23,620	14.00	61,700
1.40	5,410	3.90	13,060	6.80	24,460	14.50	64,900
1.50	5,650	4.00	13,400	7.00	25,300	15.00	68,200
1.60	5,920	4.10	13,760	7.20	26,180	15.50	71,600
1.70	6,190	4.20	14,120	7.40	27,060	16.00	75,100
1.80	6,460	4.30	14,480	7.60	27,940	16.50	78,600
1.90	6,730	4.40	14,840	7.80	28,820	17.00	82,200
2.00	7,000	4.50	15,200	8.00	29,700	17.50	85,900
2.10	7,300	4.60	15,580	8.20	30,620	18.00	89,700
2.20	7,600	4.70	15,960	8.40	31,540	19.00	97,600
2.30	7,900	4.80	16,340	8.60	32,460	20.00	105,900
2.40	8,200	4.90	16,720	8.80	33,380	21.00	114,600
2.50	8,500	5.00	17,100	9.00	34,300	22.00	123,700
2.60	8,810	5.10	17,500	9.20	35,260	23.00	133,200
2.70	9,120	5.20	17,900	9.40	36,220	24.00	143,100
2.80	9,430	5.30	18,300	9.60	37,180	25.00	153,400
2.90	9,740	5.40	18,700	9.80	38,140	26.00	163,800
3.00	10,050	5.50	19,100	10.00	39,100	27.00	174,200
3.10	10,380	5.60	19,500	10.50	41,600	28.00	184,600
3.20	10,710	5.70	19,900	11.00	44,200		
3.30	11,040	5.80	20,300	11.50	46,900		
3.40	11,370	5.90	20,700	12.00	49,700		

The above table is applicable only for open-channel conditions. It is based upon discharge measurements made during 1902 to 1904, inclusive. It is well defined between gage heights 1 and 15 feet, and fairly well defined between gage heights 15 and 25 feet. The table has been extended beyond these limits. Above gage height 25 feet the rating curve is a tangent, the difference being 1,040 per tenth.

NOTE.—This table is for the gage at the station.

Estimated monthly discharge of Sacramento River near Red Bluff, Cal., for 1904.

[Drainage area, 9,295 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	18,100	9,430	11,489	706,431	1.24	1.43
February	184,600	7,900	46,346	2,665,852	4.99	5.38
March	100,880	33,380	73,281	4,505,873	7.88	9.08
April	49,140	30,620	38,906	2,315,068	4.19	4.67
May	32,000	19,100	25,080	1,542,109	2.70	3.11
June	17,300	9,430	12,362	735,590	1.33	1.48
July	9,430	7,600	8,656	532,237	.93	1.07
August	7,600	5,650	6,348	390,323	.68	.78
September	14,480	5,650	6,530	388,562	.70	.78
October	45,280	5,785	10,990	675,749	1.18	1.36
November	12,380	7,450	8,932	531,491	.96	1.07
December	59,840	8,500	13,875	853,141	1.49	1.72
The year	184,600	5,650	21,900	15,842,426	2.36	31.93

M'CLOUD RIVER NEAR GREGORY, CAL.

This station was established March 23, 1902, at the request of the consulting engineer of the McCloud River Electric Company, with the understanding that they would maintain the station. The watershed of McCloud River includes the southern and eastern slopes of Mount Shasta and is heavily timbered. The river is fed by the numerous springs and its minimum flow is about 1,100 second-feet. The gage rod is a 2 by 3 inch timber nailed and wired to a tree on the right bank of the stream at Johns Camp, 14 miles east of Gregory. Measurements are made from a car suspended from a wire cable. The initial point of sounding is at the gage rod on the right bank of the stream. The channel is straight for 300 feet above and for 600 feet below the gaging station. The current is swift at all stages. The banks are high and wooded and not liable to overflow. The bed is composed of limestone on the sides, with some large river gravel and bowlders in the center of the channel. Sufficient meter measurements have not been taken to construct a rating curve.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of McCloud River near Gregory, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 25	W. B. Newhall	1.85	1,900
August 8	W. B. Clapp	1.90	1,653
October 30	O. W. Peterson	1.75	1,600

Mean daily gage height, in feet, of McCloud River near Gregory, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.10	1.80	5.90	4.30	3.80	3.15	2.20	1.90	1.75	1.75	1.90	1.95
2	2.00	1.80	7.10	4.00	3.95	2.95	2.20	1.90	1.75	1.75	1.90	1.90
3	1.90	1.70	6.00	4.80	3.80	2.90	2.20	1.90	1.75	1.75	1.90	1.90
4	1.90	1.90	5.90	4.85	3.80	2.90	2.20	1.90	1.75	1.75	1.90	1.90
5	1.90	1.90	5.10	4.35	3.80	2.85	2.20	1.90	1.75	1.75	1.85	1.90
6	1.90	1.90	4.75	4.30	3.70	2.80	2.20	1.90	1.75	1.75	1.80	1.90
7	1.85	1.85	8.00	4.25	3.80	2.80	2.15	1.90	1.70	1.90	1.80	1.95
8	1.80	1.80	14.50	4.35	3.80	2.80	2.15	1.90	1.70	1.90	1.80	1.95
9	1.80	1.80	9.00	4.30	3.70	2.75	2.15	1.90	1.70	2.65	1.80	2.00
10	1.80	1.80	9.15	4.75	3.70	2.70	2.15	1.90	1.70	2.80	1.75	2.10
11	1.90	1.90	5.75	4.90	3.80	2.70	2.15	1.90	1.70	6.45	1.75	2.00
12	1.90	2.90	5.00	5.10	3.90	2.65	2.10	1.90	1.70	5.85	1.75	2.00
13	1.80	2.80	4.80	5.10	4.05	2.60	2.10	1.90	1.70	5.30	1.75	2.00
14	1.85	2.65	5.00	4.85	4.10	2.60	2.10	1.85	1.70	4.90	1.75	2.00
15	1.90	7.50	5.50	5.35	4.15	2.55	2.10	1.85	1.70	4.30	1.85	2.00
16	2.15	14.20	5.90	5.50	4.10	2.50	2.05	1.85	1.75	3.85	1.85	2.00
17	2.30	7.50	6.00	5.15	3.95	2.50	2.05	1.85	1.70	3.30	2.50	1.95
18	2.40	4.35	6.10	4.70	3.80	2.50	2.05	1.85	1.70	3.10	2.50	1.95
19	2.25	3.75	6.30	5.10	3.60	2.50	2.05	1.80	1.70	2.00	2.10	1.90
20	2.30	3.10	6.65	5.45	3.60	2.45	2.05	1.80	1.70	2.00	2.00	1.90
21	2.20	3.25	6.80	4.95	3.55	2.40	2.00	1.80	1.70	1.95	2.00	1.90
22	2.00	6.75	6.90	4.75	3.65	2.40	2.00	1.80	1.80	1.90	2.00	1.85
23	1.90	6.80	5.70	4.45	3.70	2.30	2.00	1.80	2.15	1.90	1.95	1.90
24	1.90	5.95	4.10	4.10	3.70	2.30	2.00	1.80	2.05	1.90	1.95	2.40
25	1.80	5.50	3.50	4.00	3.60	2.25	2.00	1.80	1.90	1.90	1.90	2.15
26	1.80	4.75	3.50	4.10	3.50	2.25	1.95	1.80	1.80	1.90	1.90	2.00
27	1.75	6.10	3.50	4.50	3.50	2.20	1.90	1.80	1.80	1.85	2.00	2.00
28	1.80	5.90	4.05	4.10	3.45	2.20	1.90	1.80	1.75	1.80	2.00	1.95
29	1.80	5.80	5.95	4.05	3.40	2.20	1.90	1.75	1.75	1.80	1.95	2.05
30	1.80	.....	5.50	3.95	3.35	2.20	1.90	1.75	1.75	1.90	2.00	4.20
31	1.80	.....	4.45	.....	3.30	.....	1.90	1.75	.....	1.85	.....	3.90

WEST VALLEY CREEK NEAR LIKELY, CAL.

This station was established January 7, 1904, by H. E. Green and J. S. Evans. It is located 7 miles east of Likely, Cal., at the outlet of West Valley. The gage is a 2 by 6 inch vertical plank nailed to a juniper tree on the right bank of the creek. Discharge measurements are made from cable and car, or by wading at low-water stage. The initial point for soundings is a juniper stump on left bank, which is

used for tying post for the car. The channel is straight for 200 feet above and 100 feet below station. The banks are high and not subject to overflow. The bed of the stream is rocky and not subject to change. The current is swift. The bench mark is on a large bowlder 30 feet from the creek on left bank and is marked with paint. It is 10.00 feet above the zero of the gage. As no one could be obtained to read the station gage, a gage was placed 2 miles above the station. The observer is Jasper L. Fountain. It is not deemed practical to make an estimated monthly discharge for the stream for 1904.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of West Valley Creek near Likely, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 7	J. S. Evans	3.18	21
February 2	do	3.30	20
February 16	do	4.95	200
February 25	do	3.75	74
March 18	do	3.70	74
April 2	do	3.50	51
May 24	do	4.30	138
June 6	do	3.90	70
June 14	S. G. Bennett	3.50	36
September 2	J. Y. Toler	2.90	10.3
September 17	do	3.04	15.8
September 24	do	3.15	14.8
September 30	do	3.20	16
October 12	do	3.35	20
October 19	J. Y. Toler and W. B. Clapp	3.30	29
October 29	J. Y. Toler	3.25	26
November 5	do	3.25	15.3
November 17	do	3.30	16.7
November 29	do	3.29	29
December 14	do	3.30	31
December 31	do	3.35	30

Mean daily gage height, in feet, of West Valley Creek near Likely, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.20	4.20	3.70	5.25	4.10	2.70	3.00	3.00	3.10	3.20	3.30
2	.....	3.20	4.10	3.90	4.95	4.05	2.70	3.00	3.00	3.10	3.20	3.25
3	.....	3.20	3.70	3.90	4.55	4.00	2.70	3.00	2.50	3.10	3.20	3.25
4	.....	3.40	3.75	4.10	4.50	3.95	2.70	3.00	2.50	3.10	3.20	3.25
5	.....	3.20	3.85	4.00	4.40	3.90	2.70	3.10	2.50	3.10	3.20	3.25
6	.....	3.20	4.00	4.10	4.40	3.85	2.70	3.00	2.50	3.20	3.20	3.25
7	.....	3.20	4.95	4.40	4.50	3.80	2.90	3.00	2.50	3.20	3.20	3.25
8	.....	3.20	4.50	4.80	4.45	3.80	2.75	3.00	2.50	3.10	3.20	3.25
9	.....	3.20	4.65	5.40	4.40	3.70	2.70	3.00	2.50	3.20	3.20	3.30
10	.....	3.20	4.20	5.20	4.60	3.55	2.70	3.00	2.50	3.20	3.20	3.30
11	.....	3.20	4.20	4.80	4.80	3.50	2.70	3.00	2.50	3.35	3.20	3.30
12	.....	3.30	4.10	4.80	4.90	3.40	2.70	3.00	2.50	3.20	3.20	3.30
13	3.20	3.75	5.50	4.50	4.90	3.40	2.70	3.00	2.50	3.20	3.20	3.25
14	3.20	4.35	5.75	4.50	4.95	3.30	2.70	3.00	2.50	3.25	3.20	3.25
15	3.20	5.00	5.25	4.50	4.95	3.20	2.70	3.00	2.50	3.25	3.20	3.25
16	3.20	4.85	5.00	(4.40)	4.85	3.20	2.70	(3.00)	2.50	3.20	3.20	3.25
17	3.35	4.30	4.30	(4.30)	4.85	3.20	2.70	3.00	2.50	3.20	3.20	3.25
18	3.40	3.95	4.10	(4.10)	4.85	3.10	2.70	3.00	2.50	3.20	3.20	3.25
19	3.25	3.75	4.10	4.00	4.85	3.10	(2.70)	3.00	2.50	3.20	3.20	3.25
20	3.20	3.70	3.90	3.95	4.65	3.10	(2.60)	3.00	2.50	3.20	3.25	3.25
21	3.20	4.60	3.70	4.05	4.45	3.10	2.60	3.00	2.50	3.20	3.25	3.25
22	3.20	7.25	3.85	3.90	4.45	3.00	2.60	3.00	2.50	3.20	3.25	3.30
23	3.30	5.30	3.70	3.85	4.45	3.00	2.60	3.00	2.60	3.20	3.25	3.25
24	3.20	7.20	3.85	3.85	4.45	3.00	2.60	3.00	2.60	3.20	3.25	3.20
25	3.20	5.25	3.85	3.80	4.35	3.00	2.60	3.00	3.20	3.20	3.25	3.20
26	3.20	5.00	4.20	3.80	4.30	3.00	2.60	(3.00)	3.30	3.20	3.25	3.20
27	3.20	4.65	5.00	3.85	4.15	2.80	2.60	3.00	3.20	3.20	3.25	3.20
28	3.20	4.20	7.10	4.25	4.05	2.80	2.60	3.00	3.20	3.20	3.25	3.20
29	3.30	4.00	6.85	5.25	3.95	2.70	2.60	3.00	(3.20)	3.20	3.25	3.20
30	3.40	.....	6.00	5.95	3.95	2.70	3.00	3.00	(3.10)	3.25	3.30	3.35
31	3.40	.....	4.70	.....	4.00	.....	3.00	3.00	.....	3.30	.....	3.35

NOTE.—Gage heights in parenthesis are estimated.

PIT RIVER (SOUTH FORK) NEAR IVY, CAL.

This station was established January 11, 1904, by H. E. Green and J. S. Evans. It is located 3 miles west of Ivy post-office at outlet of Jess Valley.

The gage is a 2 by 6 inch vertical plank fastened to a tree on left bank 50 feet above station. It is only read at times discharge measurements are made, as it is impossible to get an observer on account of its isolated location.

Discharge measurements are made from cable and car. The initial point for soundings is foot of post used for fastening the car on the left bank of stream. The channel is straight for 200 feet above and 80 feet below the station. The current is sluggish at low-water stage. The right bank is low and subject to overflow in high water. The bed of the stream is composed of earth and is filled with vegetation at

low-water stage. The bench mark is on large bowlder 150 feet east of cabin on the right bank and below station. It is 12.00 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Pit River (South Fork) near Ivy, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 11	J. S. Evans	3.60	44
February 3	do	3.30	26
February 16	do	5.70	202
February 25	do	5.20	158
March 18	do	4.20	60
April 2	do	4.25	69
May 7	do	5.60	197
May 24	do	7.80	573
June 14	S. G. Bennett and J. S. Evans	5.80	222
September 3	J. Y. Toler	4.00	29
September 16	do	4.15	31
September 24	do	4.22	37
October 1	do	4.20	38
October 12	do	4.65	75
October 20	J. Y. Toler and W. B. Clapp	4.35	48
October 24	J. Y. Toler	4.24	33
November 6	do	4.23	43
November 18	do	4.23	39
November 30	do	4.20	32
December 15	do	4.20	33

Mean daily gage height, in feet, of Pit River (South Fork) near Ivy, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.40	4.00	4.25	(4.50)	(7.30)	(5.00)	(4.50)	(4.10)	4.20	(4.25)	(4.20)
2	.....	3.30	4.05	4.25	(4.80)	(7.20)	(5.00)	(4.50)	(4.10)	(4.20)	(4.25)	(4.20)
3	.....	3.40	4.20	4.20	(5.00)	(7.00)	(4.95)	(4.50)	4.00	(4.20)	(4.25)	(4.20)
4	.....	3.40	4.30	4.30	(5.10)	(6.80)	(4.95)	(4.45)	(4.00)	(4.20)	(4.25)	(4.20)
5	.....	3.40	4.30	4.15	(5.40)	(6.60)	(4.95)	(4.45)	(4.00)	(4.20)	(4.25)	(4.20)
6	.....	3.35	4.20	4.10	(5.50)	(6.50)	(4.90)	(4.45)	(4.00)	(4.20)	4.25	(4.20)
7	.....	3.40	4.60	4.10	(5.60)	(6.40)	(4.90)	(4.40)	(4.00)	(4.20)	(4.25)	(4.20)
8	.....	3.40	5.00	4.25	(5.60)	(6.30)	(4.90)	(4.40)	(4.00)	(4.20)	(4.25)	(4.20)
9	.....	3.55	4.80	4.25	(5.70)	(6.20)	(4.85)	4.40	(4.00)	(4.20)	(4.25)	(4.20)
10	.....	3.35	4.70	(4.20)	(5.90)	(6.10)	(4.85)	4.35	(4.00)	(4.20)	(4.25)	(4.20)
11	3.60	3.40	4.50	(4.20)	(6.00)	(6.00)	(4.85)	(4.35)	(4.10)	(4.40)	(4.25)	(4.20)
12	3.60	3.30	4.40	(4.20)	(6.10)	(5.90)	(4.80)	(4.30)	(4.10)	4.65	(4.25)	(4.20)
13	3.40	3.60	4.30	(4.20)	(6.30)	(5.80)	(4.80)	4.30	(4.10)	(4.60)	(4.25)	(4.20)
14	3.40	3.40	4.15	(4.30)	(6.40)	5.80	(4.80)	(4.30)	(4.10)	(4.60)	(4.25)	(4.20)
15	3.40	3.90	4.25	(4.40)	(6.70)	(5.80)	(4.75)	(4.30)	(4.10)	(4.50)	(4.25)	(4.20)
16	3.50	5.50	4.20	(4.50)	(6.90)	(5.70)	(4.75)	(4.30)	4.15	(4.50)	(4.25)	(4.20)
17	3.45	5.05	4.20	(4.80)	(7.00)	(5.60)	(4.75)	4.30	(4.15)	(4.40)	(4.25)	(4.20)
18	3.40	4.30	4.20	(5.00)	(7.20)	(5.50)	(4.70)	(4.30)	(4.15)	(4.40)	(4.25)	(4.20)
19	3.40	3.90	4.20	(5.20)	(7.50)	(5.50)	(4.70)	(4.30)	(4.15)	(4.40)	(4.25)	(4.20)
20	3.40	3.90	4.40	(5.00)	(7.60)	(5.40)	(4.70)	4.25	(4.15)	4.35	(4.25)	(4.20)
21	3.40	3.70	4.45	(5.00)	(7.70)	(5.40)	(4.65)	(4.25)	(4.15)	(4.30)	(4.20)	(4.20)
22	3.40	5.90	4.30	(5.00)	(7.80)	(5.40)	(4.65)	(4.25)	(4.15)	(4.30)	(4.20)	(4.20)
23	3.40	5.80	4.10	(4.90)	(7.80)	(5.40)	(4.65)	(4.20)	(4.15)	(4.30)	(4.20)	(4.20)
24	3.40	5.40	4.00	(4.80)	7.80	(5.40)	(4.60)	(4.20)	4.20	4.25	(4.20)	(4.20)
25	3.30	5.25	4.20	(4.70)	(7.80)	(5.40)	(4.60)	(4.20)	(4.20)	(4.25)	(4.20)	(4.20)
26	3.25	5.45	4.20	(4.70)	(8.00)	(5.30)	(4.60)	(4.20)	(4.20)	(4.25)	(4.20)	(4.20)
27	3.20	4.80	4.30	(4.70)	(7.80)	(5.20)	(4.60)	(4.20)	(4.20)	(4.25)	(4.20)	(4.20)
28	3.20	4.20	5.30	(4.60)	(7.80)	(5.10)	(4.55)	(4.20)	(4.20)	(4.25)	(4.20)	(4.20)
29	3.20	4.00	5.30	(4.50)	(7.60)	(5.00)	(4.55)	(4.10)	(4.20)	(4.25)	(4.20)	(4.20)
30	3.25	.....	4.75	(4.40)	(7.50)	5.00	(4.55)	(4.10)	(4.20)	(4.25)	4.20	(4.20)
31	3.30	.....	4.45	.....	(7.50)	.....	(4.50)	(4.10)	.....	(4.25)	.....	(4.20)

NOTE.—Gage heights in parenthesis are estimated.

Rating table for Pit River (South Fork) near Ivy, Cal., from January 1 to June 30, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
3.20	25	4.30	74	5.40	168	6.50	316
3.30	28	4.40	80	5.50	180	6.60	332
3.40	31	4.50	86	5.60	192	6.70	350
3.50	34	4.60	94	5.70	204	6.80	368
3.60	37	4.70	102	5.80	216	6.90	386
3.70	41	4.80	110	5.90	228	7.00	406
3.80	46	4.90	118	6.00	242	7.20	446
3.90	51	5.00	128	6.10	256	7.40	488
4.00	56	5.10	138	6.20	270	7.60	532
4.10	62	5.20	148	6.30	284	7.80	576
4.20	68	5.30	158	6.40	300	8.00	625

Rating table for Pit River (South Fork) near Ivy, Cal., from July 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
4.00	30	4.30	45	4.60	70	4.90	100
4.10	34	4.40	52	4.70	80	5.00	110
4.20	39	4.50	60	4.80	90		

Estimated monthly discharge of Pit River (South Fork) near Ivy, Cal., for 1904.

[Drainage area, 91 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	37	25	[a]30	1,845	0.33	0.38
February	228	28	76	4,372	.84	.91
March	158	56	82	5,042	.90	1.04
April	148	62	90	5,355	.99	1.10
May	625	86	372	22,873	4.09	4.72
June	466	128	234	13,924	2.57	2.87
July	110	60	85	5,226	.93	1.07
August	60	34	46	2,828	.51	.59
September	39	30	35	2,083	.38	.42
October	75	39	47	2,890	.52	.60
November	42	39	41	2,440	.45	.50
December	39	39	39	2,398	.43	.50
The year	625	25	98	71,276	1.08	14.70

[a] Mean for 21 days assumed as mean for entire month.

PIT RIVER NEAR CANBY, CAL.

This station was established December 26, 1903, by H. E. Green and J. S. Evans. It is located at the wagon bridge, 3½ miles southwest of Canby, Cal. The gage is a 1 by 6 inch vertical plank securely fastened to the first bridge pier from the left bank of the stream. It is read twice each day by Ernest M. Hess.

Discharge measurements are made from the bridge. The initial point for soundings is a nail in the railing post at the end of the bridge on the left bank. The channel is straight for 150 feet above and 200 feet below the station. The current is moderate at all stages. The banks are high and are not subject to overflow. The channel is rocky, but is not subject to much change. The bench mark is a

painted point on a large bowlder at the bend of the wagon road near the south end of the bridge. It is 24.90 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Pit River near Canby, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
December 27	J. S. Evans	3.60	169
1904.			
February 12	J. S. Evans	3.65	183
February 18	do	6.25	1,669
February 22	do	7.15	2,435
March 3	do	7.30	2,630
March 5	do	9.05	4,383
March 29	do	10.10	6,204
May 2	do	9.70	5,236
May 16	do	5.70	1,540
June 2	do	5.20	1,204
June 12	do	4.60	728
September 6	J. Y. Toler	2.70	9
September 19	do	2.75	16
September 22	do	2.75	19
September 26	do	2.82	20
October 3	do	3.00	41
October 7	do	3.18	48
October 13	do	3.28	76
October 21	do	3.50	128
November 4	do	3.45	110
November 9	do	3.50	117
November 22	do	3.50	127
December 6	do	3.50	106
December 10	do	3.35	82
December 20	do	3.68	213
December 29	do	3.50	131

Mean daily gage height, in feet, of Pit River near Canby, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.70	3.45	6.70	8.55	8.10	5.25	3.65	3.30	2.65	3.00	3.50	3.55
2	3.60	3.45	7.30	7.55	9.85	5.20	3.60	3.30	2.65	3.35	3.50	3.55
3	3.50	3.45	7.55	6.90	9.85	5.15	3.60	3.30	2.60	3.10	3.50	3.55
4	3.55	3.50	9.05	6.75	9.30	5.05	3.60	3.30	2.60	3.10	3.50	3.50
5	3.50	3.50	9.35	6.50	8.55	5.00	3.60	3.30	2.60	3.10	3.50	3.45
6	3.40	3.50	8.45	6.30	7.45	4.90	3.60	3.30	2.60	3.10	3.50	3.50
7	3.60	3.50	9.85	5.95	7.00	4.80	3.60	3.30	2.60	3.10	3.50	3.50
8	3.50	3.50	14.00	5.90	6.60	4.75	3.60	3.30	2.65	3.15	3.50	3.50
9	3.50	3.45	12.70	5.80	6.35	4.70	3.60	3.30	2.65	3.15	3.50	3.50
10	3.50	3.45	10.50	5.65	6.05	4.70	3.60	3.30	2.65	3.15	3.50	3.50
11	3.50	3.45	8.95	5.55	5.85	4.65	3.60	3.20	2.65	3.20	3.50	3.50
12	3.50	3.50	8.15	5.50	5.80	4.60	3.50	3.20	2.65	3.25	3.50	3.50
13	3.60	3.60	7.55	5.40	5.70	4.50	3.50	3.20	2.70	3.30	3.50	3.50
14	3.60	3.65	7.00	5.60	5.70	4.50	3.50	3.10	2.70	3.30	3.50	3.55
15	3.50	5.00	7.00	6.00	5.70	4.40	3.50	3.10	2.70	3.40	3.50	3.60
16	3.70	10.70	7.00	6.00	5.80	4.30	3.50	3.10	2.75	3.40	3.50	3.75
17	3.60	7.15	7.00	6.00	5.80	4.20	3.50	3.00	2.80	3.40	3.50	3.75
18	3.50	6.45	7.40	6.00	5.80	4.10	3.50	2.90	2.80	3.40	3.50	3.80
19	3.40	6.55	8.65	5.80	5.80	4.00	3.50	2.90	2.80	3.45	3.50	3.80
20	3.40	6.40	9.70	5.80	5.80	3.95	3.50	2.80	2.80	3.45	3.50	3.75
21	3.50	6.20	8.50	5.80	5.90	3.95	3.50	2.80	2.80	3.45	3.50	3.65
22	3.50	7.50	8.35	5.75	5.90	3.90	3.50	2.80	2.80	3.50	3.50	3.50
23	3.60	10.70	6.80	5.60	5.90	3.90	3.45	2.80	2.80	3.50	3.50	3.45
24	3.45	11.00	6.45	5.50	5.75	3.90	3.45	2.75	2.80	3.50	3.50	3.40
25	3.45	10.10	6.00	5.40	5.60	3.90	3.45	2.75	2.80	3.50	3.50	3.50
26	3.45	10.50	6.15	5.30	5.50	3.80	3.45	2.70	2.85	3.50	3.50	3.30
27	3.45	9.30	6.25	5.40	5.50	3.80	3.40	2.70	2.85	3.50	3.50	3.30
28	3.45	7.70	7.20	5.50	5.40	3.75	3.40	2.75	2.90	3.50	3.50	3.35
29	3.45	7.25	10.00	5.70	5.40	3.70	3.35	2.75	2.95	3.50	3.55	3.60
30	3.45	.....	9.80	6.70	5.35	3.70	3.35	2.70	3.00	3.50	3.55	4.60
31	3.45	.....	9.35	.....	5.30	.....	3.30	2.70	.....	3.50	.....	4.70

Rating table for Pit River near Canby, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
2.60	8	4.00	360	5.40	1,260	7.60	2,900
2.70	12	4.10	415	5.50	1,330	7.80	3,080
2.80	18	4.20	475	5.60	1,400	8.00	3,260
2.90	25	4.30	535	5.70	1,470	8.50	3,720
3.00	34	4.40	600	5.80	1,540	9.00	4,280
3.10	45	4.50	665	5.90	1,610	9.50	4,990
3.20	59	4.60	730	6.00	1,680	10.00	5,910
3.30	76	4.70	795	6.20	1,820	10.50	6,900
3.40	100	4.80	860	6.40	1,960	11.00	8,000
3.50	130	4.90	925	6.60	2,100	11.50	9,300
3.60	165	5.00	990	6.80	2,260	12.00	10,700
3.70	205	5.10	1,055	7.00	2,420	12.50	12,200
3.80	255	5.20	1,120	7.20	2,580	13.00	13,700
3.90	305	5.30	1,190	7.40	2,740	14.00	17,000

Estimated monthly discharge of Pit River near Canby, Cal., for 1904.

[Drainage area, 1,500 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	205	100	135	8,301	0.09	0.10
February	7,340	115	2,137	122,922	1.42	1.53
March	17,000	1,680	4,211	258,924	2.81	3.24
April	3,770	1,190	1,675	99,669	1.12	1.25
May	5,625	1,190	2,082	128,017	1.39	1.60
June	1,155	205	594	35,345	.40	.45
July	185	76	135	8,301	.09	.10
August	76	12	43	2,644	.03	.03
September	34	8	15	893	.01	.01
October	130	34	91	5,595	.06	.07
November	148	130	131	7,795	.09	.10
December	795	76	188	11,560	.13	.15
The year	17,000	8	953	689,966	.64	8.63

ASH CREEK AT ADIN, CAL.

This station was established March 13, 1904, by J. S. Evans and William Busch. It was originally located one-fourth of a mile above the town of Adin. During the summer the closing of waste gates in the dam at Adin interfered with the discharge at this point to such an extent that on August 15, 1904, the station was reestablished at a point 100 feet below the wagon bridge in the town of Adin, Cal., which is about 500 feet below the dam.

The gage is a 2 by 6 inch vertical plank fastened to a tree on left bank of the stream. The gage is read once each day by H. Williams. Discharge measurements are made from a suspension footbridge constructed with one-half-inch cables. The channel is straight for 200 feet above and 200 feet below the station. The left bank is high, but the right bank is subject to overflow from the side channel which, in flood, diverts water from above the station. The bed of the stream is gravelly and not subject to change.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Ash Creek at Adin, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
March 13	J. S. Evans	4.50	471
April 5	do	4.70	540
April 15	do	5.80	714
May 3	do	6.10	1,117
May 17	do	4.10	447
June 2	do	2.10	140
June 12	S. G. Bennett and J. S. Evans	1.10	54
August 30	J. Y. Toler	1.80	26
September 13	do	1.80	30
September 20	do	2.01	36
September 27	do	1.98	45
October 8	do	1.85	38
October 14	do	1.80	37
October 22	J. Y. Toler and W. B. Clapp	1.75	29
November 2	J. Y. Toler	1.77	33
November 10	do	1.75	33
November 24	do	1.78	42
December 7	do	1.75	36
December 21	do	1.83	41
December 28	do	1.85	42

Mean daily gage height, in feet, of Ash Creek at Adin, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	.....	4.40	5.80	3.50	.....	.....	1.80	1.80	1.80	1.80
2	.....	.....	.....	4.50	6.00	2.00	.....	.....	1.80	1.80	1.80	1.80
3	.....	.....	.....	4.60	6.10	(a)	.....	.....	1.80	1.80	1.80	1.80
4	.....	.....	.....	4.90	6.20	.....	.....	.....	1.80	1.80	1.90	1.80
5	.....	.....	.....	4.90	6.00	.....	.....	.....	1.80	1.80	1.90	1.80
6	.....	.....	.....	4.90	5.00	.....	.....	.....	1.80	1.80	1.80	1.80
7	.....	.....	.....	4.70	5.10	.....	.....	.....	1.80	1.80	1.80	1.80
8	.....	.....	.....	4.60	5.00	.....	.....	.....	1.80	1.80	1.80	1.80
9	.....	.....	.....	4.50	4.30	.....	.....	.....	1.80	1.80	1.80	1.80
10	.....	.....	.....	4.60	4.10	.....	.....	.....	1.80	1.80	1.80	1.90
11	.....	.....	.....	4.90	4.20	.....	.....	.....	1.80	1.90	1.80	1.90
12	.....	.....	.....	5.20	4.20	1.10	.....	.....	1.80	2.00	1.80	1.90
13	.....	.....	4.50	5.30	4.00	.....	.....	.....	1.80	1.80	1.80	1.90
14	.....	.....	4.60	4.80	4.00	.....	.....	1.70	1.80	1.80	1.90	1.90
15	.....	.....	5.65	5.80	4.10	.....	.....	1.70	1.80	1.80	1.90	1.90
16	.....	.....	5.35	5.20	4.00	.....	.....	1.70	1.80	1.80	1.90	1.90
17	.....	.....	5.75	5.20	4.20	.....	.....	1.80	1.80	1.80	1.80	1.90
18	.....	.....	5.70	4.80	4.20	.....	.....	1.80	1.80	1.80	1.80	1.80
19	.....	.....	8.30	4.40	4.10	.....	.....	1.80	1.90	1.80	1.80	1.80
20	.....	.....	7.70	4.50	4.10	.....	.....	1.80	2.00	1.80	1.80	1.80
21	.....	.....	5.85	4.40	4.00	.....	.....	1.80	1.90	1.80	1.80	1.80
22	.....	.....	5.05	4.30	4.00	.....	.....	1.80	1.90	1.75	1.80	1.80
23	.....	.....	4.85	4.20	4.00	.....	.....	1.80	1.90	1.80	1.80	1.80
24	.....	.....	4.50	4.00	4.00	.....	.....	1.80	1.90	1.80	1.80	1.80
25	.....	.....	4.40	4.00	4.00	.....	.....	1.80	1.95	1.80	1.80	1.80
26	.....	.....	4.50	4.10	4.00	.....	.....	1.80	2.00	1.80	1.80	1.80
27	.....	.....	4.90	4.30	4.00	.....	.....	1.80	2.00	1.80	1.80	1.80
28	.....	.....	6.00	4.60	3.90	.....	.....	1.80	1.80	1.80	1.80	1.80
29	.....	.....	6.85	4.20	3.70	.....	.....	1.80	1.80	1.80	1.80	1.90
30	.....	.....	5.60	5.70	3.50	.....	.....	1.80	1.80	1.90	1.80	5.60
31	.....	.....	4.70	.....	3.60	.....	.....	1.80	.....	1.80	.....	5.40

a Dam put in creek at Adin mill one-fourth mile below station. Gage readings increased. Daily discharge interpolated between meter measurements from June 3 to August 13, inclusive.

Rating table for Ash Creek at Adin, Cal., from March 13 to June 2, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.00	47	2.40	182	3.80	380	5.40	688
1.10	54	2.50	195	3.90	398	5.60	735
1.20	62	2.60	208	4.00	416	5.80	785
1.30	70	2.70	221	4.10	434	6.00	835
1.40	79	2.80	234	4.20	452	6.20	885
1.50	88	2.90	247	4.30	470	6.40	935
1.60	98	3.00	260	4.40	488	6.60	985
1.70	108	3.10	275	4.50	506	6.80	1,035
1.80	118	3.20	290	4.60	524	7.00	1,085
1.90	128	3.30	305	4.70	542	7.20	1,140
2.00	138	3.40	320	4.80	560	7.40	1,200
2.10	149	3.50	335	4.90	580	7.60	1,260
2.20	160	3.60	350	5.00	600	7.80	1,320
2.30	171	3.70	365	5.20	644	8.00	1,380

Rating table for Ash Creek at Adin, Cal., from August 14 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*
1.70	28	1.90	36
1.75	29	1.95	39
1.80	31	2.00	42
1.85	33		

Estimated monthly discharge of Ash Creek at Adin, Cal., for 1904.

[Drainage area, 260 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
March	1,470	488	[a]735	45,193	2.77	3.19
April	785	416	550	32,727	2.08	2.32
May	885	335	505	31,051	1.91	2.20
June	335	50	76	4,522	.29	.32
July	45	35	40	2,460	.15	.17
August	31	28	30	1,845	.11	.13
September	42	31	33	1,964	.12	.13
October	42	29	32	1,968	.12	.14
November	36	31	32	1,904	.12	.13
December	400	31	55	3,382	.21	.24
The period				127,016		

[a] Mean for 19 days taken as mean for entire month.

PIT RIVER NEAR BIEBER, CAL.

This station was established January 22, 1904, by J. S. Evans and William Busch. It is located 12 miles below Bieber, Cal., near Muck Valley. The gage is a heavy wooden rod fastened to a large bowlder on the right bank of the stream. It is read once each day by F. H. Holabird. Discharge measurements are made from cable and car. The initial point for soundings is foot of platform at end of cable on right bank of stream. The channel is straight for 200 feet above and 300 feet below the station. The current is very sluggish at low-water stage. The banks are high and not subject to overflow. The channel is very rocky and rough, but not subject to change. The bench mark is on a large bowlder on right bank 50 feet east of pine tree to which cable is fastened. It is 12.00 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Pit River near Bieber, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 22	J. S. Evans	3.20	221
February 20	do	7.52	4,850
March 10	do	11.75	15,164
April 13	do	7.10	4,043
May 4	do	9.15	7,833
May 18	do	5.30	1,935
June 3	do	4.50	1,139
June 11	S. G. Bennett and J. S. Evans	4.00	712
August 29	J. Y. Toler	1.40	37
September 11	do	1.15	21
September 21	do	1.12	11
September 28	do	1.93	27
October 15	do	2.60	90
October 22	J. Y. Toler and S. G. Bennett	2.90	118
November 3	J. Y. Toler	3.00	142
November 11	do	2.95	139
November 25	do	3.05	163
December 8	do	2.71	73
December 27	do	3.45	280

Mean daily gage height, in feet, of Pit River near Bieber, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.20	9.80	8.10	8.30	5.00	2.90	2.30	1.20	1.75	3.05	3.30
2	.....	3.10	9.40	7.90	9.35	4.70	2.90	2.30	1.20	1.75	3.20	3.25
3	.....	3.20	8.30	7.80	9.30	4.50	2.90	2.30	1.20	1.75	3.00	3.20
4	.....	3.30	8.30	7.40	9.20	4.50	2.90	2.20	1.20	1.80	3.00	3.10
5	.....	3.30	7.80	7.20	8.80	4.40	2.80	2.20	1.20	1.80	2.95	2.90
6	.....	3.40	9.20	7.20	8.20	4.40	2.80	2.20	1.20	2.50	2.95	2.80
7	.....	3.30	9.60	7.20	7.80	4.20	2.80	2.20	1.20	2.50	2.90	2.70
8	.....	3.40	12.00	7.20	7.30	4.20	2.70	2.20	1.15	2.80	2.95	2.80
9	.....	3.40	12.70	7.20	6.40	4.10	2.70	2.20	1.15	2.80	3.00	2.80
10	.....	3.30	11.70	7.20	6.40	4.00	2.70	2.20	1.15	2.80	2.95	3.15
11	.....	3.40	12.00	7.20	6.10	4.00	2.50	2.20	1.15	2.50	2.95	3.20
12	.....	3.40	10.80	7.10	5.90	4.00	2.50	2.10	1.15	2.50	2.95	3.30
13	.....	3.60	9.80	7.10	5.90	4.00	2.50	2.10	1.10	2.50	2.95	3.40
14	.....	3.80	9.20	7.10	5.80	3.80	2.50	2.10	1.10	2.60	3.00	3.30
15	.....	4.10	8.60	7.00	5.80	3.80	2.50	2.00	1.10	2.60	3.00	3.30
16	.....	6.60	7.50	6.80	5.80	3.40	2.40	1.80	1.10	2.60	3.00	3.30
17	.....	9.45	7.20	6.40	5.80	3.30	2.40	1.70	1.15	2.70	3.00	3.35
18	.....	8.10	7.50	6.40	5.80	3.30	2.40	1.70	1.15	2.70	3.20	3.35
19	.....	8.10	8.20	6.50	5.80	3.20	2.40	1.50	1.20	2.75	3.20	3.40
20	.....	7.40	8.60	6.80	5.70	3.20	2.70	1.40	1.20	2.80	3.10	3.40
21	.....	7.60	8.10	6.90	5.70	3.10	2.70	1.00	1.20	2.80	3.10	3.45
22	3.20	7.80	7.80	6.40	5.60	3.00	2.60	1.20	1.20	2.90	3.00	3.50
23	3.20	9.80	7.20	6.40	5.50	2.80	2.50	1.20	1.30	3.00	3.00	3.50
24	3.30	11.30	6.80	6.20	5.50	2.80	2.50	1.30	1.50	3.10	3.00	3.60
25	3.50	10.80	6.20	6.50	5.40	2.70	2.40	1.40	1.40	3.05	3.00	3.05
26	3.50	10.10	6.10	6.40	5.40	2.90	2.40	1.40	1.60	3.05	3.05	3.50
27	3.40	9.80	7.00	7.80	5.30	2.90	2.40	1.40	1.80	3.00	3.20	3.50
28	3.30	9.30	8.20	8.10	5.20	2.80	2.30	1.40	1.95	3.00	3.25	3.45
29	3.30	9.10	8.50	8.50	5.20	2.80	2.30	1.30	1.75	2.90	3.25	3.05
30	3.20	.....	8.70	8.50	5.10	2.80	2.30	1.20	1.75	3.20	3.30	3.80
31	3.20	.....	8.40	.....	5.00	.....	2.30	1.20	.....	3.10	.....	4.80

Rating table for Pit River near Bieber, Cal., from January 22 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.00	10	2.60	85	4.20	870	6.40	3,210
1.10	12	2.70	96	4.30	950	6.60	3,480
1.20	14	2.80	108	4.40	1,040	6.80	3,760
1.30	16	2.90	120	4.50	1,130	7.00	4,050
1.40	18	3.00	145	4.60	1,220	7.50	4,800
1.50	20	3.10	180	4.70	1,310	8.00	5,600
1.60	23	3.20	220	4.80	1,400	8.50	6,500
1.70	26	3.30	270	4.90	1,500	9.00	7,540
1.80	30	3.40	320	5.00	1,600	9.50	8,680
1.90	35	3.50	375	5.20	1,800	10.00	9,940
2.00	40	3.60	435	5.40	2,010	10.50	11,320
2.10	45	3.70	500	5.60	2,230	11.00	12,800
2.20	50	3.80	565	5.80	2,460	11.50	14,380
2.30	57	3.90	635	6.00	2,700	12.00	16,020
2.40	65	4.00	710	6.20	2,950	12.50	17,660
2.50	75	4.10	790				

Estimated monthly discharge of Pit River near Bieber, Cal., for 1904.

[Drainage area, 2,948 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January[a]	375	220	238	14,634	0.08	0.09
February	13,740	180	3,949	227,149	1.34	1.45
March	18,320	2,820	7,590	466,691	2.57	2.96
April	6,500	2,950	4,207	250,334	1.43	1.60
May	8,320	1,600	3,439	211,456	1.17	1.35
June	1,600	96	542	32,251	.18	.20
July	120	57	83	5,103	.03	.03
August	57	10	33	2,029	.01	.01
September	38	12	16	952	.01	.01
October	220	28	103	6,333	.03	.03
November	270	120	165	9,818	.06	.07
December	1,400	96	304	18,692	.10	.12
The year	18,320	10	1,722	1,245,442	.58	7.92

[a] January 1 to 21, inclusive, discharge estimated at 220 second-feet.

FEATHER RIVER AT OROVILLE, CAL.

At Oroville, where Feather River breaks from the foothills on the western slope of the Sierra Nevada into Sacramento Valley, it has a drainage area of 3,350 square miles. This station was established January 1, 1902, by S. G. Bennett. It is located at the northeast edge of the town of Oroville, Cal. Observations of the daily river height were begun January 1, 1902, using the rod of the United States Weather Bureau, which has been in place for a number of years. This is a 2-inch vertical iron pipe. Readings on this rod have been taken and reported by the United States Weather Bureau during floods when there was danger of overflow on the lower Feather and Sacramento rivers. To avoid negative readings the height as read on the gage has been increased by 2 feet. On August 11, 1904, a new set of gage rods of 2 by 8 inch timber, painted white and graduated to feet and tenths, were set to read 2 feet more than the old gage. Three of the sections are bolted to a rock, and a fourth is nailed to one of the bridge piers. The gage is read twice each day by D. G. Page. Discharge measurements are made by means of a cable and boat, located 500 feet above the gage. Flood measurements are made by means of floats. The channel is straight for 300 feet above and 100 feet below the station. It has a width of about 200 feet at ordinary stages and of about 700 feet at

flood stages. The bed of the stream is composed mainly of rock and is rough and permanent. The current is swift at ordinary stages. A standard United States Geological Survey bench mark has been sulphured in the rock at an elevation of 15.00 feet above the zero of the gage. The minimum midsummer discharge, as far as known, was in 1900, when the stream was flowing 1,123 second-feet.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Feather River at Oroville, Cal., for 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 20	W. B. Newhall	3.42	3,403
February 19	S. G. Bennett	10.70	18,715
March 31	E. C. Murphy, S. G. Bennett, and W. B. Clapp.	13.40	34,000
May 30	Wm. Watson and John Tarish	9.20	12,793
June 8	C. W. McConaughy	7.60	9,319
June 10	Wm. Watson	7.20	9,186
June 18	C. W. McConaughy and John Tarish	5.70	6,368
June 23	C. W. McConaughy and Geo. J. Carr	4.90	5,269
June 30	C. W. McConaughy	4.00	4,129
July 15	do	2.95	2,862
August 12	O. W. Peterson	1.90	1,941
September 25	do	4.65	4,679
November 1	do	2.75	2,519

Mean daily gage height, in feet, of Feather River at Oroville, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.30	3.00	11.65	12.35	9.35	8.80	3.95	(2.20)	1.80	2.15	2.70	3.80
2	4.60	3.10	11.95	11.95	9.25	8.65	3.85	(2.20)	1.80	2.10	3.15	3.50
3	4.00	3.05	12.15	12.00	9.25	8.65	3.80	(2.20)	1.75	2.05	2.95	3.40
4	3.75	3.10	13.05	11.90	9.50	8.55	3.85	(2.15)	1.70	2.00	2.80	3.20
5	3.30	3.85	12.55	11.65	9.90	8.25	3.75	(2.15)	1.70	1.90	2.70	2.90
6	3.20	3.65	12.00	11.80	9.95	8.10	3.65	(2.10)	1.70	1.90	2.70	2.65
7	3.10	3.45	12.05	11.75	10.25	7.90	3.60	2.10	1.60	2.05	2.60	2.60
8	3.00	3.40	15.35	11.55	10.45	7.65	3.45	2.05	1.60	2.30	2.50	2.50
9	3.00	3.30	14.70	11.75	10.55	7.40	3.35	2.00	1.50	4.30	2.40	2.40
10	3.10	3.20	15.65	11.90	10.75	7.05	3.30	2.10	1.50	7.80	2.30	3.35
11	3.45	3.25	14.30	12.45	11.25	6.90	3.20	1.95	1.50	12.25	2.55	3.35
12	3.45	9.00	12.35	12.75	11.55	6.75	3.15	1.90	1.50	7.00	2.80	3.30
13	3.30	7.15	11.95	13.20	11.80	6.55	3.05	2.00	1.50	5.30	2.70	3.10
14	3.25	5.05	11.85	14.30	11.65	6.40	3.00	2.00	1.40	4.40	2.60	3.05
15	3.10	11.65	12.20	14.20	11.65	6.25	3.10	2.00	1.45	4.40	2.80	2.95
16	3.20	20.35	11.75	13.30	11.30	6.15	3.00	1.90	1.40	4.50	3.40	2.80
17	3.45	16.75	15.80	12.70	11.20	5.95	3.00	1.90	1.40	4.20	2.95	2.70
18	3.75	11.85	20.45	11.90	11.05	5.75	2.95	1.80	1.35	3.95	2.90	2.55

Mean daily gage height, in feet, of Feather River at Oroville, Cal., for 1904—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
19	3.80	10.45	19.75	12.50	10.40	5.50	2.80	1.85	1.40	3.90	2.90	2.55
20	3.45	9.55	19.15	11.95	10.25	5.35	2.75	1.80	1.50	4.05	2.70	2.70
21	3.30	9.65	16.70	11.30	10.00	5.25	2.70	1.80	1.60	3.45	2.60	2.80
22	3.45	17.80	14.70	10.90	10.75	5.15	2.65	1.80	2.00	2.80	2.70	3.05
23	3.45	16.40	13.55	10.40	10.85	4.95	2.60	1.80	4.20	2.70	2.60	3.85
24	3.35	21.50	12.80	10.30	10.60	4.75	[a](2.55)	1.80	4.80	2.70	2.50	4.70
25	3.25	18.70	12.00	10.15	10.55	4.55	(2.50)	1.90	4.70	2.60	2.40	4.50
26	3.15	17.15	11.65	10 05	10.70	4.45	(2.45)	1.90	4.05	2.50	2.40	4.10
27	3.10	16.05	11.50	9.95	9.65	4.25	(2.40)	1.95	3.80	2.50	2.70	3.90
28	3.00	13.90	13.75	9.95	9.50	4.05	(2.35)	1.90	2.80	2.25	3.10	3.60
29	3.00	12.55	16.70	9.70	9.05	4.00	(2.30)	1.80	2.55	2.25	2.20	3.25
30	2.90	.....	15.10	9.50	9.00	4.05	(2.25)	1.80	2.20	2.35	3.30	16.95
31	2.95	.....	13.40	.....	8.90	.....	(2.25)	1.80	.....	2.50	.....	12.80

[a] July 24 to August 6, inclusive, gage heights interpolated.

Rating table for Feather River at Oroville, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.30	1,570	3.20	3,090	5.20	5,630	10.50	18,100
1.40	1,630	3.30	3,210	5.40	5,910	11.00	20,100
1.50	1,690	3.40	3,330	5.60	6,190	11.50	22,500
1.60	1,750	3.50	3,450	5.80	6,470	12.00	25,100
1.70	1,810	3.60	3,570	6.00	6,750	12.50	28,100
1.80	1,870	3.70	3,690	6.20	7,050	13.00	31,100
1.90	1,930	3.80	3,810	6.40	7,350	13.50	34,600
2.00	1,990	3.90	3,930	6.60	7,660	14.00	38,100
2.10	2,050	4.00	4,050	6.80	7,980	14.50	41,850
2.20	2,120	4.10	4,180	7.00	8,300	15.00	45,600
2.30	2,190	4.20	4,310	7.20	8,640	15.50	49,600
2.40	2,260	4.30	4,440	7.40	9,000	16.00	53,600
2.50	2,330	4.40	4,570	7.60	9,400	16.50	57,850
2.60	2,410	4.50	4,700	7.80	9,800	17.00	62,100
2.70	2,500	4.60	4,830	8.00	10,260	17.50	66,600
2.80	2,610	4.70	4,960	8.50	11,520	18.00	71,100
2.90	2,730	4.80	5,090	9.00	12,900	19.00	80,500
3.00	2,850	4.90	5,220	9.50	14,400	20.00	90,500
3.10	2,970	5.00	5,350	10.00	16,150	21.00	100,500

Estimated monthly discharge of Feather River at Oroville, Cal., for 1904.

[Drainage area, 3,350 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	4,830	2,730	3,296	202,663	0.98	1.13
February	105,500	2,850	27,766	1,597,118	8.29	8.94
March	95,000	22,500	39,529	2,430,543	11.80	13.60
April	40,350	14,400	24,468	1,455,947	7.30	8.14
May	24,000	12,620	17,751	1,091,466	5.30	6.11
June	12,340	4,050	7,459	443,841	2.23	2.49
July	3,990	2,155	2,910	178,929	.87	1.00
August	2,120	1,870	1,964	120,762	.59	.68
September	5,090	1,600	2,252	134,003	.67	.75
October	26,600	1,930	4,137	254,374	1.23	1.42
November	3,330	2,120	2,556	152,093	.76	.85
December	61,675	2,260	5,874	361,178	1.75	2.02
The year	105,500	1,600	11,664	8,422,917	3.48	47.13

YUBA RIVER NEAR SMARTSVILLE, CAL.

This station was established June 2, 1903, by W. H. Stearns. It is located at what is called "The Narrows," 1 mile from Smartsville, Cal., 18 miles from the Southern Pacific Railway station at Wheatland, Cal., and 20 miles from Marysville, Cal. The gage is in two sections. The lower one is bolted to the rock wall on the left bank of the river and the upper one to the right bank. Both are painted white, and are graduated to feet and tenths. The observer, J. R. McKeel, reads the gage once each day. Discharge measurements are made from a car and cable. One auxiliary cable is stretched parallel to and 100 feet upstream from the main cable, and a second one is located 150 feet below the station cable for float measurements. The initial point for soundings is on the left bank at the eyebolt to which the cable is fastened. The channel is straight for 200 feet above and 300 feet below the station, and the current is swift at all stages. In the 150 feet above the cable the stream has a fall of 0.2 foot, and of 0.9 foot in the 200 feet below. Both banks are high and rocky and are not subject to overflow. The banks widen out considerably just below the station. The bed of the stream is composed of gravel and sand—tailings from hydraulic mining—and is constantly shifting. After the rains of 1904 it was found that the bed of the stream had been lowered for an average depth of 2 feet. The bench mark is a

cross in a projecting point of rock under the cable on the right bank of the river 350 feet from the initial point for soundings. It is 38.65 feet above the zero of the gage. Frequent discharge measurements are made on account of continual changes of the river bed. These changes, however, do not materially affect discharge measurements for the same gage height.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Yuba River near Smartsville, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 11	J. R. McKeel	6.3	2,594
January 18	do	5.9	2,020
January 29	do	5.5	1,701
February 8	do	6.0	2,162
February 25	A. C. Lootz	13.5	23,380
May 10	J. R. McKeel	10.3	10,801
May 23	do	11.2	15,910
May 28	do	9.3	8,862
June 13	do	8.3	6,711
June 23	do	7.2	4,343
July 11	do	5.1	1,468
July 17	O. W. Peterson	4.4	1,049
July 25	J. R. McKeel	4.1	849
August 6	do	3.8	669
August 13	O. W. Peterson	3.7	625
August 28	J. R. McKeel	3.5	495
September 11	do	3.4	444
September 23	O. W. Peterson	4.9	1,528
September 25	J. R. McKeel	5.45	2,256
October 27	do	4.7	968
November 13	do	4.5	787
November 28	do	5.15	1,522
December 26	do	5.2	1,537
December 27	do	5.0	1,391

Mean daily gage height, in feet, of Yuba River near Smartsville, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.10	5.50	10.00	9.60	9.30	8.50	5.90	3.90	3.50	3.80	4.90	5.50
2	5.80	5.50	9.60	9.50	9.20	8.30	5.70	3.80	(3.50)	3.80	5.30	5.10
3	5.70	5.50	10.00	9.50	8.80	8.70	5.80	3.80	3.50	3.70	5.00	5.00
4	6.30	5.90	10.90	9.50	9.10	8.50	5.70	3.80	(3.50)	3.70	4.80	4.90
5	5.70	6.10	10.90	9.40	9.30	8.30	5.60	3.80	3.40	3.70	4.80	4.80
6	5.70	5.90	10.20	9.60	9.80	8.30	5.40	3.80	(3.40)	3.70	4.70	4.80
7	5.60	5.90	10.60	9.70	9.80	8.20	5.30	3.80	3.40	3.90	4.70	4.70
8	5.60	6.00	12.50	10.10	10.20	8.20	5.20	3.70	3.40	4.40	4.70	4.70
9	5.50	5.80	11.10	10.30	10.20	8.10	5.10	3.70	3.40	6.00	4.70	4.80
10	5.60	5.70	13.10	10.50	10.20	8.10	5.00	3.70	(3.40)	6.50	4.60	5.00
11	6.30	5.70	11.10	10.80	10.20	8.20	4.90	3.70	3.40	11.50	4.60	4.80
12	5.90	10.50	10.50	10.80	10.30	8.20	4.90	3.70	(3.40)	7.50	4.50	4.80
13	5.70	8.50	9.80	11.20	10.40	8.10	4.80	3.70	3.40	6.10	4.50	5.00
14	5.70	7.50	10.70	11.40	11.20	8.00	4.70	(3.70)	(3.40)	5.70	4.50	4.90
15	5.60	9.50	10.60	11.40	10.20	7.70	4.60	3.70	3.40	5.90	5.40	4.80
16	5.70	20.00	10.50	11.10	10.20	7.40	(4.50)	(3.70)	(3.40)	5.70	5.00	4.80
17	5.70	17.00	14.80	10.30	9.80	7.30	4.40	3.70	3.40	5.40	4.70	4.70
18	5.90	(12.00)	15.50	9.90	9.70	7.20	4.30	(3.60)	(3.40)	5.20	4.70	4.70
19	6.10	(10.50)	15.10	11.30	9.50	7.20	4.30	3.60	3.40	5.10	4.80	4.70
20	5.80	(9.50)	13.30	9.90	9.30	7.00	4.30	3.60	(3.40)	5.00	4.70	4.70
21	5.70	(9.50)	10.80	9.30	10.10	6.70	4.20	(3.60)	3.40	4.90	4.70	4.60
22	5.60	20.30	10.30	9.10	11.20	6.80	4.20	3.60	3.40	4.90	4.70	4.60
23	5.80	14.30	9.10	8.90	11.10	7.00	4.20	(3.60)	5.00	4.90	4.60	4.70
24	5.70	20.30	9.30	9.20	11.00	6.50	4.10	3.60	5.50	4.80	4.60	6.50
25	5.70	13.50	9.10	8.90	11.10	6.40	4.10	(3.60)	5.50	(4.70)	4.60	5.50
26	5.60	12.40	8.70	9.70	9.30	6.40	4.10	3.60	4.90	4.70	4.50	5.20
27	5.60	11.20	9.00	9.20	9.40	6.40	4.00	(3.60)	4.50	4.70	4.80	5.00
28	5.50	10.60	14.80	9.30	9.20	6.20	4.00	3.50	4.10	4.70	5.20	4.90
29	5.50	10.30	13.30	8.90	9.50	6.10	4.00	(3.50)	4.00	4.70	4.90	4.90
30	5.50	.....	11.10	8.50	9.00	5.90	3.90	3.50	3.80	4.90	5.60	12.00
31	5.50	.....	10.20	.....	8.80	.....	3.90	(3.50)	.....	4.80	.....	11.40

NOTE.—Gage heights in parenthesis are estimated.

Rating table for Yuba River near Smartsville, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
3.40	445	5.10	1,370	6.80	3,290	10.00	10,780
3.50	495	5.20	1,450	6.90	3,450	10.50	12,340
3.60	545	5.30	1,530	7.00	3,620	11.00	14,080
3.70	595	5.40	1,610	7.20	3,970	11.50	15,940
3.80	645	5.50	1,700	7.40	4,350	12.00	17,880
3.90	695	5.60	1,790	7.60	4,750	12.50	19,880
4.00	745	5.70	1,880	7.80	5,170	13.00	21,960
4.10	795	5.80	1,980	8.00	5,600	13.50	24,080
4.20	845	5.90	2,080	8.20	6,040	14.00	26,280
4.30	895	6.00	2,190	8.40	6,500	15.00	31,000
4.40	945	6.10	2,310	8.60	6,980	16.00	36,000
4.50	1,000	6.20	2,430	8.80	7,480	17.00	41,000
4.60	1,055	6.30	2,550	9.00	8,000	18.00	46,000
4.70	1,110	6.40	2,680	9.20	8,530	19.00	52,000
4.80	1,170	6.50	2,820	9.40	9,070	20.00	58,000
4.90	1,230	6.60	2,970	9.60	9,630		
5.00	1,300	6.70	3,130	9.80	10,200		

Estimated monthly discharge of Yuba River near Smartsville, Cal., for 1904.

[Drainage area, 1,220 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	2,550	1,700	1,924	118,302	1.58	1.82
February	59,800	1,700	14,913	857,805	12.22	13.18
March	31,500	7,230	15,399	946,848	12.62	14.55
April	15,560	6,740	10,638	633,005	8.72	9.73
May	14,800	7,480	10,561	649,371	8.66	9.98
June	7,230	2,080	4,650	276,694	3.81	4.25
July	2,080	695	1,156	71,080	.95	1.10
August	695	495	580	35,663	.48	.55
September	1,700	445	637	37,904	.52	.58
October	15,940	595	1,855	114,060	1.52	1.75
November	1,790	1,000	1,180	70,215	.97	1.08
December	17,880	1,055	2,280	140,192	1.87	2.16
The year	59,800	445	5,481	3,951,139	4.49	60.73

BEAR RIVER ABOVE WHEATLAND, CAL.

This station was established by O. W. Peterson on October 8, 1904. It is located about 800 feet below McCourtney Crossing and 8 miles above Wheatland. The gage rods are 300 feet above the station, on the left bank of the river. The gage is made of 3 by 8 inch timber, painted white, and is graduated to feet and tenths. Two of the sections are bolted to the rock and the upper section is nailed to a tree. The gage is read once each day by George W. Dunlap. Discharge measurements are made from a car and cable. An auxiliary cable is located 150 feet downstream and parallel to the large one, so that float measurements can be made at very high water. The white oak tree to which the right end of the cable is fastened is the initial point for soundings. The channel is straight for 350 feet both above and below the station. At ordinary stages the velocity is moderate. Neither bank is subject to overflow. The bed of the stream is composed of gravel and is not subject to any material change. A standard United States Geological Survey bench mark is sulphured in a hole drilled in the rock between the two upper sections of the gage. Its elevation is 12.26 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Bear River above Wheatland, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
August 14	W. B. Clapp and O. W. Peterson	(a)	30
October 9	O. W. Peterson	4.90	771
October 31	do	3.70	176

a Measurement made before gage was established.

Mean daily gage height, in feet, of Bear River above Wheatland, Cal., for 1904.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	5.50	4.50	17	3.80	3.80	3.70
2	.....	4.80	4.00	18	3.80	3.60	3.60
3	.....	4.30	3.80	19	3.70	3.60	3.60
4	.....	3.70	3.80	20	3.60	3.50	3.60
5	.....	3.70	3.70	21	3.60	3.50	3.50
6	.....	3.60	3.70	22	3.60	3.50	3.50
7	.....	3.60	3.60	23	3.60	3.50	3.80
8	.....	3.60	3.60	24	3.60	3.50	5.50
9	4.80	3.60	3.80	25	3.50	3.40	4.40
10	4.10	3.60	3.90	26	3.50	3.40	4.00
11	9.00	3.60	3.80	27	3.50	3.70	3.90
12	4.70	3.60	3.70	28	3.40	3.60	3.80
13	4.00	3.60	3.90	29	3.40	3.50	3.80
14	3.90	3.60	3.80	30	3.60	3.50	5.80
15	5.10	4.40	3.80	31	3.70	.....	8.80
16	(4.40)	4.00	3.70				

AMERICAN RIVER NEAR FAIROAKS, CAL.

This station was established November 3, 1904, by O. W. Peterson. It is located at Fairoaks Bridge, near Fairoaks. The gage is made of 2 by 8 inch timber, painted white, and is graduated to feet and tenths. It is nailed to one of the piles at the upper side at the right end of the Fairoaks Bridge. The gage is read twice each day by J. P. Jones. Discharge measurements are made from the downstream side of the bridge.

The vertical face of the right abutment is 4 feet from the initial point for soundings. The channel is straight for 400 feet above and below the station. At ordinary stages the velocity is moderate. The right bank is not subject to overflow. At times of very high water the left bank is subject to overflow and a second channel is formed. The bed of the stream is composed of gravel, and is subject to slight changes at times of high water. At ordinary stages the river is about 210 feet in width and averages over 4 feet in depth. The bench mark is a nail driven in the guard rail over the upstream center pier, and is 31.00 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of American River near Fairoaks, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
October 29	O. W. Peterson	2.60	887
November 3	do	2.80	1,122

Mean daily gage height, in feet, of American River near Fairoaks, Cal., for 1904.

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	.....	3.05	12	(2.40)	2.65	23	2.55	2.70
2	.....	3.30	13	2.45	2.70	24	2.55	2.65
3	.....	3.10	14	2.60	2.55	25	2.65	2.70
4	2.75	2.65	15	2.65	2.50	26	2.60	2.55
5	2.70	2.70	16	2.75	2.55	27	2.60	2.50
6	2.70	2.55	17	2.70	2.70	28	2.70	2.40
7	2.60	2.55	18	2.50	2.60	29	2.70	2.60
8	2.50	2.60	19	2.65	2.40	30	3.05	3.70
9	2.50	2.55	20	2.60	2.65	31	.....	7.85
10	2.40	2.55	21	2.55	2.65			
11	(2.40)	2.60	22	2.50	2.90			

SACRAMENTO RIVER AT SACRAMENTO, CAL.

Gage height and turbidity records were taken at this station during 1904.

Mean daily gage height, in feet, of Sacramento River at Sacramento, Cal., for 1904.

[Observer, J. C. Pierson.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	13.1	25.4	24.0	20.8	20.5	15.5	10.3	9.0	9.7	11.1	11.9
2	.....	13.0	24.5	23.8	20.8	20.4	15.3	10.2	9.0	9.5	11.3	12.4
3	.....	13.0	24.3	23.6	20.9	21.2	15.0	10.0	8.9	9.5	11.6	12.5
4	.....	12.8	23.9	23.3	21.0	20.5	14.7	10.0	8.9	9.4	11.6	12.2
5	.....	13.2	23.6	23.0	21.2	20.5	14.4	9.9	8.9	9.3	11.5	11.9
6	.....	13.4	23.4	22.9	21.4	20.4	14.2	9.9	8.8	9.2	11.2	11.5
7	.....	13.7	23.2	22.5	22.0	20.3	13.9	10.0	8.8	9.1	11.0	11.2
8	.....	13.8	23.0	22.4	21.8	19.9	13.8	9.9	8.7	9.3	11.0	11.0
9	.....	13.9	23.0	22.2	21.6	19.9	13.5	9.7	8.7	10.5	10.9	10.9
10	14.1	13.7	23.0	22.2	21.7	19.9	13.3	9.6	8.7	11.2	10.8	10.8
11	14.2	13.5	22.9	22.2	21.8	19.0	13.2	9.5	8.6	13.5	10.7	10.8
12	14.3	14.8	23.6	22.0	21.8	19.5	13.0	9.5	8.6	17.8	10.6	11.2
13	14.4	19.9	23.7	22.2	22.0	19.3	12.9	9.3	8.5	16.2	10.6	11.1
14	14.2	19.4	23.7	22.2	21.1	19.2	12.6	9.6	8.5	15.1	10.5	11.3
15	13.9	18.8	24.0	22.3	21.8	19.0	12.4	10.0	8.4	13.9	10.4	11.8
16	13.6	22.4	23.8	22.1	21.8	19.1	12.3	10.0	8.4	13.3	10.6	11.9

Mean daily gage height, in feet, of Sacramento River at Sacramento, Cal., for 1904—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
17	13.5	21.8	23.3	22.0	21.6	19.0	12.0	9.9	8.4	13.1	10.9	11.8
18	13.8	21.4	24.2	22.2	21.6	18.9	12.0	9.8	8.4	12.6	10.9	11.5
19	14.4	21.4	24.3	22.0	21.5	18.7	12.0	9.8	8.4	12.3	11.0	11.2
20	15.2	21.6	25.9	22.0	21.2	18.5	11.9	9.7	8.3	12.0	11.0	11.1
21	15.1	22.4	26.3	21.8	21.2	18.2	11.7	9.7	8.2	11.9	11.0	11.0
22	14.9	23.8	26.2	21.8	21.4	18.0	11.6	9.6	8.2	11.9	11.0	10.9
23	14.7	25.0	25.9	21.6	21.4	17.9	11.5	9.4	8.2	11.8	10.9	10.8
24	14.5	25.6	25.4	21.5	21.2	17.8	11.4	9.4	8.7	11.8	10.8	10.9
25	14.4	27.1	25.0	21.3	21.4	17.3	11.2	9.3	9.9	11.7	10.7	10.5
26	14.2	27.8	24.5	21.2	21.1	17.0	11.0	9.3	11.6	11.6	10.6	12.7
27	14.0	27.7	24.0	21.1	20.8	16.6	11.0	9.3	11.8	11.5	10.5	13.2
28	13.7	26.7	23.7	21.1	20.8	16.2	10.8	9.3	11.1	11.4	10.6	12.8
29	13.5	26.0	23.9	21.0	20.7	15.8	10.7	9.2	10.4	11.3	11.5	12.3
30	13.4	.....	24.4	20.8	20.7	15.7	10.6	9.1	10.0	11.1	12.0	12.0
31	13.3	.....	24.2	.....	20.6	.....	10.5	9.0	.....	11.0	.....	18.6

Daily turbidity record of Sacramento River at Sacramento, Cal., for 1904.

[Observer, J. C. Pierson.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	85	250	200	95	75	60	40	50	90	70	150
2	.....	100	250	150	90	85	65	45	45	80	100	150
3	.....	85	300	150	90	75	70	35	50	65	60	180
4	.....	110	300	120	80	90	65	40	55	85	75	140
5	.....	150	200	130	80	85	75	35	55	65	55	110
6	.....	400	250	130	95	75	75	30	60	75	60	80
7	.....	180	200	200	110	85	70	45	55	65	75	65
8	.....	180	150	200	100	80	70	40	50	65	70	65
9	.....	100	150	200	110	80	65	40	45	150	65	45
10	160	110	300	180	110	75	60	50	50	250	70	75
11	170	75	300	160	120	75	55	45	50	200	70	75
12	180	350	300	100	100	80	55	55	50	400	65	75
13	250	600	250	100	100	75	55	40	50	200	70	55
14	90	400	200	110	100	75	55	55	55	200	75	60
15	100	160	250	100	100	75	55	65	50	140	75	70
16	100	700	250	110	90	70	60	65	40	110	50	100
17	100	400	150	120	90	70	50	50	45	90	180	110
18	110	250	300	130	90	75	50	65	45	85	100	90
19	200	180	250	100	100	70	40	60	40	200	65	80
20	130	160	300	130	110	70	40	60	40	140	60	80
21	110	300	250	130	110	75	50	60	40	90	65	60
22	120	800	250	100	100	60	40	60	40	55	70	60
23	100	1,000	250	95	100	65	45	65	55	60	120	80
24	100	450	200	95	90	65	45	60	85	60	100	100
25	100	600	180	100	85	60	40	50	150	60	80	80
26	100	500	150	100	100	60	45	55	150	60	70	200
27	100	450	250	110	95	60	45	55	250	55	75	160
28	100	350	200	100	95	60	50	55	100	60	80	200
29	100	250	300	100	90	65	40	60	160	55	110	110
30	95	.....	250	90	85	65	40	60	140	60	110	200
31	90	.....	250	.....	85	.....	40	50	.....	60	.....	1,500

MOKELUMNE RIVER AT ELECTRA, CAL.

This station was established January 1, 1900, by Burr Bassell. It is located 3 miles above the wagon bridge, on the Mokelumne Hill and Jackson road. It is one-half mile below the Standard Electric Company's power house and the post-office at Electra, Cal. The gage is a large inclined timber bolted to a tree on the left bank. It is read twice each day by H. F. Vogt. Discharge measurements are made by means of a cable and car 200 feet below the gage. The initial point for soundings is the anchor sheave to which the cable is fastened on the right bank. The channel is straight for 300 feet above and for 900 feet below the station. The current is swift at all stages, but there are cross currents at extreme low water. Both banks are high and are not liable to overflow. The lower part of the right bank is composed of hard gravel. The upper part of the right bank and the entire left bank are composed of solid rock. The bed of the stream is composed of rock and gravel and is fairly permanent.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Mokelumne River at Electra, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 8	S. G. Bennett	4.25	176
February 24	W. B. Newhall	12.00	17,300
February 24	do	12.70	19,000
February 26	do	8.65	4,663
February 27	do	8.95	5,742
February 28	do	8.30	4,029
June 10	O. W. Peterson	8.15	4,460
July 19	do	4.75	500
August 16	W. B. Clapp and O. W. Peterson	4.15	96

Mean daily gage height, in feet, of Mokelumne River at Electra, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.35	3.90	7.00	7.70	7.05	7.90	6.25	4.25	4.25	4.25	4.50	4.60
2	4.30	3.90	7.10	7.55	7.00	8.00	6.00	4.20	4.30	4.55	4.55	4.50
3	4.45	4.00	7.45	7.20	7.05	8.75	5.95	4.35	4.30	4.45	4.50	4.45
4	4.55	3.90	7.85	7.00	7.45	8.60	5.70	4.30	4.15	4.35	4.40	4.40
5	4.20	4.90	8.00	7.30	7.95	8.70	5.50	4.40	4.20	4.30	4.20	4.25
6	4.10	4.85	6.80	7.25	7.95	8.80	5.60	4.55	4.15	4.25	4.15	4.25
7	4.15	5.00	7.25	7.50	8.70	8.85	5.90	4.20	4.05	5.40	4.10	4.35
8	4.20	4.45	8.85	7.40	8.70	7.80	5.70	4.30	4.15	5.65	4.15	4.30
9	4.10	4.40	7.30	7.90	9.10	7.90	5.50	4.25	4.15	5.55	4.10	4.45
10	4.20	4.45	8.85	8.05	9.50	7.95	5.60	4.35	4.15	5.65	4.25	4.40
11	4.20	4.35	7.80	8.50	9.70	7.90	5.25	4.30	4.20	8.85	4.20	4.35
12	4.20	6.55	7.25	8.30	9.90	7.95	5.10	4.35	4.15	6.75	4.20	4.25
13	4.15	6.25	7.05	9.00	9.90	8.00	5.10	3.95	4.05	6.05	4.20	4.15
14	4.15	4.55	6.90	9.20	9.40	8.05	4.95	3.95	4.20	5.70	4.20	4.20
15	4.15	4.45	7.05	9.35	9.40	7.90	4.85	3.95	4.10	5.30	4.20	4.30
16	4.20	8.45	6.95	8.00	9.15	7.75	4.75	4.10	4.25	5.15	4.10	4.35
17	4.15	6.75	7.55	7.60	9.15	7.60	4.50	3.95	4.25	5.10	4.30	4.35
18	4.20	5.95	8.85	7.80	9.20	7.55	4.35	4.00	4.20	4.95	4.15	4.25
19	4.10	5.70	9.95	8.60	8.30	7.20	4.50	4.10	4.20	4.80	4.35	4.25
20	4.70	5.50	10.50	7.80	8.20	8.30	4.60	4.00	4.05	4.50	4.20	4.35
21	4.50	5.90	9.10	7.40	8.75	7.50	4.65	4.05	4.15	4.35	4.25	4.35
22	4.45	6.50	8.25	7.55	9.50	7.20	5.00	4.15	4.15	4.25	4.25	4.35
23	4.35	9.80	8.20	7.05	9.60	7.00	4.60	4.10	4.35	4.55	4.30	4.40
24	4.30	9.55	7.95	6.90	9.50	6.85	4.50	4.10	4.55	5.05	4.30	4.50
25	4.25	11.45	7.55	7.30	9.40	6.50	4.60	4.15	4.70	4.75	4.40	4.70
26	4.20	9.45	7.35	7.75	7.85	6.50	4.45	4.05	5.20	4.95	4.40	4.45
27	4.25	9.80	7.35	7.15	7.85	6.45	4.40	4.15	4.60	4.75	4.50	4.55
28	4.20	8.00	8.35	7.00	8.25	6.20	4.40	4.10	4.25	4.60	4.85	4.60
29	4.25	7.60	9.90	6.95	8.40	6.30	4.20	4.05	4.10	4.60	4.45	4.55
30	4.20	.....	8.60	7.05	8.45	6.30	4.05	4.30	4.15	4.60	4.45	5.30
31	4.15	.....	7.95	.....	8.25	.....	4.30	4.15	.....	4.55	.....	6.35

Rating table for Mokelumne River at Electra, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
4.00	25	5.50	1,100	7.00	2,750	9.00	5,900
4.10	70	5.60	1,200	7.10	2,880	9.20	6,300
4.20	120	5.70	1,300	7.20	3,010	9.40	6,700
4.30	180	5.80	1,400	7.30	3,140	9.60	7,140
4.40	240	5.90	1,500	7.40	3,270	9.80	7,620
4.50	310	6.00	1,600	7.50	3,400	10.00	8,100
4.60	380	6.10	1,700	7.60	3,550	10.20	8,660
4.70	460	6.20	1,800	7.70	3,700	10.40	9,220
4.80	540	6.30	1,900	7.80	3,850	10.60	9,840
4.90	620	6.40	2,000	7.90	4,000	10.80	10,520
5.00	700	6.50	2,100	8.00	4,150	11.00	11,200
5.10	780	6.60	2,230	8.20	4,490	11.50	13,200
5.20	860	6.70	2,360	8.40	4,830	12.00	15,600
5.30	940	6.80	2,490	8.60	5,180	12.50	18,600
5.40	1,020	6.90	2,620	8.80	5,540	13.00	22,200

Estimated monthly discharge of Mokelumne River at Electra, Cal., for 1904.

[Drainage area, 537 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	460	95	157	9,654	0.29	0.33
February	13,000	5	2,491	143,284	4.64	5.00
March	9,500	2,490	4,170	256,403	7.77	8.96
April	6,600	2,620	3,780	224,926	7.04	7.85
May	7,860	2,750	5,411	332,709	10.08	11.62
June	5,450	1,800	3,607	214,631	6.72	7.50
July	1,850	42	722	44,394	1.34	1.54
August	345	15	111	6,825	.21	.24
September	860	42	165	9,818	.31	.35
October	5,630	150	827	50,850	1.54	1.78
November	580	70	189	11,246	.35	.39
December	1,950	95	315	19,369	.59	.68
The year	13,000	5	1,829	1,324,109	3.41	46.24

MOKELUMNE RIVER NEAR CLEMENTS, CAL.

This station was established by O. W. Peterson on October 28, 1904. It is located at the bridge 1 mile north of Clements. The gage is made of 3 by 8 inch timber, painted white and graduated to feet and tenths. One section is a sloping gage and is nailed to posts driven in the ground on the right bank. The other section is nailed to a pile near the sloping rod. The gage is read twice each day, except in times of low water, by Allen Gaskill, the observer. Discharge measurements are made from the downstream side of the bridge. The right end of the bridge is the initial point for soundings. The channel is straight for 150 feet above and 500 feet below the station. At ordinary stages the velocity is moderate. Neither bank is subject to overflow, but for gage heights above 15 feet the river spreads over a terrace on the left side for 200 feet. The bed of the stream is composed of gravel and silt and is subject to slight changes. Ordinarily the width of the river is about 100 feet. The head of a bolt driven in a pile to which the upper section of the gage is fastened is the bench mark. Its elevation is 9.60 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Mokelumne River near Clements, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
August 17	O. W. Peterson and W. B. Clapp		109
October 27	O. W. Peterson	4.30	334
November 4	do	4.10	280

Mean daily gage height, in feet, of Mokelumne River near Clements, Cal., for 1904.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1		4.40	4.15	17		4.05	3.90
2		4.25	4.75	18		3.95	3.90
3		4.50	4.15	19		4.05	3.90
4		4.20	4.05	20		4.00	3.80
5		4.10	3.95	21		3.90	3.90
6		4.10	4.00	22		3.95	3.90
7		4.15	3.90	23		3.95	3.90
8		4.20	3.80	24		3.85	4.00
9		3.95	4.00	25		3.80	4.70
10		3.95	4.10	26		3.85	4.20
11		3.85	3.90	27		3.95	4.00
12		3.90	3.85	28	4.30	3.95	4.10
13		3.80	3.90	29	4.35	4.40	3.90
14		3.85	3.85	30	4.25	4.20	4.10
15		3.95	3.80	31	4.60		6.65
16		4.00	3.85				

STANISLAUS RIVER AT KNIGHTS FERRY, CAL.

This station was established May 19, 1903, by W. H. Stearns. The station is located 200 feet from the post-office at Knights Ferry. There is an island 800 feet above the gaging station and a dam on each channel at the head of the island. The Stanislaus Milling and Power Company's power house is on the right bank of the river below one of these dams and about 1,000 feet above the gaging station. Ordinary and low water stages are read on a 2-inch iron pipe driven into the bed of the stream. For high stages the gage is a 1 by 6 inch plank nailed to a 6 by 6 inch post on the right bank of the river. The graduations on both gages are to feet and tenths. The gage height is read twice each day by J. T. Cannon. Discharge measurements are made from a car suspended from a ¾-inch galvanized-iron cable. Above and parallel with the main cable is another smaller one, from which a stay line can be run to the meter to hold it, in flood measurements,

against the swift current. The initial point for soundings is the eyebolt, to which the cable is fastened on the right bank. The channel is straight for 500 feet above and below the cable. At ordinary and high stages the stream has a fall of 0.47 foot in the 500 feet above the cable, and of 0.68 foot in the 500 feet below. Both banks are composed of cemented gravel and are high. The left bank is not subject to overflow. In extreme floods the right bank has been known to be overflowed, flooding the yards and houses next the river. The bed is of gravel and is subject to some change from the addition of material which is washed down from the island above. The bench mark is a spike driven into a 6 by 6 inch redwood post near the upper section of the gage. Its elevation is 12.00 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Stanislaus River at Knights Ferry, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 20	F. W. Huber	6.60	345
February 14	J. T. Cannon	8.00	1,528
February 16	do	13.00	14,314
February 28	do	11.45	8,687
March 1	do	10.00	4,017
March 15	do	9.50	2,983
March 21	do	12.00	9,330
March 27	S. G. Bennett and W. B. Clapp	10.45	4,327
April 17	J. T. Cannon	10.80	5,091
May 8	do	11.55	7,608
May 22	do	12.25	8,754
May 29	do	11.20	6,215
June 19	do	10.00	3,832
June 29	do	9.00	2,408
July 9	do	8.70	1,832
July 11	do	8.10	1,291
July 22	O. W. Peterson and J. T. Cannon	7.50	798
August 3	J. T. Cannon and John McGrath	6.90	382
August 24	O. W. Peterson	6.30	84
August 28	John McGrath	6.45	210
September 11	do	6.00	74
September 29	do	6.85	330
October 23	do	7.50	744
November 6	do	7.25	445
November 27	do	6.80	292

Mean daily gage height, in feet, of Stanislaus River at Knights Ferry, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.40	6.50	9.95	10.60	10.10	10.95	8.90	7.15	6.20	7.15	7.20	7.00
2	6.40	6.45	9.65	10.45	9.85	10.85	8.70	7.05	6.20	7.30	7.20	7.10
3	6.40	6.40	9.80	10.30	9.90	11.75	8.65	7.00	6.15	7.30	7.15	7.10
4	6.40	6.45	9.80	10.30	10.45	11.20	8.65	7.10	6.15	7.10	7.10	7.05
5	6.15	7.00	9.75	10.15	10.90	(11.25)	8.95	7.20	6.10	7.05	7.10	6.95
6	6.40	6.65	9.70	10.15	11.55	11.35	8.50	7.15	6.10	7.10	7.05	6.90
7	6.30	7.20	9.75	10.40	12.10	11.20	8.50	7.15	6.10	8.15	7.00	6.90
8	6.35	7.10	10.30	10.60	11.75	11.05	8.40	7.10	6.15	8.80	7.00	6.90
9	6.30	7.00	10.00	10.95	12.15	10.60	8.35	6.95	6.10	8.35	7.00	6.95
10	6.30	6.85	10.55	11.30	12.50	10.65	8.10	6.85	6.10	8.35	6.95	6.90
11	6.35	6.80	10.40	11.50	12.40	11.15	8.05	6.80	6.05	10.35	6.90	6.85
12	6.40	9.75	10.00	11.75	12.90	11.70	8.05	6.75	6.00	9.25	6.90	6.90
13	6.40	9.00	(9.70)	12.05	12.80	10.50	8.00	6.65	6.00	8.70	6.90	6.90
14	6.40	8.00	9.45	12.30	13.10	10.40	7.85	6.60	6.00	8.40	6.85	6.90
15	6.50	7.70	9.60	11.90	12.80	10.35	7.65	6.60	6.00	8.10	6.80	6.90
16	6.45	12.80	9.45	11.15	12.65	10.30	7.70	7.00	6.00	8.00	6.80	6.90
17	6.40	9.40	9.95	10.75	12.70	10.15	(7.70)	6.85	6.05	7.75	6.85	6.90
18	6.50	8.60	10.85	10.80	12.60	10.00	7.65	6.70	6.10	7.65	6.80	6.85
19	6.55	8.25	11.85	11.60	11.55	10.00	7.70	6.60	6.05	7.55	6.90	6.80
20	6.55	8.00	15.45	10.65	11.45	9.75	7.65	6.60	6.10	7.50	6.90	6.80
21	6.50	8.10	12.90	10.20	12.00	9.85	7.65	6.60	6.05	7.55	6.90	6.80
22	6.40	8.85	11.60	10.20	12.70	9.90	7.65	6.45	6.00	7.50	6.85	6.80
23	6.60	12.20	11.50	10.00	13.20	9.85	7.60	6.40	6.15	7.55	6.80	6.80
24	6.60	15.10	11.75	9.70	13.10	9.60	(7.50)	6.35	6.80	7.45	6.80	7.00
25	6.60	14.25	11.25	9.95	12.95	9.25	(7.45)	6.45	7.25	7.40	6.75	7.20
26	6.55	11.60	10.40	10.35	11.35	(8.75)	(7.40)	6.45	7.35	7.35	6.70	7.10
27	6.50	14.05	10.40	10.05	11.30	8.25	(7.35)	6.50	7.20	7.35	6.80	6.90
28	6.50	11.20	10.45	9.90	11.10	8.50	(7.30)	6.50	6.90	7.35	6.80	6.90
29	6.50	10.35	12.70	9.80	11.40	9.00	(7.25)	6.40	6.85	7.30	7.15	6.90
30	6.50	.....	11.50	10.05	11.25	8.85	(7.20)	6.30	7.05	7.30	7.05	6.90
31	6.50	.....	11.15	.....	11.15	.....	7.15	6.35	.....	7.20	.....	8.25

NOTE.—Gage heights in parenthesis are estimated.

Rating table for Stanislaus River at Knights Ferry, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
6.00	60	7.60	890	9.10	2,440	11.20	6,330
6.10	70	7.70	980	9.20	2,560	11.40	6,990
6.20	80	7.80	1,070	9.30	2,680	11.60	7,700
6.30	95	7.90	1,160	9.40	2,800	11.80	8,500
6.40	125	8.00	1,250	9.50	2,950	12.00	9,300
6.50	160	8.10	1,340	9.60	3,100	12.20	10,200
6.60	200	8.20	1,440	9.70	3,250	12.40	11,200
6.70	245	8.30	1,540	9.80	3,400	12.60	12,200
6.80	295	8.40	1,640	9.90	3,550	12.80	13,250
6.90	350	8.50	1,740	10.00	3,700	13.00	14,400
7.00	410	8.60	1,840	10.20	4,040	13.50	17,400
7.10	480	8.70	1,960	10.40	4,400	14.00	20,400
7.20	550	8.80	2,080	10.60	4,800	14.50	23,400
7.30	630	8.90	2,200	10.80	5,230	15.00	26,900
7.40	710	9.00	2,320	11.00	5,730	15.50	30,400
7.50	800						

Estimated monthly discharge of Stanislaus River at Knights Ferry, Cal., including Stanislaus Water Company's ditch and Schell ditch,[a] for 1904.

[Drainage area, 935 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	257	132	199	12,236	0.21	0.24
February	27,692	217	4,712	271,037	5.04	5.44
March	30,152	2,977	6,140	377,534	6.57	7.57
April	10,807	3,357	5,389	320,668	5.76	6.43
May	15,712	3,587	9,547	587,022	10.21	11.77
June	8,418	1,611	4,558	271,220	4.88	5.44
July	2,340	624	1,295	79,626	1.39	1.60
August	630	201	372	22,873	.40	.46
September	770	145	261	15,531	.28	.31
October	4,370	545	1,174	72,186	1.26	1.45
November	613	276	412	24,516	.44	.49
December	1,540	317	436	26,809	.47	.54
The year	30,152	132	2,875	2,081,258	3.08	41.74

[a] Mean daily flow of Schell ditch estimated at 7 second-feet.

STANISLAUS WATER COMPANY'S DITCH AT KNIGHTS FERRY, CAL.

This station was established June 11, 1904, by S. G. Bennett. Measurements are made below the point where Schell ditch takes out water. The station is located about a mile below the Stanislaus Milling and Power Company's power house and about 200 feet below the place where it passes under Schell ditch flume. The gage is painted white and is graduated to feet and tenths. It is fastened to the upstream side of a small bridge and is read once each day by E. J. Coop. A meter measurement on Schell ditch 200 feet below its intake gave a discharge of about 7 second-feet, which is said to be its usual flow. In computing the estimated monthly discharge of Stanislaus River for 1904, a mean daily discharge of 7 second-feet has been used as the capacity of Schell ditch.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Stanislaus Water Company's ditch at Knights Ferry, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
July 22	O. W. Peterson	3.45	105
August 24	do	3.25	91
August 24	do	2.95	77
August 24	do	2.80	68
August 24	do	2.35	45
August 24	do	2.20	38

Mean daily gage height, in feet, of Stanislaus Water Company's ditch below Schell ditch intake, at Knights Ferry, Cal., for 1904.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.45	3.50	3.40	3.30	2.55	1.90
2	.....	2.75	3.45	3.35	3.35	2.40	2.00
3	.....	1.50	3.40	3.30	3.30	2.40	1.90
4	.....	1.70	3.35	3.35	3.35	2.25	1.90
5	.....	2.90	.00	3.30	3.25	2.20	1.80
6	.....	3.25	.00	3.30	2.90	2.25	2.20
7	.....	3.45	.00	3.30	2.95	2.15	2.00
8	.....	3.60	.00	3.20	2.70	2.20	2.15
9	.....	3.45	3.10	3.10	2.95	2.00	2.10
10	.....	3.55	3.35	3.10	2.95	2.00	2.10
11	3.45	3.45	3.40	3.25	2.60	2.00	2.15
12	3.50	3.45	3.35	3.20	2.60	1.90	1.80
13	3.60	3.30	3.35	3.20	2.60	1.95	2.30
14	3.50	3.25	3.40	3.00	2.45	1.90	1.85
15	3.50	3.35	3.35	3.10	2.25	1.85	1.80
16	3.50	3.30	3.30	3.00	2.30	1.90	1.90
17	3.65	3.30	3.30	3.40	2.20	2.10	1.75
18	3.60	3.50	3.35	3.50	2.20	2.10	2.00
19	3.60	3.50	3.35	3.40	2.10	1.95	1.85
20	3.60	3.50	3.30	3.40	2.35	2.15	1.65
21	3.60	3.50	3.30	3.30	2.30	1.95	1.60
22	3.55	3.50	3.30	3.45	2.25	1.90	1.70
23	3.60	3.40	3.30	3.35	2.45	1.85	1.90
24	3.60	3.20	3.30	3.40	2.55	2.00	1.50
25	3.30	3.40	3.30	3.40	2.40	1.90	2.00
26	3.60	3.45	3.30	3.25	2.45	1.90	1.60
27	3.60	3.55	3.40	3.10	2.50	2.10	1.65
28	3.55	3.50	3.10	2.95	2.45	1.75	1.80
29	3.50	3.50	3.30	3.30	2.40	2.10	1.90
30	3.45	3.45	3.35	3.30	2.50	1.70	1.75
31	.....	3.40	3.35	.....	2.50	.....	2.30

Rating table for Stanislaus Water Company's ditch below Schell ditch intake, at Knights Ferry, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.50	12	2.10	33	2.70	63	3.20	90
1.60	15	2.20	38	2.80	68	3.30	96
1.70	18	2.30	43	2.90	73	3.40	102
1.80	21	2.40	48	3.00	78	3.50	108
1.90	24	2.50	53	3.10	84	3.60	114
2.00	28	2.60	58				

Monthly estimates of flow included in those for Stanislaus River given on page 154.

TUOLUMNE RIVER AT LAGRANGE, CAL.

This station was established August 29, 1895, by J. B. Lippincott. It is located at the wagon bridge in the town of Lagrange, Cal. It is below the high dam of the Turlock and Modesto irrigation districts, and also below the head of the canal of the Lagrange Ditch and Hydraulic Mining Company, which diverts water from the left bank of the river 15 miles above the Lagrange dam. During 1903 this canal was being repaired and for the greater part of the year carried no water; for the remainder of the year it carried only enough water to keep the flumes wet. The gage is a vertical timber fastened to the right abutment. It is read twice each day by Miss Annie P. McGinn. Discharge measurements are made from the bridge to which the gage is attached. The initial point for soundings is at the south end of the trestle approach to bridge, on the left bank of the river.

The channel is straight for 400 feet above and 600 feet below the station. It is broken by two iron piers and has a width at ordinary stages of 300 feet. During the season of low water all the water is taken out by the canals above the station. The bed of the stream is composed of gravel and is fairly permanent. The current is swift at high stages and very sluggish during low water. The discharge has gradually increased each year for the same gage heights. Both banks are high and not subject to overflow.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Tuolumne River at Lagrange, Cal., for 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 21	F. W. Huber	4.15	143
March 26	E. C. Murphy, W. B. Clapp, and S. G. Bennett	6.90	4,750
May 9	S. G. Bennett	8.64	10,531
June 8	O. W. Peterson	8.28	9,656
July 21	do	5.73	1,986
August 23	do	3.25	4.6

Mean daily gage height, in feet, of Tuolumne River at Lagrange, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.50	3.50	6.45	7.15	6.70	8.30	7.05	5.00	(3.50)	6.20	5.50	4.70
2	4.50	3.50	6.25	6.95	6.55	8.00	6.85	4.95	(3.45)	6.50	5.45	4.70
3	4.45	3.50	6.20	6.80	6.55	9.20	6.65	4.85	3.50	6.10	5.40	4.70
4	4.40	3.50	6.30	6.65	6.90	8.80	6.60	4.70	3.00	6.00	5.35	4.70
5	4.35	4.60	6.25	6.60	7.30	8.60	6.55	4.50	3.00	5.85	5.30	4.70
6	4.30	4.10	6.15	6.85	8.10	8.95	6.65	4.40	3.10	5.90	5.30	4.65
7	4.30	4.50	6.30	7.20	8.70	8.70	6.80	4.70	3.10	7.35	5.20	4.60
8	4.25	4.45	6.60	7.35	8.70	8.20	6.60	4.55	3.10	7.45	5.15	4.60
9	4.30	4.30	6.60	7.35	8.80	8.30	6.15	4.30	3.10	7.25	5.10	4.60
10	4.25	4.20	7.15	7.60	9.00	8.45	6.10	4.20	3.10	7.10	5.10	4.55
11	4.30	4.10	7.40	7.85	9.05	8.50	6.00	3.80	3.10	9.80	5.05	4.55
12	4.35	5.30	6.80	8.10	9.50	8.55	6.00	3.70	3.10	8.20	5.00	4.50
13	4.30	6.90	6.55	8.35	9.50	8.70	5.85	3.25	3.10	6.85	5.00	4.50
14	4.20	5.70	6.35	8.35	9.65	8.50	5.75	3.25	3.10	6.50	5.00	4.50
15	4.20	5.35	6.45	7.70	9.45	8.50	5.55	3.20	3.10	6.50	4.90	4.50
16	4.20	9.35	6.40	7.50	9.45	8.50	5.45	4.00	3.10	5.90	4.90	4.50
17	4.20	7.15	6.50	7.40	9.55	8.30	5.45	4.70	3.10	5.60	4.85	4.50
18	4.40	6.35	7.50	7.30	8.45	8.20	5.50	4.50	3.10	5.50	4.80	4.45
19	4.40	5.90	7.70	8.45	8.35	8.10	5.70	4.00	3.10	5.50	4.80	4.45
20	4.30	5.60	10.30	7.45	8.35	8.05	5.85	3.70	3.10	5.50	4.80	4.40
21	4.05	5.65	8.40	7.10	8.55	8.00	5.80	3.25	3.10	5.50	4.75	4.40
22	4.10	6.25	7.75	7.00	9.50	8.00	5.80	3.20	3.10	5.50	4.75	4.35
23	4.05	8.45	8.10	6.70	10.25	7.90	5.90	3.20	3.25	5.50	4.70	4.35
24	4.20	8.50	7.60	6.55	10.15	7.90	5.90	3.20	5.05	5.50	4.70	4.35
25	4.20	9.80	7.20	6.65	9.85	7.65	5.60	3.20	5.45	5.50	4.70	4.40
26	3.90	7.80	6.95	6.90	8.70	7.35	5.30	3.20	5.85	5.50	4.70	4.50
27	3.80	8.70	6.85	6.80	8.30	7.25	5.15	3.20	5.55	5.50	4.70	4.50
28	3.65	7.60	7.30	6.60	8.30	7.25	5.00	3.10	5.50	5.50	4.70	4.50
29	3.50	6.90	9.10	6.60	8.60	7.35	4.95	4.00	5.50	5.50	4.70	4.50
30	3.50	.....	8.05	6.55	8.70	7.25	4.80	(4.00)	6.10	5.50	4.70	4.50
31	3.50	.....	7.45	.....	8.35	.....	5.00	(4.00)	.....	5.50	.....	6.20

NOTE.—Gage heights in parenthesis are estimated.

Rating table for Tuolumne River at Lagrange, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
3.20	1	4.50	360	5.80	2,100	7.20	5,700
3.30	10	4.60	430	5.90	2,300	7.40	6,300
3.40	20	4.70	510	6.00	2,500	7.60	7,000
3.50	30	4.80	600	6.10	2,700	7.80	7,700
3.60	40	4.90	700	6.20	2,900	8.00	8,400
3.70	50	5.00	810	6.30	3,150	8.20	9,100
3.80	70	5.10	930	6.40	3,400	8.40	9,900
3.90	90	5.20	1,060	6.50	3,650	8.60	10,700
4.00	110	5.30	1,200	6.60	3,900	8.80	11,500
4.10	150	5.40	1,350	6.70	4,200	9.00	12,300
4.20	200	5.50	1,520	6.80	4,500	9.50	14,300
4.30	250	5.60	1,710	6.90	4,800	10.00	16,300
4.40	300	5.70	1,900	7.00	5,100		

Estimated monthly discharge of Tuolumne River, including Turlock and Modesto canals, at Lagrange, Cal., for 1904.[a]

[Drainage area, 1,501 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	538	331	434	26,686	0.29	0.33
February	15,882	311	4,127	237,388	2.75	2.97
March	17,665	3,275	5,949	365,790	3.96	4.56
April	10,606	4,374	6,406	381,183	4.27	4.76
May	17,850	4,405	11,692	718,913	7.79	8.98
June	13,858	6,130	9,576	569,812	6.38	7.12
July	5,530	1,046	2,970	182,618	1.98	2.28
August	1,291	325	769	47,284	.51	.59
September	3,172	97	652	38,797	.43	.48
October	15,855	1,520	3,535	217,359	2.36	2.72
November	1,520	510	808	48,079	.54	.60
December	2,900	275	463	28,469	.31	.36
The year	17,850	97	3,948	2,862,378	2.63	35.75

[a] Small amount of water diverted by mining ditch not included in this estimate.

TURLOCK CANAL AT LAGRANGE, CAL.

The Turlock canal, the property of the Turlock Irrigation district, takes water from the left bank of the Tuolumne River at the Lagrange dam. This canal was designed to carry 1,500 second-feet and to irrigate a large area of fertile land in the vicinity of Turlock and Ceres, Stanislaus County, Cal. During 1898 water was first turned into the canal in small quantities and used for puddling the banks. A record of the gage height has been kept since July, 1899. Meter measurements are made when the gaging station on the Tuolumne River at Lagrange is visited, and Morgan flume, or Flume No. 2, has been rated. It is 13.75 feet in width. The observer is J. L. Montgomery.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Turlock canal at Lagrange, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 21	F. W. Huber	1.30	49
May 8	S. G. Bennett	4.78	455
May 8	do	3.70	291
May 8	do	2.60	153
May 8	do	1.98	80
May 9	do	1.70	54
June 8	O. W. Peterson	5.08	496
August 22	do	3.90	338

Mean daily gage height, in feet, of Turlock canal at Lagrange, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.00	2.40	4.15	4.00	4.75	5.00	0.00	0.80	3.20	4.40	0.00	0.00
2	.00	3.25	4.15	4.30	4.70	4.95	a 2.60	3.60	2.60	4.40	.00	.00
3	.00	3.15	4.15	4.40	4.75	5.05	3.60	4.05	2.80	4.40	.00	.00
4	.00	3.15	4.25	4.40	4.80	5.00	4.10	4.50	2.60	4.40	.00	.00
5	.00	3.60	4.25	4.40	4.86	5.10	4.50	4.60	2.70	4.40	.00	.00
6	.00	3.60	4.25	4.45	4.85	5.10	3.35	4.60	2.60	3.90	.00	.00
7	.00	3.60	2.10	4.40	4.80	5.15	3.90	4.60	2.50	4.40	.00	.00
8	.00	3.60	b .00	4.50	4.80	5.10	4.90	4.60	2.40	4.40	.00	.00
9	.00	3.30	.00	4.60	4.70	5.10	4.80	4.60	2.40	4.40	.00	.00
10	.00	3.60	.00	4.60	4.80	4.00	4.80	4.60	2.30	3.70	.00	.00
11	.00	3.60	.00	4.60	4.90	.90	4.85	4.60	2.20	4.00	.00	.00
12	.00	3.40	.00	4.65	4.90	4.90	4.85	4.60	2.20	4.40	.00	.00
13	.00	3.80	a .85	4.70	4.95	b .00	3.95	4.60	2.20	4.40	.00	.00
14	.00	3.85	3.10	4.70	4.95	.00	4.55	4.15	2.20	4.40	.00	.00
15	.00	3.50	3.50	4.70	4.95	.00	4.60	4.10	2.15	4.40	.00	.00
16	.00	3.75	2.05	4.70	4.95	.00	4.60	4.10	2.15	4.30	.00	.00
17	.00	4.00	b .00	4.70	5.00	.00	4.80	4.60	2.55	4.30	.00	.00
18	.00	4.00	.00	4.70	5.00	.00	4.85	4.60	2.55	3.60	.00	.00
19	.00	4.00	.00	3.80	4.95	.00	.80	4.70	2.65	3.30	.00	.00
20	a 1.50	4.00	.00	4.70	5.00	.00	.80	4.60	2.60	2.80	.00	.00
21	1.50	4.00	.00	4.70	5.00	.00	.80	4.50	2.50	b .00	.00	.00
22	1.10	3.80	.00	4.70	5.05	.00	.80	4.00	2.30	.00	.00	.00
23	2.00	4.00	.00	4.70	5.00	.00	.40	3.60	2.30	.00	.00	.00
24	2.00	3.60	.00	4.70	5.00	.00	1.30	3.50	3.50	.00	.00	.00
25	2.00	3.80	.00	4.80	5.00	.00	2.60	3.45	3.20	.00	.00	.00
26	2.45	2.55	.00	4.70	5.05	.00	4.00	3.45	2.00	.00	.00	.00
27	3.25	3.20	.00	4.75	5.05	.00	4.05	3.30	4.40	.00	.00	.00
28	3.10	4.15	.00	4.70	5.05	.00	4.05	3.45	4.40	.00	.00	.00
29	3.25	4.15	.00	4.75	5.05	.00	4.70	3.45	4.40	.00	.00	.00
30	3.25	.....	.00	4.75	5.10	.00	4.80	3.60	4.40	.00	.00	.00
31	3.15	.....	a 3.00	.....	5.00	.....	.80	3.20	.....	.00	.....	.00

a Water turned in. b Water turned off.

Rating table for Turlock canal at Lagrange, Cal., from January 1 to July 1, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.00	0.0	1.40	30	2.80	179	4.20	375
.10	.5	1.50	37	2.90	192	4.30	390
.20	1.	1.60	45	3.00	205	4.40	405
.30	1.5	1.70	55	3.10	218	4.50	420
.40	2.	1.80	65	3.20	231	4.60	436
.50	2.5	1.90	75	3.30	244	4.70	452
.60	3	2.00	85	3.40	257	4.80	468
.70	4	2.10	96	3.50	270	4.90	484
.80	6	2.20	107	3.60	285	5.00	500
.90	9	2.30	118	3.70	300	5.10	516
1.00	12	2.40	129	3.80	315	5.20	532
1.10	16	2.50	141	3.90	330	5.30	548
1.20	20	2.60	153	4.00	345	5.40	564
1.30	25	2.70	166	4.10	360	5.50	580

Rating table for Turlock canal at Lagrange, Cal., from July 2 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.40	1	1.60	42	2.80	178	4.00	355
.50	2	1.70	50	2.90	192	4.10	372
.60	3	1.80	58	3.00	206	4.20	389
.70	4	1.90	67	3.10	220	4.30	406
.80	6	2.00	76	3.20	235	4.40	423
.90	9	2.10	86	3.30	250	4.50	440
1.00	12	2.20	97	3.40	265	4.60	457
1.10	16	2.30	109	3.50	280	4.70	474
1.20	20	2.40	122	3.60	295	4.80	491
1.30	24	2.50	136	3.70	310	4.90	508
1.40	29	2.60	150	3.80	325	5.00	525
1.50	35	2.70	164	3.90	340		

Monthly estimates are included in those for Tuolumne River given on page 158.

MODESTO CANAL AT LAGRANGE, CAL.

The Modesto canal is the property of the Modesto irrigation district. The water is diverted from the right side of the Tuolumne River at the Lagrange dam. This canal was designed to carry 660 second-feet and to irrigate land in the vicinity of Modesto, Stanislaus County, Cal. The principal part of the construction work was done on this canal prior to 1892, but on account of litigation the canal was not completed until April, 1903.

On April 26, 1903, a gage rod was set in and a rating made of Indian Hill flume, near Lagrange, Cal. From May 10 to June 3, and from June 10 to June 25, inclusive, boards were placed in the flumes to back the water up and keep the flumes saturated. During this time gage heights were obtained by taking the depth of the water in the canal below Indian Hill flume. The observer is Annie P. McGinn.

On July 12, 1904, the station was moved to the flume near the intake. This was done so that more gage readings and explanations of their fluctuations could be obtained, by having J. L. Montgomery, the regulator of the gates at the intake, act as gage observer. This flume is 11.85 feet in width. The gage is graduated to feet and tenths.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Modesto canal at Lagrange, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 21 [a]	F. W. Huber	2.55	170
March 26 [a]	E. C. Murphy, W. B. Clapp, and S. G. Bennett.	2.60	196
May 9 [a]	S. G. Bennett	2.78	218
May 9 [b]	do	1.27	64
May 9 [b]	do	1.90	119
May 9 [b]	do	.65	24
June 8 [a]	O. W. Peterson	1.60	86
July 21 [b]	do	3.10	280
August 22 [b]	do	2.50	186

[a] Measurement made at Indian Hill flume.
[b] Measurement made at flume near intake.

Mean daily gage height, in feet, of Modesto canal at Lagrange, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.50	2.30	0.95	[a]0.90	2.20	2.80	3.20	0.00	1.80	[a]0.00	0.00	0.00
2	2.50	2.30	1.20	2.30	2.50	2.80	3.20	3.10	1.50	.00	.00	.00
3	2.50	2.30	1.70	2.30	2.70	3.00	3.20	3.15	1.50	.00	.00	.00
4	2.50	2.30	1.80	2.30	2.70	3.00	3.20	3.10	1.40	.00	.00	.00
5	2.50	2.60	1.80	2.30	2.70	3.00	3.20	3.05	1.50	.00	.00	.00
6	2.50	2.60	1.80	2.30	2.70	3.00	3.20	3.05	1.40	.00	.00	.00
7	2.50	2.60	2.10	2.30	2.70	3.00	3.20	3.10	1.30	.00	.00	.00
8	2.50	2.60	2.10	2.30	2.75	2.20	3.20	3.10	1.20	.00	.00	.00
9	2.50	2.60	2.10	2.30	2.00	2.20	3.20	3.05	1.20	.00	.00	.00
10	2.50	2.60	1.70	2.30	1.25	3.00	3.20	3.10	1.10	.00	.00	.00
11	2.50	2.60	1.70	2.40	2.30	3.15	3.20	3.10	.00	.00	.00	.00
12	2.50	2.70	2.00	[a].10	2.70	3.20	3.20	3.10	.00	.00	.00	.00
13	2.50	1.60	2.30	1.20	2.90	3.10	[c]3.25	2.95	.00	.00	.00	.00
14	2.50	[a].05	2.30	2.35	2.90	3.10	3.25	2.70	.00	.00	.00	.00
15	2.50	.00	2.30	.45	2.90	3.15	3.25	2.65	.95	.00	.00	.00
16	2.50	.00	2.30	2.30	2.90	3.20	3.25	3.20	.95	.00	.00	.00
17	2.50	.00	2.30	2.30	2.90	3.20	3.25	3.15	1.35	.00	.00	.00
18	2.50	.00	2.40	2.60	2.90	3.20	3.25	3.15	1.35	.00	.00	.00
19	2.50	.00	2.40	2.60	2.90	3.20	3.25	3 20	1.45	.00	.00	.00
20	2.50	.00	2.40	2.60	2.90	3.20	3.25	3.20	1.40	.00	.00	.00
21	2.40	.00	2.40	2.60	1.80	3.20	3.10	2.90	1.30	.00	.00	.00
22	2.40	.00	2.60	2.65	[a].00	3.20	3.15	2.60	1.10	.00	.00	.00
23	2.50	.00	2.60	2.70	1.35	3.20	.00	2.30	1.10	.00	.00	.00
24	2.60	.40	2.60	2.70	1.45	3.20	.60	2.20	1.85	.00	.00	.00
25	2.60	.80	2.65	2.70	1.85	3.20	.60	2.10	2.00	.00	.00	.00
26	2.60	.75	2.50	2.70	2.35	3.20	3.00	2.10	2.00	.00	.00	.00
27	2.60	.80	2.50	2.70	2.80	3.20	3.00	2.00	2.00	.00	.00	.00
28	2.50	.80	1.40	1.90	3.00	3.20	3.00	1.10	2.00	.00	.00	.00
29	2.30	.85	2.35	[b]1.00	2.80	3.20	3.00	2.20	2.00	.00	.00	.00
30	2.30	.....	2.60	2.20	2.80	3.20	3.05	1.90	1.05	.00	.00	.00
31	2.30	.....	2.60	.....	2.80	.....	3.00	1.90	.....	.00	.....	.00

[a] Shut off water to repair canal.
[b] Water lowered to repair canal.
[c] New station established at flume near intake.

Rating table for Modesto canal at Lagrange, Cal., from July 13 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.00	0	0.90	38	1.80	112	2.70	200
.10	2	1.00	45	1.90	121	2.80	210
.20	4	1.10	53	2.00	130	2.90	220
.30	7	1.20	61	2.10	140	3.00	230
.40	11	1.30	69	2.20	150	3.10	241
.50	16	1.40	77	2.30	160	3.20	252
.60	21	1.50	85	2.40	170	3.30	263
.70	26	1.60	94	2.50	180	3.40	274
.80	32	1.70	103	2.60	190	3.50	285

Monthly estimates are included in those for Tuolumne River given on page 158.

MERCED RIVER ABOVE MERCED FALLS, CAL.

The measurement of this stream was undertaken in response to numerous requests from mining and irrigation interests. The mid-summer flow of the stream is less than the combined capacity of the irrigation and power canals taking water in the vicinity of Snelling.

The station was established April 6, 1901, by H. H. Henderson. It is located 1 mile above Merced Falls. The gage is made of 2 by 4 inch board, painted white, and graduated to feet and tenths, and is bolted to iron stakes driven in the bed of the stream. The gage is read twice each day by Charles Siegfeldt. Discharge measurements are made from a car and cable. Both banks are high and rocky and are not subject to overflow. The bed of the stream is composed of gravel and is subject to change. The bench mark is $\frac{3}{4}$-inch round iron bolt set 10 inches in the slate rock on the right bank of the river. It has an elevation of 69.201 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Merced River above Merced Falls, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 10	H. H. Henderson	8.20	239
January 24	do	8.15	204
February 4	do	8.20	199
February 25	do	11.62	3,457
February 28	do	11.50	3,268
March 6	do	9.80	1,203
March 29	do	12.25	4,683
April 20	do	11.80	3,357

Discharge measurements of Merced River above Merced Falls, Cal., in 1904—Continued.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
May 29	H. H. Henderson	12.80	5,424
June 16	do	11.60	3,165
July 1	do	10.20	1,414
August 7	do	8.35	214
August 23	O. W. Peterson	8.32	209
August 28	H. H. Henderson	8.20	182
September 12	do	7.90	74
September 27	do	9.50	928
October 9	do	11.90	3,516
October 23	do	9.50	995
November 25	do	8.60	314
December 4	do	8.60	303

Mean daily gage height, in feet, of Merced River above Merced Falls, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.20	8.20	10.15	10.65	10.85	12.35	10.30	8.80	8.20	9.90	9.15	8.70
2	8.20	8.20	9.90	10.35	10.65	12.30	10.15	8.95	8.05	11.25	9.10	8.70
3	8.20	8.25	9.85	10.45	10.55	13.05	10.10	9.15	8.05	10.35	9.10	8.70
4	8.25	8.35	9.90	10.30	11.00	12.70	9.95	8.95	8.05	10.15	9.10	8.65
5	8.20	8.65	9.90	10.30	11.55	12.55	9.90	8.95	8.00	10.15	9.05	8.60
6	8.10	8.55	9.80	10.50	12.40	12.50	9.95	9.15	8.00	10.40	9.00	8.60
7	8.10	8.60	9.75	10.65	13.35	12.35	9.90	9.25	8.00	11.45	8.95	8.50
8	8.05	8.50	9.95	11.00	12.60	11.90	9.90	9.00	8.00	11.15	8.90	8.50
9	8.10	8.50	10.00	10.80	13.05	11.85	9.85	8.85	8.00	10.70	8.90	8.50
10	8.10	8.50	10.20	11.55	13.30	11.85	9.65	8.75	8.00	10.40	8.90	8.50
11	8.20	8.40	11.65	11.60	13.55	11.75	9.55	8.65	7.95	11.25	8.85	8.50
12	8.10	8.45	10.70	11.85	13.95	11.75	9.45	8.60	7.90	11.70	8.80	8.40
13	8.10	10.45	10.30	12.10	13.65	11.70	9.45	8.55	7.90	10.85	8.80	8.50
14	8.05	9.30	10.10	12.40	14.10	11.55	9.35	8.45	7.90	10.50	8.80	8.50
15	8.15	9.05	10.15	12.15	13.70	11.45	9.30	8.40	7.90	10.25	8.80	8.50
16	8.10	12.45	10.20	11.40	13.70	11.50	9.25	8.80	7.85	9.95	8.80	8.45
17	8.10	10.65	10.10	11.30	13.70	11.40	9.15	8.80	7.90	9.80	8.80	8.40
18	8.15	9.80	10.60	11.30	13.90	11.30	9.10	8.75	8.15	9.70	8.80	8.40
19	8.30	9.35	10.90	12.10	12.50	11.15	9.20	8.60	8.20	9.55	8.80	8.40
20	8.25	9.15	(11.30)	11.55	12.60	11.20	9.30	8.50	8.20	9.50	8.70	8.40
21	8.20	9.10	11.65	11.25	12.80	11.00	9.25	8.40	8.15	9.45	8.70	8.40
22	8.20	9.35	11.30	11.25	13.15	10.90	9.20	8.40	8.15	9.45	8.70	8.35
23	8.20	9.90	13.00	10.90	13.65	10.95	9.35	8.35	8.10	9.50	8.70	8.40
24	8.15	10.80	11.75	10.60	13.55	10.85	9.25	8.30	8.35	9.55	8.60	8.45
25	8.15	11.35	11.60	10.85	13.55	10.65	9.20	8.30	9.90	9.45	8.60	8.80
26	8.20	10.75	11.10	11.15	12.75	10.55	9.15	8.30	9.90	9.45	8.60	8.55
27	8.35	12.30	10.65	11.05	12.30	10.50	9.10	8.25	9.55	9.40	8.60	8.45
28	8.20	11.60	11.15	11.25	12.45	10.45	9.10	8.20	9.30	9.35	8.60	8.50
29	8.20	10.50	12.40	10.60	12.65	10.40	9.00	8.20	9.45	9.30	8.85	8.50
30	8.20	.....	11.55	10.60	12.50	10.35	8.90	8.30	9.80	9.30	8.75	8.50
31	8.20	.....	11.05	.....	12.45	.....	8.80	8.25	.....	9.20	.....	10.35

Rating table for Merced River above Merced Falls, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
7.80	65	9.00	565	10.10	1,450	11.40	3,000
7.90	95	9.10	630	10.20	1,550	11.60	3,300
8.00	130	9.20	700	10.30	1,650	11.80	3,630
8.10	165	9.30	770	10.40	1,760	12.00	4,000
8.20	200	9.40	845	10.50	1,870	12.20	4,400
8.30	235	9.50	920	10.60	1,980	12.40	4,800
8.40	270	9.60	1,000	10.70	2,100	12.60	5,210
8.50	310	9.70	1,085	10.80	2,220	12.80	5,630
8.60	355	9.80	1,170	10.90	2,340	13.00	6,050
8.70	400	9.90	1,260	11.00	2,460	13.50	7,200
8.80	450	10.00	1,350	11.20	2,720	14.00	8,500
8.90	505						

Estimated monthly discharge of Merced River above Merced Falls, Cal., for 1904.

[Drainage area, 1,090 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	252	148	189	11,621	0.17	0.20
February	4,900	200	1,240	71,326	1.14	1.23
March	6,050	1,128	2,265	139,269	2.08	2.40
April	4,800	1,650	2,708	161,137	2.48	2.77
May	8,780	1,925	5,797	356,444	5.32	6.13
June	6,160	1,705	3,292	195,888	3.02	3.37
July	1,650	450	909	55,892	.83	.96
August	735	200	380	23,365	.35	.40
September	1,260	80	325	19,339	.30	.33
October	3,460	700	1,511	92,908	1.39	1.60
November	665	355	471	28,026	.43	.48
December	1,705	252	361	22,197	.33	.38
The year	8,780	80	1,621	1,177,412	1.49	20.25

SAN JOAQUIN RIVER AT HERNDON, CAL.

The gage rod at this station was established by the engineering department of the Southern Pacific Railway Company in 1879. The old trestle bridge was torn down by the railroad company during 1899

and a new iron structure was erected in its place. A new gage rod, set to the datum of the old gage, was bolted to the western side of the central concrete pier. The bench mark is a nail in a post at the south end of the bridge on the west side, 0.2 foot above the ground, and marked "B. M." It is at an elevation of 24.12 feet above gage datum. The channel for some distance above and below the bridge is straight, and the water has a uniform velocity. The right bank is high, rocky, and steep. The bed of the stream is composed of small gravel and shifting sand. Because of the continual changes in the cross section, which were increased by a side channel breaking through the gravel pits on the left bank of the river just above the gaging station, meter measurements were discontinued at this station at the end of 1901.

The river stage record for 1904 has been furnished by William Hood, chief engineer of the Southern Pacific Railway Company. G. G. Nelson was the observer.

Mean daily gage height, in feet, of San Joaquin River at Herndon, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.20	2.20	4.00	5.30	5.50	8.50	6.00	4.20	3.20	4.00	3.60	3.20
2	2.20	2.20	4.00	5.30	5.40	8.50	6.00	4.00	3.20	4.20	3.50	3.20
3	2.20	2.20	4.00	5.00	5.20	10.00	5.80	4.00	3.20	4.40	3.50	3.20
4	2.20	2.20	4.00	5.00	5.20	9.50	5.80	4.20	3.20	4.50	3.50	3.10
5	2.20	2.20	4.00	5.00	6.00	8.80	5.60	4.20	3.20	4.50	3.40	3.10
6	2.20	2.20	4.00	5.00	6.50	9.00	5.50	4.20	3.00	4.80	3.40	3.10
7	2.20	2.20	4.00	5.20	6.70	8.80	5.50	4.20	3.00	5.70	3.40	3.10
8	2.20	2.20	4.00	5.50	9.00	8.00	5.50	4.20	3.00	5.70	3.40	3.10
9	2.20	2.20	4.20	6.20	8.80	7.70	5.50	4.20	3.00	5.50	3.30	3.10
10	2.20	2.20	4.20	6.80	9.00	7.50	5.20	4.30	3.00	5.50	3.30	3.10
11	2.20	2.20	6.50	7.00	9.50	7.50	5.10	4.30	3.00	5.30	3.30	3.10
12	2.20	2.20	6.80	7.20	9.70	7.50	5.00	4.10	3.00	8.00	3.30	3.10
13	2.20	2.20	6.30	7.20	10.00	7.70	5.00	4.00	2.80	6.50	3.20	3.10
14	2.20	2.20	4.50	7.30	11.20	8.00	5.00	4.00	2.80	5.50	3.20	3.10
15	2.20	2.20	4.20	7.30	11.00	7.80	5.00	4.00	2.80	5.00	3.20	3.10
16	2.20	2.30	4.20	6.80	10.70	8.00	5.00	4.00	2.80	4.70	3.20	3.10
17	2.20	5.50	4.20	6.50	10.50	7.80	5.00	4.00	2.80	4.30	3.20	3.10
18	2.20	4.00	5.00	6.30	10.20	7.50	5.00	4.00	2.80	4.30	3.20	3.10
19	2.20	3.00	4.70	6.30	9.50	7.40	5.00	4.00	2.80	4.30	3.20	3.10
20	2.50	3.20	8.50	7.30	8.50	7.20	5.00	4.00	2.80	4.20	3.20	3.10
21	2.50	3.20	6.50	6.50	8.80	7.00	5.00	3.80	2.80	4.00	3.20	3.10
22	2.40	3.20	6.00	6.30	9.30	7.00	4.80	3.70	2.80	4.00	3.20	3.10
23	2.30	3.50	5.50	6.30	10.20	7.00	4.60	3.70	2.80	4.00	3.20	3.10
24	2.30	6.00	5.30	5.50	11.00	6.70	5.00	3.60	2.80	4.00	3.20	3.10
25	2.30	6.30	5.00	6.50	10.50	6.50	5.00	3.60	5.00	4.00	3.20	3.00
26	2.30	5.80	5.00	5.50	9.50	6.20	5.00	3.50	6.80	4.00	3.20	3.00
27	2.30	6.00	4.80	5.30	8.60	6.00	5.00	3.30	5.00	3.90	3.20	3.00
28	2.20	5.30	5.00	5.30	8.50	6.00	4.70	3.30	4.80	3.90	3.20	3.00
29	2.20	4.30	8.00	5.50	9.00	6.00	4.60	3.30	4.00	3.80	3.20	3.00
30	2.20	.....	6.00	5.50	9.00	6.00	4.40	3.20	4.00	3.80	3.20	3.00
31	2.20	.....	5.50	.....	8.70	.....	4.30	3.20	.....	3.70	.....	3.20

KING RIVER NEAR SANGER, CAL.

This station was established September 3, 1895, by J. B. Lippincott. It is located 15 miles east of Sanger, Cal., near the mouth of the canyon, and is above all diversions. An automatic river stage register was installed April 18, 1903. There is also an inclined wooden gage near by from which readings were formerly taken and which is now used in checking the self-recording gage. O. G. Williams reads the gage once each day and also examines the automatic gage to see that it is in proper working order. The mean daily gage height is determined from the register sheets by the use of planimeter. Discharge measurements are made by means of a cable and car. The initial point for soundings is an eyebolt inbedded in concrete on the right bank of river. The channel is nearly straight for 300 feet above and below the station, and has a width of 180 feet at ordinary stages. The bed of the stream is composed of gravel and small bowlders and changes but little. The right bank is high and not subject to overflow. The left bank is subject to overflow during extreme high water. The current is swift. A bench mark 18.045 feet above the zero of the gage, 11 feet northwest of a sycamore tree at the upper end of the rod, is marked with a cross on the rock.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of King River near Sanger, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 30	F. W. Huber	3.94	210
March 25	E. C. Murphy and S. G. Bennett	6.60	2,038
April 27	A. C. Lootz	7.30	2,792
May 30	do	10.00	10,034
June 6	O. W. Peterson	10.85	12,827
June 30	F. R. S. Buttemer	7.80	3,704
July 19	do	6.02	1,468
July 27	do	6.50	2,008
August 8	do	6.35	1,762
August 16	do	5.60	1,292
September 8	do	4.20	312
September 29	do	6.37	1,740
October 7	do	7.25	2,704
October 15	do	6.70	2,138
October 29	do	5.47	1,054
November 8	do	4.88	712
November 17	do	4.60	520
November 25	do	4.40	445
December 2	do	4.42	445
December 9	do	4.30	368

Mean daily gage height, in feet, of King River near Sanger, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.85	3.90	5.30	7.00	7.35	10.15	7.55	5.95	4.50	6.30	5.30	4.50
2	3.85	3.90	5.30	6.95	7.20	10.40	7.45	6.15	4.45	6.40	5.30	4.45
3	3.85	3.90	5.45	6.90	7.30	11.20	7.25	5.95	4.40	6.45	5.35	4.45
4	3.85	3.90	5.55	6.75	7.75	10.95	7.15	5.75	4.40	6.50	5.20	4.40
5	3.85	4.00	5.50	6.90	8.45	10.75	7.15	5.65	4.35	6.65	5.10	4.30
6	3.90	4.05	5.30	7.10	9.15	10.65	7.15	5.70	4.30	7.30	5.05	4.25
7	3.80	5.00	5.40	7.40	9.90	10.30	7.20	6.05	4.25	7.35	5.00	4.20
8	3.80	4.10	5.55	7.60	10.05	9.70	7.20	6.25	4.25	7.35	4.95	4.20
9	3.80	4.00	5.65	7.90	10.25	9.80	6.95	6.45	4.20	7.35	4.90	4.25
10	3.80	3.90	6.05	8.20	10.45	9.85	6.75	6.20	4.15	6.95	4.90	4.25
11	3.80	4.00	6.90	8.45	10.70	10.00	6.55	5.85	4.15	8.05	4.85	4.20
12	3.80	4.05	5.90	8.65	10.95	10.05	6.60	5.55	4.10	7.95	4.80	4.20
13	3.80	4.40	(5.90)	8.95	11.15	10.10	6.45	5.35	4.10	7.15	4.80	4.30
14	3.80	4.35	(5.90)	8.75	11.25	9.80	6.30	5.40	4.10	6.80	4.75	4.20
15	3.80	4.25	(5.90)	8.75	11.25	9.70	6.15	5.55	4.10	6.65	4.70	4.20
16	3.80	4.50	6.00	8.40	11.40	9.65	6.05	5.65	4.35	6.45	4.75	4.20
17	3.80	6.90	5.95	8.00	11.45	9.45	6.00	5.65	4.35	6.20	4.75	4.20
18	3.90	5.25	6.20	8.10	11.30	9.25	6.00	5.40	4.35	6.05	4.65	4.10
19	3.90	5.00	6.65	8.50	10.30	9.00	6.05	5.20	4.30	5.95	4.65	4.10
20	3.80	4.70	8.65	8.10	10.05	9.00	6.00	5.10	4.30	5.85	4.55	4.15
21	3.70	4.70	7.20	7.65	10.15	8.60	6.00	4.95	4.30	5.85	4.60	4.15
22	3.80	5.05	6.65	7.65	10.45	8.45	6.00	4.85	4.25	5.80	4.55	4.20
23	3.90	5.05	9.70	7.25	11.10	8.50	6.25	4.75	4.25	5.80	4.55	4.15
24	4.00	5.35	7.50	7.15	11.20	8.30	6.35	4.80	5.60	5.80	(4.50)	4.15
25	3.95	(5.50)	6.85	7.45	11.25	8.10	6.25	4.85	7.50	5.75	4.40	4.45
26	3.95	5.60	6.55	7.65	10.65	7.85	6.30	4.80	6.70	5.70	4.40	4.25
27	3.95	5.40	6.55	7.35	9.95	7.80	6.40	4.85	6.25	5.60	4.40	4.20
28	3.90	6.40	7.15	7.20	10.05	7.75	6.25	4.80	6.05	5.55	4.50	4.30
29	3.90	5.55	8.75	7.05	10.35	7.75	5.95	4.75	6.15	5.45	4.50	4.20
30	3.90	.....	7.75	7.30	10.25	7.65	5.70	4.60	6.20	5.40	4.50	4.30
31	3.90	.....	7.20	.....	10.15	.....	5.65	4.55	.....	5.35	.....	4.60

NOTE.—Gage heights in parenthesis are estimated.

Rating table for King River near Sanger, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
3.70	130	5.00	740	6.30	1,730	8.00	3,900
3.80	165	5.10	805	6.40	1,820	8.20	4,280
3.90	200	5.20	870	6.50	1,920	8.40	4,700
4.00	240	5.30	940	6.60	2,020	8.60	5,140
4.10	280	5.40	1,010	6.70	2,120	8.80	5,600
4.20	325	5.50	1,085	6.80	2,230	9.00	6,080
4.30	370	5.60	1,160	6.90	2,340	9.50	7,460
4.40	420	5.70	1,235	7.00	2,460	10.00	9,100
4.50	470	5.80	1,310	7.20	2,700	10.50	11,150
4.60	520	5.90	1,390	7.40	2,960	11.00	13,500
4.70	570	6.00	1,470	7.60	3,240	11.50	16,300
4.80	625	6.10	1,550	7.80	3,560	12.00	19,300
4.90	680	6.20	1,640				

Estimated monthly discharge of King River near Sanger, Cal., for 1904.

[Drainage area, 1,742 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	240	130	183	11,252	0.11	0.13
February	2,340	200	618	35,548	.36	.39
March	8,080	940	2,166	133,182	1.24	1.43
April	5,960	2,175	3,549	211,180	2.04	2.28
May	15,700	2,700	10,376	637,995	5.96	6.87
June	14,550	3,320	7,563	450,030	4.34	4.84
July	3,170	1,198	1,957	120,331	1.12	1.29
August	1,870	495	1,041	64,008	.60	.69
September	3,100	280	702	41,772	.40	.45
October	3,990	975	1,901	116,888	1.09	1.26
November	975	420	620	36,893	.36	.40
December	520	302	354	21,767	.20	.23
The year	15,700	3,320	2,586	1,880,846	1.48	20.26

KING RIVER AT KINGSBURG, CAL.

This station was established in 1879 by the engineering department of the Southern Pacific Company. No meter measurements have been made since 1898, except a low-water measurement in 1902, because it was found impossible to construct a satisfactory rating table on account of the changes in gage heights, caused by the raising and lowering of the head-gate of the Peoples canal, which takes water from King River a few miles below the gaging station.

The gage heights have been furnished by William Hood, chief engineer of the Southern Pacific Railway Company. Alf. Thompson was the observer. The gage readings were discontinued March 8, 1904.

Mean daily gage height, in feet, of King River at Kingsburg, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.
1	2.20	2.20	4.30	17	1.70	7.00	.....
2	2.20	2.20	4.20	18	1.70	5.20	.....
3	2.20	2.20	4.00	19	2.10	4.30	.....
4	2.10	2.20	4.10	20	2.10	3.90	.....
5	2.10	2.20	4.10	21	2.20	4.10	.....
6	2.00	2.50	4.00	22	2.10	4.10	.....
7	2.00	2.80	3.90	23	2.10	4.00	.....
8	2.00	2.50	.....	24	2.00	3.80	.....
9	2.00	2.80	.....	25	2.20	4.10	.....
10	2.00	2.50	.....	26	2.20	4.10	.....
11	2.00	2.40	.....	27	2.20	4.30	.....
12	1.10	2.40	.....	28	2.20	4.90	.....
13	1.80	2.50	.....	29	2.20	5.60	.....
14	1.10	3.00	.....	30	2.20	.....	.....
15	1.80	3.00	.....	31	2.20	.....	.....
16	1.70	3.40	.....				

KAWEAH RIVER BELOW THREE RIVERS, CAL.

This station was established April 29, 1903, by W. H. Stearns. It is located at a point three-fourths of a mile below the confluence of the North, Middle, and South forks. It is 17 miles from the Southern Pacific Railway station at Exeter, Tulare County, Cal., and one-fourth of a mile west of the wagon road from Exeter to Three Rivers. The gage consists of a vertical 2-inch pipe driven 3 feet into the river bed. This is used up to medium stages. For high-water readings a timber gage is securely nailed to a willow tree on the left bank of the stream. The gage is read twice each day by Miss Mary Landsdowne. Discharge measurements are made from a cable and car. The initial point for soundings is a sycamore tree on the left bank of the stream, to which the cable is fastened. The channel is straight for 400 feet above and below the station. The current is swift at high stages, but sluggish at low water. There are rapids about 400 feet above the cable. The right bank is low and subject to overflow at high stages. The left bank is high enough to prevent overflow. There are willow trees along the water's edge on both banks and a line of willows, sycamores, and cottonwoods back from the water's edge on the left bank. The bed of the stream is composed of sand, gravel, and bowlders. Some of the bowlders are 2 feet in diameter. The section is probably permanent. The bench mark is a large rock 10 feet upstream from the tree to which the cable is attached. It is marked "B. M." in black paint. Its elevation is 13.95 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Kaweah River below Three Rivers, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
January 18	G. C. Morgan	4.50	90
January 29	do	4.40	67
February 7	C. E. Bell	4.80	113
February 21	do	5.00	225
March 11	do	5.90	465
March 20	do	6.90	1,240
March 23	do	8.40	4,788
March 28	do	6.00	695
March 29	W. B. Newhall	6.75	1,195
April 17	C. E. Bell	6.50	926
June 7	F. R. S. Buttemer	6.90	1,276
June 14	do	6.65	1,016
June 21	do	6.05	692
June 28	do	5.75	493
July 7	do	5.45	377
July 14	do	5.05	204
July 15	do	5.05	222
July 22	do	4.85	145
July 30	do	4.65	101
August 6	do	4.70	127
August 14	do	4.55	92
August 21	do	4.45	77
August 28	do	4.50	87
September 3	do	4.30	57
September 11	do	4.28	53
September 23	do	4.27	47
September 27	do	5.34	310
October 3	do	5.31	303
October 9	do	5.81	495
October 11	do	7.99	2,730
October 18	do	5.35	292
October 24	do	5.20	221
November 1	do	4.90	160
November 10	do	4.70	111
November 18	do	4.67	100
November 28	do	4.60	95
December 5	do	4.55	89
December 12	do	4.53	80

Mean daily gage height, in feet, of Kaweah River below Three Rivers, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.40	5.15	5.65	6.15	6.25	7.10	5.60	(4.65)	(4.30)	(5.30)	4.90	4.60
2	4.40	5.20	5.65	6.05	6.25	7.15	(5.60)	(4.65)	(4.30)	(5.30)	(4.90)	4.60
3	4.35	5.20	5.55	6.10	6.45	7.35	(5.60)	(4.65)	(4.30)	(5.30)	(4.90)	4.60
4	4.30	5.20	5.50	6.05	6.55	7.70	(5.50)	(4.65)	(4.30)	(5.30)	(4.90)	4.60
5	4.30	5.30	5.40	6.10	6.85	7.65	(5.50)	(4.65)	(4.30)	(5.40)	(4.80)	4.55
6	4.30	5.30	5.40	6.35	7.20	7.35	(5.50)	4.70	(4.30)	(5.50)	(4.80)	4.50
7	4.30	5.30	5.40	6.55	7.80	7.15	5.45	(5.00)	(4.30)	(5.60)	(4.80)	4.50
8	4.30	5.30	5.40	6.70	7.80	6.95	(5.40)	(5.20)	(4.30)	(5.70)	(4.80)	4.55
9	4.30	5.30	5.30	6.80	7.85	6.75	(5.30)	(5.40)	(4.30)	(5.80)	(4.80)	4.50
10	4.30	5.30	5.30	6.90	7.85	6.75	(5.30)	(5.20)	(4.30)	(5.80)	(4.75)	4.60
11	4.30	5.40	5.40	6.95	8.00	7.30	(5.20)	(4.80)	(4.30)	(8.00)	(4.70)	4.55
12	4.40	5.40	5.80	7.00	7.95	7.30	(5.20)	(4.55)	(4.30)	(7.90)	(4.70)	4.55
13	4.40	5.40	5.90	7.05	8.05	6.80	(5.10)	(4.55)	(4.30)	(7.00)	(4.70)	4.50
14	4.40	5.20	5.80	6.60	8.05	6.55	5.05	4.55	(4.30)	(6.50)	(4.70)	4.50
15	4.40	5.40	5.80	6.75	8.05	6.35	5.05	(4.55)	(4.30)	(6.00)	(4.70)	4.50
16	4.40	7.80	5.70	6.85	8.05	6.45	(5.00)	(4.55)	(4.30)	(5.50)	(4.70)	4.50
17	4.40	7.35	5.65	6.50	8.10	6.50	(5.00)	(4.56)	(4.30)	(5.50)	(4.70)	4.55
18	4.50	7.30	5.80	6.50	7.90	6.40	(5.00)	(4.50)	(4.25)	(5.35)	(4.65)	4.50
19	4.50	7.20	6.10	7.50	7.65	6.20	(4.90)	(4.50)	(4.25)	(5.30)	(4.65)	4.55
20	4.50	7.20	6.20	6.75	7.70	6.10	(4.90)	(4.45)	(4.25)	(5.30)	4.65	4.50
21	4.50	7.20	6.00	6.35	7.60	6.05	(4.90)	4.45	4.25	(5.30)	4.65	4.40
22	4.50	6.80	6.00	6.35	7.55	(6.00)	4.85	(4.45)	(4.25)	(5.30)	4.60	4.50
23	4.50	6.70	8.40	6.15	7.75	(6.00)	(4.80)	(4.45)	(4.25)	(5.20)	4.60	4.50
24	4.55	6.65	6.10	6.15	7.90	(5.90)	(4.80)	(4.45)	(4.25)	5.20	4.60	4.60
25	4.60	6.40	6.00	6.40	7.90	(5.90)	(4.80)	(4.50)	(6.00)	(5.20)	4.60	4.85
26	4.60	6.30	6.10	6.45	7.65	(5.80)	(4.70)	(4.50)	(8.00)	(5.20)	4.60	4.60
27	4.60	5.90	5.90	6.50	7.40	(5.80)	(4.70)	(4.50)	5.35	(5.10)	4.60	4.65
28	4.70	5.80	6.25	6.40	7.10	5.75	(4.70)	(4.50)	(5.35)	(5.10)	4.60	4.55
29	4.70	5.70	7.15	6.30	7.15	(5.70)	(4.70)	(4.40)	(5.30)	(5.00)	4.60	4.60
30	4.70	.....	6.75	6.40	7.05	(5.70)	4.65	(4.40)	(5.30)	(5.00)	4.60	4.60
31	5.05	.....	6.15	.....	7.10	.....	(4.65)	(4.40)	.....	(4.90)	.....	5.30

From June 21 to November 28, inclusive, gage heights interpolated between those of meter measurements.

Rating table for Kaweah River below Three Rivers, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
4.20	40	5.30	280	6.40	850	7.50	1,950
4.30	53	5.40	315	6.50	920	7.60	2,080
4.40	66	5.50	350	6.60	1,000	7.70	2,220
4.50	80	5.60	390	6.70	1,080	7.80	2,380
4.60	95	5.70	435	6.80	1,170	7.90	2,550
4.70	115	5.80	485	6.90	1,260	8.00	2,730
4.80	135	5.90	540	7.00	1,360	8.10	2,920
4.90	160	6.00	600	7.10	1,470	8.20	3,120
5.00	190	6.10	660	7.20	1,580	8.30	3,370
5.10	220	6.20	720	7.30	1,700	8.40	3,700
5.20	250	6.30	780	7.40	1,820		

Estimated monthly discharge of Kaweah River below Three Rivers, Cal., for 1904.

[Drainage area, 520 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	205	53	78	4,796	0.15	0.17
February	2,380	235	729	41,933	1.40	1.50
March	1,525	280	640	39,352	1.23	1.42
April	1,415	630	968	57,600	1.86	2.08
May	2,920	750	2,054	126,296	3.95	4.55
June	2,220	435	1,052	62,598	2.02	2.25
July	390	105	220	13,527	.42	.48
August	315	60	108	6,641	.21	.24
September	2,730	46	190	11,306	.37	.41
October	2,730	160	511	31,420	.98	1.13
November	160	95	117	6,962	.22	.25
December	280	66	95	5,841	.18	.21
The year	2,920	46	564	408,272	1.08	14.69

TULE RIVER NEAR PORTERSVILLE, CAL.

The gaging station is located about 8 miles east of Portersville at a point just below the wagon bridge near McFarland ranch and about 1 mile above the mouth of South Fork of Tule River. The station was established April 8, 1901. The gage rod is situated on the right bank of the river 100 feet below the bridge. The bench mark is a cross on the top of a large bowlder on the right bank of the river between the cable and the bridge and is 13.10 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Tule River near Portersville, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
February 1	F. W. Huber	1.28	36
April 1	W. B. Newhall	2.86	342
July 2	F. R. S. Buttemer	1.25	30
July 20	do	1.00	16
July 28	do	.90	10.2
August 17	do	.85	7.9
September 9	do	.76	6.9
October 6	do	1.24	30
October 30	do	1.25	31
November 15	do	1.20	26
November 29	do	1.18	25
December 15	do	1.25	27

Mean daily gage height, in feet, of Tule River near Portersville, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.20	1.20	1.90	2.90	2.50	2.10	1.20	0.85	0.85	1.20	1.25	1.20
2	1.20	1.20	1.90	2.80	2.60	2.05	1.15	.85	.80	1.20	1.30	1.20
3	1.20	1.20	1.85	2.70	2.60	2.00	1.15	.85	.80	1.20	1.30	1.20
4	1.20	1.20	1.85	2.70	2.60	2.00	1.20	.85	.80	1.20	1.30	1.20
5	1.20	2.00	1.85	2.75	2.70	2.00	1.20	.90	.80	1.20	1.30	1.20
6	1.20	1.80	1.70	2.80	2.80	1.95	1.15	.90	.80	2.00	1.30	1.20
7	1.20	1.60	1.70	2.80	2.80	1.90	1.15	.90	.80	1.60	1.30	1.20
8	1.20	1.40	1.60	2.65	2.80	1.85	1.15	.90	.80	1.40	1.25	1.20
9	1.20	1.35	1.60	2.45	2.80	1.80	1.15	.90	.80	1.80	1.25	1.25
10	1.20	1.35	1.60	2.60	2.85	1.75	1.10	.85	.80	1.50	1.25	1.25
11	1.20	1.35	2.35	2.80	2.85	1.75	1.10	.85	.80	1.70	1.20	1.25
12	1.20	1.35	2.00	2.75	2.90	1.70	1.10	.85	.80	2.30	1.20	1.25
13	1.20	1.80	1.90	2.75	2.90	1.65	1.05	.85	.80	1.80	1.20	1.25
14	1.20	1.60	1.85	2.75	2.90	1.60	1.05	.85	.80	1.70	1.20	1.25
15	1.20	1.45	1.90	2.70	2.85	1.55	1.05	.85	.80	1.60	1.20	1.25
16	1.15	4.10	2.00	2.60	2.80	1.50	1.05	.85	.80	1.55	1.20	1.25
17	1.15	3.10	2.00	2.50	2.75	1.45	1.00	.85	.80	1.50	1.20	1.25
18	1.40	2.10	2.10	2.40	2.65	1.40	1.00	.85	.85	1.45	1.20	1.25
19	1.30	1.90	2.10	3.15	2.60	1.40	1.00	.80	.85	1.40	1.20	1.25
20	1.30	1.85	3.00	2.90	2.55	1.40	1.00	.80	.90	1.35	1.20	1.25
21	1.30	1.80	2.90	2.70	2.50	1.40	.95	.80	.90	1.35	1.20	1.30
22	1.30	1.75	2.40	2.60	2.45	1.40	.95	.80	.95	1.30	1.20	1.30
23	1.30	1.70	6.15	2.50	2.40	1.35	.95	.85	.95	1.30	1.20	1.35
24	1.25	1.65	3.20	2.40	2.40	1.35	.95	.85	1.00	1.30	1.20	1.40
25	1.25	1.65	2.70	2.40	2.35	1.30	.90	.90	2.10	1.30	1.20	1.65
26	1.25	1.60	2.50	2.70	2.30	1.30	.90	.90	1.70	1.30	1.20	1.45
27	1.20	1.60	2.40	2.60	2.30	1.25	.90	.90	1.55	1.25	1.20	1.40
28	1.20	2.70	3.20	2.55	2.30	1.25	.90	.95	1.40	1.25	1.20	1.35
29	1.20	2.00	3.80	2.55	2.25	1.20	.85	.95	1.30	1.25	1.20	1.35
30	1.20	.....	3.70	2.50	2.20	1.20	.85	.90	1.25	1.25	1.20	1.30
31	1.20	.....	3.30	.....	2.10	.....	.85	.85	.....	1.25	.....	1.70

Rating table for Tule River near Portersville, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.80	7	2.00	132	3.20	450	4.60	1,180
.90	10	2.10	150	3.30	490	4.80	1,300
1.00	15	2.20	170	3.40	530	5.00	1,420
1.10	21	2.30	190	3.50	575	5.20	1,560
1.20	28	2.40	210	3.60	625	5.40	1,700
1.30	37	2.50	235	3.70	675	5.60	1,850
1.40	47	2.60	260	3.80	725	5.80	2,010
1.50	58	2.70	285	3.90	775	6.00	2,170
1.60	70	2.80	315	4.00	830	6.50	2,620
1.70	83	2.90	345	4.20	940	7.00	3,120
1.80	98	3.00	380	4.40	1,060	7.50	3,670
1.90	115	3.10	415				

Estimated monthly discharge of Tule River near Portersville, Cal., for 1904.

[Drainage area, 437 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	47	28	30	1,845	0.07	0.08
February	885	28	121	6,960	.28	.30
March	2,305	70	283	17,401	.65	.75
April	432	210	279	16,602	.64	.71
May	345	150	262	16,110	.60	.69
June	150	28	74	4,403	.17	.19
July	28	8	17	1,045	.04	.05
August	12	7	9	553	.02	.02
September	150	7	20	1,190	.05	.06
October	190	28	55	3,382	.13	.15
November	37	28	30	1,785	.07	.08
December	83	28	37	2,275	.08	.09
The year	2,305	7	101	73,551	.23	3.17

KERN RIVER NEAR BAKERSFIELD, CAL.

This station, established in 1893 by Walter James, chief engineer of the Kern County Land Company, is located at what is known as "first point of measurement," 5 miles above Bakersfield and at the mouth of the canyon of the river. Regular meter measurements are taken, and an automatic gage records daily fluctuations of the river heights. A. K. Warren, the engineer in charge of this work for the Kern County Land Company, attends to the discharge measurements with accuracy and precision, and furnishes the Geological Survey with the final results.

Mean daily discharge, in second-feet, of Kern River near Bakersfield, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	193	203	451	1,182	875	2,130	915	553	327	415	317	263
2	188	206	396	1,050	856	2,173	918	607	329	421	316	265
3	181	214	394	956	825	2,526	977	547	304	420	326	260
4	176	219	380	951	852	2,941	895	493	275	421	335	255
5	186	220	406	926	861	2,814	854	470	260	431	330	269
6	188	243	433	935	952	2,578	809	500	242	466	322	246
7	196	238	431	984	1,140	2,452	760	497	227	506	319	228
8	183	233	413	1,022	1,341	2,139	772	559	229	561	297	211
9	184	242	403	1,048	1,488	1,859	766	567	218	568	291	221
10	190	232	414	1,048	1,548	1,786	737	594	214	595	285	231
11	191	222	410	1,106	1,645	1,832	689	556	209	569	277	232
12	199	226	455	1,133	1,820	1,896	668	504	207	575	274	230
13	198	247	399	1,175	2,036	1,909	658	459	201	602	272	230
14	200	256	446	1,203	2,216	1,854	624	432	194	551	274	240
15	195	287	445	1,177	2,324	1,763	564	477	195	528	279	240
16	194	274	494	1,177	2,411	1,764	541	516	242	498	276	234
17	209	821	537	1,079	2,467	1,766	525	500	246	490	277	228
18	219	743	523	1,019	2,616	1,717	504	516	239	433	270	225
19	198	512	527	1,012	2,563	1,573	510	450	248	394	271	225
20	181	421	674	1,107	2,188	1,426	510	419	245	378	266	225
21	165	377	1,000	1,017	1,961	1,410	487	396	218	369	274	213
22	158	363	777	962	1,857	1,269	476	363	200	356	275	224
23	173	388	872	934	1,846	1,230	494	328	210	349	275	234
24	204	407	1,085	838	2,211	1,258	516	339	199	337	280	243
25	231	427	842	814	2,627	1,252	566	329	211	349	273	249
26	229	386	720	868	2,737	1,128	590	380	352	353	263	262
27	225	392	739	884	2,441	1,070	587	384	498	358	271	239
28	218	439	861	852	2,107	1,025	571	490	457	345	260	237
29	207	598	1,574	846	2,035	945	542	480	415	325	266	266
30	190	.....	1,759	849	2,111	899	520	413	405	314	263	255
31	193	.....	1,408	.....	2,118	.....	483	366	.....	313	.....	295

Estimated monthly discharge of Kern River near Bakersfield, Cal., for 1904.

[Drainage area, 2,345 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	241	156	195	11,990	0.08	0.09
February	1,403	199	346	19,902	.15	.16
March	2,456	351	667	41,012	.28	.32
April	1,295	796	1,005	59,802	.43	.48
May	2,932	810	1,841	113,199	.79	.91
June	3,167	868	1,746	103,894	.74	.83
July	992	441	646	39,721	.28	.32
August	652	310	467	28,715	.20	.23
September	524	187	267	15,888	.11	.12
October	666	303	438	26,932	.19	.22
November	342	249	286	17,018	.12	.13
December	350	208	241	14,819	.10	.12
The year	3,167	156	679	492,892	.29	3.93

STATIONS IN YOSEMITE VALLEY, CALIFORNIA.

During the summer of 1904 the commissioners of Yosemite Valley were desirous of having discharge stations established on several of the principal streams in the Yosemite Valley. The hydrographic branch of the Geological Survey agreed to establish these stations, furnish the necessary instruments for making the discharge measurements, make all office computations, and compile the records, the commissioners to furnish the assistant to do the field work. Stations were established June 9–11, 1904, on the Merced River at the bridge near the Sentinel Hotel; on the Yosemite Creek at bridge between Yosemite post-office and Yosemite Falls, and on Tenaya Creek at bridge between Yosemite post-office and Mirror Lake. The commissioners detailed Mr. N. W. Currie to take charge of the field work, which consisted of making weekly discharge measurements and reading the gages daily. Mr. Currie made one discharge measurement at each of the stations after they were installed and kept daily gage readings to September 24, 1904. He then stopped the work entirely, but failed to notify the hydrographer in charge until December 20, when he was asked to send his records to the hydrographer for compilation. Mr. Currie then stated that this extra work was put upon him in connection with his duties as electrician; and as he received no compensation for it, he discontinued the work upon the advice and consent of the

guardian of the park. It was hoped that a sufficient number of measurements would have been made during the past summer to have rated these streams, so that by keeping a continuous gage record the daily discharge could be published weekly in the daily papers throughout the State as a matter of interest to parties who desire to visit the valley at a time when the streams are discharging in considerable volume and when the several falls are seen to the best advantage. These measurements will be continued another summer.

MERCED RIVER NEAR SENTINEL HOTEL, YOSEMITE VALLEY, CALIFORNIA.

This station was established July 11, 1904, by E. A. Chandler and N. W. Currie. It is located at the wagon bridge near the Sentinel Hotel. The gage is a 1 by 6 inch vertical timber, painted white, and graduated to feet and tenths. It is securely fastened to a masonry abutment on west bank. Discharge measurements are made from lower side of bridge. The distance across the stream is marked by nails in the floor of the bridge every 5 feet. The initial point for soundings is stream face of abutment on right bank. The channel is straight for a distance of 150 feet above and 50 feet below station. The current is sluggish. The right bank is low and subject to overflow. The left bank is high and above high water. The bed of the stream is composed of coarse gravel and sand, with small bowlders, and is not subject to much change. The bench mark is heads of two large nails driven into stream face of bridge-seat timber on the left abutment. Its elevation is 14.64 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Merced River near Sentinel Hotel, Yosemite Valley, California, in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
July 11	A. E. Chandler	4.60	555
July 18	N. W. Currie	4.39	431

Mean daily gage height, in feet, of Merced River near Sentinel Hotel, Yosemite Valley, California, in 1904.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	.....	4.20	3.45	17	4.30	4.00	3.60
2	.....	4.45	3.40	18	4.40	3.90	3.60
3	.....	4.10	3.40	19	4.50	3.75	3.50
4	.....	4.10	3.40	20	4.50	3.75	3.45
5	.....	4.40	3.35	21	4.48	3.70	3.40
6	.....	4.60	3.35	22	4.70	3.60	3.40
7	.....	4.30	4.30	23	4.60	3.55	3.50
8	.....	4.10	4.30	24	4.48	3.55	4.20
9	.....	4.00	3.30	25	4.40	3.50	.....
10	.....	3.90	3.30	26	4.40	3.50	.....
11	4.60	3.90	3.30	27	4.35	3.55	.....
12	4.70	3.80	3.30	28	4.25	3.60	.....
13	4.57	3.75	3.30	29	4.10	3.55	.....
14	4.50	3.80	3.30	30	4.00	3.50	.....
15	4.40	4.15	3.35	31	4.00	3.48	.....
16	4.30	4.05	3.60				

TENAYA CREEK AT YOSEMITE VALLEY, CALIFORNIA.

This station was established July 11, 1904, by A. E. Chandler and N. W. Currie. It is located by the wagon bridge about 2 miles from Yosemite, Cal. The gage is a 1 by 6 inch vertical timber, painted white, and graduated to feet and tenths. It is securely fastened to the bridge stringer on upper side of bridge 9 feet from left abutment. Discharge measurements are made from the bridge. The distance across the stream is marked by nails in the bridge stringer every 5 feet. The initial point for soundings is the stream face of the abutment on the right bank. The channel is straight for 200 feet above and 200 feet below the station. Both banks are above high water. The bed of the stream is composed of small granite fragments and is not subject to change. The bench mark is formed by the heads of two nails in the top of the bridge stringer near the gage. Its elevation is 12.70 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Tenaya Creek at Yosemite Valley, California, in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
July 11	N. W. Currie	4.42	85
July 19	do	4.00	45

Mean daily gage height, in feet, of Tenaya Creek at Yosemite Valley, California, in 1904.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	.....	3.80	3.40	17	4.08	3.70	3.40
2	.....	3.85	3.40	18	4.02	3.60	3.40
3	.....	3.70	3.40	19	4.00	3.55	3.40
4	.....	3.90	3.40	20	4.00	3.50	3.40
5	.....	3.75	3.40	21	4.00	3.50	3.40
6	.....	3.70	3.40	22	4.00	3.50	3.40
7	.....	3.70	3.40	23	3.90	3.50	.....
8	.....	3.60	3.40	24	3.90	3.50	4.40
9	.....	3.60	3.38	25	3.90	3.50	.....
10	.....	3.60	3.38	26	3.85	3.45	.....
11	4.40	3.60	3.40	27	3.80	3.45	.....
12	4.40	3.50	3.40	28	3.80	3.45	.....
13	4.30	3.50	3.40	29	3.75	3.40	.....
14	4.20	3.50	3.40	30	3.70	3.40	.....
15	4.20	3.80	3.40	31	3.70	3.40	.....
16	4.10	3.80	3.40				

YOSEMITE CREEK AT YOSEMITE VALLEY, CALIFORNIA.

This station was established July 9, 1904, by A. E. Chandler and N. W. Currie. It is located at the wagon bridge about one-half mile from Yosemite, Cal. The gage is a 1 by 6 inch vertical timber, painted white, and graduated to feet and tenths. It is securely fastened to an alder tree on the right bank 50 feet above bridge. Discharge measurements are made from lower side of bridge. The distance across the stream is marked by nails in bridge stringer every 5 feet. The initial point for soundings is stream face of abutment on right bank. The channel is straight for 50 feet above and 100 feet below station; both banks are above high water. The bed of the stream is composed of small granite fragments and is permanent. The bench mark is head of two nails driven in an alder tree, to which gage is fastened. Its elevation is 9.40 feet above the zero of the gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Yosemite Creek at Yosemite Valley, California, in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
July 9	A. E. Chandler	4.85	70
July 19	N. W. Currie	4.49	33

Mean daily gage height, in feet, of Yosemite Creek at Yosemite Valley, California, for 1904.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	.....	4.30	3.80	17	4.40	3.90	3.75
2	.....	4.70	3.80	18	4.40	3.90	3.80
3	.....	4.30	3.80	19	4.50	3.90	3.75
4	.....	4.30	3.80	20	4.45	3.90	3.75
5	.....	4.15	3.75	21	4.40	3.85	3.75
6	.....	4.18	3.75	22	4.40	3.80	3.75
7	.....	.....	3.75	23	4.38	3.85	3.85
8	.....	4.00	3.75	24	4.38	3.84	4.60
9	.....	4.00	3.75	25	4.30	3.85	.....
10	.....	3.95	3.75	26	4.20	3.80	.....
11	4.60	3.90	3.75	27	4.05	3.80	.....
12	4.70	3.90	3.75	28	4.10	3.80	.....
13	4.70	3.90	3.75	29	4.00	3.80	.....
14	4.55	3.90	3.75	30	4.00	3.80	.....
15	4.50	4.00	3.75	31	4.00	3.80	.....
16	4.50	4.05	3.80				

MISCELLANEOUS MEASUREMENTS IN SAN FRANCISCO BAY DRAINAGE BASIN.

The following miscellaneous measurements were made in the San Francisco Bay drainage basin in 1903 and 1904:

Miscellaneous measurements in San Francisco Bay drainage basin.

ALAMEDA CREEK DRAINAGE.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1904.				*Sec.-feet.*
May 27	S. G. Bennett	Arroyo Hondo	Near Sunol	18
May 27	do	Alameda Creek	At Niles dam	25

SACRAMENTO RIVER DRAINAGE.

1904.				
Aug. 9	W. B. Clapp	Upper Sacramento River.	Bards Station, Shasta County.	429
Aug. 11	do	Battle Creek	Near Balls Ferry, Tehama County.	423
Aug. 12	do	Stanford canal	Headworks near Vina, Cal.	58

Miscellaneous measurements in San Francisco Bay drainage basin—Continued.

SACRAMENTO RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1904.				*Sec-feet.*
Aug. 12	W. B. Clapp	Deer Creek	Near Vina, below heading of Stanford Canal.	69
		Total Deer Creek		127
Aug. 12	do	Mill Creek	Near Tehama, above all diversions.	160
Aug. 13	do	Antelope Creek	Near Red Bluff, above all diversions.	53

PIT RIVER DRAINAGE.

1904.				
Apr. 5	J. S. Evans	Ash Creek	Ash Valley	194
May 5	do	do	do	189
June 4	do	do	do	30
June 10	S. G. Bennett and J. S. Evans.	do	do	27
Sept. 17	J. Y. Toler	Dukes ditch	Near Likely	3.3
Sept. 23	do	do	do	8.7
Sept. 17	do	Corporation ditch	do	30
Aug. 16	S. G. Bennett and J. Y. Toler.	Davis Creek	Near Davis Creek P. O.	2.4
Jan. 7	J. S. Evans	Pit River	At county bridge, Alturas.	81
Aug. 27	J. Y. Toler	E. Lauer's ditch	Near Alturas	1.4
Aug. 27	do	M. Hugh's ditch	do	3
June 12	S. G. Bennett and J. S. Evans.	Rush Creek	At Round Valley	12
Aug. 30	J. Y. Toler	do	do	7.6
Aug. 26	do	Pine Creek	Near Pine Creek P. O.	7
Sept. 5	do	do	do	22
Sept. 14	do	Canyon Creek	Near Centerville	3.8
Sept. 15	do	Fitzhugh Creek	Near Alturas	2.7
Aug. 29	do	Willow Creek	Near Adin	5.6
Sept. 20	do	do	do	5
1903.				
Sept. 11	H. G. Heisler	Pit River	At Pitville	30

Miscellaneous measurements in San Francisco Bay drainage basin—Continued.

PIT RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Sec.-feet.*
Sept. 11	H. G. Heisler..	Fall River.....	At bridge near Fall-river Mills.	1,510
Sept. 10	.....do	Hat Creek.....	At Carbon Bridge.....	657
Sept. 9	.....do	Pit River.....	At Peck's bridge, above mouth of Burney Creek.	2,617
Sept. 9	.....do	Burney Creek.....	Below Burney Falls ..	210
Sept. 8	.....do	Hatchet Creek.....	Near Montgomery	10
Sept. 7	.....do	Montgomery Creek...	At Montgomery	18

AMERICAN RIVER DRAINAGE.

1904.				
Jan. 6	S. G. Bennett..	North Fork ditch	2½ miles above Folsom.	32
1903.				
May 12	S. G. Bennett..	Folsom canal	500 feet below heading.	1,466
1904.				
Sept. 12	W. B. Clapp...	South Fork	At Morman Island bridge, 4 miles above Folsom.	82
Sept. 14	.....do	North Fork.....	500 feet above junction with Middle Fork, near Auburn.	69
Sept. 14	.....do	Middle Fork.....	½ mile above Auburn bridge.	130

STANISLAUS RIVER DRAINAGE.

1903.				
Nov. 25	S. G. Bennett..	Stanislaus Water Co.'s ditch.	Above penstock to power house, Knights Ferry.	85
Sept. 23	.....do	.....do	100 feet below penstock to power house, Knights Ferry.	61
Nov. 25	.....do	.....do	.....do.....	41
1904.				
Aug. 24	O. W. Peterson.	Schell ditch	Near head, Knights Ferry.	7.4

Miscellaneous measurements in San Francisco Bay drainage basin—Continued.

TUOLUMNE RIVER DRAINAGE.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Sec.-feet.*
Sept. 20	S. G. Bennett	Clavey River	Above mouth of Twomile Creek, Carter-Lake Eleanor trail.	2.6
Sept. 20	do	Twomile Creek	At mouth	.8
Sept. 20	do	Hull Creek	At Carter-Lake Eleanor trail crossing.	3.7
Sept. 21	do	North Fork of Tuolumne River.	Above mouth of Basin Slope Creek.	2.9
Sept. 19	do	Reed Creek	At Rosasco ranch	2.6
Sept. 19	do	Cherry River	Carter-Lake Eleanor trail crossing.	*a*.6
Sept. 19	do	Eleanor Creek	One-half mile below Lake Eleanor.	1.0
Sept. 18	do	Tuolumne River	Above mouth, Hetch Hetchy Valley.	19.0
Sept. 18	do	Rancheria Creek	At mouth, Hetch Hetchy Valley.	1.3
Sept. 17	do	Tiltill Creek	Hetch Hetchy Valley.	.2
Sept. 18	do	Tuolumne River	Lower end of Hetch Hetchy Valley.	23
Sept. 17	do	Middle Fork of Tuolumne River.	Six miles from Sequoia post-office.	.8
Sept. 17	do	South Fork of Tuolumne River.	One mile above Sequoia post-office.	7.7
1904.				
June 8	O. W. Peterson.	Mining ditch	Near Lagrange dam	8.5
Aug. 22	do	do	do	3.7

MERCED RIVER DRAINAGE.

1903.				
June 25	S. G. Bennett	Tenaya Creek	At Tassaack Avenue Bridge, Yosemite Valley.	159
Sept. 15	do	do	do	3.0
June 25	do	Illilouette Creek	Near mouth of Yosemite Valley.	228
Sept. 15	do	do	do	3.9
June 24	do	Merced River	At bridge near Yosemite Valley post-office.	1,135
Sept. 15	do	do	do	27
June 24	do	Yosemite Creek	At wagon bridge below falls.	119

a Estimated.

Miscellaneous measurements in San Francisco Bay drainage basin—Continued.

MERCED RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Sec.-feet.*
Sept. 15	S. G. Bennett..	Yosemite Creek.....	At wagon bridge below falls.	*a* 2
June 25	.....do	Bridal Veil Creek	At Yosemite road bridge.	*a* 20
Sept. 15	.....do	.....do	.....do	*a* 2
Sept. 13	.....do	Alder Creek	South Fork Merced ...	1.0
Sept. 12	.....do	South Fork Merced River.	1,000 feet below Wawona Bridge.	1.5
Sept. 12	.....do	Washburn ditch	South Fork Merced ...	1.9
Sept. 11	.....do	Big Creek	At Summerdale.....	3.2
Sept. 11	.....do	Sugar Pine ditch	South Fork Merced ...	2.3

SAN JOAQUIN RIVER DRAINAGE.

1903.				
Sept. 11	S. G. Bennett..	Soqual ditch	At site of old mill of Madera Flume and Trading Co.	*b* 3.8
Sept. 9	.....do	Chiquita San Joaquin.	At mouth	10
Sept. 9	.....do	San Joaquin River ...	Below mouth Chiquita San Joaquin.	264

KING RIVER DRAINAGE.

1903.				
Sept. 3	S. G. Bennett..	King River	One-half mile below mouth of North Fork.	332
Sept. 3	.....do	North Fork of King River.	At mouth	32
1904.				
May 13	S. G. Bennett and I. Teilman.	Gould canal	At Holland flume, ½ mile below head-gate.	260
May 13	S. G. Bennett..	Church ditch	Near Kingriver post-office.	1,040
May 13	S. G. Bennett and I. Teilman.	Fowler Switch canal..	200 feet below road bridge, near Kingriver post-office.	476
May 14	S. G. Bennett..	.....do	.....do	588
May 13	.....do	Centerville and Kingsburg canal.	200 feet below Trimmer Spring road bridge, near Kingriver post-office.	727

a Estimated.
b Total flow of North Fork of San Joaquin River at this point.

Miscellaneous measurements in San Francisco Bay drainage basin—Continued.

KING RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Sec.-feet.*
May 14	S. G. Bennett..	'76 canal	At bridge near Carmelita.	676
May 17	.....do	Peoples ditch	300 feet below headgate near Kingsburg.	483
May 14	S. G. Bennett and I. Teilman.	Emigrant ditch	Near headworks, 3 miles from Kingsburg.	114
May 17	S. G. Bennett..	Last Chance ditch....	Near Laton.....	297
May 17	.....do	La Gunada de Tacahe grant canal.	At Laton.....	227
May 16	.....do	Liberty canal	At Lemoore road bridge crossing.	55
May 17	.....do	Lower King River canal.	Near Grangeville	180
May 16	.....do	Heinlen cut.....	50 feet above regulating weir.	1,298
May 16	S. G. Bennett and I. Teilman.	Zelda canal slough...	1,500 feet below Lemoore road.	5,420
May 20	S. G. Bennett ..	Mill race ditch.....	Near head.....	20
May 19	.....do	Riverdale canal	.....do.....	[a]1
May 19	.....do	Burrell ditch.....	.....do.....	42
May 19	.....do	Waste from New Riverdale ditch.	Into lower King River.	45
		Total New Riverdale canal.	Above waste	88
May 19	.....do	Turner ditch.....	Near head.....	8
May 19	.....do	Reed ditch	.....do.....	28
May 19	.....do	Crescent canal	Near Wheatville.....	38
May 19	.....do	Stimson canal.....	At Elkhorn road bridge crossing.	175

KAWEAH RIVER DRAINAGE.

1903.				
Aug. 31	S. G. Bennett ..	Stony Creek	North Fork Kaweah trail crossing.	1.2
Aug. 31	.....do	Dorst Creek.....	At North Fork Kaweah trail crossing.	2.6
Aug. 28	.....do	North Fork Kaweah..	3 miles above Three Rivers.	7.3
1904.				
Sept. 20	F. R. S. Buttemer.	North Fork Kaweah River.	300 feet above intake of Schreibers ditch.	6.0

[a] Waste; water shut off.

Miscellaneous measurements in San Francisco Bay drainage basin—Continued.

KAWEAH RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Sec.-feet.*
Aug. 30	S. G. Bennett ..	Marble Fork Kaweah River.	At bridge, Sequoia Park.	8.7
1904.				
Sept. 19	F. R. S. Buttemer.	Marble Fork Keweah River.	At bridge, Sequoia Park.	4.7
1903.				
Aug. 26	S. G. Bennett ..	East Fork Kaweah River.	At Mineral King.....	5.3
Aug. 26	.....do	.....do	Above headworks of Mount Whitney Power Co.'s canal.	23
1904.				
Sept. 16	F. R. S. Buttemer.	East Fork Kaweah River.	Above headworks of Mount Whitney Power Co.'s canal.	34
Sept. 22	.....do	Middle Fork Kaweah River.	800 feet above intake, Mount Whitney Power Co.'s canal.	27
Sept. 15	.....do	South Fork Kaweah River.	Above intake Cahoon's ditch, 9½ miles above junction with Middle Fork.	7.1
Sept. 18	.....do	Middle Fork Kaweah River.	200 feet above junction with Marble Fork.	23

TULE RIVER DRAINAGE.

1903.				
June 9	R. S. Hawley...	South Fork Tule River.	Near mouth	35
1904.				
Feb. 2	F. W. Huber...	South Fork Tule River.	Near mouth	7

KERN RIVER DRAINAGE.

1903.				
Aug. 24	S. G. Bennett ..	Little Kern River	3 miles below mouth of Shotgun Creek.	5.3
Aug. 22	.....do	.....do	Above junction with Kern River.	25
Aug. 22	.....do	North Fork Kern River.	Above junction with Little Kern River.	278
Aug. 21	.....do	Soda Creek	3 miles above mouth..	2.4
Aug. 21	.....do	Nameless Creek.....	.....	2.4
Aug. 20	.....do	Clark Creek	.....	2.9

Miscellaneous measurements in San Francisco Bay drainage basin—Continued.

KERN RIVER DRAINAGE—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Sec.-feet.*
Aug. 20	S. G. Bennett	Jackson Creek		2.8
Aug. 20	do	Wade Creek		2.6
Aug. 19	do	Tobias Creek	At mouth	1.9
Aug. 19	do	Salmon Creek	do	1.8
Aug. 18	do	Bull Run Creek	Above mouth	.8
Aug. 17	do	Peterson ditch	Near head, above Kernville.	1.5
Aug. 17	do	Thurston ditch	do	1.9
Aug. 17	do	North Fork of Kern River.	3 miles above Kernville.	277
Aug. 17	do	Big Blue ditch	At mill above Kernville.	25
Aug. 17	do	Neal & Stavert's upper ditch.	Above Kernville	2.2
Aug. 15	do	Brown's upper ditch		15.3
Aug. 15	do	Brown's ranch ditch		14.5
Aug. 15	do	Kernville town ditch		0.7
Aug. 15	do	Cook's ditch	Kernville	0.6
Aug. 17	do	Hooper Mill ditch	Near Isabella	8.9
Aug. 17	do	South Fork of Kern River.	Above mouth near Isabella.	17
Aug. 17	do	Kern River	Below mouth of South Fork, near Isabella.	254

NORTHERN PACIFIC OCEAN DRAINAGE BASIN.

LOST RIVER AT CLEAR LAKE, CAL.

Discharge measurements of Lost River at Clear Lake, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
September 7	T. H. Humphreys	4.95	10.78
September 25	C. T. Darley	5.20	16.00
October 21	F. S. Chapman	5.15	14.00
November 6	C. T. Darley	5.15	17.60
December 9	do	5.18	14.00

Mean daily gage height, in feet, of Lost River at Clear Lake, Cal., for 1904.

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	.....	5.25	5.20	5.20	17	5.00	5.25	5.20	.....
2	.....	5.25	5.20	5.20	18	5.00	5.25	5.20	.....
3	.....	5.25	5.15	.....	19	5.00	5.20	.....	.....
4	5.00	5.25	5.10	.....	20	5.00	5.20	.....	5.30
5	5.00	5.25	.....	.....	21	5.00	5.15	.....	5.15
6	5.00	5.25	.....	5.20	22	5.05	5.15	.....	5.20
7	5.00	5.25	.....	5.20	23	5.10	.....	5.20	5.20
8	5.00	5.25	5.15	5.15	24	5.10	.....	5.20	.....
9	5.00	5.25	5.15	5.15	25	5.20	5.10	5.20	.....
10	5.00	5.30	5.15	.....	26	5.25	5.10	5.20	.....
11	5.00	5.30	5.15	.....	27	5.25	5.10	.....	.....
12	5.00	5.30	.....	.....	28	5.25	5.10	5.20	.....
13	5.00	5.30	.....	5.20	29	5.25	.....	5.20	.....
14	5.00	5.30	.....	5.25	30	5.25	.....	.....	.....
15	5.00	5.30	5.15	5.30	31	.....	.....	.....	.....
16	5.00	5.30	5.20	5.30					

MILLER CREEK NEAR LORELLA, OREG.

Discharge measurements of Miller Creek at Horsefly, near Lorella, Oreg., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
June 24	T. H. Humphreys	.....	[a] 15.00
July 7	....do	.....	[a] 12.00
August 4	....do	.....	[a] 5.00
August 23	....do	.....	[a] 1.00
September 27	....do	6.10	1.71
October 16	C. T. Darley	6.20	4.09
November 19	....do	6.25	7.26

[a] Estimated.

Mean daily gage height, in feet, of Miller Creek at Horsefly, near Lorella, Oreg., for 1904.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	6.00	6.10	6.10	6.20	17	6.10	.....	6.20	6.10	.....
2	.....	6.00	6.10	6.20	6.20	18	6.10	.....	6.20	6.30	.....
3	.....	6.00	6.10	6.20	6.15	19	6.10	.....	6.10	6.20	.....
4	.....	6.00	6.10	6.20	6.10	20	6.10	.....	6.10	6.20	.....
5	.....	6.00	6.10	6.20	6.10	21	6.10	.....	6.10	6.20	.....
6	.....	6.00	6.10	6.20	6.10	22	6.10	.....	6.10	6.20	.....
7	6.10	6.00	6.10	6.20	6.10	23	6.05	.....	6.10	6.20	.....
8	6.10	6.00	6.10	6.20	6.10	24	6.05	.....	6.10	6.20	.....
9	6.10	6.00	6.15	6.20	6.10	25	6.05	.....	6.10	6.20	.....
10	6.10	6.00	6.15	6.15	6.10	26	6.70	.....	6.10	6.20	.....
11	6.10	.....	6.30	6.15	.....	27	6.70	6.10	6.10	6.20	.....
12	6.10	.....	6.30	6.15	.....	28	6.00	6.10	6.10	6.20	.....
13	6.10	.....	6.20	6.15	.....	29	6.00	6.10	6.10	6.20	.....
14	6.10	.....	6.15	6.15	.....	30	6.00	6.10	6.10	6.20	.....
15	6.10	.....	6.20	6.11	.....	31	6.00	.....	6.10	.....	.....
16	6.10	.....	6.20	6.11	.....						

LOST RIVER AT MERRILL, OREG.

Discharge measurements of Lost River at Merrill, Oreg., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
September 6	T. H. Humphreys	3.55	159
September 26	C. T. Darley	3.50	163
October 20	T. H. Humphreys	3.50	145
November 5	C. T. Darley	3.40	147
November 27	do	3.48	158
December 17	do	3.45	147

Mean daily gage height, in feet, of Lost River at Merrill, Oreg., for 1904.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.70	3.60	3.55	3.50	3.50	17	.....	3.70	3.55	3.55	3.50	3.50
2	.....	3.70	3.60	3.55	3.50	3.50	18	.....	3.70	3.55	3.55	3.50	3.50
3	.....	3.70	3.60	3.55	3.50	3.50	19	.....	3.70	3.55	3.50	3.50	3.50
4	.....	3.70	3.60	3.55	3.50	3.50	20	.....	3.70	3.55	3.50	3.50	3.50
5	.....	3.70	3.60	3.55	3.50	3.50	21	.....	3.70	3.55	3.50	3.50	3.50
6	.....	3.70	3.55	3.55	3.50	3.50	22	.....	3.70	3.55	3.50	3.50	3.50
7	.....	3.70	3.55	3.55	3.50	3.50	23	.....	3.70	3.55	3.50	3.50	3.50
8	.....	3.70	3.55	3.55	3.50	3.50	24	.....	3.70	3.55	3.50	3.50	3.50
9	.....	3.70	3.55	3.55	3.50	3.50	25	.....	3.70	3.55	3.50	3.50	.....
10	.....	3.70	3.55	3.55	3.50	3.50	26	3.70	3.70	3.55	3.50	3.50	.....
11	.....	3.70	3.55	3.55	3.50	3.50	27	3.70	3.60	3.55	3.50	3.50	.....
12	.....	3.70	3.55	3.55	3.50	3.50	28	3.70	3.60	3.55	3.50	3.50	.....
13	.....	3.70	3.55	3.55	3.50	3.50	29	3.70	3.60	3.55	3.50	3.50	.....
14	.....	3.70	3.55	3.55	3.50	3.50	30	3.70	3.60	3.55	3.50	3.50	.....
15	.....	3.70	3.55	3.55	3.50	3.50	31	3.70	3.60	.....	3.50	.....	.....
16	.....	3.70	3.55	3.55	3.50	3.50							

KLAMATH RIVER AT KENO, OREG.

Discharge measurements of Klamath River at Keno, Oreg., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
May 31	J. H. Lewis and Ivan Landis	15.15	8,321
June 5	do	15.05	8,230
June 18	T. H. Humphreys	14.65	7,205
August 12	do	13.00	2,571
September 17	do	12.40	1,791
September 28	C. T. Darley	12.40	1,721
October 19	do	12.50	1,900
November 3	do	12.60	1,938
November 26	do	12.65	2,161

Mean daily gage height, in feet, of Klamath River at Keno, Oreg., for 1904.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	15.10	14.20	13.30	12.70	12.40	12.60	12.70
2	.....	15.10	14.10	13.30	12.60	12.40	12.60	12.70
3	.....	15.10	14.10	13.30	12.60	12.40	12.60	12.70
4	.....	15.05	14.10	13.20	12.60	12.40	12.60	12.70
5	.....	15.00	14.05	13.20	12.60	12.40	12.60	12.70
6	.....	15.00	14.00	13.20	12.60	12.40	12.60	12.70
7	.....	15.00	14.00	13.10	12.50	12.40	12.60	12.70
8	.....	14.90	14.00	13.10	12.50	12.40	12.60	12.70
9	.....	14.90	14.00	13.10	12.50	12.50	12.60	12.70
10	.....	14.90	13.90	13.00	12.50	12.50	12.60	12.80
11	.....	14.90	13.90	13.00	12.50	12.50	12.60	12.80
12	.....	14.90	13.90	13.00	12.40	12.40	12.60	12.80
13	.....	14.80	13.80	13.00	12.40	12.40	12.60	12.80
14	.....	14.80	13.80	13.00	12.40	12.40	12.60	12.80
15	.....	14.80	13.80	13.00	12.40	12.40	12.60	12.80
16	.....	14.80	13.80	13.00	12.40	12.40	12.60	12.80
17	.....	14.70	13.80	12.90	12.40	12.50	12.60	12.80
18	.....	14.70	13.80	12.90	12.40	12.50	12.60	12.80
19	.....	14.60	13.70	12.90	12.40	12.50	12.60	12.80
20	.....	14.60	13.70	12.90	12.40	12.50	12.60	12.80
21	.....	14.60	13.70	12.90	12.40	12.50	12.70	12.80
22	.....	14.60	13.60	12.80	12.40	12.50	12.70	12.80
23	.....	14.50	13.60	12.80	12.40	12.50	12.70	12.80
24	.....	14.50	13.60	12.80	12.40	12.50	12.70	12.80
25	.....	14.40	13.50	12.80	12.40	12.50	12.70	.....
26	.....	14.40	13.50	12.80	12.40	12.50	12.70	.....
27	.....	14.40	13.50	12.70	12.40	12.50	12.70	.....
28	.....	14.30	13.40	12.70	12.40	12.50	12.70	.....
29	.....	14.30	13.40	12.70	12.40	12.50	12.70	.....
30	.....	14.20	13.40	12.70	12.40	12.50	12.70	.....
31	15.10	.....	13.40	12.70	.....	12.50	.....	.....

KLAMATH RIVER AT KLAMATH FALLS, OREG.

Discharge measurements of Klamath River at Klamath Falls, Oreg., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
May 15	J. H. Lewis and Ivan Landis	7.15	9,073
June 7	do	6.55	7,342
August 25	T. H. Humphreys	3.70	1,915
September 16	C. T. Darley	3.40	1,782
September 28	do	3.30	2,005
October 18	do	3.40	2,135
November 8	do	3.50	1,968
November 24	do	3.60	1,898

Mean daily gage height, in feet, of Klamath River at Klamath Falls, Oreg., for 1904.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	6.75	5.50	4.35	3.50	3.30	3.50	3.55
2	.....	6.80	5.45	4.30	3.50	3.30	3.45	3.60
3	.....	6.70	5.40	4.25	3.50	3.30	3.45	3.60
4	.....	6.70	5.40	4.20	3.45	3.30	3.45	3.60
5	.....	6.65	5.35	4.20	3.45	3.30	3.45	3.65
6	.....	6.60	5.30	4.15	3.45	3.30	3.50	3.70
7	.....	6.55	5.30	4.15	3.45	3.30	3.50	3.70
8	.....	6.55	5.25	4.15	3.45	3.35	3.50	3.70
9	.....	6.50	5.25	4.10	3.40	3.40	3.50	3.70
10	.....	6.45	5.20	4.05	3.40	3.40	3.50	3.70
11	.....	6.40	5.20	4.05	3.40	3.40	3.55	3.70
12	.....	6.40	5.15	4.00	3.40	3.35	3.55	3.70
13	.....	6.35	5.10	4.00	3.35	3.35	3.60	3.75
14	.....	6.30	5.10	3.95	3.35	3.40	3.50	3.75
15	7.15	6.30	5.05	3.95	3.35	3.40	3.50	3.80
16	7.10	6.25	5.00	3.90	3.35	3.45	3.50	3.80
17	7.10	6.20	4.95	3.85	3.35	3.40	3.50	3.80
18	7.15	6.10	4.90	3.85	3.30	3.40	3.50	3.80
19	7.10	6.05	4.85	3.80	3.30	3.45	3.55	3.80
20	7.10	6.00	4.80	3.80	3.30	3.45	3.50	3.80
21	7.10	6.00	4.80	3.75	3.30	3.45	3.50	3.80
22	7.05	5.95	4.75	3.75	3.45	3.45	3.55	3.85
23	7.00	5.85	4.75	3.70	3.40	3.45	3.55	3.90
24	7.00	5.80	4.75	3.70	3.35	3.45	3.60	3.95
25	6.95	5.75	4.70	3.70	3.30	3.45	3.60	.....
26	6.90	5.75	4.65	3.65	3.30	3.45	3.60	.....
27	6.90	5.70	4.60	3.65	3.25	3.45	3.60	.....
28	6.90	5.65	4.55	3.60	3.30	3.45	3.60	.....
29	6.85	5.60	4.50	3.55	3.20	3.45	3.60	.....
30	6.85	5.55	4.45	3.55	3.20	3.45	3.65	.....
31	6.80	.....	4.40	3.55	.....	3.45	.....	.....

SPRAGUE RIVER AT YAINAX, OREG.

Mean daily gage height, in feet, of Sprague River at Yainax, Oreg., for 1904.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	18.80	14.11	14.60	14.20	13.11	13.80.	14.50
2	18.80	14.11	14.50	14.20	13.11	13.80	14.50
3	18.70	14.11	14.80	14.20	13.11	13.90	14.60
4	18.70	14.10	14.80	.....	13.11	13.90	14.60
5	18.70	14.10	14.70	.....	14.00	13.90	14.60
6	18.60	14.90	14.70	.....	14.10	13.90	14.50
7	18.60	14.80	14.80	.....	14.00	13.90	14.50
8	18.50	14.80	14.80	.....	14.10	13.10	14.50
9	18.50	14.70	14.80	.....	14.10	13.10	14.50
10	18.40	14.70	14.70	.....	14.20	13.10	14.60
11	18.30	14.60	14.70	.....	14.30	13.11	14.60
12	18.20	14.50	14.70	.....	14.10	13.11	14.60
13	18.10	14.50	14.60	.....	14.10	13.11	14.60
14	17.70	14.40	14.60	.....	14.00	14.00	14.70
15	17.60	14.40	14.50	.....	14.00	14.00	14.70
16	17.40	14.30	14.50	.....	14.00	14.10	14.70
17	17.40	14.30	14.50	.....	14.00	14.20	14.80
18	17.30	14.30	14.50	.....	14.00	14.20	14.80
19	17.20	14.60	14.50	.....	13.11	14.20	14.70
20	17.10	14.60	14.50	.....	13.10	14.20	14.70
21	16.11	14.80	14.50	.....	13.10	14.20	14.60
22	16.10	14.80	14.50	.....	13.10	14.40	14.60
23	16.10	14.80	14.40	.....	13.90	14.40	14.50
24	16.90	14.70	14.40	.....	13.90	14.30	14.50
25	16.80	14.60	14.40	.....	13.90	14.30	.....
26	16.70	14.50	14.40	.....	13.80	14.30	.....
27	16.60	14.50	14.40	.....	13.80	14.40	.....
28	16.40	14.40	14.40	.....	13.80	14.40	.....
29	16.20	14.40	14.30	.....	13.70	14.50	.....
30	15.00	14.50	14.30	.....	13.70	14.50	.....
31	.....	14.50	14.30	.....	13.80	.....	.....

UPPER KLAMATH LAKE NEAR PELICAN, OREG.

Mean daily gage height, in feet, of Upper Klamath Lake near Pelican, Oreg., for 1904.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	5.70	4.50	3.85	3.40	3.40	17	.....	5.10	4.15	3.50	3.40	3.35
2	.....	5.65	4.55	3.85	3.35	3.35	18	.....	5.05	4.20	3.55	3.35	3.30
3	.....	5.65	4.50	3.85	3.40	3.35	19	.....	5.00	4.10	3.50	3.35	3.40
4	.....	5.60	4.50	3.75	3.40	3.30	20	.....	4.95	4.10	3.45	3.50	3.45
5	.....	5.60	4.45	3.75	3.40	3.30	21	.....	4.90	4.05	3.45	3.40	3.50
6	.....	5.55	4.55	3.80	3.35	3.25	22	.....	4.85	4.05	3.45	3.50	3.45
7	.....	5.50	4.45	3.85	3.40	3.30	23	.....	4.80	4.05	3.40	3.60	.....
8	.....	5.50	4.30	3.85	3.40	3.30	24	.....	4.75	4.00	3.40	3.60	.....
9	.....	5.45	4.35	3.85	3.40	3.40	25	.....	4.70	4.05	3.40	3.55	.....
10	.....	5.40	4.40	3.70	3.30	3.45	26	.....	4.70	3.95	3.45	3.50	.....
11	.....	5.35	4.20	3.65	3.35	3.50	27	.....	4.70	3.90	3.40	3.50	.....
12	.....	5.30	4.30	3.70	3.40	3.45	28	5.80	4.65	3.95	3.35	3.45	.....
13	.....	5.25	4.35	3.75	3.35	3.40	29	5.80	4.60	3.95	3.40	3.50	.....
14	.....	5.20	4.30	3.70	3.35	3.35	30	5.75	4.60	3.85	3.40	3.40	.....
15	.....	5.20	4.20	3.75	3.35	3.30	31	5.70	.....	3.90	3.45	.....	.....
16	.....	5.15	4.20	3.65	3.40	3.30							

TULE LAKE NEAR MERRILL, OREG.

Mean daily gage height, in feet, of Tule Lake near Merrill, Oreg., for 1904.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1								
2						8.80		
3								
4								8.50
5								
6								
7								
8								
9						8.80		
10		10.40						
11					9.00			
12								
13								
14								
15				9.40			8.65	
16			10.10					
17	10.50							
18					8.90			
19								
20								
21								
22				9.25				
23								
24								
25								
26								
27								
28								
29	10.70							
30								
31				9 10				

MISCELLANEOUS MEASUREMENTS IN KLAMATH RIVER DRAINAGE BASIN.

[By T. H. Humphreys, J. H. Lewis, and C. T. Darley.]

Miscellaneous measurements in Klamath River drainage basin.

Date.	Gage height.	Stream.	Location.	Discharge.
1903.	*Feet.*			*Sec.-feet.*
October 24[a]		Klamath River	Klamathon	2,000
1904.				
June 14		Antelope Creek	At head	[b] 155
June 13		Butte Creek	¼ mile above Wm. Bray's house, Cal.	148
June 15		do	1 mile above Boyce ranch, Cal.	124

[a] Measurement made by H. E. Green.

[b] Estimated.

Miscellaneous measurements in Klamath River drainage basin—Continued.

Date.	Gage height.	Stream.	Location.	Discharge.
1904.	*Feet.*			*Sec.-feet.*
June 8		Little Shasta	Table Rock, Cal	117
June 8		Ankney canal	Klamath Falls, Oreg	32
August 15		do	do	48
August 15		do	7 miles below intake, Klamath Falls, Oreg.	37
August 15		do	Klamath Falls, Oreg	40
August 27		do	do	43
August 27		do	do	29
August 27		do	7 miles below intake, Klamath Falls, Oreg.	33
August 27		Lateral of Ankney canal.	Klamath Falls, Oreg	4.8
May 20		Miller Creek	Lorella, Oreg	326
October 2		Adams ditch	Merrill, Oreg	26
May 23	5.8	Lost River	Olene, Oreg	961
June 10	4.9	do	do	322
May 19	8.9	do	Langells Valley, Oreg	746
May 21	12.4	Sprague River	10 miles above Yainax, Oreg.	2,075
June 12	10.9	do	do	1,081
May 25		Williamson River	Bridge near junction with Sprague River, Oreg.	2,091
May 26		Wood River	Fort Klamath, Oreg	450
May 22	9.3	Sprague River	5 miles below Yainax, Oreg.	3,915

MISCELLANEOUS MEASUREMENTS IN NORTHERN PACIFIC OCEAN DRAINAGE BASIN.[a]

Miscellaneous measurements in Northern Pacific Ocean drainage basin.

MAD RIVER DRAINAGE.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Sec.-feet.*
Oct. 20	S. G. Bennett	Mad River	Vance, Cal	53

[a] In this system are included streams which drain directly into the Pacific Ocean.

Miscellaneous measurements in Northern Pacific Ocean drainage basin—Continued.

EEL RIVER DRAINAGE.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Sec.-feet.*
Oct. 21	S. G. Bennett	Eel River	Stingleys station	189

RUSSIAN RIVER DRAINAGE.

1903.				
Jan. 22	S. G. Bennett	Russian River	Healdsburg	628

PAJARO RIVER DRAINAGE.

1904.				
Dec. 13	W. B. Clapp Geo. Senger	San Benito River	Kehlo ranch, 7 miles above Hollister.	1.6

THE GREAT BASIN DRAINAGE.

Under this head is comprised a limited area of arid country in California lying on the eastern slope of the Sierra Nevadas. These areas include the Susan and Owens river drainage basins. Having no outlet to the sea, the entire drainage of these basins is lost mainly through evaporation from the lakes and sinks in which the waters of these rivers collect.

Susan River has its source in the Sierra Nevada in northeastern California, and flows eastward, discharging into Honey Lake—one of the landlocked lakes of the Great Basin—of which it is the principal feeder. A considerable area of land is irrigated from the waters of the river below the gaging station, and during the last ten or twelve years several projects have been started for irrigating other extensive areas by the storage of its waters both above and below the town of Susanville.

Owens River has its source in the Sierra Nevada in eastern California, and flowing southerly parallel with this range its discharge is gradually increased by numerous tributaries until it finally discharges into Owens Lake. A considerable area of land is irrigated from the waters of the river and tributaries. Numerous gaging stations are maintained on the river, canals, and creek, and during the last two years extensive investigations have been made by the Reclamation Service of the United States Geological Survey for the construction of storage reservoirs and an irrigation system.

The following pages give the results of data collected at these stations during 1904:

SUSAN RIVER NEAR SUSANVILLE, CAL.

This station was established June 3, 1900, by L. H. Taylor, at which time a temporary gage was installed on the right bank. It is located about three-fourths of a mile southwest of Susanville, at the electric-light plant. A short distance above the station a small irrigating ditch, known as the "Masten ditch," is taken out on the right bank. There is a flume near its head in which a gage has been placed. On December 20, 1903, the station at the electric-light plant was reestablished by H. E. Green. A new gage was set which was made to read 2 feet more than original gage. A cable was installed for high-water measurements. The initial point for soundings is a post in the fence in line with the cable. The cable support on the left bank is 34.8 feet from the initial point for soundings. The channel is straight for 150 feet above and for 250 feet below the cable. The current is swift, There is a riffle immediately above the cable. The right bank is high and is composed of clay covered with vegetation. It is not liable to overflow. The left bank is low, liable to overflow, and is covered with a sparse growth of willows. The bed of the stream is composed of gravel and cobblestones and is permanent. Bench mark No. 1 is a nail in the fence post, which is used as the initial point for soundings. Its elevation is 11.35 feet above the zero of the gage. Bench mark No. 2 is a nail in the cable post. Its elevation is 9.00 feet above the zero of the gage. Bench mark No. 3 is a nail in the cottonwood tree to which the cable is attached. Its elevation is 10.00 feet above the zero of the gage. The gage is read once each day by James Branham.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Susan River near Susanville, Cal., in 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
February 21	James Branham	5.30	106
February 28	do	6.40	298
March 29	do	7.55	716
June 16	S. G. Bennett and J. S. Evans	5.60	180
June 29	James Branham	4.95	96
July 31	do	4.20	27
August 10	do	4.50	53
September 11	do	3.85	11
October 25	W. B. Clapp and J. Y. Toler	4.10	23

Mean daily gage height, in feet, of Susan River near Susanville, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.30	4.20	6.20	6.85	6.25	6.05	4.90	4.10	3.90	4.00	4.10	4.30
2	4.25	4.20	6.80	6.90	6.15	6.00	5.20	4.10	3.85	4.00	4.20	4.30
3	4.25	4.20	7.00	6.90	6.15	5.95	5.20	4.05	3.80	4.00	4.10	4.20
4	4.25	4.20	7.55	7.05	6.20	5.90	5.20	4.20	3.80	4.00	4.10	4.10
5	4.20	4.25	7.20	7.00	6.30	5.90	5.10	4.50	3.80	4.00	4.10	4.10
6	4.20	4.25	7.45	7.15	6.85	5.80	5.15	4.50	3.80	4.00	4.10	4.10
7	4.20	4.25	7.80	7.15	7.30	5.80	5.10	4.50	3.80	4.10	4.10	4.10
8	4.20	4.25	8.70	7.30	7.35	5.75	4.65	4.50	3.80	4.10	4.10	4.10
9	4.20	4.25	7.75	7.45	7.50	5.70	4.50	4.50	3.80	4.10	4.10	4.10
10	4.25	4.25	7.50	7.80	7.55	5.70	4.50	4.50	3.80	4.20	4.10	4.10
11	4.30	4.25	7.00	8.05	7.80	5.60	4.40	4.40	3.90	4.55	4.10	4.05
12	4.30	4.30	6.70	8.25	7.95	5.50	4.40	4.40	3.95	4.40	4.10	4.05
13	4.30	4.30	6.45	8.60	8.15	5.50	4.35	4.40	3.95	4.30	4.10	4.10
14	4.30	4.30	6.55	8.80	8.20	5.50	4.30	4.40	3.95	4.30	4.10	4.10
15	4.25	5.60	6.70	8.95	8.10	5.45	4.30	4.40	3.95	4.20	4.10	4.10
16	4.25	9.00	6.35	8.50	8.05	5.50	4.30	4.40	3.95	4.25	4.20	4.10
17	4.25	6.70	7.85	8.25	7.90	5.50	4.30	4.40	3.95	4.25	4.20	4.05
18	4.25	6.20	8.80	8.25	7.85	5.40	4.30	4.40	3.95	4.20	4.15	4.05
19	4.25	5.65	9.00	8.30	7.55	5.40	4.30	4.40	4.00	4.20	4.15	4.00
20	4.30	5.35	8.45	7.75	7.40	5.35	4.30	4.40	4.00	4.15	4.15	4.00
21	4.30	5.85	7.75	7.45	7.40	5.30	4.25	4.40	4.00	4.15	4.10	4.00
22	4.30	9.90	7.45	7.25	7.30	5.30	4.20	4.40	4.00	4.10	4.10	4.00
23	4.30	7.85	7.10	7.05	7.30	5.30	4.20	4.40	4.20	4.10	4.10	4.05
24	4.30	9.65	6.80	6.90	7.30	5.30	4.30	4.40	4.40	4.10	4.10	4.05
25	4.30	8.20	6.70	6.85	7.20	5.20	4.60	4.40	4.30	4.10	4.10	4.05
26	4.30	7.50	6.65	6.80	7.05	5.10	4.55	4.25	4.20	4.10	4.10	4.10
27	4.25	6.95	6.70	6.75	6.80	5.00	4.50	4.00	4.10	4.10	4.25	4.10
28	4.20	6.40	7.85	6.65	6.70	5.00	4.45	4.00	4.10	4.10	4.20	4.10
29	4.20	6.20	7.55	6.65	6.50	4.90	4.45	3.95	4.05	4.10	4.20	4.10
30	4.20	.....	7.30	6.25	6.40	4.90	4.40	3.90	4.05	4.10	4.20	7.60
31	4.20	.....	6.95	.....	6.25	.....	4.25	3.90	.....	4.10	.....	5.45

Estimated monthly discharge of Susan River near Susanville, Cal., 1904.

[Drainage area, 256 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
January	30	24	27	1,660	0.11	0.13
February	1,750	24	349	20,075	1.36	1.47
March	1,300	300	629	38,676	2.46	2.84
April	1,275	312	695	41,355	2.71	3.02
May	960	288	600	36,893	2.34	2.70
June	262	80	160	9,521	.62	.69
July	116	27	51	3,136	.20	.23
August	42	13	31	1,906	.12	.14
September	36	10	16	952	.06	.07
October	46	16	22	1,353	.09	.10
November	27	20	21	1,250	.08	.09
December	725	16	47	2,890	.18	.21
The year	1,750	10	221	159,667	.86	11.69

WILLOW CREEK AT MERRILLVILLE, CAL.

This station was established June 18, 1904, by S. G. Bennett. It is located at old bridge 100 feet above present wagon bridge. The gage is a 2 by 4 inch vertical rod fastened to the left end of the bridge. It is read once each day by R. W. Hurlbut. Discharge measurements are made from the bridge. The initial point for soundings is on the left bank of the stream. The distance across stream is marked on the foot bridge at intervals of 2 feet. The channel is straight above and below the bridge for a distance of 100 feet. The banks on each side are low, but not subject to overflow, as there is very little fluctuation in the discharge of the creek. The bed of the stream is composed of gravel and is not subject to much change.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Willow Creek at Merrillville, Cal., 1904.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Second-feet.*
June 18	S. G. Bennett	1.00	19.0
July 17	James Branham	.95	14.9
August 29	do	1.05	17.9
October 25	J. Y. Toler and W. B. Clapp	1.07	19.3

Mean daily gage height, in feet, of Willow Creek at Merrillville, Cal., for 1904.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.00	1.00	1.00	1.05	1.10	1.10
2	1.00	1.00	1.10	1.05	1.10	1.10
3	1.00	1.05	1.10	1.05	1.10	1.05
4	1.00	1.00	1.05	1.05	1.10	1.05
5	1.00	1.00	1.05	1.05	1.10	1.05
6	1.05	1.00	1.05	1.10	1.05	1.05
7	1.00	.95	1.10	1.10	1.10	1.05
8	1.00	1.05	1.05	1.05	1.05	1.05
9	1.00	1.05	1.05	1.10	1.10	1.10
10	.95	1.00	1.10	1.10	1.10	1.05
11	1.10	1.00	1.05	1.05	1.10	1.05
12	1.15	1.00	1.00	1.05	1.10	1.05
13	1.20	1.00	1.00	1.05	1.10	1.10
14	1.10	1.00	1.05	1.10	1.10	1.10
15	1.10	1.00	1.05	1.20	1.10	1.05
16	1.10	1.00	1.05	1.10	1.10	1.05
17	1.00	1.05	1.05	1.05	1.05	1.05
18	1.00	1.00	1.05	1.05	1.10	1.05
19	1.00	1.00	1.00	1.05	1.10	1.05
20	1.00	1.00	1.00	1.05	1.10	1.05
21	1.05	1.00	1.05	1.05	1.10	1.05
22	1.00	1.00	1.05	1.05	1.10	1.05

Mean daily gage height, in feet, of Willow Creek at Merrillville, Cal., for 1904—Continued.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
23	1.00	1.00	1.10	1.05	1.05	1.10
24	1.00	1.00	1.10	1.05	1.05	1.10
25	1.00	1.05	1.10	1.05	1.05	1.05
26	1.00	1.00	1.05	1.05	1.05	1.00
27	1.00	1.00	1.05	1.10	1.10	1.05
28	1.00	1.00	1.05	1.05	1.10	1.05
29	1.05	1.00	1.05	1.10	1.10	1.20
30	1.00	1.05	1.00	1.10	1.10	1.70
31	1.00	1.00	.....	1.10	.....	1.20

Estimated monthly discharge of Willow Creek at Merrillville, Cal., for 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
July	22	17	19	1,168
August	19	17	18	1,107
September	20	18	19	1,131
October	22	19	19	1,168
November	20	19	20	1,190
December	50	19	20	1,230
The period	50	17	19	6,994

OWENS RIVER NEAR ROUND VALLEY, CAL.

This station was established by J. C. Clausen, assisted by R. S. Hawley, on August 3, 1903. It is located at the footbridge, 700 feet above the junction of Owens River and Rock Creek. The river at this point cuts through a lava deposit about 100 feet thick and forms a gorge which is about 250 feet wide at the top. The gage is a 1 by 4 inch vertical rod, fastened to the concrete bridge abutment on the left bank. It is read once each day by Roscoe Jones. Discharge measurements are made from the single-span footbridge to which the gage is attached. The bridge is 37 feet long and has a clear span of 35 feet. The initial point for soundings is the anchor bolt of the right abutment. The channel is straight for 175 feet above and for 250 feet below the station. The current is swift at all stages. Both banks are high and rocky and are not liable to overflow. The bed of the stream is composed of rock and lava bowlders and is not subject to much change. The bench mark is a bolt set in a lava bowlder 97.4 feet north of the right abutment.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, hydrographers.

Discharge measurements of Owens River near Round Valley, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
August 3	R. S. Hawley	1.80	161
August 9	do	1.85	160
August 18	do	1.75	159
August 22	do	1.75	160
September 1	do	1.74	159
September 12	do	1.80	175
October 8	do	1.85	185
October 25	do	1.82	173
November 24	do	1.88	196
December 29	do	1.70	151
1904.			
January 25	R. S. Hawley	1.80	184
March 2	do	2.20	270
March 28	do	2.85	458
April 8	E. C. Murphy, S. G. Bennett, and R. S. Hawley.	1.87	186
April 27	R. S. Hawley	1.82	190
June 2	do	2.57	383
June 15	do	3.10	564
July 13	J. C. Clausen and L. M. Barnes	2.55	380
August 3	L. M. Barnes	2.40	324
September 9	R. S. Hawley	2.01	232
October 13	R. S. Hawley, W. B. Clapp, and R. J. Taylor.	2.25	269
November 12	R. J. Taylor	2.00	218
December 6	do	1.85	155

Mean daily gage height, in feet, of Owens River near Round Valley, Cal., for 1903 and 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
1	.....	.....	.....	.....	.....	.....	.....	.....	1.75	1.77	1.80	1.80
2	.....	.....	.....	.....	.....	.....	.....	.....	1.75	1.80	1.80	1.80
3	.....	.....	.....	.....	.....	.....	.....	.....	1.75	1.80	1.80	1.80
4	.....	.....	.....	.....	.....	.....	.....	1.80	1.73	1.83	1.80	1.70
5	.....	.....	.....	.....	.....	.....	.....	1.80	1.70	1.80	1.80	1.70
6	.....	.....	.....	.....	.....	.....	.....	1.80	1.72	1.80	1.75	1.70
7	.....	.....	.....	.....	.....	.....	.....	1.80	1.73	1.80	1.70	1.70
8	.....	.....	.....	.....	.....	.....	.....	1.80	1.75	1.82	1.70	1.70
9	.....	.....	.....	.....	.....	.....	.....	1.85	1.77	1.80	1.70	1.70
10	.....	.....	.....	.....	.....	.....	.....	1.80	1.80	1.83	1.70	1.70
11	.....	.....	.....	.....	.....	.....	.....	1.80	1.80	1.80	1.70	1.70
12	.....	.....	.....	.....	.....	.....	.....	1.90	1.80	1.80	1.70	1.70
13	.....	.....	.....	.....	.....	.....	.....	1.90	1.80	1.80	1.70	1.70
14	.....	.....	.....	.....	.....	.....	.....	1.90	1.80	1.82	1.70	1.70
15	.....	.....	.....	.....	.....	.....	.....	1.80	1.80	1.80	1.70	1.70
16	.....	.....	.....	.....	.....	.....	.....	1.80	1.80	1.80	1.70	1.80
17	.....	.....	.....	.....	.....	.....	.....	1.80	1.70	1.80	1.70	1.80
18	.....	.....	.....	.....	.....	.....	.....	1.75	1.80	1.80	1.70	1.80
19	.....	.....	.....	.....	.....	.....	.....	1.75	1.80	1.80	1.70	1.80
20	.....	.....	.....	.....	.....	.....	.....	1.75	1.80	1.80	1.70	1.80
21	.....	.....	.....	.....	.....	.....	.....	1.68	1.80	1.80	1.70	1.80
22	.....	.....	.....	.....	.....	.....	.....	1.72	1.80	1.80	1.70	1.80
23	.....	.....	.....	.....	.....	.....	.....	1.80	1.80	1.80	1.80	1.80
24	.....	.....	.....	.....	.....	.....	.....	1.75	1.78	1.80	1.90	1.80
25	.....	.....	.....	.....	.....	.....	.....	1.80	1.77	1.80	1.90	1.80
26	.....	.....	.....	.....	.....	.....	.....	1.80	1.80	1.80	1.80	1.80
27	.....	.....	.....	.....	.....	.....	.....	1.78	1.80	1.80	1.80	1.70
28	.....	.....	.....	.....	.....	.....	.....	1.72	1.80	1.80	1.80	1.70
29	.....	.....	.....	.....	.....	.....	.....	1.70	1.80	1.80	1.80	1.70
30	.....	.....	.....	.....	.....	.....	.....	1.70	1.78	1.80	1.80	1.70
31	.....	.....	.....	.....	.....	.....	.....	1.70	.....	1.70	.....	1.70
1904.												
1	1.70	1.85	2.20	2.00	1.80	2.60	3.00	2.70	2.30	2.30	2.15	2.10
2	1.70	1.85	2.20	2.00	1.80	2.60	2.90	2.60	2.25	2.30	2.15	2.10
3	1.70	1.80	2.20	2.00	1.80	2.80	3.00	2.50	2.20	2.20	2.15	2.10
4	1.70	1.85	2.20	1.90	1.80	2.90	3.00	2.50	2.10	2.20	2.20	2.10
5	1.70	1.85	2.20	1.90	1.85	2.90	3.00	2.45	2.10	2.15	2.30	2.10
6	1.70	1.80	2.20	1.90	1.90	3.00	3.00	2.40	2.10	2.10	2.20	2.10
7	1.70	1.80	2.10	1.90	1.95	3.00	2.90	2.50	2.20	2.15	2.10	2.00
8	1.70	1.80	2.10	1.90	2.00	2.90	2.90	2.60	2.20	2.20	2.10	2.00
9	1.70	1.85	1.90	1.90	2.00	2.90	2.90	2.70	2.15	2.20	2.10	2.00
10	1.70	1.85	2.00	1.90	2.10	3.00	2.90	2.70	2.15	2.25	2.10	2.00
11	1.70	1.90	2.00	1.90	2.10	3.00	2.85	2.60	2.15	2.30	2.10	2.00
12	1.70	1.90	1.90	1.90	2.20	3.00	2.85	2.60	2.10	2.30	2.10	2.00
13	1.70	1.90	1.90	2.00	2.20	3.00	2.90	2.60	2.00	2.25	2.10	2.00
14	1.70	2.00	1.90	2.10	2.20	3.00	2.80	2.60	2.00	2.25	2.10	2.00
15	1.70	1.95	2.20	2.00	2.40	3.10	2.60	2.45	2.10	2.20	2.10	2.05
16	1.70	2.50	2.20	2.00	2.50	3.40	2.60	2.55	2.10	2.20	2.10	2.05
17	1.70	2.25	2.20	1.90	2.50	3.40	2.55	2.50	2.10	2.10	2.10	2.05
18	1.70	1.95	2.20	1.90	2.50	3.30	2.55	2.45	2.10	2.00	2.10	2.05
19	1.70	1.90	2.20	2.00	2.50	3.30	2.50	2.40	2.00	2.15	2.10	2.00
20	1.70	2.00	2.20	1.90	2.40	3.40	2.50	2.25	2.00	2.15	2.10	2.00
21	1.70	1.95	2.20	1.90	2.40	3.30	2.50	2.30	2.00	2.20	2.10	1.95
22	1.70	2.00	2.20	1.90	2.40	3.30	2.65	2.25	2.00	2.15	2.10	1.90
23	1.70	2.30	2.20	1.90	2.40	3.20	2.70	2.25	2.10	2.15	2.10	1.85
24	1.75	2.30	2.10	1.85	2.50	3.30	2.60	2.30	2.90	2.15	2.10	1.80
25	1.80	2.30	2.10	1.85	2.70	3.20	2.55	2.30	2.95	2.15	2.00	1.80
26	1.80	2.30	2.10	1.90	2.80	3.10	2.55	2.30	2.60	2.15	2.00	1.80
27	1.70	2.20	2.10	1.90	2.80	3.20	2.70	2.30	2.55	2.15	2.00	1.90
28	1.80	2.00	2.85	1.90	2.80	3.20	2.70	2.30	2.45	2.15	2.00	1.95
29	1.80	2.00	2.60	1.85	2.60	3.10	2.65	2.30	2.40	2.10	2.00	1.90
30	1.80	.....	2.00	1.80	2.60	3.10	2.70	2.30	2.40	2.10	2.00	2.00
31	1.85	.....	1.95	.....	2.55	.....	2.80	2.25	.....	2.10	.....	2.00

Rating table for Owens River near Round Valley, Cal., from August 4, 1903, to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.60	132	2.20	272	2.70	412	3.20	568
1.70	152	2.30	298	2.80	442	3.30	601
1.80	172	2.40	325	2.90	473	3.40	636
1.90	196	2.50	353	3.00	504	3.50	675
2.00	221	2.60	382	3.10	536	3.60	715
2.10	246						

Estimated monthly discharge of Owens River near Round Valley, Cal., for 1903 and 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
1903.				
August 4–31	196	148	169	9,386
September	172	152	167	9,937
October	179	152	172	10,576
November	196	152	163	9,699
December	172	152	161	9,900
The period				49,498
1904.				
January	184	152	156.6	9,629
February	353	172	220.9	12,706
March	458	196	259.7	15,968
April	246	172	201.5	11,990
May	442	172	299.5	18,416
June	635	382	532	31,656
July	504	353	428	26,317
August	412	285	336	20,660
September	489	221	281	16,721
October	298	221	266	16,356
November	298	221	246	14,638
December	246	172	218	13,404
The year	635	152	287	208,461

ROCK CREEK NEAR ROUND VALLEY, CAL.

This station was established August 3, 1903, by J. C. Clausen and R. S. Hawley. 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 gage is a 1 by 4 inch vertical rod fastened to the left end of the bridge. It is read once each day by Roscoe Jones. Discharge measurements are made from a footbridge which has a span of 18 feet. The initial point for soundings is on right bank of stream. The distances across stream are marked on the footbridge at intervals of 2 feet. The channel is straight for 50 feet above and for 40 feet below the footbridge. The current is swift. Both banks are high and rocky and are not liable to overflow. The bed of the stream is composed of gravel and is not subject to much change. The bench mark is a point marked on a lava rock 15 feet east of the left end of the footbridge.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Rock Creek near Round Valley, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
August 3	R. S. Hawley	1.55	20.0
August 8	do	1.62	21.0
August 18	do	1.55	19.5
September 1	do	1.42	16.8
September 10	do	1.49	17.5
November 24	do	1.51	18.3
December 29	do	1.45	18.1
1904.			
March 4	R. S. Hawley	1.20	14.3
March 28	do	1.40	26
April 8	E. C. Murphy, S. G. Bennett, and R. S. Hawley	1.28	22
April 27	R. S. Hawley	1.10	15.3
June 2	do	2.40	64
June 15	do	2.76	98
July 13	J. C. Clausen and L. M. Barnes	2.00	54
August 3	L. M. Barnes	2.30	72
September 9	R. S. Hawley	1.30	22
October 13	W. B. Clapp, R. J. Taylor, and R. S. Hawley	1.90	50
November 12	R. J. Taylor	1.68	37
December 6	do	1.39	24

Mean daily gage height, in feet, of Rock Creek near Round Valley, Cal., for 1903 and 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
1	.....	.....	.....	.....	.....	.....	.....	.....	1.40	1.35	1.40	1.50
2	.....	.....	.....	.....	.....	.....	.....	.....	1.45	1.30	1.40	1.50
3	.....	.....	.....	.....	.....	.....	.....	.....	1.40	1.30	1.40	1.50
4	.....	.....	.....	.....	.....	.....	.....	[a]1.55	1.40	1.30	1.40	1.50
5	.....	.....	.....	.....	.....	.....	.....	1.50	1.40	1.35	1.40	1.50
6	.....	.....	.....	.....	.....	.....	.....	1.60	1.45	1.30	1.45	1.55
7	.....	.....	.....	.....	.....	.....	.....	1.60	1.40	1.30	1.50	1.55
8	.....	.....	.....	.....	.....	.....	.....	1.60	1.45	1.30	1.50	1.55
9	.....	.....	.....	.....	.....	.....	.....	1.55	1.45	1.30	1.50	1.55
10	.....	.....	.....	.....	.....	.....	.....	1.60	1.50	1.35	1.40	1.55
11	.....	.....	.....	.....	.....	.....	.....	1.60	1.55	1.30	1.40	1.60
12	.....	.....	.....	.....	.....	.....	.....	1.70	1.60	1.30	1.40	1.60
13	.....	.....	.....	.....	.....	.....	.....	1.70	1.60	1.30	1.40	1.60
14	.....	.....	.....	.....	.....	.....	.....	1.60	1.55	1.30	1.40	1.60
15	.....	.....	.....	.....	.....	.....	.....	1.50	1.50	1.30	1.40	1.60
16	.....	.....	.....	.....	.....	.....	.....	1.60	1.40	1.30	1.45	1.60
17	.....	.....	.....	.....	.....	.....	.....	1.60	[b]1.00	1.30	1.50	1.60
18	.....	.....	.....	.....	.....	.....	.....	1.55	1.50	1.30	1.50	1.60
19	.....	.....	.....	.....	.....	.....	.....	1.50	1.50	1.30	1.50	1.60
20	.....	.....	.....	.....	.....	.....	.....	1.50	1.50	1.30	1.50	1.60
21	.....	.....	.....	.....	.....	.....	.....	1.45	1.50	1.30	1.50	1.60
22	.....	.....	.....	.....	.....	.....	.....	1.50	1.55	1.30	1.50	1.50
23	.....	.....	.....	.....	.....	.....	.....	1.60	1.50	1.30	1.50	1.50
24	.....	.....	.....	.....	.....	.....	.....	1.60	1.50	1.30	1.50	1.55
25	.....	.....	.....	.....	.....	.....	.....	1.50	1.55	1.30	1.50	1.50
26	.....	.....	.....	.....	.....	.....	.....	1.50	1.50	1.30	1.50	1.50
27	.....	.....	.....	.....	.....	.....	.....	1.50	1.50	1.30	1.50	1.45
28	.....	.....	.....	.....	.....	.....	.....	1.45	1.40	1.30	1.50	1.45
29	.....	.....	.....	.....	.....	.....	.....	1.40	1.30	1.30	1.50	1.45
30	.....	.....	.....	.....	.....	.....	.....	1.40	1.30	1.40	1.50	1.45
31	.....	.....	.....	.....	.....	.....	.....	1.40	.....	1.40	.....	1.45
1904.												
1	1.55	1.5	1.3	1.3	1.2	2.4	2.4	2.25	1.4	1.9	1.75	1.45
2	1.55	1.5	1.25	1.3	1.2	2.4	2.4	2.35	1.4	1.9	1.7	1.45
3	1.55	1.5	1.3	1.35	1.2	2.7	2.3	2.3	1.35	1.9	1.7	1.4
4	1.55	1.5	1.3	1.3	1.2	2.6	2.5	2.25	1.4	1.8	1.75	1.4
5	1.55	1.5	1.3	1.3	1.25	2.6	2.6	2.25	1.4	1.8	1.75	1.45
6	1.55	1.3	1.3	1.3	1.25	2.7	2.5	2.2	1.35	1.8	1.75	1.45
7	1.55	1.35	1.2	1.3	1.2	2.7	2.5	2.2	1.3	1.9	1.7	1.5
8	1.4	1.35	1.25	1.3	1.2	2.4	2.5	2.15	1.2	1.9	1.7	1.5
9	1.4	1.5	1.25	1.3	1.25	2.4	2.5	2.1	1.2	1.9	1.7	1.55
10	1.5	1.5	1.25	1.2	1.25	2.6	2.4	2.3	1.2	2.0	1.7	1.55
11	1.5	1.5	1.3	1.3	1.9	2.6	2.2	2.4	1.2	2.3	1.75	1.55
12	1.5	1.5	1.2	1.3	1.9	2.7	2.0	2.2	1.2	2.2	1.7	1.55
13	1.5	1.5	1.3	1.2	2.0	2.8	1.95	2.2	1.2	2.0	1.7	1.5
14	1.5	1.5	1.3	1.2	2.0	2.7	1.8	2.15	1.2	1.95	1.7	1.4
15	1.45	1.5	1.3	1.2	2.05	2.75	1.7	2.1	1.3	1.9	1.7	1.4
16	1.45	2.1	1.2	1.2	2.1	2.9	1.6	2.15	1.35	1.8	1.7	1.35
17	1.4	1.35	1.25	1.3	2.2	2.9	1.75	2.0	1.3	1.8	1.65	1.35
18	1.4	1.3	1.3	1.3	2.1	2.8	1.75	2.25	1.3	1.8	1.60	1.35
19	1.4	1.3	1.3	1.3	2.1	2.8	1.7	2.1	1.35	1.9	1.6	1.4
20	1.4	1.35	1.5	1.3	2.1	2.75	1.7	1.8	1.4	1.9	1.6	1.4

[a] Given as 1.10, probably is 1.55.

[b] Probably is 1.50.

Mean daily gage height, in feet, of Rock Creek near Round Valley, Cal., etc.—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1904.												
21	1.35	1.3	1.4	1.3	2.2	2.75	2.0	1.8	1.3	1.9	1.65	1.45
22	1.3	1.3	1.5	1.3	2.1	2.8	2.2	1.8	1.3	1.8	1.7	1.45
23	1.3	1.3	1.6	1.3	2.0	2.8	2.3	1.9	1.35	1.8	1.7	1.4
24	1.3	1.3	1.4	1.3	2.4	2.7	2.2	2.35	2.0	1.8	1.6	1.35
25	1.3	1.3	1.4	1.25	2.8	2.6	2.15	2.2	2.3	1.8	1.5	1.35
26	1.3	1.3	1.4	1.3	2.4	2.5	2.1	2.1	2.0	1.8	1.5	1.35
27	1.45	1.3	1.4	1.3	2.4	2.5	2.1	2.1	1.9	1.8	1.5	1.4
28	1.5	1.4	1.4	1.3	2.45	2.6	2.15	1.9	1.9	1.8	1.5	1.4
29	1.5	1.3	1.55	1.2	2.4	2.6	2.0	1.9	1.9	1.8	1.5	1.4
30	1.5	.....	1.4	1.2	2.4	2.5	2.0	1.8	1.9	1.75	1.5	1.5
31	1.5	.....	1.4	.....	2.4	.....	2.2	1.8	.....	1.75	.....	1.75

Rating table for Rock Creek near Round Valley, Cal., from August 4, 1903, to February 16, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.30	15	1.60	22	1.90	32	2.10	40
1.40	17	1.70	25	2.00	35	2.20	44
1.50	19	1.80	28				

Rating table for Rock Creek near Round Valley, Cal., from February 17 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.00	12	1.60	34	2.10	58	2.60	88
1.10	15	1.70	38	2.20	63	2.70	95
1.20	18	1.80	43	2.30	69	2.80	102
1.30	22	1.90	48	2.40	75	2.90	109
1.40	26	2.00	53	2.50	81	3.00	116
1.50	30						

Estimated monthly discharge of Rock Creek near Round Valley, Cal., for 1903 and 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
1903.				
August 4–31	25	17	20	1,111
September	22	15	18	1,071
October	17	15	15	922
November	19	17	18	1,071
December	22	18	20	1,230
The period				5,405
1904.				
January	20	15	17.4	1,070
February	40	15	20.5	1,179
March	34	18	23.6	1,451
April	22	18	21	1,250
May	102	18	50	3,074
June	109	75	91.7	5,456
July	88	34	60.5	3,720
August	75	43	59	3,628
September	69	18	29	1,726
October	69	41	47	2,890
November	41	30	36	2,142
December	40	24	27.7	1,703
The year	109	15	40.3	29,289

PINE CREEK NEAR ROUND VALLEY, CAL.

This station was established August 3, 1903, by J. C. Clausen and R. S. Hawley. It is located 150 feet below the wagon bridge on the road from Bishop to Long Valley and 100 feet above the mouth of the creek. The gage is a 1 by 3 inch vertical rod fastened in the rocks near the right bank. It is read once each day by Roscoe Jones. Discharge measurements are made by wading. The initial point for soundings is a stake on the right bank of the stream.

The channel is straight for about 50 feet above and for about 100 feet below the station. The current has a velocity of about 1 foot per second at ordinary stages. Both banks are high and rocky and are not liable to overflow. The bed of the stream is rocky and permanent. The bench mark is the one at the Rock Creek station. It is a point marked on the lava rock 15 feet east of the left end of the footbridge.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Pine Creek near Round Valley, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
August 3	R. S. Hawley	1.90	15.0
August 8	do	1.87	10.4
August 18	do	1.73	5.7
September 1	do	1.71	5.9
September 10	do	1.71	6.3
November 24	do	1.89	10.1
1904.			
April 27	R. S. Hawley	1.70	4.2
June 2	do	2.80	67
June 15	do	3.70	185
July 13	J. C. Clausen and L. M. Barnes	2.95	84
August 3	L. M. Barnes	2.70	58
September 9	R. S. Hawley	1.87	10.7
October 13	R. S. Hawley, W. B. Clapp, and R. J. Taylor	2.30	31
November 12	R. J. Taylor	2.07	21
December 6	do	1.90	16

Mean daily gage height, in feet, of Pine Creek near Round Valley, Cal., for 1903 and 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
1									1.75	1.80	1.90	1.85
2									1.75	1.83	1.90	1.85
3									1.72	1.80	1.90	1.85
4								1.90	1.70	1.80	1.90	1.90
5								1.90	1.70	1.80	1.90	1.90
6								1.90	1.72	1.80	1.85	1.95
7								1.90	1.73	1.80	1.80	1.95
8								1.90	1.70	1.82	1.90	1.95
9								1.80	1.72	1.80	1.90	1.95
10								1.80	1.75	1.80	1.90	1.95
11								1.80	1.70	1.83	1.90	1.90
12								1.90	1.70	1.80	1.90	1.90
13								1.90	1.70	1.80	1.90	1.90
14								1.80	1.70	1.82	1.90	1.90
15								1.80	1.70	1.90	1.90	1.90
16								1.80	1.70	1.80	1.90	1.90
17								1.80	1.70	1.90	1.90	1.90
18								1.73	1.70	1.90	1.90	1.90
19								1.70	1.70	1.93	1.90	1.90
20								1.70	1.70	1.92	1.90	1.90
21								1.70	1.70	1.90	1.80	1.90
22								1.72	1.70	1.90	1.80	1.85
23								1.80	1.73	1.90	1.85	1.85

Mean daily gage height, in feet, of Pine Creek near Round Valley, Cal., etc.—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
24	.....	.....	.....	.....	.....	.....	.....	1.75	1.72	1.90	1.90	1.80
25	.....	.....	.....	.....	.....	.....	.....	1.80	1.70	1.90	1.90	1.85
26	.....	.....	.....	.....	.....	.....	.....	1.80	1.70	1.90	1.90	1.85
27	.....	.....	.....	.....	.....	.....	.....	1.75	1.70	1.90	1.85	1.90
28	.....	.....	.....	.....	.....	.....	.....	1.73	1.75	1.90	1.85	1.90
29	.....	.....	.....	.....	.....	.....	.....	1.70	1.80	1.90	1.85	1.90
30	.....	.....	.....	.....	.....	.....	.....	1.70	1.80	1.90	1.80	1.90
31	.....	.....	.....	.....	.....	.....	.....	1.70	.....	1.90	.....	1.90
1904.												
1	1.90	1.90	1.90	1.90	1.80	2.60	3.10	2.90	2.20	2.00	2.30	2.00
2	1.90	1.90	1.90	1.90	1.75	2.80	3.00	2.85	2.10	2.00	2.25	2.00
3	1.90	1.90	1.90	1.90	1.75	3.85	3.00	2.80	1.95	2.00	2.25	2.00
4	1.90	1.90	1.90	1.90	1.75	3.60	3.10	2.70	1.90	2.00	2.25	2.00
5	1.90	1.90	1.90	1.85	1.75	3.60	3.20	2.60	1.85	2.00	2.25	2.00
6	1.90	1.85	1.90	1.85	1.80	3.50	3.20	2.55	1.80	2.00	2.15	2.00
7	1.90	1.85	1.80	1.90	1.80	3.50	3.10	2.55	1.80	2.10	2.10	2.00
8	1.90	1.85	1.80	1.90	1.80	3.20	3.10	2.50	1.80	2.30	2.15	2.00
9	1.90	1.90	1.80	1.90	1.80	3.10	3.10	2.50	1.80	2.30	2.15	2.00
10	1.90	1.90	1.90	1.80	1.85	3.50	3.10	2.45	1.80	2.30	2.20	2.00
11	1.90	1.90	1.90	1.80	1.80	3.50	3.00	2.50	1.80	2.50	2.20	2.00
12	1.90	1.90	1.80	1.80	1.80	3.60	3.00	2.45	1.80	2.40	2.20	2.00
13	1.90	1.90	1.90	1.80	1.80	3.60	2.95	2.45	1.80	2.25	2.20	2.00
14	1.90	1.90	1.90	1.70	1.80	3.50	2.70	2.45	1.80	2.35	2.20	2.00
15	1.90	1.90	1.90	1.70	1.80	3.70	2.50	2.50	1.80	2.25	2.15	2.00
16	1.90	2.10	1.85	1.70	1.80	3.80	2.50	2.55	1.85	2.25	2.15	2.00
17	1.90	1.90	1.90	1.80	1.85	3.80	2.45	2.40	1.80	2.10	2.10	2.00
18	1.90	1.85	1.90	1.80	1.80	3.70	2.40	2.45	1.80	2.10	2.10	2.00
19	1.90	1.90	1.90	1.80	1.80	3.60	2.40	2.40	1.80	2.10	2.10	2.00
20	1.90	1.90	1.90	1.80	1.90	3.50	2.40	2.40	1.80	2.10	2.10	2.00
21	1.90	1.90	1.90	1.80	1.90	3.40	2.40	2.40	1.80	2.20	2.10	2.00
22	1.90	1.90	2.00	1.80	1.90	3.40	2.60	2.35	1.80	2.20	2.00	1.95
23	1.90	1.85	2.10	1.80	1.80	3.30	2.65	2.35	1.80	2.20	2.00	1.90
24	1.90	1.85	2.00	1.80	2.50	3.50	2.65	2.40	2.00	2.20	2.10	1.90
25	1.90	1.90	1.90	1.80	3.00	3.40	2.70	2.40	2.20	2.20	2.10	1.90
26	1.90	1.90	1.90	1.80	2.80	3.20	2.80	2.40	1.95	2.20	2.10	1.90
27	1.90	1.80	1.90	1.80	2.70	3.30	2.90	2.40	1.95	2.20	2.10	1.90
28	1.90	1.90	.....	1.80	2.60	3.30	2.80	2.25	1.90	2.25	2.10	1.95
29	1.90	1.90	1.90	1.80	2.70	3.40	2.65	2.25	1.90	2.25	2.00	2.00
30	1.90	.....	1.90	1.80	2.70	3.20	2.70	2.20	1.90	2.30	2.00	2.00
31	1.90	.....	1.90	.....	2.60	.....	2.85	2.20	.....	2.30	.....	2.30

Rating table for Pine Creek near Round Valley, Cal., from August 4, 1903, to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.70	4	2.30	33	2.90	75	3.50	149
1.80	8	2.40	39	3.00	85	3.60	165
1.90	13	2.50	45	3.10	95	3.70	184
2.00	18	2.60	52	3.20	106	3.80	203
2.10	23	2.70	59	3.30	119	3.90	223
2.20	28	2.80	67	3.40	133		

Estimated monthly discharge of Pine Creek near Round Valley, Cal., for 1903 and 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
1903.				
August 4–31	13	4	7.9	439
September	8	4	4.7	280
October	14	8	10.8	664
November	13	8	11.8	702
December	16	8	12.6	775
The period				2,860
1904.				
January	13	13	13	799
February	23	8	12.4	713
March	23	8	12.9	793
April	13	5	9	536
May	85	6	21.7	1,334
June	213	52	142	8,450
July	106	39	70	4,304
August	75	28	44	2,705
September	28	8	12	714
October	45	18	28	1,722
November	33	18	25	1,488
December	33	13	17.5	1,076
The year	213	5	34	24,634

OWENS RIVER CANAL NEAR BISHOP, CAL.

This station was established August 5, 1903, by J. C. Clausen and R. S. Hawley. It is located at the footbridge near the quarter-section line which divides the north half of sec. 27, T. 6 S., R. 32 E., of the Mount Diablo meridian. The gage is a vertical rod nailed to the bridge. It is read once each day by A. S. Kinsley, the ditch tender. Discharge measurements are made from the footbridge to which the gage is attached. The initial point for soundings is on right bank of canals. The distances across stream are marked on the bridge at intervals of 2 feet. The channel is straight for 300 feet above and for 100 feet below the station. The current is sluggish. The right bank is high and rocky and will not overflow. The left bank is low and will overflow. The bed of the stream is composed of gravel and is permanent.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Owens River canal near Bishop, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
July 30	R. S. Hawley		39.0
August 5	do	2.50	21.8
August 15	do	2.69	28.6
August 26	do	2.82	36.5
September 7	do	2.89	33.1
September 15	do	3.02	39.5
October 23	do	2.57	23.2
1904.			
February 3	R. S. Hawley	1.60	7.4
March 4	do	2.90	44
March 21	do	2.60	34
April 21	do	2.90	46
July 11	J. C. Clausen and L. M. Barnes	2.65	31
August 10	L. M. Barnes	2.80	40
September 5	R. S. Hawley	2.90	40
October 14	R. S. Hawley, W. B. Clapp, and R. J. Taylor.	1.65	6.1
November 1	R. J. Taylor	1.60	4.6

Mean daily gage height, in feet, of Owens River canal near Bishop, Cal., for 1903.

Day.	Aug.	Sept.	Oct.	Day.	Aug.	Sept.	Oct.	Day.	Aug.	Sept.	Oct.
1	.....	2.90	3.10	12	2.80	3.00	.....	22	2.85	3.00	.....
2	.....	2.90	3.10	13	2.80	3.05	.....	23	2.85	3.00	.....
3	.....	2.90	3.10	14	2.80	3.05	.....	24	2.85	3.00	.....
4	.....	2.95	3.10	15	(b)	3.05	.....	25	2.80	3.00	.....
5	a 2.50	2.95	3.10	16	(b)	3.05	.....	26	2.80	3.05	.....
6	2.50	(b)	3.10	17	2.75	3.05	.....	27	2.85	3.05	.....
7	2.50	2.95	3.10	18	2.80	3.05	.....	28	2.85	3.05	.....
8	(b)	2.90	3.10	19	(b)	3.10	.....	29	2.90	(b)	.....
9	2.70	2.90	3.10	20	2.80	3.10	.....	30	2.90	3.10	.....
10	2.75	2.95	2.70	21	(b)	(b)	.....	31	2.90	.....	.....
11	(b)	3.00	.....								

a Lowest water known in twenty-four years. b No record.

On October 10 the directors of the canal ordered part of the water turned off; irrigation was practically over for season. From October 10 no daily record was kept, but beginning October 11 the gage read about 1.60 until October 24; the water was then all turned out.

Mean daily gage height, in feet, of Owens River canal near Bishop, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	a 0.00	0.00	0.00	.....	.....	.....	.....	.....	.....
2	.00	1.6	.00	.....	2.9	.....	.....	.....	2.75
3	.00	1.6	.00	2.6	2.9	.....	.....	.....	.....
4	.00	.....	2.9	.....	2.9	.....	.....	2.65	.....
5	.00	.....	.....	.....	2.9	2.7	2.6	.....	28.
6	.00	.....	2.7	.....	2.9	.....	.....	2.8	2.95
7	.00	.....	.....	.....	2.9	2.7	2.6	.....	2.9
8	.00	.....	.....	2.7	.....	2.6	.....	.....	3.0
9	.00	.....	.....	.....	2.9	.....	.....	.....	3.0
10	.00	.....	.....	.....	2.9	.....	.....	.....	.....
11	.00	.....	.....	.....	2.9	.....	2.65	2.7	.....
12	.00	.....	.....	2.75	.....	.....	.....	.....	.....
13	.00	.....	.....	2.80	2.9	2.6	.....	.....	3.0
14	.00	.....	.....	2.85	.....	.....	.....	.....	.....
15	.00	.....	.....	2.85	.....	2.4	.....	2.7	.....
16	.00	a .00	.....	.....	2.9	.....	.....	.....	.....
17	.00	.00	.....	2.85	2.9	.....	.....	.....	3.05
18	.00	.00	.....	.....	2.9	.....	.....	.....	.....
19	.00	.00	.....	2.85	.....	.....	.....	.....	.....
20	.00	.00	.....	2.80	2.9	.....	.....	2.8	3.05
21	.00	.00	2.6	2.9	2.9	.....	.....	.....	(b)
22	.00	.00	.....	2.9	.....	2.6	.....	.....	.....
23	.00	.00	.....	.....	2.9	.....	.....	.....	.....
24	.00	.00	.....	2.9	2.9	.....	.....	.....	.....
25	.00	.00	.....	.....	2.9	.....	.....	2.8	.....
26	.00	.00	.....	2.9	.....	.....	2.7	.....	.....
27	.00	.00	.....	2.9	.....	2.5	2.75	.....	.....
28	.00	.00	.....	.....	.....	.....	.....	.....	.....
29	.00	.00	2.7	2.9	2.7	.....	.....	.....	.....
30	.00	.....	.....	.....	.....	.....	2.	.....	.....
31	.00	.....	2.6	.....	.....	.....	.....	.....	.....

a Dry January 1 to February 1; February 16 to March 3.
b No record for remainder of the year.

Rating table for Owens River canal near Bishop, Cal., from January 1 to June 30, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.60	7	2.00	15	2.40	27	2.80	42
1.70	9	2.10	18	2.50	31	2.90	46
1.80	11	2.20	20	2.60	34	3.00	50
1.90	13	2.30	23	2.70	38	3.10	54

Rating table for Owens River canal near Bishop, Cal., from July 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.60	5	2.00	13	2.40	24	2.80	37
1.70	6	2.10	16	2.50	27	2.90	41
1.80	8	2.20	18	2.60	30	3.00	45
1.90	11	2.30	21	2.70	34		

Estimated monthly discharge of Owens River canal near Bishop, Cal., for 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
February	7	0	3.4	196
March	46	0	33	2,029
April	46	34	41.4	2,464
May	46	38	45	2,767
June	38	31	33.5	1,993
July	37	27	33	2,029
August	37	32	35	2,152
September 1–20	47	35	43	1,706
The period				15,336

NOTE.—Discharge interpolated for missing days.

BISHOP CREEK CANAL NEAR BISHOP, CAL.

This station was established August 5, 1903, by J. C. Clausen, assisted by R. S. Hawley. It is located at the footbridge below the waste gate near the house of the observer, A. Fitzgerald. It is 3½ miles northwest of Bishop, Cal. The gage is a 1 by 3 inch vertical rod fastened to the bridge anchor. Discharge measurements are made from the footbridge at which the gage is located. The initial point for soundings is on right bank; the initial point and points at which soundings are made are marked on footbridge. The channel is straight for 50 feet above and for 100 feet below this station. The current is swift. The right bank is high and the left bank is low. Neither bank is liable to overflow. The bed of the stream is composed of sand and gravel and is fairly permanent. The gaging stations on canals taking water from Owens River may be considered as temporary. The gage rods in most instances are securely fastened to the footbridges and are not likely to change. No permanent bench marks were established.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Bishop Creek canal near Bishop, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
July 30	R. S. Hawley	.....	101
August 5	.....do	3.0	72
August 15	.....do	2.89	61
August 26	.....do	3.25	84
September 5	.....do	3.17	81
September 15	.....do	3.31	82
October 23	.....do	1.97	27
1904.			
February 11	R. S. Hawley	2.43	54
March 21	.....do	1.75	22
April 13	.....do	3.69	116
April 21	.....do	3.62	113
May 14	.....do	3.55	109
June 16	.....do	1.90	30
June 11	J. C. Clausen and L. M. Barnes	3.20	94
August 10	L. M. Barnes	2.00	26
September 5	R. S. Hawley	4.10	118

Mean daily gage height, in feet, of Bishop Creek canal near Bishop, Cal., for 1903.

Day.	Aug.	Sept.	Oct.	Day.	Aug.	Sept.	Oct.	Day.	Aug.	Sept.	Oct.
1				12				22	3.10	3.30	
2		3.15		13				23		3.30	
3		3.15		14	3.10			24		3.40	
4				15	2,90	3.30		25		3.40	
5	3.00	3.15		16		3.30		26	3.25	3.40	
6	3.10		2.00	17		3.25		27		3.40	
7				18	3.10	3.25		28		3.40	
8	3.10	3.30		19	3.00	3.30		29		(a)	
9				20		3.30		30			
10	3.10	3.30		21		3.30		31			
11	3.10										

a No record until October 6; but not much change in the canal.

NOTE.—On October 6 the head-gate was shut down, and until October 29, when the water was turned out, the gage read about 2.0 feet.

Mean daily gage height, in feet, of Bishop Creek canal near Bishop, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	a0.00	0.00	0.00			3.5	2.6	3.8		a0.00	0.00	0.00
2	.00	.00	.00			3.5	2.6	3.0				
3	.00	.00	.00		3.3	3.5	2.6	3.0				
4	.00	.00	.00	1.7	3.3	3.7		3.0				
5	.00	.00	.00		3.2	2.0	3.2	3.0	4.0			
6	.00	.00	.00	1.7	3.2	2.0	3.2	2.0	3.9			
7	.00	.00	.00	2.7	3.2	2.0	3.3	2.0	3.9			
8	.00	.00	.00	2.7	3.3	2.2	3.3	2.0	4.05			
9	.00	a.00	.00		3.3	2.2	3.3	2.0	4.0			
10	.00	2.45	.00	2.7	3.3			2.0	4.0			
11	.00		.00	2.7	3.3			2.1				
12	.00		.00	3.7		1.7	3.2	2.1	4.05			
13	.00	2.45	.00	3.7	3.8	1.7	3.2					
14	.00		.00		3.8	1.7	3.1	2.0	4.1			
15	.00		.00	3.7	3.8	1.7	3.1	3.3				
16	.00	2.45	.00	3.5	3.7	1.7	3.1	3.3	4.05			
17	.00		.00			1.7	3.6	3.3	4.05			
18	.00		.00	3.5	3.8	1.7	3.6	3.4				
19	.00	2.45	.00	3.6	3.7		3.6	3.35	4.1			
20	.00		a.00		3.7	1.8	3.6	3.35	3.4			
21	.00		1.75		3.7	1.8	3.6		3.4			
22	.00			3.6	3.7	1.8	3.6	3.7	3.4			
23	.00	2.45		3.3	3.7	1.8	3.6	3.7	3.4			
24	.00	a.00			3.3	1.8		3.7	3.45			
25	.00	.00		3.3	3.3	1.8	3.7					
26	.00	.00		3.3	3.3		3.7					
27	.00	.00		3.3	3.3	2.6	3.7					
28	.00	.00		3.6	3.2	2.6	3.7					
29	.00	.00		3.6	3.2	2.6	3.7					
30	.00			3.6	3.2	2.6	3.8		3.9			
31	.00						3.8					a.00

a Canal dry: January 1 to February 9, February 24 to March 20; October 1 to December 31.

Rating table for Bishop Creek canal near Bishop, Cal., from February 1 to October 1, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.60	15	2.30	48	3.00	81	3.70	116
1.70	20	2.40	53	3.10	86	3.80	121
1.80	24	2.50	57	3.20	91	3.90	126
1.90	28	2.60	62	3.30	96	4.00	131
2.00	33	2.70	67	3.40	101	4.10	136
2.10	38	2.80	72	3.50	106	4.20	141
2.20	43	2.90	76	3.60	111		

Estimated monthly discharge of Bishop Creek canal near Bishop, Cal., for 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
February	55	0	26.5	1,524
March	22	0	7.8	480
April	116	20	83.1	4,945
May	121	91	103.4	6,359
June	106	20	42.1	2,505
July	121	62	99	6,087
August	126	33	85	5,226
September	136	101	123	7,319
The period				34,445

NOTE.—Discharge interpolated for missing days.

FARMERS' CANAL NEAR BISHOP, CAL.

This station was established August 6, 1903, by J. C. Clausen and R. S. Hawley. It is located at the footbridge near the house of the observer, Robert Love, and 3 miles north of Bishop, Cal. The gage is a 1 by 3 inch vertical rod fastened to the bridge pier. Discharge measurements are made from the footbridge, to which the gage is attached. The initial point for soundings is on footbridge, near the right bank. The distances across stream are marked every 2 feet on the footbridge.

The channel is straight for 300 feet above and for 50 feet below the station. The current is sluggish. Both banks are low and are liable to overflow. The bed of the stream is sandy and shifting.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Farmers' canal near Bishop, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
July 31	R. S. Hawley		13.9
August 6	do	2.4	7.0
August 17	do	2.7	14.2
August 25	do	2.5	10.7
September 3	do	2.42	9.7
September 14	do	2.58	10.4
October 23	do	2.55	16.2
November 27	do	[a] 2.54	16.0
1904.			
February 3	R. S. Hawley	2.55	15.5
April 2	do	2.35	11.3
April 20	do	2.60	17.0
May 14	do	2.83	27.0
June 16	do	3.02	22.0
July 11	J. C. Clausen and L. M. Barnes	2.55	15.0
July 30	L. M. Barnes	3.05	24.0
August 25	do	3.05	26.0
September 6	R. S. Hawley	2.80	21.0
October 14	R. S. Hawley, W. B. Clapp, and R. J. Taylor	2.41	8.1
November 1	R. J. Taylor	2.40	8.1
December 1	do	2.30	7.2

[a] Corrected gage height.

Mean daily gage height, in feet, of Farmers' canal near Bishop, Cal., for 1903 and 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
1									2.40	2.95	2.55	2.50
2									2.40	2.95	.....	.....
3									2.43	2.95	2.55	2.50
4									2.40	3.00	.....	.....
5									2.45	3.03	2.55	2.50
6									2.45	.....	.....	.....
7								2.40	2.50	3.05	2.55	2.50
8								2.33	2.58	.....	2.55	.....
9								2.40	2.67	2.82	(2.55)	2.50
10								2.60	2.65	.....	(2.55)	.....
11								2.60	.....	2.80	(2.55)	2.50
12								2.67	2.68	.....	(2.55)	.....
13								2.75	2.57	2.80	(2.55)	2.50
14								.....	2.60	.....	2.55	.....
15								.....	2.60	.....	2.55	2.48
16								2.70	2.63	2.90	(2.55)	.....
17								2.70	.....	[a] 2.50	(2.55)	2.50

[a] The rock dam below the gage rod was partly removed.

Mean daily gage height, in feet, of Farmers' canal near Bishop, Cal., etc.—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
18	.....	.....	.....	.....	.....	.....	.....	2.68	2.67	.....	(2.55)	.....
19	.....	.....	.....	.....	.....	.....	.....	.....	2.80	2.60	(2.55)	2.45
20	.....	.....	.....	.....	.....	.....	.....	2.50	2.82	2.50	(2.55)	.....
21	.....	.....	.....	.....	.....	.....	.....	.....	2.85	2.50	2.55	2.50
22	.....	.....	.....	.....	.....	.....	.....	2.50	2.83	2.50	2.55	.....
23	.....	.....	.....	.....	.....	.....	.....	2.50	.....	2.55	(2.55)	2.48
24	.....	.....	.....	.....	.....	.....	.....	2.55	2.87	.....	(2.55)	.....
25	.....	.....	.....	.....	.....	.....	.....	2.50	.....	.....	(2.55)	2.50
26	.....	.....	.....	.....	.....	.....	.....	2.50	2.90	2.53	(2.55)	.....
27	.....	.....	.....	.....	.....	.....	.....	2.55	2.93	.....	(2.55)	2.50
28	.....	.....	.....	.....	.....	.....	.....	2.50	2.90	.....	2.55	.....
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.55	.....	2.50
30	.....	.....	.....	.....	.....	.....	.....	2.45	2.92	.....	.....	.....
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.50
1904.												
1	.....	2.55	2.3	.....	.....	2.65	2.65	3.00	3.00	2.50	2.40	2.30
2	2.5	.....	.....	2.35	2.3	.....	.....	.....	3.10	.....	.....	.....
3	.....	2.55	.....	2.5	2.1	2.75	2.60	3.05	3.05	2.45	2.35	.....
4	2.5	.....	.....	.....	.....	.....	2.60	.....	.....	.....	.....	.....
5	.....	.....	.....	.....	2.4	2.75	.....	3.10	.....	2.50	.....	.....
6	2.5	2.55	.....	.....	2.5	.....	2.55	.....	2.80	.....	.....	2.30
7	.....	2.5	.....	2.3	.....	.....	.....	3.05	2.80	2.55	.....	.....
8	.....	.....	.....	.....	.....	.....	2.55	.....	2.75	.....	2.30	.....
9	2.5	.....	.....	.....	.....	.....	.....	3.10	.....	2.45	.....	2.30
10	.....	.....	.....	2.3	.....	3.05	.....	.....	2.70	.....	.....	.....
11	2.5	.....	.....	.....	2.6	.....	2.60	3.05	.....	2.45	2.30	.....
12	.....	.....	.....	2.3	.....	.....	.....	.....	2.70	.....	.....	.....
13	2.5	.....	.....	.....	2.6	3.10	2.55	3.10	2.75	2.40	.....	2.25
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
15	.....	.....	.....	2.3	2.65	.....	2.50	3.10	2.70	2.40	2.30	.....
16	2.55	.....	.....	.....	2.85	.....	.....	.....	.....	.....	.....	2.25
17	.....	.....	.....	.....	.....	3.1	2.70	3.10	2.75	.....	.....	.....
18	2.5	.....	.....	.....	2.95	.....	.....	.....	2.80	2.40	2.25	.....
19	.....	.....	.....	2.3	.....	.....	.....	3.05	.....	.....	.....	.....
20	.....	.....	.....	2.6	2.75	3.0	.....	.....	2.90	.....	.....	2.30
21	2.5	.....	.....	.....	.....	.....	.....	.....	2.95	2.35	.....	.....
22	.....	.....	.....	2.9	.....	.....	.....	3.10	.....	.....	2.30	.....
23	2.55	.....	.....	.....	2.65	.....	.....	3.15	3.00	.....	.....	2.30
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	.....	.....	.....	2.0	2.6	.....	.....	3.05	.....	2.40	2.30	.....
26	2.55	.....	.....	.....	.....	.....	.....	.....	3.10	.....	.....	.....
27	.....	.....	.....	1.9	.....	.....	.....	.....	2.70	.....	.....	2.20
28	.....	.....	.....	0	2.65	.....	.....	.....	2.60	2.40	.....	.....
29	2.55	.....	.....	0	.....	2.6	.....	.....	.....	.....	.....	.....
30	.....	.....	.....	0	2.70	2.9	3.05	3.10	2.60	.....	.....	.....
31	.....	.....	.....	.....	.....	.....	.....	3.10	.....	.....	.....	2.15

NOTE.—Gage heights in parenthesis are estimated.

Rating table for Farmers' canal near Bishop, Cal., from January 1 to May 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
2.00	4	2.30	10	2.60	18	2.90	30
2.10	6	2.40	12	2.70	21	3.00	35
2.20	8	2.50	15	2.80	25	3.10	40

Rating table for Farmers' canal near Bishop, Cal., from June 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
2.10	3	2.40	8	2.70	15	3.00	23
2.20	5	2.50	10	2.80	18	3.10	26
2.30	6	2.60	13	2.90	21	3.20	29

Estimated monthly discharge of Farmers' canal near Bishop, Cal., for 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	16	15	15.3	941
February	16	15	15.2	874
March	10	10	10	615
April	30	0	10.2	607
May	32	6	18.8	1,156
June	26	13	21	1,250
July	25	10	16	984
August	28	23	26	1,599
September	26	13	19	1,131
October	12	7	9	553
November	8	6	6	357
December	6	4	5.7	350
The year	32	0	14.4	10,417

NOTE.—Discharge interpolated for missing days.

M'NALLY CANAL NEAR BISHOP, CAL.

This station was established July 31, 1903, by J. C. Clausen and R. S. Hawley. It is located at the head of the canal, 3¾ miles north of Bishop, Cal. The gage is a 1 by 3 inch vertical board fastened to the headworks of the canal. Discharge measurements are made from a footbridge. The initial point for soundings is marked on the footbridge near the right bank. The channel is straight for 50 feet below

the gage. The current is swift. Both banks are high and will not overflow. The bed of the stream is rocky and permanent.

No gage reader could be obtained for this station, but since the gage was installed there has been little variation in the amount of water flowing in the canal.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of McNally canal near Bishop, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
July 31	R. S. Hawley	1.40	66
August 6	do	1.40	66
August 17	do	1.36	63
August 25	do	1.25	54
September 4	do	1.25	52
September 14	do	1.26	52
September 21	do	1.10	40
1904.			
April 2	R. S. Hawley	.80	29
April 20	do	1.37	68
May 14	do	1.52	83
July 11	J. C. Clausen and L. M. Barnes	1.55	81
July 30	L. M. Barnes	1.90	81
August 25	do	1.70	50
September 5	R. S. Hawley	1.75	46

Mean daily gage height, in feet, of McNally canal near Bishop, Cal., for 1904.[a]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Oct.	Nov.	Dec.
1	[b]0.00	0.00	0.00	.....	.....	1.50	1.60	0.00	0.00	0.00
2	.00	.00	.00	0.80	.....	.....	.....	.00	.00	.00
3	.00	.00	.00	.....	.....	1.80	.....	.00	.00	.00
4	.00	.00	.00	.....	.....	.....	.....	.00	.00	.00
5	.00	.00	.00	.....	.....	.....	.....	.00	.00	.00
6	.00	.00	.00	.....	.....	1.70	.....	.00	.00	.00
7	.00	.00	.00	.....	.....	1.50	.....	.00	.00	.00
8	.00	.00	.00	.90	.....	.....	.....	.00	.00	.00
9	.00	.00	.00	.....	.....	1.70	.....	.00	.00	.00
10	.00	.00	.00	.....	.....	.....	.....	.00	.00	.00
11	.00	.00	.00	.....	.....	1.30	1.55	.00	.00	.00
12	.00	.00	.00	.....	.....	1.50	.....	.00	.00	.00
13	.00	.00	.00	.....	.....	.....	1.90	.00	.00	.00
14	.00	.00	.00	.....	1.52	1.60	.....	.00	.00	.00
15	.00	.00	.00	.....	.....	1.50	1.80	.00	.00	.00

[a] Dry: January, February, March, October, November, and December.
[b] No record: August and September.

Mean daily gage height, in feet, of McNally canal near Bishop, Cal., etc.—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Oct.	Nov.	Dec.
16	0.00	0.00	0.00	.....	.....	.....	1.90	0.00	0.00	0.00
17	.00	.00	.00	.....	.....	.....	2.00	.00	.00	.00
18	.00	.00	.00	.....	.....	.....	2.10	.00	.00	.00
19	.00	.00	.00	.....	.....	.....	.....	.00	.00	.00
20	.00	.00	.00	1.35	.....	.....	.....	.00	.00	.00
21	.00	.00	.00	.....	.....	.....	.....	.00	.00	.00
22	.00	.00	.00	.....	.....	.....	.....	.00	.00	.00
23	.00	.00	.00	.....	.....	.....	.....	.00	.00	.00
24	.00	.00	.00	.....	.....	.....	.....	.00	.00	.00
25	.00	.00	.00	.....	.....	.....	.....	.00	.00	.00
26	.00	.00	.00	.....	.....	1.40	.....	.00	.00	.00
27	.00	.00	.00	.....	.....	.....	.....	.00	.00	.00
28	.00	.00	.00	.....	.....	.....	.....	.00	.00	.00
29	.00	.00	.00	.....	.....	.....	.....	.00	.00	.00
30	.00	.....	.00	.....	.....	.....	1.90	.00	.00	.00
31	.00	.....	.00	.....	.....	.....	.....	.00	.....	.00

Rating table for McNally canal near Bishop, Cal., from April 1 to July 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.70	22	1.10	50	1.50	78	1.90	106
.80	29	1.20	57	1.60	85	2.00	113
.90	36	1.30	64	1.70	92	2.10	120
1.00	43	1.40	71	1.80	99		

Rating table for McNally canal near Bishop, Cal., from August 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.40	10	1.60	30	1.80	62
1.50	20	1.70	45	1.90	82

Estimated monthly discharge of McNally canal near Bishop, Cal., for 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
April	68	29	50.6	3,007
May	.....	.....	80	4,919
June	99	64	80	4,760
July	120	83	100	6,148
The period	.....	.....	.....	18,834

NOTE.—Discharge interpolated for missing days.

GEORGE COLLINS'S CANAL NEAR BISHOP, CAL.

This station was established August 17, 1903, by R. S. Hawley. It is located at the footbridge 3 miles east and one-half mile north of Bishop, Cal. The gage is a vertical rod fastened to the bridge near the house of Arthur Wines, the observer. Discharge measurements are made from the bridge. The initial point for soundings is marked on the footbridge near the right bank of the canal. The channel is straight for 75 feet above and for 50 feet below the station. The current is sluggish. The right bank is low and the left bank is high. Neither bank is liable to overflow. The bed of the stream is composed of sand and is fairly permanent.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of George Collins's canal near Bishop, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
July 31	R. S. Hawley		4.9
August 11	do		5.6
August 17	do	1.00	6.3
August 27	do	1.01	6.0
September 7	do	.94	5.5
September 14	do	.98	5.5
October 23	do	.60	2.8
1904.			
February 4	R. S. Hawley	.30	1.5
April 2	do	1.20	11.1
April 14	do	.70	4.2
June 8	do	1.58	14.0
July 12	J. C. Clausen and L. M. Barnes	1.50	9.6
August 6	L. M. Barnes	1.50	9.7
August 20	do	1.55	9.3
October 10	R. S. Hawley and R. J. Taylor	1.03	1.8
November 1	R. J. Taylor	.80	.7

Mean daily gage height, in feet, of George Collins's canal near Bishop, Cal., for 1903 and 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
1									1.03	0.95	0.75	0.75
2									.98	.95	.75	.75
3									.97	.95	.75	.75
4									.98	.95	.75	.75
5									.97	.95	.75	.70
6									.98	.95	.70	.65
7									.97	.95	.70	.65
8									.95	.95	.70	.65
9									.95	.95	.70	.65
10									.95	.95	.70	.65
11									.95	.95	.75	.65
12									.92	[a].80	.75	.65
13									.93	.80	.75	.63
14									.95	.80	.75	.62
15									.95	.80	.75	.63
16								1.00	.95	.80	.75	.62
17								.98	.95	.80	[b].50	.63
18								.92	.97	.80	.50	.60
19								.93	.95	.80	.50	.60
20								.92	1.35	.80	.50	.60
21								.70	1.35	.85	.55	[c]
22								.73	1.35	.85	.55	.....
23								.70	1.35	[d].75	.55	.....
24								.90	1.35	.75	.55	.....
25								.90	1.35	.75	.55	.....
26								.90	1.35	.75	.55	.....
27								.97	1.35	.75	.62	.....
28								1.03	1.20	.75	.70	.....
29								1.02	1.20	.75	.70	.....
30								1.03	1.20	.75	.85	.....
31								1.04	.....	.75	.....	.....
1904.												
1	[e]0.00	0.00	0.2	1.3	0.6	1.5	1.3	1.5	1.55	1.0	.....	.....
2	.00	.00	.2	1.3	.6	1.5	1.3	.....	.....	.....	.....	.....
3	.00	.00	.2	1.3	.6	1.5	1.3	1.5	1.49	1.3	.....	.....
4	.00	.00	.2	1.2	.6	1.6	.....	.....	1.1	1.3	.....	.....
5	.00	.00	.2	1.2	.6	.....	1.3	.....	.....	.....	.....	.....
6	.00	.00	.2	1.2	.7	.....	.....	1.5	.5	1.6	.....	.....
7	.00	.00	e.00	1.2	.7	.....	1.4	.....	.....	.....	.....	.....
8	.00	.00	.00	1.2	.6	1.6	1.4	1.3	1.0	.....	.....	.....
9	.00	.00	.00	.9	.6	.....	1.4	.....	1.4	.....	.....	.....
10	.00	.00	.00	.9	.8	1.6	.....	1.5	.....	.....	.....	.....
11	.00	.2	.00	.9	.8	1.6	1.4	.....	1.5	.7	.....	.....
12	.00	.2	.00	.9	1.1	1.5	.....	1.5	.....	.....	.....	.....
13	.00	.2	.00	.7	1.3	1.6	1.35	.....	1.5	.6	.....	.....
14	.00	.2	.00	.7	1.3	.....	.....	1.5	.....	.....	.....	.....
15	.00	.2	.00	.7	1.6	1.5	1.3	.....	1.3	.....	.....	.....
16	.00	.3	.00	.7	1.6	.....	.....	1.5	1.1	1.0	.....	.....
17	.00	.6	.2	.8	1.6	1.6	1.3	.....	1.1	.9	.....	.....
18	.00	.3	.3	.8	1.6	.....	.....	1.6	1.4	.6	.....	.....

[a] Falling slowly; no storms.
[b] Falling fast.
[c] Canal turned off.
[d] Falling slightly.
[e] Dry: January 1 to February 10; March 7–16; March 21–22.

Mean daily gage height, in feet, of George Collins's canal near Bishop, Cal., etc.—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1904.												
19	0.00	0.2	0.2	0.9	1.6	1.5	1.2	.....	.....	.....	.....	.....
20	.00	.2	.2	1.0	1.6	.....	.....	1.5	1.4	.....	.....	.....
21	.00	.2	*a* .00	1.0	1.6	1.6	.8	.....	1.4	(*b*)	.....	.....
22	.00	.3	.00	1.0	1.5	.....	.....	1.5	.....	.....	.....	.....
23	.00	.3	.5	1.1	1.4	1.5	1.2	.....	1.5	.....	.....	.....
24	.00	.6	.3	1.1	1.5	.....	.....	1.55	.....	.....	.....	.....
25	.00	.5	.3	1.2	1.5	1.5	1.5	.....	.....	.....	.....	.....
26	.00	.5	1.4	1.1	1.5	1.5	.....	1.5	.....	.....	.....	.....
27	.00	.3	1.43	1.1	1.6	1.5	1.5	.....	.....	.....	.....	.....
28	.00	.4	1.4	1.0	1.6	1.4	.....	.....	.....	.....	.....	.....
29	.00	.4	1.4	.8	1.6	1.4	1.55	1.5	.....	.....	.....	.....
30	.00	.....	1.4	.6	1.6	1.3	1.5	.....	1.2	.....	.....	.....
31	.00	.....	1.3	.....	1.6	.....	1.5	1.55	.....	.....	.....	.....

a Dry: January 1 to February 10; March 7–16; March 21–22.
b Water shut off for remainder of year.

Rating table for George Collins's canal near Bishop, Cal., from January 1 to June 30, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.30	1	0.70	5	1.10	9	1.40	12
.40	2	.80	6	1.20	10	1.50	13
.50	3	.90	7	1.30	11	1.60	15
.60	4	1.00	8				

Rating table for George Collins's canal near Bishop, Cal., from July 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
0.80	0	1.10	3	1.30	6	1.50	9
.90	1	1.20	4	1.40	7	1.60	11
1.00	2						

Estimated monthly discharge of George Collins's canal near Bishop, Cal., for 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
February	4	0	1.1	63
March	12	0	2.7	166
April	11	4	7.9	470
May	15	4	10.5	646
June	15	12	13.7	815
July	10	0	6	369
August	11	6	9	553
September	13	0	6	357
October 1–20	11	0	3	119
The period				3,558

NOTE.—Discharge interpolated for missing days.

BISHOP CREEK NEAR BISHOP, CAL.

This station was established August 10, 1903, by J. C. Clausen and R. S. Hawley. It is located at the wagon bridge on the Bishop road, about 4¼ miles from Bishop and about 2 miles from the point where the creek leaves the canyon. North Hillside canal, South Hillside canal, and Powers canal are taken out above the station. The gage is a 1 by 3 inch vertical rod fastened in the rocks and braced to the right bank just above the wagon bridge. It is read once each day by A. S. Kilpatrick. Discharge measurements are made from the wagon bridge. The initial point for soundings is marked on the bridge near the right bank of the stream. The channel is straight for 100 feet above and for 50 feet below the station. The current is swift. Both banks are high and rocky and are not liable to overflow. The bed of the stream is rough and rocky and is permanent. The bench mark is a large flat granite bowlder on the right bank, 40 feet above the bridge.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Bishop Creek near Bishop, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
August 9	R. S. Hawley	2.45	121
August 19	do	2.17	95
August 25	do	2.20	96
September 3	do	1.99	[a]67
September 7	do	1.80	52
September 15	do	1.65	40
September 21	do	1.60	38
October 24	do	1.39	27
November 20	do	1.41	26
December 26	do	1.35	25
1904.			
January 23	R. S. Hawley	1.40	30
February 20	do	1.50	33
March 14	do	1.65	42
April 8	E. C. Murphy, S. G. Bennett, and R. S. Hawley	1.60	34
April 25	R. S. Hawley	2.05	75
April 30	do	2.00	67
May 17	do	2.95	180
June 8	do	3.65	342
July 12	J. C. Clausen and L. M. Barnes	3.00	197
August 8	L. M. Barnes	3.30	240
September 7	R. S. Hawley	2.10	74
October 15	R. S. Hawley, W. B. Clapp, and R. J. Taylor	2.30	95
November 9	R. J. Taylor	1.75	49
December 5	do	1.39	20

[a] Corrected discharge.

Mean daily gage height, in feet, of Bishop Creek near Bishop, Cal., for 1903 and 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
1									2.00	1.60	1.45	1.30
2									1.95	1.60	1.45	1.30
3									1.90	1.70	1.45	1.30
4									2.00	1.70	1.45	1.35
5									2.00	1.70	1.45	1.35
6									2.00	1.70	1.45	1.35
7									2.00	1.70	1.45	1.40
8									1.90	1.70	1.45	1.40
9									1.90	1.70	1.45	1.40
10									1.80	1.70	1.45	1.40
11								2.50	1.80	1.70	1.45	1.40

Mean daily gage height, in feet, of Bishop Creek near Bishop, Cal., etc.—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
12	.....	.....	.....	.....	.....	.....	.....	2.50	1.75	1.70	1.45	1.40
13	.....	.....	.....	.....	.....	.....	.....	2.50	1.75	1.70	1.45	1.40
14	.....	.....	.....	.....	.....	.....	.....	2.40	1.70	1.70	1.45	1.40
15	.....	.....	.....	.....	.....	.....	.....	2.30	1.70	1.65	1.45	1.40
16	.....	.....	.....	.....	.....	.....	.....	2.30	1.65	1.65	1.45	1.45
17	.....	.....	.....	.....	.....	.....	.....	2.30	1.60	1.70	1.40	1.45
18	.....	.....	.....	.....	.....	.....	.....	2.20	1.60	1.65	1.40	1.45
19	.....	.....	.....	.....	.....	.....	.....	2.20	1.60	1.50	1.40	1.45
20	.....	.....	.....	.....	.....	.....	.....	2.50	1.60	1.50	1.40	1.45
21	.....	.....	.....	.....	.....	.....	.....	2.20	1.60	1.45	1.40	1.45
22	.....	.....	.....	.....	.....	.....	.....	2.20	1.70	1.45	1.40	1.45
23	.....	.....	.....	.....	.....	.....	.....	2.25	1.60	1.45	1.40	1.45
24	.....	.....	.....	.....	.....	.....	.....	2.20	1.60	1.45	1.40	1.45
25	.....	.....	.....	.....	.....	.....	.....	2.15	1.60	1.45	1.40	1.45
26	.....	.....	.....	.....	.....	.....	.....	2.15	1.65	1.45	1.40	1.45
27	.....	.....	.....	.....	.....	.....	.....	2.10	1.60	1.45	1.40	1.40
28	.....	.....	.....	.....	.....	.....	.....	2.05	1.60	1.45	1.40	1.40
29	.....	.....	.....	.....	.....	.....	.....	2.05	1.70	1.45	1.40	1.40
30	.....	.....	.....	.....	.....	.....	.....	2.05	1.65	1.45	1.40	1.40
31	.....	.....	.....	.....	.....	.....	.....	2.00	.....	1.45	.....	1.40
1904.												
1	1.4	1.4	1.6	1.6	2.0	3.2	3.3	3.7	2.1	2.1	1.9	1.5
2	1.4	1.4	1.6	1.6	2.0	3.3	3.3	3.6	2.1	2.2	1.9	1.5
3	1.4	1.4	1.6	1.6	2.0	3.7	3.1	3.5	2.1	2.4	1.8	1.5
4	1.4	1.4	1.6	1.6	2.0	3.8	3.1	3.5	2.1	2.4	1.8	1.45
5	1.4	1.5	1.6	1.6	2.0	3.9	3.2	3.5	2.1	2.4	1.8	1.45
6	1.4	1.5	1.6	1.6	2.0	3.8	3.2	3.6	2.0	2.3	1.85	1.4
7	1.4	1.5	1.6	1.5	2.1	3.7	3.15	3.7	1.95	2.2	1.8	1.4
8	1.4	1.5	1.6	1.6	2.1	3.6	3.1	3.8	1.95	2.2	1.75	1.45
9	1.4	1.5	1.6	1.7	2.1	3.6	3.1	3.7	1.9	2.2	1.7	1.45
10	1.4	1.5	1.6	1.7	2.2	3.6	3.1	3.7	1.9	2.15	1.65	1.5
11	1.4	1.5	1.7	1.7	2.4	3.7	3.0	3.6	1.85	2.15	1.65	1.5
12	1.4	1.5	1.7	1.7	2.5	3.7	2.9	3.2	1.85	2.1	1.6	1.45
13	1.4	1.5	1.7	1.7	2.6	3.8	2.9	3.0	1.85	2.1	1.6	1.45
14	1.4	1.5	1.7	1.7	2.8	3.9	2.9	2.9	1.85	2.05	1.6	1.45
15	1.4	1.5	1.7	1.8	2.8	4.0	2.8	2.9	1.8	2.0	1.6	1.45
16	1.4	1.5	1.7	1.8	2.8	4.1	2.8	2.8	1.8	2.0	1.55	1.5
17	1.4	1.5	1.6	1.8	2.9	4.1	2.8	2.7	1.8	2.0	1.55	1.5
18	1.4	1.5	1.6	1.8	2.9	4.1	2.8	2.7	1.8	1.95	1.5	1.45
19	1.4	1.5	1.6	1.8	2.8	4.1	2.8	2.6	1.8	1.95	1.5	1.4
20	1.4	1.5	1.6	1.7	2.8	4.0	3.0	2.6	1.8	1.95	1.5	1.4
21	1.4	1.5	1.5	1.6	2.9	4.0	3.2	2.6	1.85	1.9	1.5	1.4
22	1.4	1.5	1.5	1.8	2.9	3.9	3.2	2.7	1.85	1.9	1.5	1.4
23	1.4	1.5	1.6	2.1	2.9	3.9	3.1	2.7	1.9	1.95	1.5	1.4
24	1.4	1.5	1.6	2.4	3.0	3.7	3.2	2.6	1.9	1.95	1.5	1.4
25	1.4	1.5	1.9	2.3	3.0	3.7	3.5	2.5	2.0	2.0	1.5	1.4
26	1.4	1.5	1.8	2.3	3.2	3.7	3.5	2.4	1.9	2.0	1.5	1.35
27	1.4	1.5	1.7	2.2	3.1	3.5	3.5	2.5	1.85	2.0	1.5	1.35
28	1.4	1.6	1.8	2.1	3.1	3.4	3.5	2.5	1.9	1.9	1.5	1.4
29	1.4	1.6	1.7	2.0	3.1	3.4	3.5	2.3	2.0	1.85	1.5	1.4
30	1.4	.....	1.6	2.0	3.1	3.4	3.6	2.1	2.1	1.95	1.5	1.4
31	1.4	.....	1.6	.....	3.2	.....	3.7	2.1	.....	1.9	.....	1.4

Rating table for Bishop Creek near Bishop, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.30	22	2.10	80	2.90	183	3.60	327
1.40	27	2.20	90	3.00	200	3.70	355
1.50	32	2.30	101	3.10	218	3.80	386
1.60	39	2.40	113	3.20	237	3.90	417
1.70	46	2.50	125	3.30	257	4.00	448
1.80	54	2.60	138	3.40	279	4.10	479
1.90	62	2.70	152	3.50	302	4.20	510
2.00	71	2.80	167				

Estimated monthly discharge of Bishop Creek near Bishop, Cal., for 1903 and 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
1903.				
August 11–31	125	71	95.8	3,990
September	71	39	50.5	3,005
October	46	30	38.6	2,373
November	30	27	28.6	1,702
December	30	22	27.3	1,679
The period	.....	.....	.....	12,749
1904.				
January	27	27	27	1,660
February	39	27	31.8	1,829
March	62	32	42	2,582
April	113	32	56.6	3,366
May	237	71	149.3	9,180
June	479	237	372.8	22,183
July	355	167	233	14,327
August	386	80	212	13,035
September	80	54	64	3,808
October	113	58	78	4,796
November	62	32	41	2,440
December	32	24	29	1,783
The year	479	24	111	80,989

RAWSON CANAL NEAR BISHOP, CAL.

This station was established August 7, 1903, by R. S. Hawley. It is located at the county bridge 2½ miles east of Bishop, Cal. The gage is a vertical rod fastened to the bridge from which discharge measurements are made. The gage is read once each day by Paul McDonald. The initial point for soundings is marked on the bridge near the right bank of the canal. The channel is straight for 100 feet above and below the station and the current is swift. The right bank is high and the left bank is low. Neither bank is liable to overflow. The bed of the stream is composed of gravel and is permanent.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Rawson canal near Bishop, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
July 31	R. S. Hawley	.....	17.0
August 7	do	1.70	17.6
August 11	do	1.62	13.6
August 17	do	1.85	20.3
August 27	do	1.73	17.1
September 7	do	1.77	18.2
September 14	do	1.81	17.1
October 24	do	1.73	15.4
November 27	do	1.60	13.0
1904.			
February 4	R. S. Hawley	1.66	16.6
February 11	do	2.01	35
April 2	do	1.50	9.4
April 14	do	1.87	27
June 8	do	1.96	24
July 12	J. C. Clausen and L. M. Barnes	1.75	18.8
August 6	L. M. Barnes	1.80	21
August 20	do	2.23	31

Mean daily gage height, in feet, of Rawson canal near Bishop, Cal., for 1903 and 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
1	.....	.....	.....	.....	.....	.....	.....	.....	1.74	2.00	1.59	1.65
2	.....	.....	.....	.....	.....	.....	.....	.....	1.72	2.00	1.63	1.64
3	.....	.....	.....	.....	.....	.....	.....	.....	1.76	1.96	1.60	1.70
4	.....	.....	.....	.....	.....	.....	.....	.....	1.73	1.93	1.60	1.71
5	.....	.....	.....	.....	.....	.....	.....	.....	1.74	1.93	1.60	1.70
6	.....	.....	.....	.....	.....	.....	.....	.....	1.80	1.94	1.63	1.35
7	.....	.....	.....	.....	.....	.....	.....	.....	1.79	1.91	1.63	1.35
8	.....	.....	.....	.....	.....	.....	.....	.....	1.80	1.92	1.63	1.43
9	.....	.....	.....	.....	.....	.....	.....	.....	1.76	2.01	1.65	1.35
10	.....	.....	.....	.....	.....	.....	.....	.....	1.78	2.01	1.66	1.30
11	.....	.....	.....	.....	.....	.....	.....	1.60	1.77	1.80	1.65	1.30
12	.....	.....	.....	.....	.....	.....	.....	1.80	1.85	1.75	1.61	1.30
13	.....	.....	.....	.....	.....	.....	.....	1.90	1.90	1.75	1.63	1.39
14	.....	.....	.....	.....	.....	.....	.....	1.90	1.72	1.70	1.60	1.30
15	.....	.....	.....	.....	.....	.....	.....	1.85	1.80	1.70	1.70	1.42
16	.....	.....	.....	.....	.....	.....	.....	1.80	1.85	1.70	1.80	1.44
17	.....	.....	.....	.....	.....	.....	.....	1.85	1.93	1.65	1.92	1.45
18	.....	.....	.....	.....	.....	.....	.....	1.82	1.94	1.65	1.92	1.10
19	.....	.....	.....	.....	.....	.....	.....	1.81	1.99	1.80	1.93	1.10
20	.....	.....	.....	.....	.....	.....	.....	1.86	2.10	1.75	1.90	1.10
21	.....	.....	.....	.....	.....	.....	.....	1.84	2.10	1.70	1.90	1.10
22	.....	.....	.....	.....	.....	.....	.....	1.82	1.94	1.65	1.90	1.20
23	.....	.....	.....	.....	.....	.....	.....	1.81	1.92	1.70	1.91	1.10
24	.....	.....	.....	.....	.....	.....	.....	1.80	1.93	1.73	1.90	1.10
25	.....	.....	.....	.....	.....	.....	.....	1.75	1.94	1.75	1.90	1.10
26	.....	.....	.....	.....	.....	.....	.....	1.74	2.04	1.76	1.90	1.30
27	.....	.....	.....	.....	.....	.....	.....	1.74	2.00	1.77	1.53	1.30
28	.....	.....	.....	.....	.....	.....	.....	1.76	2.00	1.63	1.50	1.30
29	.....	.....	.....	.....	.....	.....	.....	1.73	2.01	1.59	1.51	1.30
30	.....	.....	.....	.....	.....	.....	.....	1.74	2.00	1.59	1.65	1.30
31	.....	.....	.....	.....	.....	.....	.....	1.72	.....	1.59	.....	1.30
1904												
1	[a] 0.00	0.00	1.7	1.5	1.9	2.1	1.9	1.8	2.25	.00	.00	.00
2	.00	.00	1.7	1.5	1.9	1.9	1.9	1.8	2.2	.00	.00	.00
3	.00	1.65	1.7	1.5	1.85	1.9	1.8	1.8	2.1	.00	.00	.00
4	.00	1.65	1.7	1.5	1.85	1.9	1.8	1.8	2.1	.00	.00	.00
5	.00	1.8	1.7	1.5	1.85	[a] .00	1.8	1.8	2.0	.00	.00	.00
6	.00	1.9	1.7	1.5	1.9	.00	1.8	1.8	2.1	.00	.00	.00
7	.00	1.9	1.7	1.5	1.9	.00	1.8	1.8	2.1	.00	.00	.00
8	.00	1.9	1.7	1.5	1.9	2.0	1.8	1.8	2.1	.00	.00	.00
9	.00	1.9	1.7	1.8	1.9	1.9	1.8	1.75	2.0	.00	.00	.00
10	.00	1.9	1.67	1.8	1.85	1.9	1.8	1.75	2.0	.00	.00	.00
11	.00	2.0	1.75	1.9	1.9	1.9	1.75	1.75	2.0	.00	.00	.00
12	.00	2.0	1.75	2.0	1.9	2.0	1.7	1.7	2.0	.00	.00	.00
13	.00	2.1	1.7	2.0	1.9	2.0	1.7	1.7	2.1	.00	.00	.00
14	.00	2.4	1.73	1.9	1.9	2.0	1.65	1.7	2.2	.00	.00	.00
15	.00	2.4	1.7	1.9	2.0	2.0	1.65	1.7	2.1	.00	.00	.00
16	.00	1.85	1.7	1.9	2.0	2.0	1.8	1.75	2.1	.00	.00	.00
17	.00	1.8	1.7	1.65	2.0	2.0	1.8	1.7	2.1	.00	.00	.00
18	.00	1.75	1.7	1.65	2.0	2.0	1.9	1.65	2.2	.00	.00	.00
19	.00	1.75	1.7	1.65	2.0	2.0	1.9	1.9	2.2	.00	.00	.00
20	.00	1.7	1.75	1.85	1.95	2.0	1.9	1.9	2.3	.00	.00	.00
21	.00	1.7	1.7	1.9	2.0	2.0	1.95	2.2	2.3	.00	.00	.00
22	.00	1.8	1.65	1.9	1.9	2.0	1.95	2.2	2.3	.00	.00	.00

[a] Dry, January 1 to February 2; June 5, 6, 7; July 26, 27; September 28 to December 31.

Mean daily gage height, in feet, of Rawson canal near Bishop, Cal., etc.—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1904.												
23	0.00	1.75	1.65	1.9	1.9	2.0	2.2	2.25	2.3	.00	0.00	0.00
24	.00	1.75	1.7	1.9	1.9	1.9	1.4	2.25	2.3	.00	.00	.00
25	.00	1.7	1.7	1.9	1.9	1.9	1.4	2.3	2.3	.00	.00	.00
26	.00	1.75	1.55	1.85	1.9	1.9	*a*.0	2.3	2.3	.00	.00	.00
27	.00	1.7	1.5	1.9	1.9	1.9	.00	2.3	2.4	.00	.00	.00
28	.00	1.7	1.5	1.9	1.9	1.9	1.95	2.3	*a*.00	.00	.00	.00
29	.00	1.7	1.55	1.9	1.9	1.9	1.95	2.3	.00	.00	.00	.00
30	.00	.....	1.55	1.9	1.9	1.9	1.85	2.25	.00	.00	.00	.00
31	.00	.....	1.5	.....	2.0	.....	1.8	2.3	.....	.00	.....	.00

Rating table for Rawson canal near Bishop, Cal., from January 1 to May 31, 1904.

Gage neight.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.30	1	1.60	14	1.90	29	2.20	48
1.40	5	1.70	18	2.00	35	2.30	55
1.50	9	1.80	23	2.10	41		

Rating table for Rawson canal near Bishop, Cal., from June 1 to September 30, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.40	5	1.70	16	2.00	26	2.30	37
1.50	9	1.80	19	2.10	30	2.40	40
1.60	12	1.90	23	2.20	33		

Estimated monthly discharge of Rawson canal near Bishop, Cal., for 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
February	59	0	26.2	1,403
March	20	9	16.6	1,018
April	35	9	22.1	1,319
May	35	26	30	1,845
June	27	0	23.1	1,374
July	25	0	20	1,230
August	37	16	26	1,599
September	40	0	29	1,726
The period	.....	.....	.....	11,514

A. O. COLLINS'S CANAL NEAR BISHOP, CAL.

This station was established August 7, 1903, by R. S. Hawley. It is located at the county bridge, 3 miles east of Bishop, Cal. The gage is a vertical rod fastened to the right bank, just above the bridge from which discharge measurements are made. It is read once each day by Paul McDonald. The initial point for soundings is marked on the foot log near the right bank of the canal. The channel is straight for 100 feet above and for 50 feet below the station. The current is sluggish. Both banks are high and are not liable to overflow. The bed of the stream is sandy and shifting.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of A. O. Collins's canal near Bishop, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
July 31	R. S. Hawley		12.1
August 7	do	2.2	8.3
August 11	do	2.0	3.9
August 17	do	1.82	2.6
August 27	do	2.1	8.8
September 7	do	2.1	7.9
September 14	do	2.1	7.6
October 23	do	1.65	1.2
1904.			
February 4	R. S. Hawley	1.80	5.2
April 14	do	1.95	7.8
June 8	do	3.67	40
June 12	J. C. Clausen and L. M. Barnes	3.80	28
August 6	L. M. Barnes	3.45	19.8
August 20	do	3.35	14.3
September 6	R. S. Hawley	3.29	17.1
October 10	R. S. Hawley and R. J. Taylor	2.73	4.4
October 14	W. B. Clapp, R. S. Hawley, and R. J. Taylor	2.58	2.8
November 1	R. J. Taylor	2.50	2.1
December 1	do	2.48	1.8

Mean daily gage height, in feet, of A. O. Collins's canal near Bishop, Cal., for 1903 and 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
1	.....	.....	.....	.....	.....	.....	.....	.....	2.06	2.40	1.99	1.60
2	.....	.....	.....	.....	.....	.....	.....	.....	2.10	2.00	1.99	1.52
3	.....	.....	.....	.....	.....	.....	.....	.....	2.10	1.65	2.00	1.60
4	.....	.....	.....	.....	.....	.....	.....	.....	2.10	1.65	2.00	1.65
5	.....	.....	.....	.....	.....	.....	.....	.....	2.01	2.10	2.00	1.60
6	.....	.....	.....	.....	.....	.....	.....	.....	2.01	2.30	2.40	1.90
7	.....	.....	.....	.....	.....	.....	.....	.....	2.01	2.40	2.00	1.85
8	.....	.....	.....	.....	.....	.....	.....	.....	2.01	2.40	2.10	1.90
9	.....	.....	.....	.....	.....	.....	.....	.....	2.01	2.00	2.00	1.90
10	.....	.....	.....	.....	.....	.....	.....	.....	2.02	1.65	2.20	1.82
11	.....	.....	.....	.....	.....	.....	.....	2.00	2.02	1.65	2.10	1.80
12	.....	.....	.....	.....	.....	.....	.....	1.80	2.03	1.65	2.40	1.80
13	.....	.....	.....	.....	.....	.....	.....	1.80	2.07	1.65	2.30	1.60
14	.....	.....	.....	.....	.....	.....	.....	1.80	2.02	1.65	1.50	1.72
15	.....	.....	.....	.....	.....	.....	.....	1.80	2.03	1.65	1.50	1.72
16	.....	.....	.....	.....	.....	.....	.....	1.70	2.04	1.65	1.66	1.90
17	.....	.....	.....	.....	.....	.....	.....	1.82	2.14	1.65	1.80	1.70
18	.....	.....	.....	.....	.....	.....	.....	1.74	2.10	1.65	1.81	2.10
19	.....	.....	.....	.....	.....	.....	.....	2.20	2.07	1.65	1.82	1.70
20	.....	.....	.....	.....	.....	.....	.....	2.12	2.09	1.65	1.80	1.72
21	.....	.....	.....	.....	.....	.....	.....	2.10	2.07	1.65	1.80	1.70
22	.....	.....	.....	.....	.....	.....	.....	2.04	2.20	1.65	1.83	1.73
23	.....	.....	.....	.....	.....	.....	.....	2.10	2.30	1.65	1.60	1.70
24	.....	.....	.....	.....	.....	.....	.....	2.10	2.40	1.65	1.62	1.72
25	.....	.....	.....	.....	.....	.....	.....	2.03	2.50	2.40	1.53	1.70
26	.....	.....	.....	.....	.....	.....	.....	2.03	2.40	2.50	1.51	1.70
27	.....	.....	.....	.....	.....	.....	.....	2.10	2.70	2.40	1.50	1.70
28	.....	.....	.....	.....	.....	.....	.....	2.01	2.40	2.40	1.65	1.70
29	.....	.....	.....	.....	.....	.....	.....	2.10	2.04	2.40	1.51	1.70
30	.....	.....	.....	.....	.....	.....	.....	2.00	2.40	2.06	1.65	1.70
31	.....	.....	.....	.....	.....	.....	.....	2.04	.....	2.09	.....	1.70
1904.												
1	[a]0.00	0.00	1.80	1.70	1.90	2.20	3.90	3.50	3.25	2.90	2.50	2.50
2	.00	.00	1.80	1.65	1.90	3.00	4.00	3.55	3.20	2.90	2.50	.....
3	.00	.00	1.80	1.65	1.85	3.20	4.00	3.55	3.10	2.90	.....	.....
4	.00	.00	1.80	2.00	1.80	3.40	4.00	3.50	3.10	3.00	.....	.....
5	.00	.00	1.85	2.00	1.80	3.50	4.00	3.50	3.30	3.00	.....	.....
6	.00	.00	1.80	2.00	1.80	3.50	4.00	3.45	3.30	3.10	2.50	.....
7	.00	.00	1.78	2.00	1.80	3.50	3.90	3.45	3.30	3.20	2.50	.....
8	.00	.00	2.00	2.00	1.80	3.60	3.90	3.50	3.30	3.00	.....	.....
9	.00	.00	2.00	2.00	1.80	3.60	3.90	3.50	3.30	2.80	.....	.....
10	.00	.00	2.10	2.00	1.75	3.70	3.90	3.45	3.25	2.80	2.50	.....
11	.00	2.00	2.00	1.80	1.75	3.70	3.90	3.40	3.20	.....	2.50	.....
12	.00	2.60	2.10	2.00	1.80	3.80	3.85	3.40	3.20	2.80	2.50	.....
13	.00	2.60	2.00	1.90	1.95	3.80	3.80	3.35	3.30	2.90	.....	.....
14	.00	2.50	2.00	1.90	1.95	3.90	3.80	3.45	3.30	2.90	2.50	.....
15	.00	2.50	2.00	1.90	3.10	4.00	3.75	3.50	3.20	2.90	2.50	.....
16	.00	2.60	2.00	1.90	3.10	4.00	3.70	3.45	3.20	.....	2.50	.....
17	.00	2.60	2.10	2.10	3.10	4.00	3.70	3.40	3.20	2.80	2.50	.....
18	.00	2.70	2.00	2.00	3.10	4.00	3.60	3.40	3.30	2.80	2.50	.....
19	.00	2.50	1.70	2.00	3.20	4.00	3.60	3.35	3.30	[a].00	2.50	.....
20	.00	2.60	1.70	2.20	3.20	4.00	3.60	3.30	3.30	.00	.....	.....

[a] Dry: January 1 to February 10; October 19–25.

Mean daily gage height, in feet, of A. O. Collins's canal near Bishop, Cal., etc.—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1904.												
21	0.00	2.25	1.70	2.40	3.20	4.00	3.60	3.30	3.30	0.00	.....	.....
22	.00	2.20	1.70	2.40	3.10	4.00	3.60	3.35	3.30	.00	.....	.....
23	.00	2.10	1.70	2.40	3.20	4.10	3.70	3.30	3.30	.00	.....	.....
24	.00	1.90	1.70	2.40	3.20	4.10	3.65	3.30	3.30	.00	.....	.....
25	.00	1.80	1.70	2.40	1.80	4.10	3.70	3.30	4.00	.00	.....	2.40
26	.00	1.85	1.70	2.10	1.80	4.00	3.70	3.30	3.90	2.50	.....	.....
27	.00	1.80	1.90	2.40	1.80	4.00	3.70	3.30	3.90	2.50	2.50	.....
28	.00	1.80	1.90	2.00	1.80	.....	3.65	3.30	3.00	.....	.....	2.30
29	.00	1.80	1.90	2.10	1.70	4.00	3.50	3.30	3.10	2.50	2.50	.....
30	.00	.....	1.90	2.00	1.70	4.00	3.50	3.30	.....	2.50	2.50	.....
31	.00	.....	1.70	.....	1.60	.....	3.50	3.30	.....	2.50	.....	2.20

Rating table for A. O. Collins's canal near Bishop, Cal., from January 1 to June 30, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.50	1	2.20	12	2.90	26	3.50	38
1.60	2	2.30	14	3.00	28	3.60	40
1.70	3	2.40	16	3.10	30	3.70	42
1.80	4	2.50	18	3.20	32	3.80	44
1.90	6	2.60	20	3.30	34	3.90	46
2.00	8	2.70	22	3.40	36	4.00	48
2.10	10	2.80	24				

Rating table for A. O. Collins's canal near Bishop, Cal., from July 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
2.40	1	2.90	8	3.30	16	3.70	24
2.50	2	3.00	10	3.40	18	3.80	27
2.60	3	3.10	12	3.50	20	3.90	30
2.70	4	3.20	14	3.60	22	4.00	33
2.80	6						

Estimated monthly discharge of A. O. Collins's canal near Bishop, Cal., for 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
February	22	0	12.9	486
March	10	3	5.6	344
April	16	2	9	536
May	32	2	12.8	787
June	50	12	43.1	2,565
July	33	20	26	1,599
August	21	16	18	1,107
September	33	10	16	952
October	14	0	5	307
November	2	2	2	119
December	2	0	a 2	123
The period				8,925

a Assumed 2 as mean for December.

DELL CANAL NEAR BISHOP, CAL.

This station was established August 24, 1903, by R. S. Hawley. It is located at a flume 3 miles from the head-gate at a point where the canal crosses a slough in Sanders's field. The gage is a vertical rod fastened to the flume. Discharge measurements are made from a bridge across the flume. The observer is F. Sanders. The initial points for soundings is the edge of the flume at the right side. The channel is straight for 150 feet above and for 200 feet below the station. The current is sluggish at all times.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Dell canal near Bishop, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
August 11	R. S. Hawley		24.2
August 20	do		11.0
August 24	do		10.0
August 24	do	0.85	8.0
September 4	do	.78	7.0
September 22	do	1.47	19.6
October 7	do	1.52	19.0

Discharge measurements of Dell canal near Bishop, Cal., in 1903 and 1904—Continued.

Date.	Hyrographer.	Gage height.	Discharge.
1904.		*Feet.*	*Second-feet.*
March 16	R. S. Hawley	1.40	22.0
April 15	do	1.31	17.9
May 28	do	1.60	19.0
June 20	do	1.80	23.0
July 14	J. C. Clausen and L. M. Barnes	1.80	16.9
August 11	L. M. Barnes	1.90	22.0
September 8	R. S. Hawley	1.39	14.5
November 17	R. J. Taylor	1.05	12.0
December 12	do	1.10	11.0

Mean daily gage height, in feet, of Dell canal near Bishop, Cal., for 1903 and 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1903.											
1	.....	.....	.....	.....	.....	.....	.....	.....	0.79	0.80	0.90
2	.....	.....	.....	.....	.....	.....	.....	.....	.80	.80	.90
3	.....	.....	.....	.....	.....	.....	.....	.....	.80	.81	.90
4	.....	.....	.....	.....	.....	.....	.....	.....	.79	.....	.91
5	.....	.....	.....	.....	.....	.....	.....	.....	.79	.80	.91
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.80	.92
7	.....	.....	.....	.....	.....	.....	.....	.....	.78	.81	.92
8	.....	.....	.....	.....	.....	.....	.....	.....	.78	.81	.....
9	.....	.....	.....	.....	.....	.....	.....	.....	.79	.80	.95
10	.....	.....	.....	.....	.....	.....	.....	.....	.80	.80	.94
11	.....	.....	.....	.....	.....	.....	.....	.....	.80	.....	.95
12	.....	.....	.....	.....	.....	.....	.....	.....	.80	.82	.95
13	.....	.....	.....	.....	.....	.....	.....	.....	.80	.82	1.01
14	.....	.....	.....	.....	.....	.....	.....	.....	.79	.83	1.02
15	.....	.....	.....	.....	.....	.....	.....	.....	.79	.83	.....
16	.....	.....	.....	.....	.....	.....	.....	.....	.80	.83	1.06
17	.....	.....	.....	.....	.....	.....	.....	.....	.80	.84	1.08
18	.....	.....	.....	.....	.....	.....	.....	.....	.78	.....	1.11
19	.....	.....	.....	.....	.....	.....	.....	.....	.78	.84	1.12
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.85	1.14
21	.....	.....	.....	.....	.....	.....	.....	.....	.79	.86	1.13
22	.....	.....	.....	.....	.....	.....	.....	.....	.80	.86	1.12
23	.....	.....	.....	.....	.....	.....	.....	0.85	.81	.86	1.11
24	.....	.....	.....	.....	.....	.....	.....	.85	.81	.87	1.12
25	.....	.....	.....	.....	.....	.....	.....	.86	.80	.88	1.15
26	.....	.....	.....	.....	.....	.....	.....	.86	.81	.88	1.16
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.89	1.12
28	.....	.....	.....	.....	.....	.....	.....	.85	.78	.81	(a)
29	.....	.....	.....	.....	.....	.....	.....	.85	.78	.89	.....
30	.....	.....	.....	.....	.....	.....	.....	.....	.79	.89	.....
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.89	.....

a No record obtained from November 27, to December 31, 1903, when the water was turned out.

Mean daily gage height, in feet, of Dell canal near Bishop, Cal., etc.—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1904.											
1	[a]0.00	0.00	1.40	0.00	1.30	1.60	1.80	1.80	1.90	[b]	.....
2	.00	.00	.....	.00	.....	.....	.....	1.80	.....	.....	.....
3	.00	.00	.....	.00	1.30	1.60	1.80	.....	1.90	.....	.....
4	.00	.00	.....	.00	.....	1.60	.....	1.80	.....	.....	.....
5	.00	.00	.....	.....	1.40	.....	1.80	.....	1.90	.....	.....
6	.00	.00	.....	1.30	.....	1.60	.....	1.80	.....	.....	.....
7	.00	.00	.....	.....	1.30	.....	1.80	.....	1.90	.....	.....
8	.00	.00	.....	1.30	.....	1.60	.....	1.80	.....	.....	.....
9	.00	.00	.....	.....	1.40	.....	1.70	.....	1.90	.....	.....
10	.00	.00	.....	1.40	.....	1.60	.....	1.90	.....	.....	.....
11	.00	.00	.....	1.40	1.50	.....	1.70	.....	.....	.....	.....
12	.00	.00	.....	.....	.....	1.60	.....	1.90	1.90	.....	.....
13	.00	.00	.....	1.30	1.60	.....	1.80	.....	.....	.....	.....
14	.00	.00	.....	.....	.....	1.70	.....	1.90	1.90	.....	.....
15	.00	.00	.....	1.30	1.60	.....	.....	.....	.....	.....	.....
16	.00	.00	1.40	.....	.....	1.80	1.70	1.90	1.90	.....	.....
17	.00	.00	.....	1.30	1.60	.....	.....	.....	.....	.....	.....
18	.00	.00	.....	.....	.....	1.80	1.70	1.90	1.90	.....	.....
19	.00	.00	.....	1.40	1.60	.....	.....	.....	.....	.....	.....
20	.00	.00	.....	.....	.....	1.80	.....	1.90	1.90	.....	.....
21	.00	.00	.....	.....	1.60	.....	1.80	1.90	.....	.....	.....
22	.00	.00	1.40	1.40	.....	1.80	.....	.....	1.90	.....	.....
23	.00	.00	[a].00	.....	1.70	.....	1.80	1.90	.....	.....	.....
24	.00	.00	.00	1.40	.....	1.80	.....	.....	1.90	.....	.....
25	.00	.00	.00	.....	1.70	.....	1.80	1.90	.....	.....	.....
26	.00	.00	.00	1.30	.....	1.80	.....	.....	1.90	.....	.....
27	.00	.00	.00	.....	1.70	.....	1.80	1.90	.....	.....	.....
28	.00	.00	.00	1.30	1.60	1.80	.....	1.90	1.90	.....	.....
29	.00	.00	.00	.....	.....	.....	.....	.....	.....	.....	.....
30	.00	.....	.00	1.30	1.60	1.80	1.80	1.90	1.90	.....	.....
31	.00	.....	.00	.....	.....	.....	.....	.....	.....	.....	.....

[a] Dry: January 1 to February 29; March 23 to April 5.
[b] No record; October 1 to December 31.

Estimated monthly discharge of Dell canal near Bishop, Cal., for 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
March	21	0	15	922
April	21	0	16	952
May	21	9	15.7	970
June	24	18	21.2	1,304
July	18	15	16.1	984
August	22	18	21	1,291
September	22	22	22	1,309
The period	.....	.....	.....	7,732

NOTE.—Discharge interpolated for missing days. The discharge has been obtained indirectly from measurements.

BIG PINE AND OWENS RIVER CANAL NEAR BISHOP, CAL.

This station was established by J. C. Clausen and R. S. Hawley August 4, 1903. It is located at a footbridge near the house of William Oliver, the observer. It is 7½ miles south and 3 miles east of Bishop, Cal. The gage is a vertical rod securely nailed to the footbridge. Discharge measurements are made from the footbridge. The initial point for soundings is marked on the footbridge near the right bank of the canal. The channel is straight for 600 feet above and for 300 feet below the station. The current is sluggish. Both banks are high and are not liable to overflow. The bed of the stream is sandy and somewhat shifting.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Big Pine and Owens River canal near Bishop, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
August 4	R. S. Hawley	1.60	19.0
August 11	do	1.55	16.3
August 20	do	1.50	17.3
September 14	do	.90	1.3
September 22	do	1.15	4.3
October 27	do	2.29	46.4
1904.			
March 16	R. S. Hawley	2.42	59
May 28	do	2.90	58
June 20	do	3.31	91
July 14	J. C. Clausen and L. M. Barnes	2.40	32
August 11	L. M. Barnes	2.60	29
September 8	R. S. Hawley	1.51	10.6

Mean daily gage height, in feet, of Big Pine and Owens River canal near Bishop, Cal., for 1903 and 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
1									0.90	1.20	2.53	2.35
2									.90	1.25	2.58	2.40
3									.90	1.35	2.53	2.40
4									.90	1.35	2.53	2.40
5								1.55	.90	1.50	2.53	2.30
6								1.50	.90	1.80	2.53	2.30
7								1.63	.90	1.90	2.53	2.30
8								1.62	.90	1.95	2.57	2.30
9								1.80	.90	1.95	2.57	2.35

Mean daily gage height, in feet, of Big Pine and Owens River canal, etc.—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec
1903.												
10								1.70	0.97	2.03	2.57	2.35
11								1.53	.98	2.22	2.62	2.35
12								1.55	1.00	2.25	2.57	2.35
13								1.40	1.00	2.25	2.57	1.50
14								1.40	1.05	2.27	2.60	1.50
15								1.40	1.05	2.40	2.60	1.50
16								1.60	1.05	2.42	2.55	1.50
17								1.60	1.05	2.45	2.55	1.50
18								1.60	1.10	2.42	2.50	1.52
19								1.60	1.15	2.43	2.50	1.58
20								1.60	1.15	2.45	2.50	1.47
21								1.40	1.12	2.47	2.53	1.48
22								1.40	1.10	2.46	2.53	1.53
23								1.40	1.10	2.30	2.53	1.53
24								1.40	1.10	2.30	2.43	1.47
25								1.35	1.10	2.33	2.41	1.47
26								1.35	1.10	2.32	2.35	1.50
27								1.75	1.12	2.28	2.35	1.50
28								1.75	1.15	2.27	2.35	1.50
29								1.75	1.18	2.25	2.38	1.50
30								1.30	1.22	2.45	[illegible]	1.50
31								.90		2.45		1.50
1904.												
1	[a]0.00	1.95	2.5	1.6	1.7	2.6	2.7	2.6	2.12	2.7	1.45	1.4
2	.00	1.95	2.5	1.45	1.6	2.6	2.7	2.6	2.12	2.65	1.4	1.4
3	1.45	1.96	2.55	1.4	1.6	2.6	2.7	2.6	2.06	2.6	1.4	1.3
4	1.45	1.87	2.55	1.45	1.6	2.9	2.6	2.65	1.8	2.65	1.4	1.4
5	1.45	2.1	2.45	1.0	1.55	3.1	2.6	2.63	1.8	2.65	1.4	1.4
6	1.43	2.0	2.35	1.0	1.5	3.1	2.6	2.55	1.6	1.65	1.4	1.4
7	1.43	2.05	2.35	1.0	1.4	3.1	2.6	2.55	1.55	1.7	1.35	1.3
8	1.43	1.92	2.35	[a].00	1.4	3.2	2.6	2.55	1.5	1.6	1.35	1.25
9	1.45	1.83	2.4	.00	1.4	3.1	2.6	2.6	1.5	1.6	1.35	1.2
10	1.45	1.72	2.4	.00	1.4	3.0	2.6	2.65	1.5	1.55	1.35	1.2
11	1.43	1.73	2.75	.00	1.4	3.0	2.5	2.6	1.5	1.55	1.35	1.25
12	1.43	1.86	2.7	.00	1.4	3.0	2.5	2.42	1.45	2.0	1.35	1.2
13	2.0	1.95	2.3	.00	1.45	3.1	2.4	2.42	1.45	1.65	1.35	1.2
14	1.82	2.03	2.3	.00	1.45	3.3	2.4	2.33	1.5	1.55	1.35	1.2
15	1.83	2.03	2.35	1.65	1.55	3.3	2.3	2.3	1.4	1.55	1.35	1.2
16	1.86	2.5	2.5	1.65	1.95	3.4	2.2	2.3	1.45	1.5	1.35	1.2
17	1.87	2.6	2.4	1.6	2.25	3.5	1.6	2.3	1.45	1.5	1.35	1.2
18	1.86	2.03	2.4	1.6	1.7	3.5	1.4	2.3	1.55	1.5	1.35	1.2
19	1.87	1.8	2.4	1.8	2.2	3.4	2.2	2.2	1.6	1.45	1.35	1.2
20	1.8	1.72	2.4	1.8	2.35	3.4	2.2	2.2	1.6	1.45	1.35	1.2
21	1.95	2.33	2.5	1.9	2.2	3.3	2.1	2.2	1.7	1.45	1.4	1.2
22	2.0	2.3	2.3	1.85	2.2	3.3	2.2	2.1	1.7	1.45	1.4	1.2
23	2.0	2.5	2.2	2.05	2.23	3.2	2.3	2.16	1.75	1.45	1.35	1.25
24	2.0	2.7	2.2	1.95	2.5	3.2	2.4	2.16	1.85	1.5	1.35	1.25
25	2.0	2.65	1.8	1.9	2.85	3.1	2.5	2.16	2.75	1.5	1.35	1.25
26	1.9	2.6	1.6	1.9	3.0	3.1	2.5	2.1	3.25	1.5	1.35	1.25
27	1.9	2.66	1.7	1.8	3.0	3.0	2.5	2.16	2.8	1.5	1.35	1.2
28	1.9	2.67	2.0	1.8	2.9	2.9	2.5	2.15	2.7	1.5	1.4	1.2
29	1.9	2.5	2.1	1.8	2.8	2.8	2.5	2.06	2.55	1.5	1.4	1.2
30	1.9	.....	1.9	1.7	2.75	2.8	2.4	2.0	2.75	1.5	1.4	1.2
31	1.9	.....	1.6	.....	2.75	.....	2.4	2.0	.....	1.45	.....	1.3

[a] Dry: January 1, 2; April 8–14.

Rating table for Big Pine and Owens River canal near Bishop, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.20	5	1.80	16	2.40	30	3.00	68
1.30	6	1.90	18	2.50	33	3.10	76
1.40	8	2.00	20	2.60	38	3.20	85
1.50	10	2.10	22	2.70	43	3.30	94
1.60	12	2.20	24	2.80	50	3.40	103
1.70	14	2.30	27	2.90	59		

Estimated monthly discharge of Big Pine and Owens River canal near Bishop, Cal., for 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	20	0	14	861
February	43	14	24.7	1,421
March	46	12	28	1,722
April	21	3	10	595
May	64	8	23.8	1,466
June	114	38	75.2	4,474
July	43	8	31.2	1,918
August	41	20	29	1,783
September	90	8	21	1,250
October[a]	43	9	16	984
November	9	7	7	416
December	8	5	5.8	357
The year	114	0	23.8	17,247

[a] Head gate shut down October 6. Water flowing after that date is leakage.

SANGER CANAL AT ALVORD, CAL.

This station was established August 4, 1903, by J. C. Clausen and R. S. Hawley. It is located at the county road bridge, one-fourth mile east of the Southern Pacific Railway station at Alvord, Cal. The gage is a vertical rod, fastened to the bridge from which discharge measurements are made. It is read once each day by John Hale. The initial point for soundings is marked on the bridge near the left bank of the canal. The channel is straight for 300 feet above and for 100 feet below the station. The current is sluggish. Both banks are low and liable to overflow. The bed of the stream is shifting.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Sanger canal at Alvord, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
August 4	R. S. Hawley	2.00	3.1
August 13	do	2.60	10.0
September 8	do	2.45	11.3
September 22	do	2.26	10.1
October 27	do	2.70	14.5
December 4	do	2.30	13.4
1904.			
January 27	R. S. Hawley	1.90	6.6
April 6	do	2.00	9.7
July 14	J. C. Clausen and L. M. Barnes	3.05	10.3
August 11	L. M. Barnes	3.20	15.4
September 8	R. S. Hawley	2.80	7.3
October 9	R. S. Hawley and R. J. Taylor	2.75	14.4
November 17	R. J. Taylor	2.52	15.3
December 9	do	2.30	11.0

Mean daily gage height, in feet, of Sanger canal at Alvord, Cal., for 1903 and 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct	Nov.	Dec.
1903.												
1										2.50	2.60	2.40
2											2.60	
3										2.50	2.60	2.40
4										2.50	2.55	
5											2.50	2.40
6										2.50	2.50	2.40
7											2.50	
8										2.50	2.40	2.30
9											2.40	
10										2.50	4.40	2.30
11										2.20	2.40	
12											2.40	2.30
13										2.50	2.30	2.30
14											2.30	
15										2.50	2.30	2.30
16												
17										2.50	2.30	2.30
18										2.60		
19										2.60	2.40	2.30
20										2.60		2.30
21											2.50	
22										2.60	2.50	2.30

Mean daily gage height, in feet, of Sanger canal at Alvord, Cal., etc.—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.60	2.50	2.30
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.60	.....	.....
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.50	2.30
27	.....	.....	.....	.....	.....	.....	.....	.....	2.60	2.50	.....	2.30
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.50	2.30
29	.....	.....	.....	.....	.....	.....	.....	.....	2.60	2.50	2.40	2.30
30	.....	.....	.....	.....	.....	.....	.....	.....	2.50	.....	2.40	2.30
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.40	.....	2.30
1904.												
1	2.3	1.9	1.9	1.9	2.7	3.0	3.2	3.4	3.1	2.5	2.6	2.5
2	2.3	.....	1.9	1.9	.....	3.0	3.2	3.4	3.0	2.5	2.6	2.5
3	2.3	2.5	1.9	1.9	2.7	3.0	3.2	3.4	2.9	2.5	2.6	2.5
4	.....	.....	1.9	1.9	.....	3.0	3.2	3.4	2.8	2.5	2.6	(a)
5	1.9	2.5	1.9	1.9	2.7	3.0	3.2	3.4	2.7	2.4	2.6	.....
6	.....	2.5	.....	2.3	.....	3.0	3.2	3.4	2.7	2.4	2.6	.....
7	1.9	2.5	1.9	.....	2.7	3.0	3.2	3.4	2.7	2.4	2.6	.....
8	.....	.....	.....	2.3	2.7	3.2	3.2	3.4	2.7	2.35	2.6	.....
9	1.9	1.9	1.9	2.3	2.7	3.2	3.2	3.4	2.7	2.35	2.6	.....
10	1.9	.....	.....	2.3	2.7	3.2	3.1	3.4	2.7	2.4	2.6	.....
11	.....	1.9	1.9	2.3	2.8	3.2	3.0	3.4	2.7	2.5	2.6	.....
12	1.9	.....	1.9	.....	2.8	3.2	3.0	3.4	2.7	2.6	2.6	.....
13	1.9	1.9	.....	2.5	2.8	3.2	2.9	3.4	2.7	2.6	2.6	.....
14	1.9	1.9	1.9	.....	2.9	3.2	2.9	3.4	2.7	2.6	2.6	.....
15	.....	.....	.....	2.5	2.9	3.2	2.9	3.4	2.7	2.7	2.6	.....
16	1.9	1.9	1.9	2.5	2.9	3.2	2.9	3.4	2.7	2.7	2.6	.....
17	1.9	1.9	2.1	2.5	2.9	3.2	2.9	3.4	2.7	2.7	2.6	.....
18	.....	.....	.....	.....	2.9	3.2	3.0	3.4	2.7	2.7	2.6	.....
19	1.9	1.9	2.1	2.5	2.9	3.2	3.0	3.4	2.7	2.7	2.6	.....
20	.....	1.9	2.1	.....	3.0	3.2	3.0	3.4	2.7	2.7	2.6	.....
21	1.9	1.9	.....	2.5	3.0	3.2	3.2	3.4	2.7	2.7	2.6	.....
22	.....	.....	2.1	.....	3.0	3.2	3.2	3.4	2.7	2.7	2.6	.....
23	1.9	1.9	.....	2.5	3.0	3.2	3.2	3.4	2.7	2.7	2.6	.....
24	1.9	.....	2.1	2.5	.....	3.2	3.3	3.4	2.7	2.7	2.6	.....
25	1.9	1.9	.....	.....	3.0	3.2	3.3	3.4	2.7	2.7	2.6	.....
26	.....	.....	2.1	2.7	3.0	3.2	3.3	3.4	2.7	2.7	2.6	.....
27	1.9	1.9	.....	.....	3.0	3.2	3.3	3.4	2.7	2.7	2.6	.....
28	.....	1.9	.....	2.7	3.0	3.2	3.3	3.4	2.6	2.7	2.6	.....
29	1.9	1.9	1.9	.....	3.0	3.2	3.4	3.4	2.6	2.7	2.6	.....
30	1.9	.....	1.9	2.7	3.0	3.2	3.4	3.4	2.6	2.6	2.6	.....
31	.....	.....	1.9	.....	3.0	.....	3.4	3.4	.....	2.6	.....	.....

(a) No record for remainder of year.

EAST SIDE CANAL NEAR CITRUS, CAL.

This station was established August 27, 1903, by R. S. Hawley. It is located at the head-gate of the canal. The gage is a vertical rod fastened to the head-gate at which discharge measurements are made. The gage is read once each day by J. Vaughn. At low stages the meter measurements are made by wading at a point below head-gate.

High-stage measurements are made from Southern Pacific Railroad bridge, one-half mile below head-gate.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of East Side canal near Citrus, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
August 13	R. S. Hawley	1.95	32
August 27	do	2.00	44
September 16	do	1.98	36
October 30	do	2.95	80
December 4	do	3.23	96
1904.			
February 24	R. S. Hawley	1.55	35
April 6	do	1.70	28
May 3	do	1.60	24
June 9	do	2.50	50
July 22	L. M. Barnes	2.50	40
September 12	R. S. Hawley	2.60	42
October 9	R. S. Hawley and R. J. Taylor	2.60	45
November 4	R. J. Taylor	2.30	30
December 2	do	2.25	27

Mean daily gage height, in feet, of East Side canal near Citrus, Cal., for 1903 and 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
1												
2									2.00	2.00	3.00	3.20
3												
4									2.00		3.00	3.20
5										2.20		
6											3.00	(a)
7									2.00	2.30		(a)
8												(a)
9									2.00	2.30	3.00	2.35
10												
11									2.00		3.00	2.40
12										2.40		
13											3.00	
14									1.90	2.50		2.40
15												
16									2.00	2.60	3.00	2.40
17												
18									2.00		3.00	2.00

a Head-gate shut down.

Mean daily gage height, in feet, of East Side canal near Citrus, Cal., etc.—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
19										2.70		
20											3.00	
21									2.00	2.70		2.00
22												
23									2.00	3.10		2.40
24												
25									2.00		3.05	2.40
26										3.10		
27								2.00			3.15	
28								2.00	2.10	3.00		1.80
29												
30									2.10	2.00	3.15	
31								2.00				
1904.												
1		1.7		1.9			2.6	2.6				
2					1.9				2.6			2.4
3			1.8		1.6	2.4				2.5		
4	1.4			1.8			2.5				2.6	
5								2.6	2.5			2.1
6	1.4					2.4						(a)
7			1.8							2.4	2.5	
8		1.6					2.8	2.6				
9					1.6			b.00	2.6			
10						2.5		.00		2.6		
11	1.1		1.7	1.85			2.8	.00			2.6	
12		1.5						.00	2.6			
13					1.8	2.6		.00				
14	1.4		1.7					.00		2.8	2.5	
15		1.5		1.8			2.6	.00				
16					1.9			.00	2.6			
17						2.6		.00		2.3		
18	1.4	1.8	1.8	1.9			2.8	.00			2.5	
19								.00	2.6			
20	1.4					2.6		.00				
21			1.8					.00		2.4	2.4	
22		1.6					2.5	.00				
23					2.0			.00	2.6			
24						2.5		.00		2.4		
25	1.5		2.1	1.9			2.9	.00			2.5	
26		1.6						.00	2.7			
27					2.4	2.6		.00				
28			1.8					2.0		2.4	2.4	
29	1.6	1.5					2.8	2.4				
30					2.2				2.6			
31										2.5		

a Water shut off for remainder of the year.
b Dry August 9–27.

Rating table for East Side canal near Citrus, Cal., from July 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.50	3	1.90	18	2.30	32	2.70	48
1.60	7	2.00	21	2.40	36	2.80	52
1.70	11	2.10	25	2.50	40	2.90	55
1.80	14	2.20	28	2.60	44	3.00	59

Estimated monthly discharge of East Side canal near Citrus, Cal., for 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	24	10	18.7	1,150
February	30	21	24.4	1,406
March	39	27	30.3	1,863
April	33	30	31.8	1,892
May	48	24	34	2,091
June	54	48	51.8	3,082
July	55	28	47	2,890
August 1–8, 27–31	44	21	40	1,031
September	48	40	44	2,618
October	52	32	39	2,398
November	44	36	40	2,380
The period				20,909

NOTE.—Discharge interpolated for missing days. From January 1 to June 30 no rating table was made, but discharge was based on measurements indirectly.

STEVENS CANAL NEAR CITRUS, CAL.

This station was established August 27, 1903, by R. S. Hawley. It is located at the waste gate of the canal, 3½ miles north of Citrus, Cal. The gage is a vertical rod fastened to the waste gate. It is read once each day by J. Vaughn. Discharge measurements are made by wading. The initial point for soundings is on the right bank of the canal. The channel is straight for 300 feet above and for 200 feet below the station. The current is sluggish. Both banks are high and are not liable to overflow. The bed of the stream is composed of gravel and earth and is fairly permanent.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Stevens canal near Citrus, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
August 13	R. S. Hawley	.....	17.7
August 27	do	2.30	23.0
September 16	do	2.40	21.3
1904.			
February 24	R. S. Hawley	2.40	24.0
April 6	do	.....	10.7
May 3	do	2.20	32.0
June 9	do	3.30	38.0
June 24	do	3.87	54.0
July 22	L. M. Barnes	3.20	22.0
September 12	R. S. Hawley	1.70	3.5

Mean daily gage height, in feet, of Stevens canal near Citrus, Cal., for 1903 and 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.										
1										
2							2.30	2.50		
3										
4							2.30			
5								2.50		
6										
7							2.35	2.50		
8										
9							2.35			
10										
11							2.30			
12										
13										
14							2.60			
15										
16							2.40			
17										
18							2.00			
19										
20										
21							2.40			
22										
23							2.00			
24										
25							2.00			
26										
27						2.30				
28						2.30	2.30			
29										
30							2.35			
31						2.30				

On October 7 the water was turned out.

Mean daily gage height, in feet, of Stevens canal near Citrus, Cal., etc.—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	Aug.	Sept.	Oct.	Nov.	Dec.
1904.										
1	(a)	1.9								
2	(a)				2.2				1.6	
3	(a)							2.5		
4	(a)		2.4						1.5	
5	(a)							2.5		1.5
6	(a)				2.2					
7	(a)		2.2					2.6	1.6	1.5
8	(a)	1.8								
9	(a)				2.0				1.5	1.5
10	(a)							2.5		
11	(a)		2.0						1.5	
12	(a)	1.7						2.5		1.5
13	(a)				2.2					
14	(a)		2.1					2.7	1.6	1.5
15	(a)	1.7								
16	(a)								1.6	1.5
17	(a)			2.2				2.3		
18	(a)		2.6						1.6	
19	(a)							2.4		1.5
20	(a)									
21	(a)						2.6	2.3	1.6	1.5
22	(a)	2.6								
23	(a)				2.3		2.6		1.6	1.5
24	(a)							1.6		
25	(a)		2.9	2.2					1.6	
26	(a)	2.5					2.7	1.5		1.5
27	(a)									
28	(a)						2.5	1.5	1.6	1.5
29	(a)	2.4								
30	1.7						2.5		1.6	1.5
31								1.6		

a Dry; January 1–29.

Observer discontinued taking gage height in May on account of high water. Could not cross river.

Rating table for Stevens canal near Citrus, Cal., from January 1 to June 30, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.40	14	1.70	17	2.00	20	2.30	23
1.50	15	1.80	18	2.10	21	2.40	24
1.60	16	1.90	19	2.20	22		

Rating table for Stevens canal near Citrus, Cal., from July 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.50	3.0	1.80	4.0	2.10	6	2.40	9
1.60	3.2	1.90	4.5	2.20	7	2.50	10
1.70	3.5	2.00	5.0	2.30	8		

Estimated monthly discharge of Stevens canal near Citrus, Cal., for 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
February	26	17	20.1	1,156
March	24	20	21.3	1,310
April	22	22	22	1,309
May	23	22	22	1,353
September 21–30	12	10	11	218
October	12	3	8	492
November	3	2	3	178
December	3	3	3	184
The period				6,200

Note.—Discharge interpolated for missing days.

OWENS RIVER NEAR CITRUS, CAL.

This station was established October 30, 1903, by R. S. Hawley. It is located at the county bridge 4 miles east of Independence, Cal., and 1 mile from the Southern Pacific Railway station at Citrus, Cal. The station at this point shows the amount of waste water which is discharged into Owens Lake. The gage is a 1 by 4 inch vertical rod nailed to a pile on the upstream side of the middle pier of the bridge. It is read twice each day by Milton Levy. Discharge measurements are made from the county bridge at which the gage is located. The initial point for soundings is the end of the rail at the right end of the bridge. The channel is straight for 200 feet above and for 300 feet below the station. The current has a mean velocity of about 2 feet at ordinary stages. Both banks are high and are not liable to overflow. The bed of the stream is sandy and is liable to shift. The bench mark is a copper tack in the floor beam directly over the gage rod. Its elevation is 1.50 feet above the 12-foot mark of the gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Owens River near Citrus, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
June 27	J. C. Clausen		534
August 28	R. S. Hawley	[a]2.7	8.6
October 30	do	4.4	[a]105
December 4	do	5.0	215
1904.			
January 27	R. S. Hawley	5.45	303
April 6	do	5.30	298
May 3	do	3.65	25
June 9	do	6.65	569
June 24	do	7.20	733
July 22	L. M. Barnes	4.80	176
September 12	R. S. Hawley	4.10	59
October 9	R. S. Hawley and R. J. Taylor	6.30	456
November 4	R. J. Taylor	5.90	410
December 2	do	5.80	351

[a] Corrected gage height and discharge.

Mean daily gage height, in feet, of Owens River near Citrus, Cal., for 1903 and 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
1											4.48	4.95
2											4.45	5.0
3											4.65	4.95
4											4.7	5.0
5											4.75	5.0
6											4.7	5.0
7											4.6	5.0
8											4.65	5.03
9											4.7	5.03
10											4.77	5.01
11											4.8	5.0
12											4.83	5.01
13											4.85	5.01
14											4.85	5.2
15											4.87	5.2
16											4.85	5.0
17											4.85	5.2
18											4.85	5.2
19											4.85	5.2
20											4.88	5.2
21											4.95	5.25
22											4.97	5.3
23											4.9	5.3
24											4.95	5.2

Mean daily gage height, in feet, of Owens River near Citrus, Cal., etc.—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1903.												
25											5.0	5.15
26											5.0	5.15
27											5.0	5.2
28											5.0	5.2
29											5.0	5.35
30										4.4	5.0	5.35
31										4.47		5.35
1904.												
1	5.35	5.35	5.45	6.15	3.55	5.25	6.6	5.1	4.6	5.75	5.8	5.8
2	5.4	5.3	5.35	5.7	3.6	5.2	6.5	5.4	4.6	5.8	5.7	5.85
3		5.25	5.15	5.55	3.65	5.1	6.45	5.5	4.55	5.7	5.9	(5.85)
4	5.35	5.25	5.3	5.35	3.6	5.0	6.4	5.55	4.6	6.0	5.9	5.9
5	5.4	5.05	5.35	5.25	3.6	5.3	6.35	5.8	4.65	6.0	5.9	5.9
6	5.4	5.05	5.25	5.3	3.55	5.8	6.3	5.7	4.5	6.0	5.85	5.8
7	5.4	5.0	5 15	4.9	3.55	6.2	6.2	5.7		6.0	5.85	5.85
8	5.4	5.0	5.05	4.8	3.5	6.4	6.15	5.6	4.3	6.5	5.9	5.8
9	5.4	5.0	5.05	4.75	3.5	6.5	6.2	5.85	4.25	6.4	5.9	5.85
10	5.45	5.0	4.9	5.5	3.45	6.6	6.2	6.0	4.15		5.85	5.85
11	5.45	5.0	4.95	5.55	3.5	6.5	6.1	6.3	4.05	5.9	5.85	5.8
12	5.4	4.9	5.0	5.4	3.4	6.4	6.1	6.2	4.05	6.1	5.85	5.8
13	5.4	4.85	5.3	5.35	3.45	6.4	6.0	5.9	4.05	6.2	5.8	5.8
14	5.4	4.9	5.1	5.3	3.45	6.4	5.8	5.9	4.1	6.5	5.8	5.8
15	5.4	4.85	5.0	5.2	3.45	6.5	5.65	5.6	4.1	6.5	5.8	5.8
16	5.4	4.9	5.0	5.15	3.4	6.8	5.55	5.65	4.1	6.3	5.85	(5.8)
17	5.4	5.45	5.2	4.15	3.4	6.8	5.4	5.6	4.1	6.4	5.8	(5.8)
18	5.4	5.4	5.25	3.9	3.4	6.8	5.2	5.5	4.1	6.3	5.75	(5.8)
19	5.45	5.7	5.2	3.95	3.8	7.0	5.0	5.55	4.1	6.1	5.8	(5.8)
20	5.4	5.7	5.15	3.9	4.1	7.3	5.0	5.6	4.1	6.0	5.75	(5.8)
21	5.4	5.6	5.2	3.7	4.1	7.3	4.9	5.35	3.85		5.8	(5.75)
22	5.35	5.45	5.2	3.75	4.1	7.3	4.8	5.2	3.75	6.0	5.8	(5.75)
23	5.4	5.5	5.15	3.6	4.5	7.3	4.8	5.15	3.75	6.0	5.8	(5.7)
24	5.4	5.55	5.4	3.55	4.05	7.3	4.7		3.75	6.0	5.8	(5.7)
25	5.45	5.5	6.0	3.5	4.1	7.2	4.8		3.8	6.1	5.85	5.7
26	5.4	5.75	5.95	3.45	4.8	7.2	5.0		4.2	5.9	5.85	5.6
27	5.45	5.5	5.6	3.4	4.9	7.0	4.8	5.1	5.6	5.8	5.8	5.65
28	5.4	5.7	5.8	3.4	5.5	6.8	5.2		5.7	5.9	5.85	(5.65)
29	5.4	5.5	5.95	3.45	5.8	6.8	5.2		5.75	5.9	5.8	(5.65)
30	5.35		6.4	3.4	5.45	6.7	5.3		5.8	5.9	5.8	(5.65)
31	5.4		6.6		5.35		5.1					(5.65)

NOTE.—Gage heights in parenthesis are estimated.

Rating table for Owens River near Citrus, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
3.60	20	4.60	150	5.60	335	6.60	585
3.70	30	4.70	165	5.70	360	6.70	610
3.80	40	4.80	180	5.80	385	6.80	640
3.90	50	4.90	195	5.90	410	6.90	670
4.00	60	5.00	210	6.00	435	7.00	700
4.10	75	5.10	230	6.10	460	7.10	730
4.20	90	5.20	250	6.20	485	7.20	760
4.30	105	5.30	270	6.30	510	7.30	790
4.40	120	5.40	290	6.40	535	7.40	820
4.50	135	5.50	310	6.50	560		

Estimated monthly discharge of Owens River near Citrus, Cal., for 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	300	280	290.3	17,851
February	372	187	267.5	15,387
March	585	195	289.9	17,823
April	472	2	160.5	9,552
May	385	2	76.8	4,720
June	790	210	572.5	34,064
July	585	165	350	21,521
August	510	230	318	19,553
September	385	35	125	7,438
October	560	360	451	27,731
November	410	360	388	23,088
December	410	335	378	23,242
The year	790	2	306	221,970

POWERS CANAL NEAR BISHOP, CAL.

This station was established August 19, 1903, by R. S. Hawley. It is located one-half mile above mill, on Bishop Creek, and 4½ miles west of Bishop, Cal. The gage is a 1 by 3 inch rod on left bank of canal. Discharge measurements are made by wading. The canal is straight for 20 feet above and 50 feet below the station. The bed of the canal is composed of gravel and is not subject to change. The bench mark is on granite bowlder 60 feet north of penstock of mill pressure pipe. Its elevation is 3.50 feet above the zero of gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Powers canal near Bishop, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
August 10	R. S. Hawley	.....	6.2
August 19	do	1.50	6.8
August 25	do	1.48	6.8
September 3	do	1.33	2.8
September 9	do	1.41	4.9
September 15	do	1.38	3.5
September 21	do	1.36	3.6
1904.			
April 16	R. S. Hawley	1.40	4.4
May 17	do	1.50	6.1
July 12	J. C. Clausen and L. M. Barnes	1.75	16.6
August 6	L. M. Barnes	1.75	15.8
October 24	R. J. Taylor	1.40	3.9

Mean daily gage height, in feet, of Powers canal near Bishop, Cal., for 1904.[a]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Day.	Mar.	Apr.	May.	June.	July.	Aug.
1	1.3	1.4	.....	.....	.....	.....	17	.....	.....	1.5	1.8	.....	.....
2	.....	.....	.....	1.5	.....	.....	18	.....	1.4	.....	.....	1.7	1.85
3	.....	.....	1.4	.....	.....	.....	19	1.3	.....	1.5	1.8	.....	.....
4	.....	.....	.....	1.5	.....	.....	20	.....	.....	.....	.....	.....	.....
5	.....	.....	1.4	.....	.....	1.8	21	.....	.....	.....	1.8	.....	.....
6	.....	.....	.....	.....	.....	.....	22	.....	.....	1.5	.....	1.7	.....
7	.....	.....	1.5	.....	.....	.....	23	.....	.....	.....	1.8	.....	.....
8	.....	1.4	.....	.....	1.8	.....	24	.....	.....	.....	.....	.....	.....
9	.....	.....	1.5	.....	.....	.....	25	.....	1.4	1.5	1.8	.....	.....
10	.....	.....	.....	.....	.....	.....	26	.....	.....	.....	.....	.....	1.85
11	.....	.....	1.5	.....	1.8	.....	27	.....	.....	1.5	1.75	1.7	.....
12	.....	.....	.....	1.6	.....	.....	28	.....	.....	.....	.....	.....	.....
13	.....	.....	1.5	.....	.....	.....	29	.....	.....	.....	1.8	.....	.....
14	1.3	.....	.....	1.6	.....	.....	30	.....	.....	.....	.....	.....	.....
15	.....	.....	.....	.....	1.8	.....	31	1.3	.....	.....	.....	.....	.....
16	.....	1.4	.....	1.7	.....	.....							

[a] No record January, February, September, October, November, December.

Rating table for Powers canal near Bishop, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet*	*Feet.*	*Second-feet.*
1.20	0	1.50	7	1.70	14	1.90	23
1.30	2	1.60	10	1.80	18	2.00	29
1.40	4						

Estimated monthly discharge of Powers canal near Bishop, Cal., for 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
March	.....	.....	2	123
April	.....	.....	4	238
May	7	4	6.4	394
June	18	7	12.8	762
July	18	14	16	984
August	20	18	19	1,168
The period	.....	.....	.....	3,669

SOUTH HILLSIDE CANAL NEAR BISHOP, CAL.

This station was established August 26, 1903, by R. S. Hawley. It is located just below the waste gate at head of canal, 5 miles west of Bishop, Cal. The gage is a 1 by 3 inch rod on left bank of canal. The discharge measurements are made by wading. The bench mark is on granite bowlder marked by ring of white paint and located on left bank 2 feet from gage; it is 2.99 feet above zero of gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of South Hillside canal near Bishop, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
August 26	R. S. Hawley	1.8	3.9
September 3	do	1.8	4.2
September 9	do	1.8	4.2
1904.			
February 20	R. S. Hawley	1.60	1.0
April 25	do	2.00	7.0
June 8	do	2.20	10.0
August 27	L. M. Barnes	1.90	5.1
September 7	R. S. Hawley	2.15	10.5
October 15	R. S. Hawley, W. B. Clapp, and R. J. Taylor	1.65	1.0
November 9	R. J. Taylor	1.63	1.1
December 5	do	1.50	.4

Mean daily gage height, in feet, of South Hillside canal near Bishop, Cal., for 1904.[a]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1								
2						1.5		
3					2.0			
4						1.5		
5					2.0			2.1
6								
7					2.0			
8								
9					2.0			
10								
11					2.0		1.9	
12			(b)			1.6		
13					2.0			
14						1.6		
15							1.9	
16						1.7		
17					2.0	1.8		
18							1.9	2.0
19					2.0	1.8		
20		1.6					2.0	
21						1.8		
22					2.0			
23	1.65			(c)		1.8		
24								
25					2.0	1.8		
26								2.0
27					2.0	1.75	2.0	
28								
29						1.8		
30								
31								

[a] No record for September, October, November, and December.
[b] Water turned out March 12 to April 22, inclusive.
[c] Water turned in.

Rating table for South Hillside canal near Bishop, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.50	0	1.70	2.5	1.90	5.5	2.10	8.5
1.60	1	1.80	4	2.00	7	2.20	10

Estimated monthly discharge of South Hillside canal near Bishop, Cal., for 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
April 24–30	7	7	7	97
May	7	7	7	430
June	4	0	2	119
July	7	4	5.7	350
August	9	7	8	492
The period				1,488

NOTE.—Discharge interpolated for missing days.

NORTH HILLSIDE CANAL NEAR BISHOP, CAL.

This station was established September 3, 1903, by R. S. Hawley. It is located at head gate of the canal, 5 miles west of Bishop, Cal. The gage is a 1 by 3 inch vertical rod fastened to the right side of flume or head gate. Discharge measurements are made from crosspiece of flume on which the distances across are marked at each foot. The initial point for soundings is the end of crosspiece of flume at right bank. The bench mark is on a granite bowlder marked with white paint, and located near gage. It is 2.96 feet above zero of gage.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of North Hillside canal near Bishop, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
August 19	R. S. Hawley		10.6
August 25	do		9.5
September 3	do	1.99	11.2
September 9	do	1.95	11.1
October 26	do	1.77	4.3
1904.			
April 16	R. S. Hawley	1.76	4.6
April 25	do	1.95	10.3
May 17	do	2.00	13.0
June 20	do		13.5
July 12	J. C. Clausen and L. M. Barnes	2.00	13.8
August 8	L. M. Barnes	2.00	15.6
September 7	R. S. Hawley	1.90	9.3
October 15	R. S. Hawley, W. B. Clapp, and R. J. Taylor.	1.70	4.4
November 9	R. J. Taylor	1.70	3.8
December 5	do	1.55	1.7

Mean daily gage height, in feet, of North Hillside canal near Bishop, Cal., for 1904.[a]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	[b] 0.00	0.00	0.00	0.00	.....	.....	.....	.....
2	.00	.00	.00	.00	.....	2.05	.....	.....
3	.00	.00	.00	.00	2.05	.....	.....	.....
4	.00	.00	.00	.00	.....	2.05	.....	.....
5	.00	.00	.00	.00	2.05	.....	.....	2.2
6	.00	.00	.00	.00	.....	.....	.....	.....
7	.00	.00	.00	.00	2.05	.....	.....	.....
8	.00	.00	.00	.00	.....	.....	1.9	2.0
9	.00	.00	.00	.00	2.05	.....	.....	.....
10	.00	.00	.00	.00	.....	.....	.....	.....
11	.00	.00	.00	.00	2.05	.....	1.9	.....
12	.00	.00	.00	.00	.....	2.02	.....	.....
13	.00	.00	.00	.00	2.05	.....	.....	.....
14	.00	.00	.00	.00	.....	.....	.....	.....
15	.00	.00	.00	.00	.....	.....	2.0	.....
16	.00	.00	.00	1.76	.....	2.02	.....	.....
17	.00	.00	.00	.....	2.05	.....	.....	.....
18	.00	.00	.00	.....	.....	.....	2.1	2.2
19	.00	.00	.00	.....	2.05	2.0	.....	.....
20	.00	.00	.00	.....	.....	.....	.....	.....
21	.00	.00	.00	.....	.....	1.95	.....	.....
22	.00	.00	.00	.....	2.04	.....	2.1	.....
23	.00	.00	.00	1.95	.....	1.9	.....	.....
24	.00	.00	.00	.....	2.05	.....	.....	.....
25	.00	.00	.00	1.95	.....	1.9	.....	.....
26	.00	.00	.00	.....	.....	.....	.....	2.2
27	.00	.00	.00	.....	2.05	1.9	2.1	.....
28	.00	.00	.00	.....	.....	.....	.....	.....
29	.00	.00	.00	.....	.....	1.9	.....	.....
30	.00	.....	.00	.....	2.03	.....	.....	.....
31	.00	.....	.00	.....	.....	.....	.....	.....

[a] No record for September, October, November, and December. [b] Dry: January 1 to April 15.

Rating table for North Hillside canal near Bishop, Cal., from April 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.60	3	1.80	6	2.00	11	2.20	21
1.70	4	1.90	8	2.10	15		

Estimated monthly discharge of North Hillside canal near Bishop, Cal., for 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
April	10	0	3.8	226
May	13	13	13	799
June	13	9	11.2	666
July	15	9	12.1	744
August	21	11	19	1,168
The period	.....	.....	.....	3,603

NOTE.—Discharge interpolated for missing days.

BIG PINE CREEK NEAR BIG PINE, CAL.

This station was established December 5, 1903, by R. S. Hawley. It is located 3 miles southwest of Big Pine, Cal., at a point where the creek leaves the foothills. The gage is a 1 by 3 inch vertical rod fastened to a tree on the left bank of the creek, 3 feet above the footbridge, from which discharge measurements are made. The initial point for soundings is on the footbridge near the right bank, and distances across the stream are marked at intervals of 1 foot. The channel is straight for 30 feet above and 50 feet below the station. The current is swift at all stages. Both banks are high and rocky. The bed of the stream is rough and rocky, and is not subject to much change. Bench mark No. 1 is on a granite bowlder marked by a ring of white paint, 40 feet southeast of the south end of the footbridge. It is 8.54 feet above the zero of the gage. Bench mark No. 2, which is 10.44 feet above the zero of the gage, is marked with a ring of white paint and is located 45 feet southwest of the south end of the footbridge. The gage is read once each day by Mrs. J. M. Randle.

The observations at this station during 1904 have been made under the direction of S. G. Bennett and W. B. Clapp, district hydrographers.

Discharge measurements of Big Pine Creek near Big Pine, Cal., in 1903 and 1904.

Date.	Hydrographer.	Gage height.	Discharge.
1903.		*Feet.*	*Second-feet.*
October 12	R. S. Hawley		16.4
August 14	do		112.4
December 5	do	1.8	8.5
1904.			
January 28	R. S. Hawley	1.80	11.1
February 10	do	1.82	16.5
April 22	do	2.00	22.0
June 4	R. S. Hawley and J. C. Clausen	2.95	105
September 10	R. S. Hawley	2.45	58
October 10	R. S. Hawley and R. J. Taylor	2.00	31
November 18	R. J. Taylor	1.90	21
December 9	do	1.90	20

Mean daily gage height, in feet, of Big Pine Creek near Big Pine, Cal., for 1904.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.8	1.8	1.9	1.9	1.9	2.9	3.1	3.0	2.5	2.0	2.0	2.0
2	1.8	1.8	1.9	1.9	1.9	3.0	3.1	2.8	2.6	2.0	2.0	1.9
3	1.8	1.8	1.9	1.9	1.9	3.1	3.0	2.8	2.6	2.1	2.0	1.9
4	1.8	1.8	1.9	1.9	2.0	3.0	3.0	2.8	2.5	2.0	2.0	1.9
5	1.8	1.8	1.9	1.9	2.0	3.0	3.0	2.8	2.4	2.1	2.0	1.9
6	1.8	1.8	1.9	1.9	2.1	3.2	3.0	3.0	2.4	2.2	2.0	2.0
7	1.8	1.85	1.9	1.9	2.45	3.1	3.2	3.0	2.5	2.1	2.0	1.95
8	1.8	1.8	1.9	1.95	2.7	3.0	3.2	3.1	2.6	2.1	2.0	1.95
9	1.8	1.8	1.9	1.95	2.7	3.0	3.0	3.5	2.5	2.1	2.0	1.9
10	1.8	1.8	1.8	1.95	2.7	3.1	2.9	3.2	2.5	2.0	2.0	1.9
11	1.8	1.8	1.9	2.0	2.7	3.2	2.9	3.0	2.5	2.0	1.9	1.9
12	1.8	1.8	1.95	2.0	2.8	3.5	2.9	2.9	2.5	2.0	2.0	1.9
13	1.8	1.8	1.9	2.05	2.8	3.5	2.9	2.9	2.5	2.0	2.0	1.85
14	1.8	1.8	1.9	2.1	2.8	3.5	2.9	2.9	2.5	2.0	2.0	1.85
15	1.8	1.8	1.9	2.0	2.8	3.8	2.8	2.9	2.4	2.0	2.0	1.85
16	1.8	2.0	1.9	2.05	2.9	3.8	2.8	2.9	2.4	2.0	2.0	1.85
17	1.8	1.85	1.9	2.0	2.8	3.7	2.8	3.2	2.4	1.9	2.0	1.85
18	1.8	1.8	1.9	2.0	2.9	3.5	2.8	3.0	2.4	1.9	1.9	1.85
19	1.8	1.8	1.9	2.0	2.8	3.5	3.1	3.0	2.3	2.0	1.9	1.85
20	1.8	1.8	1.85	2.0	2.7	3.5	3.3	2.8	2.2	2.0	2.0	1.85
21	1.8	1.8	1.9	2.0	2.6	3.1	3.2	2.8	2.2	2.0	2.0	1.85
22	1.8	1.85	1.9	2.0	2.6	3.0	3.4	2.8	2.2	2.0	1.9	1.85
23	1.8	1.85	1.85	2.0	2.7	3.1	3.5	2.7	2.1	2.1	2.0	1.85
24	1.8	1.85	1.95	2.0	2.9	3.2	3.5	2.7	2.3	2.1	2.0	1.85
25	1.8	1.85	2.0	2.0	3.0	3.1	3.2	2.7	2.2	2.0	2.0	1.85
26	1.8	1.85	1.9	2.0	3.0	3.1	4.0	2.6	2.0	2.0	2.0	1.8
27	1.8	1.85	2.0	2.0	2.8	3.1	3.5	2.6	2.0	2.0	2.0	1.8
28	1.8	1.85	2.0	2.0	2.8	3.1	3.1	2.6	2.0	2.0	2.0	1.8
29	1.8	1.8	2.0	1.9	2.9	3.1	3.0	2.6	2.0	2.1	2.0	1.8
30	1.8	.....	2.0	2.0	2.9	3.1	3.0	2.6	2.0	2.0	2.0	1.85
31	1.8	.....	1.9	.....	2.9	.....	3.0	2.5	.....	2.0	.....	1.9

Rating table for Big Pine Creek near Big Pine, Cal., from January 1 to December 31, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*	*Feet.*	*Second-feet.*
1.80	11	2.30	45	2.80	90	3.20	127
1.90	16	2.40	53	2.90	100	3.30	136
2.00	22	2.50	62	3.00	109	3.40	145
2.10	29	2.60	71	3.10	118	3.50	154
2.20	36	2.70	81				

Estimated monthly discharge of Big Pine Creek near Big Pine, Cal., for 1904.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
January	12	11	11	676
February	22	11	12	690
March	22	11	16.8	1,033
April	29	16	20.5	1,220
May	109	16	72.7	4,469
June	188	100	132	7,855
July	208	90	119	7,317
August	154	62	95.8	5,593
September	71	22	49	2,916
October	36	16	24	1,476
November	22	16	21	1,250
December	22	11	15	922
The year	208	11	49.1	35,417

MISCELLANEOUS MEASUREMENTS IN THE GREAT BASIN.

The following miscellaneous measurements were made in the Great Basin during 1903 and 1904:

Miscellaneous measurements in the Great Basin in 1903 and 1904.

WILLOW CREEK DRAINAGE BASIN IN CALIFORNIA.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1904.				*Sec.-feet.*
January 7	J. S. Evans	Willow Creek	Susanville	11.6
May 12	James Branham	do	do	9
August 16	S. G. Bennett and J. Y. Toler.	do	do	5.4
November 11	James Branham	do	Standish	52

Miscellaneous measurements in the Great Basin in 1903 and 1904—Continued.

OWENS RIVER DRAINAGE BASIN IN CALIFORNIA.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1903.				*Sec.-feet.*
July 30	R. S. Hawley	Hillside canal	At Bishop	3.8
Aug. 5	do	do	do	1.9
Aug. 15	do	do	do	2.3
Sept. 7	do	do	do	2.7
Sept. 15	do	do	do	2.9
Aug. 5	do	Love's ditch	do	.9
Aug. 15	do	do	do	.5
Sept. 5	do	do	do	1.5
Sept. 15	do	do	do	2.4
Oct. 10	do	McGee Creek	do	2.6
Oct. 10	do	Birch Creek	do	5.0
Oct. 12	do	Coyote Creek	do	1.6
Oct. 12	do	Mill Creek	At Big Pine	7.0
Aug. 14	do	Big Pine Creek	do	112
Oct. 12	do	do	do	16.4
Oct. 13	do	Birch Creek	At Fish Springs	3.5
Sept. 21	do	Fish Slough ditch	do	11.2
Oct. 13	do	Tinemaha Creek	do	3.6
Oct. 13	do	Taboose Creek	At Black Rock	4.8
Oct. 13	do	Clear Creek	do	1.7
Oct. 13	do	Goodale Creek	do	6.6
Oct. 13	do	Division Creek	Near Independence	2.5
Oct. 13	do	Oak Creek	do	10.7
Aug. 13	do	IndependenceCreek	At Independence	8.6
Sept. 17	do	do	do	4.5
Oct. 14	do	do	do	4.3
Oct. 14	do	Shepherd Creek	Near Independence	2.1
Oct. 14	do	Moffitt Creek	do	.3
Oct. 14	do	Georges Creek	do	.8
Oct. 15	do	Lone Pine Creek	At Lone Pine	3.3
Oct. 15	do	Tuttle Creek	Near Lone Pine	2.3
Oct. 31	do	Cottonwood Creek	Near Olancha	7.6
Oct. 31	do	Ash Creek	do	1.2
1904.				
Apr. 21	R. S. Hawley	Hillside canal	At Bishop	8.4
July 11	J. C. Clausen	do	do	5.0
Aug. 10	L. M. Barnes	do	do	6.3
Nov. 17	R. J. Taylor	do	do	11.5

Miscellaneous measurements in the Great Basin in 1903 and 1904—Continued.

OWENS RIVER DRAINAGE BASIN IN CALIFORNIA—Continued.

Date.	Hydrographer.	Stream.	Location.	Discharge.
1904.				*Sec.-feet.*
May 14	R. S. Hawley	Love's ditch	At Bishop	5.6
Apr. 21	do	do	do	4.2
July 11	J. C. Clausen	do	do	3.8
Apr. 1	R. S. Hawley	McGee Creek	do	3.8
Apr. 1	do	Birch Creek	do	4.8
Apr. 5	do	do	do	5.0
Apr. 4	do	Coyote Creek	do	2.0
Apr. 4	do	Mill Creek	At Big Pine	5.2
Apr. 5	do	Birch Creek	At Fish Springs	5.0
Apr. 5	do	Tinemaha Creek	do	4.0
Apr. 5	do	Taboose Creek	At Black Rock	4.2
Apr. 5	do	Clear Creek	do	6.4
Apr. 5	do	Goodale Creek	do	2.1
Apr. 5	do	Division Creek	At Black Rock Springs	2.5
Apr. 5	do	Oak Creek	At Independence	9.4
June 24	do	do	do	35
Apr. 5	do	IndependenceCreek	do	3.3
June 24	do	do	do	40
Dec. 19	R. J. Taylor	do	do	3.5
May 4	R. S. Hawley	Shepherd Creek	do	1.0
May 4	do	Georges Creek	do	2.4
May 4	do	Lone Pine Creek	At Lone Pine	4.0
June 10	do	do	do	28
May 5	do	Tuttle Creek	do	3.0
May 5	do	Cottonwood Creek	At Olancha	21
June 10	do	do	do	30
May 5	do	Ash Creek	do	3.0
June 18	J. C. Clausen	North Fork Bishop Creek.	At Bishop	81
Apr. 28	R. S. Hawley	Horton Creek	At Round Valley	5.0
Apr. 12	do	Hughes ditch	At Bishop	1.5
Oct. 1	do	do	do	.3
Oct. 10	do	do	do	3.0
Nov. 3	R. J. Taylor	do	do	2.2
Feb. 20	R. S. Hawley	Indian ditch	do	12.1

INDEX.