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Water-Supply and Irrigation Paper No. 81

Series M, General Hydrographic Investigations, 5

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86  
✓ DEPARTMENT OF THE INTERIOR  
UNITED STATES GEOLOGICAL SURVEY

CHARLES D. WALCOTT, DIRECTOR  
7

# CALIFORNIA HYDROGRAPHY

BY

✓ JOSEPH BARLOW LIPPINCOTT



WASHINGTON  
GOVERNMENT PRINTING OFFICE  
1903



## PUBLICATIONS OF UNITED STATES GEOLOGICAL SURVEY.

The publications of the United States Geological Survey consist of (1) Annual Reports; (2) Monographs; (3) Professional Papers; (4) Bulletins; (5) Mineral Resources; (6) Water-Supply and Irrigation Papers; (7) Topographic Atlas of United States, folios and separate sheets thereof; (8) Geologic Atlas of United States, folios thereof. The classes numbered 2, 7, and 8 are sold at cost of publication; the others are distributed free. A circular giving complete lists may be had on application.

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- WS 71. Irrigation systems of Texas, by T. U. Taylor. 1902. 137 pp., 9 pls.
- WS 74. Water resources of the State of Colorado, by A. L. Fellows. 1900. 151 pp., 14 pls.

The following papers also relate especially to irrigation: Irrigation in India, by H. M. Wilson, in Twelfth Annual, Part II; two papers on irrigation engineering, by H. M. Wilson, in Thirteenth Annual, Part III.

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The following paper also should be noted under this heading: Reservoirs for irrigation, by J. D. Schuyler, in Eighteenth Annual, Part IV.

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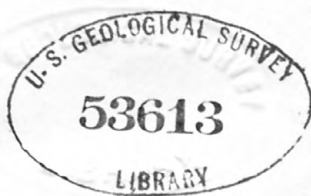
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## LETTER OF TRANSMITTAL.

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DEPARTMENT OF THE INTERIOR,  
UNITED STATES GEOLOGICAL SURVEY,  
DIVISION OF HYDROGRAPHY,

*Washington, D. C., January 15, 1903.*

SIR: I have the honor to transmit herewith a paper entitled "California Hydrography," by Mr. J. B. Lippincott, containing a summary of as much of the data concerning the water supply of California as is available from printed records and from observations of other engineers and investigations made by this Survey. The published records on the subject, hitherto much scattered, some of them out of print and difficult to secure, are here brought together, and the paper should therefore form a convenient and valuable book of reference for the use of engineers, irrigators, and all who are interested in the development of the valuable water resources of California.

For convenience in the use of the book the prominent drainage basins have been placed in alphabetic order, and the minor tributaries of the larger streams have been arranged alphabetically under the name of the trunk stream into which they discharge. The minor tributaries and irrigation ditches have in addition been cross-entered in alphabetic place, so that they may be found independently under their local names. The discharge measurements include both low-water and flood records and are accompanied by useful precipitation data.

Very respectfully,

F. H. NEWELL,  
*Hydrographer in Charge.*

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





# CALIFORNIA HYDROGRAPHY.

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By JOSEPH BARLOW LIPPINCOTT.

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## INTRODUCTION.

The purpose of this publication is to assemble under one cover as much of the data concerning the water supply of California as is available from printed records, observations of other engineers, and investigations made by this Survey. The greater portion of the data are obtained from the latter source. The records of stream flow that have been published by the United States Geological Survey appear, first, in numerous Water-Supply Papers, which are published annually, soon after the end of the year's work, and contain a brief summary of the past year's operations, and, second, in large annual reports, showing the average monthly discharge and other records of streams in all portions of the United States. Thus, while the published record is complete, it is distributed through many volumes, and numerous investigators do not have a complete set of these publications.

The methods of stream measurement practiced by the Geological Survey are fully described in Water-Supply and Irrigation Paper No. 56. In brief, they usually consist of measuring the cross section of the stream with a tape and a sounding rod, and determining the velocity at numerous points in this cross section by means of a current meter, usually of the Price type. On large streams the meter measurements are usually made from cables. On small streams they are often made from foot bridges. The velocity observed is applied to each subdivision of the cross section where it is made, and the aggregate discharge of these cross sections is taken as the total discharge of the stream. On small streams weir measurements are often made.

When a record of daily flow is to be kept on any river a gage rod is established on the stream near the point of measurement, and the height of the water on this rod is observed and recorded at the time each measurement is made. By properly selecting periods of high, low, and average water for the times of measurement it is possible to



formulate a rating or discharge curve for the river in terms of volume discharged and water height on the rod. A local observer is employed to read the rod daily, and from these observed rod readings a statement of daily, monthly, and annual discharge is deduced.

Some of the data given were contributed by irrigation and power companies from daily records kept at their head works. In cases of this kind due credit is given.

The reports compiled and published by the California State engineering department between the years 1878 and 1884<sup>a</sup> are now out of print and hard to obtain. The information contained in them is therefore included in this paper. The method of stream measurement most commonly practiced by the State engineering department consisted of stretching two wires across the stream at a fixed distance apart and noting the time of passage of floats through the section observed from the upper to the lower wire. Cross-sectional areas were measured and the velocities indicated by the floats were applied thereto, thus determining the discharge. Daily records of river heights on gage rods were kept on a number of the streams in a manner similar to that practiced by the United States Geological Survey. A rating table for the station was obtained from the discharge measurements, and, by applying it to the daily rod readings, monthly and annual discharge tables were determined. In several instances, however, where records have been kept on neighboring streams the State engineering department has prepared theoretical discharge estimates of other streams in the same locality by using the rate of run-off per square mile obtained from a measured stream and applying it in determining the probable run-off from the basin of a neighboring stream. In cases of this kind the discharge figures are marked with a star. In each instance the effort has been made to give the date of the measurement, the name of the observer, the volume discharged, and a description of the locality and stream.

The measurements have been grouped in the principal drainage basins, but it would obviously be impossible to adhere rigidly to this arrangement. For instance, all the streams of the San Joaquin Valley are, technically speaking, tributary to San Joaquin River, but it would be manifestly improper to include all the main rivers from the Sierras in this section under the head of San Joaquin River. The rule therefore has been adopted of giving each prominent drainage basin its place in alphabetic sequence; the minor tributaries of these large streams are then arranged alphabetically under the name of the trunk stream into which they discharge. For instance, Tuolumne River is considered an independent stream, but Eleanor Creek, Falls Creek, etc., are considered minor tributaries and are arranged under the heading "Tuolumne River." The effort has been made, however,

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<sup>a</sup> No measurements were made by the California State engineering department subsequent to 1884, as the office was then discontinued.







to cross-enter all these minor tributaries, so that they may be found independently under their local names, reference being made to the trunk stream into which they discharge.

Undoubtedly many measurements that are not available for this publication have been made for corporations and individuals by engineers of California. These data, if they could be obtained, would doubtless be of great value, and the suggestion is here made that it would be a public benefit to send this information to the United States Geological Survey, where it would be available for publication in subsequent bulletins of this nature.

The records of the Signal Service and Weather Bureau are also contained in annual reports extending over a long term of years, and the engineer who possesses a complete file of these publications is indeed fortunate.

The rain water which forms the source of the water supply for agriculture in California falls in large part upon the mountain ranges of the State. It is a well-known fact that within the State there are vast differences in rainfall with increase or decrease of elevation, particularly on the western slopes of the mountain ranges. Rainfall statistics have been compiled in great mass for the valley districts, where farming is actually carried on, but the engineer who is investigating plans for storage and power is much more interested in the rainfall of the mountains. An attempt has been made to include in this paper all available data relative to precipitation at the higher elevations. The Weather Bureau publishes its records of precipitation in calendar years, beginning with the 1st of January, which is the middle of the rainy season on the California coast. A record beginning on the 1st of January may show for that and following months conditions of excessive drought, while for the following November and December of the same calendar year it may give records of excessive rainfall, the result indicated for the calendar year being a mean rainfall, whereas there may have been a dry season followed by one of excessive precipitation. For this reason the rainfall records for the mountain districts have been classified in seasonal years, and it is believed that their presentation in this form will avoid for the engineer many laborious retabulations of results. Particular effort has been made to collect and present new data.

Each table of precipitation is accompanied with a statement showing the approximate position of the station and its elevation, as well as the authority for the record. These records are in part taken from the annual reports of the Weather Bureau and rearranged in seasonal instead of calendar years, as stated above. All the regular stations of the United States Weather Bureau are situated at relatively low elevations with the exception of Mount Tamalpais, but some voluntary observers report to the Weather Bureau from mountain sta-



tions. These observers use a variety of measuring devices. Some use glass graduates, with various-sized catchment cups, and some employ more primitive implements. The records of mountain precipitation, however, are so scarce that they are all given here, because it is believed that any information tending to throw light on this subject is of value.

All the records that are credited to the Southern Pacific Railroad were obtained from Mr. William Hood, chief engineer of the system. The rain gages used by the railroad company are small gages with 3-inch catchment cups, usually set on posts about 6 feet in height, and the observations are made by the local railroad agents. Their reports are sent in promptly to San Francisco and are there tabulated by a corps of clerks whose time is devoted entirely to this subject.

In many places in the high mountain districts, particularly at the greatest elevations, the gages have been lately furnished by the hydrographic branch of the United States Geological Survey. The gages used in these places are of the standard type, with an 8-inch measuring cup. Snow observations are made by melting the snow and reporting the resultant water.

## RELATION OF RAINFALL TO RUN-OFF IN CALIFORNIA.

### DIAGRAMS AND TABLES.

The accompanying diagrams and tables are presented as the result of a study of the available rainfall and run-off data for California watersheds.

As the run-off diagram was to be used in estimating the water supply available for various storage reservoirs for irrigation, it was thought best to represent the run-off in acre-feet per square mile. The majority of the discharge reports give the depth of run-off in inches. The accompanying table has been made for converting depth of run-off in inches to run-off in acre-feet per square mile, the following formula being used:

Depth of run-off in inches  $\times (0.0833 \times 640)$  = run-off in acre-feet per square mile.

*Table for converting depth of run-off in inches into acre-feet per square mile.*

Depth of run-off.	Acre-feet per square mile.	Depth of run-off.	Acre-feet per square mile.	Depth of run-off.	Acre-feet per square mile.	Depth of run-off.	Acre-feet per square mile.
<i>Inches.</i>		<i>Inches.</i>		<i>Inches.</i>		<i>Inches.</i>	
0.01	0.533	0.26	13.867	0.51	27.200	0.76	40.533
.02	1.067	.27	14.400	.52	27.733	.77	41.067
.03	1.600	.28	14.933	.53	28.267	.78	41.600
.04	3.133	.29	15.467	.54	28.800	.79	42.133
.05	2.667	.30	16.000	.55	29.333	.80	42.667
.06	3.200	.31	16.533	.56	29.867	.81	43.200
.07	3.733	.32	17.067	.57	30.400	.82	43.733
.08	4.267	.33	17.600	.58	30.933	.83	44.267
.09	4.800	.34	18.133	.59	31.467	.84	44.800
.10	5.333	.35	18.667	.60	32.000	.85	45.333
.11	5.867	.36	19.200	.61	32.533	.86	45.867
.12	6.400	.37	19.733	.62	33.067	.87	46.400
.13	6.933	.38	20.267	.63	33.600	.88	46.933
.14	7.467	.39	20.800	.64	34.133	.89	47.467
.15	8.000	.40	21.333	.65	34.667	.90	48.000
.16	8.533	.41	21.867	.66	35.200	.91	48.533
.17	9.067	.42	22.400	.67	35.733	.92	49.067
.18	9.600	.43	22.933	.68	36.267	.93	49.600
.19	10.133	.44	23.467	.69	36.800	.94	50.133
.20	10.667	.45	24.000	.70	37.333	.95	50.667
.21	11.200	.46	24.533	.71	37.867	.96	51.200
.22	11.733	.47	25.067	.72	38.400	.97	51.733
.23	12.267	.48	25.600	.73	38.933	.98	52.267
.24	12.800	.49	26.133	.74	39.467	.99	52.800
.25	13.333	.50	26.667	.75	40.000	1.00	53.333

At the outset many difficulties presented themselves. The most serious one was that of obtaining measurements of rainfall at the higher elevations. The streams having the largest run-off, and on which discharge records had been kept, have their sources on the western slopes of the high Sierra Nevada, where there are few or no inhabitants above 7,000 feet, and consequently no observers of rainfall; but the valuable rainfall records of the Pacific Railway system along the line of railway from Sacramento to the summit of the Sierra Nevada at Railroad Pass offered a solution of this difficulty. In fig. 1 the mean rainfall and the elevation of the station are plotted as ordinates, and the distance inland of the station as abscissas.

The rate of increase of precipitation from Sacramento to Cisco, at the elevation of 6,000 feet, the point of maximum rainfall, seems to

be 0.6 inch per 100 feet of rise. The precipitation above the 6,000-foot point decreases with the elevation approximately at the rate of 0.4 inch per 100 feet of rise.

Fortunately, in Tuolumne River Basin, about midway between American and King river basins, there is another series of rainfall stations, including Lagrange, elevation 293 feet above sea level; Sonora, elevation 1,824 feet; Second Garrote, elevation 2,900 feet, and Crockers, elevation 4,453 feet. The mean rainfall of these stations, plotted as in the above diagram, indicates the rate of increase from Lagrange to Crockers to be 0.84 inch per 100 feet of rise. This rate of increase has been taken to hold good up to an elevation of 6,000 feet, and above this the rate of decrease of rise to be 0.4 inch per 100 feet to an elevation of 9,000 feet. Probably the rate of increase and

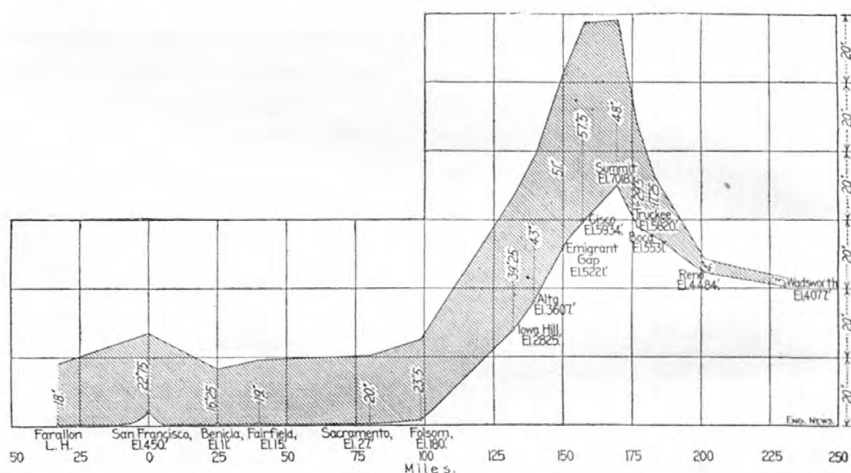


FIG. 1.—Diagram showing increase of rainfall with rise in elevation over the Sierras in central California.

decrease would be more correctly represented by a curved line, but the data are not sufficient to warrant such representation.

At these rates of increase and decrease, the mean precipitation for the years 1896-1899, at an elevation of 9,000 feet in the Tuolumne River Basin, would be 49.8 inches; if snow converts into water at the ratio of 8 to 1, the snowfall would be 33.2 feet at this elevation.

It was found impossible to use the run-off data of Kern River Basin—though that stream is without doubt more closely watched than any other stream in the State and the record is the oldest for any large stream in the State—because of the exposure of the watershed and because of the scarcity of rainfall data. This watershed is bounded on the west for almost its entire length by a high mountain range. Concerning the precipitation on the eastern slope of this range, little is known beyond the fact that it is very much less than on the western slope.

In 1896 the total run-off from King River Basin, comprising 1,775 square miles, was 1,871,005 acre-feet. For the same year the run-off from Kern River Basin was 619,630 acre-feet. The ratio of the area of King River Basin to Kern is 1 to 1.32, and the ratio of run-off, 1 to 0.33, though the higher drainage areas of the streams are contiguous. It was also thought best not to use the run-off and rainfall data for Piru Creek Basin, furnished by the Antelope Valley Water Company, because the ratio of discharge in acre-feet per square mile was greater than any other record. There is little doubt about the accuracy of both the run-off and precipitation records, the explanation being that the rainfall observation stations were necessarily situated at so low an elevation that the record did not represent the mean rainfall for the higher portions of the basin.

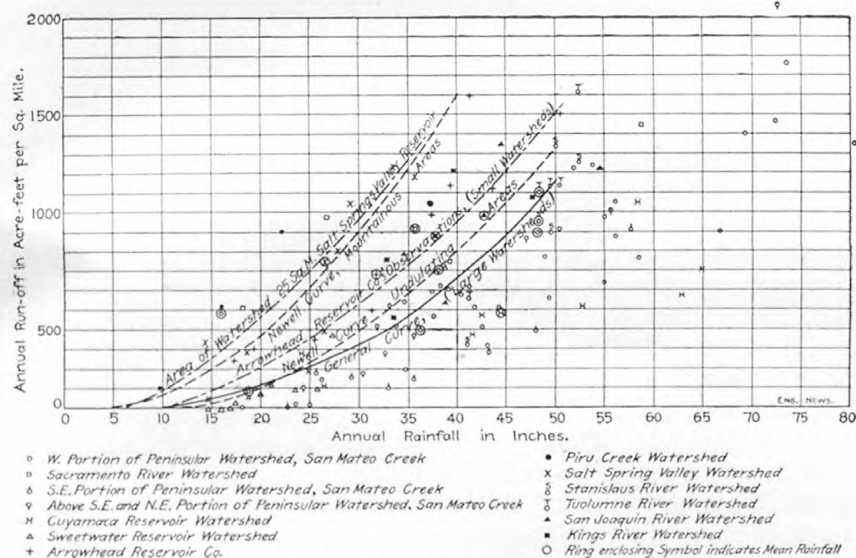


FIG. 2.—Annual and mean run-off from California watersheds, based on several years' observations.<sup>a</sup>

The run-off and rainfall data of the streams which were used to make the discharge diagram, fig. 2, will be mentioned in the order from north to south in which their watersheds occur.

#### STATISTICS BY BASINS.

*Sacramento River Basin.*—The rainfall stations used in determining the mean annual precipitation for Sacramento River Basin were the following: Red Bluff, Rosewood, Redding, Delta, Dunsmuir, Shasta, Sisson, and Fort Bidwell.

There were absolutely no records for the great interior mountain-

<sup>a</sup> For derivation of "Newell curves," see Nineteenth Ann. Rept. U. S. Geol. Survey, pt. 2, 1894, p. 151.



ous and lava country in Siskiyou, Modoc, and Lassen counties, comprising more than 5,334 square miles of the watershed.

Fort Bidwell is situated outside of the watershed, on the eastern slope of the mountains that form the boundary, and would probably have a less rainfall than Modoc County. The record was kept there for a period of twenty-two years, and the mean rainfall is 20.8 inches.

The average rainfall at Red Bluff for a period of twenty-three years was 23.9 inches; at Rosewood, for a period of six years, 25.63; at Redding, for twenty-four years, 35.69 inches. The precipitation at these three latter stations was taken to get the average for Sacramento Valley for the years 1896-1899, during which years run-off measurements were made at Jellys Ferry. The mean rainfall of Pit River drainage area (5,334 square miles), which has an average elevation of 5,000 feet, was taken to be the same as that of the Sacramento Basin above Red Bluff.

The average rainfall at Delta for a period of fourteen years was 62.39 inches; at Dunsmuir, for ten years, 57.16 inches; at Shasta, for six years, 53.26 inches; at Sisson, for ten years, 32.75 inches. The rainfall at these four stations was taken to obtain the mean rainfall for the mountainous area of the watershed for the years 1896-1899.

*San Mateo Creek.*—The Spring Valley Water Company's record of rainfall and run-off from the watershed of San Mateo Creek is without doubt the oldest record in the State, having been kept for thirty years. In the table given on page 390 of Water-Supply and Irrigation Paper No. 38 of the United States Geological Survey, no allowance has been made for evaporation from the surface of the reservoir; 20 per cent has here been added to the run-off as calculated from those tables to cover evaporation. The drainage basin of San Mateo Creek ranges in elevation from 250 to 1,800 feet, with an average of about 750 feet. The hills are undulating. There is a limited growth of timber on the northern slopes near the summit, but a large amount of brush covers other portions of the basin. On the southern slopes and crest the hills are frequently bare of brush, but are covered with grasses.

*Salt Springs Valley watershed.*—The basin of Salt Springs Valley is largely of red clay, which scantily covers a bed rock of granite and slate. The topography is undulating rather than mountainous, about 20 per cent of the total drainage area being valley land. There is little brush or timber in the valley, and only a scattered growth of oak and scrubby pine on the hills. To obtain the mean for the basin 10 per cent has been added to the rainfall for North Hill, 6 miles northwest of the dam. To obtain the total run-off for the basin 4,132 acre-feet have been added to the amounts given in the table on page 337, Part IV, of the Eighteenth Annual Report of the United States Geological Survey, to compensate for evaporation from the reservoir surface.

The methods of measurement of discharge from the reservoir are

very crude, and this may partly account for the very high percentage of run-off from this basin, which contains 25 square miles.

*Stanislaus River Basin.*—No rainfall data were obtained for this basin, but since it joins the Tuolumne and is in most respects similar to that, the rainfall for Tuolumne Basin has been taken to apply to both.

*Tuolumne River Basin.*—To obtain the mean rainfall for this basin the average elevations and the areas of the various portions were taken from the topographic maps of the United States Geological Survey. The areas were obtained by the use of a planimeter. La Grange was taken as the base station, and the percentage of increase for the various elevations is shown by the diagram, fig. 1. The following example, for the year 1896, will illustrate more particularly the method:

*Table of estimated rainfall, Tuolumne River Basin.*

Average elevation.	Number of square miles.	Estimated rainfall, 1896.	Mile-inches.
1,200	75	26.4	1,980
1,500	88	29.0	2,552
2,500	182	37.4	6,807
3,500	46	45.8	2,107
4,000	105	50.0	5,252
4,500	147	54.2	7,967
5,500	90	60.9	5,481
6,000	143	63.3	9,052
6,500	105	61.3	6,437
7,500	189	57.3	10,830
9,000	330	51.3	16,927
1,500	-----	-----	75,692

$$\frac{75,692}{1,500} = 50.3 \text{ inches mean for basin, 1896.}$$

*San Joaquin and King river basins.*—There were practically no rainfall data for either San Joaquin or King River Basin.

The estimated mean rainfall for Tuolumne River Basin for the years 1896-1899 is 48.2 inches; the depth of mean run-off for the same period is 20.8 inches; the depth of mean run-off for San Joaquin River for this period is 18.4 inches. Since the topography, exposure, etc., in the two basins are similar, the rainfall will probably be proportional to the run-off.

Example, 20.8 : 18.4 : : 48.2 : 42.7. Similarly, the mean rainfall for King River Basin will be 37.8 inches.

*Mohave River.*—The meteorologic and hydrographic work of the Arrowhead Water Company has been carried on for a number of years at the head of Mohave River. Twenty-eight rain gages, carefully located at elevations of from 2,100 to 7,200 feet, have been maintained. The measurements of run-off from several tributaries have been made over weirs. The areas of the basins are each less than 50 square miles. The watershed is covered with a thick growth of timber on the crest. The growth of timber diminishes as the desert is approached, the northern part of the watershed being covered with brush only. The mean elevation of the watershed above sea level is about 5,250 feet.

*Cuyamaca reservoir watershed.*—The area of this watershed is 11 square miles and the mean elevation above sea-level is probably 5,500 feet.

The run-off is carefully measured. There is only one rain gage maintained, and that is at the dam. The resident engineer, Mr. F. S. Hyde, says that as this rain gage is located between two high wooded peaks, which act as condensers of the moisture-laden clouds, the recorded precipitation is undoubtedly heavier than the average of the watershed. This probably explains why the mean annual run-off is so far below the general curve.

*Sweetwater reservoir basin.*—The evaporation and run-off records from this basin date from 1888, and have been very carefully kept.

There is no doubt that many of the points on the curves (fig. 2) would be changed if we had more definite information as to the rainfall, but the curves are the best that could be made from the information at hand. The mean discharge for the period of observation on each stream is used, together with the mean rainfall for the same years. These means are considered the more satisfactory, as they tend to eliminate erratic stream and rainfall records.

## EVAPORATION.

### LAKE TAHOE.

On May 17, 1900, a galvanized-iron tank, 2 feet square and 2 feet deep, was placed in Lake Tahoe at its outlet, where it would be protected from the heavy waves of the lake, for the purpose of measuring the evaporation from the lake surface. A finely divided scale was placed in this tank, and daily readings taken at about the same hour of each day by Mr. J. U. Haley, general freight and passenger agent of the Lake Tahoe Railway and Transportation Company. The tank was at all times kept full to within 1 or 2 inches of the top, and was floated by means of a timber frame, which also served as a protection from waves and drift, so that the water level inside and outside was about the same. The depth of water in which the tank was anchored was about 6 feet, and the water in the tank was fully exposed to wind and

sun. The following table shows the monthly evaporation from May 17 to November 30.<sup>a</sup>

*Evaporation at Lake Tahoe, as measured in tank in lake at Tahoe City.*

Date.	Depth in inches.
1900.	
May 17 to 31 .....	1.83
June .....	3.80
July .....	4.00
August .....	5.15
September .....	3.10
October .....	2.15
November .....	1.38
Total .....	21.41

While it is possible that the evaporation from the lake surface was somewhat greater than from the tank, owing to its greater roughness and consequent greater surface, relatively, in contact with the air during high winds, it is believed that the results here given are as near to the truth as it is possible to attain, and that they represent very closely the loss of water which may be expected from evaporation from natural lakes or storage reservoirs situated at about 6,000 feet altitude in this portion of the Sierras during the period over which the record extends.

#### RENO, NEV.

During the year 1894, from May 11 to November 30, a series of observations were made at Reno, Nev., with a view to determining approximately the depth of evaporation at that point. For this purpose a small galvanized-iron tank, 18 inches square and 18 inches deep, was sunk in the ground until the rim was but half an inch above the surface. This was kept filled to within less than 1 inch of the top at all times and was so placed that it was fully exposed to the sun and wind. The earth immediately around the tank was kept wet. The results, while not absolutely reliable as an index to the actual evaporation from a lake reservoir or canal surface, are believed to be a fairly close approximation to what would occur from such a surface at Reno, and since the conditions influencing evaporation—temperature, humidity of atmosphere, winds, etc.—over the lower portion of the Truckee River Basin are nearly identical with those at Reno, they should be roughly applicable to other points in that portion of the basin.

<sup>a</sup>Taylor, H. L., Water storage in the Truckee Basin: Water-Sup. and Irr. Paper No. 68, U. S. Geol. Survey, 1902.



*Evaporation from tank in earth at Reno, Nev.*

Date.	Depth in inches.
1894.	
May 11 to 31 .....	2.80
June .....	5.35
July .....	8.45
August .....	9.12
September .....	7.44
October .....	4.31
November .....	2.75
Total .....	40.22

## SWEETWATER RESERVOIR.

The following table shows the amount of evaporation, wind movement, humidity, and temperature at Sweetwater reservoir for a series of years:

*Annual evaporation, temperature, etc., in Sweetwater Basin, San Diego County.*

[Elevation of reservoir, 250 feet.]

Period.	Evaporation.	Wind.	Humidity.	Temperature of air.	Temperature of water.
	Inches.	Miles per hour.	Per cent.	°F.	°F.
1889-90 .....	56.47	4.9			
1890-91 .....	57.54	4.6			
1891-92 .....	58.65	4.8	72	61	68
1892-93 .....	49.60	4.9	68	61	67
1893-94 .....	48.68	5.1	70	60	67
1894-95 .....	46.31	5.2	79	59	
1895-96 .....	45.18	5.2	71	61	
1896-97 .....	<sup>a</sup> 41.24	5.3	76	61	
1897-98 .....	61.93	5.9	73	60	
1898-99 .....	<sup>b</sup> 32.54	5.8	72	59	

<sup>a</sup> Evaporation January 1 to August 31.

<sup>b</sup> Evaporation September 1 to April 30.

KERN AND TULARE COUNTIES. <sup>a</sup>

To ascertain the amount of evaporation from exposed surfaces of water, experiments have been made in Kern County at various points, and in Tulare County at Kingsburg.

The experiments in Kern County commenced in the latter part of

<sup>a</sup> Authority, Physical Data and Statistics of California.

June, 1879, and were continued at several localities through July, August, and September, the three hottest months of the year. Subsequently observations were made until December 20, 1879, at Rio Bravo ranch, about 10 miles east of Bakersfield. The experiments at Kingsburg, Tulare County, commenced on November 1, 1881, and were continued to November 1, 1885.

In making the Kern County experiments pans of galvanized iron 2 feet square and 1 foot deep were used, some of the observations being made in pans floated in large bodies of water, and others in pans set in open ground, as will be explained more fully for each of the records.

The pans used in making the later observations at Kingsburg were 3 feet square and 15 inches deep. The water surface was maintained about 5 inches below the rim of the pan.

The amount of water required from time to time to maintain its surface in the pans at a fixed height was measured in standard cups prepared for the purpose and graduated to represent depth of water in the pan for which they were used.

When floated in a lake or river the pans were protected from the splash of waves. The contrivance used in King River, at Kingsburg, for this purpose was a large wooden frame, into which the pan was fitted so as to float horizontally, but not be protected from the sun or movement of the air.

Observers at Kingsburg were instructed, among other things—

To fill the pan to the normal plane once every day during the summer months; less frequently at other seasons of the year.

To take an observation at the commencement of every fall of rain, and to restore the water surface to the normal plane at the end of every fall of rain.

To keep a daily record of the temperature of the air, of the water in the pan, and of the water surrounding the pan.

To keep a rainfall record.

The earlier observations made in Kern County were conducted less systematically, but still with sufficient care and thoroughness to serve a good purpose.

The results of the observations made in Kern County are embodied in Tables No. 1 to 6, which are a rearrangement of data published by the State engineering department in the report of 1880.

In Table No. 1 are given the results of the experiment made in Reeder Lake, which is a narrow body of water, 12 to 15 feet deep, surrounded by large cottonwood trees and willows. The pan was placed in a shallow arm of the lake, fully exposed to the sun, but protected from the wind.

Panama Slough (see Table No. 2) was selected for another set of observations. The pan was placed in running water 10 feet deep, showing a much lower temperature than Reeder Lake. It was fully exposed to the sun, but protected from the wind.

The pan in the center of Kern Lake (Table No. 3) was about 2 miles from shore, in 5 feet of water. On September 5, 13, and 29 the wind was northwest; on September 19 it was southwest.

The pan near the shore of Kern Lake (Table No. 4) was placed on the northeast side of the lake, in about 2 feet of water.

In Tables No. 5 and 6 are given the results of observations made at the Rio Bravo ranch, 3 miles below the mouth of Kern River Canyon. The pan in Kern River was freely exposed to sun and wind, but was immersed in water to within 2 inches of its top. The pan placed on top of the ground was free to the action of all elements, producing extreme evaporation.

In Tables No. 7 to 11 are presented, in condensed form, the results of observations covering a period of four years. The total depth of water evaporated during each month, each period of three months, and each year is given in a separate table for each of the four years. The tables contain also the averages of daily temperature records.

Table No. 11 is one of averages, in which columns are added, showing the rate of evaporation per twenty-four hours, and the amount evaporated per second per square mile, during the different time periods.

The pan in the air referred to in the Kingsburg tables was, after the first three months, set into the ground, earth being banked up around its sides to the same elevation as the water in it. Its surface was fully exposed to sun and wind. During November and December, 1881, and January, 1882, this pan was on the railroad bridge, exposed on all sides to sun and air.

*Evaporation at several points in Kern County, June to December, 1879.*

TABLE NO. 1.—PAN IN REEDER LAKE.

Date.	Time of day.	Temperature (degrees F.).			Evaporation (depth in feet).	Evaporation per 24 hours (depth in feet).	Evaporation in cubic feet per second per square mile.
		Water in pan.	Water surrounding pan.	Air.			
1879.							
June 23 .....	9.55 a. m. ....	-----	-----	-----	-----	-----	-----
June 23 to 25 .....	6.25 a. m. ....	83 .....	-----	92 .....	0.040 .....	0.0168 .....	5.42 .....
June 25 to 28 .....	7.50 p. m. ....	81 .....	-----	90 .....	.068 .....	.0222 .....	7.12 .....
June 28 to 30 .....	5 p. m. ....	82 .....	-----	79 .....	.035 .....	.0187 .....	6.04 .....
June 30 to July 5 .....	4.50 p. m. ....	87 .....	-----	73 .....	.096 .....	.0192 .....	6.20 .....
July 5 to 8 .....	5 p. m. ....	92 .....	-----	77 .....	<i>a</i> .072 .....	<i>a</i> .0240 .....	<i>a</i> 7.74 .....
June 23 to July 8.	-----	-----	-----	-----	.311 .....	.0203 .....	6.56 .....

*a* Water fell, leaving the pan at the top 6 inches above water surface.

*Evaporation at several points in Kern County, June to December, 1879—Cont'd.*

TABLE NO. 2.—PAN IN PANAMA SLOUGH.

Date.	Time of day.	Temperature (degrees F.).			Evaporation (depth in feet).	Evaporation per 24 hours (depth in feet).	Evaporation in cubic feet per second per square mile.
		Water in pan.	Water surrounding pan.	Air.			
1879.							
July 9	12.30 p. m.						
July 9 to 11	6.20 p. m.	72		76	0.030	0.0134	4.34
July 11 to 21	9 a. m.						
July 21 to 24	6.50 p. m.			88	.037	.0108	3.48
July 24 to 29	6.15 p. m.	76	71	88	.054	.0108	3.48
July 29 to August 5.	7 p. m.	79	77	92			
August 5 to 13	7 a. m.	72	74	76			
August 13 to 20.	6.45 a. m.	64	67	68	.084	.0120	3.87
July 9 to August 20.					<i>a</i> .490	<i>a</i> .0116	<i>a</i> 3.74

*a* Approximate.

TABLE NO. 3.—PAN IN CENTER OF KERN LAKE.

1879.							
August 30	10.40 a. m.	88	86	90			
August 30 to September 5.	11.30 a. m.	89	81	90	0.105	0.0175	5.63
September 5 to 13.	12.30 p. m.	86	86	118	.096	.0119	3.90
September 13 to 19	12.05 p. m.	86	86	120	.150	.0250	8.08
September 19 to 29	12.10 p. m.	78	78	88	.180	.0180	4.80
August 30 to September 29.					.531	.0173	5.70

TABLE NO. 4.—PAN NEAR SHORE OF KERN LAKE.

1879.							
August 14	10.40 a. m.						
August 14 to 30	10.40 a. m.	88	86	90	0.480	0.0300	9.67
August 30 to September 5.	11.10 a. m.	79	83	90	.201	.0334	9.31
September 5 to 13.	12 m.	88	90	118	.195	.0242	7.81
September 13 to 19	12 m.	81	89	120	.156	.0259	8.36
September 19 to 29	12 m.	76	80	88	.189	.0190	6.13
August 14 to September 29.					1.221	.0265	8.55



*Evaporation at several points in Kern County, June to December, 1879—Cont'd.*

TABLE NO. 5.—PAN IN KERN RIVER AT THE RIO BRAVO RANCH.

Date.	Time of day.	Temperature (degrees F.).			Evapo- ration (depth in feet).	Evapora- tion per 24 hours (depth in feet).	Evapora- tion in cubic feet persquare mile.
		Water in pan.	Water surround- ing pan.	Air.			
1879.							
October 2							
October 2 to 11	4 p. m.	66	64	74	0.104	0.0116	3.73
October 11 to 18	4 p. m.	68	66	84			
October 18 to 25	4 p. m.	68	66	78	.052	.0074	2.38
October 25 to No- vember 1.	4 p. m.	62	61	67	.052	.0074	2.38
November 1 to 8	4 p. m.	55	55	63	.045	.0064	2.06
November 8 to 15	4 p. m.	56	56	62			
November 15 to 22	4 p. m.	54	54	64	.030	.0043	1.38
November 22 to 29	4 p. m.	53	53	68	.030	.0043	1.38
November 29 to December 6.	4 p. m.	52	52	54	.030	.0043	1.38
December 6 to 13	4 p. m.	50	50	54	.030	.0043	1.38
December 13 to 20	4 p. m.	52	52	54	.030	.0043	1.38
October 2 to December 20.					a.408	a.0052	a1.67

a Approximate.

TABLE NO. 6.—PAN ON OPEN GROUND AT THE RIO BRAVO RANCH.

1879.							
October 2	7 a. m.						
October 2 to 3	1 p. m.	68		94	0.037	0.0292	9.40
October 3 to 11	4 p. m.	68		74	.148	.0180	5.80
October 11 to 18	4 p. m.	80		84	.071	.0101	3.25
October 18 to 25	4 p. m.	78		78	.147	.0210	6.76
October 25 to No- vember 1.	4 p. m.	70		67	.148	.0211	6.79
November 1 to 8	4 p. m.	58		63	.113	.0176	3.46
November 8 to 15	4 p. m.	65		62	.030	.0043	1.38
November 15 to 22	4 p. m.	64		64	.070	.0100	3.22
November 22 to 29	4 p. m.	62		68	.052	.0074	2.38
November 29 to December 6.	4 p. m.	58		54	.015	.0021	.68
December 6 to 13	4 p. m.	55		54	.037	.0053	1.71
December 13 to 20	4 p. m.	55		54	.037	.0053	1.71
October 2 to December 20.					.906	.0115	3.70

*Evaporation at Kingsburg Bridge, King River.*

TABLE NO. 7.—NOVEMBER 1, 1881, TO OCTOBER 31, 1882.

[Elevation 297 feet.]

Date.	Time of day.	Temperature of air.	Pan in river.			Pan in air.	
			Temperature of water in river.	Temperature of water in pan.	Evaporation (depth in feet).	Temperature of water in pan.	Evaporation (depth in feet).
1881.							
November	4.30 p. m.	66	56	55	0.220	60	0.335
December	4.30 p. m.	55	52	52	.050	55	.120
1882.							
January	4.30 p. m.	54	52	50	.090	53	.200
February	5 p. m.	56	55	54	.115	56	.105
March	5.15 p. m.	64	60	59	.180	66	.265
April	5.15 p. m.	73	63	62	.260	72	.435
May	5.45 p. m.	84	63	63	.305	77	.835
June	6.30 p. m.	88	67	68	.475	83	.940
July	6.30 p. m.	98	80	81	.660	91	1.075
August	6 p. m.	96	84	85	.665	85	.875
September	6 a. m.	81	73	73	.475	75	.575
October	10 a. m.	68	63	63	.135	60	.195
November to January. <sup>a</sup>					.360		.655
February to April. <sup>b</sup>					.555		.805
May to July. <sup>c</sup>					1.440		2.850
August to October. <sup>d</sup>					1.275		1.645
Total, November to October.					3.630		5.955

<sup>a</sup>First period.<sup>b</sup>Second period.<sup>c</sup>Third period.<sup>d</sup>Fourth period.

*Evaporation at Kingsburg Bridge, King River—Continued.*

TABLE NO. 8.—NOVEMBER 1, 1882, TO OCTOBER 31, 1883.

Date.	Time of day.	Tempera- ture of air.	Pan in river.			Pan in air.	
			Tempera- ture of water in river.	Tem- pera- ture of water in pan.	Evapora- tion (depth in feet).	Tempera- ture of water in pan.	Evapora- tion (depth in feet).
1882.							
November .....	10 a. m. ....	53	52	52	0.115	49	0.100
December .....	10 a. m. ....	51	50	50	.085	46	.090
1883.							
January .....	10 a. m. ....	43	44	43	.060	41	.040
February .....	10 a. m. ....	54	50	49	.100	52	.070
March .....	10 a. m. ....	69	63	62	.305	60	.310
April .....	10 a. m. ....	67	61	62	.270	61	.260
May .....	10 a. m. ....	76	61	63	.160	67	.310
June .....	10 a. m. ....	92	68	71	.500	77	.850
July .....	10 a. m. ....	96	82	84	.760	78	.970
August .....	10 a. m. ....	93	82	83	.920	75	.970
September .....	10 a. m. ....	88	78	79	.730	73	.705
October .....	10 a. m. ....	69	62	62	.400	57	.290
November to Jan- uary. <sup>a</sup>	10 a. m. ....	49	49	48	.260	45	.230
February to April <sup>b</sup>	10 a. m. ....	63	58	58	.675	58	.640
May to July <sup>c</sup> .....	10 a. m. ....	88	70	73	1.420	74	2.130
August to Octo- ber. <sup>d</sup>	10 a. m. ....	83	74	75	2.050	68	1.965
Total, No- vember to October.	10 a. m. ....	71	63	64	4.405	61	4.965

<sup>a</sup> First period.<sup>b</sup> Second period.<sup>c</sup> Third period.<sup>d</sup> Fourth period.

*Evaporation at Kingsburg Bridge, King River—Continued.*

TABLE NO. 9.—NOVEMBER 1, 1883, TO OCTOBER 31, 1884.

Date.	Time of day.	Tempera- ture of air.	Pan in river.			Pan in air.	
			Tempera- ture of water in river.	Tem- pera- ture of water in pan.	Evapora- tion (depth in feet).	Tempera- ture of water in pan.	Evapora- tion (depth in feet).
1883.							
November .....	10 a. m. ....	59	55	54	0.170	52	0.140
December .....	10 a. m. ....	49	48	47	.080	44	.065
1884.							
January .....	9 a. m. ....	47	48	48	.105	44	.075
February .....	9 a. m. ....	52	52	52	.050	49	.060
March .....	9 a. m. ....	61	56	57	.090	57	.105
April .....	9 a. m. ....	67	60	61	.160	61	.180
May .....	9 a. m. ....	76	59	61	.320	69	.400
June .....	9 a. m. ....	77	57	60	.295	61	.505
July .....	9 a. m. ....	83	61	63	.380	73	.670
August .....	9 a. m. ....	78	64	66	.370	69	.670
September .....	9 a. m. ....	75	63	63	.320	64	.520
October .....	9 a. m. ....	68	62	63	.350	60	.310
November to Jan- uary <sup>a</sup> .....					.355		.280
February to April <sup>b</sup>	9 a. m. ....	60	56	57	.300	56	.345
May to July <sup>c</sup> .....	9 a. m. ....	79	59	61	.995	68	1.575
August to Octo- ber <sup>d</sup> .....	9 a. m. ....	74	63	64	1.040	64	1.500
Total, No- vember to October .....					2.690		3.700
<sup>a</sup> First period.		<sup>b</sup> Second period.		<sup>c</sup> Third period.		<sup>d</sup> Fourth period.	

<sup>a</sup>First period.<sup>b</sup>Second period.<sup>c</sup>Third period.<sup>d</sup>Fourth period.

*Evaporation at Kingsburg Bridge, King River—Continued.*

TABLE No. 10.—NOVEMBER 1, 1884, TO OCTOBER 31, 1885.

Date.	Time of day.	Tempera- ture of air.	Pan in river.			Pan in air.	
			Tempera- ture of water in river.	Tem- pera- ture of water in pan.	Evapora- tion (depth in feet).	Tempera- ture of water in pan.	Evapora- tion (depth in feet).
1884.							
November .....	9 a. m. ....	58	58	57	0.200	55	0.120
December .....	9 a. m. ....	50	48	47	.180	48	.140
1885.							
January .....	9 a. m. ....	48	50	49	.010	47	.010
February .....	9 a. m. ....	54	53	53	.140	51	.130
March .....	9 a. m. ....	65	60	60	.240	59	.220
April .....	9 a. m. ....	68	62	63	.160	63	.270
May .....	9 a. m. ....	75	63	65	.340	68	.660
June .....	9 a. m. ....	77	65	68	.660	71	.810
July .....	9 a. m. ....	84	72	74	.710	74	.900
August .....	9 a. m. ....	86	72	72	.930	72	.930
September .....	9 a. m. ....	79	74	74	.640	71	.660
October .....	9 a. m. ....	71	67	66	.470	63	.360
November to Jan- uary. <sup>a</sup>	9 a. m. ....	52	52	51	.390	50	.270
February to April <sup>b</sup>	9 a. m. ....	62	58	60	.540	58	.620
May to July <sup>c</sup> .....	9 a. m. ....	79	67	69	1.710	71	2.370
August to Octo- ber. <sup>d</sup>	9 a. m. ....	79	71	71	2.040	69	1.950
Total, No- vember to Octo- ber.	9 a. m. ....	63	62	63	4.680	62	5.210

<sup>a</sup>First period.<sup>b</sup>Second period.<sup>c</sup>Third period.<sup>d</sup>Fourth period.



*Evaporation at Kingsburg Bridge, King River—Continued.*

TABLE NO. 11.—NOVEMBER 1, 1881, TO OCTOBER 31, 1885.

[Average for four years.]

Date.	Pan in river.			Pan in air.		
	Evapora- tion (depth in feet).	Evapora- tion per 24 hours (depth in feet).	Evapora- tion in cubic feet per second per square mile.	Evapora- tion (depth in feet).	Evapora- tion per 24 hours (depth in feet).	Evapora- tion in cubic feet per second per square mile.
November .....	0.176	0.0059	1.89	0.174	0.0058	1.87
December .....	.099	.0032	1.03	.104	.0034	1.08
January .....	.066	.0021	.69	.081	.0026	.84
February .....	.101	.0036	1.16	.091	.0033	1.05
March .....	.204	.0066	2.12	.225	.0073	2.34
April .....	.213	.0071	2.29	.286	.0095	3.08
May .....	.281	.0091	2.93	.551	.0178	5.74
June .....	.483	.0161	5.20	.776	.0259	8.35
July .....	.628	.0203	6.54	.904	.0292	9.41
August .....	.721	.0233	7.51	.861	.0278	8.96
September .....	.541	.0180	5.82	.615	.0205	6.62
October .....	.339	.0109	3.53	.289	.0093	3.01
November to January <sup>a</sup> .....	.341	.0037	1.20	.359	.0039	1.26
February to April <sup>b</sup> .....	.518	.0058	1.88	.603	.0068	2.19
May to July <sup>c</sup> ..	1.391	.0151	4.88	2.231	.0243	7.83
August to Octo- ber <sup>d</sup> .....	1.601	.0174	5.61	1.765	.0192	6.19
Total No- vember to Octo- ber .....	3.851	.0106	3.40	4.958	.0136	4.38
<sup>a</sup> First period. <sup>b</sup> Second period. <sup>c</sup> Third period. <sup>d</sup> Fourth period.						

## CLEAR LAKE, LAKEPORT, CAL.

Evaporation records have been kept by the United States Geological Survey at Lakeport, Cal., on Clear Lake, since February 1, 1901. The evaporation pan is 3 feet square and 1.5 feet deep, and is floated on a triangular raft anchored in a cove where it is not exposed to the full force of the wind. Evaporation observations were begun on the

land at the same point September 15, 1901. Capt. D. C. Rumsey is the observer. The following table gives the evaporation by months:

*Evaporation record of Clear Lake, Lakeport, Cal.*

1901.	Lake.	Land.	1902.	Lake.	Land.
January .....	<sup>a</sup> 0.85	.....	January .....	0.85	0.85
February .....	.95	.....	February .....	.25	.30
March .....	2.40	.....	March .....	1.60	1.55
April .....	3.05	.....	April .....	2.60	2.35
May .....	3.70	.....	May .....	4.00	3.70
June .....	3.95	.....	June .....	4.65	5.15
July .....	5.15	.....	July .....	6.65	7.40
August .....	5.00	.....	August .....	4.40	4.95
September .....	3.35	<sup>b</sup> 1.60	September .....	4.10	4.40
October .....	2.30	2.45	October .....	1.95	1.85
November .....	.85	1.05	November .....	.45	.45
December .....	1.30	.95	December .....	.40	.45
Total for period of observa- tions.	32.85	6.05	Total for period of observa- tions.	31.90	33.40

<sup>a</sup> Estimated.

<sup>b</sup> September 15-29 only.

### DISCHARGE TABLES.

The following tables, showing measurements of the discharge of California streams, are arranged alphabetically under the names of the streams considered.

#### AGUILAR CREEK.

*Discharge measurement of Aguilar Creek.*

Date.	Hydrographer.	Dis- charge.	Locality.
Aug. —, 1899 .....	G. F. Wright .....	<i>Sec.-ft.</i> .12	Santa Barbara County.

#### ALAMEDA CREEK.

Alameda Creek, in Alameda County, Cal., flows westerly into San Francisco Bay. The stream passes through narrows at Niles, where a weir dam known as the Niles dam is situated, and below this point spreads over certain absorbent gravel beds, at the lower end of which wells supplying considerable volumes of water are located. In the crest of the Niles dam is a rectangular weir opening. The length of this weir can be adjusted by inserting flash boards or planks. When the water reaches high stages it fills the rectangular weir opening

and flows over the top of the walls of the dam on the side, so that the large flood measurements that have been computed contain considerable elements of error. The measurements of smaller volumes, however, are doubtless more accurate. The Spring Valley Water Company, of San Francisco, has a pumping station which is supplied from an intake above the Niles dam, so that the amount of water pumped, as given in the following tables, should be added to the amount of water passing over the weir, in order to get total discharge.

During a term of years the Spring Valley Water Company kept observations at this weir dam of the height of water on the weir and the length of weir, and also of the amount of water pumped. These data were presented as Exhibit 11 in a certain suit entitled "*Clough v. Crystal Springs Water Company of San Francisco*," involving water rights to Alameda Creek, tried in the Alameda County superior court in the fall of 1901.

The record is not entirely complete, but the available data were assembled and computations of discharge were made by this office, and average monthly flow is given in the following tables. In some instances uncertainty exists as to the proper length of weir. This matter has been taken up, however, with the Spring Valley Water Company, and all corrections have been made for which the data are available. While the record is not considered perfect, it is the best obtainable, and in view of the extent of the data it is deemed to be worthy of publication.

*Discharge measurements of Alameda Creek, Alameda County.*

Date.	Hydrographer.	Dis- charge.	Locality.
		<i>Sec.-ft.</i>	
Dec. 18, 1896	W. W. Brier	38.68	Niles dam.
Dec. 19, 1896	do	32.49	Do.
Dec. 20, 1896	do	30.94	Do.
Jan. 11, 1897	do	63.44	Do.
Jan. 12, 1897	do	57.25	Do.
Jan. 18, 1897	do	51.06	Do.
Dec. 18, 1896	do	7.74	3 miles below Niles.
Dec. 19, 1896	do	6.19	Do.
Dec. 20, 1896	do	.77	Do.
Jan. 11, 1897	do	44.87	Do.
Jan. 12, 1897	do	40.23	Do.
Jan. 18, 1897	do	34.04	Do.

*Estimated monthly discharge of Alameda Creek at Niles dam.*

Month.	Discharge over weir.			Quantity of water pumped.
	Maximum.	Minimum.	Mean.	
1889.	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Sec.-feet.</i>
January .....				12
February .....				11
March .....				8
April .....				13
May .....				13
June .....				12
July .....				11
August .....				7
September .....				5
October .....				7
November .....				8
December .....	2,577		996	4
The year .....				9.25
1890.				
January .....	7,792	412	1,664	2
February .....	2,813	237	1,007	
March .....	1,353	324	646	
April .....	412	176	242	
May .....	253	82	144	
June .....	88	41	62	
July .....	47	22	31	7
August .....	22	16	20	13
September .....	38	16	17	12
October .....	28	16	17	12
November .....	22	16	19	12
December .....	293	31	49	10
The year .....			326.5	5.7



*Estimated monthly discharge of Alameda Creek at Niles dam—Continued.*

Month.	Discharge over weir.			Quantity of water pumped.
	Maximum.	Minimum.	Mean.	
1891.	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Sec.-feet.</i>
January .....	165	38	58	9
February .....	3,311	38	457	10
March .....	3,965	98	424	5
April .....	253	84	147	10
May .....	79	47	60	12
June .....	47	22	32	12
July .....	19	2	9	12
August .....	2	0	2	12
September .....				10
October .....				10
November .....				10
December .....	1,701	0	84	10
The year .....			<sup>a</sup> 159.1	10.17
1892.				
January .....	324	22	78	8
February .....	279	47	86	12
March .....	2,016	54	190	11
April .....	752	62	168	9
May .....	324	41	111	11
June .....	34	14	23	12
July .....	14	0	<sup>b</sup> 4	12
August .....				9
September .....				6
October .....				6
November .....	3,566	599	<sup>c</sup> 4,332	7
December .....	4,951	120	997	3
The year .....				8.8

<sup>a</sup> Eight months' mean.<sup>b</sup> Mean of July 1 to 19, inclusive.<sup>c</sup> Mean of November 28 to 30, inclusive.

*Estimated monthly discharge of Alameda Creek at Niles dam—Continued.*

Month.	Discharge over weir.			Quantity of water pumped.
	Maximum.	Minimum.	Mean.	
1893.	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Sec.-feet.</i>
January .....	2,016	120	437	6
February <sup>a</sup> .....	2,577	237	743	0
March .....				
April .....				
May .....				
June .....				2
July .....				12
August .....				12
September .....				9
October .....				8
November .....				8
December .....				7
The year .....			<sup>b</sup> 590	5.3
1894.				
January .....				3
February .....				
March .....				1
April .....				8
May .....				8
June .....				8
July .....				8
August .....				8
September .....				8
October .....				8
November .....				2
December 9 to 31 .....	<sup>c</sup> 3,700	79	659	
The year .....				5.2

<sup>a</sup>No record for rest of year.<sup>b</sup>Two months' mean.<sup>c</sup>No record prior to December 9.

*Estimated monthly discharge of Alameda Creek at Niles dam—Continued.*

Month.	Discharge over weir.			Quantity of water pumped.
	Maximum.	Minimum.	Mean.	
1895.	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Sec.-feet.</i>
January .....	4,521	200	1,221	-----
February .....	<i>a</i> 2,577	206	625	-----
March .....	224	125	170	-----
April .....	176	71	124	-----
May .....	224	54	92	-----
June .....	58	16	30	-----
July .....	16	3	10	<i>b</i> 4
August .....	3	1	1	12
September .....	<i>c</i> 2	2	2	12
October .....	47	0	8	12
November .....	14	3	7	12
December .....	25	6	9	12
The year .....			191.6	<i>d</i> 10.7
1896.				
January .....	2,936	6	534	6
February .....	306	75	118	-----
March .....	200	79	121	-----
April .....	2,577	79	336	-----
May .....	224	54	137	-----
June .....	54	16	29	7
July .....	16	2	5	12
August .....	2	1	1	12
September .....	4	1	1	12
October .....	23	0	3	12
November .....	25	4	8	10
December .....	872	12	81	8
The year .....			115	6.6

*a* Record missing February 15 to 28, inclusive.*b* No record previous to July.*c* Record missing September 16 to 30, inclusive.*d* Six months mean.

*Estimated monthly discharge of Alameda Creek at Niles dam—Continued.*

Month.	Discharge over weir.			Quantity of water pumped.
	Maximum.	Minimum.	Mean.	
1897.	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Sec. feet.</i>
January	565	47	123	
February	2,577	224	837	
March	3,700	246	816	
April	639	98	227	
May	98	58	71	
June	54	19	25	
July	<i>a</i> 19	12	16	
August				8
September				8
October				8
November	<i>b</i> 14	4	7	8
December	( <i>c</i> )			2
The year				2.8
1898.				
January				
February				8
March				9
April				12
May	<i>d</i> 4	2	2	12
June	<i>e</i> 4	0	0	12
July				9
August				7
September				8
October	( <i>f</i> )			10
November	0	0	0	11
December	2	0	0	11
The year				9.1

*a* Mean of July 1 to 15, inclusive. No record for remainder of month.*b* No record from July 16 to November 15, inclusive.*c* No record from December 1, 1897, to May 22, 1898, inclusive.*d* No record from December 1, 1897, to May 22, 1898, inclusive.*e* June 18 to October 22, inclusive, water below crest.*f* No length of weir given from October 23 to November 18, inclusive.



*Estimated monthly discharge of Alameda Creek at Niles dam—Continued.*

Month.	Discharge over weir.			Quantity of water pumped.
	Maximum.	Minimum.	Mean.	
1899.	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Sec.-feet.</i>
January .....	431	0	41	8
February .....	4	0	2	11
March <sup>a</sup> .....				6
April .....	200	21	54	10
May .....	19	6	12	11
June .....	8	2	4	12
July .....	1	0	1	12
August .....	0	0	0	12
September .....				11
October .....				10
November .....	<sup>b</sup> 338	8	47	6
December .....	565	14	101	7
The year .....				9. 67
1900.				
January .....	3,700	41	297	5
February .....	47	25	34	12
March .....	306	25	112	7
April .....	71	25	35	12
May .....	31	7	17	12
June .....	<sup>c</sup> 6	1	4	12
July .....	1	0	0	12
August .....	1	0	0	12
September .....	<sup>d</sup> 17	0	4	10
October .....				12
November .....				<sup>d</sup> 9
December .....				
The year .....				<sup>e</sup> 10. 45

<sup>a</sup> Record incomplete.<sup>b</sup> August 17 to November 15, inclusive, water below crest.<sup>c</sup> No record from June 17 to 24, inclusive.<sup>d</sup> End of record.<sup>e</sup> Eleven months mean.

## ALDER CREEK.

Alder Creek is a tributary of the Santa Ana, in San Bernardino County. (See Santa Ana River, Alder Creek.)

## ALISO CREEK.

Aliso Creek rises in the Fernando hills. It is normally dry at the points of measurement. During the night preceding the measurements there had been 0.65 inch of rain. At the point of first measurement it is 1.5 miles from the foothills. The measurements show the manner in which the creek sinks. Just below the point of second measurement the water all disappears.

*Discharge measurements of Aliso Creek, San Fernando Valley.*

Date.	Hydrographer.	Dis-charge.	Locality.
1901.		<i>Sec.-foot.</i>	
January 28	J. B. Lippincott	0.60	At Chatsworth road crossing.
Do	do	.32	2 miles below road crossing.

## AMERICAN RIVER.

*Discharge measurements of American River, Sacramento County.*

Date.	Hydrographer.	Discharge.	Locality.
		<i>Sec.-feet.</i>	
Sept. —, 1898	J. B. Lippincott	34.5	Folsom.
Aug. 3, 1901	C. W. Landis	619	Do.
Sept. 18, 1901	J. B. Lippincott	23	Eldorado flume at Riverton.
Sept. 16, 1899	S. G. Bennett	86	Main river, 1 mile above South Fork.
Sept. 14, 1900	do	235	Do.
Sept. 16, 1899	do	20	North Fork ditch, 2½ miles above Folsom.
Sept. 14, 1900	do	12	Do.
Dec. 28, 1878	State engineering department.	570	4 miles above Folsom.
July 14, 1879	do	4,000	Do.
Jan. 24, 1879	do	13,000	Sacramento, Twelfth street bridge.
Feb. 23, 1879	do	10,000	Near mouth.
May 21, 1879	do	10,000	Do.

*Discharge measurements of South Fork of American River, Eldorado County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec. feet.</i>	
Aug. 21, 1902	S. G. Bennett	100	Chillie Bar, 3 miles from Placerville.
		5	Big Canyon Creek at Chillie Bar.
Aug. 22, 1902	do	12	South Fork of Silver Creek, 200 feet above mouth.
Do	do	30	Main Silver Creek, 150 feet above junction of South Fork of Silver Creek.
Aug. 23, 1902	do	30	Eldorado ditch, 1 mile from Pacific post-office.
Sept. 18, 1899	S. G. Bennett	<i>a</i> 20	South Fork at iron road bridge near mouth.
Sept. 14, 1900	do	80.5	Do.
Do	do	35	South Fork, Natoma ditch.
Sept. 18, 1900	do	<i>a</i> 20	Do.
Aug. 2, 1901	do	36	South Fork, Natoma ditch near Salmon Falls.
Sept. 13, 1901	J. B. Lippincott	<i>b</i> 28	Silver Creek below mouth of Little Silver.
Sept. 14, 1901	do	<i>c</i> 40	Do.
Sept. 13, 1901	do	<i>c</i> 25	South Fork at Riverton.
Sept. 18, 1901	do	<i>d</i> 16	Do.
Aug. 22, 1902	S. G. Bennett	11	Do.
Sept. 19, 1901	J. B. Lippincott	69	South Fork at Mosquito Bridge.
Aug. 19, 1902	Chas. A. Miller	7.5	Branch of Natoma ditch, South Fork of American River.
Do	do	40	Natoma ditch.
Aug. 22, 1902	do	29	Natoma ditch near Salmon Falls.
Do	do	7.9	Nigger Hill ditch near Salmon Falls.
Aug. 21, 1902	do	87	Iron bridge near mouth.
Aug. 23, 1902	do	102	2 miles above iron bridge.

*a* Estimated.*b* 4.30 p. m.*c* 8 a. m.*d* 11 a. m. Flume company is said to be diverting entire river at their intake above Riverton, but considerable water returns to the river from leaks in old flume.

*Discharge measurements of North Fork of American River.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-ft.</i>	
Aug. 25, 1902	S. G. Bennett -----	59	200 feet above Colfax, Iowa Hill road bridge.
Do -----	do -----	35	South Yuba Water Company's new power canal.
Aug. 21, 1902	Chas. A. Miller -----	204	Above junction with South Fork.
Aug. 23, 1902	do -----	145	1 mile above mouth of South Fork.
Aug. 27, 1902	do -----	121	Do.
Aug. 28, 1902	do -----	78	2½ miles from Auburn above mouth Middle Fork.
Aug. 26, 1902	do -----	14	North Fork Canal, second crossing of ditch from Folsom.

*Discharge measurements of Middle Fork of American River.*

Date.	Hydrographer	Dis-charge.	Locality.
		<i>Sec.-ft.</i>	
Aug. 26, 1902	S. G. Bennett -----	25	North Fork of Middle Fork, 300 feet above junction.
Do -----	do -----	11	North Fork of Middle Fork, mining ditch.
Do -----	do -----	18	300 feet above junction with Rubicon River.
Do -----	do -----	42	Rubicon River, 300 feet above junction with Middle Fork of American River.
Aug. 28, 1902	do -----	110	Middle Fork above mouth.

**ARMAS CREEK.***Discharge measurements of Armas Creek, Santa Barbara County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-ft.</i>	
Aug. —, 1889	G. F. Wright -----	0.08	

**ARMITAS CREEK.***Discharge measurements of Armitas Creek, Santa Barbara County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-ft.</i>	
Aug. —, 1889	G. F. Wright -----	0.04	

## ARROYO BURRO.

*Discharge measurements of Arroyo Burro,<sup>a</sup> Santa Barbara County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Aug. —, 1889	G. F. Wright	0.23	
June 21, 1902	J. B. Lippincott	.0036	100 feet below Moore's north line.
June 17, 1900	J. Harrington	.03	San Roqui Creek, above tunnel.
Do	do	.03	San Roqui Creek, below tunnel.
May 2, 1900	do	.04	San Roqui Creek, station 6, opposite tunnel.
Do	do	.02	San Roqui Creek, station 8, opposite tunnel.
Do	do	.08	Tunnel of Pacific Improvement Co.
June 21, 1902	J. B. Lippincott	.009	San Roqui Creek, below tunnel.
Do	do	.25	Tunnel of Pacific Improvement Co.
Do	do	.011	San Roqui Creek at station 44, opposite tunnel.
Do	do	.0063	San Roqui Creek at station 65, opposite tunnel.

## ARROYO CARNERO.

*Discharge measurements of Arroyo Carnero, Santa Barbara County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Aug. —, 1889	G. F. Wright	0.08	

## ARROYO GRANDE.

*Discharge measurements of Arroyo Grande, San Luis Obispo County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Nov. 20, 1897	W. W. Brier	7.80	Arroyo Grande.

## ARROYO LEON.

*Discharge measurements of Arroyo Leon, San Mateo County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Oct. 17, 1893	W. W. Brier	0.63	$\frac{1}{2}$ mile above Half Moon Bar.

<sup>a</sup>The upper mountainous portion of this stream is called the San Roqui and the lower part the Arroyo Burro.



## ARROYO SECO.

This stream is a tributary of Los Angeles River, which it joins at the city of Los Angeles. Its basin is small, draining 21 square miles of the Sierra Madre. The river issues from the mountains on the west side of Pasadena Mesa, passes through an opening in a granite spur known as Devils Gate, and joins Los Angeles River at Los Angeles. Between the point where the water issues from the mountain and Devils Gate lies a broad river bottom 2 miles in length, composed of coarse material. In passing over this the water sinks rapidly, diminishing in volume of flood water from the mouth of the canyon to Devils Gate. It is believed that a large portion of the underflow from the gravels above Devils Gate passes to the east of Devils Gate and flows toward the San Gabriel Valley. (See also Pasadena Mesa.)

*Discharge measurements of Arroyo Seco, at cable station terminal quarries, Los Angeles County.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
Nov. 21, 1900, 1.30 p. m	E. P. Dewey	81
Nov. 21, 1900, 2 p. m	do	100
Nov. 21, 1900, 3 p. m	do	144
Nov. 22, 1900, 11 a. m	do	85
Nov. 22, 1900, 2 p. m	do	99
Nov. 23, 1900	do	31
Nov. 24, 1900, 3 p. m	do	11.5
Nov. 26, 1900, 3.45 p. m	do	8.7
Dec. 1, 1900	W. B. Clapp	4.3
Dec. 6, 1900	do	1.4
Jan. 6, 1901	do	7
Jan. 7, 1901, 9.30 a. m	do	172
Jan. 7, 1901, 3.45 p. m	do	103
Jan. 8, 1901	do	28
Jan. 11, 1901	do	14
Jan. 14, 1901	do	7
Jan. 20, 1901	do	5
Jan. 21, 1901	do	11
Jan. 23, 1901	do	7
Jan. 28, 1901	do	32
Jan. 29, 1901	do	11
Feb. 1, 1899	W. B. Clapp	.24
Mar. 17, 1899	do	3.24
Mar. 18, 1899	do	1.77
Mar. 19, 1899	do	.93
Mar. 20, 1899	do	2.52

*Discharge measurements of Arroyo Seco, etc.—Continued.*

Date.	Hydrographer.	Dis- charge.
		<i>Sec.-feet.</i>
Mar. 21, 1899	W. B. Clapp	1.90
Mar. 22, 1899	do	1.64
Mar. 23, 1899	do	1.56
Mar. 26, 1899	do	2.20
Mar. 28, 1899	do	1.22
Apr. 2, 1899	do	.28
Apr. 12, 1899	do	.08
Jan. 10, 1899	E. P. Dewey	3.02
Jan. 11, 1899	do	1.90
Jan. 12, 1899	do	2
Do	do	2.06
Nov. 20, 1900	do	.23
Nov. 21, 1900, 11 a. m.	do	32
Nov. 21, 1900, 12 m.	do	35
Nov. 21, 1900 1 p. m.	do	75
Feb. 4, 1901	W. B. Clapp	29
Feb. 5, 1901, 11 a. m.	do	869
Feb. 5, 1901, 3 p. m.	do	410
Feb. 6, 1901	do	200
Feb. 9, 1901	do	102
Feb. 11, 1901	do	102
Mar. 16, 1901	do	17
Apr. 29, 1901	do	1.6
May 10, 1901	do	5.3

*Discharge measurements of Arroyo Seco near Devils Gate, Los Angeles County.*

Date.	Hydrographer.	Dis- charge.
		<i>Sec.-feet.</i>
June 14, 1899	T. D. Allen	a 5.17
July 12, 1897	do	a 5.12
Aug. 9, 1897	do	a 4.63
Oct. 11, 1897	do	a 4.13
Nov. 8, 1897	do	a 4.16
May 31, 1899	do	a 3.17
July 10, 1899	W. B. Clapp	a 2.87
Sept. 17, 1900	do	a 3.55
Sept. 16, 1898	F. H. Olmsted	a 3.60
Oct. 12, 1898	J. B. Lippincott	a 3.44

a Devils Gate developments, including Richardson and Wilson tunnels.

*Discharge measurements of Arroyo Seco, Los Angeles County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-ft.</i>	
Jan. 11, 1899	W. B. Clapp .....	4.17	Loughery dam site.
Oct. 13, 1898	J. B. Lippincott .....	.08	Painter pipe-line diversion.
Sept. 16, 1898	F. H. Olmsted .....	1.69	Sheep corral, total.
Oct. 24, 1898	J. B. Lippincott .....	1.48	Do.
May 29, 1899	W. B. Clapp .....	1.43	Do.
June 3, 1899	.....do .....	1.36	Do.
June 21, 1899	.....do .....	1.62	Do.
July 1, 1899	.....do .....	1.33	Do.
July 13, 1899	.....do .....	1.30	Do.
Sept. 19, 1900	W. W. Cockins, jr .....	1.94	Do.
Sept. 21, 1900	J. B. Lippincott .....	1.37	Do.
Feb. 6, 1901	S. G. Bennett .....	270	Avenue 26 bridge (flood measurement).

## BEAR CREEK.

See Santa Ana, Bear Creek.

## BEAMS DITCH.

See San Bernardino Valley, Beams ditch.

## BEAR RIVER.

*Discharge measurements of Bear River, Yuba County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-ft.</i>	
Sept. 17, 1900	S. G. Bennett .....	11.7	Wagon bridge 1 mile south of Wheatland.
Dec. 16, 1878	State engineering department.	10	Wire bridge.
Sept. 6, 1879	.....do .....	15	Do.
Feb. 22, 1879	.....do .....	6,500	Do.
Sept. 6, 1879	.....do .....	15	Wheatland.
Oct. 20, 1879	.....do .....	12	1 mile below wire bridge.
Aug. 25, 1902	S. G. Bennett .....	16	Below waste from old mining ditch.
Do .....	.....do .....	33	Old mining ditch of South Yuba Water Company, one-fourth mile below head works.
Aug. 26, 1902	Charles A. Miller .....	28	Wooden flume of South Yuba Water Company, near Auburn.

*Estimated monthly discharge of Bear River, Merced County, at base of foothills.<sup>a</sup>*

[Drainage area, 166 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1878.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
November .....	0	0	0	0	0	0
December .....	0	0	0	0	0	0
1879.						
January .....	0	0	0	0	0	0
February .....	312	0	25	1,388	0.15	0.16
March .....	570	0	57	3,505	.34	.39
April .....	197	5	54	3,213	.33	.37
May .....	0	0	0	0	0	0
June .....	0	0	0	0	0	0
July .....	0	0	0	0	0	0
August .....	0	0	0	0	0	0
September .....	0	0	0	0	0	0
October .....	0	0	0	0	0	0
November .....	0	0	0	0	0	0
December .....	257	0	18	1,107	.11	.13
The year .....	570	0	13	9,213	.08	1.35
1880.						
January .....	217	0	25	1,537	.15	.17
February .....	700	0	61	3,509	.37	.40
March .....	85	10	31	1,906	.19	.22
April .....	2,080	25	321	19,101	1.93	2.15
May .....	47	0	23	1,414	.14	.16
June .....	0	0	0	0	0	0
July .....	0	0	0	0	0	0
August .....	0	0	0	0	0	0
September .....	0	0	0	0	0	0
October .....	0	0	0	0	0	0
November .....	0	0	0	0	0	0
December .....	421	0	115	7,071	.69	.80
The year .....	2,080	0	48	34,538	.29	3.90

<sup>a</sup>Authority, State engineering department.

*Estimated monthly discharge of Bear River, etc.—Continued.*

Month.	Discharge			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1881.	<i>Sec. feet.</i>	<i>Sec. feet.</i>	<i>Sec. feet.</i>	<i>Acre-feet.</i>	<i>Sec. feet.</i>	<i>Inches.</i>
January .....	1,920	20	169	10,391	1.02	1.18
February .....	1,423	47	214	11,885	1.29	1.34
March .....	197	13	48	2,951	.29	.33
April .....	20	0	6	357	.04	.04
May .....	0	0	0	0	0	0
June .....	0	0	0	0	0	0
July .....	0	0	0	0	0	0
August .....	0	0	0	0	0	0
September .....	0	0	0	0	0	0
October .....	0	0	0	0	0	0
November .....	0	0	0	0	0	0
December .....	0	0	0	0	0	0
The year .....	1,920	0	36	25,584	.22	2.89
1882. <sup>a</sup>						
January .....	0	0	0	0	0	0
February .....			33	1,833	.20	.21
March .....			100	6,149	.60	.69
April .....			130	7,736	.78	.87
May .....	0	0	0	0	0	0
June .....	0	0	0	0	0	0
July .....	0	0	0	0	0	0
August .....	0	0	0	0	0	0
September .....	0	0	0	0	0	0
October .....			17	1,045	.10	.12
November .....			25	1,488	.15	.17
December .....			17	1,045	.10	.12
The year .....			27	19,296	.16	2.18

<sup>a</sup> Run-off for 1882, 1883, and 1884, estimated from previous measurements or from run off of neighboring streams.



*Estimated monthly discharge of Bear River, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1883, <sup>a</sup>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....			66	4,058	.40	.46
February .....			33	1,833	.20	.21
March .....			170	10,453	1.02	1.18
April .....			100	5,950	.60	.67
May .....			50	3,074	.30	.35
June .....	0	0	0	0	0	0
July .....	0	0	0	0	0	0
August .....	0	0	0	0	0	0
September .....	0	0	0	0	0	0
October .....	0	0	0	0	0	0
November .....	0	0	0	0	0	0
December .....	0	0	0	0	0	0
The year .....			35	25,368	.21	2.87
1884, <sup>a</sup>						
January .....			17	1,045	.10	.12
February .....			660	37,964	3.98	4.29
March .....			910	55,954	5.48	6.32
April .....			660	39,273	3.98	4.44
May .....			330	20,291	1.99	2.29
June .....			170	10,116	1.02	1.14
July .....			66	4,058	.40	.46
August .....	0	0	0	0	0	0
September .....	0	0	0	0	0	0
October .....	0	0	0	0	0	0

<sup>a</sup> Run-off for 1882, 1883, and 1884, estimated from previous measurements or from run-off of neighboring streams.

## BIG ROCK CREEK.

*Discharge measurements of Big Rock Creek, Los Angeles County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec. feet.</i>	
Jan. 4, 1898	J. B. Lippincott .....	5.27	Dam site above development tunnel.
Jan. 4, 1898	.....do .....	1.27	Diversion to tunnel.
Jan. 4, 1898	.....do .....	1.33	Developed in tunnel.
Jan. 4, 1898	.....do .....	.78	Cienega on Pallett tributary.

## WILLIAMS RIVER.

*Discharge measurement of Williams River, Yuma County, Ariz.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec. feet.</i>	
Jan. 1, 1902	J. B. Lippincott .....	4	Mouth of river.
Oct. 28, 1902	E. T. Perkins .....	4	Do.

## BLOOMINGTON FLUME, SAN BERNARDINO COUNTY.

See San Bernardino Valley.

## BRISCOE CREEK, GLENN COUNTY.

See Stony Creek, Briscoe tributary.

## BURNEY CREEK.

See Pit River, Burney tributary.

## BUTANO CREEK.

*Discharge measurement of Butano Creek, San Mateo County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec. feet.</i>	
Oct. 17, 1893	W. W. Brier .....	2.05	5 miles above junction with Pescadero Creek.

CACHE CREEK.<sup>a</sup>

This stream is the outlet of Clear Lake, in Lake County, Cal., and is described in Water-Supply Paper No. 51, p. 453.

On account of the great importance of Clear Lake as a storage reservoir, a gaging station was established at the wagon bridge across Cache Creek, one-half mile north of the town of Lower Lake, January 1, 1901. Gage rods were put in at this point and an observer was employed by Mr. P. N. Ashley, of Woodlands, for the Agricultural Department, about October, 1900, but no meter measurements were made.

In order to determine the evaporation from the surface of Clear Lake an evaporation pan and gage were placed in a cove near Lakeport in January, 1901, and the observations for evaporation were begun February 1 by Capt. D. C. Rumsey. The pan is not exposed to the full force of the wind, as the waves often run high.

*Discharge measurements of Cache Creek, Lake County.*

Date.	Hydrographer.	Gage height.	Discharge.	Locality.
		<i>Feet.</i>	<i>Sec.-feet.</i>	
Sept. 24, 1900	S. G. Bennett		3.8	Lower Lake Bridge.
Dec. 16, 1900	do	1.18	123	Do.
Jan. 25, 1901	do	3.60	675	Do.
Apr. 13, 1901	do	3.80	673	Do.
June 17, 1901	S. Matthews	2.85	333	Do.
July 15, 1901	do	2.45	236	Do.
Aug. 13, 1901	do	2.05	144	Do.
Sept. 4, 1901	J. R. Anderson	1.72	88	Do.
Oct. 5, 1901	do	1.45	34	Do.
Nov. 9, 1901	do	1.20	20	Do.
Nov. 29, 1901	do	1.60	69	Do.
Dec. 30, 1901	do	1.60	65	Do.
Jan. 29, 1902	do	1.60	70	Do.
Feb. 13, 1902	do	2.50	260	Do.
Mar. 3, 1902	do	6.50	1,151	Do.
Mar. 19, 1902	do	7.70	1,866	Do.
Apr. 5, 1902	do	6.5	1,397	Do.
Apr. 24, 1902	do	5.9	1,212	Do.
May 3, 1902	do	5.2	1,042	Do.
May 19, 1902	do	4.5	853	Do.
May 31, 1902	do	4.0	720	Do.
June 14, 1902	do	3.6	629	Do.
July 12, 1902	do	3.1	422	Do.

<sup>a</sup> For a detailed statement concerning the hydrography of Cache Creek, see Water-Supply Paper No. 45, by A. E. Chandler.

*Discharge measurements of Cache Creek, Lake County—Continued.*

Date.	Hydrographer.	Gage height.	Dis-charge.	Locality.
		<i>Feet.</i>	<i>Sec.-feet.</i>	
July 26, 1902	J. R. Anderson	2.8	345	Lower Lake Bridge.
Aug. 9, 1902	do	2.7	289	Do.
Aug. 22, 1902	do	2.5	246	Do.
Sept. 6, 1902	do	2.3	193	Do.
Sept. 20, 1902	do	2.2	156	Do.
Oct. 4, 1902	do	2.1	108	Do.
Oct. 20, 1902	do	2.0	83	Do.
Nov. 4, 1902	do	2.1	118	Do.
Nov. 19, 1902	do	2.8	245	Do.
Dec. 19, 1902	S. G. Bennett	2.8	300	Do.
June 24, 1900	do		196	Runsey, Colusa County.
June 25, 1900	do		189	Do.
Sept. 23, 1900	do		3.8	Do.
Apr. 12, 1901	do		811	Do.
Apr. 15, 1901	do	3.4	720	Woodland Bridge, Yolo County.
May 8, 1902	do	4.4	1,276	Do.
Sept. 25, 1902	do	1.4	56	Do.

*Estimated monthly discharge of Cache Creek at Lower Lake.*

[Drainage area, 500 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1901.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January	2,020	155	535	32,896	1.07	1.23
February	2,520	615	909	50,483	1.82	1.89
March	1,330	805	1,079	66,345	2.16	2.49
April	805	530	654	38,916	1.31	1.46
May	570	380	481	29,576	.96	1.10
June	415	255	327	19,458	.65	.72
July	255	155	199	12,236	.40	.46
August	155	86	114	7,010	.23	.26
September	86	40	55	3,273	.11	.12
October	50	16	31	1,906	.06	.07
November	62	16	26	1,547	.05	.06
December	74	40	62	3,812	.12	.14
The year	2,520	16	373	263,858	.75	10.00

*Estimated monthly discharge of Cache Creek at Lower Lake—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1902.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	78	40	53	3,259	0.11	0.13
February .....	1,345	52	381	21,160	.76	.79
March .....	2,080	1,275	1,766	108,587	3.53	4.07
April .....	1,660	1,100	1,427	84,912	2.85	3.18
May .....	1,100	670	865	53,187	1.73	1.99
June .....	670	460	556	33,084	1.11	1.24
July .....	460	310	380	23,365	.76	.88
August .....	310	200	243	14,941	.49	.56
September .....	200	130	163	9,699	.33	.37
October .....	150	110	127	7,809	.25	.29
November .....	580	110	263	15,650	.53	.59
December .....	340	280	307	18,877	.61	.70
The year .....	2,080	40	544	394,530	1.09	14.79

## CAJON CREEK.

*Discharge measurements of Cajon Creek, San Bernardino County.*

Date.	Hydrographer.	Discharge.	Locality.
		<i>Sec.-feet.</i>	
June 8, 1900	S. G. Bennett .....	1.37	Keenebrook station.

## CALAVERAS RIVER.

*Discharge measurements of Calaveras River, Calaveras County.*

Date.	Hydrographer.	Discharge.	Locality.
		<i>Sec.-feet.</i>	
Sept. 6, 1899	S. G. Bennett .....	Dry .....	San Andreas, Jackson road.



*Estimated monthly discharge of Calaveras River at Bellota,<sup>a</sup>*

[Drainage area, 491 square miles.]

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1878.	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
November <sup>b</sup> .....	0	0	0	0
December <sup>b</sup> .....	0	0	0	0
1879.				
January .....	229	14, 081	0.47	0.54
February .....	648	35, 988	1.32	1.37
March .....	1, 068	65, 669	2.18	2.51
April .....	680	40, 463	1.38	1.54
May .....	166	9, 878	.34	.39
June <sup>b</sup> .....	98	5, 831	.20	.22
July <sup>b</sup> .....	24	1, 476	.05	.06
August <sup>b</sup> .....	0	0	0	0
September <sup>b</sup> .....	0	0	0	0
October <sup>b</sup> .....	0	0	0	0
November <sup>b</sup> .....	0	0	0	0
December <sup>b</sup> .....	295	18, 139	.60	.69
The year <sup>b</sup> .....	267	191, 525	.55	7.32
1880. <sup>c</sup>				
January .....	221	13, 589	.45	.52
February .....	393	22, 606	.80	.86
March .....	614	37, 753	1.25	1.44
April .....	4, 174	248, 370	8.50	9.48
May .....	1, 473	90, 571	3.00	3.46
June .....	196	11, 663	.40	.45
July .....	24	1, 476	.05	.06
August .....	10	615	.02	.02
September .....	0	0	0	0
October .....	0	0	0	0
November .....	0	0	0	0
December .....	246	15, 126	.50	.58
The year .....	613	441, 769	1.25	16.87

<sup>a</sup> Authority, California State engineering department.<sup>b</sup> For November and December, 1878, and from June, 1879, to October, 1884, estimated from run off of neighboring stream.<sup>c</sup> Estimated from run-off of neighboring stream.

*Estimated monthly discharge of Calaveras River at Bellota—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1881. <sup>a</sup>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	1,473	90,571	3.00	3.46
February .....	2,700	149,950	5.50	5.73
March .....	982	60,381	2.00	2.31
April .....	982	58,433	2.00	2.23
May .....	196	12,052	.40	.46
June .....	74	4,403	.15	.17
July .....	49	3,013	.10	.12
August .....	0	0	0	0
September .....	0	0	0	0
October .....	0	0	0	0
November .....	0	0	0	0
December .....	74	4,550	.15	.17
The year .....	544	383,353	1.11	14.65
1882. <sup>a</sup>				
January .....	344	21,152	.70	.81
February .....	442	24,547	.90	.94
March .....	1,719	105,697	3.50	4.04
April .....	1,719	102,288	3.50	3.90
May .....	2,946	181,142	6.00	6.92
June .....	246	14,638	.50	.56
July .....	0	0	0	0
August .....	0	0	0	0
September .....	0	0	0	0
October .....	98	6,026	.20	.23
November .....	147	8,747	.30	.33
December .....	147	9,039	.30	.35
The year .....	651	473,276	1.33	18.08

<sup>a</sup> Estimated from run-off of neighboring stream.

*Estimated monthly discharge of Calaveras River at Bellota—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1883. <sup>a</sup>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	491	30,190	1.00	1.15
February .....	393	21,826	.80	.83
March .....	737	45,316	1.50	1.73
April .....	982	58,433	2.00	2.23
May .....	491	30,190	1.00	1.15
June .....	196	11,663	.40	.45
July .....	0	0	0	0
August .....	0	0	0	0
September .....	0	0	0	0
October .....	74	4,550	.15	.17
November .....	24	1,428	.05	.06
December .....	49	3,013	.10	.12
The year .....	286	206,609	.58	7.89
1884. <sup>a</sup>				
January .....	196	12,052	.40	.46
February .....	2,455	141,213	5.00	5.39
March .....	2,946	181,142	6.00	6.92
April .....	2,455	146,083	5.00	5.58
May .....	491	30,190	1.00	1.15
June .....	491	29,217	1.00	1.12
July .....	196	12,052	.40	.46
August .....	0	0	0	0
September .....	0	0	0	0
October .....	0	0	0	0

<sup>a</sup> Estimated from run-off of neighboring stream.CALIENTE CREEK.<sup>a</sup>*Discharge measurements of Caliente Creek, Kern County.*

Date.	Hydrographer.	Discharge.	Locality.
		<i>Sec.-feet.</i>	
May 1, 1895	J. B. Lippincott .....	23	1½ miles northwest of station.

<sup>a</sup> Stream usually dry in summer months.

*Estimated monthly discharge of Caliente Creek, Kern County, at base of foothills.<sup>a</sup>*

[Drainage area, 423 square miles.]

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1878.	<i>Second-feet.</i>	<i>Acre-feet.</i>	<i>Second-feet.</i>	<i>Inches.</i>
November .....	0	0	0	0
December .....	0	0	0	0
1879.				
January .....	34	2,091	0.08	0.09
February .....	59	3,277	.14	.15
March .....	30	1,845	.07	.08
April .....	106	6,307	.25	.28
May .....	76	4,673	.18	.21
June .....	25	1,488	.06	.07
July .....	0	0	0	0
August .....	0	0	0	0
September .....	0	0	0	0
October .....	0	0	0	0
November .....	110	6,545	.26	.29
December .....	212	13,035	.50	.58
The year .....	54	39,261	.13	1.75
1880.				
January .....	508	31,236	1.20	1.38
February .....	973	55,968	2.30	2.48
March .....	1,100	67,636	2.60	3.00
April .....	1,227	73,012	2.90	3.24
May .....	846	52,019	2.00	2.31
June .....	212	12,615	.50	.56
July .....	21	1,291	.05	.06
August .....	0	0	0	0
September .....	0	0	0	0
October .....	0	0	0	0
November .....	85	5,058	.20	.22
December .....	212	13,035	.50	.58
The year .....	432	311,870	1.02	13.83

<sup>a</sup> Estimated from run-off of neighboring streams. Authority, California State engineering department.

*Estimated monthly discharge of Caliente Creek, etc.—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1881.	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	212	13, 035	0. 50	0. 58
February .....	423	23, 492	1. 00	1. 04
March .....	423	26, 009	1. 00	1. 15
April .....	423	25, 170	1. 00	1. 12
May .....	423	26, 009	1. 00	1. 15
June .....	212	12, 615	. 50	. 56
July .....	0	0	0	0
August .....	0	0	0	0
September .....	0	0	0	0
October .....	0	0	0	0
November .....	0	0	0	0
December .....	51	3, 136	. 12	. 14
The year .....	181	129, 466	. 43	5. 74
1882.				
January .....	51	3, 136	. 12	. 14
February .....	63	3, 499	. 15	. 16
March .....	212	13, 035	. 50	. 58
April .....	212	12, 615	. 50	. 56
May .....	42	2, 582	. 10	. 12
June .....	0	0	0	0
July .....	0	0	0	0
August .....	0	0	0	0
September .....	0	0	0	0
October .....	0	0	0	0
November .....	63	3, 749	. 15	. 17
December .....	63	3, 874	. 15	. 17
The year .....	59	42, 490	. 14	1. 90



*Estimated monthly discharge of Caliente Creek, etc.—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1883.	<i>Sec. feet.</i>	<i>Acre-feet.</i>	<i>Sec. feet.</i>	<i>Inches.</i>
January .....	63	3,874	0.15	0.17
February .....	63	3,499	.15	.16
March .....	338	20,783	.80	.92
April .....	212	12,615	.50	.56
May .....	169	10,391	.40	.46
June .....	0	0	0	0
July .....	0	0	0	0
August .....	0	0	0	0
September .....	0	0	0	0
October .....	42	2,582	.10	.12
November .....	42	2,499	.10	.11
December .....	63	3,874	.15	.17
The year .....	83	60,117	.20	2.67
1884.				
January .....	212	13,035	.50	.58
February .....	1,269	72,994	3.00	3.24
March .....	1,269	78,028	3.00	3.46
April .....	846	50,340	2.00	2.23
May .....	169	10,391	.40	.46
June .....	212	12,615	.50	.56
July .....	0	0	0	0
August .....	0	0	0	0
September .....	0	0	0	0
October .....	0	0	0	0

#### CALLOWAY CANAL.

See Kern River, Calloway canal.

#### CAMP CARLTON DITCH, SAN BERNARDINO COUNTY.

See San Bernardino Valley, Camp Carlton ditch.

## CANYADA DEL CORRAL.

*Discharge measurement of Canyada del Corral Creek.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Aug. —, 1889	G. F. Wright.....	0. 15	Santa Barbara County.

## CANYADA LARES.

*Discharge measurement of Canyada Lares Creek.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Aug. —, 1889	G. F. Wright.....	0. 08	Santa Barbara County.

## CANYADA REFUGIO.

*Discharge measurement of Canyada Refugio Creek.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Aug. —, 1889	G. F. Wright.....	0. 31	Santa Barbara County.

## CANYADA VERDE.

*Discharge measurement of Canyada Verde Creek.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Aug. —, 1889	G. F. Wright.....	0. 08	Santa Barbara County.

## CAPITAN CREEK.

*Discharge measurement of Capitan (El) Creek.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Aug. —, 1889	G. F. Wright.....	0. 23	Santa Barbara County.

## CARPENTERIA CREEK.

*Discharge measurement of Carpentaria Creek.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Aug. —, 1889	G. F. Wright.....	0.08	Santa Barbara County, 1 mile above Placitas Road.
June 16, 1900	R. Moyer.....	.003	Do.

## CARSON RIVER.

## EAST FORK CARSON RIVER.

This branch of Carson River has its source in the high Sierra of California, and flows northward, crossing the Nevada-California boundary line and entering Carson Valley at Rodenbah's ranch, about 20 miles from Carson, a little east of south. There it turns to the northwest, and a short distance above the town of Genoa unites with the West Fork, forming Carson River. The drainage area above Rodenbah's is 414 square miles in extent, and is mapped on the Markleeville and Dardanelles atlas sheets of the United States Geological Survey. This gaging station was established by L. H. Taylor on October 17, 1900, at the place where measurements were made in the years 1890, 1891, and 1892. The rod was an inclined timber securely fastened to posts set in the right bank of the stream. The bench mark was on a basalt rock at the edge of the stream, 20 feet from the gage, and was at an elevation of 6.3 feet above gage datum. The channel at the station is straight and the banks are high. The stream bed is of cobbles and gravel, and is quite stable. Measurements are made from a cable and suspended car. On August 2, 1901, a loose rock dam was raised a short distance below the gaging station, which affected the velocity at the latter point. The dam was partly washed out by a freshet on December 4, 1901. On March 10, 1901, a new gage was established a short distance downstream from the original one, which had been destroyed. It consists of a vertical timber driven into the stream bed at the right bank and spiked to a cottonwood tree. A bench mark was also established on a large granite boulder 20 feet south of the gage, under the cable from which the measurements are made. Its elevation is 8.10 feet above the datum of the gage.

*Discharge measurements of East Fork Carson River, near Gardnerville, Nev.*

Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-feet.</i>
Mar. 10, 1901	L. H. Taylor	4.00	459
Apr. 30, 1901	do	4.55	<sup>a</sup> 864
June 4, 1901	do	5.85	1,868
June 9, 1901	do	5.40	1,356
Sept. 29, 1901	do	3.70	<sup>a</sup> 127
Nov. 7, 1901	do	3.70	<sup>a</sup> 117
Dec. 19, 1901	do	3.40	156

<sup>a</sup> Approximate.*Estimated monthly discharge of East Fork Carson River, at Gardnerville (Rodenbah), Nev.*

[Drainage area, 1,519 square miles.]

Month.	Mean dis-charge.	Month.	Mean dis-charge.
1890.	<i>Sec.-ft.</i>	1891—Continued.	<i>Sec.-ft.</i>
April	1,026	October	385
May	2,654	November	385
June	2,430	December	438
July	1,789	The year	619
August	597		
September	415	1892.	
October	386	January	390
November	384	February	388
December	379	March	422
		April	478
1891.		May	1,226
January	388	June	1,158
February	402	July	506
March	783	August	413
April	452	September	414
May	1,445	October	416
June	1,328	November	414
July	618	December	1,097
August	408		
September	388	The year	610

For further details of the flow of East and West forks of Carson River, see the Twelfth Annual Report of the United States Geological Survey, Pt. II, page 351.

#### WEST FORK, CARSON RIVER.

This stream rises on the eastern slope of the Sierra Nevada in California, immediately southeast of the source of Truckee River, and, flowing in a general northeast direction, crosses the State line into Nevada and joins the East Fork near Genoa, in Carson Valley. The drainage area is mapped on the Markleeville atlas sheet of the United States Geological Survey. This gaging station, established by L. H. Taylor on October 18, 1900, is about three-fourths of a mile above the post-office at Woodfords, near the point where measurements were made in 1890, 1891, and 1892. The gage at present in use is a vertical timber, but it is only temporary, the equipment of the station being incomplete. The channel at the station is straight, the banks are high and rocky, and the bed is of rock and gravel and not likely to shift. Measurements are made from a car suspended on a steel cable across the stream.

#### *Discharge measurements of West Fork, Carson River, near Woodfords, Cal.*

Date.	Hydrographer	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-feet.</i>
Mar. 8, 1901	L. H. Taylor	3.30	1.58
Apr. 28, 1901	do	3.95	a 3.21
May 26, 1901	do	3.80	2.85
May 31, 1901	do	4.05	a 3.50
June 13, 1901	do	3.75	2.74
Sept. 21, 1901	do	2.35	.31
Nov. 6, 1901	do	2.60	.68
Apr. 22, 1902	D. W. Hayes		182.50
May 13, 1902	C. V. Taylor		422.50
July 3, 1902	D. W. Hayes		157.60
July 30, 1902	do		46.70
Aug. 6, 1902	C. V. Taylor		53.00
Sept. 9, 1902	L. L. Richards		40.00

<sup>a</sup>Approximate.

*Estimated monthly discharge of West Fork Carson River, at Woodfords, Cal.*

[Drainage area, 70 square miles.]

Month.	Mean discharge.	Month.	Mean discharge.
1890.	<i>Sec.-ft.</i>	1891—Continued.	<i>Sec.-ft.</i>
April .....	284	May .....	534
May .....	657	June .....	338
June .....	614	July .....	130
July .....	380	August .....	65
August .....	135	September .....	41
September .....	75	October .....	48
October .....	67	November .....	43
November .....	49	December .....	47
December .....	53	The year .....	128
1891.		1892.	
January .....	52	January .....	45
February .....	48	February .....	46
March .....	61	March .....	65
April .....	127		

*Discharge measurements in Carson River Basin.*

Date.	Hydrographer.	Discharge.	Location.
		<i>Sec. ft.</i>	
Aug. 6, 1902	C. V. Taylor .....	0.72	Indian Creek and Harvey's ditch.
Do .....	do .....	1.18	Hawkins Creek, one-fourth mile above Hawkins's house.
Sept. 9, 1902	L. L. Richards .....	1.10	Do.
Aug. 6, 1902	C. V. Taylor .....	1.27	Petersons Creek, near old sawmill.
Sept. 9, 1902	L. L. Richards .....	.42	Petersons Creek, above Cohn's meadow.
Aug. 6, 1902	C. V. Taylor .....	2.84	Bruns Creek, mouth of canyon.
Sept. 9, 1902	L. L. Richards .....	3.48	Do.

## CASCADE CREEK, TUOLUMNE COUNTY.

See Stanislaus River, Cascade Creek.

## CHERRY CREEK, TUOLUMNE COUNTY.

See Tuolumne River, Cherry Creek.

## CHINO CREEK, RIVERSIDE COUNTY.

See Santa Ana River, Chino Creek.



## CHOWCHILLA CREEK.

*Estimated monthly discharge of Chowchilla Creek at base of foothills.<sup>a</sup>*

[Drainage area, 268 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1878.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
November .....	0	0	0	0	0	0
December .....	0	0	0	0	0	0
1879.						
January .....	140	0	8	492	0.03	0.03
February .....	1,000	0	56	3,110	.21	.22
March .....	760	0	63	3,874	.24	.28
April .....	300	11	48	2,856	.18	.20
May .....	140	0	14	861	.05	.06
June .....	0	0	0	0	0	0
July .....	0	0	0	0	0	0
August .....	0	0	0	0	0	0
September .....	0	0	0	0	0	0
October .....	0	0	0	0	0	0
November .....	0	0	0	0	0	0
December .....	192	0	12	738	.04	.04
The year .....	1,000	0	17	11,931	.06	.83
1880.						
January .....	18	0	5	307	.02	.02
February .....	1,500	0	167	9,606	.62	.67
March .....	91	11	19	1,168	.07	.08
April .....	6,380	0	1,266	75,332	4.72	5.26
May <sup>b</sup> .....			53	3,259	.20	.23
June <sup>b</sup> .....			27	1,607	.10	.11
July <sup>b</sup> .....	0	0	0	0	0	0
August <sup>b</sup> .....	0	0	0	0	0	0
September <sup>b</sup> .....	0	0	0	0	0	0
October <sup>c</sup> .....	0	0	0	0	0	0
November <sup>b</sup> .....	0	0	0	0	0	0
December <sup>b</sup> .....			201	12,359	.75	.86
The year .....			145	103,638	.54	7.23

<sup>a</sup> Authority, California State engineering department<sup>b</sup> Estimated from previous measurements, or from run-off of neighboring stream.

*Estimated monthly discharge of Chowchilla Creek at base of foothills—Continued.*

Month.	Discharge.			Total discharge.	Run-off	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1881. <sup>a</sup>	<i>Sec. feet.</i>	<i>Sec. feet.</i>	<i>Sec. feet.</i>	<i>Acre-feet.</i>	<i>Sec. feet.</i>	<i>Inches.</i>
January			295	18,139	1.10	1.27
February			375	20,826	1.40	1.46
March			83	5,103	.31	.36
April			11	655	.04	.04
May	0	0	0	0	0	0
June	0	0	0	0	0	0
July	0	0	0	0	0	0
August	0	0	0	0	0	0
September	0	0	0	0	0	0
October	0	0	0	0	0	0
November	0	0	0	0	0	0
December			27	1,660	.10	.12
The year			66	46,383	.25	3.25
1882.						
January <sup>a</sup>			54	3,320	.20	.23
February	1,120	0	164	9,108	.61	.64
March	10,770	0	1,168	71,818	4.36	5.02
April <sup>a</sup>			268	15,947	1.00	1.12
May <sup>a</sup>			54	3,320	.20	.23
June <sup>a</sup>	0	0	0	0	0	0
July <sup>a</sup>	0	0	0	0	0	0
August <sup>a</sup>	0	0	0	0	0	0
September <sup>a</sup>	0	0	0	0	0	0
October <sup>a</sup>	0	0	0	0	0	0
November <sup>a</sup>			53	3,154	.20	.22
December <sup>a</sup>			27	1,660	.10	.12
The year			149	108,327	.56	7.58

<sup>a</sup> Estimated from previous measurements, or from run-off of neighboring stream.

*Estimated monthly discharge of Chowchilla Creek at base of foothills—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1883. <sup>a</sup>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January			80	4,919	0.30	0.35
February			53	2,943	.20	.21
March			268	16,479	1.00	1.15
April			134	7,974	.50	.56
May			107	6,579	.40	.46
June	0	0	0	0	0	0
July	0	0	0	0	0	0
August	0	0	0	0	0	0
September	0	0	0	0	0	0
October	0	0	0	0	0	0
November	0	0	0	0	0	0
December	0	0	0	0	0	0
The year			54	38,894	.20	2.73
1884. <sup>a</sup>						
January			27	1,660	.10	.12
February			1,340	77,078	5.00	5.39
March			1,608	98,872	6.00	6.92
April			1,072	63,788	4.00	4.46
May			804	49,436	3.00	3.46
June			804	47,841	3.00	3.35
July			268	16,479	1.00	1.15
August			27	1,660	.10	.12
September			0	0	0	0
October			0	0	0	0

<sup>a</sup> Estimated from previous measurements, or from run-off of neighboring stream.

## CITY CREEK.

*Discharge measurements of City Creek at mouth of canyon, San Bernardino County.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
June 11, 1898	J. B. Lippincott	3.03
Sept. 9, 1898	.....do	.07
Mar. 25, 1899	S. G. Bennett	8.80
Aug. 25, 1899	.....do	.17
July 12, 1900	.....do	.16
Oct. 1, 1900	W. W. Cockins, jr	.21
Apr. 7, 1902	S. G. Bennett	12.5
Sept. 4, 1902	W. B. Clapp	.2

NOTE.—For measurements of sundry small canals from City Creek in San Bernardino Valley see Santa Ana River near Cotton. Detailed descriptions given in Water-Supply Paper No. 59.

## COLD SPRING CANYON.

*Discharge measurements of Cold Spring Canyon, Santa Barbara County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Aug. 13, 1897	Montecito Water Co.	0.66	City tunnel.
Do	.....do	.08	Creek at falls.
Sept. 6, 1897	.....do	.31	City tunnel.
Do	.....do	.06	Creek at falls.
Sept. 12, 1897	.....do	.31	City tunnel.
Do	.....do	.09	Creek at falls.
Oct. 2, 1897	.....do	.28	City tunnel.
Do	.....do	.09	Creek at falls.
Dec. 8, 1897	.....do	.22	City tunnel.
Do	.....do	.09	Creek at falls.
Jan. 26, 1898	.....do	.22	City tunnel.
Do	.....do	.11	Creek at falls.
June 14, 1900	R. Moyer	.02	City tunnel, station 29+97.
Do	.....do	.04	City tunnel, 100 feet from head, station 29+27.
Apr. 19, 1898	Montecito Water Co.	.22	City tunnel.
June 10, 1900	J. B. Lippincott	.41	City tunnel at Portal.
Do	.....do	Dry.	Creek at falls.
Mar. 22, 1896	Montecito Water Co.	.06	City tunnel.
Do	.....do	Dry.	Creek at falls.
Aug. —, 1889	G. F. Wright	.23	

## COLDWATER CREEK.

*Discharge measurements of Coldwater Creek, Riverside County, one-fifth mile above dam.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
Jan. 4, 1899	F. Rolfe	0.82
Jan. 18, 1899	do	1.43
Jan. 27, 1899	do	.84
Feb. 3, 1899	do	.99
Feb. 11, 1899	do	.97
Feb. 18, 1899	do	.78
Feb. 24, 1899	do	.94
Mar. 1, 1899	do	.92
Mar. 12, 1899	do	.71
Mar. 17, 1899	do	1.60
Mar. 25, 1899	do	1.18
Mar. 31, 1899	do	.84
Apr. 14, 1899	do	.68
Apr. 15, 1899	do	.62
Apr. 21, 1899	do	.26
Apr. 26, 1899	do	.38
May 5, 1899	do	.37
May 13, 1899	do	.21
May 17, 1899	do	.21
May 29, 1899	do	.27
May 31, 1899	do	.38
Do	do	.30
June 5, 1899	do	.30
June 7, 1899	do	.22

## COLORADO RIVER.

*Discharge measurements of Colorado River.*

Date.	Hydrographer.	Gage height.	Dis-charge.	Locality.
		<i>Feet.</i>	<i>Sec.-feet.</i>	
Aug. 18, 1875	U. S. Engineers		18,410	Stones Ferry.
Aug. 20, 1875	do		11,610	Camp Mohave.
Mar. 15, 1876	do		7,659	Yuma.
Jan. 17, 1895	J. B. Lippincott	20.3	9,737	Do.
Apr. 18, 1895	do	20.2	21,094	Do.
July 10, 1895	do	21.2	45,533	Do.
May 20, 1896	do	22.2	57,903	Do.

*Discharge measurements of Colorado River—Continued.*

Date.	Hydrographer.	Gage height.	Dis-charge.	Locality.
		<i>Feet.</i>	<i>Sec.-feet.</i>	
Aug. 18, 1901	H. G. Heisler	20.71	18,683	Yuma.
Jan. 9, 1902	J. B. Lippincott	17.2	3,637	Do.
Feb. 20, 1902	S. G. Bennett	17.15	3,939	Do.
May 30, 1902	do	23	38,400	Do.
July 9, 1902	do	20.52	14,799	Do.
July 7, 1902	W. W. Follett	21.06	18,350	Do.
Oct. 11, 1902	S. G. Bennett	18.5	6,030	Do.
Oct. 14, 1902	R. P. H. Laney	17.9	4,798	Do.
Oct. 17, 1902	do	17.5	3,559	Do.
Oct. 21, 1902	do	17.6	4,203	Do.
Oct. 24, 1902	do	17.5	3,547	Do.
Nov. 12, 1902	S. G. Bennett	17.4	3,614	Do.
Nov. 13, 1902	do	17.5	3,865	Do.
Nov. 15, 1902	W. D. Smith	18.55	5,276	Do.
Nov. 18, 1902	do	18.05	4,213	Do.
Nov. 20, 1902	do	18	4,368	Do.
Nov. 22, 1902	do	18.10	4,600	Do.
Nov. 24, 1902	do	18.45	5,500	Do.
Nov. 26, 1902	do	18.40	4,979	Do.
Nov. 28, 1902	do	18.50	5,544	Do.
Dec. 1, 1902	do	20	12,596	Do.
Dec. 3, 1902	do	19.25	7,862	Do.
Dec. 5, 1902	do	18.85	6,347	Do.
Dec. 8, 1902	do	18.3	4,825	Do.
Dec. 10, 1902	do	18.2	5,081	Do.
Dec. 12, 1902	do	18	4,669	Do.
Dec. 15, 1902	do	17.65	3,818	Do.
Dec. 16, 1902	do	17.5	3,589	Do.
Dec. 18, 1902	do	18.3	5,361	Do.
Dec. 19, 1902	do	18.05	4,607	Do.
Dec. 20, 1902	do	18.05	5,237	Do.
Dec. 22, 1902	do	17.7	4,698	Do.
Dec. 24, 1902	do	18	4,863	Do.
Dec. 26, 1902	do	18.1	5,356	Do.
Dec. 27, 1902	do	18.3	5,497	Do.
Dec. 29, 1902	do	18	4,588	Do.
Dec. 31, 1902	do	17.7	4,176	Do.

*Estimated monthly discharge of Colorado River at Yuma.*

[Drainage area, 225,049 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1902.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	4,520	3,230	3,727	229,164	0.017	0.020
February .....	4,720	3,300	3,955	219,650	.018	.019
March .....	5,340	4,340	4,903	301,474	.022	.025
April .....	11,400	4,340	6,179	367,676	.027	.030
May .....	59,200	11,400	35,961	2,211,156	.160	.184
June .....	56,200	29,000	42,520	2,530,115	.189	.211
July .....	27,000	5,130	12,527	770,255	.056	.065
August .....	5,560	3,230	4,183	257,203	.019	.022
September .....	8,360	3,050	3,819	227,246	.017	.019
October .....	6,600	3,140	4,299	264,335	.019	.022
November .....	5,540	3,140	4,187	249,144	.019	.021
December .....	12,600	3,590	5,412	332,771	.025	.028
The year .....	59,200	3,050	10,973	7,960,189	.049	.666

*Discharge measurements of Colorado River at Bulls Head Canyon.*

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-feet.</i>
Dec. 5, 1902	J. T. Whistler .....	3	5,786
Dec. 10, 1902	L. M. Barnes .....	2.65	4,051
Dec. 13, 1902	do .....	2.45	3,222
Dec. 17, 1902	do .....	2.95	4,138
Dec. 20, 1902	do .....	3.50	4,792
Dec. 24, 1902	do .....	3.23	4,939
Dec. 29, 1902	do .....	2.45	3,366
Dec. 31, 1902	do .....	2.20	2,913

## COLTON CITY AND COLTON TERRACE, SAN BERNARDINO COUNTY.

See San Bernardino Valley.

## CONVICT CREEK.

See Owens River, Convict Creek.



## COSUMNES RIVER.

*Discharge measurements of Cosumnes River, Eldorado County.*

Date	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Sept. 16, 1899	S. G. Bennett	2	Bridge near Latrobe, Jackson road.
Do	do	2	Ditch on south side of Latrobe, Jackson road.
Sept. 12, 1900	do	1.7	Bridge near Latrobe, Jackson road.
Do	do	3.7	Ditch on south side.

*Estimated monthly discharge of Cosumnes River at Live Oak Suspension Bridge, Sacramento County.<sup>a</sup>*

[Drainage area, 580 square miles.]

Month.	Mean dis-charge.	Total dis-charge.	Run-off.	
			Per square mile.	Depth.
1878.	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
November	29	1,726	0.05	0.06
December	29	1,783	.05	.06
1879.				
January	290	17,831	.50	.58
February	1,218	67,644	2.10	2.19
March	1,740	106,988	3	3.46
April	3,132	186,367	5.40	6.03
May	3,248	199,712	5.60	6.46
June	3,480	207,074	6	6.69
July	422	25,948	.73	.84
August	116	7,133	.20	.23
September	23	1,369	.04	.04
October	17	1,045	.03	.03
November	52	3,094	.09	.10
December	406	24,964	.70	.81
The year	1,179	849,169	2.03	27.46

<sup>a</sup> Authority, California State engineering department. Estimated from run-off of neighboring drainage basins.

*Estimated monthly discharge of Cosumnes River, etc.—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1880.	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	232	14,265	0.40	0.46
February .....	441	25,367	.76	.82
March .....	696	42,795	1.20	1.38
April .....	4,582	272,648	7.90	8.81
May .....	5,104	313,833	8.80	10.15
June .....	6,090	362,380	10.50	11.71
July .....	2,726	167,615	4.70	5.42
August .....	348	21,398	.60	.69
September .....	29	1,726	.05	.06
October .....	47	1,045	.03	.03
November .....	12	714	.02	.02
December .....	290	17,831	.50	.58
The year .....	1,714	1,241,617	2.96	40.13
1881.				
January .....	1,624	99,856	2.80	3.23
February .....	3,074	170,721	5.30	5.52
March .....	1,102	67,750	1.90	2.19
April .....	3,190	189,818	5.50	6.14
May .....	3,074	189,013	5.30	6.11
June .....	1,218	72,476	2.10	2.34
July .....	174	10,699	.30	.35
August .....	87	5,349	.15	.17
September .....	87	5,177	.15	.17
October .....	58	3,566	.10	.12
November .....	174	10,354	.30	.33
December .....	522	32,097	.90	1.04
The year .....	1,199	856,885	2.07	27.71

*Estimated monthly discharge of Cosumnes River, etc.—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1882.	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	522	32,097	0.90	1.04
February .....	522	28,990	.90	.94
March .....	1,740	106,988	3	3.46
April .....	2,320	138,050	4	4.46
May .....	4,524	278,170	7.80	8.99
June .....	2,900	172,562	5	5.58
July .....	696	42,795	1.20	1.38
August .....	580	35,663	1	1.15
September .....	52	3,094	.09	.10
October .....	232	14,265	.40	.46
November .....	100	5,950	.17	.19
December .....	100	6,149	.17	.20
The year .....	1,191	864,773	2.05	27.95
1883.				
January .....	348	21,398	.60	.69
February .....	290	16,106	.50	.52
March .....	522	32,097	.90	1.04
April .....	1,740	103,537	3	3.35
May .....	3,480	213,977	6	6.92
June .....	2,320	138,050	4	4.46
July .....	580	35,663	1	1.15
August .....	232	14,265	.40	.46
September .....	87	5,177	.15	.17
October .....	87	5,349	.15	.17
November .....	116	6,902	.20	.22
December .....	116	7,133	.20	.23
The year .....	827	599,654	1.43	19.38

*Estimated monthly discharge of Cosumnes River, etc.—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1884.	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	145	8,916	0.25	0.29
February .....	1,740	100,086	3	3.24
March .....	3,480	213,977	6	6.92
April .....	3,480	207,074	6	6.69
May .....	2,900	178,314	5	5.76
June .....	2,320	138,050	4	4.46
July .....	2,320	142,651	4	4.61
August .....	580	35,663	1	1.15
September .....	116	6,902	.20	.22
October .....	87	5,349	.15	.17

#### COW CREEK, TUOLUMNE COUNTY.

See Stanislaus River, Cow Creek.

#### CUCAMONGA CREEK.

*Discharge measurements of Cucamonga Creek, San Bernardino County.*

Date.	Hydrographer.	Discharge.	Locality.
		<i>Sec.-feet.</i>	
Aug. 26, 1898	F. H. Olmsted .....	1.04	Headworks in canyon.
July 11, 1900	S. G. Bennett .....	1.08	Do.
Oct. 7, 1901	.....do .....	2.06	Do.
Apr. 3, 1902	.....do .....	4.80	Do.

## Tabulation of measurements of cienagas and developments at Red Hill as indicated in miners' inches.

[Fifty miners' inches to one second-foot.]

Date.	Hydrographer.	East side.								West side.										
		Creek Div. box, 30-inch line.	Div. box 1, 16-inch line and V tunnel, built in 1886-1887.	China cienaga	Lone Star Spring tunnel.	V tunnel, built prior to 1886.	Cienaga below No. 1.	Total without Lone Star.	Total.	Spring northwest of tunnel No. 2 portal.	W. cienaga "D."	Picnic Spring, cienaga C.	Artesian well Nos. 1 and 2.	Tiburcio Spring.	Tunnel No. 2 on 90-acre.	China garden.	Stowell wells and tunnel above 90-acre tract.	Rain previous season.	Total on 90-acre tract.	Grand total, Red Hills.
Sept. 26, 1885	Wm. M. Fitzhugh	225.36	-----	51.73	(2.02)	$\left\{ \begin{array}{l} 6.61 \\ 9.61 \\ 16.22 \end{array} \right\}$	-----	293.31	295.33	56.47	45.27	(9.00)	-----	(1.00)	-----	-----	-----	10.81	111.74	406.07
Nov. 30, 1886	J. P. Culver	261.43	64.67	11.46	2.02	-----	-----	337.56	339.57	9.50	$\left\{ \begin{array}{l} 5.70 \\ 97.80 \\ .90 \\ 104.40 \end{array} \right\}$	18.40	-----	2.16	-----	(a)	-----	21.83	134.46	474.03
July 24, 1887	F. Eaton	147.50	169.50	(10.00)	(2.00)	163.00	-----	327.00	329.00	13.67	31.90	10.00	(b)	(1.00)	-----	(16.76)	-----	14.50	73.33	402.33
July 13, 1888	J. P. Culver	155.78	183.61	18.10	13.59	138.62	46.43	357.49	371.08	3.14	38.89	5.38	15.14	1.59	417.70	16.76	-----	17.76	98.60	469.68
July 13, 1889	E. T. Wright	184.58	163.57	13.27	9.78	136.23	48.36	361.42	371.20	3.94	40.53	17.33	15.14	1.81	54.02	(16.76)	-----	20.97	149.53	520.73
July 14, 1890	do	260.03	228.53	17.32	10.85	156.01	72.52	505.88	516.73	3.08	71.98	30.53	13.98	0.92	673.82	(16.76)	-----	25.45	211.07	727.80
July 14, 1890	J. P. Culver	266.82	238.04	18.50	11.25	165.55	72.49	523.36	534.61	3.14	81.78	31.47	14.29	2.38	75.42	(16.76)	-----	25.24	759.85	-----
June 29, 1893	E. T. Wright	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	13.29	-----	-----	-----	-----	-----	19.82	-----	-----
July 14, 1893	do	-----	-----	-----	-----	152.42	-----	-----	-----	-----	-----	-----	-----	-----	36.45	-----	-----	-----	-----	-----
Sept. 15, 1894	do	160.31	182.84	13.14	(8.00)	141.10	41.74	356.29	364.29	-----	-----	-----	-----	-----	-----	-----	-----	8.13	-----	-----
June 12, 1895	do	198.53	154.87	21.00	(7.00)	(110.60)	(44.27)	374.40	381.40	-----	-----	-----	-----	-----	-----	-----	-----	20.98	-----	-----
June 14, 1896	N. W. Stowell	-----	-----	-----	-----	-----	-----	-----	-----	0.00	22.00	1.00	23.00	-----	418.00	-----	0.00	-----	64.00	352.55
Aug. 20, 1896	F. E. Trask	132.40	137.90	11.25	(7.00)	-----	-----	281.55	288.55	-----	-----	-----	-----	-----	-----	-----	-----	8.11	-----	-----

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Mar. 2, 1897	N. W. Stowell	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	46.00	-----	-----	-----
Aug. 5, 1897	do	-----	-----	-----	9.42	-----	-----	-----	-----	0.00	$\left\{ \begin{array}{l} 20.00 \\ 7.00 \\ 27.00 \end{array} \right\}$	(0.50)	20.25	0.00	41.40	0.00	-----	89.15	334.07	-----
Aug. 10, 1897	F. E. Trask	104.90	120.10	10.50	(9.42)	-----	-----	225.50	244.92	0.00	-----	-----	-----	-----	-----	-----	-----	16.74	-----	-----
Aug. 13, 1898	do	76.68	95.91	7.84	47.00	-----	-----	180.43	227.43	0.00	-----	-----	-----	-----	-----	-----	-----	8.24	-----	-----
Aug. 14, 1898	N. W. Stowell	-----	-----	-----	-----	-----	-----	-----	-----	0.00	524.00	(0.50)	413.00	0.00	26.00	0.00	-----	63.50	290.93	-----
Apr. 1, 1899	do	107.25	98.20	-----	-----	-----	-----	205.45	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.49	-----	-----
Aug. 21, 1899	E. T. Wright	m91.58	80.95	-----	-----	$\left\{ \begin{array}{l} m27.00 \\ c75.00 \end{array} \right\}$	56.17	24.78	172.53	$\left\{ \begin{array}{l} m199.53 \\ p247.53 \end{array} \right\}$	0.00	-----	-----	-----	-----	-----	-----	-----	-----	-----
Aug. 25, 1899	E. T. Wright and F. C. Finkle	-----	-----	-----	-----	-----	-----	-----	-----	3.13	-----	2.68	-----	61.80	-----	92.40	-----	67.61	267.14	-----
Apr. 1, 1899	Newman and Finkle	107.25	98.20	(5.00)	435.60	72.60	-----	210.45	246.05	0.00	415.49	-----	7.90	-----	-----	-----	-----	-----	-----	-----
Feb. 3 and 5, 1900	Newman, Trask, and Finkle	m97.06	77.22	-----	17.06	54.88	-----	174.28	191.34	0.00	3.91	-----	1.45	-----	-----	-----	-----	-----	-----	-----
Feb. 11, 1900	Trask and Finkle	-----	-----	-----	-----	-----	-----	-----	-----	3.81	0.56	1.20	-----	55.90	-----	76.25	-----	61.47	252.81	-----

a China garden included in "D."

b Fall, 1897.

c Tunnel.

d Construction begun January, 1888.

e Length, 2,600 feet.

f 1 p. m.

g Caved in.

h August 4, well No. 2 cut.

i Exterior of tunnel begun, 11.

j Stowell.

k June 12, not pumped.

l July 24, not pumped.

m And China cienaga.

n Flow.

o Pumped.

p When Lone Star Tunnel was pumped.

q March 15.

LIPSCOTT.]

CUCAMONGA CREEK.

*Discharge measurements of tributaries of Cucamonga Creek around Red Hills.*

Date.	Hydrographer.	Dis-charge	Locality.
		<i>Sec.-feet.</i>	
Sept. 9, 1898	O. J. Sutton	2.20	Springs.
Do	do	2.80	Tunnels.
Do	do	1.80	Artesian wells.
Total		6.80	
Aug. 29, 1899	S. G. Bennett	2.48	From Stowell wells to Ontario.
July 11, 1900	S. G. Bennett	4.03	East side.
Do	do	2.97	West side.
Do	do	2.13	San Antonio water, Haskell well.
Do	do	1.72	Sixteenth street wells.
Total from Red Hills.		10.85	

## DALEY DITCH, SAN BERNARDINO COUNTY.

See San Bernardino Valley, Daley ditch.

## DEER CREEK.

*Estimated monthly discharge of Deer Creek, Tulare County, at base of foothills.<sup>a</sup>*

[Drainage area, 110 square miles.]

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1878.	<i>Second-feet.</i>	<i>Acre-feet.</i>	<i>Second-feet.</i>	<i>Inches.</i>
November	0	0	0	0
December	0	0	0	0
1879.				
January	9	553	0.03	0.09
February	15	833	.14	.15
March	8	492	.07	.08
April	28	1,666	.25	.28
May	20	1,230	.18	.21
June	7	417	.06	.07
July	0	0	0	0
August	0	0	0	0
September	0	0	0	0
October	0	0	0	0
November	29	1,726	.26	.29
December	55	3,382	.50	.58
The year	14	10,299	.13	1.75

<sup>a</sup> Authority, California State engineering department. Estimated from run-off of neighboring streams.

*Estimated monthly discharge of Deer Creek, etc.—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1880.	<i>Second-feet.</i>	<i>Acre-feet.</i>	<i>Second-feet.</i>	<i>Inches.</i>
January .....	132	8, 116	1. 20	1. 38
February .....	253	14, 553	2. 30	2. 48
March .....	286	17, 585	2. 60	3. 00
April .....	319	18, 982	2. 90	3. 24
May .....	220	13, 527	2. 00	2. 31
June .....	55	3, 273	. 50	. 56
July .....	6	369	. 05	. 06
August .....	0	0	0	0
September .....	0	0	0	0
October .....	0	0	0	0
November .....	22	1, 309	. 20	. 22
December .....	55	3, 382	. 50	. 58
The year .....	112	81, 096	1. 02	13. 83
1881.				
January .....	55	3, 382	. 50	. 58
February .....	110	6, 109	1. 00	1. 04
March .....	116	6, 764	1. 00	1. 15
April .....	110	6, 545	1. 00	1. 12
May .....	110	6, 764	1. 00	1. 15
June .....	55	3, 273	. 50	. 56
July .....	0	0	0	0
August .....	0	0	0	0
September .....	0	0	0	0
October .....	0	0	0	0
November .....	0	0	0	0
December .....	23	1, 414	. 21	. 24
The year .....	48	34, 251	. 43	5. 84



*Estimated monthly discharge of Deer Creek, etc.—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile	Depth
1882.	<i>Second-feet.</i>	<i>Acre-feet.</i>	<i>Second-feet.</i>	<i>Inches.</i>
January .....	23	1,414	0.21	0.24
February .....	17	944	.15	.16
March .....	55	3,382	.50	.58
April .....	55	3,273	.50	.56
May .....	11	676	.10	.12
June .....	0	0	0	0
July .....	0	0	0	0
August .....	0	0	0	0
September .....	0	0	0	0
October .....	11	676	.10	.12
November .....	17	1,012	.15	.17
December .....	6	369	.05	.06
The year .....	16	11,746	.15	2.01
1883.				
January .....	17	1,045	.15	.17
February .....	17	944	.15	.16
March .....	88	5,411	.80	.92
April .....	55	3,273	.50	.56
May .....	44	2,705	.40	.46
June .....	0	0	0	0
July .....	0	0	0	0
August .....	0	0	0	0
September .....	0	0	0	0
October .....	11	676	.10	.12
November .....	11	655	.10	.11
December .....	17	1,045	.15	.17
The year .....	22	15,754	.21	2.67

*Estimated monthly discharge of Deer Creek, etc.—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1884.	<i>Second-feet.</i>	<i>Acre-feet.</i>	<i>Second-feet.</i>	<i>Inches.</i>
January .....	55	3,382	0.50	0.58
February .....	330	18,982	3.00	3.24
March .....	330	20,291	3.00	3.46
April .....	220	13,091	2.00	2.23
May .....	44	2,705	.40	.46
June .....	55	3,273	.50	.56
July .....	0	0	0	0
August .....	0	0	0	0
September .....	0	0	0	0
October .....	0	0	0	0

#### DINSMORE CREEK.

*Discharge measurement of Dinsmore Creek, Santa Barbara County.*

Date.	Hydrographer.	Discharge.
		<i>Sec.-feet.</i>
Aug. —, 1889	G. F. Wright .....	0.23

#### DOBBINS CREEK.

*Discharge measurement of Dobbins Creek, Yuba County.*

Date.	Hydrographer.	Discharge.
		<i>Sec.-feet.</i>
Apr. 29, 1901	F. S. Hyde .....	<sup>a</sup> 224

<sup>a</sup> Estimated, at dam.

#### DOS PUEBLOS CREEK.

*Discharge measurement of Dos Pueblos Creek, Santa Barbara County.*

Date.	Hydrographer.	Discharge.
		<i>Sec.-feet.</i>
Aug. —, 1889	G. F. Wright .....	0.54

## • DRY OR JACKSON CREEK.

*Estimated monthly discharge of Dry Creek, San Joaquin County, at base of foothills.<sup>a</sup>*

[Drainage area, 283 square miles.]

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
	<i>Second-feet.</i>	<i>Acre-feet.</i>	<i>Second-feet.</i>	<i>Inches.</i>
1878.				
November .....	0	0	0	0
December .....	0	0	0	0
1879.				
January .....	84	5, 165	0.30	0.35
February .....	425	23, 603	1.50	1.56
March .....	849	52, 203	3.00	3.46
April .....	425	25, 289	1.50	1.67
May .....	113	6, 948	.40	.46
June .....	57	3, 392	.20	.22
July .....	15	922	.05	.06
August .....	0	0	0	0
September .....	0	0	0	0
October .....	0	0	0	0
November .....	0	0	0	0
December .....	198	12, 175	.70	.81
The year .....	181	129, 697	.64	8.59
1880.				
January .....	127	7, 809	.45	.52
February .....	140	8, 053	.49	.53
March .....	354	21, 767	1.25	1.44
April .....	2, 264	134, 717	8.00	8.93
May .....	879	54, 048	3.11	3.59
June .....	113	6, 724	.40	.45
July .....	15	922	.05	.06
August .....	6	369	.02	.02
September .....	0	0	0	0
October .....	0	0	0	0
November .....	0	0	0	0
December .....	142	8, 731	.50	.58
The year .....	337	243, 140	1.19	16.12

<sup>a</sup> Authority, California State engineering department. Estimated from run-off of neighboring streams.

*Estimated monthly discharge of Dry Creek, etc.—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1881.	<i>Second-feet.</i>	<i>Acre-feet.</i>	<i>Second-feet.</i>	<i>Inches.</i>
January .....	879	54,048	3.11	3.59
February .....	1,557	86,471	5.50	5.73
March .....	566	34,802	2.00	2.31
April .....	566	33,679	2.00	2.23
May .....	113	6,948	.40	.46
June .....	42	2,499	.15	.17
July .....	0	0	0	0
August .....	0	0	0	0
September .....	0	0	0	0
October .....	0	0	0	0
November .....	57	3,392	.20	.22
December .....	254	15,618	.90	1.04
The year .....	336	237,457	1.19	15.75
1882.				
January .....	254	15,618	.90	1.04
February .....	283	15,717	1.00	1.04
March .....	849	52,203	3.00	3.46
April .....	566	33,679	2.00	2.23
May .....	57	3,505	.20	.23
June .....	0	0	0	0
July .....	0	0	0	0
August .....	0	0	0	0
September .....	15	893	.05	.06
October .....	57	3,505	.20	.23
November .....	84	4,998	.30	.33
December .....	84	5,165	.30	.35
The year .....	187	135,283	.66	8.97

*Estimated monthly discharge of Dry Creek, etc.—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1883.	<i>Second-feet.</i>	<i>Acre-feet.</i>	<i>Second-feet.</i>	<i>Inches.</i>
January .....	168	10,330	0.59	0.68
February .....	141	7,831	.50	.52
March .....	254	15,618	.90	1.04
April .....	283	16,840	1.00	1.12
May .....	168	10,330	.59	.68
June .....	0	0	0	0
July .....	0	0	0	0
August .....	0	0	0	0
September .....	0	0	0	0
October .....	15	922	.05	.06
November .....	0	0	0	0
December .....	15	922	.05	.06
The year .....	87	62,793	.31	4.16
1884.				
January .....	142	8,731	.50	.58
February .....	1,132	65,113	4.00	4.31
March .....	1,132	69,604	4.00	4.61
April .....	879	52,304	3.11	3.47
May .....	168	10,330	.59	.68
June .....	283	16,840	1.00	1.12
July .....	0	0	0	0
August .....	0	0	0	0
September .....	0	0	0	0
October .....	0	0	0	0

## EAST RIVERSIDE WATER COMPANY, SAN BERNARDINO COUNTY.

See San Bernardino Valley.

## EATON CANYON.

*Discharge measurements of Eaton Canyon, Los Angeles County.*

Date.	Hydrographer.	Discharge.	Locality.
		<i>Sec.-feet.</i>	
Jan. 11, 1899	E. P. Dewey .....	0.50	Near falls.
Oct. 18, 1898	J. B. Lippincott .....	1.87	Water from large wells in Eaton Wash.
Do .....	do .....	.04	Around superintendent's house and barns.
Do .....	do .....	.10	San Gabriel water.
Do .....	do .....	.10	Dairy well.
Nov. 14, 1898	do .....	2.11	

## ELEANOR CREEK.

See Tuolumne River, Eleanor Creek.

## FALLS CREEK.

See Tuolumne River, Falls Creek.

## FALL RIVER.

See Pit River, Fall River.

## FEATHER RIVER.

*Discharge measurements of Feather River, Butte County.*

Date.	Hydrographer.	Gage height.	Discharge.	Locality.
		<i>Feet.</i>	<i>Sec.-feet.</i>	
Feb. 18, 1879	State engineering department.		21,000	Hennesseys.
May 13, 1879	do .....		15,000	Do.
Feb. 19, 1879	do .....		12,000	Burts Ferry.
Aug. 31, 1879	do .....		1,200	Do.
Nov. 12, 1879	do .....		2,700	Do.
Mar. 6, 1879	do .....		56,000	Marysville.
Sept. 1, 1879	do .....		1,200	Do.
July 16, 1879	do .....		1,900	Near mouth.
Aug. 27, 1879	do .....		1,200	Oroville.
Sept. 1, 1879	do .....		1,800	Below mouth of Yuba.
Sept. 7, 1901	S. G. Bennett .....		34	West Branch of North Fork, Cherokee Pipe Crossing.
Sept. 18, 1900	do .....		1,123	Oroville Bridge.
Sept. 6, 1901	do .....		1,220	Do.

*Discharge measurements of Feather River, Butte County—Continued.*

Date.	Hydrographer.	Gage height.	Discharge.	Locality.
		<i>Feet.</i>	<i>Sec.-feet.</i>	
Jan. 29, 1902	S. G. Bennett	-----	1,960	Oroville Bridge.
Sept. 7, 1901	do	*	946	North Fork, Huffs Bar.
Mar. 1, 1902	do	8.7	15,228	Oroville Bridge.
May 7, 1902	do	8.75	15,476	Do.
Sept. 4, 1902	Chas. A. Miller	.96	1,385	Do.
Sept. 10, 1902	do	.92	1,390	Do.
Dec. 18, 1902	S. G. Bennett	3.65	3,298	Do.
Sept. 3, 1902	do	-----	1	South Fork at Little Grass Valley.
Sept. 6, 1902	Chas. A. Miller	-----	1	South Fork at bridge at Enterprise.
Do	do	-----	216	South Fork at Bidwell Bar Bridge.
Do	do	-----	30	South Fork Palermo Canal at Enterprise.
Sept. 4, 1902	S. G. Bennett	-----	92	Middle Fork, below mouth of Nelson Creek.
Do	do	-----	33	Middle Fork, Nelson Creek above mouth.
Do	do	-----	28	Middle Fork, Spanish Creek at Pocket Bridge, lower end of American Valley.
Sept. 5, 1902	do	-----	22	North Fork, Indian Creek at Indian Valley on Taylorsville road.
Do	do	-----	607	North Fork at lower end Big Meadows.
Sept. 8, 1902	do	-----	669	North Fork at Bidwell's sawmill.
Do	do	-----	163	East Branch North Fork at Hamilton's bridge.
Sept. 9, 1902	do	-----	64	Big Spring Branch of East Fork of North Fork at point 1 mile below boat-house.
Do	do	-----	109	Dotta or Lower Big Spring Branch of North Fork at mouth.
Do	do	-----	327	West Branch of North Fork near Prattville.
Sept. 7, 1902	do	-----	27	Butte Valley Creek, North Fork, at Butte Valley post-office.
Sept. 9, 1902	Chas. A. Miller	-----	595	North Fork, Huffs Bar.
Sept. 12, 1902	do	-----	315	Big Bend Tunnel on North Fork, at portal of tunnel.
Sept. 9, 1902	do	-----	27	West Fork of North Fork at Yankee Hill Bridge.



*Estimated monthly discharge of Feather River at Oroville, Cal.*

[Drainage area, 3,350 square miles.]

Month.	Discharge.			Total discharge	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1902.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	2,325	1,975	1,998	122,852	0.60	0.69
February .....	38,680	1,975	19,545	1,085,474	5.83	6.07
March .....	24,420	7,000	11,148	685,464	3.33	3.84
April .....	39,600	8,300	19,485	1,159,437	5.82	6.50
May .....	16,600	9,020	12,110	744,615	3.61	3.74
June .....	10,900	2,750	5,609	333,759	1.67	1.86
July .....	2,750	1,620	2,098	129,001	.63	.72
August .....	1,620	1,400	1,535	94,383	.46	.53
September .....	1,400	1,300	1,323	78,724	.40	.45
October .....	3,150	1,300	1,503	92,477	.45	.52
November .....	14,400	1,510	3,481	207,134	1.04	1.08
December .....	25,800	1,565	6,287	386,573	1.88	2.17
The year .....	39,600	1,300	7,177	5,119,893	2.14	28.57

## FICAY CREEK.

*Discharge measurement of Ficay Creek, Santa Barbara County.*

Date.	Hydrographer.	Discharge
Aug.—, 1889 .....	G. F. Wright .....	<i>Sec.-feet.</i> 0.31

## FORT TEJON CREEK.

*Discharge measurement of Fort Tejon Creek, in foothills, Kern County.*

Date.	Hydrographer.	Discharge
		<i>Sec.-feet.</i>
Nov. 13, 1895 .....	J. B. Lippincott .....	2.6
Feb. 3, 1896 .....	do .....	3.5
June 4, 1896 .....	do .....	1.1
Dec. 19, 1896 .....	do .....	1.5

## FRESNO CREEK.

*Estimated monthly discharge of Fresno Creek, Madera County, at base of foothills.<sup>a</sup>*

[Drainage area, 272 square miles.]

Month.	Maximum.	Minimum.	Mean.	Total discharge.	Run-off.	
					Per square mile.	Depth.
1878.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acres-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
November <sup>b</sup>	-----	-----	0	0	0	0
December <sup>b</sup>	-----	-----	0	0	0	0
1879.						
January <sup>c</sup>	80	0	27	1,660	0.10	0.12
February <sup>c</sup>	117	66	80	4,443	.29	.30
March <sup>c</sup>	202	66	118	7,256	.43	.50
April <sup>c</sup>	202	124	153	9,283	.57	.64
May <sup>c</sup>	102	66	79	4,858	.29	.33
June <sup>c</sup>	54	0	15	893	.06	.07
July <sup>c</sup>	0	0	0	0	0	0
August <sup>c</sup>	0	0	0	0	0	0
September <sup>c</sup>	0	0	0	0	0	0
October <sup>c</sup>	0	0	0	0	0	0
November <sup>b</sup>	0	0	0	0	0	0
December <sup>b</sup>	-----	-----	109	6,702	.40	.46
The year	-----	-----	49	35,095	.18	2.42
1880. <sup>b</sup>						
January	-----	-----	5	307	.02	.02
February	-----	-----	150	8,628	.55	.59
March	-----	-----	16	984	.06	.07
April	-----	-----	1,088	64,740	4.00	4.46
May	-----	-----	54	3,320	.20	.23
June	-----	-----	27	1,607	.10	.11
July	-----	-----	0	0	0	0
August	-----	-----	0	0	0	0
September	-----	-----	0	0	0	0
October	-----	-----	0	0	0	0
November	-----	-----	0	0	0	0
December	-----	-----	218	13,404	.80	.92
The year	-----	-----	130	92,990	.48	6.40

<sup>a</sup> Authority, California State engineering department.

<sup>b</sup> November and December, 1878, and from November, 1879, to October, 1884, inclusive, estimated from run-off of neighboring streams.

<sup>c</sup> Measured.

*Estimated monthly discharge of Fresno Creek, etc.—Continued.*

Month.	Maximum.	Minimum.	Mean.	Total discharge.	Run-off.	
					Per square mile.	Depth.
1881. <sup>a</sup>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January	-----	-----	544	33,449	2.00	2.31
February	-----	-----	544	30,212	2.00	2.08
March	-----	-----	272	16,725	1.00	1.15
April	-----	-----	109	6,486	.40	.45
May	-----	-----	54	3,320	.20	.23
June	-----	-----	0	0	0	0
July	-----	-----	0	0	0	0
August	-----	-----	0	0	0	0
September	-----	-----	0	0	0	0
October	-----	-----	0	0	0	0
November	-----	-----	0	0	.0	0
December	-----	-----	27	1,660	.10	.12
The year	-----	-----	129	91,852	.48	6.34
1882. <sup>a</sup>	-----	-----	-----	-----	-----	-----
January	-----	-----	54	3,320	.20	.23
February	-----	-----	163	9,053	.60	.62
March	-----	-----	1,088	66,899	4.00	4.61
April	-----	-----	272	16,185	1.00	1.12
May	-----	-----	54	3,320	.20	.23
June	-----	-----	0	0	0	0
July	-----	-----	0	0	0	0
August	-----	-----	0	0	0	0
September	-----	-----	0	0	0	0
October	-----	-----	27	1,660	.10	.12
November	-----	-----	54	3,213	.20	.22
December	-----	-----	27	1,660	.10	.12
The year	-----	-----	145	105,310	.53	7.27

<sup>a</sup>November and December, 1878, and from November, 1879, to October, 1884, inclusive, estimated from run-off of neighboring streams.

*Estimated monthly discharge of Fresno Creek, etc.—Continued.*

Month.	Maximum.	Minimum.	Mean.	Total discharge.	Run-off.	
					Per square mile.	Depth.
1883. <sup>a</sup>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January			82	5,042	0.30	0.35
February			54	2,999	.20	.21
March			272	16,725	1.00	1.15
April			136	8,093	.50	.56
May			109	6,702	.40	.46
June			0	0	0	0
July			0	0	0	0
August			0	0	0	0
September			0	0	0	0
October			0	0	0	0
November			0	0	0	0
December			0	0	0	0
The year			54	39,561	.20	2.73
1884. <sup>a</sup>						
January			27	1,660	.10	.12
February			1,360	78,228	5.00	5.39
March			1,632	100,348	6.00	6.92
April			1,088	64,740	4.00	4.46
May			816	50,174	3.00	3.46
June			816	48,555	3.00	3.35
July			272	16,725	1.00	1.15
August			27	1,660	.10	.12
September			0	0	0	0
October			0	0	0	0

<sup>a</sup>November and December, 1878, and from November, 1879, to October, 1884, inclusive, estimated from run-off of neighboring streams.

## GAGE CANAL.

See San Bernardino Valley, Gage canal.

## GATO CREEK.

Gato Creek was measured by Charles J. Johansen for the Pacific Improvement Company, as given below. It was gaged a short distance above its junction with the Loma Abajo, and at the time of its measurement no water was being conveyed in the pipe line situated along this stream.

*Discharge measurements of Gato Creek, Santa Barbara County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Feb. 7, 1890	Charles J. Johansen	2.26	At mouth.
Feb. 14, 1890	do	2.37	Do.
Feb. 27, 1890	do	2.81	Do.
Mar. 2, 1890	do	2.05	Do.
Mar. 4, 1890	do	1.95	Do.
Mar. 6, 1890	do	1.85	Do.
Mar. 9, 1890	do	1.85	Do.
Mar. 11, 1890	do	1.65	Do.
Mar. 13, 1890	do	1.55	Do.
Mar. 15, 1890	do	1.45	Do.
Mar. 17, 1890	do	1.36	Do.
Mar. 21, 1890	do	1.45	Do.
Mar. 23, 1890	do	1.36	Do.
Mar. 25, 1890	do	1.27	Do.
Mar. 27, 1890	do	1.09	Do.
Mar. 29, 1890	do	1.09	Do.
Mar. 31, 1890	do	1.00	Do.
Apr. 2, 1890	do	1.00	Do.
Apr. 4, 1890	do	.92	Do.
Apr. 6, 1890	do	.92	Do.
Apr. 8, 1890	do	.92	Do.
Apr. 10, 1890	do	.83	Do.
Apr. 12, 1890	do	.83	Do.
Apr. 14, 1890	do	.76	Do.
Apr. 16, 1890	do	.76	Do.
Apr. 17, 1890	do	.68	Do.
Apr. 18, 1890	do	.76	Do.
Apr. 20, 1890	do	.76	Do.
Apr. 22, 1890	do	.76	Do.
Apr. 24, 1890	do	.68	Do.
Apr. 26, 1890	do	.68	Do.
Apr. 28, 1890	do	.60	Do.
Apr. 30, 1890	do	.68	Do.
May 2, 1890	do	.60	Do.

*Discharge measurements of Gato Creek, Santa Barbara County—Continued.*

Date.		Hydrographer.	Dis-charge.	Locality.
			<i>Sec.-feet.</i>	
May	4, 1890	Charles J. Johansen	0.68	At mouth.
May	6, 1890	do	.68	Do.
May	8, 1890	do	.60	Do.
May	10, 1890	do	.53	Do.
May	12, 1890	do	.53	Do.
May	14, 1890	do	.46	Do.
May	16, 1890	do	.53	Do.
May	18, 1890	do	.46	Do.
May	20, 1890	do	.46	Do.
May	22, 1890	do	.59	Do.
May	24, 1890	do	.59	Do.
May	26, 1890	do	.58	Do.
May	28, 1890	do	.56	Do.
May	30, 1890	do	.56	Do.
June	1, 1890	do	.54	Do.
June	3, 1890	do	.49	Do.
June	5, 1890	do	.50	Do.
June	7, 1890	do	.49	Do.
June	9, 1890	do	.44	Do.
June	11, 1890	do	.50	Do.
June	13, 1890	do	.45	Do.
June	15, 1890	do	.50	Do.
June	17, 1890	do	.58	Do.
June	19, 1890	do	.50	Do.
June	21, 1890	do	.49	Do.
June	23, 1890	do	.44	Do.
June	25, 1890	do	.47	Do.
June	27, 1890	do	.45	Do.
June	29, 1890	do	.42	Do.
July	1, 1890	do	.44	Do.
July	3, 1890	do	.49	Do.
July	5, 1890	do	.34	Do.
July	7, 1890	do	.35	Do.
July	9, 1890	do	.32	Do.
July	11, 1890	do	.34	Do.
July	13, 1890	do	.34	Do.
July	15, 1890	do	.35	Do.
July	17, 1890	do	.33	Do.
July	19, 1890	do	.35	Do.
July	21, 1890	do	.27	Do.
July	23, 1890	do	.32	Do.

*Discharge measurements of Gato Creek, Santa Barbara County—Continued.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
July 25, 1890	Charles J. Johansen .....	0.26	At mouth.
July 27, 1890	do .....	.32	Do.
July 29, 1890	do .....	.34	Do.
July 31, 1890	do .....	.34	Do.
Aug. 2, 1890	do .....	.34	Do.
Aug. 4, 1890	do .....	.34	Do.
Aug. 6, 1890	do .....	.29	Do.
Aug. 8, 1890	do .....	.27	Do.
Aug. 10, 1890	do .....	.32	Do.
Aug. 12, 1890	do .....	.35	Do.
Aug. 14, 1890	do .....	.30	Do.
Aug. 15, 1890	do .....	.27	Do.
Aug. 17, 1890	do .....	.26	Do.
Aug. 19, 1890	do .....	.28	Do.
Aug. 21, 1890	do .....	.35	Do.
Aug. 23, 1890	do .....	.28	Do.
Aug. 25, 1890	do .....	.30	Do.
Aug. 27, 1890	do .....	.30	Do.
Aug. 29, 1890	do .....	.28	Do.
Aug. 31, 1890	do .....	.26	Do.
Sept. 2, 1890	do .....	.22	Do.
Sept. 4, 1890	do .....	.22	Do.
Sept. 6, 1890	do .....	.26	Do.
Sept. 8, 1890	do .....	.26	Do.
Sept. 10, 1890	do .....	.26	Do.
Sept. 12, 1890	do .....	.26	Do.
Sept. 14, 1890	do .....	.22	Do.
Sept. 16, 1890	do .....	.22	Do.
Sept. 18, 1890	do .....	.26	Do.
Sept. 21, 1890	do .....	.30	Do.
Sept. 22, 1890	do .....	.22	Do.
Sept. 24, 1890	do .....	.22	Do.
Sept. 26, 1890	do .....	.22	Do.
Sept. 28, 1890	do .....	.37	Do.
Sept. 30, 1890	do .....	.60	Do.
Oct. 2, 1890	do .....	.42	Do.
Oct. 4, 1890	do .....	.35	Do.
Oct. 6, 1890	do .....	.30	Do.
Oct. 7, 1890	do .....	.30	Do.



## GAZOO CREEK.

*Discharge measurements of Gazoo Creek, San Mateo County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec. feet.</i>	
Oct. 17, 1893	W. W. Brier .....	1.85	6 miles above mouth.

## GORMAN CREEK.

See Piru Creek, Gorman Creek.

## GREEN SPOT PIPE LINE.

See Santa Ana River, Green Spot pipe line.

## GRINDSTONE CREEK.

See Stony Creek, Grindstone Creek.

## GUBERNADOR CREEK.

*Discharge measurement of Gubernador Creek, Santa Barbara County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec. feet.</i>	
Aug. —, 1889	G. F. Wright .....	0.58	

## HAT CREEK.

See Pit River, Hat Creek.

## HAWS AND TALMAGE DITCH.

See San Bernardino Valley, Haws and Talmage ditch.

## HONEY LAKE.

Annual inflow estimated by State engineering department 200,000 acre-feet.

## HOUSE CREEK.

See Tejon House Creek.

## KAWEAH RIVER.

*Discharge measurements of Kaweah River, Tulare County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Nov. 20, 1895	J. B. Lippincott .....	70	Headworks above upper large power canal.
Sept. 1, 1898	.....do .....	35	Do.
Sept. 6, 1899	S. G. Bennett .....	41	Do.
Sept. 3, 1900	.....do .....	78.5	Do.
Nov. 20, 1895	J. B. Lippincott .....	0	Iron bridge, wagon road.
Aug. 31, 1898	.....do .....	0	Southern Pacific branch rail-road bridge.
Sept. 1, 1898	.....do .....	18	Iron bridge, wagon road.
Sept. 6, 1899	S. G. Bennett .....	33	Do.
Sept. 3, 1900	.....do .....	72	1,000 feet below iron bridge.
Do .....	.....do .....	15	Watumna Canal at head-gate.
Oct. 20, 1901	.....do .....	52	Iron bridge, 1,000 feet below.
Do .....	.....do .....	5	Watumna Canal.
Aug. 31, 1898	J. B. Lippincott .....	8.5	Kaweah irrigation and power ditch (Pogues lower ditch).
Sept. 6, 1899	S. G. Bennett .....	1.5	Do.
Sept. 3, 1900	.....do .....	8.1	Do.
Do .....	.....do .....	1	Myers ditch above Pogues upper ditch.
Aug. 31 1898	J. B. Lippincott .....	4.5	Pogues upper ditch.
Sept. 6, 1899	S. G. Bennett .....	4.9	Do.
Sept. 3, 1900	.....do .....	6.7	Do.
Sept. 1, 1898	J. B. Lippincott .....	.3	North Fork at mouth.
Sept. 6, 1899	S. G. Bennett .....	1.1	Do.
Sept. 1, 1898	J. B. Lippincott .....	0	South Fork canals.
Sept. 6, 1899	S. G. Bennett .....	.7	Do.
Sept. 25, 1902	E. T. Perkins .....	4.3	North Fork at lower end Davis ranch.
Do .....	.....do .....	.7	South Fork, 200 yards above bridge on road to Visalia.
Sept. 26, 1902	.....do .....	29	Middle Fork, $\frac{1}{4}$ mile above Sequoia National Park line.
Sept. 27, 1902	.....do .....	20	Middle Fork, 100 yards above junction with Marble Fork.
Do .....	.....do .....	4	Marble Fork, 100 yards above junction with Middle Fork.
Do .....	.....do .....	15	East Fork, $\frac{1}{2}$ mile above head-works Mount Whitney power plant.
Do .....	.....do .....	15.5	East Fork, 200 feet below head-works Mount Whitney power plant.
Sept. 28, 1902	.....do .....	11	East Fork, 100 yards below trail from Soldiers' Camp to Tar Gap.

*Discharge measurements of Kaweah River, Tulare County—Continued.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Sept. 29, 1902	E. T. Perkins.....	1	South Fork, Horse Creek, at lower end Hackett Meadows.
Do .....	do .....	2	South Fork, lower end Sand Meadows.
Sept. 27, 1902	L. M. Lawson .....	33	$\frac{1}{4}$ mile above iron bridge.
Sept. 29, 1902	do .....	9.8	South Fork, at Sequoia National Park line.
Sept. 30, 1902	do .....	31	Middle Fork, 3 miles above Three Rivers.
Sept. 10, 1902	R. McF. Doble .....	31	Middle Fork, $\frac{1}{4}$ mile inside Sequoia National Park line.
Sept. 12, 1902	do .....	18	East Fork (total flow), 1,600 feet from head of Mount Whitney Power Co. flume.

*Estimated monthly discharge of Kaweah River at Wachumna Hill, Tulare County.<sup>a</sup>*

[Drainage area, 619 square miles.]

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1878.	<i>Second-feet.</i>	<i>Acre-feet.</i>	<i>Second-feet.</i>	<i>Inches.</i>
November <sup>b</sup> .....	155	9,223	0.25	0.28
December <sup>b</sup> .....	155	9,531	.25	.29
1879.				
January <sup>c</sup> .....	248	15,249	.40	.46
February <sup>c</sup> .....	279	15,495	.45	.47
March <sup>c</sup> .....	402	24,718	.65	.75
April <sup>c</sup> .....	867	51,590	1.40	1.56
May <sup>c</sup> .....	774	47,591	1.25	1.44
June <sup>c</sup> .....	557	33,144	.90	1.00
July <sup>c</sup> .....	124	7,624	.20	.23
August <sup>c</sup> .....	31	1,906	.05	.06
September <sup>b</sup> .....	31	1,845	.05	.06
October <sup>b</sup> .....	62	3,812	.10	.12
November <sup>c</sup> .....	124	7,379	.20	.22
December <sup>c</sup> .....	279	17,155	.45	.52
The year .....	315	227,508	.51	6.89

<sup>a</sup> Authority, California State engineering department.<sup>b</sup> Estimated in part from run-off of neighboring streams.<sup>c</sup> Based in part on measurements and rod records near Three Rivers.

*Estimated monthly discharge of Kaweah River, etc.—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1880.	<i>Second-feet.</i>	<i>Acre-feet.</i>	<i>Second-feet.</i>	<i>Inches.</i>
January <sup>a</sup> .....	248	15,249	0.40	0.46
February <sup>a</sup> .....	310	17,831	.50	.54
March <sup>a</sup> .....	464	28,530	.75	.86
April <sup>a</sup> .....	2,352	139,954	3.80	4.24
May <sup>a</sup> .....	2,786	171,304	4.50	5.19
June <sup>a</sup> .....	3,900	232,066	6.30	7.02
July <sup>a</sup> .....	743	45,685	1.20	1.38
August <sup>b</sup> .....	155	9,531	.25	.29
September <sup>b</sup> .....	99	5,891	.16	.18
October <sup>b</sup> .....	50	3,074	.08	.09
November <sup>b</sup> .....	74	4,403	.12	.13
December <sup>b</sup> .....	371	22,812	.60	.69
The year .....	963	696,330	1.56	21.07
1881.				
January <sup>b</sup> .....	526	32,342	.85	.98
February <sup>b</sup> .....	774	42,986	1.25	1.30
March <sup>b</sup> .....	619	38,061	1.00	1.15
April <sup>b</sup> .....	1,393	82,889	2.25	2.51
May <sup>b</sup> .....	1,238	76,122	2.00	2.31
June <sup>b</sup> .....	990	58,909	1.60	1.79
July <sup>a</sup> .....	371	22,812	.60	.69
August <sup>a</sup> .....	155	9,531	.25	.29
September <sup>a</sup> .....	43	2,559	.07	.08
October <sup>a</sup> .....	74	4,550	.12	.14
November <sup>a</sup> .....	124	7,379	.20	.22
December <sup>a</sup> .....	279	17,155	.45	.52
The year .....	549	395,295	.89	11.98

<sup>a</sup> Based in part on measurements and rod records near Three Rivers.<sup>b</sup> Estimated in part from run-off of neighboring streams.

*Estimated monthly discharge of Kaweah River, etc.—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1882.	<i>Second-feet.</i>	<i>Acre-feet.</i>	<i>Second-feet.</i>	<i>Inches.</i>
January <sup>a</sup> .....	155	9,531	0.25	0.29
February <sup>a</sup> .....	310	17,217	.50	.52
March <sup>a</sup> .....	464	28,530	.75	.86
April <sup>a</sup> .....	1,393	82,889	2.25	2.51
May <sup>a</sup> .....	2,228	136,994	3.60	4.15
June <sup>a</sup> .....	929	55,279	1.50	1.67
July <sup>b</sup> .....	743	45,685	1.20	1.38
August <sup>b</sup> .....	198	12,175	.32	.37
September <sup>b</sup> .....	93	5,534	.15	.17
October <sup>b</sup> .....	87	5,349	.14	.16
November <sup>b</sup> .....	124	7,379	.20	.22
December <sup>b</sup> .....	93	5,718	.15	.17
The year .....	568	412,280	.92	12.47
1883. <sup>b</sup>				
January .....	155	9,531	.25	.29
February .....	124	6,887	.20	.21
March .....	619	38,061	1.00	1.15
April .....	805	47,901	1.30	1.45
May .....	1,021	62,779	1.65	1.90
June .....	990	58,909	1.60	1.79
July .....	402	24,718	.65	.75
August .....	99	6,087	.16	.18
September .....	74	4,403	.12	.13
October .....	62	3,812	.10	.12
November .....	74	4,403	.12	.13
December .....	74	4,550	.12	.14
The year .....	375	272,041	.61	8.24

<sup>a</sup>Based in part on measurements and rod records near Three Rivers.<sup>b</sup>Estimated in part from run-off of neighboring streams.

*Estimated monthly discharge of Kaweah River, etc.—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1884. <sup>a</sup>	<i>Second-feet.</i>	<i>Acre-feet.</i>	<i>Second-feet.</i>	<i>Inches.</i>
January .....	248	15,249	0.40	0.46
February .....	2,177	125,222	3.52	3.80
March .....	2,290	140,807	3.70	4.27
April .....	1,548	92,112	2.50	2.79
May .....	2,847	175,055	4.60	5.30
June .....	4,271	254,142	6.90	7.69
July .....	3,497	215,022	5.65	6.51
August .....	990	60,873	1.60	1.84
September .....	495	29,455	.80	.89
October .....	248	15,249	.40	.46

<sup>a</sup>Estimated in part from run-off of neighboring streams.

## KERN RIVER.

The gaging station on Kern River, established in 1893 by Mr. Walter Jones, chief engineer of the Kern County Land Company, is located at what is known as first point of measurement, 5 miles above Bakersfield. Meter measurements are taken once a week and an automatic gage records daily fluctuations of the river heights. Mr. A. K. Warren, the engineer in charge of this work for the Kern County Land Company, attends to the discharge measurements with much accuracy and precision, and furnishes the Survey with the final results.

*Discharge measurements of Kern River, Kern County.*

Date.	Hydrographer.	Discharge.	Locality.
		<i>Second-feet.</i>	
Feb. 10, 1897	J. B. Lippincott .....	314	Calloway Canal at second point of measurement.
July 17, 1898	F. H. Olmsted .....	5.3	Menache Meadows, Tulare County.
July 10, 1898	.....do .....	12.9	South Fork at mouth, Kern County.
July 11, 1898	.....do .....	17.9	Do.
July 13, 1898	.....do .....	10.1	South Fork, sec. 6-22-36, Kern County.
July 10, 1898	.....do .....	331	North Fork at mouth, Kern County.
June 29, 1896	J. B. Lippincott .....	3,004	First point of measurement.
Aug. 29, 1898	.....do .....	116	Do.

*Discharge measurements of Kern River, Kern County—Continued.*

Date.	Hydrographer.	Discharge.	Locality.
		<i>Second-feet.</i>	
Sept. 2, 1899	S. G. Bennett .....	99	First point of measurement.
Aug. 30, 1900	A. K. Warren .....	103	Do.
Oct. 7, 1902	L. M. Lawson .....	171	Do.
Feb. 10, 1897	J. B. Lippincott .....	322	Calloway Canal at first point of measurement.
Sept. 2, 1899	F. H. Olmsted .....	99.22	Kern River, first point of measurement.
June 19, 1900	do .....	1.32	Basin Creek, Rankin's ranch, Walker's basin.
June 20, 1900	do .....	14.18	South Fork of Kern River, 700 feet above junction.
Do .....	do .....	1,333.17	North Fork of Kern River, Hooper's Mill Bridge.
June 21, 1900	do .....	2.30	Bull Run Creek near mouth.
June 22, 1900	do .....	2.92	Tobias Creek near mouth.
Do .....	do .....	.18	Ant Creek at mouth; elevation, 3,200 feet.
Do .....	do .....	3.45	Salmon Creek at mouth.
Do .....	do .....	.32	Corral Creek near mouth.
June 23, 1900	do .....	5.82	South Needles Creek at Needles Peak; elevation, 4,550 feet.
Do .....	do .....	5.19	Clark Creek, Dry Meadows.
Do .....	do .....	5.74	Jackson Creek, Dry Meadows.
Do .....	do .....	5.07	Wade Creek, Dry Meadows.
June 24, 1900	do .....	4.26	North Needles Creek at Needles Peak.
Do .....	do .....	81	Little Kern River at junction with Kern River.
June 25, 1900	do .....	2.87	Tibbetts Creek, 1 mile above mouth.
Do .....	do .....	8.45	Harris Creek at mouth.
Do .....	do .....	4.87	One Mile Creek, 1 mile below Kern Lake.
Do .....	do .....	1,154.90	North Fork of Kern River, 3,000 feet above junction with Little Kern River.
Do .....	do .....	4.72	Whitney Creek at tunnel in divide.
June 27, 1900	do .....	39.11	Whitney Creek at Lava bridge.
Do .....	do .....	17.64	Creek south of Bald Mountain; elevation, 6,560 feet.
Do .....	do .....	939.60	North Fork of Kern River, 800 feet above Kern Lake.
June 28, 1900	do .....	3.67	South Fork of Kern River, Manache Meadows.
June 29, 1900	do .....	1.80	Tibbetts Creek; elevation, 8,300 feet.



*Discharge measurements of Kern River, Kern County—Continued.*

Date.	Hydrographer.	Discharge.	Locality.
		<i>Second-feet.</i>	
June 29, 1900	F. H. Olmsted	1.04	North Fork of Brush Creek; elevation, 5,800 feet.
Do	do	8.22	Brush Creek above North Fork; elevation, 5,600 feet.
June 30, 1900	do	825.25	North Fork of Kern River, 4,000 feet above junction with South Fork.
Do	do	4.05	Salmon Creek, Horse Meadows; elevation, 7,700 feet.
July 2, 1900	do	11.05	South Fork of Kern River, T. 25 S., R. 35 E., Mount Diablo meridian; elevation, 2,920 feet.
Do	do	2.38	Powers Ditch near head.
July 3, 1900	do	1.96	Neil's Ditch, Isabella.
Do	do	7.31	Hooper's Mill Ditch at gaging station on Kern River.
Oct. 4, 1902	E. T. Perkins	14	Little Kern 100 yards above junction.
Do	do	158	100 yards above junction with Little Kern.
Oct. 6, 1902	do	.5	Brown's upper ditch at road crossing to Hot Springs.
Do	do	7	Brown's main ditch at entrance to weir.
Do	do	1.5	Stafford & Neal ditch above Kernville.
Do	do	7.9	Brown's lower ditch above dairy.
Do	do	160	Power Company's diversion, Kernville.
Oct. 7, 1902	do	224	$\frac{1}{4}$ mile above mouth of Salmon Creek.
Do	do	.5	Salmon Creek 50 yards above junction.
Do	do	127	Above gaging station, Kern River Power Co.
Oct. 8, 1902	do	188	$\frac{1}{2}$ mile above powerhouse, Kern River Power Co.
Do	do	236	Below Clear Creek.
Do	do	201	200 yards below junction South Fork.
Do	do	18	South Fork above junction.
Do	do	202	350 yards below bridge from Isabella to Kernville.
Do	do	9	Hooper ditch at bridge from Isabella to Kernville.
Do	do	.6	Lower Stafford ditch $\frac{1}{2}$ mile north of Staffords ranch.

*Discharge measurements of Kern River, Kern County—Continued.*

Date.	Hydrographer.	Discharge.	Locality.
		<i>Second-feet.</i>	
Oct. 8, 1902	E. T. Perkins -----	0.7	Lower Murphy ditch 75 yards above Weldon road crossing.
Do -----	do -----	7	South Fork at Weldon road crossing.
Oct. 7, 1902	L. M. Lawson -----	174	$\frac{1}{2}$ mile below mouth of canyon.
Do -----	do -----	14	Below intake of Power Company's tunnel.
Oct. 8, 1902	do -----	179	Democrat Springs 200 feet below hotel at springs.

*Estimated monthly discharge of Kern River at Rio Bravo ranch, Kern County.<sup>a</sup>*

[Drainage area, 2,345 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1878.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
November -----			400	23,802	0.17	0.19
December -----			350	21,521	.15	.17
1879.						
January -----	686	389	462	28,407	.20	.23
February -----	745	466	591	32,822	.25	.26
March -----	659	510	552	33,941	.24	.28
April -----	1,054	661	764	45,461	.33	.37
May -----	1,231	680	927	56,999	.40	.46
June -----	1,190	812	971	57,779	.41	.46
July -----	865	386	535	32,896	.23	.27
August -----	387	168	266	16,356	.11	.13
September -----	174	146	171	10,175	.07	.08
October -----	210	145	182	11,191	.08	.09
November -----	325	184	261	15,531	.11	.12
December -----	650	280	356	21,890	.15	.17
The year -----	1,231	145	503	363,448	.22	2.92

<sup>a</sup>Authority, California State engineering department, from November, 1878, to October, 1884, inclusive.

*Estimated monthly discharge of Kern River, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1880.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	410	315	354	21,767	0.15	0.17
February .....	380	315	370	21,283	.16	.17
March .....	385	349	389	23,919	.17	.20
April .....	3,320	395	1,557	92,648	.66	.74
May .....	3,560	1,615	2,659	163,496	1.13	1.30
June .....	4,070	2,740	3,317	197,375	1.41	1.57
July .....	3,140	1,550	2,196	135,027	.94	1.08
August .....	1,500	840	1,060	65,177	.45	.52
September .....	846	710	767	45,640	.33	.37
October .....	794	722	758	46,608	.32	.37
November .....	830	695	767	45,640	.33	.37
December .....	1,480	790	1,063	65,361	.45	.52
The year .....	4,070	315	1,271	923,941	.54	7.38
1881.						
January .....	1,640	950	1,078	66,284	.46	.53
February .....	2,970	1,430	1,773	98,467	.76	.79
March .....	2,100	1,400	1,570	96,536	.67	.77
April .....	2,612	2,100	2,288	136,145	.98	1.09
May .....	2,710	2,060	2,362	145,234	1.01	1.16
June .....	2,390	1,475	1,890	112,463	.81	.90
July .....	1,520	710	1,126	69,235	.48	.55
August .....	1,200	420	627	38,553	.27	.31
September .....	420	320	361	21,481	.15	.17
October .....	360	310	333	20,475	.14	.16
November .....	360	300	337	20,053	.14	.16
December .....	410	320	350	21,521	.15	.17
The year .....	2,970	300	1,175	846,447	.50	6.76

*Estimated monthly discharge of Kern River, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1882.	<i>Sec. feet.</i>	<i>Sec. feet.</i>	<i>Sec. feet.</i>	<i>Acre-feet.</i>	<i>Sec. feet.</i>	<i>Inches.</i>
January .....	380	310	335	20,598	0.14	0.16
February .....	510	360	395	21,937	.17	.18
March .....	1,260	440	600	36,893	.26	.30
April .....	1,670	920	1,174	69,858	.50	.56
May .....	2,000	1,420	1,670	102,684	.71	.82
June .....	1,990	900	1,306	77,712	.56	.62
July .....	1,110	450	726	44,640	.31	.36
August .....			330	20,291	.14	.16
September .....			330	19,636	.14	.16
October .....			330	20,291	.14	.16
November <sup>a</sup> .....			280	16,661	.12	.13
December <sup>a</sup> .....			280	17,217	.12	.14
The year .....			646	468,418	.28	3.75
1883. <sup>a</sup>						
January .....			280	17,217	.12	.14
February .....			350	19,438	.15	.16
March .....			700	43,041	.30	.35
April .....			1,170	69,620	.50	.56
May .....			1,410	86,697	.60	.69
June .....			1,170	69,620	.50	.56
July .....			940	57,798	.40	.46
August .....			470	28,899	.20	.23
September .....			350	20,826	.15	.17
October .....			280	17,217	.12	.14
November .....			200	11,901	.09	.10
December .....			200	12,298	.09	.10
The year .....			627	454,572	.27	3.66

<sup>a</sup> Estimated from previous measurements and from run-off of neighboring streams.

*Estimated monthly discharge of Kern River, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1884, <sup>a</sup>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....			350	21,521	0.15	0.17
February .....			470	27,035	.20	.22
March .....			940	57,798	.40	.46
April .....			1,980	117,818	.84	.94
May .....			5,860	360,317	2.50	2.88
June .....			9,380	558,149	4	4.46
July .....			5,860	360,317	2.50	2.88
August .....			2,350	144,496	1	1.15
September .....			940	55,934	.40	.45
October .....			470	28,899	.20	.23

<sup>a</sup>Estimated from previous measurements and from run-off of neighboring streams.*Estimated monthly discharge of Kern River at first point of measurement.<sup>b</sup>*

[Drainage area, 2,345 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1893.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
October .....	554	517	534	32,861	0.23	0.26
November .....	559	467	518	30,827	.22	.24
December .....	590	430	516	31,757	.22	.25
1894.						
January .....	741	562	661	40,644	.28	.32
February .....	1,114	604	717	39,817	.30	.32
March .....	1,443	762	1,001	61,541	.43	.65
April .....	1,892	1,209	1,495	88,952	.64	.71
May .....	2,208	1,228	1,607	98,798	.69	.79
June .....	1,719	871	1,085	64,557	.46	.51
July .....	1,051	400	700	43,036	.30	.34
August .....	549	256	335	20,565	.14	.16
September .....	382	172	248	14,756	.11	.12
October .....	263	224	279	17,178	.12	.14
November .....	268	230	244	14,500	.10	.11
December .....	805	234	470	28,908	.20	.23
The year .....	2,208	172	737	533,252	.31	4.40

<sup>b</sup>Authority, Kern County Land Company.

*Estimated monthly discharge of Kern River, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1895.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acro.-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	1,616	473	809	49,762	0.34	0.40
February .....	4,762	675	1,252	69,536	.53	.55
March .....	3,004	987	1,374	84,437	.59	.67
April .....	3,897	1,911	2,724	162,076	1.16	1.29
May .....	5,384	3,100	4,369	268,608	1.86	2.14
June .....	3,721	2,174	2,906	172,919	1.24	1.37
July .....	2,063	867	1,482	91,113	.63	.73
August .....	1,073	354	629	38,665	.27	.31
September .....	676	290	344	20,469	.15	.17
October .....	612	276	327	20,106	.14	.16
November .....	436	308	346	20,588	.15	.17
December .....	447	368	403	24,779	.17	.20
The year .....	5,384	276	1,413	1,023,058	.60	8.16
1896.						
January .....	3,101	377	747	45,931	.32	.37
February .....	798	559	617	35,489	.26	.28
March .....	2,089	652	951	58,475	.41	.47
April .....	1,263	766	972	57,838	.41	.46
May .....	3,370	934	1,401	86,144	.60	.69
June .....	3,611	1,244	2,456	146,142	1.05	1.17
July .....	2,210	741	1,316	82,762	.57	.66
August .....	741	353	486	29,883	.21	.24
September .....	473	234	304	18,089	.13	.14
October .....	425	223	267	16,417	.11	.13
November .....	416	288	355	21,124	.15	.17
December .....	426	313	347	21,336	.15	.17
The year .....	3,611	223	854	619,630	.36	4.95

*Estimated monthly discharge of Kern River, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1897.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acres.-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	832	305	373	22,935	0.16	0.18
February .....	2,306	516	809	44,930	.35	.36
March .....	2,044	688	923	56,753	.39	.45
April .....	4,410	1,094	2,914	173,395	1.24	1.38
May .....	5,342	4,054	4,580	281,613	1.95	2.25
June .....	4,352	1,289	2,309	137,395	.98	1.09
July .....	1,536	644	1,006	61,857	.43	.49
August .....	671	338	469	28,838	.20	.23
September .....	363	260	295	17,554	.13	.14
October .....	441	278	340	20,906	.15	.17
November .....	477	289	355	21,124	.15	.17
December .....	1,023	327	422	25,948	.18	.21
The year .....	5,342	260	1,234	893,248	.53	7.12
1898.						
January .....	400	311	363	22,320	.15	.17
February .....	923	316	434	24,103	.19	.20
March .....	485	304	388	23,857	.17	.20
April .....	1,342	371	710	42,247	.30	.33
May .....	980	560	735	45,193	.31	.36
June .....	686	394	551	32,786	.23	.26
July .....	416	127	244	15,003	.10	.12
August .....	142	86	120	7,378	.05	.06
September .....	294	80	116	6,902	.05	.06
October .....	232	127	160	9,838	.07	.08
November .....	188	136	166	9,877	.07	.08
December .....	314	147	199	12,236	.08	.09
The year .....	1,342	80	348	251,743	.15	2.01



*Estimated monthly discharge of Kern River, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1899.	<i>Sec. feet.</i>	<i>Sec. feet.</i>	<i>Sec. feet.</i>	<i>Acre-feet.</i>	<i>Sec. feet.</i>	<i>Inches.</i>
January	361	182	263	16, 172	0. 11	0. 13
February	365	258	302	16, 772	. 13	. 14
March	4, 932	247	590	36, 278	. 25	. 29
April	1, 167	593	893	53, 138	. 38	. 43
May	1, 302	576	835	51, 342	. 36	. 41
June	2, 230	809	1, 331	79, 200	. 57	. 63
July	894	229	489	30, 057	. 21	. 24
August	240	99	156	9, 592	. 07	. 08
September	117	89	105	6, 257	. 04	. 05
October	229	86	160	9, 838	. 07	. 08
November	385	183	221	13, 151	. 09	. 10
December	781	182	277	17, 032	1. 18	1. 36
The year	4, 932	86	468	338, 829	. 29	3. 94
1900.						
January	1, 048	266	362	22, 259	. 15	. 17
February	329	238	280	15, 550	. 12	. 12
March	502	307	413	25, 394	. 18	. 21
April	592	387	472	28, 086	. 20	. 22
May	1, 969	449	1, 111	68, 312	. 47	. 54
June	1, 878	841	1, 283	76, 344	. 55	. 61
July	850	202	392	24, 103	. 17	. 20
August	217	101	144	8, 854	. 06	. 07
September	270	106	166	9, 878	. 07	. 08
October	186	137	160	9, 838	. 07	. 08
November	1, 339	161	349	20, 767	. 15	. 17
December	445	288	373	22, 934	. 16	. 18
The year	1, 969	101	459	332, 319	. 20	2. 65

*Estimated monthly discharge of Kern River, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1901.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January	2,049	226	493	30,313	0.21	0.24
February	1,963	342	860	47,762	.37	.39
March	1,658	901	1,270	78,089	.54	.62
April	2,632	637	1,398	83,187	.60	.67
May	4,419	2,091	3,032	186,430	1.29	1.49
June	4,332	2,455	3,324	197,792	1.42	1.58
July	3,856	1,120	1,864	114,163	.80	.92
August	1,804	505	968	59,520	.41	.47
September	526	249	345	20,529	.15	.17
October	756	259	317	19,492	.14	.16
November	421	343	377	22,433	.16	.18
December	457	268	323	19,860	.14	.16
The year	4,419	226	1,216	880,020	.52	7.05

## KING RIVER.

This 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 exclusively for the raising of grapes and deciduous fruits in the neighborhood of Fresno, Selma, and Hanford. The summer flow of this river is now entirely diverted, and during the dry season of the last few years the scarcity of water has worked many hardships. There is a large surplus of water in this river in the spring, due to the melting of snows, which is now going to waste, and which, if stored in suitable reservoirs, would bring larger areas under cultivation. The mountainous basin of this river has been systematically explored for reservoir sites. For a detailed statement concerning the hydrography of King River, see Water-Supply Paper No. 58, by J. B. Lippincott. Two gaging stations were formerly maintained on the river, one at Red Mountain and the other at Kingsburg, Cal. The station at Red Mountain, established September 3, 1895, is located 15 miles east of Sanger, Cal., and southwest of Red Mountain. The station is on what is called "the lower section of No. 9" of the lumber flume. It is located at the mouth of the canyon, above all diversions. The bed of the stream is of gravel, and few changes have been noticed in the cross section since the establishment of the station.

*Discharge measurements of King River, Fresno County.*

Date.	Hydrographer.	Gage height.	Discharge.	Locality.
		<i>Feet.</i>	<i>Sec.-fact.</i>	
June 20, 1900	E. G. Hamilton	-----	21.7	Boulder Creek—Crossing of upper trail from Kings River Canyon to Bearskin Meadow.
Aug. 31, 1898	J. B. Lippincott	-----	164	Church ditch (Fresno Canal), near head.
Sept. 4, 1899	S. G. Bennett	-----	151	Do.
Sept. 4, 1900	do	-----	229	Do.
Sept. 24, 1902	L. M. Lawson	-----	121	Church ditch at road crossing.
Do	do	-----	Dry.	Fowler Switch Canal, near head.
Sept. 4, 1899	S. G. Bennett	-----	Dry.	Do.
Do	do	-----	2	Gould Canal, near head.
Sept. 4, 1900	do	-----	84	Do.
Sept. 27, 1900	do	-----	1	Do.
Sept. 4, 1899	do	-----	.3	Kingsburg Canal at head.
Sept. 4, 1900	do	-----	Dry.	Do.
Sept. 24, 1902	L. M. Lawson	-----	4.8	Kingsburg Canal at road crossing.
Sept. 17, 1902	E. T. Perkins	-----	3.5	Dinkey Creek, 75 yards below bridge.
Do	do	-----	1.5	Bear Creek.
Do	do	-----	1.5	Deer Creek.
Sept. 18, 1902	do	-----	7.2	North Fork, 100 yards above trail crossing.
Do	do	-----	3	North Fork Creek below Crown Meadow.
Do	do	-----	5	North Fork, Crown Creek.
Do	do	-----	2	North Fork, Blue Canyon Creek.
Do	do	-----	75	Middle Fork at Simpson Meadow.
Sept. 22, 1902	do	-----	32	Bubbs Creek, 100 yards above junction.
Do	do	-----	29	South Fork, 100 yards below trail crossing.
Do	do	-----	.7	Granite Creek, 50 yards above bridge on trail crossing.
Do	do	-----	1.5	Copper Creek.
Sept. 23, 1902	do	-----	11	Roaring Creek at trail crossing.
Sept. 22, 1902	L. M. Lawson	-----	35	North Fork at mouth.
Sept. 24, 1902	do	-----	31	'76 Canal at Trimmer Springs road crossing.

*Discharge measurements of King River, Fresno County—Continued.*

Date.	Hydrographer.	Gage height.	Discharge.	Locality.
		<i>Feet.</i>	<i>Sec.-feet.</i>	
Sept. 22, 1902	L. M. Lawson	-----	2	Enterprise Canal at Trimmer Springs road crossing.
Sept. 25, 1902	do	-----	74	At bridge, 1 mile north of Reedley.
Jan. 10, 1895	A. P. Davis	6	1,830	Kingsburg. <sup>a</sup>
Mar. 23, 1895	J. B. Lippincott	4.1	500	Do.
Dec. 2, 1895	do	3.3	407	Do.
Apr. 11, 1896	J. A. Vogelsson	5.7	1,883	Do.
Feb. 11, 1897	J. B. Lippincott	5.6	905	Do.
Apr. 6, 1897	do	5.2	825	Do.
June 3, 1897	do	8.6	5,959	Do.
July 17, 1897	do	5.2	503	Do.
Sept. 10, 1897	A. Q. Campbell	3.2	221	Do.
Nov. 3, 1897	do	4.8	465	Do.
Dec. 23, 1897	J. B. Lippincott	4.8	522	Do.
May 28, 1898	do	6.2	1,026	Do.
Apr. 21, 1898	do	6.6	1,658	Do.
July 26, 1898	do	3.9	305	Do.
Aug. 30, 1898	do	3.4	94	Do.
Sept. 26, 1902	L. M. Lawson	-----	117	Do.
June 19, 1900	E. G. Hamilton	-----	11.6	Long Valley, 300 feet below junction of Ten-mile Creek.
Aug. 26, 1900	H. E. Green	-----	153	Middle Fork at Tehipiti.
May 23, 1900	E. G. Hamilton	-----	6.8	Mill Creek, sec. 13, T. 13 S., R. 24 E.
Aug. 19, 1900	do	-----	4.3	North Fork, Dusy Meadows.
Sept. —, 1900	J. S. Eastwood	-----	15	North Fork.
Sept. 3, 1895	A. P. Davis	4.3	524	Red Mountain.
Nov. 24, 1895	J. B. Lippincott	3.8	248	Do.
Apr. 12, 1896	J. A. Vogelsson	6.35	1,745	Do.
June 12, 1896	J. B. Lippincott	10.85	15,941	Do.
Nov. 1, 1896	do	4.2	404	Do.
Feb. 13, 1897	do	5.2	1,021	Do.
Apr. 5, 1897	do	6.82	2,047	Do.
June 1, 1897	do	10.02	8,838	Do.
July 15, 1897	A. Q. Campbell	7.17	3,333	Do.
Sept. 9, 1897	do	4.1	295	Do.

<sup>a</sup>Grade of river at Kingsburg affected by diversion dam of Last Chance Company, 2 miles below.

*Discharge measurements of King River, Fresno County—Continued.*

Date.	Hydrographer.	Gage height.	Discharge.	Locality.
		<i>Fect.</i>	<i>Sec.-fect.</i>	
Nov. 1, 1897	A. Q. Campbell ----	4.57	552	Red Mountain.
Dec. 22, 1897	J. B. Lippincott ----	4.7	515	Do.
Apr. 20, 1898	do -----	8.55	4,943	Do.
May 29, 1898	do -----	7.14	2,672	Do.
July 27, 1898	do -----	4.32	503	Do.
Aug. 31, 1898	do -----	3.77	244	Do.
Dec. 21, 1898	do -----	7.0	2,444	Do.
Apr. 19, 1899	S. G. Bennett -----	8.8	5,409	Do.
May 15, 1899	do -----	8.15	4,422	Do.
June 3, 1899	do -----	7.85	3,954	Do.
June 26, 1899	do -----	7.23	3,049	Do.
Aug. 2, 1899	do -----	4.66	608	Do.
Sept. 4, 1899	do -----	3.80	206	Do.
Dec. 8, 1899	J. B. Lippincott ----	4.36	458	Do.
Apr. 4, 1900	S. G. Bennett -----	6.54	2,035	Do.
May 16, 1900	do -----	9.2	6,436	Do.
June 19, 1900	do -----	8.59	5,072	Do.
Aug. 10, 1900	do -----	4.3	427	Do.
Sept. 4, 1900	do -----	4.28	405	Do.
Sept. 27, 1900	do -----	3.82	220	Do.
Dec. 29, 1900	do -----	4.65	576	Do.
Jan. 31, 1901	do -----	5.4	991	Do.
Feb. 28, 1901	do -----	7.90	3,593	Do.
Apr. 4, 1901	do -----	6.40	1,915	Do.
May 21, 1901	J. B. Lippincott ----	10.5	10,869	Do.
July 30, 1901	S. G. Bennett -----	7.54	3,179	Do.
Oct. 17, 1901	do -----	4.1	301	Do.
Sept. 21, 1902	do -----		217	Do.
Oct. 20, 1900	H. E. Green -----		346	South Fork, just below junction of Middle Fork.
Sept. 4, 1899	S. G. Bennett -----		Dry.	" 76 " ditch at head.
Sept. 4, 1900	do -----		Dry.	Do.
June 25, 1895	J. B. Lippincott ----	13.9	10,307	Suspension bridge.
Sept. 2, 1895	A. P. Davis -----	9.5	525	Do.
Dec. 23, 1897	J. B. Lippincott ----	4.9	522	Do.

*Estimated monthly discharge of King River at Slate Point, Fresno County.<sup>a</sup>*

[Drainage area, 1,742 square miles.]

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1878.	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
November .....	300	17,851	0.17	0.19
December .....	290	17,831	.17	.20
1879.				
January .....	370	22,750	.21	.24
February .....	870	48,317	.50	.52
March .....	1,970	121,131	1.13	1.30
April .....	4,750	282,645	2.73	3.05
May .....	5,090	312,972	2.92	3.37
June .....	3,760	223,736	2.16	2.41
July .....	1,650	101,455	.95	1.10
August .....	380	23,365	.22	.25
September .....	270	16,066	.15	.17
October .....	280	17,217	.16	.18
November .....	400	23,802	.23	.26
December .....	1,440	88,542	.83	.96
The year .....	1,769	1,281,998	1.02	13.81
1880.				
January .....	720	44,271	.41	.47
February .....	1,040	59,821	.60	.65
March .....	1,120	68,866	.64	.74
April .....	5,230	311,207	3.00	3.35
May .....	7,120	437,792	4.09	4.71
June .....	9,540	567,669	5.48	6.12
July .....	4,800	295,141	2.76	3.18
August .....	1,150	70,711	.66	.76
September .....	370	22,017	.21	.23
October .....	220	13,527	.13	.15
November .....	220	13,091	.13	.15
December .....	510	31,359	.29	.33
The year .....	2,670	1,935,472	1.53	20.84

<sup>a</sup> Authority, California State engineer.

*Estimated monthly discharge of King River, etc.—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1881.	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	870	53,494	0.50	0.58
February .....	2,430	134,955	1.39	1.45
March .....	1,900	116,826	1.09	1.26
April .....	5,800	345,124	3.33	3.71
May .....	8,220	505,428	4.72	5.44
June .....	5,010	298,116	2.88	3.21
July .....	4,790	294,526	2.75	3.17
August .....	650	39,967	.37	.43
September .....	340	20,231	.20	.22
October .....	250	15,372	.14	.16
November .....	230	13,686	.13	.15
December .....	260	15,987	.15	.17
The year .....	2,562	1,853,712	1.47	19.95
1882.				
January .....	380	23,365	.22	.25
February .....	440	24,436	.25	.26
March .....	1,250	76,859	.72	.83
April .....	3,170	188,628	1.82	2.03
May .....	9,190	565,071	5.28	6.08
June .....	6,410	381,421	3.68	4.11
July .....	2,020	124,205	1.16	1.34
August .....	620	38,122	.36	.42
September .....	390	23,207	.22	.25
October .....	610	37,507	.35	.40
November .....	470	27,967	.27	.30
December .....	340	20,906	.20	.23
The year .....	2,107	1,531,694	1.21	16.46

*Estimated monthly discharge of King River, etc.—Continued.*

Month.	Mean dis- charge.	Total dis- charge.	Run-off.	
			Per square mile.	Depth.
1883.	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January	320	19,676	0.18	0.21
February	340	18,883	.20	.21
March	1,050	64,562	.60	.69
April	2,220	132,099	1.27	1.42
May	6,700	411,967	3.85	4.44
June	6,730	400,463	3.86	4.31
July	1,460	89,772	.84	.97
August	600	36,893	.34	.39
September	480	28,562	.28	.31
October	420	25,825	.24	.28
November	260	15,471	.15	.17
December	220	13,527	.13	.15
The year	1,733	1,257,700	.99	13.55
1884.				
January	430	26,440	.25	.29
February	2,620	150,704	1.50	1.62
March	3,610	221,970	2.07	2.39
April	3,370	200,529	1.93	2.15
May	9,210	566,301	5.29	6.09
June	17,630	1,049,058	10.12	11.29
July	13,210	812,251	7.58	8.74
August	3,570	219,511	2.05	2.36
September	880	52,364	.51	.57
October	900	55,339	.52	.60



*Estimated monthly discharge of King River at Red Mountain, Fresno County.<sup>a</sup>*

[Drainage area, 1,742 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1895.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
September .....	3,920	360	778	46,294	0.45	0.50
October .....	520	320	371	22,812	.21	.24
November .....	1,834	250	368	21,898	.21	.23
December .....	520	250	328	20,168	.19	.22
The year .....	3,920	250	461	111,172	.27	1.19
1896.						
January .....	11,020	390	1,474.8	90,682	.85	.98
February .....	1,140	728	825.4	47,477	.47	.51
March .....	7,020	820	1,710.6	105,181	.98	1.13
April .....	4,600	390	1,938.5	115,349	1.11	1.24
May .....	22,100	1,140	5,918.1	363,890	3.40	3.90
June .....	18,920	5,160	12,737.3	757,922	7.31	8.15
July .....	6,680	1,212	3,742.2	230,110	2.15	2.48
August .....	1,212	590	795.9	48,938	.45	.52
September .....	590	390	491.3	29,234	.28	.31
October .....	510	310	350	21,520	.20	.23
November .....	1,076	390	538.5	32,043	.31	.35
December .....	550	470	498.4	30,645	.29	.33
The year .....	22,100	310	2,585.1	1,872,991	1.48	20.13
1897.						
January .....	624	360	437	26,870	.25	.29
February .....	6,344	1,100	1,631	90,581	.92	.96
March .....	4,408	1,240	1,884	115,843	1.06	1.22
April .....	9,380	1,930	5,318	316,442	2.99	3.33
May .....	22,732	6,344	14,470	889,731	8.15	9.40
June .....	10,580	2,520	6,145	365,652	3.45	3.87
July .....	4,040	1,036	2,177	133,859	1.22	1.41
August .....	1,100	440	739	45,440	.42	.47
September .....	480	250	329	19,577	.18	.20
October .....	572	270	394	24,226	.22	.25
November .....	2,520	360	692	41,177	.39	.44
December .....	8,348	572	985	60,566	.55	.63
The year .....	22,732	250	2,933	2,129,964	1.65	22.47

<sup>a</sup> Authority, United States Geological Survey.

*Estimated monthly discharge of King River, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1898.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	624	440	506	31, 113	0.29	0.33
February .....	1, 170	480	705	39, 154	.40	.41
March .....	1, 170	520	895	55, 032	.50	.58
April * .....	7, 820	1, 036	3, 547	211, 061	2.00	2.23
May .....	6, 520	2, 450	3, 536	217, 422	1.99	2.29
June .....	3, 280	1, 310	2, 122	126, 267	1.20	1.34
July .....	1, 310	440	696	42, 796	.39	.45
August .....	400	215	320	19, 676	.18	.21
September .....	780	145	204	12, 139	.12	.13
October .....	728	215	320	19, 676	.18	.21
November .....	285	215	231	13, 745	.13	.14
December .....	1, 450	180	315	19, 369	.18	.21
The year .....	7, 820	145	1, 116	807, 450	.63	8.53
1899.						
January .....	1, 310	250	513	31, 543	.29	.33
February .....	1, 036	440	660	36, 655	.37	.39
March .....	20, 200	624	2, 165	133, 121	1.22	1.41
April .....	7, 300	1, 834	4, 512	268, 483	2.54	2.83
May .....	4, 780	1, 450	3, 568	219, 388	2.01	2.32
June .....	10, 300	2, 852	6, 077	361, 607	3.42	3.81
July .....	2, 852	676	1, 411	86, 759	.79	.91
August .....	624	250	411	25, 271	.23	.26
September .....	285	180	215	12, 793	.12	.13
October .....	1, 205	180	378	23, 242	.21	.24
November .....	1, 240	345	638	37, 964	.36	.40
December .....	5, 096	400	991	60, 934	.56	.64
The year .....	20, 200	180	1, 795	1, 297, 760	1.01	13.67

*Estimated monthly discharge of King River, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1900.	<i>Sec. feet.</i>	<i>Sec. feet.</i>	<i>Sec. feet.</i>	<i>Acre-feet.</i>	<i>Sec. feet.</i>	<i>Inches.</i>
January .....	12,700	849	1,689	103,853	0.97	1.12
February .....	849	676	748	41,542	.43	.45
March .....	2,584	728	1,712	105,267	.98	1.13
April .....	2,852	1,546	2,098	124,840	1.20	1.34
May .....	9,400	1,930	5,881	361,609	3.38	3.90
June .....	7,900	2,986	5,127	305,078	2.94	3.27
July .....	2,584	572	1,278	78,581	.73	.84
August .....	624	250	398	24,472	.23	.26
September .....	520	215	301	17,911	.17	.19
October .....	440	215	309	19,000	.18	.21
November .....	15,700	250	1,310	77,950	.75	.83
December .....	972	572	726	44,640	.42	.48
The year .....	15,700	215	1,798	1,304,743	1.03	14.02
1901.						
January .....	43,930	520	4,337	266,672	2.49	2.87
February .....	7,040	1,040	3,319	190,392	1.90	2.00
March .....	4,490	2,034	2,965	182,311	1.70	1.96
April .....	10,840	1,642	4,492	267,293	2.58	2.87
May .....	21,830	5,548	11,093	682,082	6.37	7.36
June .....	21,180	7,040	14,363	854,658	8.25	9.20
July .....	13,240	3,280	6,258	384,789	3.59	4.14
August .....	6,260	728	2,292	140,930	1.32	1.52
September .....	780	440	534	31,775	.31	.35
October .....	2,034	360	535	32,896	.31	.36
November .....	1,450	480	694	41,296	.40	.45
December .....	1,170	440	668	41,073	.38	.44
The year .....	43,930	360	4,296	3,116,167	2.47	33.52

*Estimated monthly discharge of King River, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1902.	<i>Sec. feet.</i>	<i>Sec. feet.</i>	<i>Sec. feet.</i>	<i>Acre-feet.</i>	<i>Sec. feet.</i>	<i>Inches.</i>
January .....	520	360	440	27,055	0.25	0.29
February .....	2,852	360	665	36,932	.38	.40
March .....	4,490	1,040	1,422	87,312	.82	.95
April .....	26,380	1,450	4,163	247,716	2.39	2.67
May .....	13,760	3,440	6,532	401,637	3.75	4.32
June .....	13,240	3,760	8,063	479,782	4.63	5.16
July .....	3,600	1,040	1,638	100,717	.94	1.08
August .....	910	320	626	38,491	.36	.42
September .....	360	250	304	18,089	.17	.19
October .....	520	215	265	16,294	.15	.17
November .....	1,170	250	451	26,836	.26	.29
December .....	1,040	400	497	30,559	.29	.33
The year .....	26,380	215	2,089	1,511,420	1.20	16.27

#### LITTLE ROCK CREEK.

*Discharge measurements of Little Rock Creek, Los Angeles County.*

Date.	Hydrographer.	Discharge.	Locality.
		<i>Sec. feet.</i>	
June 2, 1896	J. B. Lippincott .....	2	Head works Little Rock irrigation district.
Apr. 20, 1896	J. A. Vogelsson .....	7.2	Head works South Antelope Valley Water Company.
June 2, 1896	J. B. Lippincott .....	1	Do.
Feb. 9, 1897	do .....	21.3	Do.
Apr. 7, 1897	do .....	120	Do.
Jan. 5, 1898	do .....	3	Do.
July 19, 1900	B. Cole .....	1.4	Pumped water in ciénaga.

#### LOBETUS CREEK.

*Discharge measurement of Lobetus Creek, San Mateo County.*

Date.	Hydrographer.	Discharge.	Locality.
		<i>Sec. feet.</i>	
Oct. 17, 1893	W. W. Brier .....	0.18	1 mile above mouth.

## LOGSDON AND FARREL DITCH, SAN BERNARDINO COUNTY.

See San Bernardino Valley, Logsdon and Farrel ditch.

## LOMA ABAJO.

The Loma Abajo was measured by Charles J. Johansen for the Pacific Improvement Company, as indicated below. The point of measurement was a short distance above the junction with the Gato. At the time of these measurements no water was flowing in the pipe line from the Loma Abajo to the Ontare ranch.

*List of discharge measurements of Loma Abajo River in Santa Barbara County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Feb. 7, 1890	Charles J. Johansen	3.84	Above junction with Gato.
Feb. 14, 1890	do	3.00	Do.
Feb. 27, 1890	do	5.67	Do.
Mar. 2, 1890	do	3.21	Do.
Mar. 4, 1890	do	3.00	Do.
Mar. 6, 1890	do	2.80	Do.
Mar. 9, 1890	do	2.80	Do.
Mar. 11, 1890	do	2.24	Do.
Mar. 13, 1890	do	2.06	Do.
Mar. 15, 1890	do	2.06	Do.
Mar. 17, 1890	do	1.88	Do.
Mar. 21, 1890	do	1.88	Do.
Mar. 23, 1890	do	1.88	Do.
Mar. 25, 1890	do	1.55	Do.
Mar. 27, 1890	do	1.55	Do.
Mar. 29, 1890	do	1.55	Do.
Mar. 31, 1890	do	1.39	Do.
Apr. 2, 1890	do	1.39	Do.
Apr. 4, 1890	do	1.39	Do.
Apr. 6, 1890	do	1.23	Do.
Apr. 8, 1890	do	1.23	Do.
Apr. 10, 1890	do	1.08	Do.
Apr. 12, 1890	do	1.23	Do.
Apr. 14, 1890	do	1.08	Do.
Apr. 17, 1890	do	.92	Do.
Apr. 18, 1890	do	.76	Do.
Apr. 20, 1890	do	.76	Do.
Apr. 22, 1890	do	.76	Do.
Apr. 24, 1890	do	.76	Do.
Apr. 26, 1890	do	.76	Do.

*List of discharge measurements of Loma Abajo River, etc.—Continued.*

Date.	Hydrographer.	Dis- charge.	Locality.
		<i>Sec. feet.</i>	
Apr. 28, 1890	Charles J. Johansen	0.76	Above junction with Gato.
Apr. 30, 1890	do	.76	Do.
May 2, 1890	do	.76	Do.
May 4, 1890	do	.68	Do.
May 6, 1890	do	.68	Do.
May 8, 1890	do	.60	Do.
May 10, 1890	do	.60	Do.
May 12, 1890	do	.60	Do.
May 14, 1890	do	.46	Do.
May 16, 1890	do	.60	Do.
May 18, 1890	do	.53	Do.
May 20, 1890	do	.53	Do.
May 20, 1890	do	.74	Do.
May 22, 1890	do	.59	Do.
May 24, 1890	do	.59	Do.
May 26, 1890	do	.61	Do.
May 28, 1890	do	.61	Do.
May 30, 1890	do	.59	Do.
June 1, 1890	do	.58	Do.
June 3, 1890	do	.49	Do.
June 5, 1890	do	.49	Do.
June 7, 1890	do	.44	Do.
June 9, 1890	do	.47	Do.
June 11, 1890	do	.47	Do.
June 13, 1890	do	.42	Do.
June 15, 1890	do	.50	Do.
June 17, 1890	do	.56	Do.
June 19, 1890	do	.52	Do.
June 21, 1890	do	.49	Do.
June 23, 1890	do	.42	Do.
June 25, 1890	do	.45	Do.
June 27, 1890	do	.42	Do.
June 29, 1890	do	.37	Do.
July 1, 1890	do	.34	Do.
July 3, 1890	do	.42	Do.
July 5, 1890	do	.26	Do.
July 7, 1890	do	.24	Do.
July 9, 1890	do	.23	Do.
July 11, 1890	do	.24	Do.
July 13, 1890	do	.24	Do.

*List of discharge measurements of Loma Abajo River, etc.—Continued.*

Date.	Hydrographer.	Dis- charge.	Locality.
		<i>Sec.-feet.</i>	
July 15, 1890	Charles J. Johansen	0.24	Above junction with Gato.
July 17, 1890	do	.20	Do.
July 19, 1890	do	.23	Do.
July 21, 1890	do	.17	Do.
July 23, 1890	do	.20	Do.
July 25, 1890	do	.18	Do.
July 27, 1890	do	.21	Do.
July 29, 1890	do	.21	Do.
July 31, 1890	do	.23	Do.
Aug. 2, 1890	do	.24	Do.
Aug. 4, 1890	do	.26	Do.
Aug. 6, 1890	do	.20	Do.
Aug. 8, 1890	do	.18	Do.
Aug. 10, 1890	do	.24	Do.
Aug. 12, 1890	do	.27	Do.
Aug. 14, 1890	do	.30	Do.
Aug. 17, 1890	do	.12	Do.
Aug. 19, 1890	do	.13	Do.
Aug. 21, 1890	do	.17	Do.
Aug. 23, 1890	do	.11	Do.
Aug. 25, 1890	do	.12	Do.
Aug. 27, 1890	do	.12	Do.
Aug. 29, 1890	do	.11	Do.
Aug. 31, 1890	do	.09	Do.
Sept. 2, 1890	do	.07	Do.
Sept. 4, 1890	do	.08	Do.
Sept. 6, 1890	do	.12	Do.
Sept. 8, 1890	do	.06	Do.
Sept. 10, 1890	do	.09	Do.
Sept. 12, 1890	do	.07	Do.
Sept. 14, 1890	do	.09	Do.
Sept. 16, 1890	do	.09	Do.
Sept. 18, 1890	do	.11	Do.
Sept. 20, 1890	do	.08	Do.
Sept. 22, 1890	do	.09	Do.
Sept. 24, 1890	do	.12	Do.
Sept. 26, 1890	do	.13	Do.
Sept. 28, 1890	do	.14	Do.
Sept. 30, 1890	do	.30	Do.
Oct. 2, 1890	do	.20	Do.

*List of discharge measurements of Loma Abajo River, etc.—Continued.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Oct. 4, 1890. ....	Charles J. Johansen	0.14	Above junction with Gato.
Oct. 6, 1890. ....	do	.14	Do.
Aug. 18, 1890, a. m. ....	do	.07	Below Upper Forks.
Aug. 18, 1890, p. m. ....	do	.04	Do.
Aug. 21, 1890, a. m. ....	do	.11	Do.
Aug. 21, 1890, p. m. ....	do	.04	Do.
May 21, 1890. ....	do	.46	Upper Forks—East Fork.
Do	do	.07	Upper Forks—West Fork.
June 4, 1890. ....	do	.31	Upper Forks—East Fork.
Do	do	.06	Upper Forks—West Fork.

## LOPEZ CREEK.

*Discharge measurements of Lopez Creek, San Luis Obispo County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Nov. 19, 1897	W. W. Brier	5.51	10 miles above Arroyo Grande.

## LOS ANGELES RIVER.

Los Angeles River heads immediately south of Santa Clara River, its various tributaries receiving their supply from the mountains surrounding the San Fernando Plains. It passes out of the lower end of the plain through a narrow valley known as The Narrows, at the lower end of which is the city of Los Angeles. The streams entering San Fernando Valley have brought down immense quantities of sand and gravel from the mountainous area, and thus have formed the San Fernando Plains. This coarse deposit acts as a natural regulator, absorbing the flood waters, which gradually appear lower down. The rainfall of Southern California has been deficient for the last few years, but the discharge of Los Angeles River at The Narrows has been exceptionally constant, the decrease in 1900 being not more than 20 per cent of the average. On account of the numerous lawsuits which have arisen regarding water rights on this river, a thorough study of its discharge has been instituted by the city of Los Angeles, the work being under the direction of J. B. Lippincott, as consulting



engineer for the city. The majority of the measurements have been made by C. A. Miller, although a number of them were made by F. H. Olmsted, city engineer. Several weirs have been placed in the river where the measurements are made. The points of measurement are as follows, in order downstream:

Weir A, at the intersection of Pacoima avenue with Los Angeles River, in the Lankershim Rancho subdivision.

Weir B, at the intersection of Vineland avenue with Los Angeles River.—

Weir C, at the intersection of Fernando avenue with Los Angeles River.

Weir E, at the southwest corner of block 73, Providencia Rancho.

Weir G, at the intersection of the east line of block 71, Providencia Rancho, with Los Angeles River.

Weir L, 770 feet above weir H.

Weir H, approximately 300 feet east of the intersection of Buena Vista street with Los Angeles River.

Weir I, 2,543 feet below weir H.

Weir J, 600 feet east of the west line of block 69, Providencia Rancho.

Weir K, in block 79, Providencia Rancho, 300 feet west of center.

Measuring bridge P, near the southwest corner of block 81, Providencia Rancho, in the headworks site of the city of Los Angeles, commonly known as the Romero & Hooker tract, where river turns to the east at angle of 90°.

Measuring bridge Q, about 400 feet above the junction of the Verdugo Wash with Los Angeles River.

Measuring bridge No. 2, about 600 feet above the head of the power ditch of the Los Angeles City Water Company, in the so-called Crystal Springs tract.

Weir No. 7, 1 mile below the head, in the main supply ditch, sometimes called the Woolen Mill ditch, in the headworks site.

Measuring point No. 7B, at a 3-foot cement pipe in the same ditch, west of bridge No. 2 and at the Los Felix ranch house.

Weir No. 17, opposite bridge No. 2, on what is called the Glassell tributary.

To get the total flow of river at bridge No. 2, there should be combined the flow at bridge No. 2, weir No. 17, and measuring point No. 7B. In case measurements were not taken on the main supply ditch at No. 7B, the measurement observed at weir No. 7, above No. 7B on the main supply ditch, was used, and the loss between No. 7 and No. 7B, 2.49 second-feet, was deducted. This is shown in detail in the table for bridge No. 2. For bridge Q a similar process is followed, omitting No. 17. For bridge P the observed flow at the bridge is combined with either the flow at No. 7 or at No. 7B.

Weir No. 9, at the mouth of Tujunga Creek, near the western end of the headworks site, and near the intersection of Buena Vista street with Los Angeles River.

Weir No. 10, approximately 200 feet west of weir No. 9, at the outlet of a small cut which was run into the gravel bed for the development of water.

Weir M, block 67, Providencia Rancho, on a small stream entering the river in the headworks tract.

*Discharge measurements of Los Angeles River.*

## AT WEIR A.

Date.	Dis-charge.	Average for month.	Date.	Dis-charge.	Average for month.
1899.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	1900.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>
August 14 .....	0.565	} 0.612	May 17 .....	0.461	0.461
August 19 .....	.660		June 12 .....	.461	} .431
September 20 .....	.500	} .500	June 29 .....	.402	
September 26 .....	.500		August 1 .....	.310	} .370
October 24 .....	.687	.687	August 8 .....	.368	
November 24 .....	.725	} .723	August 15 .....	.372	
November 28 .....	.721		August 31 .....	.430	} .368
December 7 .....	.678	} .723	September 8 .....	.378	
December 28 .....	.768		September 11 .....	.400	
			September 27 .....	.328	} .380
			November 10 .....	.380	
Mean .....		.649	Mean .....		.402

## AT WEIR B.

1899.			1900.		
August 14 .....	0.500	0.500	May 17 .....	0.482	0.482
September 20 .....	.500	} .500	June 12 .....	.430	} .355
September 26 .....	.500		June 29 .....	.280	
October 24 .....	.755	.755	July 27 .....	.160	.160
November 24 .....	.937	} .939	August 1 .....	.180	} .198
November 28 .....	.941		August 15 .....	.197	
December 7 .....	.864	} .923	August 31 .....	.219	
December 28 .....	.982		September 8 .....	.209	} .203
			September 11 .....	.223	
			September 27 .....	.176	
			November 10 .....	.260	.260
Mean .....		.723	Mean .....		.276

*Discharge measurements of Los Angeles River—Continued.*

## AT WEIR C.

Date.	Dis-charge.	Average for month.	Date.	Dis-charge.	Average for month.
1899.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	1900.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>
August 14 .....	2.88	} 2.88	May 17 .....	2.98	2.98
August 28 .....	2.88		June 12 .....	2.91	2.91
September 20 .....	2.69	} 2.48	July 27 .....	2.45	2.45
September 26 .....	2.26		August 1 .....	2.50	} 2.50
October 9 .....	2.88	} 2.93	August 8 .....	2.48	
October 24 .....	2.98		August 15 .....	2.48	
November 24 .....	3.45	} 3.43	August 31 .....	2.55	
November 28 .....	3.42		September 8 .....	1.58	} 1.86
December 28 .....	3.44	3.44	September 11 .....	2.38	
			September 27 .....	1.63	
			November 10 .....	2.42	2.42
Mean .....		3.03	Mean .....		2.52

## AT WEIR E.

1899.			1900.		
August 14 .....	5.55	} 5.55	May 15 .....	5.45	5.45
August 28 .....	5.55		June 12 .....	5.18	} 4.99
September 20 .....	5.35	} 5.30	June 29 .....	4.81	
September 26 .....	5.25		July 12 .....	4.80	} 4.80
October 25 .....	5.99	5.99	July 27 .....	4.80	
November 17 .....	6.53	} 6.38	August 1 .....	4.53	} 4.63
November 28 .....	6.24		August 15 .....	4.47	
December 13 .....	6.24	} 6.26	August 31 .....	4.88	
December 21 .....	6.24		September 8 .....	4.49	} 4.48
December 26 .....	6.30		September 11 .....	4.65	
			September 27 .....	4.30	
			November 10 .....	4.67	4.67
Mean .....		5.89	Mean .....		4.84

*Discharge measurements of Los Angeles River—Continued.*

## AT WEIR G.

Date.	Dis-charge.	Average for month.	Date.	Dis-charge.	Average for month.
1899.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	1900.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>
August 14 .....	7.92	7.92	May 15 .....	7.94	7.94
August 28 .....	7.92		June 12 .....	7.63	
September 20 .....	7.60	7.60	June 29 .....	7.00	7.31
September 26 .....	7.60		July 27 .....	6.45	
October 9 .....	7.66	8.13	August 1 .....	6.45	6.45
October 25 .....	8.60		August 15 .....	6.80	
November 17 .....	9.17	9.08	August 31 .....	6.87	6.70
November 28 .....	8.99		September 8 .....	6.72	
December 13 .....	8.90	8.90	September 11 .....	7.00	6.80
December 21 .....	8.90		September 27 .....	6.68	
December 26 .....	8.92		November 13 .....	6.99	6.99
Mean .....		8.33	Mean .....		7.03

## AT WEIR L.

1899.			1900.		
August 14 .....	9.08	9.00	May 15 .....	8.85	8.79
August 28 .....	8.93		May 23 .....	8.73	
September 20 .....	8.59	8.74	June 12 .....	8.62	8.46
September 26 .....	8.89		June 29 .....	8.30	
October 9 .....	8.59	9.22	July 27 .....	7.53	7.53
October 25 .....	9.58		August 1 .....	7.53	
October 27 .....	9.48	10.04	August 8 .....	7.59	7.71
November 17 .....	10.15		August 15 .....	7.69	
November 28 .....	9.93	10.11	August 31 .....	8.02	7.92
December 13 .....	10.02		September 8 .....	7.82	
December 21 .....	10.02	10.11	September 11 .....	8.20	7.92
December 26 .....	10.30		September 27 .....	7.76	
			November 10 .....	8.34	8.34
Mean .....		9.42	Mean .....		8.12

*Discharge measurements of Los Angeles River—Continued.*

## AT WEIR H.

Date.	Dis-charge.	Average for month.	Date.	Dis-charge.	Average for month.
1899.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	1900.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>
August 14 .....	11.88	} 12.04	May 15 .....	11.42	} 11.31
August 28 .....	12.19		May 23 .....	11.21	
September 20 .....	11.60	} 11.82	June 12 .....	11.01	} 10.84
September 26 .....	12.03		June 29 .....	10.68	
October 9 .....	11.60	} 12.31	July 27 .....	9.96	} 9.96
October 25 .....	12.66		August 1 .....	9.96	
October 27 .....	12.66	} 13.60	August 8 .....	10.16	} 10.20
November 17 .....	13.73		August 15 .....	10.13	
November 28 .....	13.47	} 13.62	August 31 .....	10.57	} 10.19
December 13 .....	13.42		September 8 .....	10.15	
December 21 .....	13.64	} 10.54	September 11 .....	10.39	} 10.19
December 26 .....	13.80		September 27 .....	10.03	
			November 10 .....	10.54	10.54
Mean .....		12.68	Mean .....		10.51

## AT WEIR I.

1899.			1900.		
August 14 .....	17.18	} 17.04	May 15 .....	16.25	} 16.15
August 28 .....	16.91		May 23 .....	16.05	
September 20 .....	17.15	} 17.23	June 12 .....	15.66	} 15.57
September 26 .....	17.32		June 29 .....	15.49	
October 9 .....	17.19	} 17.76	July 12 .....	15.58	} 15.16
October 25 .....	18.33		July 27 .....	14.74	
November 17 .....	19.04	} 18.88	August 1 .....	14.37	} 14.70
November 28 .....	18.72		August 8 .....	14.94	
December 13 .....	18.93	} 18.96	August 15 .....	14.69	} 14.53
December 26 .....	18.99		August 31 .....	14.80	
			September 8 .....	14.54	} 14.92
			September 11 .....	14.74	
			September 27 .....	14.31	} 14.53
			November 10 .....	14.92	
Mean .....		17.97	Mean .....		15.17

*Discharge measurements of Los Angeles River—Continued.*

## AT WEIR J.

NOTE.—Total discharge of river at weir J equals discharge over weir + discharge at No. 7, or + No. 7B + 2.49.

Date.	Discharge at No. 7, or No. 7B+2.49.	Discharge over weir.	Total dis- charge for weir.	Average for month.
1899.	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Second-feet.</i>
August 14 .....	18.59	0.55	19.14	} 18.76
August 28 .....	17.90	.49	18.39	
September 20 .....	17.90	.49	18.39	} 18.58
September 26 .....	18.28	.49	18.77	
October 9 .....	18.08	.44	18.52	} 18.91
October 25 .....	17.45	1.85	19.30	
November 17 .....	18.02	2.91	20.93	} 20.71
November 28 .....	13.78	6.71	20.49	
December 13 .....	13.90	6.34	20.24	} 20.31
December 26 .....	13.66	6.73	20.39	
Mean .....				19.45
1900.				
May 15 .....	20.09	1.39	21.48	} 19.76
May 23 .....	16.37	1.67	18.04	
June 12 .....	19.81	.86	20.67	} 18.92
June 29 .....	16.31	.86	17.17	
August 15 .....	18.49	.41	18.90	} 19.31
August 31 .....	19.25	.46	19.71	
September 8 .....		.42		
September 11 .....	19.81	.52	20.33	} 19.15
September 27 .....	17.59	.39	17.98	
November 10 .....	14.84	1.49	16.33	16.33
Mean .....				18.69

*Discharge measurements of Los Angeles River—Continued.*

## AT WEIR K.

NOTE.—Total discharge of river at weir K equals discharge over weir + discharge at No. 7, or + No. 7B + 2.49.

Date.	Discharge at No. 7, or No. 7B+2.49.	Discharge over weir.	Total dis- charge for weir.	Average for month.
1899.	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Second-feet.</i>
August 14 .....	18.59	4.13	22.72	} 22.27
August 28 .....	17.90	3.92	21.82	
September 20 .....	17.90	3.91	21.81	} 22.03
September 26 .....	18.28	3.98	22.26	
October 9 .....	18.08	4.13	22.21	} 22.68
October 25 .....	17.45	5.70	23.15	
November 17 .....	18.02	6.97	24.99	} 24.73
November 28 .....	13.78	10.69	24.47	
December 13 .....	13.90	10.69	24.59	} 24.58
December 26 .....	13.66	10.92	24.58	
Mean .....				23.26
1900.				
May 15 .....	20.09	4.94	25.03	} 23.17
May 23 .....	16.37	4.94	21.31	
July 2 .....	16.32	2.93	19.25	19.25
August 1 .....		2.55		
August 15 .....	18.49	2.71	21.20	} 21.50
August 31 .....	19.25	2.55	21.80	
September 8 .....		2.81		
September 11 .....	19.81	2.80	22.61	} 21.35
September 27 .....	17.59	2.50	20.09	
November 10 .....	11.84	4.12	18.96	18.96
Mean .....				20.85

*Discharge measurements of Los Angeles River—Continued.*

## AT BRIDGE P.

NOTE.—Total discharge of river at bridge P equals discharge at bridge + discharge at No. 7, or + discharge at No. 7B.

Date.	Discharge at No. 7, or No. 7B.	Discharge at bridge.	Total dis- charge at bridge.	Average for month.
1899.	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Sec.-feet.</i>
August 25 .....	18.66	20.22	38.88	38.88
September 20 .....	17.90	19.36	37.26	} 38.50
September 27 .....	18.66	21.08	39.74	
October 10 .....	18.08	19.81	37.89	
October 25 .....	17.45	17.62	35.07	} 37.16
October 28 .....	17.45	21.06	38.51	
November 17 .....	18.02	25.73	43.75	
November 28 .....	13.18	27.75	40.93	} 42.34
December 13 .....	13.90	31.94	45.84	
December 26 .....	13.66	27.67	41.33	
Mean .....				40.09
1900.				
May 15 .....	17.60	21.22	38.82	} 36.49
May 23 .....	13.88	20.28	34.16	
June 12 .....	17.32	18.59	35.91	
July 2 .....	13.83	19.51	33.34	} 32.16
July 12 .....	14.00	16.99	30.99	
August 1 .....	14.00	17.04	31.04	
August 8 .....	14.00	18.71	32.71	} 33.23
August 15 .....	16.00	19.94	35.94	
September 8 .....		19.26		
September 11 .....	17.32	19.67	36.99	} 35.23
September 28 .....	15.10	18.38	33.48	
Mean .....				34.60



*Discharge measurements of Los Angeles River—Continued.*

## AT BRIDGE Q.

NOTE.—Total discharge of river at bridge Q equals discharge at Q + discharge at No. 7—2.49, or + No. 7B.

Date.	Discharge at No. 7—2.49, or 7B.	Discharge at bridge.	Total dis- charge at bridge.	Average for month.
1899.	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Sec.-feet.</i>
September 20 .....	15.41	28.12	43.53	} 43.84
September 27 .....	16.17	27.99	44.16	
October 10 .....	15.59	27.77	43.36	} 41.31
October 25 .....	8.21	27.66	35.87	
October 28 .....	8.23	36.48	44.71	
November 17 .....	9.36	39.71	49.07	} 47.58
November 29 .....	12.20	33.89	46.09	
December 13 .....	11.41	35.99	47.40	} 45.21
December 26 .....	11.17	31.86	43.03	
Mean .....				44.49
1900.				
May 15 .....	17.60	28.42	46.02	} 43.93
May 23 .....	13.88	27.97	41.85	
June 12 .....	17.32	27.64	44.96	44.96
July 2 .....	13.83	26.20	40.03	} 39.41
July 12 .....	14.00	24.79	38.79	
August 1 .....	14.00	24.48	38.48	38.48
September 8 .....		27.09		
September 11 .....	17.32	26.22	43.54	} 43.98
September 28 .....	15.10	29.33	44.43	
Mean .....				42.15

*Discharge measurements of Los Angeles River, Los Angeles County, near bridge  
No. 2.*

Date.	Hydrographer	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
June 15, 1889	Wm. Mulholland .....	36.7	River.
Do .....	do .....	11.1	Power ditch.
Do .....	do .....	11.2	Main supply ditch.
	Total flow at bridge 2.	59.0	
July 15, 1889	Wm. Mulholland .....	33.3	River.
Do .....	do .....	11.0	Power ditch.
Do .....	do .....	14.1	Main supply ditch.
	Total at bridge 2.	58.4	
Nov. 18, 1891	Wm. Mulholland .....	68.0	River.
Do .....	do .....	10.0	Power ditch.
Do .....	do .....	3.0	Main supply ditch.
	Total at bridge 2.	81.0	
Nov. —, 1893	Wm. Mulholland .....	58.8	River.
Do .....	do .....	15.0	Power ditch.
Do .....	do .....	(?)	Main supply ditch.
Feb. 28, 1898	do .....	51.8	River.
Do .....	do .....	.7	Glassell tributary.
Do .....	do .....	15.0	Main supply ditch.
Do .....	do .....		Power ditch, measurement above.
	Total at bridge 2.	67.5	

*Discharge measurements of Los Angeles River at bridge No. 2.*

NOTE.—Total discharge of river at bridge No. 2 equals discharge at No. 2 + discharge at No. 7B, or No. 2 + No. 7—2.49.

Date.	Discharge at No. 7— 2.49, or No. 7B.	Discharge at No. 17.	Discharge at bridge.	Total dis- charge at bridge.	Average for month.
	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>
1899.					
August 19 .....	15.59	0.06	41.29	56.94	57.79
August 25 .....	16.17	.06	42.41	58.64	
September 20 .....	15.41	.06	40.23	55.70	56.00
September 27 .....	16.17	.06	40.07	56.30	
October 10 .....	15.59	.05	39.35	54.99	55.61
October 25 .....	8.21	.05	48.88	57.14	
October 28 .....	8.23	.05	44.45	52.73	
October 31 .....	8.78	.05	48.73	57.56	
November 17 .....	9.36	.06	49.71	59.13	57.39
November 29 .....	12.20	.06	43.40	55.66	
December 13 .....	11.41	.07	46.69	58.17	58.15
December 26 .....	11.17	.07	46.89	58.13	
Mean .....					56.99
1900.					
May 16 .....	17.60	.14	39.61	57.35	54.91
May 23 .....	13.88	.14	38.46	52.48	
June 12 .....	17.32	.14	39.23	56.69	56.69
July 2 .....	13.83	.10	35.38	49.31	52.43
July 13 .....	15.32	.14	40.10	55.56	
August 1 .....	14.00	.10	34.62	48.72	51.12
August 8 .....	14.00	.10	34.77	48.87	
August 15 .....	16.00	.10	38.58	54.68	
August 31 .....	16.76	.10	35.36	52.22	
September 8 .....			34.27		
September 11 .....	17.32	.20	35.56	53.08	51.27
September 28 .....	15.10	.08	34.28	49.46	
November 10 .....	14.84	.10	39.45	54.39	54.39
Mean .....					53.46

*Average discharge of Los Angeles River at weir No. 9.*

Month.	1899.	1900.	Month.	1899.	1900.
	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>		<i>Sec.-feet.</i>	<i>Sec.-feet.</i>
January .....	1.17	0.52	July .....	0.55	0.15
February .....	1.00	.49	August .....	.48	.18
March .....	1.16	.39	September .....	.44	.20
April .....	1.10	.38	October .....	.64	-----
May .....	.71	.30	November .....	.56	-----
June .....	.69	.24	December .....	.52	-----

*Average discharge of developed water at weir No. 10.*

Month.	1899.	1900.	Month.	1899.	1900.
	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>		<i>Sec.-feet.</i>	<i>Sec.-feet.</i>
January .....	-----	0.89	July .....	0.79	0.74
February .....	-----	.81	August .....	.79	.73
March .....	0.96	.86	September .....	.83	.70
April .....	.93	.79	October .....	.86	-----
May .....	.90	.82	November .....	.94	-----
June .....	.86	.79	December .....	.91	-----

*Average discharge of small tributary of Los Angeles River at weir M.*

Month.	Discharge.	Month.	Discharge.
1899.	<i>Sec.-feet.</i>	1899.	<i>Sec.-feet.</i>
January .....	0.29	July .....	Dry.
February .....	.20	August .....	Do.
March .....	.20	September .....	Do.
April .....	.14	October .....	Do.
May .....	.07	November .....	Do.
June .....	.06	December .....	Do.

*Average discharge of cut of West Los Angeles Water Company in San Fernando Valley, from gravel beds of Los Angeles River.*

Month.	1899.	1900.	Month.	1899.	1900.
	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>		<i>Sec.-feet.</i>	<i>Sec.-feet.</i>
May .....	-----	5.79	September .....	6.02	-----
June .....	-----	5.85	October .....	5.94	-----
July .....	-----	5.75	November .....	6.07	-----
August .....	6.01	5.87	December .....	6.08	-----

*Average discharge of Los Angeles River.*

Measuring point.	Interven- ing distance along river.	Average discharge, August to December, inclusive, 1899.	Rate of growth per 100 feet, 1899.	Average discharge May to No- vember, inclusive, 1900.	Rate of growth per 100 feet, 1900.
	<i>Feet.</i>	<i>Sec.-feet.</i>		<i>Sec.-feet.</i>	
Weir A .....		0.649		0.402	
	10,280		0.001		0.001
Weir B .....		.723		.276	
	3,486		.066		.064
Weir C .....		3.03		2.52	
	7,069		.039		.033
Weir E .....		5.89		4.84	
	4,585		.053		.048
Weir G .....		8.33		7.03	
	1,041		.105		.105
Weir L .....		9.42		8.12	
	770		.424		.310
Weir H .....		12.68		10.51	
	2,543		.210		.183
Weir I .....		17.97		15.17	
	3,926		.038		.089
Weir J .....		19.45		18.69	
	3,600		.100		.060
Weir K .....		23.06		20.85	
	6,345		.268		.217
Bridge P .....		40.09		34.60	
	4,629		.095		.163
Bridge Q .....		44.49		42.15	
	6,756		.185		.167
Bridge No. 2 .....		56.99		53.46	

*Discharge measurements of Los Angeles River, Los Angeles County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-ft.</i>	
Aug. 21, 1899	S. G. Bennett	0.0	Pacoima, mouth of canyon.
Jan. 9, 1901	L. Mesmer	50.0	Do.
Sept. 20, 1901	S. G. Bennett	0.0	Do.
Aug. 21, 1899	do	.44	Tujunga, Headworks Monte Vista Canal.
Oct. 9, 1900	W. W. Cockins	.19	Do.
Sept. 21, 1901	S. G. Bennett	.22	Do.
Nov. 22, 1900	do	18.7	Tujunga Railroad, main line.
Do	do	.05	Tujunga, 3 miles below above measurement.
Do	do	10.60	Tujunga Railroad, main line, flood marks.
Aug. 21, 1899	do	0.0	Tujunga—little.

*Discharge measurements of Los Angeles River at pumping stations in San Fernando Valley.*

Year.	Hydrographer.	Dis-charge.	Remarks.
		<i>Sec.-ft.</i>	
1897	J. B. Lippincott	a 0.11	Total output, 4 plants.
1898	do	a. 33	Total output, 7 plants.
1899	do	a. 99	Total output, 21 plants.
1900	do	a 1.77	Total output, 33 plants.

a Reduced to continuous flow for summer months.

**LOS FLORES CANYON.**

Los Flores Canyon is situated on the southern slope of the Sierra Madre, in Los Angeles County. The area of the drainage basin above the line of township 1 north, above which all diversions occur, is 0.35 square mile. The canyon is in granite, largely shattered, with prevailing lines of cleavage extending northwest to southeast, but with other distinct lines bearing northeastward. Below the mouth of the canyon are the beautiful Pasadena Mesa lands. The scarcity of water, coupled with the general desirability of these lands, has caused much "development work" to be done for the purpose of increasing the water supply. Twelve tunnels in all have been run into this granite rock. The experience has been that as the fissures and cracks of the rock are opened a considerable discharge has resulted for a period of a few weeks, after which the flow decreased, and the tunnels would then again be extended or new ones run.

Following is a list of the tunnels, showing their lengths:

Los Flores tunnel:	Feet.
No. 1.....	23
No. 2.....	52
No. 3.....	96
No. 4.....	55
Mining tunnel.....	37
Twaddell tunnel.....	130
McNally tunnel.....	430
Los Flores tunnel:	
No. 5.....	185
No. 6.....	475
No. 7.....	200
No. 8.....	357
Twaddell's Tiptop tunnel.....	132
Total length.....	2,172

From the nature of the drainage basin and the data obtained from neighboring streams a reasonable natural run-off from this drainage basin, including flood waters, of from 0.10 to 0.15 second-foot might be expected in average years.

The granite bed rock in the drainage basin is covered with a few feet of coarse, disintegrated, granitic soil, very absorbent of water. Rain falling upon this is rapidly absorbed, and the tunnels show within a few weeks the effect of rainfall. During the years when measurements of the tunnels were made the rainfall was, as a rule, much below normal. In the following discharge measurements all the water which is diverted, both developed and natural flow, is included, but probably a few winter storms occurred that produced greater run-off than the capacity of the diversion pipes, and consequently some of the water must have escaped unmeasured.

The lesson to be drawn from this particular case is that the expenditure of the large amount of money required to construct these tunnels was ill advised, the water supply having been not materially, if at all, increased beyond the normal flow of the canyon prior to the construction of the tunnels. A similar experience is the result of like work in Eaton Canyon, which adjoins the Los Flores to the east.

*Discharge measurements of Los Flores Canyon, Los Angeles County.*

Date.	Mean discharge.	Remarks.
	<i>Sec.-feet.</i>	
1895.....	0.18	22 inches of rain.
1896.....	.10	10 inches of rain.
1897.....	.12	21 inches of rain.
1898.....	.08	9 inches of rain.
1899.....	.10	7 inches of rain.
1900.....	.09	11 inches of rain.
1901.....	.09	12 inches of raid.

## LYTLE CREEK.

This small stream drains the southern slope of the Sierra Madre and discharges its waters on the plains northwest of San Bernardino. Although it drains a comparatively small area of 52 square miles, at the mouth of the canyon its waters are important for irrigation purposes. Owing to the controversies which have arisen over its diversions, a number of lawsuits for the settlement of the claims have been instituted from time to time. A number of measurements of this stream at the mouth of the canyon from 1892 to 1896, inclusive, are given below. They are copied from court records of proceedings in which the water supply of this creek was involved. These cases were tried in the San Bernardino courts by Judge J. W. McKinley. The measurements were made by A. H. Koebig and G. O. Newman, on weirs, and are believed to be accurate.

*Discharge measurements of Lytle Creek at mouth of canyon, San Bernardino County, Cal.*

Date.	Discharge.	Date.	Discharge.
1892.	<i>Second-feet.</i>	1894.	<i>Second-feet.</i>
June 3 .....	35.58	August 19 .....	11.44
September 20 .....	18.70	August 25 .....	12.32
September 30 .....	22.04	October 3 .....	16.20
October 28 .....	20.64		
November 21 .....	22.04	1895.	
November 27 .....	20.68	September 2 .....	56.10
		September 30 .....	40.78
1893.			
September 7 .....	49.20	1896.	
September 18 .....	49.20	March 3 .....	18.08
September 25 .....	46.34	April 23 .....	19.14
October 4 .....	45.30	April 24 .....	18.60
		April 25 .....	20.52
1894.		May 3 .....	18.52
June 6 .....	17.96	May 4 .....	17.26
June 8 .....	15.50	May 10 .....	18.16
July 10 .....	13.22	May 25 .....	15.32
July 11 .....	13.22	May 26 .....	12.84
July 25 .....	13.36		



Beginning in 1894, measurements of Lytle Creek were also made by H. D. Sibley, who was zanjero of the Lytle Creek canals at that time. The measurements were usually made because the discharge of the stream was below normal. In the winter and spring only the amount of water needed for irrigation was turned into the ditches, but later in the summer the entire flow was diverted. These measurements also were made over weirs and are believed to be fairly accurate. During 1898 trouble was experienced through miners' taking the water from the natural channel and turning it into dry channels, sluice boxes, weirs, mill races, etc., thereby causing an alleged loss of from 20 to 25 per cent of the total flow of the creek. Only a portion of these latter diversions were returned to the creek. The measurements of Mr. Sibley would not show the full flow of Lytle Creek at all times, and sometimes show less than the full discharge, for the reasons mentioned above. During 1899 the amount of water which was diverted into the main canal was measured daily by the Anglo-American Canaigre Company, at a weir erected near the head of its cement ditch. The volumes given have been occasionally checked by visiting the canal and making meter measurements. It is believed that during 1899 practically all the water of the stream was diverted into the canal.

*Discharge, in second-feet, of Lytle Creek main canal above Rialto, San Bernardino County, Cal.*

[Drainage area, 52 square miles.]

1894.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1			15.5					
2								
3		24.1	17.2		10.9		13.5	
4								
5	16.1			10.8				
6		22.6						
7			14.1				11.4	14.5
8	19.9				10.8	13.0		
9								13.7
10								
11	17.8	18.5	14.3	10.8			13.7	
12								
13	21.8			13.4				
14			14.3			13.2		
15								
16	22.6		14.4					
17		19.1						
18			15.0		13.7	11.5	14.5	
19	22.6			14.1				
20								
21			14.8	12.7				
22	24.9				11.9	12.7		12.9
23			14.6					
24		18.2	14.9					
25	25.4						14.2	
26								
27			15.0					
28		16.6						
29								
30								12.5
31				11.7	13.4			

*Discharge, in second-feet, of Lytle Creek main canal, etc.—Continued.*

1895.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			54.4						
2									
3							36.9		
4			68.0			51.4			
5									
6									
7								30.5	
8		33.9					31.5		
9									
10						48.8			
11								24.9	
12						50.8			
13									22.0
14									
15									
16					50.4				
17						44.8			
18	26.4	43.8					41.9		
19									
20									
21		57.5					36.5		
22							34.1	24.0	
23	37.4				52.5				
24						47.1			
25									
26					54.4				
27									
28						36.5	34.5		
29									
30									
31							34.5		

June 5 to August 16, ditch broken; no measurements.

*Discharge, in second-feet, of Lytle Creek main canal, etc.—Continued.*

1896.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1					17.8				13.2			
2				22.2		14.1	11.1					
3												
4												
5	20.0									12.2		
6						11.4			12.2			
7								11.5				
8		19.2					11.1					
9						13.5				11.6		16.0
10						12.5			12.2			
11												
12						11.9		10.5				
13		18.4										
14						12.2	12.2					16.0
15				24.9								
16	21.4				17.1			13.7	10.8			17.0
17			19.8									
18				19.7				11.3				
19									11.8			
20							10.5					
21								12.0				
22												16.0
23								12.5		11.1		
24				22.4				12.5				
25											28.0	
26									11.8	20.0		
27							10.7					
28								13.5				
29		17.5										
30					15.0							24.0
31												

Heavy rains March 1 to 15 and October 26; all water turned out of canal.

*Discharge, in second-feet, of Lytle Creek main canal, etc.—Continued.*

1897.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1								
2								
3		60.0						
4					36.0			
5								
6			60.0					
7		24.0						
8								
9				50.0	30.0			
10	16.0							
11								
12								10.6
13								
14			60.0					
15								
16	24.0				34.0			
17								
18		80.0						
19				60.0				
20								
21		50.0						
22								
23								
24				50.0				
25	20.0		60.0					
26								
27								
28		56.0	70.0	40.0				
29	28.0							
30								
31								

Heavy rains February 3 and 18, March 28, September 14. Chicala Water Company took charge of station June 1.

1898.

Day.	May.	June.	July.
1			10.9
2			13
3			14
4			15
5			16
6			17
7			18
8			19
9			20
10			21
11			22
Day.	May.	June.	July.
23			28
24			29
25			30
26			31
27		14.6	
28		9.0	
29			
30			
31			
Day.	May.	June.	July.
11			11.7
12			11.5
13			13.9
14			
15			
16			
17			
18			
19			
20			
21			
22			

10—05—18 MR

*Discharge, in second-feet, of Lytle Creek main canal, etc.—Continued.*

1899.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1 ----	11.1	11.8	11.2	9.7	11.2	12.2	6.3	9.4	14.5	10.9	10.5	11.1
2 ----	11.1	12.1	11.1	8.9	10.9	10.4	6.8	10.4	15.1	10.8	10.3	11.3
3 ----	12.1	12.1	11.2	8.5	10.9	9.7	6.4	9.6	16.6	10.8	10.3	11.4
4 ----	11.4	12.4	11.1	12.6	10.5	9.5	6.4	10.7	16.7	10.8	10.6	11.1
5 ----	11.7	12.4	10.8	12.5	10.5	9.4	6.4	12.2	16.0	10.7	10.5	11.3
6 ----	11.6	12.5	10.6	12.1	10.5	9.6	6.4	11.0	16.0	10.6	10.6	11.3
7 ----	11.6	12.6	10.4	11.9	10.5	9.2	6.3	10.8	16.0	10.1	10.6	11.3
8 ----	11.6	12.4	10.4	11.8	10.2	9.0	6.2	11.0	15.9	9.9	9.9	11.6
9 ----	11.6	12.1	10.9	11.7	11.8	-----	6.2	11.0	16.5	10.2	9.9	11.4
10 ----	12.0	11.8	10.6	11.9	9.5	7.2	6.0	8.7	16.1	10.8	10.0	11.5
11 ----	16.1	11.8	10.6	11.7	9.5	7.5	5.9	12.0	16.0	11.7	10.2	11.4
12 ----	13.1	11.8	10.6	11.7	9.2	8.2	6.0	12.0	15.8	12.1	10.5	11.3
13 ----	12.2	11.8	10.7	11.0	9.6	8.1	5.9	12.2	15.3	12.4	10.9	11.2
14 ----	12.0	11.6	10.7	10.6	9.5	7.8	5.9	12.1	15.4	13.5	11.0	11.1
15 ----	11.9	11.5	10.7	10.6	9.8	-----	6.0	12.3	16.0	12.7	11.3	11.2
16 ----	12.0	11.5	15.3	10.7	9.4	7.6	6.0	12.3	15.5	13.0	11.7	12.9
17 ----	12.0	11.5	14.7	10.6	9.4	7.8	5.8	12.2	15.3	13.0	11.5	11.8
18 ----	12.0	11.3	13.7	10.7	9.4	7.9	5.4	12.6	14.3	12.3	12.0	11.8
19 ----	11.9	11.4	12.3	10.2	9.7	7.7	5.6	13.0	15.7	12.0	11.9	11.6
20 ----	11.8	11.3	13.7	10.8	9.8	7.3	5.6	13.0	14.9	11.4	11.8	11.6
21 ----	11.7	11.3	13.1	9.9	9.5	7.5	5.8	12.5	15.2	11.2	12.2	11.3
22 ----	11.8	11.3	12.9	9.9	9.4	7.6	7.2	12.4	16.1	11.6	12.7	11.1
23 ----	11.7	11.3	12.8	10.3	9.4	7.4	8.6	12.4	10.8	11.9	12.1	11.1
24 ----	11.6	11.8	13.2	10.6	9.2	7.1	9.3	12.5	10.4	10.3	12.0	11.1
25 ----	11.6	11.4	14.8	10.5	9.2	7.2	8.9	12.4	10.3	10.7	13.8	10.9
26 ----	11.6	11.4	13.5	10.4	9.0	7.4	9.2	12.6	10.3	11.4	11.7	11.2
27 ----	11.6	11.3	13.4	10.4	9.0	7.3	9.4	12.5	10.5	11.3	11.5	11.1
28 ----	11.6	11.3	13.6	10.4	9.0	7.2	9.5	12.2	10.5	11.1	11.5	11.1
29 ----	11.6	-----	13.6	11.0	9.4	6.7	9.7	12.3	10.6	11.0	11.4	11.2
30 ----	11.6	-----	13.5	11.2	9.3	6.4	9.6	12.2	10.6	11.4	11.2	11.1
31 ----	11.7	-----	13.5	-----	-----	-----	10.0	12.1	-----	11.3	-----	11.3
Mean	11.9	11.7	12.2	10.8	9.8	8.1	7.1	11.8	14.3	13.3	11.2	11.3

<sup>a</sup>Rain in mountains.

The summer of 1898 was one during which the smallest stream flow occurred in southern California of which we have record. The period of smallest summer flow was during the month of September. During this minimum period the Edison Electric Company had certain measurements made on Lytle Creek at half hour intervals, to determine the diurnal fluctuations. The discharge of the stream was as follows:

*Discharge measurements of Lytle Creek at Millers Narrows, San Bernardino County.*

Date.	Time.	Dis-charge.	Date.	Time.	Dis-charge.
		<i>Sec.-feet.</i>			<i>Sec.-feet.</i>
Sept. 15, 1898	7 a. m. ....	9.16	Sept. 15, 1898	10.30 p. m. ....	8.88
Do .....	7.30 a. m. ....	9.16	Do .....	11 p. m. ....	8.88
Do .....	8 a. m. ....	9.16	Do .....	11.30 p. m. ....	8.88
Do .....	8.30 a. m. ....	9.16	Do .....	12 midnight .....	9
Do .....	9 a. m. ....	9.00	Sept. 16, 1898	12.30 a. m. ....	9
Do .....	9.30 a. m. ....	7.94	Do .....	1 a. m. ....	9
Do .....	10 a. m. ....	8.02	Do .....	1.30 a. m. ....	9.16
Do .....	10.30 a. m. ....	8.02	Do .....	2 a. m. ....	9.16
Do .....	11 a. m. ....	8.02	Do .....	2.30 a. m. ....	9.16
Do .....	11.30 a. m. ....	7.74	Do .....	3 a. m. ....	9.16
Do .....	12 m. ....	7.46	Do .....	3.30 a. m. ....	9.16
Do .....	12.30 p. m. ....	7.34	Do .....	4 a. m. ....	9.16
Do .....	1 p. m. ....	7.20	Do .....	4.30 a. m. ....	9.16
Do .....	1.30 p. m. ....	7.20	Do .....	5 a. m. ....	9.16
Do .....	2 p. m. ....	7.20	Do .....	5.30 a. m. ....	9.16
Do .....	2.30 p. m. ....	7.20	Do .....	6 a. m. ....	9.16
Do .....	3 p. m. ....	7.06	Do .....	6.30 a. m. ....	9.16
Do .....	3.30 p. m. ....	7.06		12-hour mean .....	8.86
Do .....	4 p. m. ....	6.94			
Do .....	4.30 p. m. ....	7.06	Sept. 16, 1898	7 a. m. ....	9.28
Do .....	5 p. m. ....	7.06	Do .....	7.30 a. m. ....	9.28
Do .....	5.30 p. m. ....	7.34	Do .....	8 a. m. ....	9.16
Do .....	6 p. m. ....	7.46	Do .....	8.30 a. m. ....	9
Do .....	6.30 p. m. ....	7.46	Do .....	9 a. m. ....	9
	12-hour mean .....	7.77	Do .....	9.30 a. m. ....	8.02
			Do .....	10 a. m. ....	8.02
Sept. 15, 1898	7 p. m. ....	7.46	Do .....	10.30 a. m. ....	7.74
Do .....	7.30 p. m. ....	7.74	Do .....	11 a. m. ....	7.74
Do .....	8 p. m. ....	8.40	Do .....	11.30 a. m. ....	7.46
Do .....	8.30 p. m. ....	8.58	Do .....	12 m. ....	7.20
Do .....	9 p. m. ....	8.52	Do .....	12.30 p. m. ....	7.20
Do .....	9.30 p. m. ....	8.72	Do .....	1 p. m. ....	7.06
Do .....	10 p. m. ....	8.88	Do .....	1.30 p. m. ....	6.94



*Discharge measurements of Lytle Creek at Millers Narrows, etc.—Continued.*

Date.	Time.	Dis-charge.	Date.	Time.	Dis-charge.
		<i>Sec.-feet.</i>			<i>Sec.-feet.</i>
Sept. 16, 1898	2 p. m. -----	6.80	Sept. 16, 1898	10.30 p. m. -----	9
Do -----	2.30 p. m. -----	6.94	Do -----	11 p. m. -----	9
Do -----	3 p. m. -----	7.20	Do -----	11.30 p. m. -----	9
Do -----	3.30 p. m. -----	7.20	Do -----	12 midnight -----	9
Do -----	4 p. m. -----	7.34	Sept. 17, 1898	12.30 a. m. -----	9.16
Do -----	4.30 p. m. -----	7.34	Do -----	1 a. m. -----	9.16
Do -----	5 p. m. -----	7.46	Do -----	1.30 a. m. -----	9.16
Do -----	5.30 p. m. -----	7.46	Do -----	2 a. m. -----	9.16
Do -----	6 p. m. -----	7.60	Do -----	2.30 a. m. -----	9.16
Do -----	6.30 p. m. -----	7.60	Do -----	3 a. m. -----	9.16
	12-hour mean -----	7.75	Do -----	3.30 a. m. -----	9.16
Sept. 16, 1898	7 p. m. -----	8.02	Do -----	4 a. m. -----	9.16
Do -----	7.30 p. m. -----	8.88	Do -----	4.30 a. m. -----	9.06
Do -----	8 p. m. -----	8.88	Do -----	5 a. m. -----	9.28
Do -----	8.30 p. m. -----	8.88	Do -----	5.30 a. m. -----	9.28
Do -----	9 p. m. -----	8.88	Do -----	6 a. m. -----	9.28
Do -----	9.30 p. m. -----	8.88	Do -----	6.30 a. m. -----	9.28
Do -----	10 p. m. -----	9		12-hour mean -----	9.04

The following measurements were made by the United States Geological Survey:

*Discharge measurements of Lytle Creek at mouth of canyon, San Bernardino County.*

Date.	Hydrographer.	Dis-charge.	Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>			<i>Sec.-feet.</i>
July 24, 1896	J. H. Quinton	15.7	June 8, 1900	S. G. Bennett	6.2
June 10, 1898	J. B. Lippincott	10.7	Sept. 29, 1900	W. W. Cockins, jr	4.6
Aug. 27, 1898	F. H. Olmsted	10.0	Apr. 4, 1902	S. G. Bennett	19.9
Aug. 29, 1899	S. G. Bennett	12.5	Sept. 5, 1902	W. B. Clapp	5.0

#### MAMMOTH CREEK.

See Owens River, Mammoth Creek.

#### MARIA IGNACIA CREEK.

*Discharge measurement of Maria Ignacia Creek, Santa Barbara County.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec. feet.</i>
Aug. —, 1899	Geo. F. Wright	0.23

## MARIPOSA CREEK.

*Estimated monthly discharge of Mariposa Creek at base of foothills, Mariposa County, <sup>a</sup>*

[Drainage area, 122 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1878.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
November	0	0	0	0	0	0
December	0	0	0	0	0	0
1879.						
January	0	0	0		0	0
February			20	1,111	.16	.17
March			45	2,767	.37	.43
April			43	2,559	.35	.39
May			4	246	.03	.03
June	0	0	0	0	0	0
July	0	0	0	0	0	0
August	0	0	0	0	0	0
September	0	0	0	0	0	0
October	0	0	0	0	0	0
November	0	0	0	0	0	0
December			15	922	.12	.14
The year			11	7,605	.09	1.16
1880.						
January			20	1,230	.16	.18
February			49	2,819	.40	.43
March			24	1,476	.20	.23
April			24	1,428	.20	.22
May			18	1,107	.15	.17
June			12	714	.10	.11
July	0	0	0	0	0	0
August	0	0	0	0	0	0
September	0	0	0	0	0	0
October	0	0	0	0	0	0
November	0	0	0	0	0	0
December			92	5,657	.75	.86
The year			20	14,431	.16	2.20

<sup>a</sup>Authority, California State engineering department. Estimated from run-off of neighboring streams.

*Estimated monthly discharge of Mariposa Creek, etc.—Continued.*

Month.	Discharge.			Total dis. charge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile	Depth.
1881.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....			134	8,239	1.10	1.27
February .....			171	9,497	1.40	1.46
March .....			38	2,337	.31	.36
April .....			5	298	.04	.04
May .....			0	0	0	0
June .....			0	0	0	0
July .....			0	0	0	0
August .....			0	0	0	0
September .....			0	0	0	0
October .....			0	0	0	0
November .....			0	0	0	0
December .....			0	0	0	0
The year .....			29	20,371	24	3.13
1882.						
January .....	0	0	0	0	0	0
February .....			24	1,333	.20	.21
March .....			74	4,550	.61	.70
April .....			98	5,831	.80	.89
May .....	0	0	0	0	0	0
June .....	0	0	0	0	0	0
July .....	0	0	0	0	0	0
August .....	0	0	0	0	0	0
September .....	0	0	0	0	0	0
October .....	0	0	0	0	0	0
November .....		0	18	1,071	.15	.17
December .....			12	738	.10	.12
The year .....			19	13,523	.15	2.09

*Estimated monthly discharge of Mariposa Creek, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1883.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....			49	3,013	0.40	0.46
February .....			24	1,333	.20	.21
March .....			122	7,501	1.00	1.15
April .....			73	4,344	.60	.67
May .....		0	37	2,275	.30	.35
June .....	0	0	0	0	0	0
July .....	0	0	0	0	0	0
August .....	0	0	0	0	0	0
September .....	0	0	0	0	0	0
October .....	0	0	0	0	0	0
November .....	0	0	0	0	0	0
December .....	0	0	0	0	0	0
The year .....			25	18,466	.21	2.84
1884.						
January .....		0	12	738	.10	.12
February .....			488	28,070	4.00	4.31
March .....			671	41,258	5.50	6.34
April .....			488	29,037	4.00	4.46
May .....			244	15,003	2.00	2.31
June .....			122	7,259	1.00	1.12
July .....		0	49	3,013	.40	.46
August .....	0	0	0	0	0	0
September .....	0	0	0	0	0	0
October .....	0	0	0	0	0	0

## MAYBERRY CANYON.

*Discharge measurements of Mayberry Canyon, Los Angeles County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-ft.</i>	
Oct. 19, 1898	J. B. Lippincott .....	1.40	Alhambra water—including pumped water.
	.....do .....	.24	Mayberry water—including pumped water.
	Total flow of canyon .....	1.64	
Sept. 23, 1899	J. B. Lippincott .....	1.38	Alhambra water—including pumped water.

## McCLOUD RIVER.

*Discharge measurements of McCloud River, Shasta County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-ft.</i>	
Sept. 9, 1901	S. G. Bennett .....	1,096	One-fourth mile above United States fishery.
Sept. 23, 1902	.....do .....	1,272	At Hirze Mountain.
Sept. 24, 1902	Chas. A. Miller .....	1,325	1 mile above Squaw Creek.
Sept. 26, 1902	.....do .....	1,356	United States fishery.
Sept. 24, 1902	.....do .....	67	Squaw Creek at bridge above mouth.

## McINTYRE DITCH.

See San Bernardino Valley, McIntyre ditch.

## McKENZIE DITCH.

See San Bernardino Valley, McKenzie ditch.

## MEEKS &amp; DALEY DITCH.

See San Bernardino Valley, Meeks &amp; Daley ditch.

## MERCED RIVER.

Merced River above Merced Falls drains approximately 1,090 square miles of the western slopes of the Sierra Nevada. Included in the eastern portion of its drainage area are a large number of high peaks, the highest, Mount Lyell, reaching an elevation of 13,090 feet.

The midsummer flow of this stream is larger in proportion to its drainage area than that of the Tuolumne River, which adjoins it on the north.

In their plunge into the Yosemite Valley the waters of the Merced River and its tributaries form most beautiful waterfalls.

The measurement and record of this stream was undertaken in response to numerous requests from persons interested in mining and irrigation. The midsummer flow of the stream is less than the combined capacity of the irrigation and power canals taking water in the vicinity of Snelling. The owners of these canals offered to pay \$100 toward the expenses of equipping and maintaining the gaging station for the first year. Mr. H. H. Henderson, county surveyor of Merced County, established a gaging station at a point 1 mile above Merced Falls, April 6, 1901. Meter measurements are made from a cable. The observer is Mr. Charles Siegfeldt.

*Discharge measurements of Merced River, Merced County.*

Date.	Hydrographer.	Gage height.	Discharge.	Remarks.
		<i>Feet.</i>	<i>Sec.-feet.</i>	
Sept. 11, 1899	S. G. Bennett	-----	35	River, 1 mile above head-works Crocker-Hoffman Canal. <sup>a</sup>
Do	do	-----	5	Old Mill Valley ditch.
Do	do	-----	16.5	Crocker - Hoffman Canal, 300 feet below head-works.
Sept. 10, 1900	do	-----	6.5	Do.
Sept. 4, 1902	L. M. Lawson	-----	37	Crocker-Hoffman Canal, 3 miles below Snelling.
Nov. 27, 1895	J. B. Lippincott	-----	125	Merced Falls.
Sept. 10, 1900	S. G. Bennett	-----	63	Do.
Apr. 6, 1901	do	10.3	1,379	Do.
June 11, 1901	J. B. Lippincott	12	4,139	Do.
Aug. 2, 1901	S. G. Bennett	10.05	1,122	Do.
Aug. 31, 1901	do	8.6	220	Do.
Mar. 6, 1902	do	10.1	1,302	Do.
May 13, 1902	do	12.15	5,413	Do.
Sept. 3, 1902	L. M. Lawson	-----	109	Do.
Sept. 10, 1900	S. G. Bennett	-----	27	Merced River Mills Canal, 2 miles below Snelling.
Do	do	-----	2.1	Snelling ditch.
Aug. 22, 1896	J. B. Lippincott	-----	89	Yosemite Valley, Stone-man House.

<sup>a</sup> Several small ditches are taken out of Merced River above this point.

*Discharge measurements of Merced River, Merced County—Continued.*

Date,	Hydrographer,	Gage height.	Discharge.	Remarks.
		<i>Feet.</i>	<i>Sec.-feet.</i>	
Sept. 25, 1894	N. C. Ray -----		135	Sec. 6, T. 4 S., R. 17 E., M. D. M.; floats.
Sept. 1-10, 1895	do -----		680	Sec. 36, T. 3 S., R. 16 E., M. D. M.; floats.
Mar. 25, 1899	do -----		4,000	Sec. 22, T. 3 S., R. 16 E., M. D. M.; floats.
Sept. 20, 1899	J. H. McKenzie -----		64	Sec. 6, T. 4 S., R. 17 E., M. D. M.; estimated.
Oct. 20, 1899	N. C. Ray -----		1,050	Sec. 22, T. 3 S., R. 16 E., M. D. M.; floats.
Sept. 3, 1900	do -----		55	Flume at Nameless Min- ing Co.'s dam; all water turned in.
Nov. 22, 1900	do -----		20,228	Over crest of Nameless Mining Co.'s dam.
Oct. —, 1901	A. Britt -----		67	Over weir during construc- tion of Mas. C. and M. Co.'s dam.
Sept. 3, 1902	E. T. Perkins -----		33	150 yards above junction of Illilonette.
Do -----	do -----		2.7	Tenaya River, 50 yards above bridge.
Do -----	do -----		6.2	Illilonette River, 100 yards above junction of Mer- ced.
Sept. 4, 1902	do -----		2	Bridal Veil Creek, below bridge in Yosemite Val- ley.
Do -----	do -----		3.2	South Fork at Wawona, below all buildings.
Aug. 30, 1902	L. M. Lawson -----		76	Benton Mills power flume at Benton Mills.
Aug. 31, 1902	do -----		97	Horseshoe Bend.
Sept. 1, 1902	do -----		15	Ditch below power house at Merced Falls.
Do -----	do -----		78	1,000 feet below Merced Falls.

*Estimated monthly discharge of Merced River at Merced Falls, Merced County.<sup>a</sup>*

[Drainage area, 1,076 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1879.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January			354	21,767	0.33	0.38
February			1,506	83,639	1.40	1.46
March			2,098	129,001	1.95	2.25
April			3,120	185,653	2.90	3.24
May			3,336	205,123	3.10	3.57
June			3,336	198,506	3.10	3.46
July			968	59,520	.90	1.04
August			172	10,576	.16	.18
September			75	4,463	.07	.08
October			75	4,612	.07	.08
November			172	10,235	.16	.18
December			646	39,721	.60	.69
The year			1,321	952,816	1.23	16.61
1880.						
January			387	23,796	.36	.42
February			753	43,313	.70	.75
March			807	49,621	.75	.86
April			4,250	252,893	3.95	4.41
May			4,842	297,723	4.50	5.19
June			5,111	304,126	4.75	5.30
July			2,744	168,722	2.55	2.94
August			753	46,300	.70	.81
September			323	19,220	.30	.33
October			269	16,540	.25	.29
November			237	14,102	.22	.25
December			1,291	79,380	1.20	1.38
The year			1,814	1,315,736	1.69	22.93

<sup>a</sup> Authority, state engineer, from 1879 to 1884, inclusive. Figures for January, February, and March, 1879, May, June, and July, 1881, November and December, 1882, and the years 1883 and 1884, are estimated from the run-off of neighboring streams. Those from April, 1879, to April, 1881, and from August, 1881, to October, 1882, inclusive, are estimated in part from rod records.



*Estimated monthly discharge of Merced River at Merced Falls, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1881.	<i>Sec. feet.</i>	<i>Sec. feet.</i>	<i>Sec. feet.</i>	<i>Acre-feet.</i>	<i>Sec. feet.</i>	<i>Inches.</i>
January			2,044	125,681	1.90	2.19
February			3,443	191,214	3.20	3.33
March			1,560	95,921	1.45	1.67
April			2,798	166,493	2.60	2.90
May			4,412	271,283	4.10	4.73
June			3,336	198,506	3.10	3.46
July			1,506	92,600	1.40	1.61
August			377	23,181	.35	.40
September			129	7,676	.12	.13
October			75	4,612	.07	.08
November			75	4,463	.07	.08
December			323	19,860	.30	.35
The year			1,673	1,201,489	1.55	20.93
1882.						
January			172	10,576	.16	.18
February			753	41,820	.70	.73
March			1,506	92,600	1.40	1.61
April			2,260	134,479	2.10	2.34
May			3,658	224,922	3.40	3.92
June			3,336	198,506	3.10	3.46
July			1,076	66,161	1.00	1.15
August			215	13,220	.20	.23
September			129	7,676	.12	.13
October			484	29,760	.45	.52
November			387	23,028	.36	.40
December			237	14,573	.22	.25
The year			1,184	857,319	1.10	14.92

*Estimated monthly discharge of Merced River at Merced Falls, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1883.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January			344	21, 152	.32	.37
February			355	19, 716	.33	.34
March			915	56, 261	.85	.98
April			2, 260	134, 479	2.10	2.34
May			5, 488	337, 444	5.10	5.88
June			4, 412	262, 532	4.10	4.57
July			1, 184	72, 801	1.10	1.27
August			377	23, 181	.35	.40
September			237	14, 102	.22	.25
October			183	11, 252	.17	.20
November			161	9, 580	.15	.17
December			172	10, 576	.16	.18
The year			1, 341	973, 076	1.25	16.95
1884.						
January			237	14, 573	.22	.25
February			2, 712	155, 996	2.52	2.72
March			3, 820	234, 883	3.55	4.09
April			4, 896	291, 332	4.55	5.07
May			5, 434	334, 124	5.05	5.82
June			6, 510	387, 372	6.05	6.75
July			4, 358	267, 963	4.05	4.67
August			1, 130	69, 481	1.05	1.21
September			237	14, 102	.22	.25
October			172	10, 576	.16	.18

*Estimated monthly discharge of Merced River, Merced County, 1 mile above Merced Falls.<sup>a</sup>*

[Drainage area, 1,000 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1901.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
April .....	5,000	1,090	2,687	133,240	1.55	1.73
May .....	9,450	2,700	5,419	333,201	4.97	5.73
June .....	8,220	3,380	5,389	320,678	4.94	5.51
July .....	4,560	1,090	2,096	128,878	1.92	2.21
August .....	2,090	220	704	43,287	.65	.75
September .....	250	130	183	10,889	.17	.19
October .....	990	150	265	16,294	.24	.28
November .....	730	0	399	23,742	.37	.41
December .....	2,090	220	577	35,478	.53	.61
1902.						
January .....	410	195	236	14,511	.22	.25
February .....	4,020	170	749	41,597	.69	.72
March .....	5,720	460	1,367	84,054	1.25	1.44
April .....	5,460	730	2,457	146,202	2.25	2.51
May .....	6,240	2,180	3,795	233,345	3.48	4.01
June .....	5,460	1,220	3,142	186,962	2.88	3.21
July .....	1,110	280	481	29,576	.44	.51
August .....	320	110	191	11,744	.18	.21
September .....	110	65	88	5,236	.08	.09
October .....	280	65	90	5,534	.08	.09
November .....	1,110	90	246	14,638	.23	.26
December .....	1,340	195	303	18,631	.28	.32
The year .....	6,240	65	1,095	792,030	1.01	13.62

<sup>a</sup> U. S. Geol. Survey.

#### MILL CREEK.

See King River, Mill Creek.

#### MILL CREEK.

This stream is one of the larger tributaries of Santa Ana River, although on account of its importance for irrigation it is generally considered as an independent stream. It rises on the western slope of the San Bernardino Mountains, draining the area immediately south of the headwaters of Santa Ana River. Mill Creek appears from its canyon about 5 miles east of Redlands. The Crafton Water

Company diverts all the water of this creek at the mouth of the canyon, particularly in the summer. The water passes over a weir, and the volume is therefore determined with considerable accuracy.

*Discharge measurements of Mill Creek at headworks Crafton Canal, San Bernardino County.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
Nov. 9, 1898	F. H. Ohlsted	15.2
Dec. 8, 1898	do	12.6
July 15, 1899	S. G. Bennett	7.4
July 23, 1898	J. B. Lippincott	11.8
Jan. 12, 1899	S. G. Bennett	10.8
Apr. 29, 1898	J. B. Lippincott	18.9
Oct. 2, 1900	W. W. Cockins, jr	<sup>a</sup> 8.6
Apr. 12, 1898	J. B. Lippincott	15.7
June 12, 1898	do	18.1
Sept. 8, 1898	do	13.1
Oct. 18, 1898	F. H. Ohlsted	15.3
Mar. 23, 1899	S. G. Bennett	15.6
May 6, 1899	do	14.6
May 31, 1899	do	11.6
June 15, 1899	do	6.8
July 27, 1899	do	4.3
Aug. 24, 1899	do	<sup>b</sup> 5.7
Do	do	<sup>c</sup> 1.5
Apr. 14, 1900	do	10.8
July 13, 1900	do	<sup>b</sup> 5.4
Do	do	<sup>c</sup> 3.4
Mar. 30, 1901	do	20.0
May 5, 1900	do	<sup>b</sup> 39.0
Do	do	<sup>d</sup> 8.0
July 6, 1901	do	23.3
Feb. 18, 1899	do	10.4
July 29, 1896	J. H. Quinton	14.2
Dec. 5, 1901	S. G. Bennett	14.5
Apr. 5, 1902	do	15.7
Do	do	<sup>b</sup> 5.4
May 31, 1902	do	19.2
July 10, 1902	do	10.8
Sept. 3, 1902	W. B. Clapp	5.3
Nov. 5, 1902	S. G. Bennett	12.3

<sup>a</sup> Of which 1.35 is pumped.

<sup>b</sup> In creek.

<sup>c</sup> Pumped.

<sup>d</sup> Canal.

*Discharge measurements of Mill Creek at Mountain Home, San Bernardino County.*

[Measurements made by Edison Electric Company.]

Date.	Dis-charge.	Date.	Dis-charge.
Sept. 15, 1898:	<i>Sec.-feet.</i>	Sept. 16, 1898:	<i>Sec.-feet.</i>
7 a. m. ....	11.74	12.30 a. m. ....	10.78
7.30 a. m. ....	11.74	1 a. m. ....	11.08
8 a. m. ....	11.58	1.30 a. m. ....	11.08
8.30 a. m. ....	11.74	2 a. m. ....	11.08
9 a. m. ....	11.74	2.30 a. m. ....	11.26
9.30 a. m. ....	11.42	3 a. m. ....	11.26
10 a. m. ....	11.26	3.30 a. m. ....	11.26
10.30 a. m. ....	11.26	4 a. m. ....	11.26
11 a. m. ....	11.08	4.30 a. m. ....	11.26
11.30 a. m. ....	10.78	5 a. m. ....	11.42
12 m. ....	10.48	5.30 a. m. ....	11.26
12.30 p. m. ....	10.32	6 a. m. ....	11.42
1 p. m. ....	10	6.30 a. m. ....	11.42
1.30 p. m. ....	9.84	12-hour mean ....	10.72
2 p. m. ....	9.54	Sept. 16, 1898:	
2.30 p. m. ....	9.40	7 a. m. ....	11.26
3 p. m. ....	9.24	7.30 a. m. ....	11.26
3.30 p. m. ....	9.24	8 a. m. ....	10.94
4 p. m. ....	9.24	8.30 a. m. ....	11.08
4.30 p. m. ....	9.24	9 a. m. ....	11.08
5 p. m. ....	9.24	9.30 a. m. ....	10.78
5.30 p. m. ....	9.24	10 a. m. ....	10.48
6 p. m. ....	9.54	10.30 a. m. ....	10.48
6.30 p. m. ....	9.54	11 a. m. ....	10.32
12-hour mean ....	10.35	11.30 a. m. ....	10.16
Sept. 15, 1898:		12 m. ....	10.00
7 p. m. ....	9.54	12.30 p. m. ....	9.84
7.30 p. m. ....	9.42	1 p. m. ....	9.68
8 p. m. ....	9.84	1.30 p. m. ....	9.54
8.30 p. m. ....	9.84	2 p. m. ....	9.40
9 p. m. ....	10	2.30 p. m. ....	9.24
9.30 p. m. ....	10.16	3 p. m. ....	9.10
10 p. m. ....	10.36	3.30 p. m. ....	9.24
10.30 p. m. ....	10.48	4 p. m. ....	8.94
11 p. m. ....	10.48	4.30 p. m. ....	8.94
11.30 p. m. ....	10.78	5 p. m. ....	8.94
12 midnight ....	10.62	5.30 p. m. ....	8.94

*Discharge measurements of Mill Creek at Mountain Home, etc.—Continued.*

Date.	Dis-charge.	Date.	Dis-charge.
Sept. 16, 1898:	<i>Sec.-feet.</i>	Sept. 17, 1898:	<i>Sec.-feet.</i>
6 p. m. ....	9.08	12.30 a. m. ....	10.48
6.30 p. m. ....	9.40	1 a. m. ....	10.48
12-hour mean ....	9.92	1.30 a. m. ....	10.64
Sept. 16, 1898:		2 a. m. ....	10.78
7 p. m. ....	9.54	2.30 a. m. ....	10.78
7.30 p. m. ....	9.68	3 a. m. ....	10.78
8 p. m. ....	9.68	3.30 a. m. ....	10.78
8.30 p. m. ....	9.84	4 a. m. ....	10.78
9 p. m. ....	9.84	4.30 a. m. ....	11.08
9.30 p. m. ....	9.84	5 a. m. ....	11.08
10 p. m. ....	10.16	5.30 a. m. ....	11.08
10.30 p. m. ....	10.16	6 a. m. ....	11.26
11 p. m. ....	10.32	6.30 a. m. ....	11.26
11.30 p. m. ....	10.32	12-hour mean ....	10.46
12 midnight ....	10.32		

*Discharge measurements of Mill Creek, San Bernardino County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
July 15, 1899	S. G. Bennett.....	8.9	Redlands Power Co., lower intake. <sup>a</sup>
Oct. 2, 1900	W. W. Cockins, jr. ....	7.3	Do.

<sup>a</sup> Loss from this intake to head of Crafton Canal, 1.46 second-feet.

*Estimated monthly discharge of Mill Creek at Crafton Canal headworks.*

[Drainage area, 47 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile	Depth.
1895.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
August .....	27.6	24.0	24.5	1,505	0.52	0.60
September .....	26.5	19.5	22.0	1,310	.47	.52
October .....	24.5	17.0	19.6	1,205	.42	.48
1896.						
May .....	21.4	9.4	13.4	825	.28	.33
June .....	16.0	5.1	10.3	615	.22	.25
July .....	16.0	6.1	11.5	709	.24	.28
August .....	13.2	8.7	11.6	716	.25	.28
September .....	15.0	7.4	11.5	687	.24	.27
October .....	13.1	9.0	10.5	637	.22	.26
1899.						
February .....	13.0	11.0	11.6	644	.25	.26
March .....	16.0	10.0	12.2	750	.26	.30
April .....	13.0	11.0	11.8	702	.25	.28
May .....	12.0	10.0	11.2	689	.23	.26
June .....	17.0	4.0	8.7	518	.19	.21
July .....	7.2	4.8	5.8	357	.12	.14
August .....	7.2	2.9	5.8	357	.12	.14
September .....	5.7	2.0	4.1	244	.09	.10
October .....	8.5	4.3	6.5	400	.14	.16
November .....	11.2	6.1	8.6	512	.18	.20
December .....	14.6	5.3	9.5	584	.20	.23
1900. <sup>a</sup>						
January .....	10.6	9.8	10.0	615	.22	.25
February .....	10.6	9.8	10.0	555	.22	.23
March .....	13.2	9.6	10.0	615	.22	.25
April .....	13.3	8.9	10.0	595	.22	.24
May .....	17.0	8.2	12.0	738	.27	.31
June .....	8.2	5.3	7.0	417	.16	.18
July .....	6.3	3.3	5.0	307	.11	.13
August .....	5.7	4.3	5.0	307	.11	.13
September .....	5.7	4.3	5.0	298	.11	.12
October .....	5.8	3.8	5.0	307	.11	.13
November 1 to 17 .....	8.5	5.1	5.0	298	.11	.12

<sup>a</sup>Exclusive of pumped water.

*Estimated monthly discharge of Mill Creek at Crafton Canal headworks—Cont'd.*

Month.	Discharge.			Total.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1901.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
June 19 to 30 .....	20.9	19.4	20.1	478	.43	.19
July .....	19.1	13.9	15.9	975	.34	.39
August (23 days) <sup>a</sup> .....	50.0	15.0	19.1	870	.41	.35
September .....	16.6	11.4	14.0	835	.30	.33
October .....	13.2	12.3	12.6	774	.27	.31
November .....	12.3	11.6	12.3	731	.26	.29
December .....	12.3	10.3	12.0	738	.26	.30

<sup>a</sup>On August 16 a cloudburst in Mill Creek Canyon and Crafton Hills filledzanje and supply canal with sand. No record from August 16 to 23, inclusive.

#### MILL CREEK, GREEN SPOT PIPE LINE.

See Santa Ana River, Green Spot pipe line.

#### MILL CREEK.

See Stanislaus River, Mill Creek.

#### MILL FLUME AND PUMP, RIVERSIDE WATER COMPANY.

See San Bernardino Valley.

#### MISSION CREEK.

*Discharge measurements of Mission Creek, Santa Barbara County, 200 feet above dam.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
Jan. 15, 1888	A. Poett .....	0.93
Jan. 24, 1888	do .....	2.80
Feb. 7, 1888	do .....	1.37
Mar. 16, 1888	do .....	2.23
July 26, 1888	do .....	.36
July 13, 1889	do .....	.43
Aug. —, 1889	G. F. Wright .....	.46
Sept. 1, 1889	A. Poett .....	.32
June 11, 1892	do .....	.36
June 17, 1900	R. Moyer .....	.05

<sup>a</sup>Above diversions, but not on bed rock.



## MOHAVE RIVER.

The streams forming the headwaters of this river have their source on the northern slope of the Sierra Madre and flow northerly, the river finally disappearing in the sands of the Mohave Desert. At Victorville, a station on the Atchison, Topeka and Santa Fe Railroad, 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-grained granite.<sup>a</sup> Above The Narrows the valley broadens into a large reservoir site, and at the 145-foot flow line is said to cover 7,718 acres. In order to determine the amount of water available for storage for this reservoir, a gaging station was established February 27, 1899. The rod is a 2 by 6 inch timber, bolted to a vertical cliff on the right bank of the river, 600 feet upstream from the wagon bridge. The bench mark is top of east rail of the Santa Fe track, 75 feet south of center of wagon bridge over track. The zero mark of rod is 12.84 feet below bench mark.

*Discharge measurements of Mohave River at Victorville Narrows, San Bernardino County.*

Date.	Hydrographer.	Gage height.	Discharge.
1899.		<i>Fect.</i>	<i>Sec.-fect.</i>
Feb. 27	B. Cole .....	1.0	44
May 5	S. G. Bennett .....	.9	33
June 13	do .....	.9	31
July 26	do .....	.85	27
Sept. 5	do .....	.85	28
1900.			
Apr. 13	do .....	.9	36
Apr. 28	P. H. Leahy .....	.9	42
May 11	do .....	.9	36
May 23	do .....	.9	34
May 29	do .....	.9	26
June 3	do .....	.9	24
June 20	do .....	.85	29
July 6	do .....	.85	31
July 25	do .....	.85	28

<sup>a</sup> Twenty-first Ann. Rept. U. S. Geol. Survey, pt. 4, 1901, p. 472.

*Discharge measurements of Mohave River at Victorville Narrows, etc.—Continued.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1901.		<i>Feet.</i>	<i>Sec.-feet.</i>
Feb. 11	S. G. Bennett	1.4	664
Mar. 4	P. H. Leahy	1.3	512
Mar. 25	do	.9	50
Apr. 9	do	.9	39
Apr. 27	do	.9	48
May 10	do	.85	47
May 25	do	.85	51
June 10	do	.85	43
June 25	do	.9	42
July 12	do	.9	40
July 28	do	.9	42
Aug. 8	do	.9	45
Aug. 31	do	.9	55
Sept. 6	do	.9	49
Sept. 20	do	.9	61
Oct. 5	do	.9	57
Oct. 24	do	.9	82
Nov. 6	do	.9	78
Nov. 24	do	.9	76
Dec. 10	do	.9	76
Dec. 25	do	.9	69
1902.			
Jan. 4	do	.9	47
Jan. 21	do	.9	53
Feb. 1	do	.9	58
Feb. 25	do	.9	63
Mar. 5	do	.9	66
Mar. 29	do	.9	66
Apr. 5	do	.9	67
Apr. 19	do	.9	62
Apr. 26	do		47
May 10	do		37
May 25	do		49
June 8	do		53
June 27	do		47
July 5	do		38
July 26	do		41
Aug. 9	do		48
Aug. 15	do		33
Oct. 20	do		49
Oct. 30	do		45
Nov. 10	do		43
Nov. 27	do		50
Dec. 11	do		68
Dec. 19	do		69
Dec. 27	S. G. Bennett		55

*Estimated monthly discharge of Mohave River at Victorville.*

[Drainage area 400 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1899.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....						
February .....						
March .....	60	28	37	2,275	0.09	0.10
April .....	60	28	37	2,202	.09	.10
May .....	44	28	33	2,029	.08	.09
June .....	44	28	29	1,726	.07	.08
July .....	28	22	27	1,660	.07	.08
August .....	28	17	24	1,476	.06	.07
September .....	22	22	22	1,309	.05	.06
October .....	28	17	23	1,414	.06	.07
November .....	44	22	27	1,607	.07	.08
December 1 to 13 .....	28	28	28	1,722	.07	.08
1900.						
January .....	44	44	44	2,705	.11	.13
February .....	60	44	49	2,721	.12	.12
March .....	80	44	57	3,505	.14	.16
April .....	44	33	35	2,083	.09	.10
May .....	33	33	33	2,029	.08	.09
June .....	33	25	30	1,785	.08	.09
July .....	29	25	26	1,599	.06	.07
August .....	29	29	29	1,783	.07	.08
September .....	29	29	29	1,726	.07	.08
October .....	33	29	32	1,968	.08	.09
November .....	3,200	33	139	8,271	.35	.39
December .....	33	33	33	2,029	.08	.09
The year .....	3,200	25	45	32,204	.11	1.49

*Estimated monthly discharge of Mohave River at Victorville—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1901.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	4,180	50	183	11,252	0.46	0.53
February .....	4,820	50	925	51,372	2.31	2.41
March .....	660	50	178	10,945	.45	.52
April .....	44	44	44	2,618	.11	.12
May .....	49	49	49	3,013	.12	.14
June .....	42	42	42	2,499	.11	.12
July .....	40	40	40	2,460	.10	.12
August .....	50	50	50	3,074	.13	.15
September .....	55	55	55	3,273	.14	.16
October .....	69	69	69	4,243	.17	.20
November .....	77	77	77	4,582	.19	.21
December .....	73	73	73	4,489	.18	.21
The year .....	4,820	40	149	103,820	.37	4.89
1902.						
January .....	53	47	50	3,074	.13	.15
February .....	63	58	60	3,332	.15	.16
March .....	66	66	66	4,058	.17	.20
April .....	67	47	59	3,511	.15	.17
May .....	49	37	43	2,644	.11	.13
June .....	53	47	50	2,975	.13	.14
July .....	41	38	40	2,460	.10	.12
August .....	48	33	40	2,460	.10	.12
September .....	(a)	(a)	(a)	2,618	.11	.12
October .....	49	45	47	2,890	.12	.14
November .....	50	43	46	2,737	.12	.13
December .....	69	55	65	3,997	.16	.18
The year .....	69	33	51	36,756	.13	1.76

(a) Estimated.

## MOKELUMNE RIVER.

The Mokelumne River drains 537 square miles of the western slopes of the Sierra Nevada above Electra, Cal. A gaging station was established at this point by Burr Bassell, C. E., while employed by the Standard Electric Company. Daily gage readings were taken from January 1 to June 30, 1901, and numerous meter measurements were made.

*Discharge measurements of Mokelumne River, Amador County.*

Date.	Hydrographer.	Gage height.	Discharge.	Locality
1900.		<i>Feet.</i>	<i>Second-feet</i>	
Sept. 12	S. G. Bennett	-----	37	Amador ditch at Camp Ta-beaud. <sup>a</sup>
Sept. 12	do	-----	4.8	Butte ditch above Electra.
1901.				
Jan. 8	B. Bassell	5.9	1,717	Electra.
Feb. 4	do	4.2	608	Do.
Feb. 15	do	4.8	966	Do.
Feb. 19	do	11.0	13,213	Do.
Feb. 22	do	8.6	6,330	Do.
Feb. 26	do	7.4	3,846	Do.
Mar. 4	do	6.6	2,723	Do.
May 3	do	6.2	2,232	Do.
May 21	do	6.7	3,016	Do.
1902.				
Aug. 14	E. T. Perkins	-----	51	Do.
Aug. 14	do	-----	30	Electra power plant discharge.
	Total	-----	81	
1895.				
Jan. 6	J. B. Lippincott	12.25	1,063	Lodi. <sup>b</sup>
Mar. 20	do	8.0	1,068	Do.
Aug. 27	do	1.3	91	Do.
1899.				
Aug. 20	do	-----	56	Do.
Sept. 14	S. G. Bennett	-----	33	Mokelumne Hill.

<sup>a</sup> Capacity of ditch, 64 second-feet; 25 second-feet carried out of basin to Jackson and Sutter Authority, Burr Bassell.

<sup>b</sup> The Woodbridge diversion dam, 2 miles below Lodi, affects gage heights.

*Discharge measurements of Mokelumne River, Amador County—Continued.*

Date.	Hydrographer.	Gage height.	Discharge.	Locality.
1900.		<i>Feet.</i>	<i>Sec. feet.</i>	
Sept. 12	S. G. Bennett	-----	15	Mokelumne Hill.
1902.				
Aug. 12	do	2.8	40	Woodbridge Canal at head.
Aug. 16	L. Lawson	3.0	29	Do.
Aug. 12	S. G. Bennett	-----	33	At Woodbridge.
Aug. 13	do	1.0	67	$\frac{1}{4}$ mile below Lancha Plana dam.
Aug. 14	E. T. Perkins	-----	51	Amador ditch, $\frac{1}{4}$ mile above tunnel.
Aug. 14	do	-----	53	Standard Power Canal at flume No. 59, near Electra.
Aug. 15	do	-----	21	Mokelumne ditch in flume, South Fork Mokelumne River.
Aug. 15	do	-----	1.7	Middle Fork, 150 feet below bridge near West Point.
Aug. 15	do	-----	61	North Fork, $\frac{1}{8}$ mile above bridge near West Point.
Aug. 16	do	-----	4.8	Mokelumne ditch, 2 miles southeast Fort Mountain, South Fork.
Aug. 14	L. Lawson	-----	65	Clements.
Aug. 15	do	-----	126	$\frac{1}{4}$ mile below Lancha Plana dam.

*Estimated monthly discharge of Mokelumne River at Lone Star Mills.<sup>a</sup>*

[Drainage area 657 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1878.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
November <sup>b</sup>			33	1,964	0.05	0.06
December <sup>b</sup>			33	2,029	.05	.06
1879.						
January <sup>b</sup>	2,107		328	20,168	.50	.58
February	7,575	134	1,198	66,534	1.82	1.89
March	3,420	676	1,369	84,177	2.08	2.40
April	5,072	1,579	3,065	182,380	4.67	5.21
May	6,170	1,348	3,247	199,650	4.94	5.69
June	5,610	1,579	3,629	215,941	5.52	6.16
July	1,117	288	538	33,080	.82	.95
August <sup>b</sup>			164	10,084	.25	.29
September <sup>b</sup>			26	1,547	.04	.04
October <sup>b</sup>			19	1,168	.03	.03
November <sup>b</sup>			59	3,511	.09	.10
December	624	224	465	28,592	.71	.82
The year			1,175	846,832	1.79	24.16
1880.						
January	288	256	279	17,155	.42	.48
February	520	288	396	22,778	.60	.65
March	728	520	644	39,598	.98	1.13
April	9,642	728	4,553	270,922	6.93	7.73
May	8,071	3,048	5,031	309,344	7.66	8.83
June	7,326	4,685	6,054	360,238	9.21	10.27
July	5,201	572	2,745	168,783	4.18	4.82
August	480	134	365	22,443	.55	.63
September	134		29	1,726	.04	.04
October <sup>b</sup>			164	10,084	.25	.29
November <sup>b</sup>			98	5,831	.15	.17
December	998		291	17,893	.44	.51
The year			1,721	1,246,795	2.61	35.55

<sup>a</sup> Authority, California State engineering department.<sup>b</sup> Estimated from run-off of neighboring streams and from previous measurements.

*Estimated monthly discharge of Mokelumne River at Lone Star Mills—Cont'd.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1881.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	8,536	192	1,037	63,763	1.58	1.82
February .....	8,852	624	3,049	169,333	4.64	4.83
March .....	2,701	728	1,126	69,235	1.71	1.97
April .....	4,556	1,810	3,195	190,116	4.86	5.42
May .....	4,298	1,579	3,034	186,553	4.62	5.32
June .....	2,701	572	1,237	73,607	1.88	2.10
July .....	520	-----	159	9,777	.24	.28
August <sup>a</sup> .....	-----	-----	98	6,026	.15	.17
September <sup>a</sup> .....	-----	-----	98	5,831	.15	.17
October <sup>a</sup> .....	-----	-----	66	4,058	.10	.12
November <sup>a</sup> .....	-----	-----	207	12,317	.32	.36
December <sup>a</sup> .....	-----	-----	624	38,368	.95	1.10
The year .....	-----	-----	1,160	828,984	1.77	23.66
1882. <sup>a</sup>						
January .....	-----	-----	591	36,339	.90	1.04
February .....	-----	-----	624	34,655	.95	.99
March .....	-----	-----	1,971	121,192	3.00	3.46
April .....	-----	-----	2,628	156,377	4.00	4.46
May .....	-----	-----	4,927	302,949	7.50	8.65
June .....	-----	-----	3,285	195,471	5.00	5.58
July .....	-----	-----	788	48,452	1.20	1.38
August .....	-----	-----	66	4,058	.10	.12
September .....	-----	-----	59	3,511	.09	.10
October .....	-----	-----	230	14,142	.35	.40
November .....	-----	-----	207	12,317	.31	.35
December .....	-----	-----	207	12,728	.31	.36
The year .....	-----	-----	1,298	942,191	1.98	26.89

<sup>a</sup> Estimated from run-off of neighboring streams and from previous measurements.



*Estimated monthly discharge of Mokelumne River at Lone Star Mills—Cont'd.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1883. <sup>a</sup>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....			414	25,456	0.63	0.73
February .....			328	18,216	.50	.52
March .....			591	36,339	.90	1.04
April .....			1,971	117,283	3.00	3.35
May .....			3,942	242,384	6.00	6.92
June .....			2,628	156,377	4.00	4.46
July .....			657	40,397	1.00	1.15
August .....			263	16,171	.40	.46
September .....			98	5,831	.15	.17
October .....			98	6,026	.15	.17
November .....			132	7,855	.20	.22
December .....			132	8,116	.20	.23
The year .....			938	680,451	1.43	19.42
1884. <sup>a</sup>						
January .....			164	10,084	.25	.29
February .....			1,971	113,373	3.00	3.24
March .....			3,942	242,384	6.00	6.92
April .....			3,942	234,565	6.00	6.69
May .....			3,285	201,987	5.00	5.76
June .....			2,957	175,954	4.50	5.02
July .....			2,628	161,589	4.00	4.61
August .....			657	40,397	1.00	1.15
September .....			131	7,795	.20	.22
October .....			98	6,026	.15	.17

<sup>a</sup>Estimated from run-off of neighboring streams and from previous measurements.

*Estimated monthly discharge of Mokelumne River at Electra.<sup>a</sup>*

[Drainage area, 537 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1901.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	4,600	330	1,000	61,488	1.86	2.14
February .....	13,210	610	3,302	183,384	6.15	6.40
March .....	4,020	1,130	2,004	123,221	3.73	4.30
April .....	3,160	950	2,040	121,388	3.80	4.24
May .....	9,980	1,960	4,627	284,503	8.62	9.93
June .....	6,790	1,350	3,833	228,145	7.14	7.97
July .....			260	15,987	.48	.55
August .....			190	11,683	.35	.40
September .....			60	3,570	.11	.12
October .....			76	4,673	.14	.16
November .....			210	12,496	.39	.44

<sup>a</sup> Authority, United States Geological Survey.

## MONO LAKE DRAINAGE.

*Discharge measurements in Mono Lake drainage basin, Mono County, Cal.*

Date.	Hydrographer.	Discharge.	Locality.
		<i>Sec.-feet.</i>	
July 29, 1902	F. H. Olmsted	46.72	Mill Creek, just below Lundy Lake and above all diversions.
July 30, 1902	do	89.00	Leevinig, just above Rhinedollar Lake.
Aug. 1, 1902	do	26.36	Walker Creek, easterly from Bloody Canyon.
Do	do	21.65	Parker Creek.
Do	do	62.40	Rush Creek, above Silver Lake.

## NIAGARA CREEK.

See Stanislaus River, Niagara Creek.

## OWENS RIVER.

*Discharge measurements of Owens River, Inyo County.*

Date.	Hydrographer.	Discharge.	Locality.
		<i>Sec.-feet.</i>	
Aug. 4, 1902	F. H. Olmsted	26.87	Mammoth Creek at sawmill.
Do	do	37.14	Convict Creek near crossing of Bishop road.

## PACOIMA CANYON.

See Los Angeles River, Pacoima.

## PADARO CREEK.

*Discharge measurement of Padaro Creek, Santa Barbara County.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
Aug. —, 1899	G. F. Wright .....	0.31

## PALLETT CREEK.

See Big Rock Creek, Pallett Creek.

## PASADENA MESA.

UNDERGROUND WATER OBTAINED FROM THE BED OF ARROYO SECO  
AND PASADENA MESA.

An examination of the underground water supply in the vicinity of Pasadena was made by Mr. J. B. Lippincott in October, 1898, the results of which are given in the following paragraphs:

Pasadena Mesa, lying south of the Sierra Madre, is bounded on the west, along the eastern bank of Arroyo Seco, by a low range of granite and clay hills; on the south by Raymond Hill, which is of sandstone, and by a dike, the capping of which apparently consists of adobe or clay. This dike extends from Raymond Hill, on the south side of the city of Pasadena, in a direction a little north of east, through Sunny Slope and Baldwin ranches to the base of the Sierra Madre near the mouth of Santa Anita Canyon. The mesa proper consists of deposits of sand, gravel, and bowlders, the larger bowlders lying near the mountains and the finer material near the southern slope. The voids in this absorbent material act as a storage reservoir, being filled by the flood waters issuing from the steep slopes on the southern face of the Sierra Madre. The underground waters are reenforced by the return water from irrigation on the mesa. From 1893 to 1902, inclusive, was a period of unusual drought, but most of the developments were new in 1898.

Arroyo Seco, draining 21 square miles of the Sierra Madre, issues from these mountains on the north side of Pasadena Mesa, passes through an opening in a granite spur known as Devils Gate, and joins Los Angeles River at Los Angeles. Between the point where the water from this basin issues from the mountains and Devils Gate lies a broad river bottom 2 miles in length, composed of coarse material. In passing over this the water sinks rapidly, diminishing in volume from the mouth of the canyon to Devils Gate.

Pasadena water companies have built extensive development tunnels above Devils Gate, cross cutting beneath the eastern bank and under the mesa land. A submerged dam at Devils Gate assists the tunnel developments by intercepting the underflow. An examination of these tunnels shows that no impervious stratum is encountered after the granite ledge at Devils Gate is passed. Of the water obtained from these development works, 69 per cent is gained from the portion of the tunnel which is beneath the mesa. A well about



FIG. 3.—Map showing location of wells near Pasadena.

4,000 feet upstream from the tunnel and 200 feet deep, in the bed of the wash near the mouth of the mountain canyon of the Arroyo Seco, was drained by the extension of this line of tunnels under Pasadena Mesa.

From the investigations the conclusion is reached that the water from Arroyo Seco which sinks between the mouth of the canyon proper and Devils Gate passes under the eastern bank of Arroyo Seco between these points and augments the underground water of

Pasadena Mesa. Otherwise it would be difficult to account for the large amount of water which is obtained from the lower development works at the southern dike of Pasadena Mesa. This mesa is underlain throughout with a sheet of water extending from the foot of the mountains, where its depth below the surface is from 150 to 200 feet, to the dike at its southern exposure, where the water is practically at the surface, making itself manifest in numerous small springs which rise in drainage lines on the southern face of the dike. With the exception of the Arroyo Seco developments, which in the tabulations are classified by themselves, the principal water product of this mesa is obtained along these drainage lines from the springs. Numerous wells from which water is pumped have been sunk and tunnels have been run through the dike into the water-bearing gravel.

An interesting feature of these development works is the constant strife existing between the various tunnel and well owners along the dike. For instance, the owner of a certain piece of property discovered by a tunnel the presence of a considerable body of water on his land; his neighbor to the south, whose land is at a lower elevation, drained the first tunnel by digging another on a lower grade and extending it to his northern property line. This has been done repeatedly, in some cases the water having been so diverted by two or three owners in succession.

The wells are usually bored and are lined with 7-inch casing. South of the Santa Fe Railroad a charge of 50 cents a foot is made for completing the first 50 feet in depth of the well, with an increase of 50 cents per foot for each additional 50 feet in depth. North of the railroad, where the boulders are larger, a charge of from 10 to 20 per cent more is made for boring. These prices do not include the cost of casing. The data given below concerning depth of wells and depth of water were in nearly all cases obtained from statements made by the owners.

On the following pages is given a compilation of facts with reference to the depth of water in wells through the district and a summary of the water crop from the principal development works. It has been impossible to form an exact estimate of the amount of water taken for domestic use and for minor irrigation purposes from the large number of small wells on the mesa, but the water from the larger developments has been accurately measured and included in this summary.

#### DESCRIPTION OF WELLS IN PASADENA MESA.<sup>a</sup>

1. Gidding; on Colorado street between Hollister and Chester streets; elevation, 815 feet; depth to water, 103 feet; dug mostly through gravel with no hardpan; digging cost \$1 per foot and 25 cents extra for every 25 feet additional; 109 feet deep, with 6 feet of water; elevation of water, 712 feet.

<sup>a</sup>The unit of measurement is the California miner's inch, which is 0.02 of 1 cubic foot per second.

2. McCallum; Colorado street, in McCallum wash; elevation, 785 feet; 151 feet deep; was dug originally 83 feet; at 90 feet sandstone for 10 feet; 101 feet from surface to water; 50 feet of water; elevation of water, 684 feet; water raised by windmill.

3. Hoover; a bored well with windmill; 115 feet deep, with 17 feet of water; elevation, 775 feet; water elevation, 677 feet.

4. Moses; bored well; 200 feet deep; elevation 790 feet; water elevation, 684 feet; originally 100 feet of water, now 94 feet, commencing 106 feet from the surface; 1½-horsepower gasoline engine with 8-inch stroke, 3-inch cylinder, pumping 1,000 gallons an hour.

5. King; 227 feet deep; elevation, 800 feet; water elevation, 678 feet; originally 117 feet of water, now about 105 feet; water raised by an engine with 12-inch stroke and 4-inch cylinder, pumping 2,500 gallons per hour.

6. Stevens; 121 feet deep; 31 feet of water; 90 feet to water surface; elevation, 781 feet; water elevation, 691 feet; was dug thirteen years ago.

7. McAdam; 150 feet deep; 57 feet from surface to water; elevation, 740 feet; water elevation, 683 feet.

8. Merwin; 95 feet deep; 55 feet to water; elevation, 735 feet; water elevation, 680 feet; pump capacity, 20 gallons per minute; costs 3½ to 4 cents an hour to run engine with gasoline.

9. Butler; bored well; 93 feet deep; 48 feet from surface to water, originally 40 feet; elevation, 718 feet; water elevation, 670 feet.

10. Hutchinson; bored well; 230 feet deep; 36 feet from surface to water; elevation, 713 feet; water elevation, 677 feet; well bored through clay; pressure comes from below.

11. Daniels; 107 feet deep; 40 feet from surface to water; water 67 feet deep; elevation, 715 feet; water elevation, 675 feet; strata of clay and bowlders with coarse gravel at bottom were encountered.

12. Hodge; 169 feet deep; 33 feet to water; elevation, 725 feet; water elevation, 692 feet.

13. Miles; bored well; 225 feet deep; 143 feet to water; elevation, 817 feet; water elevation, 674 feet.

14. Wilkeson; 177 feet deep; 30 feet from surface to water; elevation, 720 feet; water elevation, 690 feet; Jack Butler, well borer, says that wells during 1898 were 15 feet lower than in previous years.

15. Ackerman; bored well; 149 feet deep; 75 feet from surface to water; elevation, 710 feet; water elevation, 635 feet.

16. Thorndyke; 275 feet deep; 30 feet from surface to water; elevation, 705 feet; water elevation, 675 feet; fine clay encountered at 69 feet and 73 feet from surface, the remainder being gravel strata.

17. Lamanda Park; 180 feet deep; originally 80 feet from surface to water; elevation, 740 feet; present water elevation, 680 feet.

18. Titus; 558 feet deep; from surface to water, 12 feet, originally 4 feet; elevation, 690 feet; water elevation, 678; several strata of cement 1 inch thick were encountered.

19. Butler; 175 feet deep; 75 feet from surface to water; elevation, 720 feet; water elevation, 645 feet.

20. Graves; 88 feet deep; 40 feet from surface to water; elevation, 720 feet; water elevation, 680 feet.

21. Krouser; 113 feet deep; 15 feet from surface to water; elevation, 700 feet; water elevation, 685 feet.

22. Wakefield; 60 feet deep; originally 20 feet to water, now 30 feet; elevation, 703 feet; water elevation, 673 feet.

23. Pavey; 360 feet deep; water elevation, 670 feet; originally flowed 16 miner's inches of water; still flowing, but in less volume.

24. Chapman; flowing well; 175 feet deep. There are about 12 wells flowing on this ranch.

25. Hassleys; 500 feet deep; elevation, 600 feet; originally artesian, but now cut by a tunnel at a lower elevation.

26. Raymond; 40 feet to water, which is 4 feet deep; water fell 2 feet during season of 1898; 91 miner's inches of water were pumped from this well during October, 1898; well is brick lined and 12 feet in diameter.

27. Marengo tunnel; run into Raymond's hill at Terminal Railway, Fair Oaks station; it is discharging 18 miner's inches. This tunnel drained a small tunnel on the west side of Fair Oaks avenue.

28. Fluor; dug well, Ipswich street; depth, 48 feet; water, 12 feet; dug in October, 1897; at first there was a supply of 50 miner's inches, but the supply has diminished to 30 miner's inches; a 6-inch centrifugal pump, with 20-horsepower engine, pumps out the well in 1.5 hours.

29. Stoneman tunnel; was first run in 1892, 178 feet, and in summer of 1898 was extended 164 feet; flows 14.4 miner's inches.

30. Graves tunnel; 530 feet of tunnel and about 100 feet of ditch; water 26 feet below the surface of the ground at the upper end; 20 miner's inches of water obtained.

31. Oak Knoll; about the same class as Rhodes well and discharging the same amount of water, 4 miner's inches.

32. Brickyard well; near Lake avenue, northeast from Oak Knoll; 40 feet of well are through clay, 7 feet through sand and gravel; 7 miner's inches of water is obtained; this is a brick-lined dug well.

33. Rhodes well; near corner of Lake avenue and Hawkeye street; 49 feet deep and water approximately 8 feet in depth; steam plant, 15-horsepower boiler, with Smith valve pump; a continuous flow of 4 miner's inches is obtained.

34. Alhambra water, in Mayberry Canyon; 64 miner's inches is obtained, which is not the full capacity of the plant. There are six wells, from 350 to 750 feet deep, of which five are being pumped and one flows.

35. Patton tunnel, near Keweenaw Lake; produces 7 miner's inches.

36. Surface water; Patton water in West Canyon, 2 miner's inches.

37. Patton water, East Canyon; 24 miner's inches. (San Gabriel water not included in this.)

38. San Gabriel Mission; 24.9 miner's inches; comes from the same canyon as Patton water in East Canyon; it is surface water and has been reduced by development works.

39. Shorb water; from tunnel under orange grove on Shorb place; approximately 2 miner's inches is obtained. In small canyon northwest of house there is a stream, approximately 5 miner's inches; there are three artesian wells (No. 42) southeast of the ranch house, from which 17 miner's inches is obtained.

60. Lower Painter well; dug in 1894; 96 feet deep; water, 79 feet from surface; elevation, 1,040 feet; water elevation, 961 feet; this is a 4-foot by 7-foot dug well, the material passed through being large boulders.

61. Upper Painter well; dug well much resembling No. 60; 162 feet deep; 132 feet to water; elevation, 1,129 feet; water elevation, 997 feet.

62. Becker; 200 feet deep; depth to water, as measured in May, 1898, 173 feet; a 6-horsepower gasoline engine is used which has pumped 5 miner's inches; it is a bored well; cost \$250, including casing (\$1 per foot plus 25 cents additional for each 50 feet additional depth); elevation, 825 feet; water elevation, 652 feet.

63. Stafford; bored well; 241 feet deep; depth to water, 173 feet; elevation, 825 feet; water elevation, 652 feet.



64. Krank; 300 feet deep; 290 feet to water; elevation, 1,070 feet; water elevation, 780 feet.

65. Meers; on E street; 300 feet deep; 75 feet of water in August, 1897; elevation, 1,060 feet; water elevation, 835 feet.

66. Stone; 100 feet deep; 85 feet to water; elevation, 1,040 feet; water elevation, 955 feet; approximately 15 miner's inches is obtained when pump is run. This is a dug and timbered well and cost for excavation \$1.75 per vertical foot until water was struck; passed through, say, 65 feet of gravel, 15 feet of sand, and 12 feet of clay.

67. Called Painter well; 170 feet to water; 14 feet lower ground than No. 41; water elevation, 830 feet.

50. Hurlbut; bored well, about 1,300 feet deep; 95 feet through clay; but little water; elevation, 816 feet; water elevation, 745 feet.

26. Olmsted; 39 feet deep; elevation, 750 feet; water elevation, 740 feet; the usual depth of water from the surface is 8 feet, but in October, 1898, was 10.5 feet.

51. Pasadena and Pacific power-house well; elevation, 750 feet; water stands 11 feet from original surface of ground; water elevation, 739 feet.

52. Baker; 35 feet deep; elevation, 740 feet; water elevation, 734 feet; supply is said to come from northeast.

53. Pasadena West Side Water Company; about 70 feet deep and 3 feet to water; elevation, 718 feet; water elevation, 715 feet; water comes from northeast.

68. Morehouse; cesspool at this point of 70 feet and no water is encountered; surface elevation, 790 feet.

69. On top of a hill 500 feet east of No. 53; 60 feet deep and no water found; surface elevation, 825 feet.

74. In Arroyo Seco, at mouth of canyon; 250 feet deep and dry.

*Amount of water developed in Pasadena Mesa, October, 1898.*

[1 miner's inch is 0.02 of 1 cubic foot per second.]

	Miner's inches.
27. Raymond Improvement Company's tunnel at Fair Oaks avenue .....	18
26. Marengo well, near Atchison, Topeka and Santa Fe station, Raymond ...	91
26. Surface water in Marengo Canyon, near railroad crossing (Southern Pacific) .....	20
28. Fluor well on Ipswich street, near Santa Fe Raymond station; intermit- tent pumping .....	30
29. Las Roebles Water Company, near new Graves tunnel .....	14
29. Stoneman Canyon heads, near Fluor well .....	3
30. Walter Graves's new or upper tunnel .....	20
31. Oak Knoll well .....	4
32. Brickkiln well .....	7
33. C. H. Rhodes's well, near Lake avenue and Hawkeye street .....	4
34. Alhambra water, artesian wells and air-compressing plant .....	64
35. Patton tunnel, near Keweenaw Lake .....	7
36. Patton water in west canyon .....	2
37. Patton water from east canyon .....	24
38. San Gabriel Mission water .....	25
39. Shorb water northwest from ranch house .....	5
39a. Shorb water in tunnel southwest of ranch house .....	2
40. Graves's lower tunnel (dry) .....	0
41. Richardson's two tunnels, near Keweenaw Lake .....	18
42. Shorb's three artesian wells southeast of house .....	17
43. Pump, 13 inches; artesian, 3 inches; tunnel, 22 inches; all belong to Shorb ..	38



	Miner's inches.
44. Rose well, east side Santa Anita avenue .....	20
45. Winston wells, Santa Anita avenue .....	12
46. Alexander water, east of Santa Anita avenue .....	25
47. Titus ranch .....	19
48. Sunny Slope developments .....	66
59. Chapman .....	106
Total .....	661

*Developments near Devils Gate by the United Water Companies.*

56. Pumped from well below Devils Gate, but entering tunnel above sand box ..	7
57. Weir at mouth of northeast tunnel .....	8
58. Weir at mouth of northwest tunnel .....	123
Total from Devils Gate .....	138
59. Total from North Branch .....	118
Total from submerged dam and from under arroyo above dam .....	5
Flow from the 900-foot tunnel, east bank of arroyo, or six-tenths of whole Devils Gate flow from tunnels .....	77
70. Richardson tunnel below Devils Gate .....	24
71. Wilson tunnel below Devils Gate .....	10
Developed at Devils Gate .....	138
Total upper arroyo development .....	172
42. Upper Painter well .....	37
41. Lower Painter well .....	40
48. Stone well .....	15
Pump near reservoir No. 1 .....	22
Total .....	114
72. Sheep Corral Springs, in development cut .....	74
73. Above shaft No. 2, detail of No. 58 .....	22

*Summary of water development from Pasadena Mesa.*

Devils Gate development .....	172
Sheep corral .....	74
Lower dike in $4\frac{1}{2}$ miles .....	661
Total .....	907

PASTORIA CREEK.

*Discharge measurement of Pastoria Creek, Kern County.*

Date.	Hydrographer.	Dis charge.	Locality.
		<i>Sec. feet.</i>	
Nov. 13, 1895	J. B. Lippincott .....	0.04	Mouth of canyon.
Dec. 15, 1896	... do .....	0.00	Road crossing.

## PESCADERO CREEK.

*Discharge measurement of Pescadero Creek, San Mateo County,*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Oct. 17, 1893	W. W. Brier .....	4.67	6 miles above Pescadero.

## PILARCITOS CREEK.

*Discharge measurement of Pilarcitos Creek, San Mateo County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Oct. 17, 1893	W. W. Brier .....	0.80	3½ miles above Half Moon Bay.

## PIRU CREEK.

*Discharge measurements of Piru Creek, Ventura County.*

Date.	Hydrographer.	Gage height.	Dis-charge.	Locality.
		<i>Feet.</i>	<i>Sec.-feet.</i>	
Mar. 10, 1895	J. B. Lippincott....	0.27	3.54	Robertson Mill.
Jan. 21, 1896	S. Stewart.....		18.00	Smith's.
Jan. 31, 1896	J. B. Lippincott....	1.75	13.30	Do.
Aug. 11, 1898	F. H. Olmsted .....		0.92	French House.
Dec. 15, 1896	J. B. Lippincott....		.20	Gorman Creek below Gorman Station.
Mar. 16, 1899	S. G. Bennett .....		<sup>a</sup> 61.00	At Piru City, wagon road crossing.
Mar. 17, 1899	do .....		<sup>a</sup> 152.00	Do.
Mar. 14, 1899	do .....		5.00	Narrows, near Dutton's.
Aug. 19, 1899	do .....		1.30	Head of Piru pipe line.
Oct. 8, 1900	W. W. Cockins, jr .....		2.20	Lower Piru Creek, ditches from.

<sup>a</sup>Ditch is carrying 10 second-feet on both dates in addition.

## PIT RIVER.

*Discharge measurements of Pit River, Shasta County.*

Date.	Hydrographer.	Dis-charge.	Locality.
1901.		<i>Sec.-feet.</i>	
Sept. —	Robt. McF. Doble .....	2,230	Peck's Bridge.
Sept. 9	S. G. Bennett .....	2,682	Silverthorn Ferry.
Sept. —	Robt. McF. Doble .....	177	Burney Creek, tributary of Pit River.
Sept. —	do .....	1,447	Fall River, near mouth.
Sept. —	do .....	627	Hat Creek, Carbon bridge.
Sept. 9	S. G. Bennett .....	23	Squaw Creek, near Copper City bridge.
1902.			
Sept. 17	do .....	208	Pit River above mouth of Fall River, at Fall River Mills.
Sept. 16	do .....	1,543	Fall River, at bridge.
Do	do .....	583	Hat Creek, at Carbon bridge.
Sept. 15	do .....	2,350	Peck's bridge.
Do	do .....	209	Burney Creek, $\frac{1}{2}$ mile below Burney Falls.
Sept. 27	Chas. A. Miller .....	2,508	Silverthorn Ferry.
Do	do .....	37	Squaw Creek, near Copper City bridge.

## PLUNGE CREEK.

*Discharge measurements of Plunge Creek, at headworks in canyon, San Bernardino County.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
June 12, 1898	J. B. Lippincott .....	2.30
Sept. 9, 1898	do .....	.20
Mar. 25, 1899	S. G. Bennett .....	10.90
Aug. 25, 1899	do .....	.50
July 12, 1900	do .....	.34
Apr. 7, 1902	do .....	12.40
Sept. 4, 1902	W. B. Clapp .....	.37

## POMPONIO CREEK.

*Discharge measurement of Pomponio Creek, San Mateo County.*

Date.	Hydrographer.	Dis-charge.	Locality
1893.		<i>Sec.-feet.</i>	
Oct. 17	W. W. Brier .....	0.27	2 miles above mouth.

## POSO CREEK.

*Estimated monthly discharge of Poso Creek at base of foothills.<sup>a</sup>*

[Drainage area, 289 square miles.]

Month	Mean discharge.	Total discharge.	Run off.	
			Per square mile.	Depth.
1878.	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
November .....	0	0	0	0
December .....	0	0	0	0
1879.				
January .....	23	1,414	0.08	0.09
February .....	40	2,221	.14	.15
March .....	20	1,230	.07	.08
April .....	72	4,284	.25	.28
May .....	52	3,197	.18	.21
June .....	17	1,012	.06	.07
July .....	0	0	0	0
August .....	0	0	0	0
September .....	0	0	0	0
October .....	0	0	0	0
November .....	75	4,463	.26	.29
December .....	145	8,916	.50	.58
The year .....	37	26,737	13	1.75
1880.				
January .....	347	21,336	1.20	1.38
February .....	665	38,251	2.30	2.48
March .....	751	46,177	2.60	3.00
April .....	838	49,864	2.90	3.24
May .....	578	35,540	2.00	2.31
June .....	145	8,628	.50	.56
July .....	14	861	.05	.06
August .....	0	0	0	0
September .....	0	0	0	0
October .....	0	0	0	0
November .....	58	3,451	.20	.22
December .....	145	8,916	.50	.58
The year .....	294	213,024	1.02	13.83

<sup>a</sup> Authority, State engineer. Estimated from run-off of neighboring streams.

*Estimated monthly discharge of Poso Creek at base of foothills—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off	
			Per square mile	Depth
1881. <sup>a</sup>	<i>Sec. feet.</i>	<i>Acre-feet.</i>	<i>Sec. feet.</i>	<i>Inches.</i>
January .....	145	8,916	0.50	0.58
February .....	289	16,050	1.00	1.04
March .....	289	17,770	1.00	1.15
April .....	289	17,197	1.00	1.12
May .....	289	17,770	1.00	1.15
June .....	145	8,628	.50	.56
July .....				
August .....				
September .....				
October .....				
November .....	0	0	0	0
December .....	35	2,152	.12	.14
The year .....	123	88,483	.42	5.74
1882. <sup>a</sup>				
January .....	35	2,152	.12	.14
February .....	43	2,388	.15	.16
March .....	145	8,916	.50	.58
April .....	145	8,628	.50	.56
May .....	29	1,783	.10	.12
June .....	0	0	0	0
July .....	0	0	0	0
August .....	0	0	0	0
September .....	0	0	0	0
October .....	0	0	0	0
November .....	43	2,559	.15	.17
December .....	14	861	.05	.06
The year .....	38	27,287	.13	1.79

<sup>a</sup>Estimated from run-off of neighboring stream.

*Estimated monthly discharge of Poso Creek at base of foothills—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1883. <sup>a</sup>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	43	2,644	0.15	0.17
February .....	43	2,388	.15	.16
March .....	231	14,204	.80	.92
April .....	145	8,628	.50	.56
May .....	119	7,317	.41	.47
June .....	0	0	0	0
July .....	0	0	0	0
August .....	0	0	0	0
September .....	0	0	0	0
October .....	29	1,783	.10	.12
November .....	29	1,726	.10	.11
December .....	43	2,644	.15	.17
The year .....	57	41,334	.19	2.68
1884. <sup>a</sup>				
January .....	145	8,916	.50	.58
February .....	867	49,870	3.00	3.24
March .....	867	53,310	3.00	3.46
April .....	578	34,393	2.00	2.23
May .....	119	7,317	.41	.47
June .....	145	8,628	.50	.56
July .....	0		0	0
August .....	0		0	0
September .....	0		0	0
October .....	0		0	0

<sup>a</sup>Estimated from run-off of neighboring stream.

#### PURISSIMA CREEK.

*Discharge measurement of Purissima Creek, San Mateo County.*

Date.	Hydrographer.	Discharge.	Locality.
1893.		<i>Sec.-feet.</i>	
Oct. 17	W. W. Brier .....	2.03	1½ miles above Purissima.

## PUTAH CREEK.

*Discharge measurement of Putah Creek, Napa County.*

Date.	Hydrographer.	Dis-charge.	Remarks.
1900.		<i>Sec.-feet.</i>	
Sept. 23	S. G. Bennett -----	4.4	6 miles above Winters, at Devils Gate.

## RABEL DAM DITCH, SAN BERNARDINO COUNTY.

See San Bernardino Valley, Rabel dam ditch.

## RANCHERO DITCH, SAN BERNARDINO COUNTY.

See San Bernardino Valley, Ranchero ditch.

## RED HILLS DEVELOPMENTS.

See Cucamonga Creek, Red Hills.

## REDLANDS CANAL.

See Santa Ana River, Redlands canal.

## RINCON CREEK.

*Discharge measurements of Rincon Creek, Santa Barbara County.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
Aug. —, 1889	G. F. Wright -----	0.12
June 16, 1900	R. Moyer -----	.03

## RUBICON RIVER.

See Middle Fork American River.

## RIVERSIDE WATER COMPANY, UPPER CANAL.

See San Bernardino Valley.

## SACRAMENTO RIVER.

This river rises in the extreme northeastern corner of California and flows in a general southerly direction, draining a large area in northern California between the Coast Range on the west and the Sierra Nevada on the east. It discharges into San Francisco Bay. A num-

ber of storage reservoirs have been constructed on the various tributaries of the river, and are used for hydraulic mining purposes and to a less extent for irrigation. The gaging station of the Geological Survey, established April 30, 1895, is located 12 miles above the town of Red Bluff at the crossing of the country road at Jellys Ferry. The gage consists of a vertical rod made in three sections and nailed firmly to trees near the ferry landing. A second rod is located 1,206 feet above the gage, and a third one 350 feet below the main rod, in order to determine the slope of the water surface. The three rods are referred to the same datum. Bench mark No. 1 is on an oak tree on the left bank of the river 300 feet below the cable, and is 22.429 feet above gage datum. The ferry cable is used in the discharge measurements. The channel for 1,000 feet above and below the station is nearly straight. The right bank is high, but the left bank is liable to overflow when the water rises above the 25-foot mark. The bed of the stream consists of gravel and changes only slightly. The gaging station of the State engineering department was at the mouth of the river.

*Discharge measurements of Sacramento River.*

Date.	Hydrographer.	Dis-charge.	Locality.
1878.		<i>Sec. feet.</i>	
Oct. —	United States Engineers.	6,425	Sacramento.
1879.			
May 12	State engineering de- partment.	16,000	Knights Landing.
July 16	do	7,000	Sacramento Slough.
May 16	do	38,000	Gray & Shaws.
May 21	do	26,000	Above mouth of American River.
July 14	do	13,000	Do.
May 22	do	39,000	Sacramento, foot of I street.
July 14	do	15,000	Do.
Mar. 3	do	40,000	Freeport.
Mar. 20	do	56,000	Do.
Jan. 24	do	12,000	Brannan Slough.



## Estimated monthly discharge of Sacramento River at Colusa, Cal.

[Drainage area, 26,187 square miles.]

Month.	Mean dis-charge.	Total dis-charge.	Run-off.	
			Per square mile.	Depth.
1878.	<i>Sec.-feet.</i> 8,000	<i>Acre.-feet.</i> 476,033	<i>Sec.-feet.</i> 0.31	<i>Inches.</i> 0.35
November	9,000	553,388	.34	.39
December				
1879.				
January	12,000	737,851	.46	.53
February	30,000	1,666,115	1.14	1.19
March	110,000	6,763,640	4.20	4.84
April	110,000	6,545,450	4.20	4.68
May	75,000	4,611,570	2.86	3.30
June	45,000	2,677,686	1.72	1.92
July	16,000	983,802	.61	.70
August	8,500	522,644	.32	.37
September	6,500	386,776	.25	.28
October	8,000	491,901	.30	.35
November	7,500	446,281	.29	.32
December	27,000	1,660,165	1.03	1.19
The year	37,958	27,493,881	1.45	19.67
1880.				
January	28,000	1,721,653	1.07	1.23
February	21,000	1,207,933	.80	.86
March	22,000	1,352,727	.84	.97
April	95,000	5,652,892	3.63	4.05
May	135,000	8,300,828	5.16	5.94
June	110,000	6,545,450	4.20	4.68
July	53,000	3,258,843	2.02	2.33
August	18,000	1,106,777	.69	.80
September	9,000	553,537	.34	.38
October	7,500	461,157	.29	.33
November	7,000	416,529	.27	.30
December	20,000	1,229,752	.76	.88
The year	43,792	31,790,078	1.67	22.75

a Authority, State engineer.

*Estimated monthly discharge of Sacramento River at Collinsville—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1881.	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	95,000	5,841,322	3.63	4.18
February .....	115,000	6,386,776	4.39	4.57
March .....	77,000	4,734,545	2.94	3.39
April .....	90,000	5,355,372	3.44	3.84
May .....	70,000	4,304,132	2.67	3.08
June .....	25,000	1,487,603	.95	1.06
July .....	14,000	860,826	.53	.61
August .....	8,000	491,901	.30	.35
September .....	6,500	386,777	.25	.28
October .....	7,000	430,413	.27	.31
November .....	8,200	487,934	.31	.35
December .....	16,000	983,802	.61	.70
The year .....	44,308	31,751,403	1.69	22.72
1882.				
January .....	24,000	1,475,702	.92	1.06
February .....	22,000	1,221,818	.84	.87
March .....	55,000	3,381,818	2.10	2.42
April .....	90,000	5,355,372	3.44	3.84
May .....	92,000	5,656,859	3.51	4.05
June .....	74,000	4,403,306	2.82	3.15
July .....	17,000	1,045,289	.65	.75
August .....	8,000	491,901	.30	.35
September .....	6,500	386,777	.25	.28
October .....	10,000	614,876	.38	.44
November .....	14,000	833,058	.53	.59
December .....	11,000	676,364	.42	.48
The year .....	35,292	25,543,140	1.35	18.28

*Estimated monthly discharge of Sacramento River at Collinsville—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1883.	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	12,000	737,851	0.46	0.53
February .....	17,000	944,132	.65	.68
March .....	21,000	1,291,240	.80	.92
April .....	73,000	4,343,801	2.79	3.11
May .....	80,000	4,919,008	3.05	3.52
June .....	32,000	1,904,132	1.22	1.36
July .....	12,000	737,851	.46	.53
August .....	7,000	430,413	.27	.31
September .....	6,500	386,776	.25	.28
October .....	7,000	430,413	.27	.31
November .....	7,500	446,281	.29	.32
December .....	7,400	455,008	.28	.32
The year .....	23,533	17,026,906	.90	12.19
1884.				
January .....	12,000	737,851	.46	.53
February .....	24,000	1,380,496	.92	1.01
March .....	80,000	4,919,008	3.05	3.52
April .....	105,000	6,247,934	4.01	4.47
May .....	111,000	6,825,124	4.23	4.88
June .....	90,000	5,355,372	3.44	3.84
July .....	31,000	1,906,116	1.18	1.36
August .....	12,000	737,851	.46	.53
September .....	7,500	446,281	.29	.32
October .....	8,000	491,901	.30	.35

*Discharge measurements of Sacramento River, Iron Canyon, 4 miles above Red Bluff, Tehama County, Cal.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1901.		<i>Feet.</i>	<i>Sec.-feet.</i>
Oct. 30	S. G. Bennett .....	1.02	5,187
Dec. 13	do .....	2.68	9,651
1902.			
Jan. 28	do .....	1.35	5,912
Feb. 12	Wm. F. Luning .....	20.6	<sup>a</sup> 110,824
Mar. 3	S. G. Bennett .....	10.6	41,570
May 10	do .....	5.5	18,927
Sept. 13	Chas. A. Miller .....	.84	4,425
Dec. 31	S. G. Bennett .....	3.20	9,858

<sup>a</sup>Float measurement.

*Discharge measurements of Sacramento River at Red Bluff, Tehama County, Cal.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1894.		<i>Feet.</i>	<i>Sec.-feet.</i>
Dec. 20	A. P. Davis and J. B. Lippincott.....	10.7	45,000
1895.			
Mar. 19	J. B. Lippincott .....	4.8	15,461
Apr. 27	do .....	8.4	36,181
1896.			
Jan. 21	do .....	20.8	109,432
Jan. 22	do .....	17.7	83,558

*Estimated monthly discharge of Sacramento River at Red Bluff, Tehama County.*<sup>a</sup>[Drainage area, 9,356 square miles.]<sup>b</sup>

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1895.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	123,000	15,220	47,267	2,906,320	5.052	5.824
February .....	65,600	13,860	26,792	1,487,940	2.864	2.982
March .....	85,360	15,220	32,517	1,999,418	3.475	4.007
April .....	33,880	26,670	29,566	1,759,300	3.160	3.526
May .....	48,600	16,840	30,238	1,859,250	3.232	3.726
June .....	18,600	9,040	12,764	759,510	1.717	1.522
July .....	9,040	6,150	7,235	444,863	1.364	.892
August .....	6,150	5,990	6,057	372,436	.647	.746
September .....	10,820	5,830	6,321	376,106	.676	.754
October .....	6,285	5,910	5,989	368,261	.640	.738
November .....	6,690	5,910	6,046	359,792	.646	.711
December .....	36,880	6,150	10,095	620,760	1.079	1.244
Per annum .....	123,000	5,830	18,390	13,313,956	1.9656	26.672
1896.						
January .....	140,000	6,150	51,702	3,179,032	5.53	6.41
February .....	46,860	9,040	15,231	876,120	1.63	1.76
March .....	74,050	9,700	25,533	1,569,981	2.73	3.15
April .....	72,910	16,370	30,708	1,827,271	3.28	3.61
May .....	81,030	19,660	35,019	2,153,252	3.74	4.35
June .....	21,150	8,600	13,599	809,215	1.45	1.62
July .....	8,380	5,990	6,907	424,694	.74	.85
August .....	5,910	5,660	5,738	352,858	.61	.70
September .....	5,830	5,660	5,696	338,977	.61	.68
October .....	6,555	5,660	5,730	352,336	.61	.70
November .....	57,200	5,660	11,260	670,058	1.20	1.34
December .....	106,880	11,380	33,316	2,048,546	3.56	4.09
The year .....	140,000	5,660	20,037	14,602,340	2.14	29.26

<sup>a</sup> Authority, United States Geological Survey.<sup>b</sup> Drainage areas were measured from maps of United States Geological Survey.

*Discharge measurements of Sacramento River at Jellys Ferry, Tehama County.*

Date.	Hydrographer.	Gage height.	Discharge.
1895.		<i>Fect.</i>	<i>Sec.-ft.</i>
Apr. 30	J. B. Lippincott .....	12	27,255
June 30	do .....	6.75	8,456
Aug. 25	A. P. Davis and J. B. Lippincott .....	5.55	5,452
Oct. 5	J. B. Lippincott .....	5.5	6,046
1896.			
Jan. 21	J. B. Lippincott .....	25.9	105,000
Jan. 22	do .....	22.7	82,000
July 7	C. C. Babb .....	6.6	6,924
Nov. 1	Richard Gernon .....	5.9	6,773
1897.			
Mar. 29	Fred Lemstrom .....	14.4	28,319
Mar. 13	do .....	10.3	18,568
Apr. 3	J. B. Lippincott .....	10.85	21,519
Apr. 16	Fred Lemstrom .....	12.2	25,806
Apr. 30	do .....	10.3	18,544
May 14	do .....	9	14,719
May 28	do .....	7.5	10,193
June 11	do .....	6.5	7,277
June 28	do .....	6.42	6,493
July 13	do .....	5.95	5,032
July 28	do .....	5.7	5,082
Aug. 13	do .....	5.6	4,285
Aug. 28	do .....	5.5	4,490
Sept. 13	do .....	5.5	4,257
Sept. 28	do .....	5.5	4,418
Oct. 13	do .....	5.6	4,591
Oct. 28	do .....	5.7	4,202
Nov. 13	do .....	5.7	4,196
Nov. 28	do .....	5.95	6,179
Dec. 13	do .....	7.4	10,151
Dec. 17	J. B. Lippincott .....	6.85	8,802
Dec. 28	Fred Lemstrom .....	5.95	6,105

*Discharge measurements of Sacramento River at Jellys Ferry, etc.—Continued.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1898.		<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 28	Fred Lemstrom	5.7	5,578
Feb. 21	do	8.3	13,118
Feb. 28	do	15.32	42,020
Mar. 13	do	6.95	9,495
Mar. 28	do	6.1	7,155
Apr. 13	do	6.1	7,216
Apr. 27	do	6.2	7,606
May 13	do	5.5	5,473
May 28	do	7.92	12,477
June 3	J. B. Lippincott	7.1	9,048
June 13	Fred Lemstrom	5.9	6,162
June 28	do	5.45	5,093
July 13	do	5.2	4,625
July 28	do	5.1	4,520
Aug. 13	do	5	4,324
Aug. 27	do	5	4,089
Sept. 13	do	5	4,160
Sept. 28	do	5.1	4,322
Oct. 12	do	5.15	4,380
Oct. 28	do	5.15	4,271
Nov. 28	do	5.2	4,662
Dec. 13	do	5.2	4,367
Dec. 28	do	5.3	4,462
1899.			
Jan. 14	Fred Lemstrom	11.4	21,211
Jan. 28	do	7.5	10,299
Feb. 13	do	5.9	5,848
Feb. 28	do	6.1	6,380
Mar. 13	do	6.15	6,644
Mar. 29	do	11.5	21,985
Apr. 13	do	7.8	10,659
Apr. 28	do	7.3	7,813
May 13	do	6.65	7,630
June 3	do	6.9	8,409
June 13	do	5.9	6,104
June 28	do	5.5	4,866
July 13	do	5.25	4,276
July 28	do	5.05	4,025
Aug. 13	do	5.0	3,969
Aug. 28	do	5.0	3,764
Sept. 13	do	5.0	4,087
Sept. 28	do	5.0	4,009

*Discharge measurements of Sacramento River at Jellys Ferry, etc.—Continued.*

Date.	Hydrographer.	Gage height.	Discharge.
1900.		<i>Feet.</i>	<i>Sec.-ft.</i>
Feb. 17	Richard Gernon .....	6.8	8,374
Apr. 29	do .....	7.1	9,586
May 28	do .....	6.4	7,173
Sept. 20	S. G. Bennett .....	5.0	4,105
Dec. 18	do .....	10.0	18,361
1901.			
Jan. 27	S. G. Bennett .....	9.46	15,908
Apr. 9	do .....	7.8	11,112
Sept. 2	do .....	4.9	4,390

*Estimated monthly discharge of Sacramento River at Jellys Ferry, Tehama County.*

[Drainage area, 9,134 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1896.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	130,050	6,360	46,152	2,837,813	5.05	5.86
February .....	34,460	10,070	15,468	889,764	1.69	1.82
March .....	62,870	11,310	24,099	1,481,801	2.64	3.05
April .....	59,500	16,920	25,793	1,534,819	2.82	3.14
May .....	75,120	19,300	30,941	1,902,543	3.39	3.91
June .....	20,515	9,200	14,217	846,018	1.56	1.74
July .....	8,960	6,720	7,591	466,789	.83	.95
August .....	6,720	6,180	6,394	393,201	.70	.81
September .....	6,360	6,000	6,204	369,163	.68	.75
October .....	8,000	6,000	6,163	378,960	.67	.77
November .....	43,000	6,360	11,965	712,014	1.31	1.46
December .....	93,000	8,480	22,318	1,372,304	2.44	2.82
The year .....	130,050	6,000	18,109	13,185,189	1.98	27.08



*Estimated monthly discharge of Sacramento River at Jellys Ferry, etc.—Cont'd.*

Month.	Discharge.			Total discharge.	Run off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1897.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	49,765	8,320	14,280	878,050	1.56	1.80
February .....	89,100	17,420	36,108	2,005,335	3.95	4.11
March .....	44,340	13,100	21,790	1,339,825	2.39	2.76
April .....	28,710	18,830	22,807	1,357,108	2.50	2.79
May .....	18,520	9,200	13,737	844,660	1.50	1.73
June .....	9,200	6,680	7,620	453,420	.83	.92
July .....	6,550	5,120	5,699	350,420	.62	.71
August .....	5,120	4,600	4,776	293,667	.52	.60
September .....	4,600	4,600	4,600	273,718	.50	.56
October .....	6,680	4,600	4,955	304,673	.54	.62
November .....	8,600	5,120	5,590	332,627	.61	.68
December .....	16,940	5,380	7,792	479,114	.85	.98
The year .....	89,100	4,600	12,480	8,912,617	1.36	18.26
1898.						
January .....	6,525	5,835	6,120	376,307	.67	.77
February .....	33,600	5,835	12,479	693,049	1.37	1.43
March .....	22,500	6,525	9,745	599,201	1.07	1.23
April .....	7,260	6,525	6,872	408,911	.75	.83
May .....	10,800	5,375	6,632	407,789	.73	.84
June .....	10,500	5,150	6,674	397,130	.73	.81
July .....	5,150	4,475	4,700	288,994	.52	.60
August .....	4,475	4,250	4,276	262,923	.47	.54
September .....	4,475	4,250	4,280	254,677	.47	.53
October .....	4,925	4,475	4,631	284,751	.51	.59
November .....	6,892	4,475	4,785	284,727	.52	.58
December .....	5,950	4,700	4,991	306,887	.55	.63
The year .....	33,600	4,250	6,349	4,565,346	.70	9.38

*Estimated monthly discharge of Sacramento River at Jellys Ferry, etc.—Cont'd.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1899.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	42,600	5,065	13,498	829,965	1.48	1.71
February .....	8,644	5,810	6,646	369,100	.73	.76
March .....	83,400	6,750	20,915	1,286,022	2.29	2.64
April .....	16,100	7,800	10,837	344,845	1.19	1.33
May .....	7,530	6,030	6,908	424,759	.76	.87
June .....	15,200	4,965	6,199	368,865	.68	.75
July .....	4,760	4,170	4,531	278,592	.50	.58
August .....	4,170	3,980	3,986	245,061	.44	.51
September .....	3,980	3,980	3,980	236,826	.44	.49
October .....	10,550	3,980	5,063	311,314	.55	.63
November .....	53,480	4,760	14,532	864,712	1.59	1.77
December .....	45,600	8,915	14,519	892,744	1.59	1.83
The year .....	83,400	3,980	9,301	6,752,805	1.02	13.87
1900.						
January .....	119,700	10,400	30,661	1,885,271	3.36	3.88
February .....	24,800	7,800	11,687	649,063	1.28	1.33
March .....	123,000	10,700	23,288	1,431,923	2.55	2.94
April .....	16,700	8,630	12,082	718,929	1.32	1.47
May .....	19,780	6,265	9,572	588,559	1.05	1.21
June .....	6,265	4,760	5,477	325,904	.60	.67
July .....	4,760	3,805	4,212	258,986	.46	.53
August .....	3,805	3,805	3,805	233,960	.42	.48
September .....	5,170	3,630	3,981	236,886	.44	.49
October .....	21,520	3,805	6,381	392,352	.70	.81
November .....	28,800	4,560	8,205	488,231	.90	1.00
December .....	80,100	6,030	15,553	956,317	1.70	1.96
The year .....	123,000	3,630	11,242	8,166,381	1.23	16.77

*Estimated monthly discharge of Sacramento River at Jellys Ferry, etc.—Cont'd.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1901.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	74,240	8,915	20,983	1,290,194	2.30	2.66
February .....	101,880	9,800	34,138	1,895,928	3.74	3.89
March .....	46,100	12,200	20,628	1,268,366	2.26	2.61
April .....	16,700	9,200	10,870	646,810	1.19	1.33
May .....	13,700	7,530	9,804	602,824	1.07	1.23
June .....	7,265	4,965	5,596	332,985	.61	.68
July .....	4,760	3,980	4,365	268,393	.48	.55
August .....	3,980	3,805	3,850	236,727	.42	.48
September .....	5,380	3,630	3,922	233,375	.43	.48
October .....	5,380	3,980	4,194	257,879	.46	.53
November .....	44,100	4,360	7,745	460,859	.85	.94
December .....	61,800	5,380	12,149	747,013	1.33	1.53
The year .....	101,880	3,630	11,520	8,241,353	1.26	16.91
1902.						
January .....	6,750	4,760	5,376	330,557	.59	.68
February .....	151,320	5,660	69,153	3,840,563	7.44	7.75
March .....	61,700	14,150	27,371	1,682,977	2.94	3.39
April .....	53,800	14,150	21,992	1,308,615	2.37	2.64
May .....	24,460	10,150	17,803	1,094,663	1.92	2.21
June .....	13,450	7,060	9,998	594,922	1.08	1.20
July .....	7,060	5,880	6,192	380,731	.67	.77
August .....	5,880	5,440	5,674	348,881	.61	.70
September .....	5,220	5,000	5,007	297,938	.54	.60
October .....	11,750	5,000	5,931	364,683	.64	.74
November .....	118,200	5,660	19,834	1,180,204	2.13	2.38
December .....	39,100	8,110	17,506	1,076,402	1.88	2.17
The year .....	151,320	4,760	17,653	12,501,135	1.90	25.23

*Discharge measurement of Upper Sacramento River, Shasta County, 1 mile above junction with Pitt River.*

Date.	Hydrographer.	Gage height.	Discharge.
1901.		<i>Feet.</i>	<i>Sec.-feet.</i>
Sept. 10	S. G. Bennett .....	-----	242

*Discharge measurements of Sacramento River.*

Date.	Hydrographer.	Gage height.	Discharge.	Locality.
1902.		<i>Feet.</i>	<i>Sec.-feet.</i>	
Sept. 22	Charles A. Miller	-----	384	Castle Crags, Shasta County.
Do	S. G. Bennett	-----	286	Bards Station, Shasta County.
Do	Charles A. Miller	-----	15	Soda Creek at Castle Crags, Shasta County.
Sept. 14	do	-----	4,455	Balls Ferry, Tehama County.
Sept. 15	do	-----	313	Battle Creek, near Balls Ferry, Tehama County.
Do	do	-----	27	Ditch from Battle Creek, near Balls Ferry, Tehama County.
	Total	-----	340	
Sept. 26	S. G. Bennett	7.22	5,848	Sacramento, Sacramento County.

## SALINAS RIVER.

Salinas River rises in San Luis Obispo County, flows in a north-westerly direction through Salinas Valley, and discharges into the Bay of Monterey. The crest of the Coast Range, locally known as the Santa Lucia Mountains, forms the boundary of the watershed on the south and west; the crest of the Gabilan Mountains and the Mount Diablo Range forms the eastern boundary of the watershed. The total area drained is 4,780 square miles. The principal tributaries of the river, Nacimiento and San Antonio creeks and Arroyo Seco, drain the eastern slopes of the Santa Lucia Mountains. The only important stream entering from the east is San Lorenzo Creek, which drains the western slopes of the Mount Diablo Range.

A reconnaissance survey for reservoir sites on Salinas River and its tributaries was made during the period from May 28 to August 31, 1900, under the direction of Prof. Charles D. Marx, of Stanford University. These studies were continued by Mr. Homer Hamlin during the years 1901 and 1902, and the results are being prepared for publication.

A gaging station was established on the river January 8, 1900, by D. A. Porter. On account of the shifting nature of the channel during floods, four gage rods were set between January 8 and April 2, 1900, and each was referred to a different datum. On June 8, 1900, a permanent station was established at the county bridge,  $3\frac{3}{4}$  miles south of Salinas. The gage, which is vertical, is attached to one of the piers of the bridge. The bench mark is a nail in the washer in the top of a redwood post, 13 inches by 15 inches in size, on the north bank of the river, at an elevation of 20 feet above gage datum.

On account of the continual shifting of the stream bed and the improbability of its water being used for either power or irrigation purposes, the record on this stream was discontinued August 3, 1901.

*Discharge measurements of Salinas River, near Salinas, Monterey County.*

Date.	Hydrographer.	Gage height.	Dis-charge.	Remarks.
1900.		<i>Feet.</i>	<i>Sec.-feet.</i>	
Apr. 9	S. G. Bennett	4.20	25.51	
Apr. 9	D. A. Porter	4.20	26.04	
Apr. 12	do	4.15	15.44	Strong wind upstream.
Apr. 15	do	4.10	13.10	Do.
Apr. 19	do	4.10	17.04	No wind.
Apr. 22	do	4.25	33.85	Do.
Apr. 25	do	4.15	18.91	Strong wind upstream.
May 1	do	4.10	18.02	No wind.
May 4	do	4.10	16.40	Do.
May 7	do	4.10	17.50	Do.
May 12	do	4.10	17.85	Do.
May 16	do	4.10	17.94	Light wind.
May 19	do	4.10	16.23	Do.
May 24	do	4.1	17.20	No wind.
May 29	do	4.1	17.43	Do.
June 2	do	4.05	13.32	Windy.
June 5	do	4.05	15.29	No wind.
June 8	do	4.0	14.05	Do.
June 12	do	4.05	15.79	Do.
June 15	do	4.05	15.32	Light wind.
June 18	do	4.0	13.93	Do.
June 22	do	4.0	12.91	No wind.
June 26	do	4.0	11.47	Light wind upstream.
June 30	do	3.9	10.50	No wind.
July 3	do	3.65	9.96	Fresh wind upstream.
July 16	do	3.70	9.56	No wind.
Aug. 1	do	3.70	9.83	Do.
Aug. 18	do	3.65	9.88	Light breeze downstream.
Sept. 1	do	3.65	10.10	No wind.
Sept. 26	S. G. Bennett	3.45	1.7	
Oct. 23	J. B. Lippincott	3.45	1.7	
Oct. 26	W. W. Cockins, jr		1.1	1 mile below sugar factory.
Nov. 14	do	3.7	8.6	
Nov. 16	do	4.2	31.6	
Nov. 19	do	6.7	2,056	
Nov. 20	do	5.9	829	
Nov. 21	do	5.6	743	
Nov. 22	do	15.6	33,600	Float.
Nov. 23	do	9.7	12,851	Do.

*Discharge measurements of Salinas River, near Salinas, etc.—Continued.*

Date.	Hydrographer.	Gage height.	Discharge.	Remarks.
1901.		<i>Feet.</i>	<i>Sec.-feet.</i>	
Jan. 15	S. G. Bennett .....	6.8	2,142	
Jan. 22	do .....	5.8	1,338	
Jan. 24	W. W. Cockins, jr .....	5.9	1,598	
Feb. 9	S. G. Bennett .....	7.9	4,982	
Feb. 19	do .....	6.05	1,561	
Apr. 12	W. W. Cockins, jr .....	4.7	342	
Mar. 17	do .....	5.6	1,204	
Mar. 24	do .....	5.2	668	
Mar. 30	do .....	4.9	541	
Apr. 6	do .....	4.75	512	

*Estimated monthly discharge of Salinas River at a point 4 miles south of Salinas, Monterey County.*

[Drainage area, 4,084 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1900.						
January 8 to 31 .....	2,700	223	848	40,368	0.21	0.19
February .....	223	40	105	5,831	.03	.03
March .....	223	25	73	4,489	.02	.02
April .....	32	19	22	1,309	.01	.01
May .....	19	17	17	1,045	.00	.00
June .....	17	15	16	952	.00	.00
July .....	10	6	8	492	.00	.00
August .....	8	6	7	430	.00	.00
September .....	8	2	6	357	.00	.00
October .....	4	1	2	123	.00	.00
November .....	33,600	0	2,413	143,583	.59	.66
December .....	1,050	82	295	18,139	.07	.08
The year .....	33,600	0	318	217,118	.08	.99

*Estimated monthly discharge of Salinas River, etc.—Continued.*

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January .....	35,162	380	4,921	302,580	1.21	1.39
February .....	20,927	540	4,172	231,701	1.02	1.06
March .....	1,772	430	1,063	65,361	.26	.30
April .....	405	160	270	16,066	.07	.07
May .....	2,012	160	533	32,773	.13	.15
June .....	160	30	56	3,332	.01	.02
July .....	30	25	27	1,660	.01	.01

*Discharge measurements of Salinas River at bridge, Bradley, Monterey County.*

Date.	Hydrographer.	Gage height.	Discharge.
1901.		<i>Feet.</i>	<i>Sec.-feet.</i>
Feb. 14.....	S. G. Bennett .....		1,424

## TRIBUTARIES OF SALINAS RIVER.

## ARROYO SECO.

This stream rises on the eastern slope of the Santa Lucia Mountains, flows eastward, and empties into Salinas River at Soledad, Cal. A gaging station was established December 30, 1900, by W. W. Cockins, jr., at Foster's ranch, near Piney, Cal. The high water of January, 1901, enlarged the old channel, and the gaging station was removed to Pettit'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 watershed drained above Pettit's ranch is 215 square miles.

*Discharge measurements of Arroyo Seco, a tributary of Salinas River.*

Date.	Hydrographer.	Gage height.	Discharge.	Locality.
1900.		<i>Feet.</i>	<i>Sec.-feet.</i>	
June 20, 2.30 p. m.	D. A. Porter	-----	11.78	First pool above entrance of Santa Lucia, Monterey County.
June 20, 3.10 p. m.	do	-----	12.42	Between second and third pools above entrance of Santa Lucia, Monterey County, Cal.
June 21, 8 a. m.	do	-----	10.40	Road crossing of stream between Moor's and Abbott's houses, Monterey County, Cal.
June 21, 3.20 p. m.	do	-----	7.30	200 feet above Currier's dam site, Monterey County, Cal.
June 21, 4.55 p. m.	do	-----	6.14	50 feet below head gate Salina Valley Water Co.'s Arroyo Seco ditch No. 2. Canal was taking all water of creek on this date.
1901.				
Feb. 11	S. G. Bennett	3.70	535	Point near Foster's, Monterey County, Cal.
Mar. 26	W. W. Cockins, jr.	-----	162	Do.
Apr. 2	do	5.8	105	Pettitt's Ranch, Monterey County, Cal.
July 10	Homer Hamlin	5.3	23	Do.
Sept. 24	do	-----	7.9	Do.
Nov. 6	H. E. Green	5.2	15	Do.
1902.				
Feb. 24	S. G. Bennett	8.2	<sup>a</sup> 1,720	
Feb. 25	do	11.7	<sup>a</sup> 7,883	
Feb. 26	do	9	<sup>a</sup> 2,777	
Apr. 29	do	5.75	144	
July 18	Homer Hamlin	5.08	10.4	
Aug. 7	do	4.9	2.3	

<sup>a</sup>Float measurements.



*Estimated monthly discharge of Arroyo Seco, a tributary of Salinas River, at Piney, Monterey County.*

[Drainage area, 215 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1901.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	4,500	105	888	54,601	4.13	4.76
February .....	2,860	160	931	51,705	4.33	4.51
March .....	610	105	246	15,126	1.14	1.32
April .....	2,500	95	195	11,603	.91	1.01
May .....			95	5,841	.44	.51
June .....			58	3,451	.27	.30
July .....			22	1,353	.10	.12
August .....			15	922	.07	.08
September .....			8	476	.04	.04
October .....			10	615	.05	.05
November .....			22	1,309	.10	.11
December .....			26	1,599	.12	.14
The year .....			209	148,601	.98	12.95
1902.						
January .....	40	25	28	1,722	.13	.15
February .....	2,860	25	605	33,600	2.81	2.93
March .....	2,320	185	620	38,122	2.88	3.32
April .....	1,650	145	270	16,066	1.26	1.41
May .....	105	55	74	4,550	.34	.39
June .....	55	15	32	1,904	.15	.17
July .....	15	7	12	738	.06	.07
August .....	7	3	4	246	.02	.02
September .....	3	0	0	0	.00	.00
October .....	55	0	9	553	.04	.05
November .....	750	11	57	3,392	.27	.30
December .....	145	25	54	3,320	.25	.29
The year .....	2,860	0	147	104,213	.68	9.10

## NACIMIENTO CREEK.

This stream drains the eastern slopes of the Santa Lucia Mountains and enters Salinas River 5 miles above Bradley, Cal. A gaging station was established on this stream at Harris ranch, near Bryson, Cal., by S. G. Bennett, on February 17, 1901. The record on this stream was discontinued April 30, 1901. The total area drained above the gaging station is 171 square miles.

*Discharge measurements of Nacimiento Creek, a branch of Salinas River, at point near Bryson, Monterey County.*

Date.	Hydrographer.	Gage height.	Discharge.
1901.		<i>Feet.</i>	<i>Sec.-feet.</i>
Feb. 17	S. G. Bennett .....	6.15	284
Mar. 25	W. W. Cockins, jr .....	5.3	105
Apr. 3	do .....	5.3	121

*Discharge measurements of Nacimiento Creek, a branch of Salinas River, near Newhall Ranch house, San Migulito ranch, Monterey County.*

Date.	Hydrographer.	Gage height.	Discharge.
1901.		<i>Feet.</i>	<i>Sec.-feet.</i>
Jan. 18	S. G. Bennett .....	6.1	106
Feb. 13	do .....	6.5	169
June 3	H. Hamlin .....	4.82	33
July 12	do .....	4.42	3.8

*Estimated monthly discharge of Nacimiento Creek, a tributary of Salinas River, at Bryson, Monterey County.*

[Drainage area, 171 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
February 17 to 28 .....	3,300	295	855	20,350	5.00	5.21
March .....	365	110	184	11,314	1.08	1.24
April .....	670	87	99	5,891	.58	.65

*Discharge measurements of Nacimiento Creek, a tributary of Salinas River, 4 miles above mouth, San Luis Obispo County.*

Date.	Hydrographer.	Gage height.	Discharge.
1901.		<i>Feet.</i>	<i>Sec.-feet.</i>
Feb. 15 .....	S. G. Bennett .....		527

## BURNETT CREEK.

*Discharge measurements of Burnett Creek, tributary of Nacimiento Creek, a branch of Salinas River, San Luis Obispo County.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1901.		<i>Feet.</i>	<i>Sec.-feet.</i>
Apr. 4	W. W. Cockins, jr		21

## SAN ANTONIO CREEK.

This stream drains the eastern slopes of the Santa Lucia Mountains and enters the Salinas River at Bradley, Cal. A gaging station was established near Jolon, Cal., December 15, 1900, by W. W. Cockins, jr. The total area drained is 161 square miles. The record on this stream was discontinued April 30, 1901.

*Discharge measurements of San Antonio Creek, Salinas River, near Jolon, Monterey County.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1901.		<i>Feet.</i>	<i>Sec.-feet.</i>
Jan. 19	S. G. Bennett	4.45	185
Feb. 12	do	4.8	242
Mar. 18	W. W. Cockins, jr	4.5	148
Mar. 26	do	4.3	76
Apr. 5	do	4.3	76
Apr. 18	do	4.1	59
July 11	H. Hamlin		.64

*Discharge measurement of San Antonio Creek, Salinas River, Los Ojitos Dam site, Monterey County.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1901.		<i>Feet.</i>	<i>Sec.-feet.</i>
Apr. 17	J. B. Lippincott		50

*Discharge measurement of San Antonio Creek, Salinas River, Pinkerton Dam site, Monterey County.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1901.		<i>Feet.</i>	<i>Sec.-feet.</i>
Apr. 17	J. B. Lippincott		37

*Estimated monthly discharge of San Antonio Creek, a tributary of Salinas River, at Jolon, Monterey County.*

[Drainage area, 161 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1900.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
December 15 to 28	200	170	184	5, 109	1. 14	0. 59
1901.						
January	3, 700	64	523	32, 158	3. 25	3. 75
February	1, 700	110	509	28, 268	3. 17	3. 31
March	400	84	171	10, 514	1. 06	1. 22
April	740	39	83	4, 939	. 52	. 58

#### SAN LORENZO CREEK.

This stream drains the western slopes of the Gavilan Mountains and enters the Salinas River near Kings City, Cal. There is a reservoir and dam site on the stream 5 miles above its mouth. The stream is entirely dry during the summer months. The flood waters are used for winter irrigation. A gaging station was established December 16, 1900, by W. W. Cockins, jr., at Hollenbeck's ranch, a quarter of a mile below the dam site.

The area of the watershed drained is 235 square miles.

*Discharge measurements of San Lorenzo Creek, Salinas River, at dam site, 5 miles above King City, Monterey County.*

Date.	Hydrographer.	Gage height.	Dis-charge.	Locality.
1901.		<i>Feet.</i>	<i>Sec.-feet.</i>	
Jan. 22	S. G. Bennett	4. 98	28. 7	Near Hollenbeck ranch house.
Feb. 14	do	5. 3	71. 2	Do.
Mar. 27	W. W. Cockins, jr	4. 3	12. 6	Do.
Apr. 1	do	4. 2	5. 1	Do.
Apr. 15	do	4. 1	2. 1	Do.
Nov. 2	H. E. Green	. 9	2. 8	Near Mathews ranch house.
1902.				
Jan. 24	S. G. Bennett	. 9	4. 6	Do.
Feb. 24	do	1. 09	43. 0	Do.
Apr. 30	do	. 9	1. 8	Do.
July 16	Homer Hamlin		. 08	Do.

*Estimated monthly discharge of San Lorenzo Creek, a tributary of Salinas River,  
at King City, Monterey County.*

[Drainage area, 235 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1900.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
December 16 to 31	13	9	9	286	0.04	0.02
1901.						
January	2,540	9	171	10,514	.73	.84
February	9,200	9	725	40,264	3.09	3.21
March	27	9	17	1,045	.07	.08
April	13	6	8	476	.03	.03

*Estimated monthly discharge of San Lorenzo Creek at King City.*

[Drainage area, 235 square miles.]

Month.	Discharge.			Total dis- charge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1902.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January	15	5	6	369	.03	.03
February	795	5	69	3,832	.29	.30
March	875	5	81	4,980	.34	.39
April	5	3	4	238	.02	.02
November	200	15	85	5,057	.36	.40
December	15	5	7	430	.03	.03

SALT SPRING VALLEY.

*Estimated seasonal discharge into Salt Spring Valley reservoir near Milton, Calaveras County, Cal.<sup>a</sup>*

[Drainage area, 25 square miles.]

Year.	Mean dis- charge.	Total for year.	Run-off.		Rainfall.	Run-off.
			Per square mile.	Depth.		
	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Per cent.</i>
1889-90	36.7	26,606	1.47	19.95	30.38	65
1890-91	6.3	4,591	.25	3.39	13.06	26
1891-92	4.9	3,560	.20	2.71	16.98	16
1892-93	30.8	22,311	1.23	16.69	26.46	63
1893-94	22.5	16,323	.90	12.21	25.37	48
1894-95	35.4	25,664	1.42	19.27	32.31	59
1895-96	8.5	6,221	.34	4.61	23.98	19
Mean	20.7	15,099	.83	11.26	24.08	42

<sup>a</sup> Evaporation not considered in this table.

## SAN ANTONIO CREEK.

The discharge of the streams of southern California was unusually low in September, 1898, and these measurements were made by the Edison Electric Company to determine the minimum with its hourly fluctuation.

*Discharge measurements of San Antonio Creek, at Water Company's weir, San Bernardino County.*

[Measurements by Edison Electric Co.]

Date.	Dis-charge.	Date.	Dis-charge.
September 15, 1898:	<i>Sec.-feet.</i>	September 15, 1898—Cont'd.	<i>Sec.-feet.</i>
7 a. m. ....	5.60	9 p. m. ....	5.44
7.30 a. m. ....	5.60	9.30 p. m. ....	5.60
8 a. m. ....	5.60	10 p. m. ....	5.60
8.30 a. m. ....	5.60	10.30 p. m. ....	5.60
9 a. m. ....	5.58	11 p. m. ....	5.60
9.30 a. m. ....	5.58	11.30 p. m. ....	5.70
10 a. m. ....	5.58	12 midnight .....	5.70
10.30 a. m. ....	5.44	September 16, 1898:	
11 a. m. ....	5.32	12.30 a. m. ....	5.70
11.30 a. m. ....	5.32	1 a. m. ....	5.70
12 m. ....	5.32	1.30 a. m. ....	5.70
12.30 p. m. ....	5.32	2 a. m. ....	5.70
1 p. m. ....	5.06	2.30 a. m. ....	5.70
1.30 p. m. ....	5.06	3 a. m. ....	5.70
2 p. m. ....	5.06	3.30 a. m. ....	5.70
2.30 p. m. ....	5.06	4 a. m. ....	5.70
3 p. m. ....	4.94	4.30 a. m. ....	5.70
3.30 p. m. ....	4.94	5 a. m. ....	5.70
4 p. m. ....	4.94	5.30 a. m. ....	5.70
4.30 p. m. ....	4.80	6 a. m. ....	5.60
5 p. m. ....	4.80	6.30 a. m. ....	5.60
5.30 p. m. ....	4.80	12-hour mean .....	5.57
6 p. m. ....	4.92	September 16, 1898:	
6.30 p. m. ....	5.06	7 a. m. ....	5.60
12-hour mean .....	5.22	7.30 a. m. ....	5.60
September 15, 1898:		8 a. m. ....	5.60
7 p. m. ....	5.06	8.30 a. m. ....	5.60
7.30 p. m. ....	5.06	9 a. m. ....	5.60
8 p. m. ....	5.06	9.30 a. m. ....	5.60
8.30 p. m. ....	5.44	10 a. m. ....	5.44

*Discharge measurements of San Antonio Creek, etc.—Continued.*

Date.	Dis-charge.	Date.	Dis-charge.
September 16, 1898—Cont'd.	<i>Sec.-feet.</i>	September 16, 1898—Cont'd.	<i>Sec.-feet.</i>
10.30 a. m. ....	5.20	9 p. m. ....	5.44
11 a. m. ....	5.18	9.30 p. m. ....	5.44
11.30 a. m. ....	5.06	10 p. m. ....	5.44
12 m. ....	5.06	10.30 p. m. ....	5.60
12.30 p. m. ....	4.94	11 p. m. ....	5.60
1 p. m. ....	4.94	11.30 p. m. ....	5.60
1.30 p. m. ....	5.06	12 midnight .....	5.60
2 p. m. ....	5.06	September 17, 1898:	
2.30 p. m. ....	5.06	12.30 a. m. ....	5.60
3 p. m. ....	5.06	1 a. m. ....	5.60
3.30 p. m. ....	4.80	1.30 a. m. ....	5.60
4 p. m. ....	4.80	2 a. m. ....	5.60
4.30 p. m. ....	4.56	2.30 a. m. ....	5.60
5 p. m. ....	5.06	3 a. m. ....	5.60
5.30 p. m. ....	5.06	3.30 a. m. ....	5.70
6 p. m. ....	5.06	4 a. m. ....	5.70
6.30 p. m. ....	4.92	4.30 a. m. ....	5.70
12-hour mean .....	5.16	5 a. m. ....	5.70
September 16, 1898:		5.30 a. m. ....	5.70
7 p. m. ....	5.06	6 a. m. ....	5.70
7.30 p. m. ....	5.06	6.30 a. m. ....	5.60
8 p. m. ....	5.06	12-hour mean .....	5.52
8.30 p. m. ....	5.06		

*Discharge measurements of San Antonio Creek, San Bernardino County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
July 23, 1896	J. H. Quinton .....	7.9	Mouth of canyon.
July 2, 1898	F. H. Olmsted .....	6.59	Do.
Aug. 26, 1898	do .....	5.18	Division weir.
Aug. 25, 1899	S. G. Bennett .....	4.48	Mouth of canyon.
July 11, 1900	do .....	4.07	Do.
Sept. 25, 1900	W. W. Cockins, jr. ....	3.72	Division weir.
April 3, 1902	S. G. Bennett .....	11.40	Do.
July 23, 1896	J. H. Quinton .....	1.88	Ontario water from tunnel.
July 2, 1898	F. H. Olmsted .....	3.36	In creek at Pierce's camp.

The water of San Antonio Creek is utilized to a large extent. The Pacific Electric Light and Power Company, commonly called the San Gabriel Electric Company, has a power plant in the canyon at an elevation of 3,250 feet. The water from the tailrace of this power house passes over a measuring weir and is discharged into the pipe line of the San Antonio Water Company's power plant. It is carried in this conduit on the right bank of the canyon to a point opposite the old division weir between the San Antonio Water Company and the Pomona Land and Water Company, from which point it is discharged through the power house of the San Antonio Water Company. The portion of the water which goes to the San Antonio Water Company is again diverted through a pipe line and used at a third power house, at an elevation of about 1,900 feet, near the left bank of the canyon. In addition there is a tunnel in the mouth of the canyon run through the bowlders and gravels of the river bed to bed rock, up to and near the old division box mentioned above. This tunnel water together with all other water after it has been used for power is used for irrigation near Ontario and Pomona.

The second power plant on the river was constructed by the San Antonio Water Company during the year 1902, and before the water was diverted into the conduits of this corporation a board of engineers was appointed by the San Antonio Water Company to make measurements of the water in various portions of the canyon in order to determine what effect, if any, would result from the diversion of the stream which they contemplated from the upper power house of the San Gabriel Electric Company to the old division box. This board of engineers consisted of W. H. Saunders, chief engineer, F. E. Trask, Samuel Storrow, and J. B. Lippincott, consulting engineer. Suitable weirs were erected, and automatic river-height-recording devices were installed on most of these weirs. The San Gabriel Electric Company's power-house weir was located in the tailrace of the power house, and measured the main volume of water in the river at that point. The "Fountain of Life" spring is a small steady flow of water issuing from a spring near the San Gabriel Electric Company's power house, but the water is not included in that measured in the power-house weir. A small amount of water was flowing in the bed of the stream opposite the San Gabriel Electric Company's power house, and was not included in either the power-house weir or the "Fountain of Life" spring measurements.

The Spring Hill weir was located in the main river below the San Gabriel Electric Company's power house and measured total flow.

The "Baby Ruth" weir was also in the main stream below the San Gabriel Electric Company's power house, and above the division weir, and measured the full stream.

The division weir was located in the main stream opposite the power house of the San Antonio Water Company. At this point the



water is divided between the San Antonio Water Company and the Pomona Land and Water Company, but before the division occurs a certain amount of water, known as gird water, is taken out of the stream and not included in the measurement of the main division weir.

The water measured in the San Antonio tunnel is picked up from the sands and gravels of the river bed below all the above-mentioned points of measurements, and this water is not included in any other measurement.

All these measurements were made prior to the time when the diversion occurred through the new pipe line and power plant of the San Antonio Water Company.

All these measurements were made for the San Antonio Water Company by the engineers in question. They were supplemented by further continuous records obtained from the automatic registers; but these records are not now available for publication.

*Discharge measurements of San Antonio Creek.*

Date.	Hydrographer.	Dis-charge.	Locality.
1902.		<i>Sec.-feet.</i>	
June 28 -----	J. B. Lippincott	7.69	Baby Ruth weir.
July 12, 11.40 a. m. -----	do -----	6.88	Do.
July 12, 1.13 p. m. -----	do -----	6.58	Do.
Aug. 2, 11.15 a. m. -----	do -----	6.15	Do.
Aug. 9, 11 a. m. -----	do -----	6.15	Do.
Aug. 9, 1.12 p. m. -----	do -----	5.99	Do.
Aug. 29, 11.45 a. m. -----	do -----	5.61	Do.
Sept. 29, 12.30 p. m. -----	do -----	4.88	Do.
Oct. 18, 12.30 p. m. -----	do -----	4.74	Do.
June 28 -----	do -----	6.56	Division weir.
Do -----	do -----	.42	Gird water.
		6.98	Total.
July 12, 10.58 a. m. -----	do -----	5.76	Division weir.
Do -----	do -----	.35	Gird water.
		6.11	Total.
July 12, 2.40 p. m. -----	do -----	5.20	Division weir.
Do -----	do -----	.35	Gird water.
		5.55	Total.

*Discharge measurements of San Antonio Creek—Continued.*

Date.	Hydrographer.	Dis-charge.	Locality.
1902.		<i>Sec.-feet.</i>	
Aug. 2, 10.30 a. m	J. B. Lippincott	4.83	Division weir.
Do	do	.36	Gird water.
		5.19	Total.
Aug. 2, 2.30 p. m	do	4.35	Division weir.
Do	do	.36	Gird water.
		4.71	Total.
Aug. 9, 10.18 a. m	do	4.76	Division weir.
Do	do	.35	Gird water.
		5.11	Total.
Aug. 9, 2.40 p. m	do	4.18	Division weir.
Do	do	.35	Gird water.
		4.53	Total.
Aug. 29, 10.55 a. m	do	4.26	Division weir.
Do	do	.38	Gird water.
		4.64	Total.
Aug. 29, 2.27 p. m	do	3.55	Division weir.
Do	do	.38	Gird water.
		3.93	Total.
Sept. 27, 10.30 a. m	do	4.00	Division weir.
Do	do	.33	Gird water.
		4.33	Total.
Sept. 27, 2.15 p. m	do	3.57	Division weir.
Do	do	.33	Gird water.
		3.90	Total.
Oct. 18, 10.55 a. m	do	3.98	Division weir.
Do	do	.38	Gird water.
		4.36	Total.
June 28	do	.34	Fountain of Life spring— weir measurement.
July 12, 12.15 p. m	do	.34	Do.
Aug. 2, 12.05 p. m	do	.30	Do.

*Discharge measurements of San Antonio Creek—Continued.*

Date.	Hydrographer.	Dis-charge.	Locality.
1902.		<i>Sec. feet.</i>	
Aug. 9, 11.42 a. m	J. B. Lippincott	0.32	Fountain of Life spring— weir measurement.
Aug. 29, 12.20 p. m	do	.29	Do.
Sept. 27, 11.33 a. m	do	.29	Do.
Oct. 18, 12 m	do	.30	Do.
June 28	do	1.38	San Antonio tunnel—weir measurement.
July 12, 10.36 a. m	do	1.27	Do.
Aug. 2, 10.10 a. m	do	1.19	Do.
Aug. 9, 10 a. m	do	1.17	Do.
Aug. 30, 10.30 a. m	do	1.15	Do.
Sept. 27, 10.12 a. m	do	1.12	Do.
June 28	do	7.40	San Gabriel Electric Com- pany's power house— concrete weir basin— weir measurement.
July 12, 12.20 p. m	do	6.10	Do.
Aug. 2, 12 m	do	5.59	Do.
Aug. 9, 11.48 a. m	do	5.67	Do.
Aug. 29, 12.30 p. m	do	4.59	Do.
Sept. 27, 11.37 a. m	do	4.64	Do.
Oct. 13, 11.38 a. m	do	4.31	Do.
June 28	do	.55	San Gabriel Electric Com- pany's power house— weir measurement in creek.
July 12, 12.33 p. m	do	.47	Do.
Aug. 2, 12.10 p. m	do	.40	Do.
Aug. 9, 12.11 p. m	do	.40	Do.
Aug. 29, 12.40 p. m	do	.35	Do.
Sept. 27, 12 m	do	.36	Do.
Oct. 18, 12 m	do	.39	Do.
Aug. 2, 11.45 a. m	do	6.31	Spring Hill weir.
Aug. 9, 11.22 a. m	do	6.36	Do.
Aug. 9, 1 p. m	do	5.88	Do.
Aug. 29, 12.07 p. m	do	5.59	Do.
Aug. 29, 12.10 p. m	do	5.40	Do.
Sept. 27, 12.05 p. m	do	5.28	Do.
Oct. 18, 12.12 p. m	do	5.01	Do.

## SAN BERNARDINO VALLEY.

*Discharge measurements of San Bernardino Valley, between San Bernardino and Riverside.*

Date.	Dis-charge.	Locality.
	<i>Sec.-feet.</i>	
June, 1898 .....	0.61	Developed water, Camp Carlton ditch.
September, 1898 .....	1.20	Do.
March, 1899 .....	2.13	Do.
June, 1899 .....	1.63	Do.
August, 1899 .....	1.02	Do.
March, 1900 .....	2.55	Do.
June, 1900 .....	2.60	Do.
September, 1900 .....	1.67	Do.
October 7, 1902 .....	1.70	Do.
June, 1898 .....	.67	Beams ditch, natural water.
September, 1898 .....	.65	Do.
March, 1899 .....	.72	Do.
June, 1899 .....	.52	Do.
August, 1899 .....	.40	Do.
March, 1900 .....	.68	Do.
June, 1900 .....	.50	Do.
September, 1900 .....	.33	Do.
October 13, 1902 .....	.22	Do.
June, 1898 .....	5.26	Bloomington flume, developed water.
September, 1898 .....	5.49	Do.
March, 1899 .....	.00	Do.
June, 1899 .....	5.93	Do.
August, 1899 .....	3.05	Do.
March, 1900 .....	3.80	Do.
June, 1900 .....	3.68	Do.
September, 1900 .....	3.28	Do.
October 7, 1902 .....	2.28	Do.
June, 1898 .....	6.82	City of Colton ditch, developed water.
September, 1898 .....	7.40	Do.
March, 1899 .....	3.20	Do.
June, 1899 .....	5.49	Do.
August, 1899 .....	3.89	Do.
March, 1900 .....	4.94	Do.
June, 1900 .....	3.21	Do.
September, 1900 .....	3.54	Do.
October 7, 1902 .....	3.53	Do.
June, 1898 .....	1.97	Colton Terrace Water Co., developed water.
September, 1898 .....	1.61	Do.

*Discharge measurements of San Bernardino Valley, etc.—Continued.*

Date.	Dis- charge.	Locality.
	<i>Sec.-feet.</i>	
March, 1899 .....	1.69	Colton Terrace Water Co., developed water.
June, 1899 .....	1.30	Do.
August, 1899 .....	1.30	Do.
March, 1900 .....	1.69	Do.
June, 1900 .....	1.54	Do.
September, 1900 .....	1.53	Do.
October 7, 1902 .....	1.08	Do.
June, 1898 .....	.63	Daley ditch, natural water.
September, 1898 .....	.67	Do.
March, 1899 .....	.71	Do.
June, 1899 .....	.51	Do.
August, 1899 .....	.51	Do.
March, 1900 .....	.72	Do.
June, 1900 .....	1.12	Do.
September, 1900 .....	.54	Do.
October 13, 1902 .....	.00	Do.
June, 1898 .....	4.40	East Riverside district, or Riverside Highlands Water Co., developed water.
September, 1898 .....	4.43	Do.
March, 1899 .....	4.25	Do.
June, 1899 .....	2.08	Do.
August, 1899 .....	2.00	Do.
March, 1900 .....	6.59	Do.
June, 1900 .....	5.38	Do.
September, 1900 .....	3.70	Do.
June, 1898 .....	1.16	Gage canal, Santa Ana River, natural water.
September, 1898 .....	1.16	Do.
March, 1899 .....	.72	Do.
June, 1899 .....	.24	Do.
August, 1899 .....	.64	Do.
March, 1900 .....	.395	Do.
June, 1900 .....	.29	Do.
September, 1900 .....	.17	Do.
October 7, 1902 .....	.00	Do.
June, 1898 .....	26.26	Gage canal, Palm avenue weir, developed water.
September, 1898 .....	25.07	Do.
March, 1899 .....	26.68	Do.
June, 1899 .....	25.22	Do.
August, 1899 .....	23.47	Do.
March, 1900 .....	21.96	Do.
June, 1900 .....	22.23	Do.

*Discharge measurements of San Bernardino Valley, etc.—Continued.*

Date.	Dis-charge	Locality.
	<i>Sec. feet.</i>	
September, 1900 . . . .	27.85	Gage canal, Palm avenue weir, developed water.
October 11, 1902. . . .	30.17	Do.
June, 1898 . . . . .	.84	Haws and Talmadge ditch, natural water.
September, 1898 . . . .	.00	Do.
March, 1899 . . . . .	.28	Do.
June, 1899 . . . . .	.00	Do.
August, 1899 . . . . .	.00	Do.
March, 1900 . . . . .	.00	Do.
June, 1900 . . . . .	.00	Do.
September, 1900 . . . .	.00	Do.
September 30, 1902. . .	.00	Do.
June, 1898 . . . . .	.72	Logsdon and Farrell ditch, natural water.
September, 1898 . . . .	.63	Do.
March, 1899 . . . . .	1.61	Do.
June, 1899 . . . . .	1.15	Do.
August, 1899 . . . . .	.54	Do.
March, 1900 . . . . .	1.26	Do.
June, 1900 . . . . .	.49	Do.
September, 1900 . . . .	.20	Do.
October 13, 1902 . . . .	.00	Do.
June, 1898 . . . . .	.37	McIntyre ditch, natural water.
September, 1898 . . . .	.038	Do.
March, 1899 . . . . .	.82	Do.
June, 1899 . . . . .	.15	Do.
August, 1899 . . . . .	.00	Do.
March, 1900 . . . . .	.14	Do.
June, 1900 . . . . .	.01	Do.
September, 1900 . . . .	.00	Do.
October 7, 1902 . . . .	.00	Do.
June, 1898 . . . . .	2.54	McKenzie ditch, natural water.
September, 1898 . . . .	2.08	Do.
March, 1899 . . . . .	9.40	Do.
June, 1899 . . . . .	3.86	Do.
August, 1899 . . . . .	2.00	Do.
March, 1900 . . . . .	2.30	Do.
June, 1900 . . . . .	1.57	Do.
September, 1900 . . . .	1.69	Do.
September 30, 1902. . .	.00	Do.
June, 1898 . . . . .	8.42	Meeks and Daley ditch, natural water.
September, 1898 . . . .	17.00	Do.

*Discharge measurements of San Bernardino Valley, etc.—Continued.*

Date.	Dis- charge.	Locality.
	<i>Sec. feet.</i>	
March, 1899 .....	17.00	Meeks and Daley ditch, natural water.
June, 1899 .....	15.48	Do.
August, 1899 .....	10.45	Do.
March, 1900 .....	13.94	Do.
June, 1900 .....	13.78	Do.
September, 1900 .....	14.68	Do.
September 30, 1902 .....	13.40	Do.
June, 1898 .....	1.94	Mill pump, developed water.
September, 1898 .....	2.04	Do.
March, 1899 .....	.00	Not running.
June, 1899 .....	1.77	Mill pump, developed water.
August, 1899 .....	1.67	Do.
March, 1900 .....	.00	Not running.
June, 1900 .....	1.88	Mill pump, developed water.
September, 1900 .....	1.52	Do.
September 30, 1902 .....	1.20	Do.
June, 1898 .....	5.37	Rabel dam ditch, natural water.
September, 1898 .....	3.07	Do.
March, 1899 .....	2.26	Do.
June, 1899 .....	1.54	Do.
August, 1899 .....	.94	Do.
March, 1900 .....	.54	Do.
June, 1900 .....	.35	Do.
September, 1900 .....	.07	Do.
September 30, 1902 .....	.00	Do.
June, 1898 .....	1.75	Ranchero ditch, natural water.
September, 1898 .....	1.64	Do.
March, 1899 .....	1.64	Do.
June, 1899 .....	1.00	Do.
August, 1899 .....	.41	Do.
March, 1900 .....	.24	Do.
June, 1900 .....	.55	Do.
September, 1900 .....	1.33	Do.
Do .....	.80	Ranchero ditch, developed water.
June, 1898 .....	3.12	Riverside Water Company, natural water.
September, 1898 .....	3.36	Do.
March, 1899 .....	5.30	Do.
June, 1899 .....	7.29	Do.
August, 1899 .....	2.56	Do.
March, 1900 .....	2.67	Do.

*Discharge measurements of San Bernardino Valley, etc.—Continued.*

Date.	Dis-charge.	Locality.
	<i>Sec.-feet.</i>	
June, 1900 .....	2.17	Riverside Water Company, natural water.
September, 1900 .....	.94	Do.
September 30, 1902 .....	.50	Do.
June, 1898 .....	2.30	Shay or Stout dam ditch, natural water.
September, 1898 .....	2.08	Do.
March, 1899 .....	2.23	Do.
June, 1899 .....	1.13	Do.
August, 1899 .....	.90	Do.
March, 1900 .....	.507	Do.
June, 1900 .....	.40	Do.
September, 1900 .....	.16	Do.
September 30, 1902 .....	.00	Do.
June, 1898 .....	1.00	Swamp ditch, natural water.
September, 1898 .....	1.02	Do.
March, 1899 .....	.85	Do.
June, 1899 .....	.77	Do.
August, 1899 .....	.69	Do.
March, 1900 .....	.70	Do.
June, 1900 .....	.89	Do.
September, 1900 .....	.86	Do.
October 14, 1902 .....	.93	Do.
June, 1898 .....	1.60	Ward and Warren ditch, developed water.
Do .....	.72	Ward and Warren ditch, natural water.
September, 1898 .....	1.60	Ward and Warren ditch, developed water.
Do .....	.72	Ward and Warren ditch, natural water.
March, 1899 .....	1.60	Ward and Warren ditch, developed water.
Do .....	1.49	Ward and Warren ditch, natural water.
June, 1899 .....	.615	Ward and Warren ditch, developed water.
August, 1899 .....	1.56	Do.
March, 1900 .....	1.60	Do.
Do .....	.95	Ward and Warren ditch, natural water.
June, 1900 .....	1.60	Ward and Warren ditch, developed water.
Do .....	.10	Ward and Warren ditch, natural water.
September, 1900 .....	.53	Ward and Warren ditch, developed water.
October 14, 1902 .....	.30	Do.
Do .....	1.58	Ward and Warren ditch, natural water.
June, 1898 .....	.26	Whiting ditch, natural water.
September, 1898 .....	.01	Do.
March, 1899 .....	.76	Do.
June, 1899 .....	.246	Do.



*Discharge measurements of San Bernardino Valley, etc.—Continued.*

Date.	Dis-charge.	Loca.ity.
	<i>Sec.-feet.</i>	
August, 1899 .....	0.01	Whiting ditch, natural water.
March, 1900 .....	1.12	Do.
June, 1900 .....	.13	Do.
September, 1900 .....	.00	Do.
October 13, 1902 .....	.00	Do.
June, 1898 .....	.34	Whitlock ditch, natural water.
September, 1898 .....	.38	Do.
March, 1899 .....	.47	Do.
June, 1899 .....	.28	Do.
August, 1899 .....	.09	Do.
March, 1900 .....	.23	Do.
June, 1900 .....	.00	Do.
September, 1900 .....	.00	Do.
October 13, 1902 .....	.00	Do.

*List of discharge measurements of San Bernardino Valley between San Bernardino and Colton.*

Date.	Dis-charge.	Remarks.
	<i>Sec.-feet.</i>	
June, 1898 .....	18.00	Riverside Water Co., upper canal, developed water.
Do .....	41.04	Riverside Water Co., upper canal, natural water.
September, 1898 .....	17.54	Riverside Water Co., upper canal, developed water.
Do .....	43.80	Riverside Water Co., upper canal, natural water.
March, 1899 .....	18.04	Riverside Water Co., upper canal, developed water.
Do .....	42.49	Riverside Water Co., upper canal, natural water.
June, 1899 .....	17.50	Riverside Water Co., upper canal, developed water.
Do .....	36.42	Riverside Water Co., upper canal, natural water.
August, 1899 .....	27.50	Riverside Water Co., upper canal, developed water.
Do .....	24.54	Riverside Water Co., upper canal, natural water.
March, 1900 .....	24.54	Riverside Water Co., upper canal, developed water.
Do .....	37.40	Riverside Water Co., upper canal, natural water.
June, 1900 .....	32.36	Riverside Water Co., upper canal, developed water.
Do .....	20.58	Riverside Water Co., upper canal, natural water.
September, 1900 .....	27.00	Riverside Water Co., upper canal, developed water.
Do .....	34.02	Riverside Water Co., upper canal, natural water.
September 30, 1902 .....	26.08	Riverside Water Co., upper canal, developed water.
Do .....	21.89	Riverside Water Co., upper canal, natural water.

*Discharge measurements of return waters below Slover Mountain, above Riverside Narrows, San Bernardino Valley, between San Bernardino and Riverside.*

Date.	Dis-charge.	Remarks.
1902.	<i>Sec.-feet.</i>	
September 29 .....	5.94	West Riverside pumping plant, developed water.
October 11 .....	4.38	Rogers pumping plant, developed water.
Do .....	2.95	Riverside Water Co., pumping plant No. 1, Santa Ana River flume, developed water.
Do .....	2.08	Riverside Water Co., pumping plant No. 2, Santa Ana River flume, developed water.
September 29 .....	3.07	Riverside Water Co., flume head of lower canal, natural water.
Do .....	7.19	Roubidoux Canal, natural water.
Do .....	2.17	Evans ditch at north line Riverside County line, natural water.
Do .....	.53	Evans ditch 1 mile south Riverside County line, natural water.
Do .....	5.35	Evans Island ditch, west end of West Riverside bridge, natural water.
Do .....	1.96	Alvetriz ditch at east end West Riverside bridge, natural water.
October 10 .....	43.25	Santa Ana River at Riverside Narrows.
Total .....	63.52	

*Comparative amounts of water, in second-feet, flowing in canals above Colton.*

Name of ditch.	June, 1898.	Sept., 1898.	Mar., 1899.	June, 1899.	Aug., 1899.	Mar., 1900.	June, 1900.	Sept., 1900.	Sept., 1902.
Haws & Talmage	0.84	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00
Rabel dam	5.37	3.07	2.36	1.54	.94	.54	.35	.07	.00
Shay or Stout dam	2.30	2.08	2.23	1.13	.90	.507	.40	.16	.00
McKenzie	2.54	2.08	9.40	3.86	2.00	2.30	1.57	1.69	.00
Meeks & Daley	8.42	17.00	17.00	15.48	10.45	13.94	13.78	14.68	13.40
Beam	.67	.65	.72	.52	.40	.68	.50	.33	.22
Riverside Water Co., upper ca- nal <i>b</i>	59.04	61.34	60.53	53.92	52.04	61.94	52.94	61.02	47.97
Timber	.00	.00	.00	.00	.00	.00	.00	.00	.00
Gage canal, Santa Ana River	1.16	1.16	.72	.24	.64	.395	.29	.17	.00
Gage canal, Palm avenue	26.26	25.07	26.68	25.22	23.47	21.96	22.23	27.85	30.17
Logsdon & Far- rell	.72	.63	1.61	1.15	.54	1.26	.49	.20	.00
Whitlock	.34	.38	.47	.28	.094	.23	.00	.00	.00
Daley	.63	.67	.71	.51	.51	.72	1.12	.54	.00
McIntyre	.37	.038	.82	.15	.00	.14	.01	.00	.00
Whiting	.26	.01	.76	.246	.01	1.12	.13	.00	.00
Swamp	1.00	1.02	.85	.77	.69	.70	.89	.86	.93
Ranchero	1.75	1.64	1.64	1.00	.41	.24	.55	1.33	2.28
Ward & Warren	2.32	2.32	3.09	.615	1.56	2.55	1.70	.53	1.88
Mill flume of Riv- erside Water Co.	3.12	3.36	5.30	7.29	2.56	2.67	2.17	.94	.50
Mill pump of Riv- erside Water Co.	1.94	2.04	( <i>d</i> )	1.77	1.67	( <i>d</i> )	1.88	1.52	1.20
Camp Carlton	.61	1.20	2.13	1.62	1.02	2.55	2.60	1.67	1.70
East Riverside	4.40	4.43	4.25	2.08	2.00	6.59	5.38	3.70	-----
Colton Terrace Water Co.	1.97	1.61	1.69	1.30	1.30	1.69	1.54	1.53	1.08
City of Colton	6.82	7.40	3.20	5.49	3.89	4.94	3.21	3.54	3.53
Bloomington flume	5.26	5.49	( <i>d</i> )	5.93	3.05	3.80	3.68	3.28	.00
West Riverside 350-inch pump- ing plant	-----	-----	-----	-----	-----	-----	-----	-----	5.94
Rogers pumping plant	-----	-----	-----	-----	-----	-----	-----	-----	4.38
Santa Ana River flume; River- side pumping plants Nos. 1 and 2	-----	-----	-----	-----	-----	-----	-----	-----	5.03
Total	138.11	144.69	146.44	132.11	110.14	131.46	117.41	125.61	120.21

*a* Interpolated. *b* Above Slover Mountain. *c* River water not included. *d* Pumps not run.

*Return water, natural flow in second-feet, compared with developed water in San Bernardino Valley above Colton.*

Name of ditch.	June, 1898.		September, 1898.		March, 1899.		June, 1899.	
	Devel- oped.	Natu- ral.	Devel- oped.	Natu- ral.	Devel- oped.	Natu- ral.	Devel- oped.	Natu- ral.
Haws & Talmage		0.84		0.00		0.28		0.00
Rabel dam		5.37		3.07		2.36		1.54
Shay or Stout dam		2.30		2.08		2.23		1.13
McKenzie		2.54		2.08		9.40		3.86
Beam		.67		.65		.72		.52
Riverside Water Co., upper canal	18.00	41.04	17.54	43.80	18.04	42.49	17.50	36.42
Gage canal, Santa Ana River		1.16		1.16		.72		.24
Gage canal, Palm avenue weir	26.26		25.07		26.68		25.22	
Logsdon & Farrell		.72		.63		1.61		1.15
Whitlock		.34		.38		.47		.28
Daley		.63		.67		.71		.51
McIntyre		.37		.038		.82		.15
Whiting		.96		.010		.76		.246
Swamp		1.00		1.020		.85		.77
Ranchero		<sup>a</sup> 1.75		1.640		1.64		1.00
Ward & Warren	1.60	.72	1.60	.720	1.60	1.49	.615	
Mill flume of River- side Water Co		3.12		3.360		5.30		7.29
Mill pump of River- side Water Co	1.94		2.04		{ Not run. }		1.77	
Camp Carlton ditch	.61		1.20		2.13		1.62	
East Riverside dis- trict, or Riverside Highland Water Co	4.40		4.43		4.25		2.08	
Colton Terrace Water Co	1.97		1.61		1.69		1.30	
City of Colton pump- ing plant	6.82		7.40		3.20		5.49	
Bloomington flume	5.26		5.49		.00		5.93	
Meeks & Daley ditch		8.42		<sup>a</sup> 17.00		17.00		15.48
Total	66.86	71.25	66.38	78.31	57.5 <sup>9</sup>	88.85	61.525	70.59

<sup>a</sup> Interpolated.

*Return water, natural flow in second-feet, etc.—Continued.*

Name of ditch.	August, 1899.		March, 1900.		June, 1900.		September, 1900.		September, 1902.	
	Devel- oped.	Natu- ral.	Devel- oped.	Natu- ral.	Devel- oped.	Natu- ral.	Devel- oped.	Natu- ral.	Devel- oped.	Natu- ral.
Haws & Talmage	-----	0.00	-----	0.000	0.00	0.00	-----	0.00	-----	0.00
Rabel dam	-----	.94	-----	.540	-----	.35	-----	.07	-----	.00
Shay or Stout dam	-----	.90	-----	.507	-----	.40	-----	.16	-----	.00
McKenzie	-----	2.00	-----	2.300	-----	1.57	-----	1.69	-----	.00
Beam	-----	.40	-----	.680	-----	.50	-----	.33	-----	.22
Riverside Water Co., upper canal	27.50	24.54	24.54	37.40	32.36	20.58	27.00	34.02	26.08	21.89
Gage canal, Santa Ana River	-----	.64	-----	.395	-----	.29	-----	.17	-----	.00
Gage canal, Palm avenue weir	23.47	-----	21.96	-----	22.23	-----	27.85	-----	30.17	-----
Logsdon & Farrell	-----	.54	-----	1.26	-----	.49	-----	.20	-----	.00
Whitlock	-----	.09	-----	.23	-----	.00	-----	.00	-----	.00
Daley	-----	.51	-----	.72	-----	1.12	-----	.54	-----	.00
McIntyre	-----	.00	-----	.14	-----	.01	-----	.00	-----	.00
Whiting	-----	.01	-----	1.12	-----	.13	-----	.00	-----	.00
Swamp	-----	.69	-----	.70	-----	.89	-----	.86	-----	.93
Ranchero	-----	.41	-----	.24	-----	.55	.80	.53	2.28	-----
Ward & Warren	1.56	-----	1.60	.95	1.60	.10	.53	-----	.30	1.58
Mill flume of River- side Water Co	-----	2.56	-----	2.67	-----	2.17	-----	.94	-----	.50
Mill pump of River- side Water Co	} 1.67	-----	{ Not run. }	-----	} 1.88	-----	1.52	-----	1.20	-----
Camp Carlton ditch		1.02		2.55		2.60	1.67	-----		1.70
East Riverside dis- trict, or Riverside Highland Water Co	2.00	-----	6.59	-----	5.38	-----	3.70	-----	-----	-----
Colton Terrace Wa- ter Co	1.30	-----	1.69	-----	1.54	-----	1.53	-----	1.08	-----
City of Colton pump- ing plant	3.89	-----	4.94	-----	3.21	-----	3.54	-----	3.53	-----
Bloomington flume	3.05	-----	3.80	-----	3.68	-----	3.28	-----	.00	-----
Meeks & Daley ditch	-----	10.45	-----	13.94	-----	13.78	-----	14.68	-----	13.40
West Riverside 350- inch pumping plant	-----	-----	-----	-----	-----	-----	-----	-----	5.94	-----
Rogers pumping plant	-----	-----	-----	-----	-----	-----	-----	-----	4.38	-----
Santa Ana River flume; Riverside pumping plant Nos. 1 and 2	-----	-----	-----	-----	-----	-----	-----	-----	5.03	-----
Total	65.46	44.68	67.67	63.79	74.48	42.93	71.42	54.18	81.69	38.52

From the two preceding tables it will be noted that despite severe droughts which existed from 1898 to 1902, inclusive, the output of water from the gravel beds above Colton has but slightly diminished, the total being 144.69 second-feet in September, 1898, as compared with 120.21 second-feet in September, 1902. The amount of developed water in September, 1898, was 66.38 second-feet, and in September, 1902, 81.69 second-feet, while the natural return water between the same dates decreased from 78.31 second-feet to 38.52 second-feet. During this period much development work was done, and while these new supplies do not mean an absolute addition to the output from the district, the fact that the total supply was maintained notwithstanding the drought is a decided achievement.

#### SAN DIEMAS WASH.

See San Gabriel River, miscellaneous measurements, San Diemas Wash.

#### SAN FERNANDO CREEK.

*Discharge measurement of San Fernando Creek, tributary of Los Angeles River, at San Fernando Mission, Los Angeles County.*

Date.	Hydrographer.	Dis-charge.
1901.		<i>Sec.-feet.</i>
Jan. 28	J. B. Lippincott	3.21

#### SAN FRANCISQUITO CREEK.

*Discharge measurement of San Francisquito Creek at junction with Santa Clara River, Los Angeles County.*

Date.	Hydrographer.	Dis-charge.
1898.		<i>Sec.-feet.</i>
Aug. 11	F. H. Olmsted	2.07

#### SAN GABRIEL RIVER.

The drainage basin of this river lies on the southern slope of the Sierra Madre, the watershed 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 appear lower down in the valley. The floods discharge into the Pacific Ocean through a number of poorly defined storm channels. All the summer flow of this stream is now used for irrigation purposes in the vicinity of Azusa. Owing to the numerous diversions, it has been difficult to obtain accurate discharge measurements, 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 head works 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 low water is measured at this point. The capacity of the conduit is 90 second-feet. The gaging station on the main river is located at the mouth of the canyon. The equipment consists of a rod, a cable, a car, and a tagged wire.

*Discharge measurements of San Gabriel River at point near mouth of canyon near Azusa, Los Angeles County, Cal.*

Date.	Hydrographer.	Gage height.	Dis-charge.	Remarks.
1895.		<i>Feet.</i>	<i>Sec.-feet.</i>	
Sept. 10	J. B. Lippincott	1.19	34.93	Total flow, meter measurement.
Nov. 5	do		13.25	Total flow.
Dec. 11	do		0.00	River.
Do	do		37.50	Canals.
Dec. 21	do	1.9	27.30	River.
Do	do		26.60	Canals.
	Total		53.90	
Dec. 21	J. B. Lippincott		27.05	River.
Do	do		26.60	Canals.
	Total		53.65	
1896.				
Feb. 17	J. B. Lippincott	1.35	4.86	River.
Do	do		33.00	Canals.
	Total		37.86	
Mar. 22	J. B. Lippincott	2.27	69.91	River.
Do	do		35.20	Canals.
	Total		105.11	
Apr. 30	J. B. Lippincott		0.00	River.
Do	do		55.20	Canals.
June 17	do		25.14	Irrigators upper weir.
Do	do		19.94	River.
Do	do		3.99	Azusa irrigation development.
Do	do		1.54	Vineland tunnel.
	Total		25.47	
July 22	John H. Quinton		0.00	River.
Do	do		26.75	Canals.
Nov. 22	J. B. Lippincott		0.00	
Do	do		21.10	Canals.

*Discharge measurements of San Gabriel River, etc.—Continued.*

Date.	Hydrographer.	Gage height.	Dis-charge.	Remarks.
1897.		<i>Feet.</i>	<i>Sec.-feet.</i>	
Jan. 10	J. B. Lippincott	1.28	4.50	River.
Do	do		19.93	Canals.
Do	do		1.65	Vineland canal water.
	Total		26.08	
Jan. 25	J. B. Lippincott	2.00	57.79	River.
Do	do		16.20	Canals.
Do	do		1.13	Vineland canal water.
	Total		75.12	
Feb. 1	J. B. Lippincott	5.1	1,725.0	River.
Do	do		00.0	Canals.
Feb. 2	do	3.4	422.1	River.
Do	do		00.0	Canals.
Mar. 12	do	3.3	410.1	River.
Do	do		18.0	Canals.
	Total		428.1	
Apr. 29	J. B. Lippincott	2.6	162.30	River.
Do	do		71.27	Canals.
	Total		233.57	
May 24	J. B. Lippincott	2.08	76.00	River.
Do	do		67.90	Canals.
	Total		143.90	
June 30	A. Q. Campbell		0.00	River.
Do	do		55.68	Canals.
July 5	do		0.00	River.
Do	do		53.94	Canals.
Aug. 7	do		0.00	River.
Do	do	2.33	31.37	Canals.
Sept. 1	do		0.00	River.
Do	do	2.2	24.25	Canals.
Sept. 29	do		0.00	River.
Do	do	2.1	19.28	Canals.
Nov. 13	do		7.56	River.
Do	do		24.16	Canals.
	Total		31.72	



*Discharge measurements of San Gabriel River, etc.—Continued.*

Date.	Hydrographer.	Gage height.	Dis-charge.	Remarks.
1897.		<i>Feet.</i>	<i>Sec.-feet.</i>	
Nov. 27	J. B. Lippincott		3.50	River.
Do	do		32.89	Canals.
	Total		36.39	
Nov. 28	J. B. Lippincott		42.11	At San Gabriel Power Com- pany's intake; total flow.
1898.				
Jan. 12	do	1.36	23.29	River.
Do	do		25.00	Canals.
	Total		48.29	
Mar. 8	H. F. Crowe		12.3	Duarte canal.
Do	do		36.9	Azusa canal.
	Total river		49.2	
Apr. 2	J. B. Lippincott		11.30	Duarte canal.
Do	do		29.92	Azusa canal.
	Total river		41.22	
May 10	J. B. Lippincott		0	River.
Do	do		23.34	Canals.
May 17	do	1.03	15.40	River.
Do	do		44.61	Canals.
	Total		60.01	
July 1	F. H. Olmsted		3.59	Duarte canal.
Do	do		11.78	Azusa canal at Slaughter- house tunnel.
	Total river		15.37	
July 21	J. B. Lippincott		0	River.
Do	do		13.21	San Gabriel Power Com- pany's canal headworks.
Aug. 16	do		0	Power Co.'s headworks; 3 p. m.
Do	do		6.20	Canals; 3 p. m.
Do	do		5.78	Canals; 4 p. m.
Do	do		5.60	Canals; 5 p. m.
Do	do		5.60	Canals; 6 p. m.
Do	do		5.78	Canals; 7 p. m.
Aug. 21	do		5.78	Canals; 8 p. m.

*Discharge measurements of San Gabriel River, etc.—Continued.*

Date.	Hydrographer.	Gage height.	Discharge.	Remarks.
1898.		<i>Feet.</i>	<i>Sec.-feet.</i>	
Aug. 22	J. B. Lippincott		0.00	River; 8 p.m.
Do	do		6.20	Canals; 8 p.m.
Aug. 23	do		0	River; 10 a.m.
Do	do		8.48	Daily maximum; 10 a.m.
1899.				
Jan. 11	do	1.16	15.9	River.
Do	do		5.0	Waste.
Do	do		28.3	Canals.
	Total		49.2	
Jan. 16 to 19.	H. F. Parkinson		18.00	River and canals.
Aug. 26	do		5.5	Canals; no water in river.
1900.				
Nov. 21	S. G. Bennett		0	River; 11 a.m.
Do	do		20.15	Waste.
Do	do		26.13	Canal.
	Total		46.28	
1901.				
Jan. 7	S. G. Bennett	6.16	2,709.0	River (calculated).
Do	do		0	Canals.
Feb. 4	do	2.30	112.0	River.
Do	do		65.0	Canals.
	Total		177.0	
Feb. 5	S. G. Bennett	7.6	6,253.0	River (calculated).
Do	do		0	Canals.
Feb. 22	do	4.1	700.4	River.
Do	do		65.0	Canals.
	Total		765.4	
Mar. 5	S. G. Bennett	3.00	248.0	River.
Do	do		65.0	Canals.
	Total		313.0	

*Discharge measurements of San Gabriel River, etc.—Continued.*

Date.	Hydrographer.	Gage height.	Dis-charge.	Remarks.
1901.		<i>Feet.</i>	<i>Sec. feet.</i>	
Mar. 29	S. G. Bennett .....	2.25	96.5	River.
Do	do .....		33.0	Canal.
	Total .....		129.5	
July 11	S. G. Bennett .....		0	River.
Do	do .....		31.6	Canal.
1902.				
Jan. 25	W. B. Clapp .....		0	River.
Do	do .....		50.94	Canals.
Feb. 26	J. B. Lippincott .....	2.05	126.19	River.
Do	do .....		64.00	Canal.
	Total .....		190.19	
Mar. 6	J. Ahern .....	1.57	46.2	River.
Do	do .....		62.0	Canals.
	Total .....		108.2	
Apr. 8	S. G. Bennett .....	1.4	26.0	River.
Do	do .....		44.6	Canals.
	Total .....		70.6	
June 12	S. G. Bennett .....		0	River.
Do	do .....		25.7	Canals.
Sept. 1	W. B. Clapp .....		5.0	Total flow.

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec. feet.</i>	
June 17, 1896	J. B. Lippincott .....	3.99	Azusa Irrigators Development Tunnel.
Aug. 24, 1898	do .....	.22	Same place; river being diverted through power company's conduit.
Do	do .....	.30	Irrigators Development Tunnel, pumped; additional.

*Discharge measurements of San Gabriel River, Azusa, Los Angeles County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
June 17, 1896	J. B. Lippincott	1.54	Mouth of Vineland tunnel.
Do	do	2.11	Same; pump running.
Apr. 29, 1897	do	2.23	Mouth of Vineland tunnel.
Do	do	2.11	Same; shaft No. 2.
Do	do	2.13	Same; at head of flume, between shafts Nos. 3 and 4.
Do	do	1.07	Same; right fork, above shaft No. 4.
May 24, 1897	do	1.88	Mouth of Vineland Tunnel.

*Discharge measurements of San Gabriel River at intake of San Gabriel Power Company, Los Angeles County.*

[Measurements by Edison Electric Company. The flow was unusually small in September, 1898, and these measurements were made to determine this minimum and its hourly fluctuation.]

Date.	Dis-charge.	Date.	Dis-charge.
	<i>Sec.-feet.</i>		<i>Sec.-feet.</i>
September 15, 1898:		September 15, 1898—Cont'd.	
7 a. m.	8.16	6 p. m.	6.94
7.30 a. m.	8.28	6.30 p. m.	6.94
8 a. m.	8.40	12-hour mean	7.99
8.30 a. m.	8.50		
9 a. m.	8.72	September 15, 1898:	
9.30 a. m.	8.84	7 p. m.	6.94
10 a. m.	8.84	7.30 p. m.	6.94
10.30 a. m.	8.84	8 p. m.	6.94
11 a. m.	8.84	8.30 p. m.	6.94
11.30 a. m.	8.72	9 p. m.	7.04
12 m.	8.62	9.30 p. m.	7.04
12.30 p. m.	8.40	10 p. m.	7.04
1 p. m.	8.28	10.30 p. m.	7.04
1.30 p. m.	8.06	11 p. m.	7.04
2 p. m.	7.84	11.30 p. m.	7.04
2.30 p. m.	7.62	12 midnight	7.04
3 p. m.	7.50	September 16, 1898:	
3.30 p. m.	7.40	12.30 a. m.	7.04
4 p. m.	7.18	1 a. m.	7.04
4.30 p. m.	7.04	1.30 a. m.	7.18
5 p. m.	6.94	2 a. m.	7.18
5.30 p. m.	6.94	2.30 a. m.	7.28

*Discharge measurements of San Gabriel River, etc.—Continued.*

Date.	Dis-charge.	Date	Dis-charge.
September 16, 1898—Cont'd.	<i>Sec. feet.</i>	September 16, 1898—Cont'd.	<i>Sec. feet.</i>
3 a. m. ....	7.40	5.30 p. m. ....	6.82
3.30 a. m. ....	7.50	6 p. m. ....	6.82
4 a. m. ....	7.62	6.30 p. m. ....	6.82
4.30 a. m. ....	7.72	12-hour mean ....	8.02
5 a. m. ....	7.84	September 16, 1898:	
5.30 a. m. ....	7.96	7 p. m. ....	6.72
6 a. m. ....	8.06	7.30 p. m. ....	6.60
6.30 a. m. ....	8.06	8 p. m. ....	6.60
12-hour mean ....	7.29	8.30 p. m. ....	6.60
September 16, 1898:		9 p. m. ....	6.60
7 a. m. ....	8.28	9.30 p. m. ....	6.60
7.30 a. m. ....	8.40	10 p. m. ....	6.50
8 a. m. ....	8.28	10.30 p. m. ....	6.50
8.30 a. m. ....	8.50	11 p. m. ....	6.60
9 a. m. ....	8.72	11.30 p. m. ....	6.60
9.30 a. m. ....	8.94	12 midnight ....	6.72
10 a. m. ....	9.06	September 17, 1898:	
10.30 a. m. ....	9.06	12.30 a. m. ....	6.82
11 a. m. ....	8.94	1 a. m. ....	6.82
11.30 a. m. ....	8.84	1.30 a. m. ....	6.82
12 m. ....	8.72	2 a. m. ....	6.94
12.30 p. m. ....	8.50	2.30 a. m. ....	7.04
1 p. m. ....	8.28	3 a. m. ....	7.04
1.30 p. m. ....	8.06	3.30 a. m. ....	7.04
2 p. m. ....	7.84	4 a. m. ....	7.00
2.30 p. m. ....	7.62	4.30 a. m. ....	6.92
3 p. m. ....	7.50	5 a. m. ....	7.40
3.30 p. m. ....	7.40	5.30 a. m. ....	7.50
4 p. m. ....	7.18	6 a. m. ....	7.62
4.30 p. m. ....	7.04	6.30 a. m. ....	7.72
5 p. m. ....	6.94	12-hour mean ....	6.89

The following table is prepared from measurements made three times daily for the San Gabriel Electric Company, and filed in a suit before the United States land office at Los Angeles, Cal. The mean of the three daily measurements is here given.

*Estimated daily discharge, in second-feet, of San Gabriel River over weir on West Branch of North Fork, at Sycamore Flat, for 1900.*

[Observer, San Gabriel Power Company.]

Day.	July.	August.	September.	October.
1.....		0.23	0.19	0.20
2.....	0.28	.23	.19	.12
3.....	.27	.23	.17	.18
4.....	.27	.26	.22	.18
5.....	.26	.17	.12	.23
6.....	.28	.23	.12	.23
7.....	.24	.23	.22	.19
8.....	.23	.22	.18	.19
9.....	.25	.12	.20	.19
10.....	.23	.12	.22	.19
11.....	.25	.19	.22	.19
12.....	.25	.19	.22	.19
13.....	.22	.19	.22	.22
14.....	.27	.19	.18	.....
15.....	.27	.15	.18	.....
16.....	.31	.26	.12	.....
17.....	.31	.23	.12	.....
18.....	.27	.23	.25	.....
19.....	.31	.23	.15	.....
20.....	.39	.22	.12	.....
21.....	.39	.22	.15	.....
22.....	.24	.22	.12	.....
23.....	.26	.22	.15	.....
24.....	.26	.22	.22	.....
25.....	.28	.22	.27	.....
26.....	.37	.23	.26	.....
27.....	.37	.18	.26	.....
28.....	.26	.18	.22	.....
29.....	.23	.25	.20	.....
30.....	.23	.20	.17	.....
31.....	.23	.....	.....	.....
Total .....	.28	.21	.19	.19

*Estimated daily discharge, in second-feet, of San Gabriel River over weir on North Branch of North Fork, at Sycamore Flat, for 1900.*

[Observer, San Gabriel Power Company.]

Day.	July.	August.	September.	October.
1		0.89	0.62	0.65
2	0.92	.89	.62	.72
3	.92	.89	.62	.68
4	.92	.95	.62	.68
5	.89	.95	.60	.68
6	.89	.74	.65	.68
7	.89	.74	.61	.56
8	.82	.74	.61	.56
9	.80	.77	.83	.56
10	.70	.77	.61	.57
11	.81	.74	.61	.59
12	.83	.74	.63	.59
13	.86	.77	.61	.59
14	.95	.68	.63	
15	.97	.74	.63	
16	.97	.62	.59	
17	.97	.65	.59	
18	.97	.65	.59	
19	.97	.62	.59	
20	.97	.60	.59	
21	.97	.60	.53	
22	.96		.53	
23	1.07	.55	.53	
24	.95	.52	.81	
25	.95	.52	.68	
26	.96	.56	.65	
27	.68	.57	.65	
28	.68	.57	.68	
29	.89	.57	.68	
30	.86	.74	.68	
31	.68			
Total	.89	.70	.63	.62

*Estimated daily discharge, in second-feet, of San Gabriel River over weir on West Fork above mouth of North Fork for 1900.*

[Observer, San Gabriel Power Company.]

Day.	July.	August.	September.	October.
1	0.55	0.05	0.12	0.16
2	.62	.02	.12	.16
3	.68		.12	.16
4	.62		.12	.16
5	.53		.08	.15
6	.55		.11	.20
7	.55		.16	.20
8	.55		.12	.16
9	.44		.12	.16
10	.34		.16	.13
11	.29		.16	.20
12	.26	.08	.12	.20
13	.24	.07	.12	.20
14	.20	.08	.16	
15	.13	.08	.16	
16	.12	.12	.16	
17	.16	.10	.16	
18	.16	.12	.11	
19	.12	.10	.12	
20	.12	.12	.12	
21	.07	.12	.16	
22	.12	.10	.16	
23		.07		
24		.08		
25	.08	.08	.12	
26			.20	
27		.08	.16	
28	.05	.08	.16	
29	.08	.10	.13	
30	.05	.12	.14	
31	.05	.10		
Total	.29	.09	.14	.17



*Estimated daily discharge, in second-feet, of San Gabriel River over weir on Cold-water Creek,  $2\frac{1}{2}$  miles above mouth, for 1900.*

[Observer, San Gabriel Power Company.]

Day.	July.	August.	September.	October.
1		0. 43	0. 52	
2			. 58	0. 60
3		. 49	. 62	. 62
4		. 46	. 57	. 61
5		. 54	. 55	. 63
6		. 53	. 56	. 61
7		. 50	. 51	. 58
8		. 50	. 51	. 58
9		. 53	. 56	. 58
10		. 53	. 50	. 55
11		. 53	. 55	. 60
12		. 51	. 52	. 60
13		. 46		. 64
14		. 47		
15		. 45		
16		. 45		
17		. 47		
18		. 47		
19		. 52		
20		. 55		
21		. 56		
22		. 51		
23		. 49		
24		. 45		
25		. 44		
26		. 45		
27	0. 37	. 42		
28	. 49	. 42		
29	. 50	. 41		
30	. 47	. 40		
31	. 46	. 56		
Total	. 46	. 48	. 55	. 60

*Estimated daily discharge, in second-feet, of San Gabriel River over weir 100 yards above Fish Fork, for 1900.*

[Observer, San Gabriel Power Company.]

Day.	July.	August.	September.	October.
1	2.24			1.67
2	2.48			1.67
3	2.48	1.72		1.71
4	2.42	1.80		1.84
5	2.33	1.80		1.84
6	2.27	1.80		1.80
7	2.06	1.80		1.72
8	2.12	1.80		1.67
9	2.09	1.80	1.84	1.71
10	2.15	1.80	1.80	1.71
11	2.09	1.80	1.72	1.75
12	2.15	1.97	1.76	1.76
13	2.15	1.92	1.72	1.89
14	2.03	1.85	1.76	
15	2.03	1.80	1.76	
16	2.12	1.68	1.80	
17	2.00	1.76	1.71	
18	2.00	1.68	1.72	
19	1.97	1.68	1.72	
20	1.97	1.64	1.68	
21	2.00	1.68	1.59	
22	2.00	1.68	1.63	
23	2.00	1.68	1.79	
24	1.97	1.68	1.89	
25	2.18	1.76	1.84	
26	2.00	1.68	1.84	
27	2.00	1.60	1.67	
28	1.95	1.60	1.63	
29	1.77	1.68	1.67	
30	1.77	1.68	1.79	
31		1.97		
Total	2.09	1.75	1.74	1.75

*Estimated daily discharge, in second-feet, of San Gabriel River over weir on Fish Fork, 100 yards from mouth, for 1900.*

[Observer, San Gabriel Power Company.]

Day.	July.	August.	September.	October.
1	1.42			0.95
2	1.66			.90
3	1.68	0.99		.95
4	1.66	.96		.96
5	1.28	1.02		.93
6	1.25	1.06		.93
7	1.16	1.06		.93
8	1.18	.92		.93
9	1.08	.95	1.52	.90
10	.98	1.02	.92	.89
11	.96	.99	.96	.95
12	.98	1.11	1.13	.95
13	.98	1.11	1.10	1.01
14	1.04	1.02	.99	
15	1.02	.99	1.08	
16	1.25	.90	.94	
17	.93	.90	.93	
18	1.00	.84	.89	
19	1.00	.84	.86	
20	1.00	.95	.84	
21	1.12	.89	.84	
22	1.12	.90	.80	
23	1.13	.90	.98	
24	1.06	.90	1.02	
25	1.02	.92	1.01	
26	.90	.92	.98	
27	.90	.92	.78	
28	.90	.92	.80	
29	.87	.99	.81	
30	.87	.95	.84	
31		1.08		
Total	1.11	.96	.96	.94

*Estimated daily discharge, in second-feet, of San Gabriel River over weir on Iron Fork, 100 yards from mouth, for 1900.*

[Observer, San Gabriel Power Company.]

Day.	July.	August.	September.	October.
1.....	1.97			1.05
2.....	1.97	0.87		1.08
3.....	2.03	1.05		1.05
4.....	2.09	1.09		1.12
5.....	1.89	1.16		1.20
6.....	1.91	1.16		1.12
7.....	1.83	.62		1.09
8.....	1.66	1.16		1.16
9.....	1.55	1.12	1.09	1.12
10.....	1.58	1.16	1.12	1.09
11.....	1.50	1.24	1.12	1.20
12.....	1.39	1.06	1.09	1.20
13.....	1.42	1.09	1.09	1.23
14.....	1.42	1.20	1.12	1.31
15.....	1.44	1.24	1.16	
16.....	1.42	1.12	1.09	
17.....	1.42	1.12	1.16	
18.....	1.37	1.09	1.09	
19.....	1.37	1.09	1.09	
20.....	1.42	1.16	1.05	
21.....	1.31	1.12	.91	
22.....	1.34	1.12	.87	
23.....	1.37	1.02	1.12	
24.....	1.24	1.02	1.27	
25.....	1.29	.95	1.20	
26.....	1.24	.95	1.20	
27.....	1.26	.95	1.05	
28.....	1.21	1.02	1.01	
29.....	1.09	1.09	1.01	
30.....	1.14	1.09	1.16	
31.....	1.24	1.12		
Total.....	1.50	1.07	1.09	1.14

*Discharge measurements of San Gabriel River at point above Iron Fork.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
November, 1896 .....	F. C. Finkle .....	7.7
December, 1896 .....	do .....	7.4
January, 1897 .....	do .....	28.4
February, 1897 .....	do .....	42.0
March, 1897 .....	do .....	52.1
April, 1897 .....	do .....	27.9
May, 1897 .....	do .....	24.7
June, 1897 .....	do .....	25.4
July, 1897 .....	do .....	17.8
August, 1897 .....	do .....	16.4
September, 1897 .....	do .....	16.5
April, 1900 .....	J. B. Lippincott et al .....	5.76

*Discharge measurements of Iron Fork of San Gabriel River at mouth.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
November, 1896 .....	F. C. Finkle .....	5.6
December, 1896 .....	do .....	3.0
January, 1897 .....	do .....	10.1
February, 1897 .....	do .....	18.3
March, 1897 .....	do .....	18.9
April, 1897 .....	do .....	10.2
May, 1897 .....	do .....	8.9
June, 1897 .....	do .....	7.7
July, 1897 .....	do .....	8.6
August, 1897 .....	do .....	3.9
September, 1897 .....	do .....	4.1
April, 1900 .....	J. B. Lippincott et al .....	1.69

*Discharge measurements of North Fork of San Gabriel River.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
November, 1896	F. C. Finkle	3.7
December, 1896	do	3.6
January, 1897	do	10.8
February, 1897	do	17.0
March, 1897	do	19.4
April, 1897	do	13.8
May, 1897	do	11.2
June, 1897	do	7.1
July, 1897	do	5.9
August, 1897	do	4.1
September, 1897	do	3.9
April, 1900	J. B. Lippincott et al	1.43

*Discharge measurements of Coldwater Creek, San Gabriel River, Los Angeles County, Cal.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
November, 1896	F. C. Finkle	4.1
December, 1896	do	4.2
January, 1897	do	11.3
February, 1897	do	19.1
March, 1897	do	17.8
April, 1897	do	11.3
May, 1897	do	9.8
June, 1897	do	8.3
July, 1897	do	6.5
August, 1897	do	5.1
September, 1897	do	5.0
April, 1900	J. B. Lippincott et al	1.46

*Discharge measurements of Bear Creek, San Gabriel River, Los Angeles County, Cal.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
November, 1896 .....	F. C. Finkle .....	3.3
December, 1896 .....	do .....	3.4
January, 1897 .....	do .....	9.1
February, 1897 .....	do .....	24.7
March, 1897 .....	do .....	23.9
April, 1897 .....	do .....	17.3
May, 1897 .....	do .....	14.1

*Discharge measurements of Bear Creek, San Gabriel River, at point near mouth, Los Angeles County, Cal.*

Date	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
June, 1897 .....	F. C. Finkle .....	6.3
July, 1897 .....	do .....	6.2
August, 1897 .....	do .....	4.4
September, 1897 .....	do .....	4.5
April, 1900 .....	J. B. Lippincott et al .....	2.42

*Discharge measurement of West Fork of San Gabriel River above Bear Creek, Los Angeles County, Cal.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
April, 1900 .....	J. B. Lippincott et al .....	1.80

*Discharge measurement of West Fork of San Gabriel above junction with East Fork, or Main River, Los Angeles County, Cal.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
August 23, 1898 .....	J. B. Lippincott .....	2.67

*Discharge measurement of East Fork of San Gabriel above junction with West Fork, Los Angeles County, Cal.*

Date.	Hydrographer.	Dis-charge.
August 23, 1898.....	J. B. Lippincott.....	<i>Sec.-feet.</i> 7.11

*Discharge measurement of San Gabriel River at junction of East and West forks.*

Date.	Hydrographer.	Dis-charge.
August 23, 1898.....	J. B. Lippincott.....	<i>Sec.-feet.</i> 9.78
Do.....	do.....	<i>a</i> 8.42
Loss.....		1.36

*a* San Gabriel River at headworks of San Gabriel Power Company.

*Discharge measurement of Cattle Canyon above Coldwater, San Gabriel River, Los Angeles County, Cal.*

Date.	Hydrographer.	Dis-charge.
April, 1900.....	J. B. Lippincott et al.....	<i>Sec.-feet.</i> 0.32

*Discharge measurements of San Gabriel River at various points in watershed below El Monte Narrows.*

Date.	Hydrographer.	Dis-charge.	Locality.
July 3, 1898	F. H. Olmsted	<i>Sec.-feet.</i> 2.52	Whittier ditch, El Monte road crossing.
Do.....	do.....	9.06	Temple ditch, left of Narrows flume.
Do.....	do.....	8.79	Baldwin ranch house road.
Do.....	do.....	6.18	Original river channel.
Do.....	do.....	3.36	Campers station.
Do.....	do.....	1.22	Puente ditch: 50 per cent of usual head in ditch.
Do.....	do.....	29.79	Old mission bridge (Rio Hondo).
	Total.....	60.92	



*Discharge measurements of San Gabriel River at various points in watershed.*

Date.	Hydrographer.	Locality.	Area of section.	Mean velocity.	Discharge.
1897.			<i>Sq. feet.</i>	<i>Ft. per sec.</i>	<i>Sec. feet.</i>
Dec. 5	J. B. Lippincott	San Gabriel River, Los Angeles and Whittier road bridge.			106
1900.					
Aug. 7	S. G. Bennett	East Whittier ditch at El Monte road crossing.	4.08	1.4	5.71
Aug. 7	do	Killion's pumping plant, 4 wells near El Monte.	5.76	1.774	10.22
Aug. 7	do	Cameron or Sheep Creek ditch.	9.62	.25	2.46
Aug. 7	do	Rincon ditch	1.99	1.24	2.47
Aug. 7	do	Old Temple ditch	1.22	.98	1.20
Aug. 7	do	Cate ditch, near head	9.47	.92	8.71
Aug. 7	do	Standifer ditch	9.34	1.557	14.56
Aug. 7	do	Banta ditch	11.45	1.349	15.44
		Total, San Gabriel River at intake of Standifer and Banta ditches.			30.00
Aug. 8	do	Rodriguez ditch, near Old Mission.	1.20	1.67	2.00
Aug. 8	do	Rio Honda or Old San Gabriel, under Mission bridge.	31.42	.74	23.28
Aug. 8	do	Arroyo ditch	11.90	1.83	21.08
Aug. 8	do	Little Lake	.60	.37	.22
Aug. 8		"Agricultural ditch			Dry.
Sept. 17	W. W. Cockins	Bradbury ranch, Santa Anita, and Rose avenues.			1.44
Sept. 17	do	San Gabriel Sanitarium tunnel.			.04
Sept. 18	do	W. A. Highland, Rose avenue, Lamanda Park.			.10
Sept. 19	do	Chapman ranch, 2 wells pumped; 1 artesian well.			1.01
Sept. 19	do	Chapman ranch, 4 wells pumped.			1.90
Sept. 20	do	Chapman ranch, natural flow of cienaga.			.07
Sept. 20	do	Chapman ranch dairy	.52	1.38	.72
		Chapman ranch, total			3.70

"San Gabriel River dry below this point.

*Discharge measurements of San Gabriel River, etc.—Continued.*

Date.	Hydrographer.	Locality.	Area of section.	Mean velocity.	Discharge.
1900.			<i>Sq. feet.</i>	<i>Ft. per sec.</i>	<i>Sec.-feet.</i>
Sept. 20	W. W. Cockins	Alhambra Water Co., weir No. 1.			2.58
Sept. 20	do	Alhambra Water Co., weir No. 2.			.34
		Total			2.92
Sept. 24	do	Santa Anita Canyon, natural flow.			.22
Sept. 24	do	Sierra Madre Water Co. (weir).			.145
Sept. 24	do	Remamettes east of Sierra Madre.	0.12	0.75	.09
Sept. 18	do	Monrovia Water Co., 3 wells pumped.			3.24
Sept. 24	do	Monrovia Canyon, to Monrovia Water Co. (weirs).			.428
		To Bradbury			.116
		Total			.544
Sept. 21	do	Duarte Mutual Improvement and Canal Co.			.78
Sept. 21	do	Beardsley Water Co.			.44
Sept. 13	do	Morengo Water Co. Southern Pacific Co.'s Garfield station (weir).			1.82
Sept. 13	do	Morengo Water Co.'s weir in Morengo Canyon (weir).			.46
Sept. 13	do	Los Robles Water Co.'s reservoir (weir).			.31
Sept. 13	do	Reservoir at junction of Glenarm and Los Robles avenues, Pasadena (weir).			.068
Sept. 13	do	Graves & Bean tunnel.	2.06	5.34	1.10
Sept. 14	do	Brick kiln between Molino and Hope streets, Pasadena.			.02
Sept. 14	do	Oak Knoll Park, Pasadena.	.096	3.53	.34
Sept. 14	do	Patton tunnel, near Kewen Lake.	.047	3.80	.18
Sept. 14	do	Patton's east canyon	.87	1.70	1.48
Sept. 17	do	Patton's east canyon, natural flow; pump not running.	.36	1.03	.37

*Discharge measurements of San Gabriel River, etc.—Continued.*

Date.	Hydrographer.	Locality.	Area of section.	Mean velocity.	Dis-charge.
1900.			<i>Sq. feet.</i>	<i>Ft. per sec.</i>	<i>Sec.-feet.</i>
Sept. 17	W. W. Cockins	Mission ditch, Patton ranch.			0.20
Sept. 14	do	Winston ranch	0.60	0.93	.56
Sept. 14	do	Shorbes ranch (weir)			.18
Sept. 15	do	Y oak ham's ranch (weir).			.12
Sept. 15	do	Robert Liddel, San Pasqual and Shorb (weir).			.10
Sept. 15	do	R. W. Scoville (weir)			.07
Sept. 15	do	Mrs. Black, San Pasqual and Craig streets (weir).			.07
Sept. 15	do	Morningside ranch (weir).			.04
Sept. 27	do	Glendora, Azusa Irrigation Co.:			
		Massey well			1.50
		Paine well			.90
		Total			2.40
Sept. 27	Irwin F. Daniels	Wells in San Diemas wash:			
Sept. 27	do	Daty & Sons			1.80
Sept. 27	do	San Diemas Irrigation Co., F. D.			
Sept. 27	do	Smith well			1.20
Sept. 27	do	Thacker well			.80
Sept. 27	do	Smith well (private).			.30
Sept. 27	do	Chapman well			.70
Sept. 27	do	Ruddock well			.50
Sept. 27	do	Artesian Belt Co., 2 wells.			1.60
Sept. 27	do	Azusa city well			.50
Sept. 27	do	Walker's well			.90
Sept. 27	do	Citizens' Water Co. (Covina).			.10
Sept. 27	do	Covina plant, Deacon well.			.44
Sept. 27	do	Natural flow, San Diemas Canyon.			.04
Sept. 27	do	Spark's well			.40
		Total			11.38

*Discharge measurements of San Gabriel River at wells on Lordsburg Mesa.*

Date.	Hydrographer.	Locality.	Area of section.	Mean velocity.	Discharge.
			<i>Sq. feet.</i>	<i>Ft. pr. sec.</i>	<i>Sec.-feet.</i>
Sept. 27	Irwin F. Daniels	Richards, 4 wells			1.52
Sept. 27	do	Sumner			.48
Sept. 27	do	Sheldon Bros			.30
Sept. 27	do	La Verne Land and Water Co.			.70
Sept. 27	do	Rodgers			.10
Sept. 27	do	True (5 days in 30)			.16
Sept. 27	do	Rodney Soper			.24
Sept. 27	do	Hayes & Stratton			.20
Sept. 27	do	Wallace			.16
Sept. 27	do	Mullard			.30
Sept. 27	do	Douglas & McQuilly			.76
Sept. 27	do	Norris			.30
Sept. 27	do	Williams Bros			.80
Sept. 27	do	Kulp (intermittent), south of Mesa avenue.			.20
Sept. 27	do	D. Fulton			.50
Sept. 27	do	Steves			.20
Sept. 27	do	Daniels & Overholtzer			1.34
Sept. 27	do	Massey, 2 wells			.54
Sept. 27	do	Hauser Bros			.76
Sept. 27	do	Moorwaw & Son			.50
Sept. 27	do	Sleider			.88
Sept. 27	do	Rutherford & Co			.40
Sept. 27	do	New Deal Water Co			.40
Sept. 27	do	Kiser			.90
		Total			12.64

*Estimated monthly discharge of San Gabriel River at Azusa, Los Angeles County.*

[Drainage area, 222 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1894.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
May .....	50	27	32	1,968	0.14	0.16
June .....	27	17	23	1,369	.10	.11
July .....	17	9	12	738	.05	.06
August .....	27	10	14	861	.06	.07
September .....	23	13	15	893	.07	.08
October .....	16	13	14	861	.06	.07
November 1 to 15.....	14	13	13	387	.06	.03
1895.						
August 8 to 31.....	47	38	42	1,999	.19	.17
September .....	39	29	32	1,904	.14	.16
October .....	32	27	29	1,783	.13	.15
November .....	50	29	40	2,380	.18	.20
December .....	45	37	42	2,582	.19	.22
1896.						
January .....	25	0	11	676	0.05	0.06
February .....	28	3	12	690	.05	.06
March .....	134	27	75	4,612	.34	.39
April .....	46	0	11	655	.05	.06
May .....	0	0	0	0	0	0
June .....	0	0	0	0	0	0
July .....	0	0	0	0	0	0
August .....	0	0	0	0	0	0
September .....	0	0	0	0	0	0
October .....	177	0	12	738	.05	.06
November .....	16	0	3	179	.01	.01
December .....	12	0	2	123	.01	.01
The year .....	177	0	11	7,673	.05	.65

NOTE.—During the summer months all this water is diverted by the canals. For 1894 and 1895 the above table is for the total discharge from the drainage basin. Subsequent to 1895 the table shows the separate flow in river and canals, except where combined and so stated.

*Estimated monthly discharge of San Gabriel River at Azusa, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1897.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	130	5	40	2,484	0.181	0.201
February .....	1,710	46	332	18,420	1.494	1.555
March .....	1,765	275	448	27,572	2.020	2.329
April .....	345	141	259	15,417	1.166	1.301
May .....	141	28	82	5,042	.369	.420
June .....	28	.2	5	274	.021	.024
July .....	0	0	0	0	0	.000
August .....	0	0	0	0	0	.000
September .....	0	0	0	0	0	.000
October .....	1,600	0	72	4,458	.322	.372
November .....	15	.4	8	475	.036	.040
December .....	5	3.0	4	221	.016	.018
The year .....	1,765	0	104	74,302	.469	6.260
1898.						
January .....	31	0	14	863	0.06	0.07
February .....	41	0	11	622	.05	.05
March .....	1	0	0.03	2	0	0
April .....	0	0	0	0	0	0
May .....	63	0	4.5	277	.02	.02
June .....	0	0	0	0	0	0
July .....	0	0	0	0	0	0
August .....	0	0	0	0	0	0
September .....	0	0	0	0	0	0
October .....	0	0	0	0	0	0
November .....	0	0	0	0	0	0
December .....	0	0	0	0	0	0
The year .....	63	0	2.5	1,764	.01	.14

*Estimated monthly discharge of San Gabriel River at Azusa, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1899.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	16	0	1.2	74	0.005	0.005
February .....	0	0	0	0	0	0
March .....	0	0	0	0	0	0
April .....	0	0	0	0	0	0
May .....	0	0	0	0	0	0
June .....	0	0	0	0	0	0
July .....	0	0	0	0	0	0
August .....	0	0	0	0	0	0
September .....	0	0	0	0	0	0
October .....	13	0	.42	26	0.002	.002
November .....	0	0	0	0	0	0
December .....	0	0	0	0	0	0
The year .....	16	0	.13	100	.007	.007
1900.						
January .....	49	0	2	123	0.01	0.01
February .....	0	0	0	0	0	0
March .....	0	0	0	0	0	0
April .....	0	0	0	0	0	0
May .....	38	0	2	123	.01	.01
June .....	0	0	0	0	0	0
July .....	0	0	0	0	0	0
August .....	0	0	0	0	0	0
September .....	0	0	0	0	0	0
October .....	0	0	0	0	0	0
November .....	5,168	0	172	10,235	0.17	0.85
December .....	0	0	0	0	0	0
The year .....	5,168	0	15	10,481	.07	.87

*Estimated monthly discharge of San Gabriel River at Azusa, etc.—Continued.*

Month.	Discharge.				Total discharge.	Per square mile.	Depth.
	Maximum.	Minimum.	Mean.				
1901.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>	
January	1,450	0	111	6,825	0.50	0.58	
February	2,600	70	613	34,044	2.76	2.87	
March	370	80	158	9,715	.71	.82	
April	75	13	43	2,559	.19	.21	
May	200	18	55	3,382	.25	.29	
June	27	0	7	417	.03	.03	
July	0	0	0	0	0	0	
August	0	0	0	0	0	0	
September	0	0	0	0	0	0	
October	70	0	3	184	.01	.01	
November	0	0	0	0	0	0	
December	0	0	0	0	0	0	
The year	2,600	0	83	57,126	.37	4.81	
1902.							
January	0	0	0	0			
February	57	0	3	167			
March	318	4	38	2,337			
April	37	0	7	417			
May	0	0	0	0			
June	0	0	0	0			
July	0	0	0	0			
August	0	0	0	0			
September	0	0	0	0			
October	0	0	0	0			
November	0	0	0	0			
December	0	0	0	0			
The year	318	0	4	2,921			



*Estimated monthly discharge of San Gabriel canals at Azusa, Los Angeles County.*

[Drainage area, 222 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1896.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	26	26	26	1,599	0.12	0.14
February .....	34	26	30	1,726	.14	.15
March .....	43	35	36	2,214	.16	.18
April .....	45	40	43	2,559	.19	.21
May .....	42	29	36	2,214	.16	.18
June .....	27	13	19	1,131	.09	.10
July .....	15	9	12	738	.05	.06
August .....	36	9	14	861	.06	.07
September .....	19	11	13	774	.06	.07
October .....	17	10	11	676	.05	.06
November .....	24	15	17	1,012	.08	.09
December .....	25	18	20	1,230	.09	.10
The year .....	45	9	23	16,734	.10	1.41
1897.						
January .....	22	13	17.56	1,072	0.079	0.091
February .....	20	3	13.10	726	.059	.061
March .....	21	0	17.14	1,051	.077	.089
April .....	60	15	35.30	2,102	.159	.177
May .....	68	55	62.97	3,810	.284	.328
June .....	71	54	63.20	3,759	.285	.317
July .....	52	27	38.13	2,343	.171	.197
August .....	34	22	26.45	1,613	.118	.136
September .....	23	18	20.66	1,226	.088	.098
October .....	26	10	18.03	1,106	.081	.093
November .....	29	16	23.30	1,385	.105	.109
December .....	29	25	26.84	1,648	.121	.139
The year .....	71	0	30.20	21,831	.136	1.835

*Estimated monthly discharge of San Gabriel canals at Azusa, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1898.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	32	23	26	1,591	0.12	0.14
February .....	34	10	29	1,618	.13	.14
March .....	48	28	35	2,129	.16	.18
April .....	37	25.3	33	1,950	.15	.17
May .....	45	20.0	32	1,947	.14	.16
June .....	30	14.5	19	1,159	.09	.10
July .....	14	9.0	11	672	.05	.06
August .....	9	5.0	7	456	.03	.03
September .....	10	6.1	8	467	.04	.04
October .....	10	7.5	9	533	.04	.04
November .....	11	8.0	10	580	.04	.04
December .....	18	11.7	14	832	.06	.07
The year .....	48	5.0	19.4	13,934	.09	1.17
1899.						
January .....	33	15	21.8	1,340	0.098	0.115
February .....	27	20	22.0	1,244	.102	.106
March .....	40	18	26.0	1,623	.119	.137
April .....	28	16	21.0	1,262	.096	.107
May .....	17	12	14.0	842	.062	.071
June .....	22	5	10.0	565	.043	.048
July .....	4	3	4.0	221	.016	.018
August .....	6	4	5.0	295	.022	.025
September .....	6	3	4.0	220	.019	.021
October .....	26	4	11.1	683	.050	.058
November .....	24	10	14.0	847	.064	.071
December .....	39	16	20.0	1,247	.091	.105
The year .....	40	3	14.4	10,389	.065	.882

*Estimated monthly discharge of San Gabriel canals at Azusa, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1900.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	50	22	30	1,845	0.14	0.16
February .....	23	18	20	1,111	.09	.09
March .....	30	16	20	1,230	.09	.10
April .....	26	13	17	1,012	.08	.09
May .....	56	16	35	2,152	.16	.18
June .....	22	8	15	893	.07	.08
July .....	10	4	6	369	.03	.03
August .....	5	4	4	246	.02	.02
September .....	6	3	4	238	.02	.02
October .....	6	4	5	307	.02	.02
November .....	55	5	14	833	.06	.07
December 1 to 16 .....	53	31	40	1,269	.18	.11
The year .....	55	3	18	11,505	.08	.97
1901.						
January .....	90	0	58	3,566	0.26	0.30
February .....	70	5	67	3,721	.30	.31
March .....	70	35	63	3,874	.28	.32
April .....	84	55	67	3,987	.30	.33
May .....	72	59	66	4,058	.30	.35
June .....	66	41	56	3,332	.25	.28
July .....	41	24	30	1,845	.14	.16
August .....	27	15	20	1,230	.09	.10
September .....	20	15	17	1,012	.08	.09
October .....	64	0	21	1,291	.09	.10
November .....	50	29	32	1,904	.14	.16
December .....	30	26	27	1,660	.12	.14
The year .....	90	0	44	31,480	.20	2.64

*Estimated monthly discharge of San Gabriel canals at Azusa, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1902.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	51	24	28	1,722	-----	-----
February .....	63	27	34	1,888	-----	-----
March .....	62	55	61	3,750	-----	-----
April .....	62	46	59	3,510	-----	-----
May .....	48	30	39	2,398	-----	-----
June .....	29.5	13.5	20	1,190	-----	-----
July .....	17	7.5	11	676	-----	-----
August .....	8.5	6	7	430	-----	-----
September .....	6	4.5	5	298	-----	-----
October .....	10.5	5.5	7	430	-----	-----
November .....	62	7.5	19	1,131	-----	-----
December .....	68	16	32	1,968	-----	-----
The year .....	68	4.5	27	19,391	-----	-----

*Estimated monthly discharge of San Gabriel River and canals at Azusa, Los Angeles County.*

[Drainage area, 222 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1896.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	51	26	37	2,275	0.17	0.20
February .....	61	36	41	2,358	.18	.19
March .....	169	37	111	6,825	.50	.58
April .....	91	40	54	3,213	.24	.27
May .....	40	29	36	2,214	.16	.18
June .....	27	13	19	1,131	.09	.10
July .....	15	9	12	738	.05	.06
August .....	36	9	14	861	.06	.07
September .....	19	11	13	774	.06	.07
October .....	188	10	24	1,476	.11	.13
November .....	40	15	19	1,131	.09	.10
December .....	37	17	22	1,353	.10	.12
The year .....	188	9	34	24,349	.15	2.07

*Estimated monthly discharge of San Gabriel River and canals at Azusa, Los Angeles County—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1897.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	147	25	57.9	3,617	0.260	0.292
February .....	1,713	64	344.8	19,146	1.553	1.579
March .....	1,765	294	465.6	28,623	2.097	2.418
April .....	370	201	294.4	17,519	1.325	1.478
May .....	196	94	145.0	8,851	.653	.748
June .....	91	54	67.8	4,033	.306	.341
July .....	52	27	38.1	2,343	.171	.197
August .....	34	22	26.4	1,613	.118	.136
September .....	23	18	20.7	1,226	.088	.098
October .....	1,640	22	90.5	5,564	.403	.465
November .....	34	31	33.3	1,860	.141	.149
December .....	34	28	30.5	1,875	.137	.158
The year .....	1,765	18	134.6	96,270	.604	8.059
1898.						
January .....	63	28	40	2,453	0.18	0.20
February .....	70	32	40	2,241	.18	.19
March .....	48	28	35	2,131	.16	.18
April .....	37	25.3	33	1,950	.15	.17
May .....	83	25.0	36	2,223	.16	.19
June .....	30	14.5	19	1,159	.09	.10
July .....	14	9.0	11	672	.05	.06
August .....	9	5.0	7	456	.03	.04
September .....	10	6.1	8	467	.04	.04
October .....	10	7.5	9	533	.04	.05
November .....	11	8.0	10	580	.04	.05
December .....	18	11.7	14	832	.06	.07
The year .....	83	5.0	22	15,697	.10	1.34

*Estimated monthly discharge of San Gabriel River and canals at Azusa, Los Angeles County—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1899.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	33	15	23	1,414	0.104	0.120
February .....	28	20	22	1,244	.102	.106
March .....	40	18	26	1,623	.119	.137
April .....	28	16	21	1,262	.096	.107
May .....	17	12	14	842	.062	.071
June .....	22	5	10	565	.043	.048
July .....	4	3	4	221	.016	.018
August .....	6	4	5	295	.022	.025
September .....	6	3	4	220	.019	.021
October .....	26	4	11	709	.050	.058
November .....	24	10	14	847	.064	.071
December .....	39	16	20	1,247	.091	.105
The year .....	40	3	5	10,489	.065	.887
1900.						
January .....	89	22	32	1,968	0.14	0.16
February .....	23	18	20	1,111	.09	.09
March .....	30	16	20	1,230	.09	.10
April .....	26	13	17	1,012	.08	.09
May .....	86	16	37	2,275	.17	.20
June .....	22	8	15	893	.07	.08
July .....	10	4	6	369	.03	.03
August .....	5	4	4	246	.02	.02
September .....	6	3	4	238	.02	.02
October .....	6	4	5	307	.02	.02
November .....	5,200	5	186	11,068	.84	.93
December 1 to 16 .....	53	31	40	1,269	.18	.11
The year .....	5,200	3	32	21,986	.15	1.85

*Estimated monthly discharge of San Gabriel River and canals at Azusa, Los Angeles County—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1901.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	1,450	28	169	10,391	0.76	0.87
February .....	2,605	137	680	37,765	3.06	3.19
March .....	440	135	221	13,589	1.00	1.15
April .....	130	95	110	6,545	.50	.56
May .....	272	83	121	7,440	.55	.63
June .....	93	41	63	3,749	.28	.31
July .....	41	24	30	1,845	.14	.16
August .....	27	15	20	1,230	.09	.10
September .....	20	15	17	1,012	.08	.09
October .....	122	15	24	1,476	.11	.13
November .....	50	29	32	1,904	.14	.16
December .....	30	26	27	1,660	.12	.14
The year .....	2,605	15	126	88,606	.57	7.49
1902.						
January .....	51	24	28	1,722	0.13	0.15
February .....	120	38	37	2,055	.17	.17
March .....	378	63	99	6,087	.45	.52
April .....	99	48	66	3,927	.30	.33
May .....	48	30	39	2,398	.17	.20
June .....	29.5	13.5	20	1,190	.09	.10
July .....	17	7.5	11	676	.05	.06
August .....	8.5	6	7	430	.03	.03
September .....	6	4.5	5	298	.02	.02
October .....	10.5	5.5	7	430	.03	.03
November .....	80	7.5	19	1,131	.09	.10
December .....	68	16	32	1,968	.14	.16
The year .....	378	4.5	31	22,312	.14	1.87

## SAN GREGORIO CREEK.

*Discharge measurement of San Gregorio Creek, San Mateo County.*

Date.	Hydrographer.	Dis-charge.	Locality.
1893.		<i>Sec. ft.</i>	
Oct. 17	W. W. Brier .....	6.49	One-third mile above San Gregorio.

## SAN JOAQUIN RIVER.

The headwater tributaries of this river receive the drainage from the crests of the Sierra Nevada north of Mount Whitney. The fall of the river is rapid, with many favorable locations for power development, and in one case advantage has been taken of the fall on the North Fork, and a power plant constructed, developing electric power for transmission to Fresno and Hanford, Cal. During 1899 a second storage reservoir was under course of construction on the North Fork, which will tend further to regulate the flow of the river. No permanent diversions above the gaging station are made, but the water is extensively used below for irrigation purposes. The gage rod at the station was established by 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. This necessitated a new gage rod, which was set to the datum of the old gage and 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 of sand and gravel.

*Discharge measurements of San Joaquin River at Herndon, Fresno County, Cal.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1895.		<i>Feet.</i>	<i>Sec.-feet.</i>
Jan. 9	A. P. Davis and J. B. Lippincott .....	4	1,995
Mar. 22	J. B. Lippincott .....	3.85	1,938
May 5	do .....	6.65	7,419
June 23	do .....	8.00	11,225
Aug. 31	do .....	3.00	677
Oct. 11	do .....	2.6	382
Nov. 25	do .....	2.55	270
1896.			
Apr. 13	J. A. Vogleson .....	4.1	2,406
June 11	J. B. Lippincott .....	9.33	15,942
Nov. 2	do .....	2.75	424



*Discharge measurements of San Joaquin River at Herndon, etc.—Continued.*

Date.	Hydrographer	Gage height.	Discharge.
1897.		<i>Feet.</i>	<i>Sec.-feet.</i>
Feb. 14	J. B. Lippincott	3.58	1,117
May 31	do	8.60	10,500
July 16	A. Q. Campbell	4.5	3,223
Sept. 8	do	2.66	271
Nov. 2	do	2.92	515
Dec. 21	J. B. Lippincott	3.00	699
1898.			
Apr. 19	J. B. Lippincott	5.42	4,162
May 30	do	4.58	2,235
July 28	do	3	611
Sept. 2	do	2.52	328
Dec. 20	do	2.5	287
1899.			
Mar. 5	J. B. Lippincott	3.25	786
Apr. 18	S. G. Bennett	6.34	5,310
May 13	do	<sup>a</sup> 7	7,435
June 2	do	5.76	4,177
June 27	do	4.90	2,922
Aug. 1	do	3.32	743
Sept. 8	do	2.67	196
1900.			
Feb. 2	J. B. Lippincott	3.25	1,003
Apr. 3	S. G. Bennett	4.66	2,641
May 15	do	5.91	4,448
June 18	do	5.67	3,710
Aug. 9	do	2.83	466
Sept. 1	do	2.50	246
Sept. 28	do	2.33	197
Dec. 30	do	3.33	614
1901.			
Jan. 30	S. G. Bennett	4	1,357
Mar. 2	do	6.8	6,179
Apr. 3	do	5	3,357
July 31	do	5.67	3,909
Oct. 16	do	2.25	352
1902.			
May 14	S. G. Bennett	7.35	7,381
Sept. 11	L. M. Lawson		323

<sup>a</sup> Gage height at beginning, 6.75; at ending, 7.25

*Discharge measurements of San Joaquin River, Fresno County.*

Date.	Hydrographer.	Dis-charge.	Locality.
1899.		<i>Sec.-feet.</i>	
Sept. 8	S. G. Bennett -----	269	500 feet above Pollasky Bridge.
1900.			
Sept. 28	S. G. Bennett -----	188	Do.
Sept. 28	J. S. Eastwood -----	188	
1901.			
Oct. 16	S. G. Bennett -----	315	At Pollasky Ford.
1900.			
Aug. 31	E. G. Hamilton ----	31	South Fork at Blaney Meadows.
1902.			
Sept. 27	S. G. Bennett -----	589	Above railroad bridge near Lathrop, San Joaquin County.
Sept. 6	E. T. Perkins -----	7	Granite Creek 100 feet below sheep bridge.
Sept. 7	do -----	342	150 yards below junction Jackass Creek.
Sept. 7	do -----	3	Jackass Creek 50 feet above junction with San Joaquin.
Sept. 8	do -----	148	Middle Fork 100 yards above Miller Bridge.
Sept. 10	do -----	51	Mono Creek at Trail Crossing.
Sept. 10	do -----	107	South Fork at Trail Crossing.
Sept. 10	do -----	9	Big Creek at dam site of J. S. Eastwood.
Sept. 8	L. M. Lawson -----	309	Pollasky.
Sept. 9	do -----	18	Canal at Reservoir, North Fork, at San Joaquin power house.
Sept. 10	do -----	310	San Joaquin Electric Co.'s power house.
Sept. 12	do -----	25	Below dam at Mendota.
Sept. 12	do -----	260	Miller and Lux Canal at small dam.
Sept. 12	do -----	265	Miller and Lux canal at bridge near dredger.

## County.

[Drainage area, 1,637 square miles.]

Month.	1878. <i>a</i>			1879. <i>a</i>			1880. <i>a</i>		
	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.
The year.	11,640	260	2,063	11,640	260	2,063	11,640	260	2,063
	4,700	700	1,140	4,700	700	1,140	4,700	700	1,140
	420	370	411	420	370	411	420	370	411
	480	260	373	480	260	373	480	260	373
	480	310	381	480	310	381	480	310	381
	1,300	550	786	1,300	550	786	1,300	550	786
	4,460	1,300	2,303	4,460	1,300	2,303	4,460	1,300	2,303
	11,640	4,200	6,379	11,640	4,200	6,379	11,640	4,200	6,379
	10,030	2,850	5,302	10,030	2,850	5,302	10,030	2,850	5,302
	8,560	2,360	3,849	8,560	2,360	3,849	8,560	2,360	3,849
	3,340	1,300	1,953	3,340	1,300	1,953	3,340	1,300	1,953
	5,420	620	1,276	5,420	620	1,276	5,420	620	1,276
The year.	3,010	370	609	3,010	370	609	3,010	370	609
	3,340	1,300	1,953	3,340	1,300	1,953	3,340	1,300	1,953
	8,560	2,360	3,849	8,560	2,360	3,849	8,560	2,360	3,849
	10,030	2,850	5,302	10,030	2,850	5,302	10,030	2,850	5,302
	11,640	4,200	6,379	11,640	4,200	6,379	11,640	4,200	6,379
	4,460	1,300	2,303	4,460	1,300	2,303	4,460	1,300	2,303
	1,300	550	786	1,300	550	786	1,300	550	786
	480	310	381	480	310	381	480	310	381
	480	260	373	480	260	373	480	260	373
	420	370	411	420	370	411	420	370	411
	4,700	700	1,140	4,700	700	1,140	4,700	700	1,140
	4,700	700	1,140	4,700	700	1,140	4,700	700	1,140
Discharge.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.
	25,600	370	4,367	25,600	370	4,367	25,600	370	4,367
	6,730	395	2,001	6,730	395	2,001	6,730	395	2,001
Run-off.	Per square mile.	Depth.		Per square mile.	Depth.		Per square mile.	Depth.	
	19,636	0.20	0.22	19,636	0.20	0.22	19,636	0.20	0.22
	25,210	.25	.29	25,210	.25	.29	25,210	.25	.29
January	1,020	770	825	1,020	770	825	1,020	770	825
	2,360	770	942	2,360	770	942	2,360	770	942
	1,640	1,120	1,229	1,640	1,120	1,229	1,640	1,120	1,229
	15,580	1,300	4,846	15,580	1,300	4,846	15,580	1,300	4,846
	25,000	5,420	13,170	25,000	5,420	13,170	25,000	5,420	13,170
	25,600	14,180	18,120	25,600	14,180	18,120	25,600	14,180	18,120
	14,650	3,350	8,010	14,650	3,350	8,010	14,650	3,350	8,010
	4,700	840	1,730	4,700	840	1,730	4,700	840	1,730
	840	550	734	840	550	734	840	550	734
	480	380	422	480	380	422	480	380	422
	450	370	380	450	370	380	450	370	380
	6,730	395	2,001	6,730	395	2,001	6,730	395	2,001
February	1,020	770	825	1,020	770	825	1,020	770	825
	2,360	770	942	2,360	770	942	2,360	770	942
	1,640	1,120	1,229	1,640	1,120	1,229	1,640	1,120	1,229
	15,580	1,300	4,846	15,580	1,300	4,846	15,580	1,300	4,846
	25,000	5,420	13,170	25,000	5,420	13,170	25,000	5,420	13,170
	25,600	14,180	18,120	25,600	14,180	18,120	25,600	14,180	18,120
	14,650	3,350	8,010	14,650	3,350	8,010	14,650	3,350	8,010
	4,700	840	1,730	4,700	840	1,730	4,700	840	1,730
	840	550	734	840	550	734	840	550	734
	480	380	422	480	380	422	480	380	422
	450	370	380	450	370	380	450	370	380
	6,730	395	2,001	6,730	395	2,001	6,730	395	2,001
March	1,020	770	825	1,020	770	825	1,020	770	825
	2,360	770	942	2,360	770	942	2,360	770	942
	1,640	1,120	1,229	1,640	1,120	1,229	1,640	1,120	1,229
	15,580	1,300	4,846	15,580	1,300	4,846	15,580	1,300	4,846
	25,000	5,420	13,170	25,000	5,420	13,170	25,000	5,420	13,170
	25,600	14,180	18,120	25,600	14,180	18,120	25,600	14,180	18,120
	14,650	3,350	8,010	14,650	3,350	8,010	14,650	3,350	8,010
	4,700	840	1,730	4,700	840	1,730	4,700	840	1,730
	840	550	734	840	550	734	840	550	734
	480	380	422	480	380	422	480	380	422
	450	370	380	450	370	380	450	370	380
	6,730	395	2,001	6,730	395	2,001	6,730	395	2,001
April	1,020	770	825	1,020	770	825	1,020	770	825
	2,360	770	942	2,360	770	942	2,360	770	942
	1,640	1,120	1,229	1,640	1,120	1,229	1,640	1,120	1,229
	15,580	1,300	4,846	15,580	1,300	4,846	15,580	1,300	4,846
	25,000	5,420	13,170	25,000	5,420	13,170	25,000	5,420	13,170
	25,600	14,180	18,120	25,600	14,180	18,120	25,600	14,180	18,120
	14,650	3,350	8,010	14,650	3,350	8,010	14,650	3,350	8,010
	4,700	840	1,730	4,700	840	1,730	4,700	840	1,730
	840	550	734	840	550	734	840	550	734
	480	380	422	480	380	422	480	380	422
	450	370	380	450	370	380	450	370	380
	6,730	395	2,001	6,730	395	2,001	6,730	395	2,001
May	1,020	770	825	1,020	770	825	1,020	770	825
	2,360	770	942	2,360	770	942	2,360	770	942
	1,640	1,120	1,229	1,640	1,120	1,229	1,640	1,120	1,229
	15,580	1,300	4,846	15,580	1,300	4,846	15,580	1,300	4,846
	25,000	5,420	13,170	25,000	5,420	13,170	25,000	5,420	13,170
	25,600	14,180	18,120	25,600	14,180	18,120	25,600	14,180	18,120
	14,650	3,350	8,010	14,650	3,350	8,010	14,650	3,350	8,010
	4,700	840	1,730	4,700	840	1,730	4,700	840	1,730
	840	550	734	840	550	734	840	550	734
	480	380	422	480	380	422	480	380	422
	450	370	380	450	370	380	450	370	380
	6,730	395	2,001	6,730	395	2,001	6,730	395	2,001
June	1,020	770	825	1,020	770	825	1,020	770	825
	2,360	770	942	2,360	770	942	2,360	770	942
	1,640	1,120	1,229	1,640	1,120	1,229	1,640	1,120	1,229
	15,580	1,300	4,846	15,580	1,300	4,846	15,580	1,300	4,846
	25,000	5,420	13,170	25,000	5,420	13,170	25,000	5,420	13,170
	25,600	14,180	18,120	25,600	14,180	18,120	25,600	14,180	18,120
	14,650	3,350	8,010	14,650	3,350	8,010	14,650	3,350	8,010
	4,700	840	1,730	4,700	840	1,730	4,700	840	1,730
	840	550	734	840	550	734	840	550	734
	480	380	422	480	380	422	480	380	422
	450	370	380	450	370	380	450	370	380
	6,730	395	2,001	6,730	395	2,001	6,730	395	2,001
July	1,020	770	825	1,020	770	825	1,020	770	825
	2,360	770	942	2,360	770	942	2,360	770	942
	1,640	1,120	1,229	1,640	1,120	1,229	1,640	1,120	1,229
	15,580	1,300	4,846	15,580	1,300	4,846	15,580	1,300	4,846
	25,000	5,420	13,170	25,000	5,420	13,170	25,000	5,420	13,170
	25,600	14,180	18,120	25,600	14,180	18,120	25,600	14,180	18,120
	14,650	3,350	8,010	14,650	3,350	8,010	14,650	3,350	8,010
	4,700	840	1,730	4,700	840	1,730	4,700	840	1,730
	840	550	734	840	550	734	840	550	734
	480	380	422	480	380	422	480	380	422
	450	370	380	450	370	380	450	370	380
	6,730	395	2,001	6,730	395	2,001	6,730	395	2,001
August	1,020	770	825	1,020	770	825	1,020	770	825
	2,360	770	942	2,360	770	942	2,360	770	942
	1,640	1,120	1,229	1,640	1,120	1,229	1,640	1,120	1,229
	15,580	1,300	4,846	15,580	1,300	4,846	15,580	1,300	4,846
	25,000	5,420	13,170	25,000	5,420	13,170	25,000	5,420	13,170
	25,600	14,180	18,120	25,600	14,180	18,120	25,600	14,180	18,120
	14,650	3,350	8,010	14,650	3,350	8,010	14,650	3,350	8,010
	4,700	840	1,730	4,700	840	1,730	4,700	840	1,730
	840	550	734	840	550	734	840	550	734
	480	380	422	480	380	422	480	380	422
	450	370	380	450	370	380	450	370	380
	6,730	395	2,001	6,730	395	2,001	6,730	395	2,001
September	1,020	770	825	1,020	770	825	1,020	770	825
	2,360	770	942	2,360	770	942	2,360	770	942
	1,640	1,120	1,229	1,640	1,120	1,229	1,640	1,120	1,229
	15,580	1,300	4,846	15,580	1,300	4,846	15,580	1,300	4,846
	25,000	5,420	13,170	25,000	5,420	13,170	25,000	5,420	13,170
	25,600	14,180	18,120	25,600	14,180	18,120	25,600	14,180	18,120
	14,650	3,350	8,010	14,650	3,350	8,010	14,650	3,350	8,010
	4,700	840	1,730	4,700	840	1,730	4,700	840	1,730
	840	550	734	840	550	734	840	550	734
	480	380	422	480	380	422	480	380	422
	450	370	380	450	370	380	450	370	380
	6,730	395	2,001	6,730	395	2,001	6,730	395	2,001
October	1,020	770							

*Estimated monthly discharge of San Joaquin River at Hamptonville, Fresno County—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1881. <sup>a</sup>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January	59,800	1,024	3,856	237,096	2.35	2.71
February	22,450	2,440	6,340	352,106	3.87	4.03
March	6,570	2,440	2,855	175,547	1.74	2.01
April	13,250	5,900	8,008	476,509	4.89	5.45
May	16,500	5,900	9,095	559,230	5.56	6.41
June	9,230	4,300	5,948	353,931	3.63	4.05
July	5,180	2,200	3,064	188,398	1.87	2.16
August	1,640	760	1,260	77,474	.77	.89
September	760	490	584	34,750	.36	.40
October	490	430	463	28,469	.28	.32
November	530	380	461	27,431	.28	.31
December	2,740	340	632	38,860	.39	.45
The year	59,800	340	3,547	2,549,801	2.17	29.19
1882. <sup>a</sup>						
January	330	290	303	18,631	0.19	0.22
February	520	280	330	18,327	.20	.21
March	3,890	340	1,522	93,584	.93	1.07
April	7,360	2,540	3,409	202,849	2.08	2.32
May	12,860	7,360	8,850	544,165	5.41	6.23
June	13,980	4,280	7,867	468,119	4.81	5.36
July	6,900	700	2,918	179,421	1.78	2.05
August	1,630	450	591	36,339	.36	.42
September <sup>b</sup>			240	14,281	.15	.17
October <sup>b</sup>			564	34,679	.34	.39
November <sup>b</sup>			490	29,157	.30	.33
December <sup>b</sup>			320	19,676	.20	.23
The year			2,370	1,659,228	1.40	19.00

<sup>a</sup>Authority, California State engineering department.

<sup>b</sup>Estimated from previous measurements and neighboring streams.

*Estimated monthly discharge of San Joaquin River at Hamptonville, Fresno County—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1883. <sup>a</sup>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January <sup>b</sup>			320	19,676	0.20	0.23
February <sup>b</sup>			320	17,771	.20	.21
March <sup>b</sup>			1,150	70,711	.70	.81
April <sup>b</sup>			2,130	126,744	1.30	1.45
May <sup>b</sup>			7,370	453,164	4.50	5.19
June <sup>b</sup>			6,220	370,116	3.80	4.24
July <sup>b</sup>			1,470	90,387	.90	1.04
August <sup>b</sup>			490	30,129	.30	.35
September <sup>b</sup>			410	24,397	.25	.28
October <sup>b</sup>			330	20,291	.20	.23
November <sup>b</sup>			250	14,876	.15	.17
December <sup>b</sup>			250	15,372	.15	.17
The year			1,726	1,253,634	1.05	14.37
1884. <sup>a</sup>						
January <sup>b</sup>			410	25,210	0.25	0.29
February <sup>b</sup>			2,460	141,501	1.50	1.62
March <sup>b</sup>			4,090	251,484	2.50	2.88
April <sup>b</sup>			3,270	194,578	2.00	2.23
May <sup>b</sup>			8,190	503,583	5.00	5.76
June <sup>b</sup>			16,400	975,868	10.02	11.18
July <sup>b</sup>			13,100	805,488	8.00	9.22
August <sup>b</sup>			3,270	201,064	2.00	2.31
September <sup>b</sup>			980	58,314	.60	.67
October <sup>b</sup>			820	50,420	.50	.58

<sup>a</sup> Authority. California State engineering department.

<sup>b</sup> Estimated from previous measurements and neighboring streams.

*Estimated monthly discharge of San Joaquin River at Herndon, Fresno County.*

[Drainage area, 1,637 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1895.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	11,225	1,260	2,881	177,146	1.76	2.03
February .....	8,500	909	2,568	142,619	1.57	1.63
March .....	9,318	1,554	2,779	170,874	1.70	1.96
April .....	9,863	3,354	5,834	347,147	3.56	3.97
May .....	19,960	5,100	13,124	806,963	8.02	9.24
June .....	14,250	7,250	10,674	635,147	6.52	7.27
July .....	8,000	2,148	4,528	278,416	2.77	3.20
August .....	2,301	793	1,417	87,128	.87	1.00
September .....	8,500	260	1,085	64,562	.66	.73
October .....	1,260	260	420	25,825	.26	.30
November .....	426	260	362	21,540	.22	.24
December .....	677	260	373	22,935	.23	.26
The year .....	19,960	260	3,837	2,780,302	2.25	31.83
1896.						
January .....	12,800	250	2,119	130,335	1.29	1.49
February .....	1,750	950	1,177	67,696	.72	.77
March .....	12,176	1,180	2,612	160,649	1.60	1.84
April .....	5,648	1,920	2,675	159,192	1.64	1.83
May .....	18,800	2,560	5,394	331,700	3.30	3.81
June .....	16,920	6,544	11,799	702,106	7.21	8.00
July .....	8,080	1,600	4,177	256,865	2.55	3.04
August .....	1,300	700	1,048	64,463	.64	.74
September .....	1,180	80	534	31,817	.33	.37
October .....	700	80	167	10,275	.10	.12
November .....	2,390	430	697	41,492	.43	.48
December .....	1,750	430	666	40,957	.41	.47
The year .....	18,800	80	2,756	1,997,547	1.69	22.96

*Estimated monthly discharge of San Joaquin River at Herndon, Fresno County—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1897.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	1, 180	535	655	40, 275	0. 40	0. 46
February .....	15, 660	1, 180	2, 598	144, 286	1. 59	1. 66
March .....	4, 600	1, 675	2, 325	142, 960	1. 42	1. 64
April .....	11, 708	2, 305	6, 541	389, 216	4. 00	4. 46
May .....	18, 600	9, 565	13, 545	832, 855	8. 27	9. 54
June .....	12, 332	2, 390	5, 862	348, 812	3. 57	3. 98
July .....	4, 300	1, 300	2, 493	153, 290	1. 52	1. 75
August .....	1, 300	590	898	55, 216	. 55	. 63
September .....	535	105	227	13, 507	. 14	. 16
October .....	820	105	279	17, 155	. 17	. 20
November .....	4, 300	120	872	51, 887	. 53	. 59
December .....	4, 000	<sup>a</sup> 513	995	61, 180	. 61	. 70
The year .....	18, 600	105	3, 108	2, 250, 639	1. 90	25. 77
1898.						
January .....	763	530	658	40, 459	0. 40	0. 46
February .....	1, 425	530	842	46, 762	. 51	. 54
March .....	1, 242	763	908	55, 831	. 56	. 64
April .....	5, 846	1, 018	2, 944	175, 180	1. 80	2. 01
May .....	5, 141	2, 262	3, 206	197, 131	1. 96	2. 26
June .....	3, 744	1, 730	2, 718	161, 732	1. 66	1. 85
July .....	1, 730	530	959	58, 967	. 59	. 68
August .....	610	350	480	29, 514	. 29	. 33
September .....	1, 882	220	363	21, 600	. 22	. 24
October .....	763	350	509	31, 297	. 31	. 36
November .....	350	290	308	18, 327	. 19	. 21
December .....	1, 181	240	384	23, 611	. 24	. 26
The year .....	5, 846	220	1, 190	860, 411	. 73	9. 84

<sup>a</sup> Minimum of 60 second-feet given in Nineteenth Ann. Rept. is error.

*Estimated monthly discharge of San Joaquin River at Herndon, Fresno County—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1899.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	1, 170	170	463	28, 469	0. 28	0. 32
February .....	1, 060	350	645	35, 821	. 39	. 41
March .....	16, 206	692	2, 689	165, 341	1. 64	1. 89
April .....	7, 354	2, 030	4, 233	251, 880	2. 59	2. 88
May .....	7, 090	1, 830	3, 730	229, 350	2. 28	2. 63
June .....	9, 070	2, 620	5, 700	339, 173	3. 48	3. 88
July .....	3, 105	955	1, 664	104, 284	1. 02	1. 18
August .....	745	250	428	26, 317	. 26	. 30
September .....	220	70	152	9, 045	. 09	. 10
October .....	776	69	214	13, 158	. 13	. 15
November .....	1, 175	130	565	33, 620	. 34	. 39
December .....	4, 775	220	1, 018	62, 595	. 62	. 71
The year .....	16, 206	69	1, 792	1, 299, 053	1. 09	14. 84
1900.						
January .....	15, 932	745	2, 244	137, 978	1. 37	1. 58
February .....	745	355	534	29, 657	. 33	. 34
March .....	2, 780	640	1, 748	107, 480	1. 07	1. 23
April .....	2, 780	1, 520	2, 060	122, 578	1. 26	1. 41
May .....	9, 730	2, 170	5, 725	352, 016	3. 50	4. 04
June .....	8, 674	3, 620	5, 728	340, 840	3. 50	3. 90
July .....	3, 445	630	1, 642	100, 962	1. 00	1. 15
August .....	630	240	390	23, 980	. 24	. 28
September .....	240	180	204	12, 139	. 13	. 14
October .....	990	180	451	27, 730	. 28	. 32
November .....	20, 780	240	1, 834	109, 130	1. 12	1. 25
December .....	1, 285	745	1, 033	63, 517	. 63	. 72
The year .....	20, 780	180	1, 966	1, 428, 007	1. 20	16. 36



*Estimated monthly discharge of San Joaquin River at Herndon, Fresno County—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1901.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acres.-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	21,372	810	3,506	215,576	2.14	2.47
February .....	12,940	1,550	4,983	276,742	3.04	3.17
March .....	6,830	2,480	4,191	257,695	2.56	2.95
April .....	12,400	1,930	4,680	278,479	2.86	3.18
May .....	17,870	4,775	10,935	672,367	6.68	7.71
June .....	15,662	7,882	11,998	713,930	7.33	8.17
July .....	14,294	3,110	3,466	213,116	2.12	2.45
August .....	5,850	500	2,373	145,910	1.45	1.67
September .....	500	360	399	23,742	.24	.27
October .....	2,480	340	489	30,067	.30	.35
November .....	1,550	500	702	41,772	.43	.48
December .....	2,060	460	872	53,617	.53	.61
The year .....	21,372	340	4,050	2,923,013	2.47	33.48

*Discharge measurements of Chiquita San Joaquin River, Madera County.*

Date.	Hydrographer.	Discharge.
Sept. 27, 1900	J. S. Eastwood .....	<i>Sec.-feet.</i> 22.6

**SAN JOSE CREEK.**

*Discharge measurements of San Jose Creek, Santa Barbara County.*

Date.	Hydrographer.	Discharge.
Aug. —, 1889	G. F. Wright .....	<i>Sec.-feet.</i> 0.27

The following measurements of San Jose Creek were made by Charles J. Johansen for the Pacific Improvement Company. The pipe line along the West Fork of San Jose Creek was not carrying water in the year 1890.

The point of measurement of the West Fork was a short distance above its junction with the East Fork, or main stream. The main stream, or East Fork, of San Jose Creek was gaged a short distance above its junction with the West Fork, and the pipe line along this stream was not carrying water in the year 1890.

*List of discharge measurements of San Jose Creek, Santa Barbara County.*

Date.	Hydrographer.	Dis-charge.	Locality.
1890.		<i>Sec.-feet.</i>	
Feb. 4	Charles J. Johansen	1.57	West Fork at mouth.
Feb. 15	do	.54	Do.
Feb. 28	do	.94	Do.
Mar. 1	do	.60	Do.
Mar. 3	do	.60	Do.
Mar. 5	do	.54	Do.
Mar. 7	do	.54	Do.
Mar. 9	do	.50	Do.
Mar. 11	do	.50	Do.
Mar. 13	do	.44	Do.
Mar. 15	do	.44	Do.
Mar. 17	do	.44	Do.
Mar. 19	do	.50	Do.
Mar. 21	do	.44	Do.
Mar. 23	do	.40	Do.
Mar. 25	do	.40	Do.
Mar. 27	do	.40	Do.
Mar. 29	do	.40	Do.
Mar. 31	do	.40	Do.
Apr. 2	do	.40	Do.
Apr. 4	do	.40	Do.
Apr. 6	do	.40	Do.
Apr. 8	do	.40	Do.
Apr. 10	do	.35	Do.
Apr. 12	do	.40	Do.
Apr. 14	do	.40	Do.
Apr. 15	do	.32	Do.
Apr. 17	do	.29	Do.
Apr. 19	do	.32	Do.
Apr. 21	do	.32	Do.
Apr. 23	do	.32	Do.
Apr. 25	do	.32	Do.
Apr. 27	do	.32	Do.
Apr. 29	do	.35	Do.

*List of discharge measurements of San Jose Creek, etc.—Continued.*

Date.	Hydrographer.	Dis-charge.	Locality.
1890.		<i>Sec.-feet.</i>	
May 1	Charles J. Johanson	0.32	West Fork at mouth.
May 3	do	.26	Do.
May 5	do	.32	Do.
May 7	do	.32	Do.
May 9	do	.26	Do.
May 11	do	.26	Do.
May 12	do	.23	Do.
May 13	do	.26	Do.
May 15	do	.23	Do.
May 17	do	.26	Do.
May 19	do	.26	Do.
May 21	do	.23	Do.
May 23	do	.23	Do.
May 25	do	.23	Do.
May 27	do	.23	Do.
May 29	do	.23	Do.
May 31	do	.21	Do.
June 2	do	.21	Do.
June 4	do	.21	Do.
June 6	do	.21	Do.
June 8	do	.18	Do.
June 10	do	.23	Do.
June 12	do	.21	Do.
June 14	do	.21	Do.
June 16	do	.27	Do.
June 18	do	.21	Do.
June 20	do	.19	Do.
June 22	do	.21	Do.
June 24	do	.17	Do.
June 26	do	.19	Do.
June 28	do	.20	Do.
June 30	do	.20	Do.
July 2	do	.17	Do.
July 4	do	.17	Do.
July 6	do	.18	Do.
July 8	do	.17	Do.
July 10	do	.17	Do.
July 12	do	.17	Do.
July 14	do	.16	Do.

*List of discharge measurements of San Jose Creek, etc.—Continued.*

Date.	Hydrographer.	Dis-charge.	Locality.
1890.		<i>Sec.-feet.</i>	
July 16	Charles J. Johansen	0.16	West Fork at mouth.
July 18	do	.14	Do.
July 20	do	.16	Do.
July 22	do	.14	Do.
July 24	do	.17	Do.
July 26	do	.16	Do.
July 28	do	.17	Do.
July 30	do	.17	Do.
Aug. 1	do	.17	Do.
Aug. 2	do	.17	Do.
Aug. 3	do	.17	Do.
Aug. 4	do	.17	Do.
Aug. 6	do	.17	Do.
Aug. 8	do	.17	Do.
Mar. 1	do	6.38	East Fork above West Fork.
Mar. 3	do	5.76	Do.
Mar. 5	do	5.17	Do.
Mar. 7	do	4.88	Do.
Mar. 9	do	4.59	Do.
Mar. 11	do	4.03	Do.
Mar. 13	do	3.76	Do.
Mar. 15	do	3.51	Do.
Mar. 17	do	3.00	Do.
Mar. 19	do	3.51	Do.
Mar. 21	do	5.11	Do.
Mar. 23	do	4.59	Do.
Mar. 25	do	4.59	Do.
Mar. 27	do	4.31	Do.
Mar. 29	do	4.31	Do.
Mar. 31	do	4.03	Do.
Apr. 2	do	4.03	Do.
Apr. 4	do	3.51	Do.
Apr. 6	do	3.51	Do.
Apr. 8	do	3.51	Do.
Apr. 10	do	3.25	Do.
Apr. 12	do	3.00	Do.
Apr. 14	do	3.00	Do.
Apr. 15	do	1.97	Do.
Apr. 17	do	2.24	Do.

*List of discharge measurements of San Jose Creek, etc.—Continued.*

Date.	Hydrographer.	Dis-charge.	Locality.
1890.		<i>Sec.-feet.</i>	
Apr. 19	Charles J. Johansen	2.10	East Fork above West Fork.
Apr. 21	do	2.10	Do.
Apr. 23	do	1.97	Do.
Apr. 25	do	1.97	Do.
Apr. 27	do	1.97	Do.
Apr. 29	do	2.10	Do.
May 1	do	1.97	Do.
May 3	do	1.72	Do.
May 5	do	1.72	Do.
May 7	do	1.72	Do.
May 9	do	1.72	Do.
May 11	do	1.72	Do.
May 12	do	1.18	Do.
May 13	do	1.59	Do.
May 15	do	1.47	Do.
May 17	do	1.47	Do.
May 19	do	1.47	Do.
May 21	do	1.19	Do.
May 23	do	1.19	Do.
May 25	do	1.25	Do.
May 27	do	1.19	Do.
May 29	do	1.19	Do.
May 31	do	1.19	Do.
June 2	do	1.12	Do.
June 4	do	.94	Do.
June 6	do	.88	Do.
June 8	do	.91	Do.
June 10	do	.91	Do.
June 12	do	.94	Do.
June 14	do	1.00	Do.
June 16	do	1.12	Do.
June 18	do	1.06	Do.
June 20	do	1.00	Do.
June 22	do	.82	Do.
June 24	do	.82	Do.
June 26	do	.88	Do.
June 28	do	.94	Do.
June 30	do	.82	Do.
July 2	do	.76	Do.

*List of discharge measurements of San Jose Creek, etc.—Continued.*

Date.	Hydrographer.	Dis-charge.	Locality.
1890.		<i>Sec. feet.</i>	
July 4	Charles J. Johansen	0.76	East Fork above West Fork.
July 6	do	.79	Do.
July 8	do	.76	Do.
July 10	do	.71	Do.
July 12	do	.73	Do.
July 14	do	.70	Do.
July 16	do	.70	Do.
July 18	do	.65	Do.
July 20	do	.62	Do.
July 22	do	.60	Do.
July 24	do	.60	Do.
July 26	do	.63	Do.
July 28	do	.54	Do.
July 30	do	.60	Do.
Aug. 1	do	.63	Do.
Aug. 2	do	.63	Do.
Aug. 3	do	.63	Do.
Aug. 4	do	.63	Do.
Aug. 6	do	.63	Do.
Aug. 8	do	.63	Do.
Aug. 11	do	.88	Do.
Aug. 13	do	.88	Do.
Aug. 15	do	.82	Do.
Aug. 17	do	.65	Do.
Aug. 19	do	.60	Do.
Aug. 21	do	.60	Do.
Aug. 23	do	.60	Do.
Aug. 25	do	.65	Do.
Aug. 27	do	.65	Do.
Aug. 29	do	.60	Do.
Aug. 31	do	.60	Do.
Sept. 2	do	.57	Do.
Sept. 4	do	.40	Do.
Sept. 6	do	.44	Do.
Sept. 8	do	.57	Do.
Sept. 10	do	.44	Do.
Sept. 12	do	.54	Do.
Sept. 14	do	.50	Do.

*List of discharge measurements of San Jose Creek, etc.—Continued.*

Date.	Hydrographer.	Dis-charge.	Locality
1890.		<i>Sec.-feet.</i>	
Sept. 15	Charles J. Johansen	0.60	East Fork above West Fork.
Sept. 18	do	.60	Do.
Sept. 20	do	.65	Do.
Sept. 22	do	.60	Do.
Sept. 24	do	.71	Do.
Sept. 26	do	.71	Do.
Sept. 28	do	.82	Do.
Sept. 30	do	.71	Do.
Oct. 2	do	.71	Do.
Oct. 4	do	.68	Do.
Oct. 6	do	.60	Do.
Oct. 7	do	.61	Do.

#### SAN LUIS REY RIVER.

*Discharge measurements of San Luis Rey River, San Diego County.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
June 20, 1899	S. G. Bennett	1.04	Headworks Escondido Irrigation District canal.
Aug. 19, 1900	H. N. Savage	2.00	Do.
Sept. —, 1899	do	2.50	4 miles east of Sicklers Mill, Pala.
Sept. —, 1899	do	<sup>a</sup> 3.50	
Apr. 2, 1900	do	10.00	Do.
May —, 1894	E. F. Tabor	6.716	
Oct. —, 1894	do	4	
Dec. 8, 1894	do	10	
Dec. 20, 1894	do	240	
Jan. 15, 1895	do	5,000	
Mar. 8, 1895	do	152	
Apr. 11, 1895	do	100	
Apr. 17, 1895	do	72	
May 10, 1895	do	39	
May 19, 1895	do	19	

<sup>a</sup> H. N. Savage states this to be minimum prior to September, 1899.

## SAN MATEO CREEK.

San Francisco obtains its domestic water supply from a series of impounding reservoirs located in the southern portion of the peninsula between San Francisco Bay and the Pacific Ocean. The drainage basin of these reservoirs ranges in elevation from 250 to 1,800 feet, with an average of about 750 feet. The hills are undulating. There is a limited growth of timber on the northern slopes near the summit, but a large amount of brush covers other portions of the basin. On the southern slopes and crests the hills are frequently bare of brush, but are covered with grasses. The Spring Valley Water Company owns the entire area of the drainage basin and protects the forest covering, not even permitting grazing within its limits. Mr. Herman Schussler, chief engineer of the water company, has furnished this office with a statement of the rainfall and run-off of the drainage basins which contribute to the water supply under the control of the company. The table given below extends from 1869 to 1899, and shows the seasonal rainfall, together with the percentage collected in the reservoirs. The record is therefore thirty years in length. It is by far the oldest table of run-off in the State, and for this reason is of unusual value. The seasonal year rather than the calendar is given. Column No. 1 shows the year; column No. 2 the inches of rainfall in the respective basins; column No. 3 the percentage of this rainfall which is caught and delivered, the evaporation being deducted. The portion of the discharge table marked "Southeasterly portion of the watershed southeast of old dam," etc., refers to the area above the reservoir, which was constructed at an early date. At a later period, at a point lower down the stream, the Crystal Springs dam was constructed and flooded water over the top of the original dam and into the valleys of other streams. This explains the change in the description of the drainage basin which occurs in 1888. The portion of the table marked "Above southeasterly and northeasterly portion of peninsula watershed, total Crystal Lake drainage," is for the entire area above the Crystal Springs gage datum. The remarkable variation in percentage strikingly illustrates the necessity for storing water from the drainage basins in order to provide for periods of drought. In the western portion of the drainage basin there was practically no run-off in the season of 1876-77, and in the easterly portion of the basin there was practically no run-off in the seasons of 1881-82, 1882-83, and 1897-98. It would therefore be necessary to store enough water in the reservoirs to furnish a supply for two summers and at least one winter. Another feature of interest in this table is that while the run-off in the seasons of 1881-82 and 1882-83 was practically nothing from the easterly portion of the basin, the percentage of rainfall in the western portion of the watershed was 29.4 and 23, respectively.



*Rainfall and run-off from basin of San Mateo Creek, California.*

Year.	Rainfall.	Run-off.	Year.	Rainfall.	Run-off.
	<i>Inches.</i>	<i>Per cent.</i>		<i>Inches.</i>	<i>Per cent.</i>
Western portion of peninsula watershed:			Southeasterly portion of peninsula watershed (southeast from old dam):		
1869-70.....	41.95	22.6	1877-78.....	57.70	29.3
1870-71.....	34.70	9.8	1878-79.....	43.12	12.2
1871-72.....	80.42	31.4	1879-80.....	48.01	15.1
1872-73.....	39.31	28.4	1880-81.....	38.78	34.1
1873-74.....	48.88	29.5	1881-82.....	25.02	.9
1874-75.....	44.26	21.2	1882-83.....	23.06	.0
1875-76.....	69.24	39.2	1883-84.....	40.32	26.8
1876-77.....	23.83	.7	1884-85.....	25.67	13.1
1877-78.....	72.51	37.8	1885-86.....	35.58	25.4
1878-79.....	56.10	29.2	1886-87.....	28.61	9.7
1879-80.....	56.14	35.0	1887-88.....	32.96	5.3
1880-81.....	53.81	43.0	1888-89.....	35.70	7.4
1881-82.....	34.23	29.4	Total.....	434.53	179.5
1882-83.....	33.89	23.0	Mean.....	36.21	14.94
1883-84.....	54.99	33.2			
1884-85.....	38.25	30.0	Above southeasterly and northeasterly portions of peninsula watershed, total Crystal Lake drainage:		
1885-86.....	51.90	43.9	1889-90.....	72.68	53.2
1886-87.....	34.44	29.1	1890-91.....	31.92	24.4
1887-88.....	37.53	29.2	1891-92.....	24.16	8.0
1888-89.....	41.17	28.1	1892-93.....	47.07	34.3
1889-90.....	73.67	44.7	1893-94.....	33.08	29.0
1890-91.....	37.69	22.8	1894-95.....	55.77	33.8
1891-92.....	43.10	13.3	1895-96.....	32.62	16.2
1892-93.....	58.25	24.4	1896-97.....	35.62	19.3
1893-94.....	54.90	21.8	1897-98.....	18.17	0.0
1894-95.....	66.93	25.2	1898-99.....	30.37	11.0
1895-96.....	49.45	21.0	Total.....	381.46	230.1
1896-97.....	50.47	34.0	Mean.....	38.15	23.01
1897-98.....	26.26	9.6			
1898-99.....	42.56	17.7			
Total.....	1,450.83	808.2			
Mean.....	48.36	26.94			

## SAN ROQUI CREEK.

San Roqui Creek was measured during the year 1890 by Charles J. Johansen for the Pacific Improvement Company. The point of measurement was a short distance below the San Roqui tunnel, which was being built from 1899 to 1901, the point of measurement being near an old dam in the stream. This drainage line is called San Roqui Creek in its mountainous portions, but lower down and south of the Southern Pacific Railroad it is called the Arroyo Burro.

List of discharge measurements of San Roqui Creek, Santa Barbara County.

Date.	Hydrographer.	Dis-charge.	Locality.
1890.	Charles T. Johansen	<i>Sec.-feet.</i>	
Feb. 13	do	4.96	At old diversion box below tunnel.
Feb. 19	do	5.70	Do.
Feb. 21	do	9.61	Do.
Feb. 26	do	11.03	Do.
Mar. 1	do	6.91	Do.
Mar. 3	do	6.28	Do.
Mar. 5	do	5.67	Do.
Mar. 6	do	5.67	Do.
Mar. 8	do	5.20	Do.
Mar. 10	do	5.20	Do.
Mar. 12	do	4.96	Do.
Mar. 14	do	4.96	Do.
Mar. 16	do	4.27	Do.
Mar. 18	do	4.27	Do.
Mar. 20	do	4.73	Do.
Mar. 22	do	4.73	Do.
Mar. 24	do	4.27	Do.
Mar. 26	do	3.84	Do.
Mar. 28	do	3.84	Do.
Mar. 30	do	3.84	Do.
Apr. 1	do	3.42	Do.
Apr. 3	do	3.42	Do.
Apr. 5	do	3.42	Do.
Apr. 7	do	3.21	Do.
Apr. 9	do	3.21	Do.
Apr. 11	do	3.00	Do.
Apr. 13	do	2.80	Do.
Apr. 15	do	2.62	Do.
Apr. 17	do	2.62	Do.
Apr. 19	do	2.42	Do.
Apr. 21	do	2.15	Do.
Apr. 23	do	1.88	Do.
Apr. 25	do	1.80	Do.
Apr. 27	do	1.80	Do.
Apr. 29	do	1.55	Do.
May 1	do	1.55	Do.
May 3	do	1.39	Do.
May 5	do	1.39	Do.
May 7	do	1.39	Do.
May 9	do	1.23	Do.
May 11	do	1.23	Do.

*List of discharge measurements of San Roqui Creek, etc.—Continued.*

Date.	Hydrographer.	Dis-charge.	Locality.
1890.		<i>Sec.-feet.</i>	
May 13	Charles J. Johansen	1.30	At old diversion box below tunnel.
May 15	do	1.23	Do.
May 17	do	1.23	Do.
May 19	do	1.23	Do.
May 20	do	.63	Do.
May 22	do	.65	Do.
May 24	do	.65	Do.
May 26	do	.65	Do.
May 28	do	.54	Do.
May 30	do	.54	Do.
June 2	do	.52	Do.
June 4	do	.52	Do.
June 5	do	.44	Do.
June 7	do	.40	Do.
June 9	do	.35	Do.
June 11	do	.35	Do.
June 13	do	.35	Do.
June 15	do	.35	Do.
June 17	do	.38	Do.
June 19	do	.38	Do.
June 21	do	.38	Do.
June 23	do	.38	Do.
June 25	do	.35	Do.
June 27	do	.35	Do.
June 29	do	.29	Do.
July 1	do	.29	Do.
July 3	do	.29	Do.
July 5	do	.29	Do.
July 7	do	.29	Do.
July 9	do	.29	Do.
July 11	do	.26	Do.
July 13	do	.26	Do.
July 15	do	.26	Do.
July 17	do	.26	Do.
July 19	do	.23	Do.
July 21	do	.20	Do.
July 23	do	.20	Do.
July 25	do	.20	Do.
July 27	do	.20	Do.
July 29	do	.20	Do.
July 31	do	.24	Do.

*List of discharge measurements of San Roqui Creek, etc.—Continued.*

Date.	Hydrographer.	Dis-charge.	Locality.
1890.		<i>Sec.-feet.</i>	
Aug. 2	Charles J. Johansen	0.24	At old diversion box below tunnel.
Aug. 4	do	.24	Do.
Aug. 6	do	.24	Do.
Aug. 8	do	.26	Do.
Aug. 10	do	.26	Do.
Aug. 12	do	.26	Do.
Aug. 14	do	.23	Do.
Aug. 16	do	.23	Do.
Aug. 18	do	.20	Do.
Aug. 19	do	.20	Do.
Aug. 22	do	.17	Do.
Sept. 2	do	.19	Do.
Sept. 3	do	.19	Do.
Sept. 4	do	.19	Do.
Sept. 5	do	.19	Do.
Sept. 6	do	.19	Do.
Sept. 7	do	.19	Do.
Sept. 8	do	.19	Do.
Sept. 10	do	.19	Do.
Sept. 11	do	.19	Do.
Sept. 12	do	.19	Do.
Sept. 13	do	.19	Do.
Sept. 14	do	.19	Do.
Aug. 26	do	.09	Below old diversion box.
Aug. 28	do	.09	Do.
Aug. 30	do	.07	Do.
Sept. 2	do	.04	Do.
Sept. 4	do	.04	Do.
Sept. 6	do	.05	Do.
Sept. 8	do	.04	Do.
Sept. 10	do	.04	Do.
Sept. 12	do	.04	Do.
Sept. 14	do	.04	Do.

## SANTA ANA RIVER.

The river has its source on the southwestern slope of the San Bernardino Mountains and flows west, appearing from its canyon 6 miles northeast 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, and the stream flows thence in a general southwesterly direction, emptying into the Pacific Ocean. The station, established June, 1896, is located 5 miles northeast of Mentone, Cal., three-fourths of a mile below the head works of the Santa Ana canal and opposite the warm springs in the canyon. The gage is an inclined timber fastened to a large bowlder and posts set in the bank of the river. On October 16, 1898, owing to some local legal complications, an unusually large volume of water was turned into the Santa Ana canal by the Bear Valley Company. This water was wasted from the canal at a point below the old gage rod, necessitating the establishment of a new gage rod upon this stream at a point below where the waste from the canal was turned into the river. The new gage was put in November 9, 1898, and since that date daily observations have been kept on the lower gage, which is a 2 by 6 inch timber firmly bolted to a granite cliff, which forms the left bank of the river, and is situated 800 feet below the mouth of Warm Springs Canyon and 100 feet above a ford on the canyon road. A landslide occurred below the gage rod April 16, 1899, which changed the condition of the rating for the station. Owing to the shifting nature of the stream bed it has not been possible to construct perfectly satisfactory rating curves, but the tables as presented are based on the best information that could be obtained. This river is one of the most difficult streams in the State to accurately gage. 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. Only limited portions of the water are allowed to pass out of the conduits during certain hours of the day, the water being held back for the purpose of obtaining additional power when the greatest demand exists. An effort is being made to arrange with this company to obtain a record of the number of gates, the sizes of the openings, and the hours at which the various wheels are run, in order to more accurately determine the volumes of water. The Santa Ana canal, as mentioned above, also diverts water from Santa Ana River above the station, but the greater part of it is returned to the channel of the stream before passing the point of measurement.

It was found that this station could not be used during high water, and on January 1, 1901, observations were resumed at the old station and on Santa Ana Canal near the river station.

From June 1 to December 31, 1901, and for the entire year 1902, except from February 26 to April 23, inclusive, the discharge of Santa Ana River was obtained by observations on the weirs at the head works of Green Spot pipe line, Highlands canal, and Redlands canal. The flow from Redlands tunnel and Morton Canyon was assumed to offset the loss by evaporation between the old gaging station and the mouth of the canyon.

The drainage area used prior to 1902 was obtained from Land Office maps. Subsequently the Geological Survey completed its contour

map of this basin and an area of 182 square miles above the gaging station was obtained therefrom and was accepted.

*Discharge measurements of Alder Creek, a branch of Santa Ana River, San Bernardino County.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
August 8, 1897 .....	A. Q. Campbell .....	0.88
August 31, 1897 .....	do .....	1.00
November 14, 1897 .....	J. B. Lippincott .....	2.00
April 14, 1900 .....	S. G. Bennett .....	1.90
October 8, 1901 .....	do .....	.89

*Discharge measurements of Santa Ana River above mouth of Bear Creek, San Bernardino County.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
July 27, 1896 .....	J. H. Quinton .....	14.2
August 31, 1897 .....	A. Q. Campbell .....	17.9
November 14, 1897 .....	J. B. Lippincott .....	17.5

The discharge of the streams of southern California was unusually low in September, 1898, and these measurements were made to determine this minimum with its hourly fluctuation.

*Discharge measurements of Santa Ana River above mouth of Bear Creek.*

[Measurements by Edison Electric Company.]

Date.	Dis-charge.	Date.	Dis-charge.
	<i>Sec.-feet.</i>		<i>Sec.-feet.</i>
Sept. 15, 1898:		Sept. 15, 1898—Continued.	
7 a. m. ....	8.22	1.30 p. m. ....	7.12
7.30 a. m. ....	8.22	2 p. m. ....	7.20
8 a. m. ....	8.22	2.30 p. m. ....	7.06
8.30 a. m. ....	8.22	3 p. m. ....	6.92
9 a. m. ....	8.22	3.30 p. m. ....	6.86
9.30 a. m. ....	8.22	4 p. m. ....	6.66
10 a. m. ....	8.46	4.30 p. m. ....	6.98
10.30 a. m. ....	8.10	5 p. m. ....	6.44
11 a. m. ....	7.98	5.30 p. m. ....	6.22
11.30 a. m. ....	7.86	6 p. m. ....	6.22
12 m. ....	7.76	6.30 p. m. ....	6.10
12.30 p. m. ....	7.48		
1 p. m. ....	7.54	12-hour mean .....	7.43

*Discharge measurements of Santa Ana River, etc.—Continued.*

Date.	Dis-charge.	Date.	Dis-charge.
Sept. 15, 1898—Continued.	<i>Sec.-feet.</i>	Sept. 16, 1898—Continued.	<i>Sec.-feet.</i>
7 p. m. ....	6.10	1.30 p. m. ....	7.32
7.30 p. m. ....	6.10	2 p. m. ....	7.20
8 p. m. ....	6.10	2.30 p. m. ....	7.06
8.30 p. m. ....	6.02	3 p. m. ....	6.86
9 p. m. ....	6.02	3.30 p. m. ....	6.66
9.30 p. m. ....	6.02	4 p. m. ....	6.44
10 p. m. ....	6.02	4.30 p. m. ....	6.32
10.30 p. m. ....	6.02	5 p. m. ....	6.22
11 p. m. ....	6.32	5.30 p. m. ....	6.10
11.30 p. m. ....	6.96	6 p. m. ....	6.02
12 midnight .....	6.60	6.30 p. m. ....	6.02
Sept. 16, 1898:		12-hour mean .....	7.23
12.30 a. m. ....	6.66		
1 a. m. ....	6.66	7 p. m. ....	6.20
1.30 a. m. ....	6.86	7.30 p. m. ....	6.20
2 a. m. ....	6.92	8 p. m. ....	6.20
2.30 a. m. ....	7.06	8.30 p. m. ....	6.20
3 a. m. ....	7.20	9 p. m. ....	5.76
3.30 a. m. ....	7.32	9.30 p. m. ....	5.92
4 a. m. ....	7.54	10 p. m. ....	5.92
4.30 a. m. ....	7.66	10.30 p. m. ....	6.02
5 a. m. ....	7.66	11 p. m. ....	6.22
5.30 a. m. ....	7.86	11.30 p. m. ....	6.32
6 a. m. ....	7.76	12 midnight .....	6.32
6.30 a. m. ....	7.76	Sept. 17, 1898:	
12-hour mean .....	6.80	12.30 a. m. ....	6.44
7 a. m. ....	7.76	1 a. m. ....	6.66
7.30 a. m. ....	7.76	1.30 a. m. ....	6.76
8 a. m. ....	8.10	2 a. m. ....	6.86
8.30 a. m. ....	7.98	2.30 a. m. ....	6.92
9 a. m. ....	8.04	3 a. m. ....	7.06
9.30 a. m. ....	8.10	3.30 a. m. ....	7.20
10 a. m. ....	7.82	4 a. m. ....	7.32
10.30 a. m. ....	7.98	4.30 a. m. ....	7.32
11 a. m. ....	7.86	5 a. m. ....	7.54
11.30 a. m. ....	7.76	5.30 a. m. ....	7.54
12 m. ....	7.48	6 a. m. ....	7.66
12.30 p. m. ....	7.44	6.30 a. m. ....	7.76
1 p. m. ....	7.32	12-hour mean .....	6.68

*Discharge measurements of Bear Creek above Santa Ana River, San Bernardino County.*

[Measurements by Edison Electric Co.]

Date.	Dis-charge.	Date.	Dis-charge.
Sept. 15, 1898:	<i>Sec.-feet.</i>	Sept. 16, 1898:	<i>Sec.-feet.</i>
7 a. m. -----	23.30	12.30 a. m. -----	19.74
7.30 a. m. -----	23.30	1 a. m. -----	19.74
8 a. m. -----	23.30	1.30 a. m. -----	19.54
8.30 a. m. -----	25.94	2 a. m. -----	19.34
9 a. m. -----	23.30	2.30 a. m. -----	19.14
9.30 a. m. -----	23.30	3 a. m. -----	18.72
10 a. m. -----	23.30	3.30 a. m. -----	18.72
10.30 a. m. -----	23.10	4 a. m. -----	18.32
11 a. m. -----	23.10	4.30 a. m. -----	18.32
11.30 a. m. -----	22.84	5 a. m. -----	18.12
12 m. -----	22.66	5.30 a. m. -----	18.12
12.30 p. m. -----	22.66	6 a. m. -----	17.92
1 p. m. -----	22.66	6.30 a. m. -----	17.80
1.30 p. m. -----	22.66	12-hour mean -----	19.84
2 p. m. -----	22.66		
2.30 p. m. -----	22.66	7 a. m. -----	17.92
3 p. m. -----	22.66	7.30 a. m. -----	17.92
3.30 p. m. -----	22.44	8 a. m. -----	17.80
4 p. m. -----	22.44	8.30 a. m. -----	16.94
4.30 p. m. -----	22.44	9 a. m. -----	17.34
5 p. m. -----	22.02	9.30 a. m. -----	17.24
5.30 p. m. -----	22.02	10 a. m. -----	17.12
6 p. m. -----	22.02	10.30 a. m. -----	17.12
6.30 p. m. -----	21.80	11 a. m. -----	16.84
12-hour mean -----	22.86	11.30 a. m. -----	16.94
		12 m. -----	16.56
7 p. m. -----	21.60	12.30 p. m. -----	16.94
7.30 p. m. -----	21.60	1 p. m. -----	16.76
8 p. m. -----	21.60	1.30 p. m. -----	16.76
8.30 p. m. -----	21.40	2 p. m. -----	16.56
9 p. m. -----	21.06	2.30 p. m. -----	16.56
9.30 p. m. -----	21.18	3 p. m. -----	16.56
10 p. m. -----	20.98	3.30 p. m. -----	16.56
10.30 p. m. -----	20.98	4 p. m. -----	16.38
11 p. m. -----	20.78	4.30 p. m. -----	16.38
11.30 p. m. -----	21.60	5 p. m. -----	16.38
12 midnight -----	19.94	5.30 p. m. -----	16.38



*Discharge measurements of Bear Creek, etc.—Continued.*

Date.	Dis-charge.	Date.	Dis-charge.
Sept. 16, 1898—Continued.	<i>Sec.-feet.</i>	Sept. 17, 1898:	<i>Sec.-feet.</i>
6 p. m. ....	16.38	12.30 a. m. ....	16.38
6.30 p. m. ....	16.38	1 a. m. ....	16.38
12-hour mean .....	16.86	1.30 a. m. ....	16.38
7 p. m. ....	16.38	2 a. m. ....	16.38
7.30 p. m. ....	16.28	2.30 a. m. ....	16.38
8 p. m. ....	16.28	3 a. m. ....	16.38
8.30 p. m. ....	16.28	3.30 a. m. ....	16.38
9 p. m. ....	16.18	4 a. m. ....	16.38
9.30 p. m. ....	16.38	4.30 a. m. ....	16.38
10 p. m. ....	16.38	5 a. m. ....	16.38
10.30 p. m. ....	16.38	5.30 a. m. ....	16.38
11 p. m. ....	16.38	6 a. m. ....	16.38
11.30 p. m. ....	16.38	6.30 a. m. ....	16.38
12 midnight .....	16.38	12-hour mean .....	16.36

*Discharge measurements of Bear Creek above Santa Ana River, San Bernardino County.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
July 27, 1896	J. H. Quinton .....	70.6
Aug. 31, 1897	A. Q. Campbell .....	54.3
Nov. 14, 1897	J. B. Lippincott .....	8.95

*Discharge measurements of Green Spot Pipe Line, Santa Ana River, San Bernardino County.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
1896.		
Nov. 21	J. B. Lippincott .....	0.40
1898.		
Jan. 8	J. B. Lippincott .....	.38
Apr. 12	do .....	<i>a</i> 1.88
Apr. 12	do .....	<i>b</i> 1.74
Apr. 29	do .....	2.94
June 12	do .....	.63
July 23	do .....	2.20
Sept. 8	do .....	0.00
Oct. 18	F. H. Olmsted .....	1.36
Nov. 9	do .....	.50
Dec. 8	do .....	.50
Dec. 8	do .....	<i>b</i> .15

*a* Intake.*b* Outlet (lower end).

*Discharge measurements of Green Spot Pipe Line, etc.—Continued.*

Date.	Hydrographer.	Dis-charge.
1899.		<i>Sec.-feet.</i>
Jan. 12	S. G. Bennett	0.00
Feb. 18	do	<i>a</i> 3.53
Feb. 18	do	<i>b</i> .35
Mar. 23	do	3.71
May 6	do	<i>a</i> 1.43
May 6	do	<i>b</i> .62
May 31	do	.14
July 15	do	<i>a</i> .59
July 15	do	<i>b</i> .44
July 27	do	<i>a</i> .64
July 27	do	<i>b</i> .54
Aug. 24	do	<i>b</i> .28
1900.		
April 14	S. G. Bennett	2.15
July 13	do	<i>a</i> 0.00
Oct. 2	W. W. Cockins, jr.	<i>a</i> 1.12
1901.		
Feb. 5	S. G. Bennett	<i>a</i> 0.00
Mar. 4	do	<i>a</i> 2.73
Mar. 30	do	<i>a</i> 0.00
July 6	do	<i>a</i> 3.68
July 6	do	<i>b</i> 3.49
Aug. 20	do	0.00
Oct. 8	do	5.77
Dec. 5	do	1.65
1902.		
May 31	S. G. Bennett	<i>a</i> 2.70
May 31	do	<i>b</i> 2.50
July 10	do	<i>a</i> 0.00
Sept. 3	W. W. Clapp	<i>a</i> 0.00
Nov. 5	S. G. Bennett	<i>a</i> 2.83

*a* Intake.*b* Outlet (lower end).

*Estimated monthly discharge of Bear Valley Water, Green Spot Pipe Line, Santa Ana River, at head of Crafton ditch, San Bernardino County.*

Month.	Mean discharge.	Month.	Mean discharge.
1897.	<i>Sec.-feet.</i>	1899.	<i>Sec.-feet.</i>
August .....	21.5	July .....	5.8
September .....	15.8	August .....	5.8
October 1 to 21 .....	13.2	September .....	4.1
1898.		October .....	6.6
April .....	17.0	November .....	8.6
May .....	17.2	December .....	9.5
June .....	13.2		
July .....	9.1	1900.	
August .....	9.1	January .....	2.1
September .....	8.2	February .....	2.5
October .....	9.0	March .....	1.5
November .....	10.0	April .....	2.3
December .....	10.7	May .....	1.9
1899.		June .....	.4
January 1 to 9 .....	11.0	July 1 to 15 .....	1.1
February .....	11.6	August .....	0
March .....	12.2	September .....	0
April .....	11.8	October .....	0
May .....	11.2	November .....	0
June .....	5.4	December .....	0

*Estimated monthly discharge of Green Spot Pipe Line, Santa Ana River, at Headworks Weir, San Bernardino County.*

Month.	Mean discharge.	Month.	Mean discharge.
1901.	<i>Sec.-feet.</i>	1901—Continued.	<i>Sec.-feet.</i>
June .....	1.5	October .....	5.7
July .....	2.3	November .....	1.7
August .....	2.7	December .....	1.2
September .....	5.5		

*Discharge measurements of Highlands or North Fork Canal at intake weir, Santa Ana River, San Bernardino County.*

Date.	Hydrographer.	Discharge.
1896.		<i>Sec.-feet.</i>
Nov. 21	J. B. Lippincott .....	8.50
1898.		
Jan. 8	J. B. Lippincott .....	11.91
Mar. 9	H. Crowe .....	10.76
Apr. 12	J. B. Lippincott .....	12.40
Apr. 29	do .....	17.03
June 12	do .....	11.37
Sept. 8	do .....	13.29
Oct. 18	F. H. Olmsted .....	9.85
Nov. 9	do .....	8.12
Dec. 8	do .....	6.95
1899.		
Feb. 18	S. G. Bennett .....	8.07
Mar. 23	do .....	11.78
May 6	do .....	7.70
May 31	do .....	6.74
June 15	do .....	10.30
July 15	do .....	13.14
July 27	do .....	11.92
Aug. 24	do .....	4.28
1900.		
Apr. 14	S. G. Bennett .....	7.48
July 13	do .....	( <sup>a</sup> )
Oct. 2	W. W. Cockins, jr .....	5.61
1901.		
July 6	S. G. Bennett .....	13.28
Aug. 20	do .....	15.79
Oct. 8	do .....	14.30
Dec. 5	do .....	8.53
May 31	do .....	7.90
1902.		
July 10	S. G. Bennett .....	11.50
Sept. 3	W. B. Clapp .....	11.10
Nov. 5	S. G. Bennett .....	10.02

<sup>a</sup> Water not going through weir basin; weir was being repaired.

*Discharge measurements of Santa Ana River above Keller Creek, San Bernardino County,<sup>a</sup>*

[Measurements by Edison Electric Company.]

Date.	Dis-charge.	Date.	Dis-charge.
Sept. 15, 1898:	<i>Sec.-feet.</i>	Sept. 16, 1898:	<i>Sec.-feet.</i>
7 a. m. ....	29.30	12.30 a. m. ....	27.08
7.30 a. m. ....	30.44	1 a. m. ....	27.08
8 a. m. ....	23.30	1.30 a. m. ....	27.08
8.30 a. m. ....	30.44	2 a. m. ....	27.08
9 a. m. ....	30.44	2.30 a. m. ....	26.02
9.30 a. m. ....	30.44	3 a. m. ....	26.02
10 a. m. ....	30.44	3.30 a. m. ....	26.02
10.30 a. m. ....	30.44	4 a. m. ....	26.02
11 a. m. ....	30.44	4.30 a. m. ....	26.02
11.30 a. m. ....	30.44	5 a. m. ....	24.92
12 m. ....	29.30	5.30 a. m. ....	24.92
12.30 p. m. ....	29.30	6 a. m. ....	24.92
1 p. m. ....	29.30	6.30 a. m. ....	24.92
1.30 p. m. ....	29.30	12-hour mean .....	27.06
2 p. m. ....	29.30		
2.30 p. m. ....	29.30	7 a. m. ....	24.92
3 p. m. ....	29.30	7.30 a. m. ....	24.92
3.30 p. m. ....	28.20	8 a. m. ....	24.92
4 p. m. ....	28.20	8.30 a. m. ....	24.92
4.30 p. m. ....	28.20	9 a. m. ....	24.92
5 p. m. ....	28.20	9.30 a. m. ....	24.92
5.30 p. m. ....	28.20	10 a. m. ....	24.92
6 p. m. ....	28.20	10.30 a. m. ....	24.92
6.30 p. m. ....	29.30	11 a. m. ....	24.92
12-hour mean .....	29.16	11.30 a. m. ....	24.92
		12 m. ....	24.92
7 p. m. ....	29.30	12.30 p. m. ....	23.86
7.30 p. m. ....	28.22	1 p. m. ....	23.86
8 p. m. ....	28.20	1.30 p. m. ....	22.80
8.30 p. m. ....	28.20	2 p. m. ....	22.80
9 p. m. ....	28.20	2.30 p. m. ....	22.80
9.30 p. m. ....	28.20	3 p. m. ....	22.80
10 p. m. ....	28.20	3.30 p. m. ....	22.80
10.30 p. m. ....	28.20	4 p. m. ....	22.80
11 p. m. ....	28.20	4.30 p. m. ....	21.80
11.30 p. m. ....	28.20	5 p. m. ....	21.80
12 midnight .....	28.20	5.30 p. m. ....	21.80

<sup>a</sup>The discharge of the streams of southern California was unusually low in September, 1898, and these measurements were made by the Edison Electric Company to determine this minimum with its hourly fluctuation.

*Discharge measurements of Santa Ana River, etc.—Continued.*

Date.	Dis-charge.	Date.	Dis-charge.
Sept. 16, 1898—Continued.	<i>Sec.-feet.</i>	Sept. 17, 1898:	<i>Sec.-feet.</i>
6 p. m. ....	21.80	12.30 a. m. ....	22.80
6.30 p. m. ....	22.80	1 a. m. ....	22.80
12-hour mean. ....	23.74	1.30 a. m. ....	23.86
7 p. m. ....	22.80	2 a. m. ....	23.86
7.30 p. m. ....	22.80	2.30 a. m. ....	23.86
8 p. m. ....	22.80	3 a. m. ....	23.86
8.30 p. m. ....	23.86	3.30 a. m. ....	23.86
9 p. m. ....	23.86	4 a. m. ....	23.86
9.30 p. m. ....	22.80	4.30 a. m. ....	23.86
10 p. m. ....	22.80	5 a. m. ....	23.86
10.30 p. m. ....	22.80	5.30 a. m. ....	22.80
11 p. m. ....	22.80	6 a. m. ....	21.80
11.30 p. m. ....	22.80	6.30 a. m. ....	22.80
12 midnight. ....	22.80	12-hour mean. ....	23.20

*Discharge measurements of Keller Creek, a tributary of Santa Ana River.*

Date.	Hydrographer.	Dis-charge.
1897.		<i>Sec.-feet.</i>
Nov. 14	A. Q. Campbell. ....	1.00
1900.		
Apr. 14	S. G. Bennett. ....	.67

*Discharge measurements of Morton Canyon Water, tributary to Santa Ana River.*

Date.	Hydrographer.	Dis-charge.
1898.		<i>Sec. feet.</i>
Apr. 12	J. B. Lippincott .....	0.20
Apr. 29	do .....	.20
June 12	do .....	.12
1899.		
May 31	S. G. Bennett .....	.23
June 15	do .....	.17
July 15	do .....	.12
Aug. 24	do .....	.11
1900.		
Apr. 14	S. G. Bennett .....	.29
July 13	do .....	.09
Oct. 2	W. W. Cockins, jr .....	.12

*Discharge measurements of Redlands or South Fork canal weir at Sand Box, tributary to Santa Ana River.*

Date.	Hydrographer.	Dis-charge.
1896.		<i>Sec. feet.</i>
July 29	J. H. Quinton .....	40.62
Nov. 21	J. B. Lippincott .....	12.00
1898.		
Jan. 8	J. B. Lippincott .....	21.32
Mar. 9	H. Crowe .....	22.22
Apr. 12	J. B. Lippincott .....	16.70
Apr. 29	do .....	13.00
June 12	do .....	18.40
July 23	do .....	15.00
Sept. 8	do .....	15.40
Oct. 18	F. H. Olmsted .....	7.26
Nov. 9	do .....	10.20
Dec. 8	do .....	12.00
1899.		
Jan. 12	S. G. Bennett .....	15.10
Feb. 18	do .....	15.70
Mar. 23	do .....	17.00
May 6	do .....	15.49
May 31	do .....	14.67
June 15	do .....	7.76
June 27	do .....	12.40
July 15	do .....	12.70
Aug. 24	do .....	5.71

*Discharge measurements of Redlands or South Fork canal weir, etc.—Cont'd.*

Date.	Hydrographer.	Dis-charge.
1900.		<i>Sec.-feet.</i>
Apr. 14	S. G. Bennett .....	12. 10
July 13	do .....	10. 65
Oct. 2	W. W. Cockins, jr .....	6. 25
1901.		
Mar. 30	S. G. Bennett .....	30. 00
May 31	do .....	19. 60
July 6	do .....	19. 91
Aug. 20	do .....	16. 75
Oct. 8	do .....	24. 10
Dec. 5	do .....	14. 27
1902.		
July 10	S. G. Bennett .....	10. 06
Sept. 3	W. B. Clapp .....	14. 60
Nov. 5	S. G. Bennett .....	7. 55

*Discharge measurements of Redlands or Bolen tunnel, tributary to Santa Ana River.*

Date.	Hydrographer.	Dis-charge.
1896.		<i>Sec.-feet.</i>
Nov. 21.	J. B. Lippincott .....	1. 00
1898.		
June 12	J. B. Lippincott .....	1. 24
Sept. 8	do .....	1. 24
1899.		
June 15	S. G. Bennett .....	. 67
July 15	do .....	1. 03
Aug. 24	do .....	1. 10
1900.		
Apr. 14	S. G. Bennett .....	. 88
July 13	do .....	. 84
Oct. 2	W. W. Cockins, jr .....	. 85
1901.		
July 6	S. G. Bennett .....	1. 40
Dec. 5	do .....	. 90
1902.		
July 10	do .....	. 90



*Discharge measurements of Santa Ana Canal, San Bernardino County.*<sup>a</sup>

Date.	Hydrographer.	Dis-charge.
1896.		<i>Sec.-feet.</i>
June 20	J. B. Lippincott .....	18.28
July 28	J. H. Quinton .....	14.98
Nov. 21	J. B. Lippincott .....	3.50
1897.		
Jan. 27	J. B. Lippincott .....	4.00
Mar. 4	do .....	5.00
June 15	do .....	19.00
July 1	do .....	18.50
July 6	A. Q. Campbell .....	12.42
July 6	do .....	11.02
Aug. 8	do .....	18.68
Aug. 31	do .....	18.49
Sept. 30	do .....	22.95
Nov. 14	do .....	7.29
1898.		
Jan. 8	A. Q. Campbell .....	8.72
Mar. 9	do .....	7.04
Apr. 2	J. B. Lippincott .....	12.66
Apr. 12	do .....	7.67
June 12	do .....	3.92
July 23	do .....	5.34
Sept. 8	do .....	1.66
Oct. 18	F. H. Olmsted .....	7.92
Nov. 9	do .....	19.50
Dec. 8	do .....	20.60
1899.		
Jan. 12	S. G. Bennett .....	.00
Feb. 18	do .....	4.00
Mar. 23	do .....	7.60
May 6	do .....	3.40
May 31	do .....	1.10
June 15	do .....	.20
July 15	do .....	.00
July 27	do .....	.00
Aug. 24	do .....	.00

<sup>a</sup>For total flow of river and canal see Santa Ann River, total flow.

*Discharge measurements of Santa Ana Canal, etc.—Continued.*

Date.	Hydrographer.	Dis-charge.
1901.		<i>Sec.-feet.</i>
Mar. 30	S. G. Bennett .....	3.40
Oct. 8	do .....	13.20
Dec. 5	do .....	9.70
1902.		
May 31	S. G. Bennett .....	20.70
July 10	do .....	18.5
Sept. 3	W. B. Clapp .....	14.2
Nov. 5	S. G. Bennett .....	12.7

*Discharge measurements of Santa Ana River and Canal at Warm Spring, San Bernardino County.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1896.		<i>Feet.</i>	<i>Sec.-feet.</i>
Apr. 27	J. A. Vogleson .....		51.00
July 25	J. H. Quinton .....		75.00
June 20	J. B. Lippincott .....		<i>a</i> 61.77
Do	do .....		<i>b</i> 18.28
	Total .....		80.05
1896.			
July 28	J. H. Quinton .....	1.29	<i>a</i> 59.72
Do	do .....		<i>b</i> 14.98
	Total .....		74.70
Nov. 21	J. B. Lippincott .....	.98	<i>a</i> 31.68
Do	do .....		<i>b</i> 3.50
	Total .....		35.18
Nov. 21	J. B. Lippincott .....		<i>c</i> 27.40
1897.			
Jan. 27	J. B. Lippincott .....		<i>a</i> 43.58
Do	do .....		<i>b</i> 4.00
	Total .....		47.58
Mar. 4	J. B. Lippincott .....		<i>a</i> 100.70
Do	do .....		<i>b</i> 5.00
	Total .....		105.70

*a* River.

Santa Ana Canal.

*c* Total flow at mouth of canyon.

*Discharge measurements of Santa Ana River and Canal, etc.—Continued.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1897.		<i>Feet.</i>	<i>Sec.-feet.</i>
June 15	J. B. Lippincott	1.15	<i>a</i> 63.74
Do	do		<i>b</i> 19.00
	Total		82.74
July 1	A. Q. Campbell	1.20	<i>a</i> 72.29
Do	do		<i>b</i> 18.50
	Total		90.79
July 6	A. Q. Campbell	1.1	<i>a</i> 60.35
Do	do		<i>b</i> 11.02
	Total		71.37
Aug. 8	A. Q. Campbell	1.32	<i>a</i> 56.28
Do	do		<i>b</i> 18.68
	Total		74.96
Aug. 8	A. Q. Campbell		<i>c</i> 83.22
Aug. 31	do		<i>d</i> 78.10
Do	do		<i>c</i> 78.37
Sept. 30	do		64.53
Do	do	1.13	<i>a</i> 42.53
Do	do		<i>b</i> 22.95
	Total		65.48
Nov. 14	A. Q. Campbell	1.25	<i>a</i> 39.92
Do	do		<i>b</i> 7.29
	Total		47.21
1898.			
Jan. 8	J. B. Lippincott	1.00	<i>a</i> 25.56
Do	do		<i>b</i> 8.72
	Total		34.28
Mar. 9	H. Crowe	1.05	<i>a</i> 43.78
Do	do		<i>b</i> 7.04
	Total		50.82

*a* River.*b* Santa Ana Canal.*c* Weir above Santa Ana Canal intake.*d* Meter above Santa Ana Canal intake.

*Discharge measurements of Santa Ana River and Canal, etc.—Continued.*

Date.	Hydrographer.	Gage height.	Discharge.
1898.		<i>Feet.</i>	<i>Sec. feet.</i>
Mar. 9	H. Crowe .....		<i>a</i> 68.01
Apr. 11	J. B. Lippincott .....	.98	<i>b</i> 31.61
Do	do .....		<i>c</i> 7.67
	Total .....		39.28
Apr. 29	J. B. Lippincott .....	.90	<i>b</i> 29.67
Do	do .....		<i>c</i> 12.66
	Total .....		42.33
June 12	J. B. Lippincott .....	1.10	<i>b</i> 35.14
Do	do .....		<i>c</i> 3.92
	Total .....		39.06
July 23	J. B. Lippincott .....	1.10	<i>b</i> 42.22
Do	do .....		<i>c</i> 5.34
	Total .....		47.56
Sept. 8	J. B. Lippincott .....	1.05	<i>b</i> 35.01
Do	do .....		<i>c</i> 1.66
	Total .....		36.67
Oct. 18	F. H. Olmsted .....	.95	<i>b</i> 22.78
Do	do .....		<i>c</i> 7.92
	Total .....		30.70
Nov. 9	F. H. Olmsted .....	1.10	<i>d</i> 21.78
Dec. 8	do .....	1.13	<i>d</i> 24.74
1899.			
Jan. 12	S. G. Bennett .....	1.07	<i>b</i> 38.00
Do	do .....		<i>c</i> 0
	Total .....		38.00
Feb. 18	S. G. Bennett .....	<i>c</i> 2.16	<i>b</i> 28.04
Do	do .....		<i>c</i> 4.00
	Total .....		32.04
Mar. 23	S. G. Bennett .....	2.30	<i>b</i> 29.62
Do	do .....		<i>c</i> 7.60
	Total .....		37.22

*a* Above Santa Ana Canal intake.*b* River.*c* Canal.*d* Total water from Santa Ana Canal wasted above gaging station.*e* New rod.

*Discharge measurements of Santa Ana River and Canal, etc.—Continued.*

Date.	Hydrographer.	Gage height.	Discharge.
1899.		<i>Feet.</i>	<i>Sec.-feet.</i>
May 6.	S. G. Bennett	2.45	<i>a</i> 25.84
Do	do		<i>b</i> 3.40
	Total		29.24
May 31	S. G. Bennett	2.27	<i>a</i> 21.00
Do	do		<i>b</i> 1.10
	Total		22.10
June 15	S. G. Bennett	2.21	<i>a</i> 19.60
Do	do		<i>b</i> .20
	Total		19.80
July 15	S. G. Bennett	2.30	<i>a</i> 25.90
Do	do		<i>b</i> 0
July 27	do	2.3	<i>a</i> 23.55
Do	do		<i>b</i> 0
Aug. 24	do	1.85	<i>a</i> 10.86
Do	do		<i>b</i> 0
1900.			
Apr. 14	S. G. Bennett	2.25	<i>a</i> 22.66
Do	do		<i>b</i> 0
July 13	S. G. Bennett		<i>a</i> 22.30
Do	do		<i>b</i> 0.0
Nov. 20	do	<i>c</i> 1.70	<i>a</i> 102.00
Do	do		<i>b</i> 0.0
1901.			
Feb. 5	S. G. Bennett	1.65	<i>d</i> 101.00
Feb. 23	do	1.80	<i>d</i> 110.00
Mar. 4	do	1.70	<i>d</i> 102.00
Mar. 30	do	1.35	<i>a</i> 40.60
Do	do		<i>b</i> 3.40
	Total		44.00
July 6	S. G. Bennett	1.15	<i>a</i> 26.10
Do	do		<i>b</i> 13.20
	Total		39.30
Do	S. G. Bennett		<i>e</i> 36.90
			<i>f</i> 1.40
	Total		35.50
Aug. 20	S. G. Bennett	1.24	<i>a</i> 30.78
Do	do		<i>b</i> 0.0

*a* River.*d* Total flow.*f* Less tunnel water.*b* Canal.*e* Total for canals at mouth of canyon,  
including tunnel water.*g* Loss from Warm Spring to  
mouth of canyon.*c* Old rod.

*Discharge measurements of Santa Ana River and Canal, etc.—Continued.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1901.		<i>Feet.</i>	<i>Sec-feet.</i>
Oct. 8	S. G. Bennett	1.25	<i>a</i> 32.00
Do	do		<i>b</i> 13.20
	Total		45.20
Dec. 5	S. G. Bennett	1.03	<i>a</i> 14.00
Do	do		<i>b</i> 9.70
	Total		23.70
1902.			
Apr. 5	S. G. Bennett	1.39	<i>a</i> 51.00
Do	do		<i>b</i> 4.20
	Total		55.20
May 31	S. G. Bennett	.91	<i>a</i> 8.30
Do	do		<i>b</i> 20.70
	Total		29.00
July 10	S. G. Bennett	.84	<i>a</i> 5.00
Do	do		<i>b</i> 18.50
	Total		23.50
Sept. 3	W. B. Clapp	.95	<i>a</i> 10.00
Do	do		<i>b</i> 14.20
	Total		24.20
Nov. 5	S. G. Bennett	.87	<i>a</i> 5.30
Do	do		<i>b</i> 12.70
	Total		18.00

*a* River.*b* Canal.

*Discharge measurements of Santa Ana River at Warm Spring, San Bernardino County.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1896.		<i>Feet.</i>	<i>Sec.-feet.</i>
June 20	J. B. Lippincott		61.77
July 28	J. H. Quinton		59.72
Nov. 21	J. B. Lippincott		31.68
1897.			
Jan. 27	J. B. Lippincott		43.58
Mar. 4	do		100.70
June 15	do	1.15	63.74
July 1	A. Q. Campbell	1.20	72.29
July 6	do	1.11	60.35
Aug. 8	do	1.32	56.28
Sept. 30	do	1.13	42.53
Nov. 14	do	1.25	39.92
1898.			
Jan. 8	A. Q. Campbell	1.00	25.56
Mar. 9	H. Crowe	1.05	43.78
Apr. 11	J. B. Lippincott	.98	31.61
Apr. 29	do	.90	29.69
June 12	do	1.10	35.14
July 23	do	1.10	42.22
Sept. 8	do	1.05	35.01
Oct. 18	F. H. Olmsted	.95	22.78
Nov. 9	do	1.10	21.78
Dec. 8	do	1.13	24.74
1899.			
Jan. 12	S. G. Bennett	1.07	38.00
Feb. 18	do	<sup>a</sup> 2.16	28.04
Mar. 23	do	2.30	29.62
May 6	do	2.45	25.84
May 31	do	2.27	21.00
June 15	do	2.21	19.60
July 15	do	2.30	25.90
July 27	do	2.30	23.55
Aug. 24	do	1.85	10.86
1900.			
Apr. 14	S. G. Bennett	2.25	22.66
May 5	do	2.20	24.40
July 13	do		22.34
Nov. 20	do	<sup>b</sup> 1.70	102.40
Nov. 22	do		<sup>c</sup> 15.64

<sup>a</sup> New rod.<sup>b</sup> Old rod.<sup>c</sup> Calculated.

*Discharge measurements of Santa Ana River at Warm Spring, etc.—Continued.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1901.		<i>Feet.</i>	<i>Sec.-feet.</i>
Mar. 4	S. G. Bennett	1.70	102.20
Mar. 30	do	1.35	40.60
Feb. 5	do	1.65	101.00
Feb. 23	do	1.80	110.00
July 6	do	1.15	26.11
Aug. 20	do	1.24	30.78
Oct. 8	do	1.25	32.00
Dec. 5	S. G. Bennett	1.03	14.0
1902.			
May 31	S. G. Bennett	.91	8.3
July 10	do	.84	5.0
Sept. 3	W. B. Clapp	.95	10.0
Nov. 5	S. G. Bennett	.87	5.3

*Discharge measurements of Santa Ana River, Alsetrez ditch, in vicinity of Colton and Riverside, San Bernardino and Riverside counties.*

Date.	Hydrographer.	Dis-charge.
1900.		<i>Sec.-feet.</i>
Oct. 25	K. Sanborn	1.53
1902.		
Sept. 29	K. Sanborn	1.96

*Discharge measurements of Evans lower ditch, Riverside County.*

Date.	Hydrographer.	Dis-charge.
1898.		<i>Sec.-feet.</i>
June 19	F. H. Olmsted	5.68
Aug. 28	do	4.87
1899.		
Aug. 30	S. G. Bennett	4.48
1900.		
July 27	S. G. Bennett	5.27
Oct. 25	K. Sanborn	4.36
1902.		
Sept. 29	K. Sanborn	5.35



*Discharge measurements of Evans upper ditch, Riverside County.*

Date.	Hydrographer.	Dis-charge.
1900.		<i>Sec.-feet.</i>
July 27	S. G. Bennett	1.04
Oct. 25	K. Sanborn	3.32
1901.		
Aug. 30	J. B. Lippincott	1.88
1902.		
Sept. 29	K. Sanborn	<i>a</i> 2.17
Sept. 29	do	<i>b</i> .53

*a* At north line Riverside County.*b* One mile south of north line Riverside County.*Estimated monthly discharge of Santa Ana River at Warm Spring, San Bernardino County, exclusive of Santa Ana canal.*

[Drainage area, 188 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1896.	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
July	76	48	63	3,891	0.34	0.39
August	83	33	57	3,492	.30	.35
September	77	27	55	3,289	.29	.32
October	170	38	55	3,387	.29	.33
November	52	30	<i>a</i> 33	1,939	.17	.19
December	40	33	<i>a</i> 35	2,176	.19	.22
1897.						
January	101	27	62	3,836	0.33	0.38
February	580	72	181	10,060	.96	1.00
March	460	64	119	7,317	.63	.72
April	186	101	146	8,675	.78	.87
May	101	29	61	3,769	.33	.38
June	67	57	63	3,737	.33	.37
July	85	57	67	4,119	.36	.41
August	80	34	57	3,505	.30	.35
September	61	38	47	2,779	.25	.28
October	250	25	42	2,582	.22	.25
November	52	34	<i>a</i> 38	2,261	.20	.22
December	30	22	<i>a</i> 26	1,610	.14	.16
The year	580	22	76	54,250	.40	5.39

*a*The reduced flow of November and December is due to closing the Bear Valley dam.

*Estimated monthly discharge of Santa Ana River at Warm Spring, San Bernardino County, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1898.	<i>Second-feet.</i>	<i>Second-feet.</i>	<i>Sec.-feet.</i>	<i>Acres-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	58	33	40	2,460	0.21	0.24
February .....	76	33	40	2,221	.21	.22
March .....	40	25	32	1,968	.17	.20
April .....	34	28	31	1,845	.16	.18
May .....	149	26	55	3,382	.29	.33
June .....	58	36	44	2,618	.23	.26
July .....	53	33	41	2,521	.22	.25
August .....	58	33	41	2,521	.22	.25
September .....	45	28	36	2,142	.19	.21
October .....	36	19	26	1,599	.14	.16
November .....	34	18	22	1,309	.12	.13
December .....	28	22	22	1,353	.12	.14
The year .....	149	18	36	25,939	.19	2.57
1901.						
January .....	600	31	78	4,796	0.41	0.47
February .....	540	48	194	10,774	1.03	1.07
March .....	114	45	68	4,181	.36	.41
April .....	107	39	43	2,559	.23	.26
May .....	68	35	42	2,582	.22	.25
June .....	44	30	37	2,202	.20	.22
July .....	42	34	38	2,337	.20	.23
August .....	200	31	50	3,074	.27	.31
September .....	60	42	49	2,916	.26	.29
October .....	96	24	48	2,951	.26	.30
November .....	36	22	26	1,547	.14	.16
December .....	25	21	24	1,476	.13	.15
The year .....	600	21	58	41,395	.31	4.12

*Estimated monthly discharge of Santa Ana canal at Warm Spring, San Bernardino County.*

[Drainage area, 188 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1896.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
July			14	861	0.07	0.08
August			14	861	.07	.08
September			14	833	.07	.08
October			16	984	.09	.10
November			3.5	2,083	.02	.02
December			4.2	2,582	.02	.02
1897.						
January	8.5	3.2	5.6	344	0.03	0.03
February	6	0	4	222	.02	.02
March	6	.5	5.2	320	.03	.03
April	12	0	3.8	226	.02	.02
May	20	0	15	922	.08	.09
June	19	0	16.6	988	.09	.10
July	18.5	10.6	15.6	960	.08	.09
August	20	17.4	18.3	1,125	.10	.12
September			20	1,190	.11	.12
October			12.4	762	.07	.08
November			7	417	.04	.04
December			7	430	.04	.04
The year			10.9	7,906	.06	.78
1898.						
January			9	553	0.05	0.06
February			8	444	.04	.04
March			8	492	.04	.04
April			8	476	.04	.04
May			6	369	.03	.03
June			4	258	.02	.02
July			2	123	.01	.01
August			2	123	.01	.01
September			2	119	.01	.01
October			0	0	0	0
November			0	0	0	0
December			0	0	0	0
The year			4	2,937	.02	.26
1901.						
March	6	0	2.71	167	0.01	0.01
April	4.62	0	2.34	139	.01	.01
May	4.62	3.8	3.96	243	.01	.01

*Estimated monthly discharge of Santa Ana River and canals at Warm Spring,  
San Bernardino County,<sup>a</sup>*

[Drainage area, 188 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1896.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
July .....			77	4,753	0.41	0.47
August .....			71	4,353	.38	.44
September .....			69	4,124	.37	.41
October .....			71	4,372	.38	.44
November .....			37	2,148	.19	.21
December .....			39	2,435	.21	.24
1897.						
January .....	104	35	68	4,179	0.36	0.41
February .....	585	77	185	10,282	.98	1.02
March .....	465	70	124	7,637	.66	.76
April .....	190	113	150	8,899	.80	.89
May .....	113	48	76	4,690	.41	.47
June .....	86	60	80	4,723	.42	.47
July .....	102	70	83	5,077	.44	.51
August .....	100	54	75	4,628	.40	.46
September .....	81	58	67	3,968	.35	.39
October .....	270	45	54	3,347	.29	.33
November .....	59	40	45	2,678	.24	.27
December .....	38	29	33	2,040	.18	.21
The year .....	585	29	87	62,148	.46	6.19
1898.						
January .....			49	2,987	0.26	0.30
February .....			48	2,688	.26	.27
March .....			40	2,448	.21	.24
April .....			39	2,333	.21	.23
May .....			61	3,727	.32	.37
June .....			48	2,840	.25	.28
July .....			43	2,625	.23	.26
August .....			43	2,653	.23	.26
September .....			38	2,223	.20	.22
October .....			26	1,581	.14	.16
November .....			22	1,285	.12	.13
December .....			22	1,364	.12	.14
The year .....			40	28,754	.21	2.86

<sup>a</sup>Total flow.

*Estimated monthly discharge of Santa Ana River and canals at Warm Spring, San Bernardino County—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1899.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	34	22	26	1,593	0.14	0.16
February .....	34	27	27	1,516	.15	.15
March .....	48	24	32	1,949	.17	.19
April .....	34	22	25	1,458	.13	.15
May .....	27	19	22	1,365	.12	.14
June .....	34	19	22	1,315	.12	.13
July .....	29	19	22	1,371	.12	.14
August .....	19	11	13	782	.07	.08
September .....	12	10	12	690	.06	.07
October .....	19	12	17	1,015	.09	.10
November .....	49	17	21	1,268	.11	.13
December .....	36	18	23	1,427	.12	.14
The year .....	49	10	22	15,749	.12	1.58
1900.						
January .....	36	19	23	1,414	0.12	0.14
February .....	23	20	22	1,222	.12	.12
March .....	28	20	23	1,414	.12	.14
April .....	43	19	25	1,488	.13	.14
May .....	250	20	57	3,505	.30	.35
June .....	25	19	22	1,309	.12	.13
July .....	25	11	19	1,168	.10	.12
August .....	12	9	11	676	.06	.07
September .....	16	11	12	714	.06	.07
October .....	16	12	14	861	.07	.08
November .....	1,564	14	107	6,367	.57	.63
December .....	31	25	28	1,722	.15	.17
The year .....	1,564	9	30	21,860	.16	2.16

*Estimated monthly discharge of Santa Ana River and canals at Warm Spring, San Bernardino County—Continued.*

Month.	Discharge			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1901.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	600	31	78	4,796	0.41	0.47
February .....	540	48	194	10,774	1.03	1.07
March .....	114	45	68	4,181	.36	.41
April .....	107	39	43	2,559	.23	.26
May .....	68	35	42	2,582	.22	.25
June .....	44	30	37	2,202	.20	.22
July .....	42	34	38	2,337	.20	.23
August .....	200	31	50	3,074	.27	.31
September .....	60	42	49	2,916	.26	.29
October .....	96	24	48	2,951	.26	.30
November .....	36	22	26	1,547	.14	.16
December .....	25	21	24	1,476	.13	.15
The year .....	600	21	58	41,395	.31	4.12
1902.						
January .....	45	20	24	1,476	0.13	0.15
February .....	240	20	38	2,110	.21	.22
March .....	485	41	79	4,858	.43	.50
April .....	71	43	51	3,035	.28	.31
May .....	45	31	36	2,214	.20	.23
June .....	47	23	33	1,964	.18	.20
July .....	32	23	26	1,599	.14	.16
August .....	30	22	25	1,537	.14	.16
September .....	29	22	24	1,428	.13	.15
October .....	55	30	40	2,460	.22	.25
November .....	43	19	24	1,428	.13	.15
December .....	27	19	22	1,353	.12	.14
The year .....	485	19	35	25,462	.19	2.62

*Discharge measurements of Santa Ana River at head of Gage canal.<sup>a</sup>*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
1888. <sup>b</sup>	W. Irwin .....	2,000.00
1898.		
June 29	J. B. Lippincott .....	1.16
June 30	do .....	27.42
Sept. 21	do .....	25.66

<sup>a</sup> See San Bernardino Valley, Gage canal.<sup>b</sup> Flood. Since that time floods as great as 4,000 second-feet have been observed.*Discharge measurements of Jurupa Canal.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
1898.		
June 18	F. H. Olmsted .....	13.83
July 1	J. B. Lippincott and K. Sanborn .....	7.11
Aug. 27	F. H. Olmsted .....	10.18
Sept. 22	J. B. Lippincott .....	5.41
May 31	S. G. Bennett .....	6.74
July 15	do .....	13.14
1899.		
Aug. 24	S. G. Bennett .....	<sup>a</sup> 4.28
July 26	do .....	<sup>a</sup> 5.11
1900.		
July 27	G. S. Bennett .....	14.42
Oct. 19	K. Sanborn .....	14.05

<sup>a</sup> Submerged flume above Colton bridge.*Discharge measurement of Santa Ana River below Jurupa ditch.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
June 17, 1898	F. H. Olmsted .....	9.74

*Discharge measurements of Santa Ana River below Roubidoux, Evans Upper, and Trujillo ditches.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
July 27, 1900	S. G. Bennett .....	0.44
Oct. 25, 1900	K. Sanborn .....	.56

*Discharge measurements of Santa Ana River in vicinity of Colton and Riverside, San Bernardino and Riverside Counties.*

## RIVERSIDE WATER COMPANY'S LOWER CANAL.

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
June —, 1898	K. Sanborn	10.27
Sept. —, 1898	do	7.70
Mar. —, 1899	do	16.20
June —, 1899	do	9.09
Aug. —, 1899	do	7.38
Mar. —, 1900	do	8.00
June —, 1900	K. Sanborn	7.16
Sept. —, 1900	do	6.69
June 17, 1898	F. H. Olmsted	9.27
June 18, 1898	do	11.27
		<i>a</i> 10.27
July 27, 1900	S. G. Bennett	7.13
Aug. 30, 1901	J. B. Lippincott	<i>b</i> 4.52
Sept. 30, 1902	K. Sanborn	3.07

RIVERSIDE WATER COMPANY'S UPPER CANAL.<sup>c</sup>

Aug. 30, 1899	S. G. Bennett	<i>d</i> 57.4
July 26, 1906	do	<i>d</i> 43.3

## ROUBIDOUX DITCH.

June 19, 1898	F. H. Olmsted	8.94
<sup>a</sup> Aug. 28, 1898	do	8.50
July 27, 1900	S. G. Bennett	8.18
Oct. 25, 1900	K. Sanborn	7.80
Aug. 30, 1901	J. B. Lippincott	8.75
Sept. 30, 1902	K. Sanborn	7.19

## SANTA ANA RIVER 1½ MILES BELOW INTAKE OF RIVERSIDE WATER COMPANY'S LOWER CANAL.

Aug. 27, 1898	F. H. Olmsted	0.50
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<sup>a</sup>Mean for June 17 and 18.

<sup>b</sup>One-fourth of a mile below headworks; 0.4 second-feet wasted below point of measurement into river for Roubidoux Canal.

<sup>c</sup>See also Riverside Water Company's upper canal, under San Bernardino Valley.

<sup>d</sup>In flume above tunnel near Riverside Mesa.



*Discharge measurements of Santa Ana River in vicinity of Colton and  
Riverside, etc.—Continued.*

SPRING BROOK BELOW WEST RIVERSIDE BRIDGE.

Date.	Hydrographer.	Dis- charge.
		<i>Sec. feet.</i>
June 19, 1898	F. H. Olmsted .....	2.92
Aug. 28, 1898	do .....	1.27
July 28, 1900	S. G. Bennett .....	2.77
Aug. 30, 1901	J. B. Lippincott .....	2.08
Aug. 28, 1898	F. H. Olmsted .....	<sup>a</sup> 3.85
Oct. 25, 1900	K. Sanborn .....	<sup>a</sup> 8.45

SANTA ANA RIVER BELOW WEST RIVERSIDE BRIDGE.

July 30, 1900	S. G. Bennett .....	1.16
Aug. 30, 1901	J. B. Lippincott .....	1.19

SANTA ANA RIVER AT GALLIGERS FORD, 2 MILES BELOW WEST RIVERSIDE BRIDGE.

Aug. 30, 1899	S. G. Bennett .....	5.6
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<sup>a</sup>Santa Ana River, West Riverside Bridge.

*Discharge measurements of Trujillo ditch, tributary to Santa Ana.*

Date.	Hydrographer	Dis- charge.
		<i>Sec. feet.</i>
July 27, 1900	S. G. Bennett .....	0.46
Oct. 25, 1900	K. Sanborn .....	.53 <sub>4</sub>

*Discharge measurement of Santa Ana River 1,000 feet below Roubidoux ditch  
intake.*

Date.	Hydrographer.	Dis- charge.
		<i>Sec. feet.</i>
Oct. 25, 1900	K. Sanborn .....	0.56

*Discharge measurements of Santa Ana River in vicinity of Rincon, Riverside County.*

## ANAHEIM UNION CANAL.

Date.	Hydrographer.	Dis-charge.	Remarks.
		<i>Sec.-feet.</i>	
June 22, 1898	F. H. Olmsted .....	34.74	5 miles below division box.
Sept. 15, 1899	J. B. Lippincott .....	27.92	
Oct. 26, 1899	....do .....	17.14	1 mile below Esperanza.
Aug. 15, 1900	W. P. Searcy .....	18.37	
Sept. 3, 1900	....do .....	18.22	
Aug. 31, 1901	....do .....	23.11	

## SANTA ANA RIVER AT AUBURNDALE BRIDGE.

July 17, 1888	F. C. Finkle .....	14.6	
Aug. 22, 1888	....do .....	13.3	
Sept. 15, 1888	....do .....	14.2	
Aug. 14, 1889	....do .....	15.6	
Sept. 28, 1889	....do .....	16.7	
Aug. 13, 1890	....do .....	22.3	
Sept. 10, 1891	....do .....	25.6	
Sept. 11, 1892	....do .....	43.4	
June 21, 1898	F. H. Olmsted .....	60.00	Including ditches.
Aug. 30, 1899	S. G. Bennett .....	53.10	Do.
Sept. 12, 1899	J. B. Lippincott .....	59.83	
July 28, 1900	S. G. Bennett .....	54.45	Do.
Oct. 5, 1900	W. W. Cockins, jr .....	69.70	Do.
Aug. 27, 1901	J. B. Lippincott .....	43.70	Above Roberts ditch.
Aug. 31, 1901	....do .....	28.54	Do.

## CASTILLO DITCH BELOW RIVERSIDE NARROWS.

Aug. 30, 1901	J. B. Lippincott .....	1.19	
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## CHINO CREEK NEAR RINCON.

Aug. 30, 1898	F. H. Olmsted .....	4.95	
May 2, 1899	F. Rolfe .....	12.79	
May 15, 1899	....do .....	8.64	
June 3, 1899	....do .....	17.02	
June 15, 1899	....do .....	5.63	
July 4, 1899	....do .....	3.02	
July 17, 1899	....do .....	4.68	

*Discharge measurements of Santa Ana River in vicinity of Rincon, etc.—Cont'd.*

CHINO CREEK NEAR RINCON—continued.

Date.	Hydrographer.	Dis-charge.	Remarks.
		<i>Sec.-feet.</i>	
Aug. 1, 1899	F. Rolfe .....	7.49	
Aug. 15, 1899	do .....	2.14	
Aug. 31, 1899	do .....	3.19	
Sept. 13, 1899	J. B. Lippincott .....	3.53	
Oct. 25, 1899	do .....	14.52	
Apr. 17, 1900	W. P. Searcy .....	8.79	
June 24, 1900	do .....	3.97	
July 7, 1900	do .....	2.09	
July 28, 1900	S. G. Bennett .....	2.20	
Aug. 15, 1900	W. P. Searcy .....	1.08	
Sept. 3, 1900	do .....	0.0	
Oct. 5, 1900	W. W. Cockins, jr .....	5.00	
Aug. 31, 1901	J. B. Lippincott .....	2.80	

DIVISION BOX SANTA ANA AND ANAHEIM CANALS.

June 22, 1898	F. H. Olmsted .....	67.5	
Aug. 30, 1898	do .....	52.9	
Aug. 30, 1899	S. G. Bennett .....	59.6	
Sept. 15, 1899	J. B. Lippincott .....	71.7	
Oct. 25, 1899	do .....	144.7	
July 28, 1900	S. G. Bennett .....	49.7	
Oct. 5, 1900	W. W. Cockins, jr .....	75.1	
Aug. 27, 1901	J. B. Lippincott .....	64.5	
Aug. 31, 1901	do .....	55.4	

DURKEE DITCH.

Sept. 3, 1899	J. B. Lippincott .....	1.38	Near ranch house.
Sept. 13, 1899	do .....	6.14	Newberry east line.
July 28, 1900	S. G. Bennett .....	1.80	At ranch house.
Aug. 27, 1901	J. B. Lippincott .....	3.98	
Aug. 31, 1901	do .....	8.24	

SANTA ANA RIVER, OPPOSITE ESPERANZA STATION.

Oct. 26, 1899	J. B. Lippincott .....	49.2	
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*Discharge measurements of Santa Ana River in vicinity of Rincon, etc.—Cont'd.*

## FULLER DITCH.

Date.	Hydrographer.	Dis-charge.	Remarks.
		<i>Sec.-feet.</i>	
July 28, 1900	-----	13.00	Said by Fuller to be carrying this amount at intake.
Oct. 5, 1900	W. W. Cockins, jr -----	6.50	
Aug. 30, 1901	J. B. Lippincott -----	9.69	Near intake.
Do -----	do -----	7.15	At Fuller's ranch house.

## SANTA ANA RIVER, ABOVE FULLER'S DITCH.

Aug. 30, 1901	J. B. Lippincott -----	24.34	Intake.
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## GILLILAND'S DITCH, AUBURNDALE BRIDGE.

July 28, 1900	S. G. Bennett -----	1.40	
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*Discharge measurement of Santa Ana River, Newberry's east line.*

Date.	Hydrographer.	Dis-charge.	Remarks.
		<i>Sec.-feet.</i>	
Aug. 31, 1901	J. B. Lippincott -----	40.7	

*Discharge measurements of Newberry ditch.*

Date.	Hydrographer.	Dis-charge.	Remarks.
		<i>Sec.-feet.</i>	
July 28, 1900	S. G. Bennett -----	5.47	At Auburndale bridge.
Aug. 27, 1901	J. B. Lippincott -----	3.05	At head.
Aug. 31, 1901	do -----	3.23	Do.

*Discharge measurement of Newton ditch, below Narrows.*

Date.	Hydrographer.	Dis-charge.	Remarks.
		<i>Sec.-feet.</i>	
Aug. 30, 1901	J. B. Lippincott -----	7.04	

*Discharge measurements of Santa Ana River 1 mile below railroad bridge,  
Rincon, Cal.*

Date.	Hydrographer.	Dis-charge.	Remarks.
1898.		<i>Sec. feet.</i>	
June 21	F. H. Olmsted -----	<i>a</i> 79.81	
Do	do -----	<i>b</i> 3.18	
	Total -----	82.99	
Aug. 29	F. H. Olmsted -----	<i>a</i> 62.67	
Do	do -----	<i>b</i> 4.15	
	Total -----	66.82	
1899.			
Jan. 3	S. G. Bennett -----	<i>a</i> 209.4	
Do	do -----	<i>b</i> 2.3	
	Total -----	211.7	
Jan. 16	F. Rolfe -----	231.9	
Jan. 28	do -----	<i>a</i> 216.0	
Do	do -----	<i>b</i> 6.5	
	Total -----	222.5	
Feb. 15	F. Rolfe -----	<i>a</i> 181.0	
Do	do -----	<i>c</i> 1.75	
	Total -----	182.75	
Mar. 4	F. Rolfe ----- total	108.6	
Mar. 18	do ----- do	199.89	
Apr. 6	do -----	172.23	
	Total -----	480.72	
April 18	F. Rolfe -----	<i>a</i> 101.10	One mile below railroad bridge.
Do	do -----	<i>b</i> 2.75	
	Total -----	103.85	
May 2	F. Rolfe -----	<i>a</i> 100.34	
Do	do -----	<i>b</i> 2.45	
	Total -----	102.79	
May 15	F. Rolfe -----	<i>a</i> 100.36	
Do	do -----	<i>b</i> 3.95	
	Total -----	104.31	

*a* River.*b* Ditch.*c* Canal.

*Discharge measurements of Santa Ana River, etc.—Continued.*

Date.	Hydrographer.	Dis-charge.	Remarks.
		<i>Sec. feet.</i>	
June 3	F. Rolfe .....	<i>a</i> 110.27	
Do ..	do .....	<i>b</i> 3.18	
	Total .....	113.45	
June 15	F. Rolfe .....	<i>a</i> 84.43	
Do ..	do .....	<i>b</i> 1.94	
	Total .....	86.37	
July 4	F. Rolfe .....	<i>a</i> 68.89	
Do ..	do .....	<i>b</i> 2.42	
	Total .....	71.31	
July 16	S. G. Bennett and F. Rolfe.	<i>a</i> 101.41	
Do ..	do .....	<i>b</i> 1.89	
	Total .....	103.30	
Do ..	S. G. Bennett and F. Rolfe.	<i>a</i> 87.89	
Do ..	do .....	<i>b</i> 1.65	
	Total .....	89.54	
July 18	F. Rolfe .....	<i>a</i> 64.13	One mile below railroad bridge.
Do ..	do .....	<i>b</i> 1.54	
	Total .....	65.67	
Aug. 1	F. Rolfe .....	<i>a</i> 57.82	
Do ..	do .....	<i>b</i> 3.44	
	Total .....	61.26	
Aug. 15	F. Rolfe .....	<i>a</i> 64.71	
Do ..	do .....	<i>b</i> 3.16	
	Total .....	67.87	
Aug. 30	F. Rolfe .....	<i>a</i> 65.90	
Do ..	do .....	<i>b</i> 2.00	
	Total .....	67.90	
Aug. 31	F. Rolfe .....	<i>a</i> 68.02	Do.
Do ..	do .....	<i>b</i> 3.06	
	Total .....	71.08	
Sept. 13 1900.	J. B. Lippincott .....	<i>a</i> 72.73	Do.
Apr. 16	S. G. Bennett .....	90.86	Do.

*a* River.*b* Ditch.

*Discharge measurements of Santa Ana River at Rincon wagon bridge.*

Date.	Hydrographer.	Dis-charge.
1899.		<i>Sec.-feet.</i>
Sept. 13	J. B. Lippincott .....	72.58
Oct. 25	do .....	130.32
Oct. 26	do .....	146.53
Dec. 28	do .....	165.05
1900.		
Apr. 17	W. P. Searcy .....	101.60
June 24	do .....	69.20
July 7	do .....	84.47
July 28	S. G. Bennett .....	60.76
Aug. 15	W. P. Searcy .....	87.10
Sept. 3	do .....	88.20
Oct. 5	W. W. Cockins, jr .....	74.20
1901.		
Aug. 27	J. B. Lippincott .....	78.60
Aug. 31	do .....	65.30
1902.		
Sept. 2	W. B. Clapp .....	74.90

*Discharge measurements of Santa Ana River at Riverside Narrows.*

Date.	Hydrographer.	Dis-charge.
1888.		<i>Sec.-feet.</i>
July 16	F. C. Finkle .....	10.1
July 17	do .....	10.5
Aug. 21	do .....	8.5
Sept. 14	do .....	9.5
1889.		
Aug. 13	do .....	11.0
Sept. 27	do .....	11.2
1890.		
Aug. 12	do .....	18.8
1901.		
Sept. 9	do .....	15.5
1892.		
Sept. 10	do .....	29.4

*Discharge measurements of Santa Ana River at Riverside Narrows—Continued.*

Date.	Hydrographer.	Dis-charge.
1898.		<i>Sec.-feet.</i>
June 20	F. H. Olmsted .....	47.63
Aug. 29	do .....	39.05
1899.		
July 17	F. Rolfe .....	31.70
Sept. 9	J. B. Lippincott .....	39.69
1900.		
July 27	S. G. Bennett .....	38.41
Oct. 25	K. Sanborne .....	70.64
1901.		
Aug. 30	J. B. Lippincott .....	33.87
1902.		
Oct. 10	K. Sanborne .....	43.25

*Discharge measurements of canals and ditches of Santa Ana River system near Rincon, Riverside County.*

## DITCH ON RIGHT BANK OF SANTA ANA RIVER 3 MILES BELOW RIVERSIDE NARROWS.

Date.	Hydrographer.	Dis-charge.
1898.		<i>Sec.-feet.</i>
June 20	F. H. Olmsted .....	3.75

## DITCH ON RIGHT BANK OF SANTA ANA RIVER 5 MILES BELOW RIVERSIDE NARROWS, ON GRIFFITH'S PLACE.

June 20	F. H. Olmsted .....	9.99
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## ROBERTS DITCH.

1901.		
Aug. 27	J. B. Lippincott .....	0
Aug. 31	do .....	0



*Discharge measurements of canals and ditches, etc.—Continued.*

SANTA ANA VALLEY IRRIGATION COMPANY'S CANAL, ORANGE COUNTY, CAL.

Date.	Hydrographer.	Dis-charge.
1898.		<i>Sec.-feet.</i>
June 22	F. H. Olmsted .....	<i>a</i> 28.99
Aug. 30	.....do .....	<i>a</i> 24.62
1899.		
May 26	F. Rolfe .....	<i>b</i> 43.98
Sept. 15	J. B. Lippincott .....	30.26
Oct. 26	.....do .....	<i>c</i> 47.19
1900.		
Sept. 3	W. P. Searcy .....	38.99
Aug. 15	.....do .....	25.71
1901.		
Aug. 31	J. B. Lippincott .....	<i>d</i> 18.30

## SEECHER DITCH, AT RINCON BRIDGE.

1901.		
June 24	W. P. Searcy .....	.62

## TOWNSEND DITCH.

1898.		
June 20	F. H. Olmsted .....	4.80
1900.		
Oct. 5	W. W. Cockins, jr .....	5.84

## WILBUR DITCH.

1901.		
Aug. 30	J. B. Lippincott .....	4.52

## YORBA DITCH.

1899.		
Oct. 26	J. B. Lippincott .....	8.88
1900.		
Aug. 15	W. P. Searcy .....	14.00 <sup>b</sup>
Sept. 3	.....do .....	21.45
1901.		
Aug. 31	J. B. Lippincott .....	<i>e</i> 4.40

*a* Near bridge to Yorba.  
*b* Three miles above Olive.  
*c* First road crossing.

*d* At road crossing at head of cement lining.  
*e* Estimated above drop from Anaheim ditch  
and opposite Esperanza.

*Miscellaneous low-water measurements made in watershed of Santa Ana River, Los Angeles, San Bernardino, Riverside, and Orange counties.*

Date.	Locality.	Area of section.	Mean velocity.	Discharge.
1900.		<i>Sq. feet.</i>	<i>Feet per sec.</i>	<i>Sec.-feet.</i>
Sept. 25	Frey's ranch, near Spadra .....	0.80	2.312	1.85
Do .....	Phillips's ranch, near Spadra (weir) .....			.74
Sept. 27	C. L. Lancaster, Mesa avenue, Lordsburg (weir) .....			.559
Sept. 26	Covina Irrigation Co. compressor pumping plant, south of Lordsburg .....			3.58
Sept. 24	Neuruff place, corner Holt avenue and San Antonio avenue, Pomona (weir) .....			.33
Sept. 26	Pomona Land and Water Co., Garey avenue (weir) .....			1.28
Sept. 26	Consolidated Water Co.'s Pomona air-compressor plant (weir) .....			3.34
Sept. 24	Consolidated Water Co., north of Pomona College (weir) .....			.82
Sept. 25	James Warden's place (weir) .....			.25
Sept. 24	Brundege place, San Antonio avenue, Pomona .....	.25	1.04	.26
Sept. 25	Del Monte Water Co. (weir) .....			.96
Do .....	San Antonio Water Co.'s wells in Claremont; water goes to Ontario (weir) .....			.40
Do .....	San Antonio Water Co.'s wells at Indian Hill, $\frac{1}{2}$ mile north of Pomona College (weir) .....			.99
Do .....	San Antonio Canyon. From records of Pomona Land and Water Co. The discharge from San Antonio Canyon was 7.53 second-feet Sept. 2, 1895, and 9.02 second-feet on Sept. 6, 1897 (weir). <sup>a</sup> .....			3.72
	RED HILL, CUCAMONGA.			
July 11	Cucamonga Land and Water Co., Cucamonga Creek, 30-inch pipe line (weir) .....			1.15
Do .....	Cucamonga Land and Water Co., Lone Star Spring pumping plant (weir) .....			1.20
Do .....	Cucamonga Land and Water Co., "Y" tunnel (weir) .....			1.68
Do .....	Stowell water from 90-acre tract; west side part to Ontario (weir) .....			2.97
Do .....	San Antonio Water Co., Haskell well (weir) .....			2.13
Do .....	San Antonio Water Co., Sixteenth street, pumping plant (weir) .....			1.72
	Total .....			10.85

<sup>a</sup>July 11, 1900, measurement made of water in San Antonio Canyon by S. G. Bennett; discharge, 4.07 second-feet.

*Miscellaneous low-water measurements made, etc.*—Continued.

Date.	Locality.	Area of section.	Mean velocity.	Discharge.
1900.	RED HILL, CUCAMONGA—continued.			
July 11	Natural surface flow of Cucamonga Creek in canyon (Iomosa Water Co.)	<i>Sq. feet.</i> 0.22	<i>Feet per sec.</i> 4.10	<i>Sec.-feet.</i> 0.90
	Developed by bed-rock tunnel			.18
	Total			1.08
Aug. 4	Cucamonga Land and Water Co., Lone Star Spring pumping plant (weir)			1.02
June 8	Lytle Creek at intake of Rialto Canal (weir)			6.19
Sept. 29	do			4.62
June 8	Cajon Creek Canyon in flume, opposite Keenbrook station	1.49	.92	1.37
July 12	West Twin Creek in flume	.084	2.66	.22
Oct. 1	do			.16
July 12	East Twin Creek, Del Rosa cement canal	.40	1.55	.62
Oct. 1	do			.36
July 12	East Twin Creek, Kansas City Syndicate development	.44	3.45	.15
Oct. 1	do			.17
July 12	City Creek measurement in cement canal	.32	.50	.16
Oct. 1	City Creek, at head of pipe line	.24	.88	.21
July 12	Plunge Creek at intake of ditch (weir)			.34
July 13	Below wasteway of Santa Ana Canal	9.29	2.404	22.34
Do	South Fork or Redlands Canal, water not going over weir into North Fork or Highlands Canal on account of repairs (weir)			10.65
Do	Redlands tunnel (weir)			.84
Do	Morton Canyon (weir)			.09
Oct. 2	South Fork or Redlands Canal (weir)			6.25
Do	North Fork or Highlands Canal (weir)			5.61
Do	Green Spot pipe line (weir)			.12
Do	Redlands tunnel (weir)			.85
Do	Morton Canyon (weir)			.20
July 13	Water in Mill Creek zanja (weir)			5.35
Do	Mill Creek. Water is being pumped by Crafton Water Co. et al. in Mill Creek Canyon and Yucipe Valley (weir)			3.44
	Total			8.79

*Miscellaneous low-water measurements made, etc.—Continued.*

Date.	Locality.	Area of section.	Mean velocity.	Discharge.
1900.	RED HILL, CUCAMONGA—continued.			
Oct. 2	Crafton Water Co.'s pumping plant, Mill Creek Canyon (weir) .....	<i>Sq. feet.</i>	<i>Feet per sec.</i>	<i>Sec.-feet.</i>
				1.35
Do	At mouth of Mill Creek Canyon (weir) .....			7.21
	Total .....			8.56
July 14	San Timoteo Canyon ditch at Bicknell Station .....	1.00	1.50	1.50
June —	Haws & Talmadge .....			.00
June —	Rabel ditch .....			.35
June —	Shay ditch .....			.40
June —	McKenzie ditch .....			1.57
June —	Meeks & Daley ditch .....			13.78
June —	Beams ditch .....			.50
June —	Riverside Water Co., upper canal .....			52.94
June —	Riverside Water Co., lower canal .....			7.16
June —	Timber ditch .....			.00
June —	Gage Canal, Santa Ana River .....			.29
June —	Gage Canal, Palm avenue .....			22.52
June —	Logsdon & Farrel ditch .....			.49
June —	Whitlock ditch .....			.00
June —	Daley ditch .....			1.12
June —	McIntyre ditch .....			.01
June —	Whiting ditch .....			.13
June —	Swamp ditch .....			.89
June —	Ranchero ditch .....			.55
June —	Ward & Warren ditch .....			1.70
June —	Mill flume, Riverside Water Co. ....			2.17
June —	Mill pump, Riverside Water Co. ....			1.88
June —	Camp Carlton ditch .....			2.60
June —	East Riverside ditch .....			5.38
June —	Colton Terrace Water Co. ....			1.54
June —	City of Colton .....			3.21
June —	Bloomington flume .....			3.68
July 26	Riverside Water Co.'s upper canal in flume 150 feet above tunnel River- side Mesa .....	17.48	2.477	43.30
July 27	North Riverside and Jurupa Canal in flume near Beckstead's house .....	6.94	2.077	14.42
July 27	Riverside Water Co.'s lower canal .....	3.35	2.128	7.13
July 27	Roubidoux ditch .....	6.21	1.317	8.18
July 27	Trujillo ditch .....	.75	.61	.46

*Miscellaneous low-water measurements made, etc.—Continued.*

Date.	Locality.	Area of section.	Mean velocity.	Discharge.
1900.	RED HILL, CUCAMONGA—continued.	<i>Sq. feet.</i>	<i>Feet per sec.</i>	<i>Sec. feet.</i>
July 27	75 feet below intake of Trujillo ditch	0.38	1.17	0.44
July 27	Evans upper ditch	.95	1.10	1.04
	Total flow Santa Ana at Roubidoux ditch intake			10.12
July 27	Alsetrez ditch from Spring Brook, 100 feet below West Riverside bridge	1.95	1.42	2.77
July 27	200 feet below West Riverside bridge	1.77	.65	1.16
July 27	West Riverside bridge, Roubidoux Mountain	2.85	1.85	5.27
July 27	At Riverside Narrows	26.54	1.443	38.41
Sept. 13	Riverside Water Co.'s lower canal	3.36	1.99	6.69
Oct. 19	North Riverside and Jurupa canal	6.69	2.10	14.05
Oct. 25	Roubidoux ditch	5.95	1.31	7.80
Oct. 25	Trujillo ditch	1.10	.48	.53
Oct. 25	20 feet below intake of Trujillo ditch	.80	.70	.56
Oct. 25	Evans's upper ditch	2.42	1.37	3.32
	Total			12.21
Oct. 25	Alsetrez ditch from Spring Brook, West Riverside bridge	1.75	.87	1.53
Oct. 25	At West Riverside bridge	5.50	1.54	8.45
Oct. 25	Evans's ditch, West Riverside bridge	2.52	1.75	4.36
Oct. 25	At Riverside Narrows	43.3	1.63	70.64
July 28	300 feet above Auburndale bridge	28.65	1.576	45.16
July 28	Newberry ditch, Auburndale bridge	5.32	1.03	5.47
July 28	Ditch south of Newberry ditch, Auburndale bridge	1.58	1.47	2.32
July 28	Gilliland ditch, Auburndale bridge	1.49	.94	1.40
	Total			54.35
Oct. 5	Auburndale bridge	40.50	1.577	63.9
Oct. 5	Townsend ditch, Auburndale bridge	6.10	.957	5.84
Oct. 5	Fuller's ditch, near schoolhouse	5.10	1.274	6.50
July 28	Rincon bridge	35.55	1.704	60.76
July 28	Chino Creek under bridge, Chino-Corona road	3.66	.60	2.20
Oct. 5	Rincon bridge	43.90	1.69	74.20
Oct. 5	Chino Creek	1.90	2.63	5.00
July 28	Durkee ditch, near ranch house	1.40	1.30	1.80
July 28	At Anaheim and Santa Ana division box	23.64	2.103	49.72
Oct. 5	do	29.00	2.59	75.10

For tabulation of a large number of water measurements in the San Bernardino Valley above Riverside Narrows and in the basin of the Santa Ana River, see San Bernardino Valley.

## SANTA ANA RIVER, MILL CREEK.

See Mill Creek (page 158).

## SANTA ANA RIVER, LYTLE CREEK.

See Lytle Creek (page 139).

## SANTA ANA RIVER, SAN ROQUE CREEK.

See Arroyo Burro (page 43).

## SANTA BARBARA COUNTY.

*Miscellaneous measurements of streams east of Santa Barbara City, Santa Barbara County, made in July and August, 1889, by George F. Wright.*

Stream.	Dis- charge.	Area of water- shed.
	<i>Sec.-feet.</i>	<i>Sq. miles.</i>
Rincon .....	0.12	10.5
Gubernador .....	.58	4.2
Carpenteria .....	.08	44.0
Santa Monica .....	.23	4.3
Padaro .....	.31	2.2
Dinsmore .....	.23	2.2
Cold Stream .....	.23	3.0
Mission .....	.46	4.0

*Miscellaneous measurements of streams west of Santa Barbara City, Santa Barbara County, made in July and August, 1889, by George F. Wright.*

Stream.	Dis- charge.	Area of water- shed.
	<i>Sec.-feet.</i>	<i>Sq. miles.</i>
Arroyo Burro .....	0.23	2.5
Maria Ignacia .....	.23	16.5
San Jose .....	.27	.....
San Pedro .....	.08	3.0
Arroyo Carnero .....	.08	1.0
Armas .....	.08	1.0
Tecolote .....	.27	2.0
Aguilar .....	.12	2.0
Dos Pueblos .....	.54	3.25
Canyada Verde .....	.08	2.00
Canyada Llaces .....	.08	1.50
El Capitan .....	.23	1.50
Canyada del Corral .....	.15	1.00
Canyada Refugio .....	.31	2.00

*Discharge measurements of San Pedro Creek, Santa Barbara County, Cal.*

Date.	Hydrographer.	Dis-charge.	Remarks.
		<i>Sec.-feet.</i>	
Aug. —, 1889	G. F. Wright .....	0.08	Drainage area, 3 square miles.

*Discharge measurements of San Timoteo Creek, Riverside County.*

Date.	Hydrographer.	Dis-charge.	Remarks.
		<i>Sec.-feet.</i>	
July 14, 1900	S. G. Bennett .....	1.50	Bicknel station.

*Discharge measurements of San Ysidro Creek, Santa Barbara County, Cal., above dam.*

Date.	Hydrographer.	Dis-charge.	Remarks.
		<i>Sec.-feet.</i>	
Nov. 2, 1899	Greenheld .....	0.06	
Dec. 3, 1899	.....do .....	.15	
Mar. 6, 1900	.....do .....	1.00	
Mar. 19, 1900	.....do .....	.35	
June 16, 1900	R. Moyer .....	.07	

## SANTA CLARA RIVER.

*Discharge measurements of Santa Clara River at point below mouth of San Francisco Creek, on Newhall ranch, Los Angeles County.*

Date.	Hydrographer.	Dis-charge.	Remarks.
		<i>Sec.-feet.</i>	
Aug. 9, 1898	F. H. Olmsted .....	10.83	
Aug. 19, 1899	S. G. Bennett .....	3.38	East channel.
Aug. 19, 1899	.....do .....	1.65	West channel.
Aug. 19, 1899	.....do .....	3.37	Newhall ditch.
	Total .....	8.40	
Oct. 8, 1900	W. W. Cockins, jr .....	3.64	East channel.
Oct. 8, 1900	.....do .....	3.25	West channel.
Oct. 8, 1900	.....do .....	3.35	Newhall ditch.
	Total .....	10.24	

*Discharge measurements of Santa Clara River at point 2 miles east of Camulos, Ventura County.*

Date.	Hydrographer.	Dis-charge.	Remarks.
		<i>Sec.-feet.</i>	
June 18, 1898	J. B. Lippincott .....	25.74	Camulos ditch. River.
Aug. 11, 1898	F. H. Olmsted .....	17.36	
Aug. 19, 1899	S. G. Bennett .....	17.63	
Aug. 19, 1899	do .....	1.24	
	Total .....	18.87	
Oct. 8, 1900	W. W. Cockins, jr .....	11.38	Camulos ditch at head of wooden flume.

*Discharge measurements of Santa Clara River in Cienega, 1 mile east of Fillmore, Ventura County.*

Date.	Hydrographer.	Dis-charge.	Remarks.
		<i>Sec.-feet.</i>	
Mar. 15, 1899	S. G. Bennett .....	3.60	

*Discharge measurements of Santa Clara River near Santa Paula, Ventura County.*

Date.	Hydrographer.	Dis-charge.	Remarks.
		<i>Sec.-feet.</i>	
Aug. 18, 1899	S. G. Bennett .....	16.00	Farmers ditch.
Aug. 18, 1899	do .....	8.60	Grease or Santa Clara ditch.
Aug. 18, 1899	do .....	5.80	Ditch taken out on east side of river.
Aug. 18, 1899	do .....	10.30	River.
	Total .....	40.70	

#### SANTA MONICA CREEK.

*Discharge measurements of Santa Monica Creek, Santa Barbara County.*

[Drainage, 4.3 square miles.]

Date.	Hydrographer.	Dis-charge.	Remarks.
		<i>Sec.-feet.</i>	
Aug. —, 1889	G. F. Wright .....	0.23	¼ mile above Fithian's house.
June 16, 1900	R. Moyer .....	.11	



## SANTA PAULA RIVER.

*Discharge measurement of Santa Paula River above Neeper schoolhouse, near Santa Paula, Ventura County, Cal.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Aug. 18, 1899	S. G. Bennett	0.85	

## SANTA YNEZ RIVER.

As determined from Geological Survey maps the area of the drainage basin of this stream above Juncal dam site is 13.4 square miles. E. J. S. Purslow stated in a report to the Santa Barbara Water Company in 1896 that the Santa Ynez River at the Juncal reservoir site was measured during the "past winter and spring;" further details are not given. The discharge stated was 800,000,000 gallons=2,455 acre-feet. The rainfall for season at Santa Barbara was 13.77 inches and the mean from 1867 to date is 16.82 inches. The period of stream observations probably extended from November 1, 1895, to July 1, 1896. This includes Alder Creek water below Juncal.

During the winter of 1902-3 the city of Santa Barbara cooperated with the United States Geological Survey in determining the run-off from portions of the drainage basin of the Santa Ynez River, as given below.

Measurements were first made of the main Santa Ynez River above its junction with the Mono tributary. The drainage area above this point is 71 square miles. Measurements were also made of the discharge of the Mono tributary of the Santa Ynez River at its mouth. The drainage area above this point is 119 square miles. Both of these streams flow from the mountains of the Coast Range, the elevations of their basins ranging from 1,400 to 7,000 feet.

The estimated average rainfall in these drainage basins is 22 inches, and during the season of 1902-3 the mean rainfall was probably exceeded by about 2 inches. The precipitation, however, occurred in gentle slow storms until the latter part of March, when there were heavier rains. It is locally stated that the stream flow is not up to the average. This probably could be explained by the fact of the gentle rains referred to above, and to the further fact that the season of 1902-3 was preceded by years of protracted drought.

*List of discharge measurements of Santa Ynez River above junction with Mono.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1903.		<i>Feet.</i>	<i>Sec.-feet.</i>
Jan. 12	Howard Rankin	1.10	1.79
Jan. 25	do	1.10	1.93
Jan. 27	do	1.20	3.30
Jan. 28	do	3.55	457.24
Jan. 29	do	1.70	49.75
Jan. 30	do	1.50	22.45
Jan. 31	do	1.48	17.90
Feb. 1	do	1.50	22.18
Feb. 2	do	1.45	16.01
Feb. 3	do	1.42	14.61
Feb. 4	do	1.45	15.31
Feb. 5	do	1.45	14.92
Feb. 7	do	1.45	15.63
Feb. 8	do	1.58	24.74
Feb. 9	do	1.50	18.38
Feb. 10	do	1.49	17.63
Feb. 11	do	1.46	16.15
Feb. 12	do	1.45	15.54
Feb. 13	do	1.44	14.92
Feb. 14	do	1.44	14.72
Feb. 16	do	1.40	10.85
Feb. 17	do	1.40	11.34
Feb. 18	do	1.40	11.11
Feb. 19	do	1.40	11.05
Feb. 20	do	1.39	10.75
Feb. 21	do	1.39	10.98
Feb. 23	do	1.38	10.11
Feb. 24	do	1.37	9.05
Feb. 25	do	1.37	9.07
Feb. 26	do	1.36	8.58
Feb. 27	do	1.35	8.72
Feb. 28	do	1.35	8.32
Mar. 1	do	1.35	8.16
Mar. 2	do	1.35	8.01
Mar. 3	do	1.35	7.91
Mar. 4	do	1.45	14.78
Mar. 5	do	1.65	31.60
Mar. 6	do	1.50	20.19
Mar. 7	do	1.50	19.95
Mar. 9	do	1.43	13.52
Mar. 10	do	1.42	13.20
Mar. 11	do	1.42	13.42

*List of discharge measurements of Santa Ynez River, etc.—Continued.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1903.		<i>Feet.</i>	<i>Sec. feet.</i>
Mar. 12	Howard Rankin	1.41	12.70
Mar. 13	do	1.42	13.24
Mar. 14	do	1.43	12.84
Mar. 15	do	1.43	13.11
Mar. 16	do	1.43	12.85
Mar. 17	do	1.42	11.63
Mar. 18	do	1.41	11.27
Mar. 19	do	1.40	11.08
Mar. 20	do	1.40	10.88
Mar. 21	do	1.40	10.55
Mar. 22	do	1.40	10.48
Mar. 23	do	1.40	10.60
Mar. 25	do	1.67	29.26
Mar. 26	do	1.55	19.58
Mar. 27	do	1.50	17.15
Mar. 28	do	1.49	16.91
Mar. 29	do	1.50	18.05

*List of discharge measurements of Mono Creek at mouth.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1903.		<i>Feet.</i>	<i>Sec. feet.</i>
Jan. 28	Howard Rankin	2.95	295.00
Jan. 29	do	1.55	20.23
Jan. 30	do	1.30	12.51
Jan. 31	do	1.25	9.03
Feb. 1	do	1.35	14.83
Feb. 2	do	1.30	10.12
Feb. 3	do	1.20	6.93
Feb. 4	do	1.28	8.82
Feb. 5	do	1.28	8.25
Feb. 6	do	1.21	8.08
Feb. 8	do	1.35	11.96
Feb. 9	do	1.29	8.81
Feb. 10	do	1.28	8.42
Feb. 11	do	1.27	8.77
Feb. 12	do	1.26	8.23
Feb. 13	do	1.25	7.61
Feb. 14	do	1.20	4.89
Feb. 16	do	1.20	5.10
Feb. 17	do	1.20	5.04

*List of discharge measurements of Mono Creek at mouth—Continued.*

Date.	Hydrographer.	Gage height.	Discharge.
1903.		<i>Feet.</i>	<i>Sec.-feet.</i>
Feb. 18	Howard Rankin	1.20	5.14
Feb. 19	do	1.20	5.17
Feb. 20	do	1.19	4.75
Feb. 21	do	1.19	4.74
Feb. 23	do	1.17	4.65
Feb. 24	do	1.15	4.60
Feb. 25	do	1.15	4.56
Feb. 26	do	1.15	4.45
Feb. 27	do	1.14	3.79
Feb. 28	do	1.14	3.81
Mar. 1	do	1.12	3.61
Mar. 2	do	1.12	3.62
Mar. 3	do	1.12	3.64
Mar. 4	do	1.30	10.99
Mar. 5	do	1.60	25.85
Mar. 6	do	1.37	13.57
Mar. 7	do	1.35	13.28
Mar. 9	do	1.30	9.77
Mar. 10	do	1.25	6.58
Mar. 11	do	1.22	6.32
Mar. 12	do	1.22	6.56
Mar. 13	do	1.22	6.49
Mar. 14	do	1.27	9.22
Mar. 15	do	1.25	7.52
Mar. 16	do	1.30	9.83
Mar. 17	do	1.32	9.94
Mar. 18	do	1.26	8.19
Mar. 19	do	1.25	7.99
Mar. 20	do	1.24	7.08
Mar. 21	do	1.24	7.07
Mar. 22	do	1.23	7.18
Mar. 23	do	1.23	7.17
Mar. 25	do	2.50	153.23
Mar. 26	do	1.90	62.52
Mar. 27	do	1.70	36.27
Mar. 28	do	1.60	26.63
Mar. 29	do	1.61	29.54
Mar. 30	do	2.65	177.46
Mar. 31	do	2.80	227.31
Apr. 1	do	4.50	710.58
Apr. 2	do	3.00	269.83

## SAWPIT CREEK.

*Discharge measurement of Sawpit Creek at Division Box, Los Angeles County, Cal.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
July 1, 1898	F. H. Olmsted -----	1.33	Near mouth of canyon.

## SESPE CREEK.

*Discharge measurements of Sespe Creek, Santa Clara River, Ventura County, Cal.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Aug. 11, 1898	F. H. Olmsted -----	2.5	At head of Sespe Land and Water Co. Canal.
Mar. 15, 1899	S. G. Bennett -----	8.3	
Aug. 18, 1899	--- do -----	1.9	

## SHASTA RIVER.

*Discharge measurement of Shasta River.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Aug. —, 1899	M. M. O'Shaughnessy --	279	Wagon bridge 1 mile south of Montague railroad station.

## SNOW CREEK.

*Discharge measurement of Snow Creek, Palm Valley, Riverside County, Cal.*

Date.	Hydrographer.	Dis-charge.	Locality.
		<i>Sec.-feet.</i>	
Feb. 22, 1898	J. B. Lippincott -----	4.5	

## SPRING VALLEY WATER COMPANY.

See San Mateo Creek, Water Supply and Irrigation Paper No. 51, page 390.

## STANISLAUS RIVER.

The river has its source on the western slope of the Sierra Nevada in California. It drains a country lying between the basins of Mokelumne River on the north and Tuolumne River on the south, and flows in a general southwesterly direction, entering San Joaquin River 23 miles above Stockton. A number of canals divert water from this stream on either side, the principal one being the canal of the Stanislaus and San Joaquin Water Company, which irrigates lands in the vicinity of Oakdale and between Knights Ferry and Stockton.

The canal of the Stanislaus and San Joaquin Water Company diverts water from Stanislaus River at a point 3 miles above Knights Ferry, or approximately 15 miles above Oakdale. The volume of this canal at what is known as section 3, was rated on June 1, 1898, by turning in various amounts of water and measuring the same with a meter. It was found on June 6, 1899, that silt had accumulated in the bottom of the flume at the old gage, and a new station was adopted. This point was rated similarly to the one of the year previous.

The record at this station was discontinued February 16, 1901.

*Discharge measurements of Stanislaus River at Oakdale, Stanislaus County.*

Date.	Hydrographer.	Gage height.	Discharge.
1895.		<i>Feet.</i>	<i>Sec.-feet.</i>
May 3	J. B. Lippincott .....	8.85	7,744
July 1	do .....	6.17	3,754
Aug. 28	do .....	2.40	279
Oct. 10	do .....	2.11	192
Nov. 29	do .....	2.12	147
1896.			
Apr. 17	J. A. Vogleson .....	5.40	2,801
July 5	C. C. Babb .....	4.80	2,061
Sept. 7	H. Crowe .....	2.50	304
Oct. 29	J. B. Lippincott .....	2.40	210
1897.			
Feb. 16	J. B. Lippincott .....	4.22	1,346
June 30	J. B. Lippincott and B. Cole .....	8.60	6,754
July 14	A. Q. Campbell .....	3.20	1,015
Sept. 5	do .....	2.00	144
Oct. 29	do .....	2.40	223
Dec. 19	J. B. Lippincott .....	3.00	429

*Discharge measurements of Stanislaus River at Oakdale, etc.—Continued.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1898.		<i>Fect.</i>	<i>Sec.-feet.</i>
Apr. 17	J. B. Lippincott .....	5.30	2,203
June 2	do .....	3.77	912
July 29	do .....	<sup>a</sup> 4.30	73
Oct. 6	do .....	4.20	50
Dec. 22	do .....	4.97	362
1899.			
Mar. 3	J. B. Lippincott .....	5.13	487
Apr. 20	S. G. Bennett .....	8.80	3,873
May 18	do .....	7.63	2,634
June 5	do .....	7.94	3,057
June 8	do .....	8.42	3,599
June 28	do .....	6.3	1,167
Aug. 3	do .....	4.53	143
Sept. 9	do .....	4.41	88
Dec. 6	J. B. Lippincott .....	5.41	531
1900.			
Apr. 5	S. G. Bennett .....	6.82	1,703
May 19	do .....	9.33	4,515
June 21	do .....	6.65	1,438
Aug. 11	do .....	4.38	66
Sept. 6	do .....	4.25	35
Dec. 28	do .....	5.66	611
1901.			
Jan. 29	S. G. Bennett .....	6.18	965
Oct. 21	do .....	4.78	189
1902.			
Aug. 20	L. M. Lawson .....		125

<sup>a</sup>New rod set July 20, 1898.*Discharge measurements of Stanislaus River at Parrots Ferry.*

Date.	Hydrographer.	Dis-charge.
1899.		<i>Sec.-feet.</i>
Sept. 13	S. G. Bennett .....	70

*Estimated monthly discharge of Stanislaus River at Oakdale, Stanislaus County. <sup>a</sup>*

[Drainage area, 1,051 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1878.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
November <sup>b</sup>			42	2,499	0.04	0.04
December <sup>b</sup>			42	2,582	.04	.05
1879.						
January <sup>b</sup>			525	32,281	.50	.58
February	9,830	350	1,994	110,741	1.89	1.97
March	6,960		4,523	278,108	4.30	4.96
April	7,390	3,260	4,307	256,284	4.09	4.56
May	6,060	2,950	4,098	251,976	3.90	4.50
June	6,720	3,160	4,387	261,044	4.17	4.65
July	2,230	1,320	1,584	97,396	1.51	1.74
August <sup>b</sup>			126	7,747	.12	.14
September <sup>b</sup>			21	1,249	.02	.02
October <sup>b</sup>			21	1,291	.02	.02
November <sup>b</sup>			74	4,403	.07	.08
December <sup>b</sup>			630	38,737	.60	.69
The year			1,858	1,341,257	1.77	23.91
1880.						
January <sup>b</sup>			315	19,369	0.30	0.35
February <sup>b</sup>			526	30,256	.50	.53
March <sup>b</sup>			630	38,737	.60	.69
April <sup>b</sup>			5,781	343,993	5.50	6.14
May	10,980	4,370	7,251	445,846	6.90	7.96
June	10,820	5,240	7,742	460,681	7.37	8.22
July	4,630	1,680	3,255	200,142	3.10	3.57
August			735	45,193	.70	.81
September			74	4,403	.07	.08
October			32	1,967	.03	.03
November <sup>b</sup>			21	1,249	.02	.02
December <sup>b</sup>			630	38,737	.60	.69
The year			2,249	1,630,573	2.14	29.09

<sup>a</sup> Authority: California State engineering department from November, 1878, to October, 1884; United States Geological Survey from June, 1895, to December, 1900.

<sup>b</sup> Estimated from run-off of neighboring streams and from previous measurements.



*Estimated monthly discharge of Stanislaus River, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1881.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January <sup>a</sup>			2, 102	129, 247	2. 00	2. 31
February <sup>a</sup>			5, 255	291, 847	5. 00	5. 21
March <sup>a</sup>			2, 102	129, 247	2. 00	2. 31
April <sup>a</sup>			4, 729	281, 394	4. 50	5. 02
May <sup>a</sup>			5, 255	323, 117	5. 00	5. 76
June <sup>a</sup>			2, 733	162, 625	2. 60	2. 90
July			960	59, 028	. 91	1. 05
August			360	22, 136	. 34	. 39
September			140	8, 330	. 13	. 15
October			120	7, 378	. 11	. 13
November			150	8, 925	. 14	. 16
December			1, 488	91, 493	1. 42	1. 64
The year			2, 116	1, 514, 767	2. 01	27. 03
1882.						
January			398	24, 472	0. 38	0. 44
February			908	50, 428	. 86	. 89
March			4, 771	293, 357	4. 54	5. 23
April			3, 782	225, 044	3. 60	4. 02
May			5, 155	316, 968	4. 91	5. 66
June <sup>a</sup>			5, 255	312, 694	5. 00	5. 58
July <sup>a</sup>			1, 892	116, 334	1. 80	2. 08
August <sup>a</sup>			105	6, 456	. 10	. 12
September <sup>a</sup>			105	6, 248	. 10	. 11
October <sup>a</sup>			473	29, 083	. 45	. 52
November <sup>a</sup>			368	21, 897	. 35	. 39
December <sup>a</sup>			210	12, 912	. 20	. 23
The year			1, 951	1, 415, 893	1. 85	25. 27

<sup>a</sup> Estimated from run-off of neighboring streams and from previous measurements.

*Estimated monthly discharge of Stanislaus River, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1883.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January			525	32,281	0.50	0.58
February <sup>a</sup>			420	23,325	.40	.42
March <sup>a</sup>			840	51,649	.80	.92
April <sup>a</sup>			2,102	125,078	2.00	2.23
May <sup>a</sup>			5,255	323,117	5.00	5.76
June <sup>a</sup>			4,204	250,155	4.00	4.46
July <sup>a</sup>			1,051	64,623	1.00	1.15
August <sup>a</sup>			315	19,368	.30	.35
September <sup>a</sup>			210	12,496	.20	.22
October <sup>a</sup>			168	10,330	.16	.18
November <sup>a</sup>			210	12,496	.20	.22
December <sup>a</sup>			210	12,912	.20	.23
The year			1,292	937,830	1.23	16.72
1884. <sup>a</sup>						
January			263	16,171	0.25	0.29
February			3,153	181,362	3.00	3.24
March			4,204	258,494	4.00	4.61
April			4,729	281,394	4.50	5.02
May			4,729	290,775	4.50	5.19
June			5,255	312,694	5.00	5.58
July			4,204	258,494	4.00	4.61
August			1,051	64,623	1.00	1.15
September			210	12,496	.20	.22
October			158	9,715	.15	.17
1895.						
June	8,510	3,842	5,686	338,340	5.41	6.04
July	3,842	550	1,778	109,330	1.69	1.95
August	550	145	330	20,304	.31	.36
September	3,161	145	638	37,970	.61	.68
October	246	145	176	10,802	.17	.19
November	179	179	179	10,651	.17	.19
December	414	145	198	12,208	.19	.22

<sup>a</sup>Estimated from run-off of neighboring streams and from previous measurements.

*Estimated monthly discharge of Stanislaus River, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1896.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	6,956	150	1,806	111,058	1.72	1.98
February .....	1,208	632	782	45,038	.75	.80
March .....	12,000	694	2,464	151,505	2.35	2.70
April .....	9,050	1,966	3,274	194,870	3.11	3.48
May .....	13,050	2,290	4,717	290,092	4.57	5.17
June .....	11,000	2,656	6,541	389,247	6.22	6.97
July .....	3,156	470	1,293	79,503	1.23	1.42
August .....	2,412	218	385	23,703	.37	.42
September .....	962	252	332	19,761	.32	.35
October .....	370	218	239	14,695	.22	.26
November .....	4,514	252	705	41,968	.67	.75
December .....	1,750	470	681	41,904	.65	.75
The year .....	13,050	150	1,935	1,403,344	1.85	25.05
1897.						
January .....	2,251	410	609	37,446	0.58	0.67
February .....	10,580	1,264	3,252	180,607	3.10	3.23
March .....	5,062	1,264	1,915	117,750	1.82	2.10
April .....	9,234	1,880	5,064	301,328	4.81	5.37
May .....	9,980	5,480	7,324	450,338	6.97	8.04
June .....	3,974	860	2,077	123,590	1.98	2.21
July .....	1,180	250	582	35,786	.55	.63
August .....	230	170	198	12,175	.19	.22
September .....	190	140	152	9,045	.14	.16
October .....	250	140	176	10,822	.17	.20
November .....	780	170	255	15,174	.24	.27
December .....	1,516	210	411	25,272	.39	.45
The year .....	10,580	140	1,835	1,319,333	1.74	23.55

*Estimated monthly discharge of Stanislaus River, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1898.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	336	74	207	12,728	0.20	0.23
February .....	1,372	156	389	21,604	.37	.39
March .....	1,000	336	572	35,171	.54	.62
April .....	3,920	536	1,813	107,881	1.73	1.93
May .....	2,540	536	1,378	84,730	1.31	1.51
June .....	880	480	647	38,499	.62	.69
July .....	384	74	167	10,268	.16	.18
August .....	100	27	66	4,058	.06	.07
September .....	100	50	61	3,630	.06	.07
October .....	100	74	77	4,735	.07	.08
November .....	100	50	71	4,225	.07	.08
December .....	315	74	139	8,547	.13	.15
The year .....	3,920	27	466	336,076	.44	6.00
1899.						
January .....	1,240	70	457	28,100	0.44	0.51
February .....	690	130	355	19,716	.34	.35
March .....	13,940	220	2,425	149,108	2.31	2.66
April .....	5,270	1,450	3,525	209,752	3.35	3.74
May .....	5,780	1,450	2,559	157,348	2.43	2.80
June .....	4,632	1,045	2,663	158,459	2.53	2.82
July .....	1,120	175	502	30,867	.48	.55
August .....	265	90	150	9,223	.14	.16
September .....	130	50	85	5,058	.08	.09
October .....	1,200	90	309	19,000	.29	.33
November .....	2,340	90	1,092	64,978	1.04	1.16
December .....	5,015	550	1,461	89,834	1.39	1.60
The year .....	13,940	50	1,299	941,443	1.24	16.77

*Estimated monthly discharge of Stanislaus River, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1900.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	7,050	820	1,944	119,532	1.85	2.13
February .....	1,100	540	700	38,876	.67	.70
March .....	2,640	540	1,829	112,461	1.74	2.01
April .....	3,000	1,260	1,761	104,787	1.68	1.87
May .....	4,377	1,260	3,343	205,553	3.18	3.67
June .....	3,125	960	1,863	110,856	1.77	1.97
July .....	960	70	349	21,459	.33	.38
August .....	110	30	64	3,935	.06	.07
September .....	70	30	46	2,737	.04	.04
October .....	2,760	70	448	27,546	.43	.49
November .....	6,037	310	1,220	72,595	1.16	1.29
December .....	1,640	610	871	53,556	.83	.95
The year .....	7,050	30	1,203	873,893	1.15	15.57

*Discharge measurement of Cascade Creek, Stanislaus River, Tuolumne County.*

Date.	Hydrographer.	Discharge.
		<i>Sec.-feet.</i>
Oct. 21, 1896	J. B. Lippincott .....	0.0

*Discharge measurement of Cow Creek, Stanislaus River, Tuolumne County.*

Date.	Hydrographer.	Discharge.
		<i>Sec.-feet.</i>
Oct. 21, 1896	J. B. Lippincott .....	0.5

*Discharge measurement of Stanislaus River, Main Fork, Eureka Valley,  
Tuolumne County.*

Date.	Hydrographer.	Dis-charge.
Nov. 20, 1896	J. B. Lippincott .....	<i>Sec.-feet.</i> 158.0

*Discharge measurement of Mill Creek, Stanislaus River, Tuolumne County.*

Date.	Hydrographer.	Dis-charge.	Remarks.
Oct. 21, 1896	J. B. Lippincott .....	<i>Sec.-feet.</i> 1.5	

*Discharge measurement of Niagara Creek, Stanislaus River, Tuolumne County.*

Date.	Hydrographer.	Dis-charge.	Remarks.
Oct. 21, 1896	J. B. Lippincott .....	<i>Sec.-feet.</i> 1.5	

*Discharge measurement of Stanislaus River, Middle Fork, Donnels Flat, near  
mouth of Niagara Creek, Tuolumne County.*

Date.	Hydrographer.	Dis-charge.	Remarks.
Oct. 12, 1899	Mr. Coul .....	<i>Sec.-feet.</i> 144	Mean of 12 measurements not influenced by reservoired water; no diversion above.

*Discharge measurement of Stanislaus River, Middle Fork, north of Shot Gun,  
Tuolumne County.*

Date.	Hydrographer.	Dis-charge.	Remarks.
1901. Sept. 16, 17	C. E. Moore .....	<i>Sec. feet.</i> 300	

*Discharge measurement of Stanislaus River, Oakdale Ditch Company's Flume, Stanislaus County.*

Date.	Hydrographer.	Gage height.	Dis-charge.	Remarks.
1899.		<i>Feet.</i>	<i>Sec.-feet.</i>	
May 19	S. G. Bennett		10.6	
1902.				
May 12	S. G. Bennett	23	36.0	Flume No. 13, main canal below head of Oakdale Canal.
Do	do		73.0	Flume No. 6, main canal below head of Oakdale Canal.
Do	do		13.71	

*Discharge measurements of Stanislaus Water Company's Canal, Stanislaus River, near Knights Ferry, Stanislaus County.*

Date.	Hydrographer.	Gage height.	Dis-charge.	Remarks.
1896.		<i>Feet.</i>	<i>Sec.-feet.</i>	
Sept. 8	H. Crowe		66	
Oct. 30	J. B. Lippincott		38	
1897.				
Feb. 16	J. B. Lippincott		26	Below forks.
Do	do		13	Little John Canal.
	Total		39	
May 30	J. B. Lippincott		54	Main canal below forks.
Do	do		12	Little John Canal.
	Total		66	
July 13	A. Q. Campbell		36	Below forks.
Do	do		15	Little John Canal.
	Total		51	
Sept. 6	A. Q. Campbell		52	Below forks.
Do	do		1	Little John Canal.
	Total		53	
Oct. 29	A. Q. Campbell		35	Below forks.
Do	do		1	Little John Canal.
	Total		36	
Dec. 19	J. B. Lippincott		17	Below forks.
Do	do		4	Little John Canal.
	Total		21	

*Discharge measurements of Stanislaus Water Company's Canal, etc.—Continued.*

Date.	Hydrographer.	Gage height.	Discharge.	Remarks.
1898.		<i>Feet.</i>	<i>Sec.-feet.</i>	
Apr. 17	J. B. Lippincott		58	
June 1	do		72	Main canal flume No. 3.
July 29	do		42	Do.
Oct. 5	do		33	
Oct. 6	do		33	
1899.				
May 19	S. G. Bennett		74	Do.
June 6	do		71	Do.
1900.				
May 9	S. G. Bennett	2.79	95	Do.
Sept. 7	do		85	At headworks of canal.
1902.				
May 12	S. G. Bennett	1.14	129	Flume No. 3, main canal.
Aug. 16	E. T. Perkins		3.5	San Antonio Creek below mouth of Big Tree Creek.
Aug. 17	do		67	Angel's ditch near head North Fork Stanislaus.
Do	do		1	North Fork, 400 feet below suspension bridge.
	Total		68	
Aug. 17	E. T. Perkins		2.3	Mill Creek at junction Love and Morgan creeks.
Aug. 20	do		54	Power company's flume above ditch tender's house, South Fork.
Do	do		16	Do.
Aug. 21	do		53	Clarks Fork at mouth Middle Fork.
Do	do		126	Middle Fork below mouth of Clarks Fork.
Do	do		73	Middle Fork above mouth of Clarks Fork.
Aug. 14	do		53	Standard ditch at flume No. 59.
Aug. 22	L. M. Lawson		193	Below Colliers.
Aug. 24	do		170	Abbotts ferry.
Aug. 21	do	.6	168	Parrotts ferry.
Aug. 23	do		171	Robinsons ferry.
Aug. 19	do		166	Knights ferry.
Aug. 17	do		154	Stanislaus Water Co.'s canal below intake.



*Discharge measurements of Stanislaus Water Company's Canal, etc.—Continued.*

Date.	Hydrographer.	Gage height.	Dis-charge.	Remarks.
1900.		<i>Feet.</i>	<i>Sec.-feet.</i>	
Sept. 7	S. G. Bennett -----		<i>a</i> 28	At headworks Stanislaus Water Co.'s Canal, 6 miles above Knights Ferry.
Sept. 7	do -----		<i>b</i> 85	
	Total -----		113	
		<i>a</i> River.	<i>b</i> Canal.	

*Discharge measurements of Stanislaus River, Tuolumne County.*

Date.	Hydrographer.	Gage height.	Dis-charge.	Locality.
1896.		<i>Feet.</i>	<i>Sec.-feet.</i>	
Sept. 3	J. B. Lippincott -----		60	South Fork at Sugar Pine. In flume; not entire flow of river.
1901.				
Sept. 17	C. E. Moore -----		300	Middle Fork, 15 miles above junction with North Fork.

#### STONY CREEK.

This stream drains 700 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 eastward and enters the Sacramento River 20 miles 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.

On January 30, 1901, a gaging station was established by Mr. Burt Cole at Julian's ranch, 6 miles northwest of the town of Fruto, Cal., to determine the amount of water available for storage.

For a description in detail of the reservoir sites and drainage basin of Stony Creek, see Water-Supply and Irrigation Paper No. 86.

*Discharge measurements of Stony Creek, Glenn County, Cal.*

Date.	Hydrographer.	Gage height.	Discharge.	Locality.
		<i>Feet.</i>	<i>Sec.-feet.</i>	
Aug., 1900 <sup>a</sup>	Burt Cole		0.0	{ Grindstone Creek, 4 miles above mouth.
Sept., 1900 <sup>a</sup>				
Oct., 1900 <sup>a</sup>				
Nov. 22, 1901	H. E. Green		38.0	Grindstone Creek, point above bridge.
Aug. 3, 1900	Burt Cole		1.7	Hall ditch.
Sept. 30, 1900	do		1.4	Hall ditch, 100 feet above head gate.
July 28, 1900	do		2.3	Orland ditch.
Aug. 3, 1900	do		1.7	Do.
Sept. 30, 1900	do		1.3	Do.
Sept. 22, 1900	S. G. Bennett		7.7	1 mile below Elk Creek.
Aug., 1900 <sup>a</sup>	Burt Cole		.0	Briscoe Creek, at mouth.
Sept., 1900 <sup>a</sup>				
Oct., 1900 <sup>a</sup>				
Nov. 22, 1901	H. E. Green		10.4	Briscoe Creek, above dam site.
Sept. 21, 1900	Burt Cole		13.8	Brown ditch.
Sept. 1, 1899	W. W. Brier		3.25 <i>t</i>	Thomas Creek, Tehama County, at Richfield Sta- tion.
Nov. 11, 1900	Burt Cole		62.0	Gaging station, Julian's ranch.
Feb. 1 <del>4</del> , 1901	do		18,000.0 <sup>b</sup>	
Feb. 27, 1901	do	6.9	2,583.0	Do.
Mar. 9, 1901	do	5.6	933.0	Do.
Apr. 30, 1901	S. G. Bennett	4.9	382.0	Do.
Sept. 3, 1901	do	3.17	3.4	Do.
Nov. 21, 1901	H. E. Green	4.3	165.0	Do.
Jan. 26, 1902	S. G. Bennett	3.9	126.0	Do.
Feb. 28, 1902	do	10.0	7,336.0	Do.
May 8, 1902	S. G. Bennett	5.33	1,080.0	Do.
Sept. 24, 1902	do	3.00	14.0	Do.
Sept. 21, 1900	B. Cole		.3	Laux ditch.
Do.	do		20.0	Stony Creek, near Stony Fork, above Laux ditch.
Sept. 26, 1900	do		6.2	Stony Ford ditch, at head- gate.
Sept. 21, 1900	do		.3	Welton ditch headgate.

<sup>a</sup> Dry.<sup>b</sup> Estimated.

*Estimated monthly discharge of Stony Creek at Julian's ranch.*

[Drainage area, 760 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1901.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acres.-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
February .....	10,385	725	2,707	150,339	3.56	3.71
March .....	2,215	435	893	54,908	1.18	1.36
April .....	630	225	361	21,481	.48	.54
May .....	555	225	349	21,459	.46	.53
June .....	195	5	66	3,927	.09	.10
July .....	15	0	7	430	.01	.01
August .....	10	2	4	246	.01	.01
September .....	725	5	35	2,083	.05	.06
October .....	340	0	130	7,993	.17	.20
November .....	1,125	35	161	9,580	.21	.23
December .....	3,875	77	425	26,132	.56	.64
11 months .....	10,385	0	428	298,578	.57	7.39
1902.						
January .....	150	109	114	7,010	0.15	0.17
February .....	14,650	109	4,201	233,312	5.53	5.76
March .....	7,000	920	2,588	159,130	3.41	3.93
April .....	4,680	690	1,522	90,565	2.00	2.23
May .....	1,000	270	578	35,540	.76	.88
June .....	370	5	132	7,855	.17	.19
July .....	9	2	3	184	0	0
August .....	5	2	3	184	0	0
September .....	14	5	9	536	.01	.01
October .....	225	55	92	5,657	.12	.14
November .....	5,005	109	1,584	94,255	2.08	2.32
December .....	2,765	690	1,132	69,604	1.49	1.72
The year .....	14,650	2	997	703,832	1.31	17.35

## SUSAN RIVER.

*Discharge measurements of Susan River at Honey Lake Basin, Lassen County.*

Date.	Hydrographer.	Gage height.	Discharge.	Locality.
1899.		<i>Feet.</i>	<i>Sec.-feet.</i>	
Apr. 18	Albert Halen .....	-----	25.0	Mouth of Willow Creek.
Apr. 18	W. D. Minckler .....	-----	25.0	Do.
Apr. 23	Albert Halen .....	-----	28.0	Do.
June 4	do .....	-----	25.0	Do.
Apr. 24	W. D. Minckler .....	-----	28.0	Willow Creek, near Ravens- crofts.
June 4	do .....	-----	24.0	Do.
June 11	Albert Halen .....	-----	21.0	Do.
June 11	W. D. Minckler .....	-----	21.0	Do.
1900.				
June 4	L. H. Taylor .....	2.60	16.0	Do.
July 30	do .....	2.85	26.0	Do.
Oct. 10	do .....	2.80	20.0	Do.
1899.				
Apr. 18	Albert Halen .....	-----	139.0	Main river, dam near mouth of Willow Creek.
Apr. 23	do .....	-----	115.0	Do.
June 4	do .....	-----	37.0	Do.
June 11	do .....	-----	33.0	Do.
June 11	do .....	-----	34.0	Main river, below dam.
Apr. 18	W. D. Minckler .....	-----	14.5	Do.
Apr. 23	do .....	-----	41.0	Do.
June 11	do .....	-----	34.0	Main river, below Colony dam.
	do .....	-----	23.0	Do.
1900.				
June 30	L. H. Taylor .....	3.20	40.0	Near Susanville.
July 5	do .....	2.60	8.0	Do.
1901.				
Mar. 16	do .....	4.30	274.0	Do.
Apr. 5	do .....	4.00	178.0	Do.
May 20	do .....	4.50	351.0	Do.
June 7	do .....	3.60	84.0	Do.

*Discharge measurements of Susan River at Honey Lake Basin, etc.—Continued.*

Date.	Hydrographer.	Dis-charge.	Locality.
1899.		<i>Sec.-feet.</i>	
June 11	W. D. Minckler .....	33.00	North and South branches above Colony dam.
Apr. 24	do .....	31.00	South Branch, Otis Johnson's.
June 4	do .....	30.00	Do.
Apr. 4	do .....	11.00	North Branch, Otis Johnson's.
June 4	do .....	7.00	Do.
Apr. 18	do .....	30.00	Tanners Slough.
Apr. 23	do .....	27.00	Do.
June 4	do .....	15.00	Do.
June 11	do .....	18.00	Do.

#### SUTTER RIVER.

*Discharge measurement of Sutter River, Amador County.*

Date.	Hydrographer.	Dis-charge.	Locality.
1899.		<i>Sec.-feet.</i>	
Sept. 18	S. G. Bennett .....	1.00	At Sutter Creek (estimated).

#### SWEETWATER RIVER.

The drainage basin of Sweetwater River is in the extreme south-western corner of the United States, being in San Diego County, Cal., adjacent to the Republic of Mexico. The river flows from the western slope of Cuyamaca Mountain, which rises to an elevation of 6,000 feet. The city of San Diego, on the coast, is about 33 miles west and 12 miles south of this peak. The drainage basin is 34 miles in length by about 5 miles in width, its total area above the reservoir being 186 square miles, as determined in part from survey and in part from the county maps. This area is classified as follows:

	Sq. miles.
Steep and rocky mountains favorable to large run-off .....	26
Lower rolling mountains, usually covered with brush .....	99
Rolling hills, covered with soil and disintegrated granite .....	30
Agricultural lands (17 per cent) and river bottom .....	31
Total .....	186

The most noticeable topographic feature of this basin influencing the run-off is the abrupt flattening of the slopes at the base of the mountains into agricultural fields. The drainage lines deeply cut into the steep hillsides are quickly lost or are poorly defined in crossing the flat

alluvial cones or partly filled valleys on the low grounds. In turn, the nearly level fields or parks drain into deep canyons. The occasional flood caused by a heavy rain rushing down the mountain side spreads out over the flat lands, much of it disappearing before it can reach the lower canyon. The steady percolation which might be expected at points below is to a large extent cut off by the high rate of evaporation, and thus the percentage of run-off, taking the basin as a whole, is small. A more detailed description of this river is given in William Ham. Hall's report on irrigation in southern California.

The figures relating to the amount of water draining from this basin and also the other details given in the following table have been compiled from data obtained by Mr. H. N. Savage, chief engineer, and Mr. James D. Schuyler, consulting engineer, of the San Diego Land and Town Company. The first column in the table gives the evaporation from the surface of the Sweetwater reservoir in inches in depth per month. This was measured from a metallic pan exposed to the direct rays of the sun at a point near the dam, this being continued in use until May, 1893. Subsequently observations were made by means of a Piche evaporimeter.<sup>a</sup> This was placed in an instrument shelter of the ordinary type used by the Weather Bureau. This shelter is 15 feet above the ground and about 40 feet above the level of the lake, being located 500 feet northeast from the gate tower. It has been noted that the records from the Piche evaporimeter which cover the same months as those from the pan are in the ratio of 48 to 57. It is believed that the exposed pan gives more nearly the evaporation from the water surface than the Piche evaporimeter. If the evaporation were annually 5 feet in depth from the surface of the reservoir—that is, from the 70-foot level down to the 65-foot level—the loss would amount to 24 per cent of the total amount stored. The area of the reservoir at the 70-foot level is 721.86 acres.

The average wind velocity given in miles per hour is that noted at the city of San Diego, 12 miles from the reservoir, and under similar conditions. In this connection it may be well to note the results obtained by Prof. Thomas Russell as to the effect of velocity upon evaporation obtained by whirling the Piche evaporimeter at varying rates.

Experiments were made which show that the effect of the wind on the evaporation from a vessel exposed in the open air is very great. Two Piche instruments were taken, one suspended in quiet air and the other fixed rigidly on the end of the 28-foot arm of the whirling machine set up in the inclosure of the Pension Office building. The whirling machine was the one used in standardizing anemometer.

The instruments, filled with water, were first weighed on a fine balance to the hundredth of a gram. The whirling arm was then turned so that the Piche on its end moved with a velocity of 5 miles an hour. The motion was continued for

<sup>a</sup> Described by Prof. Thomas Russell in the Monthly Weather Review for September, 1888, in connection with a report upon the depth of evaporation in the United States.

half an hour, and at the end of the time both Piches were again weighed. Then the Piche that had been suspended in quiet air was put on the arm, and the one that had been on the arm was put in its place. The whirling was then started again at the same velocity, and continued for another half hour. At the end of the time the Piches were again weighed. While this was being done the humidity of the air was determined from time to time by means of whirled wet and dry bulb thermometers.

Observations were also made in the same way with the Piche moving at velocities of 10, 15, 20, 25, and 30 miles per hour. At a velocity of 5 miles an hour the evaporation from a Piche was 2.2 times that from one in quiet air; at 10 miles, 3.8 times; at 15 miles, 4.9 times; at 20 miles, 5.7 times; at 25 miles, 6.1 times; and at 30 miles, 6.3 times. During the time the observations were made, June 25 and 26, 1888, the average temperature of the air was 83.7 and the relative humidity 50 per cent.

Measurements were made of the relative humidity at the reservoir during 1893 and 1894. When not obtained at this point they are given from the Weather Bureau figures for San Diego. The temperature of the air is taken as the average of the maximum and minimum daily readings. The temperature of the water in the lake and also in the pan was taken daily. That in the pan was observed at about 2 p. m., thus giving a reading slightly higher than that of the lake, as the pan under the hot sun caused the water to warm slightly. If two readings had been taken each day at intervals of twelve hours the average would probably have been very nearly that of the lake. It is noted that the water in the lake was usually a few degrees warmer than the atmosphere.

#### RAINFALL IN SWEETWATER BASIN.

The rainfall has been measured at two rain gages, one at the reservoir and one at Descanso, 25 miles east of the reservoir and at an elevation of 3,500 feet. The Descanso gage is 3 miles to the east of the summit of a ridge which may act in such a manner as to cut off the precipitation, thus reducing it below a theoretical amount for this position. In addition to the two rain gages within the drainage basin, the record from a third—that at the Cuayamaca reservoir—is given. This is at an elevation of 4,800 feet, and is only 3 miles distant from the divide between the drainage of Sweetwater and of San Diego River. The gage here is in a narrow valley or canyon, and the results obtained, being probably influenced by local topography, are regarded as excessive for this altitude and the locality. The rainfall at the dam in the winter of 1900–1901 was 11 inches.

The total amount of precipitation, as obtained at the reservoir and at Descanso, is not considered as showing the rainfall upon the drainage basin as a whole. One of the gages is located too high and the other too low to fairly represent the average conditions. In order, therefore, to obtain approximately the total amount of water falling upon the basin, certain assumptions are made and corrections are

applied to the recorded precipitation. It is assumed that there is a regular increase in the rate of precipitation with altitude, and that this is at the rate of 0.6 inch of rain for each 100 feet increase in elevation. It is also assumed that the mean elevation of the whole basin is approximately 2,200 feet. Taking San Diego, which is nearly at sea level, as the base station, this, under the assumptions just given, would indicate that the rainfall on the basin should average 13.2 inches greater than that at San Diego. As the average rainfall at San Diego is 9.92 inches, the rainfall on the Sweetwater catchment area should be 9.92 plus 13.2 inches, or 23.12 inches.

In the same way the average rainfall is deduced from the measurements at the points within the basin. At Descanso the average rainfall is 26.38 inches. This point, having an altitude of 3,500 feet, is 1,300 feet above the assumed altitude of Sweetwater basin. Deducting, therefore, 7.8 inches leaves 18.58 inches as the average rainfall. Again, taking the results obtained at the rain gage at the Sweetwater reservoir, 12.01 inches, at an elevation of 250 feet, and adding to this the *theoretical increase* due to altitude of 11.70 inches, the sum 23.71 can be applied to the basin. The average of these two computations, based on the observations at Descanso and at the reservoir, is 21.14 inches for the basin. This method has been used in the following table, page 351, in determining the average rainfall throughout the 186 square miles in the catchment basin for each year, additions being made to the rainfall recorded at the reservoir, and subtractions from that at Descanso, the average of the two results thus obtained being given in the table.

#### RUN-OFF FROM SWEETWATER BASIN.

The discharge from this watershed, embracing 186 square miles, during the winter of 1900-1901, was 280,000,000 gallons, or 861 acre-feet.

The run-off shown in the table on page 351 has been computed by Mr. H. N. Savage. The stream usually ceased flowing about the 1st of June and remained dry throughout the summer, water flowing again in the fall or early winter after the rains began. At this latter time the reservoir is at a low stage, the water having been used for irrigation during the hot season. The flow into the reservoir, being wholly held, is therefore computed from the increase of height shown by the readings on the gage rod in the reservoir, due allowance being made for evaporation and the amount withdrawn. Later, when the reservoir is full and some of the water overflows, an additional amount must be added. To obtain this amount is a somewhat difficult matter, as the water flows out through a gate valve, over the waste weir, and also occasionally, during floods, over the top of the dam.



*Evaporation, temperature, and rainfall at Sweetwater reservoir, San Diego County.*

Month.	Evapora- tion.	Wind (miles per hour).	Humid- ity.	Temperature.		Rainfall.		
				Air, degrees Fahren- heit.	Water, degrees Fahren- heit.	At reser- voir.	At Des- canso.	At Cuya- maca.
1888.	<i>Inches.</i>		<i>Per cent.</i>			<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
September				70		0.00		0.21
October				65		.36		3.82
November				60		2.81		8.33
December				58		3.20		13.30
1889.								
January	1.990	4.8	80	57		1.56		2.99
February	3.336	5.7	74	56		.82		4.70
March	3.380	5.4	80	59		3.87		12.85
April	4.961	5.6	79	61		.36		3.34
May	5.822	5.9	75	61		.21		2.21
June	6.806	5.5	81	64		.33		.00
July	7.398	5.1	79	67		.01		.00
August	8.253	5.0	69	73		.00		1.71
September	7.360	5.1		71		.00		.03
October	2.998	4.7		65		2.22		2.82
November	4.800	4.4		60		1.08		1.64
December	.246	4.7		56		7.07		21.00
1890.								
January	1.588	5.0		48		2.20		11.02
February	2.214	5.2		52		2.07		16.36
March	3.280	4.9		55		1.30		4.00
April	4.141	5.1		58		.10		.97
May	6.140	4.6		60		.41		.00
June	7.302	5.4		65		.00		.00
July	7.380	4.7		70		.00		.09
August	9.020	4.6		71		.07		.90
September	6.482	4.3	69	72		.42		1.40
October	4.920	4.0	79	66		.45		.58
November	5.535	4.3	59	65		.93		3.62
December	1.845	4.5	83	62		2.29		12.13
1891.								
January	3.608	4.4	58	55		.83		.00
February	1.353	5.8	73	52		5.28		34.70
March	3.075	5.3	74	57		.23		3.17
April	3.707	4.9	76	58	70	1.27		3.50

*Evaporation, temperature, and rainfall at Sweetwater reservoir, etc.—Continued.*

Month.	Evapora- tion.	Wind (miles per hour).	Humid- ity.	Temperature.		Rainfall.		
				Air, degrees Fahren- heit.	Water, degrees Fahren- heit.	At reser- voir.	At Des- canso.	At Cuya- maca.
1891.	<i>Inches.</i>		<i>Per cent.</i>	*		<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
May .....	5.599	5.4	75	61	69	0.83	-----	3.69
June .....	6.027	4.6	74	65	78	.09	-----	.00
July .....	6.501	4.0	78	71	80	.00	-----	.04
August .....	8.890	3.8	77	73	82	.03	-----	.30
September .....	6.150	4.7	76	73	76	.00	-----	2.67
October .....	6.314	3.8	79	66	72	.00	-----	.00
November .....	4.100	3.8	74	60	64	.13	-----	.45
December .....	2.752	5.4	65	52	54	.90	-----	6.75
1892.								
January .....	2.542	3.7	58	55	54	2.42	-----	7.23
February .....	1.394	4.7	75	54	63	3.47	-----	6.47
March .....	3.075	4.8	73	56	66	.55	-----	7.76
April .....	5.822	5.5	82	57	70	.93	-----	3.35
May .....	4.674	5.7	68	61	71	1.39	-----	5.90
June .....	6.478	5.6	69	63	74	.07	-----	.67
July .....	8.808	5.0	73	67	78	.00	-----	.00
August .....	6.540	4.9	74	68	78	.02	-----	.00
September .....	6.273	4.8	74	68	76	.00	0.00	.00
October .....	6.560	4.2	65	64	68	.15	.00	.30
November .....	4.766	3.7	50	62	60	.04	1.50	2.87
December .....	2.614	4.3	66	53	56	2.12	2.00	3.76
1893.								
January .....	2.768	4.0	51	57	58	.22	3.01	5.55
February .....	2.214	5.1	67	54	59	1.96	2.64	9.13
March .....	1.076	6.2	76	51	60	6.50	14.07	15.60
April .....	5.002	5.3	73	58	64	.27	.50	1.00
May .....	4.902	5.8	72	61	68	.20	.00	1.00
June .....	3.411	4.9	77	65	76	.00	.00	.00
July .....	5.318	5.1	77	69	81	.16	.75	1.20
August .....	4.693	5.0	75	72	80	.00	.00	.30
September .....	4.864	5.1	75	66	77	.00	.25	.00
October .....	4.586	4.6	67	65	70	.33	1.25	1.90
November .....	4.513	4.5	65	58	60	.84	3.15	3.30
December .....	6.283	4.5	60	58	58	2.08	4.38	6.05

<sup>a</sup> End of measurements from pan and beginning of observations on Piche evaporimeter.

*Evaporation, temperature, and rainfall at Sweetwater reservoir, etc.—Continued.*

Month.	Evapora- tion.	Wind (miles per hour).	Humid- ity.	Temperature.		Rainfall.		
				Air, degrees Fahren- heit.	Water, degrees Fahren- heit.	At reser- voir.	At Des- canso.	At Cuya- maca.
1894.	<i>Inches.</i>		<i>Per cent.</i>			<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
January .....	3.897	5.0	68	50	52	0.36	2.10	2.05
February .....	3.533	5.2	67	50	56	.71	3.40	2.05
March .....	3.008	5.8	73	56	59	1.69	3.63	3.00
April .....	3.634	5.4	70	59	65	.04	.13	.00
May .....	3.451	5.7	74	59	68	.15	.50	1.00
June .....	4.683	5.6	72	62	76	.00	.38	.50
July .....	3.161	5.2	75	67	80	.00	.12	.00
August .....	3.066	4.8	77	68	82	.00	.13	1.50
September .....	4.637	5.1	76	69	75	.00	.00	.40
October .....	3.232	3.8	72	64	70	.04	.00	.00
November .....	3.347	3.9	76	59	64	.00	.00	.00
December .....	2.344	4.3	73	54	59	3.03	7.62	12.76
1895.								
January .....	2.357	6.0	74	53	-----	9.63	19.52	28.43
February .....	2.850	5.0	-----	54	-----	1.52	2.76	6.05
March .....	3.121	5.3	-----	56	-----	1.18	3.13	5.52
April .....	3.939	5.2	-----	58	-----	.44	.64	1.20
May .....	4.119	5.8	77	63	-----	.35	.63	.16
June .....	3.188	-----	-----	66	-----	.00	.00	.00
July .....	<sup>a</sup> 6.428	-----	-----	69	-----	.00	.00	.00
August .....	<sup>a</sup> 6.744	-----	-----	71	-----	.00	.00	.00

<sup>a</sup> Estimated.

The following table gives, for the period from 1888 to 1901, the estimated precipitation upon the catchment basin, obtained as stated on page 347, also the depth of run-off in inches and the relation which this bears to the depth of rainfall, by years. The years chosen are not calendar years, but extend from September to August, inclusive, as this division is more in accordance with the distribution of rainfall and the discharge of the streams.

*Estimated rainfall upon the Sweetwater catchment basin; also depth and percentage of run-off.*

Year.	Rain.	Run-off.		Per cent.
		Per square mile.	Inches.	
	<i>Inches.</i>	<i>Sec.-feet.</i>		
1887-88		0.0524		
1888-89	21.00	.1875	2.54	12.000
1889-90	25.71	.1525	3.71	14.000
1890-91	23.40	.1602	2.07	9.000
1891-92	17.14	.0460	.62	4.000
1892-93	20.00	.1210	1.61	8.000
1893-94	14.76	.0099	.14	1.000
1894-95	27.14	.5452	7.12	26.000
1895-96	19.54	.0098	.101	.517
1896-97	24.91	.0512	.665	2.67
1897-98	18.18	.00003	.0005	.003
1898-99	18.51	.0018	.025	.135
1899-1900	19.10	0	0	0
1900-1901	23.65	.0063	.087	.368
1901-1902	20.29	0	0	0

The figures showing evaporation, wind movement, humidity, and temperature are brought together for comparison by years in the following table. In this case, as stated above, the years extend from September to August, inclusive, as this most nearly agrees with the natural division.

*Annual evaporation, temperature, etc., in Sweetwater Basin.*

[Elevation of reservoir, 250 feet.]

Period.	Evaporation.	Wind.	Humidity.	Temperature of air.	Temperature of water.
	<i>Evaporation.</i>	<i>Miles per hour.</i>	<i>Per cent.</i>	<i>Deg. F.</i>	<i>Deg. F.</i>
1888-89	56.47	4.9			
1889-90	57.54	4.6			
1890-91	58.65	4.8	72	61	68
1891-92	49.60	4.9	68	61	67
1892-93	48.68	5.1	70	60	67
1893-94	45.18	5.2	79	59	
1894-95	41.24	5.3	76	61	
1895-96	61.93	5.9	73	60	
1896-97	32.54	5.7	75	61	
1897-98					
1898-99					
1899-1900					
1900-1901					

<sup>a</sup> Evaporation January 1 to August 31.

<sup>b</sup> Evaporation September 1 to April 30.

#### FLOODS IN THE RIVER.

The Sweetwater, like the other rivers of southern California, is liable at times to extraordinary floods, due to heavy precipitation upon the catchment basin. In 1893 two floods furnished 70 per cent of the annual discharge of the river for that year. For the 24 hours ending March 24, 1893, the river discharged 3,069 acre-feet. For the seven days ending March 27, the total amount discharged was 7,980 acre-feet. In January, 1895, a flood was carefully watched and the flow computed at short intervals, as shown in the following table. The total run-off from 5 p. m. on January 14 to noon on January 22 was equivalent to a trifle over 4.70 inches over the whole drainage basin, or in all 46,670 acre-feet. This same storm gave a maximum discharge from Cedar, Boulder, and Colman creeks, aggregating 100 square miles within the drainage basin of San Diego River, of 13,000 second-feet.

*Rate of flow during flood of January, 1895, in Sweetwater River.*

Time.	Second-feet.	Time.	Second-feet.
January 14:		January 17—Continued.	
5 p. m. ....	0	3 p. m. ....	4,416
January 15:		January 18:	
7 a. m. ....	84	8 a. m. ....	3,331
12 m. ....	1,855	9 a. m. ....	2,090
3 p. m. ....	6,410	10 a. m. ....	2,048
4 p. m. ....	5,214	7 p. m. ....	2,466
5 p. m. ....	5,262	January 19:	
6 p. m. ....	4,152	5 a. m. ....	1,532
7 p. m. ....	6,135	8.30 a. m. ....	2,944
9 p. m. ....	5,567	9.30 a. m. ....	2,888
10 p. m. ....	5,080	10.30 a. m. ....	3,068
January 16:		11.30 a. m. ....	3,470
5 a. m. ....	3,297	1.30 p. m. ....	3,364
6 a. m. ....	4,720	3 p. m. ....	3,968
7 a. m. ....	3,585	3.30 p. m. ....	4,692
8.30 a. m. ....	5,316	4 p. m. ....	3,224
9.30 a. m. ....	5,370	4.30 p. m. ....	3,230
10.30 a. m. ....	6,602	9 p. m. ....	3,176
11.30 a. m. ....	8,713	January 20:	
12.30 p. m. ....	8,713	7 a. m. ....	3,314
1.30 p. m. ....	13,684	9 a. m. ....	2,805
2 p. m. ....	13,000	10 a. m. ....	2,674
2.30 p. m. ....	15,148	11 a. m. ....	2,484
3.30 p. m. ....	18,148	1 p. m. ....	2,500
4 p. m. ....	14,034	2 p. m. ....	2,136
4.30 p. m. ....	14,490	January 21:	
5.30 p. m. ....	7,227	7 a. m. ....	1,880
6.30 p. m. ....	9,420	10 a. m. ....	820
7.30 p. m. ....	8,310	12 m. ....	750
8 p. m. ....	6,930	5.30 p. m. ....	800
January 17:		January 22:	
5 a. m. ....	5,302	7 a. m. ....	810
6 a. m. ....	3,545	12 m. ....	530
8 a. m. ....	3,954		

#### INCREASE OF PRECIPITATION WITH ALTITUDE.

In connection with the above data concerning the rainfall and run-off on the Sweetwater drainage basin, the writer has given a discussion of the precipitation in southern California, and has brought

together figures showing the increase of rainfall with altitude. The following statement is quoted from a report made on this subject:

The warm, moisture-laden winds from the sea on their inland journey are driven up the slopes in the Coast Range. As they rise in elevation they expand under the lighter atmospheric pressure, become chilled, and are deprived of all moisture in excess of the point of saturation at that temperature and pressure. This lowering of temperature in their ascent is more pronounced in winter than in summer, and, coupled with the fact that a high barometer is normal off the coast of southern California during the summer season, the winds yield much less rain.

The year in California is naturally divided into a wet and a dry season, the dry season beginning about the 1st of May, with little rain falling, except in thunderstorms in the high mountains, before the 1st of October. The rains then gradually increase, reaching their maximum in January. The records of the United States Signal Service and the Weather Bureau begin the year with the 1st of January. This is not a proper division in this region, as it will not show either the maximum or minimum years of rainfall. Engineers divide the year either with the 1st of July or the 1st of September.

The effect of topography on rainfall is given in a report by Prof. G. E. Curtis<sup>a</sup> in the following words:

"In general the amount of rain increases with the elevation above sea level up to a maximum plane, after which a decrease takes place. S. A. Hill has shown that in the northwest Himalayas, where the rainfall is most remarkable in amount and rate of variation, the observations can be represented by the following empirical formula:  $R=1+1.92h-0.40h^2+0.02h^3$ , in which R represents the amount of rain and  $h$  the relative height in units of 1,000 feet above the assumed plane, which is itself 1,000 feet above sea level. From this formula the height of maximum rainfall is computed to be 3,160 feet above the plane, or 4,160 feet above sea level. It is further shown that this elevation is that at which, according to the observed law of decrease of temperature, the southwest monsoon is cooled just below its dew-point. This point will be that at which in the mean we should expect the maximum precipitation to take place. \* \* \* A very rapid diminution takes place on the leeward side, where the stations record only about half the amount of rainfall given by stations of equal elevation on the windward side."

Similar conditions prevail in California. In illustration the following table (p. 355) is given, in which the results obtained at a base station are compared with those from other stations in the vicinity and on that parallel. The base station in each case is one whose record is of long standing. In the table the second column gives the period during which the record has been kept. The third shows the elevation of the station above sea. The fourth gives the annual average recorded rain at that station. The fifth gives the relation of the rainfall at the base station, during the years that rainfalls were actually recorded at the station under consideration, to the total average rainfall recorded at the base station during its entire period of observation. The record at the second station is then adjusted by this ratio and a probable average rainfall is determined for the station considered and entered in the sixth column under the head "Probable mean rain."<sup>b</sup> For example, take the station Poway. The record at this point is for ten years, while the record at the base station, San Diego, has been kept for a period of

<sup>a</sup> Signal Service Notes, No. 16 The effect of wind currents on rainfall, by G. E. Curtis, Washington, 1884, pamphlet, 11 pp., pp. 6-7.

<sup>b</sup> See statement of Arthur Jacobs, late executive engineer for irrigation, Her Majesty's Bombay Service, in Van Nostrand's Science Series, No. 6, p. 11.

forty-five years. Now, the average annual rain for a period of forty-five years is probably nearer the actual average than that given by a record extending over a much less period. The two stations, being so near together and subject to the same general climatic conditions, have probably a close relation. If during the time that the record has been kept at Poway the rain at San Diego is found to be 117 per cent of the average of forty-five years, then the recorded rain at Poway is assumed to be 117 per cent of the average there.

By examining the data available, it has been found that the increase in precipitation due to elevation is approximately at the rate of 0.6 of an inch of rain for each 100 feet rise in elevation on the western slope of the Coast Range and of the Sierra Nevadas in California. There is also an increase due to elevation on the eastern slope, but this is very much less in amount. The figures in the seventh column in the table below have been obtained by adding the computed increase due to elevation above the base station to the recorded rain at the base station. By comparing these figures in the seventh column, showing theoretical rainfall, with the recorded mean rainfall and the probable mean rainfall given in the fourth and sixth columns, the applicability of this deduced rate of increase of precipitation with altitude is shown.

*Table showing the relation of rainfall to elevation in California.*

Station.	Period.	Eleva- tion.	Rainfall.			
			Re- corded.	Percent.	Probable mean.	Theoret- ical.
<i>First group.</i>						
		<i>Feet.</i>	<i>Inches.</i>		<i>Inches.</i>	<i>Inches.</i>
San Diego <sup>a</sup> .....	1850-95	0	9.92			
Sweetwater, reservoir .....	1888-95	250	12.37	103	12.01	11.42
Poway .....	1878-89	460	13.38	117	11.43	12.68
Descanso .....	1889-95	3,500	26.65	101	26.38	30.92
Julian .....	1879-84	4,500	37.75	130	29.04	36.92
Cuyamaca .....	1887-95	4,800	44.66	102	43.79	38.72
<i>Second group.</i>						
Los Angeles <sup>a</sup> .....	1871-94	330	16.96			
Bear Valley, reservoir .....	1883-94	6,000	54.03	110	49.09	50.92
<i>Third group.</i>						
Sacramento <sup>a</sup> .....	1849-89	31	19.90			
Auburn .....	1870-84	1,360	32.72	102	32.08	27.78
Colfax .....	1870-84	2,422	44.81	102	43.93	34.20
Cisco .....	1870-84	5,934	57.41	102	56.28	55.20
Summit .....	1870-84	7,017	47.93	102	46.99	61.80
<i>Fourth group.</i>						
Truckee .....	1870-84	5,919	29.53	102	28.95	54.60
Reno .....	1870-91	4,497	5.17	102	5.07	46.56
Wadsworth .....	1870-91	4,085	3.83	102	3.75	44.28

<sup>a</sup> Base stations.



The stations of the first and second groups are located in San Diego County, and are all on the western slope of the Coast Range. Bear Valley is 80 miles east of Los Angeles on the same slope. The third group comprises the stations along the Central Pacific from Sacramento east to the summit, and the fourth those along the same line of road on the eastern slope 14, 49, and 83 miles by rail beyond the summit. This fourth group is given to show that wholly different conditions prevail on the eastern and on the western slope of the mountain.

All these records are seasonal, the year being divided at the 1st of September when possible. Data are given from Signal Service and Weather Bureau reports, and from those of the California State engineer, the former being accepted in cases of difference. Excepting the fourth or last group, which is given simply to show that the conditions prevailing on the eastern slope are different from those of the western, it may be seen that the theoretical rain is very nearly the same as the probable mean rain. The instances where the widest variations exist usually can be explained.

In regard to the value of the theoretical rainfall, reference may again be made to the paper by Professor Curtis. He states (p. 8) that the Signal Service, in an investigation of the rainfall on the summit of Mount Washington to determine the local distribution and the average rainfall for the station, placed five gages on the summit of the mountain, one in the center and four to the four points of the compass 75 feet distant from it. It has been known for a long time that a gage placed at an elevation above ground usually recorded less than one placed on the ground below, this difference being caused by wind currents. The increased velocities of the wind around the corners and over the tops of the buildings, hills, or even the gage, tend to increase the slant of the falling rain at those points, and when just past the obstruction, the velocity of the wind being again reduced, a heavier fall of rain will be deposited. In this experiment on Mount Washington observations were made from September 1, 1882, to October 1, 1883. As the measurement of snow was reported as altogether unreliable, it was excluded. In the following table it is shown that the windward gages had received during this period 24.64 inches of rain and the leeward ones 28.43 inches, single storms showing greater variation. The conclusion reached is that precipitation varies materially within distances of only 100 or 200 feet.

The most remarkable feature of the experiment is the different results obtained from gages with 3-inch and 8-inch catchment cups. The gages that were set to the four points of the compass had 3-inch cups and the regular station gage had one 8-inch cup. For the period in question the four exterior gages recorded 45.82, 51.19, 45.40, and 42.63 inches, respectively, while the regular station gage recorded 58.70 inches of rain.

*Comparative reading of 3-inch and 8-inch gages in wind.*

	Wind velocity in miles per hour.							
	15		40		60		75	
	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
Diameter of gage . . .	3	8	3	8	3	8	3	8
Amount of rain . . .	1.75	1.84	2.77	3.37	1.60	2.44	1.87	3.49
Per cent . . . . .	100	105	100	122	100	152	100	186

In view of these records, which are taken with experimental care, the statement would be justified that the "Probable rainfall," as shown in the table on page 351, agrees with the "Theoretical rainfall" as closely as it can be measured, the gages being of different makes and sizes.

The recorded rainfall of the Cuyamaca gage is probably in excess of the average rain for this elevation and the locality, and it is so considered by engineers in San Diego. The gage is in a narrow valley or canyon, and is probably affected by the winds and the topography.

It will be seen that Cisco, with an elevation of 5,934 feet, has a rainfall of 56.28 inches, while Summit, 13 miles beyond, with an elevation of 7,017, has only 46.99 inches of rain. It may be that this variation is due to the wind action, especially on the snow, which averages each year 31 feet in depth, or to the fact that Summit is above the plane of maximum rainfall, as mentioned on page 354.

### TECOLOTE CREEK.

*Discharge measurement of Tecolote Creek, Santa Barbara County.*

Date.	Hydrographer.	Dis-charge.
1899.		<i>Sec.-feet.</i>
Aug. —	G. F. Wright	a 0.27

a Drainage area, 2 square miles.

### TEJON CREEK.

See Fort Tejon Creek.

### TEJON HOUSE CREEK.

*Discharge measurements of Tejon House Creek, at Tejon Ranch House, Kern County.*

Date.	Hydrographer.	Dis-charge.
1895.		<i>Sec.-feet.</i>
Mar. 6	J. B. Lippincott	22.7
Apr. 3	do	17.2
Sept. 4	A. P. Davis and J. B. Lippincott	1.57
Nov. 13	J. B. Lippincott	3.46
1896.		
Feb. 1	J. B. Lippincott	7.82
Feb. 2	do	18.3
June 4	do	6.09
June 5	do	8.31
Dec. 18	do	3.96
Dec. 19	do	2.66

## TEMESCAL CREEK.

*Discharge measurements of Temescal Creek at lower pipe line, Temescal Land and Water Company, Temescal, Riverside County, Cal.*

Date.	Hydrographer.	Dis-charge.
1899.		<i>Sec. feet.</i>
Jan. 28	F. Rolfe	0.66
Feb. 1	do	0.00
Feb. 11	do	.31
Feb. 15	do	1.39
Feb. 20	do	1.56
Mar. 4	do	4.22
Mar. 12	do	3.55
Mar. 18	do	2.69
Mar. 25	do	2.91
Mar. 31	do	3.42
Apr. 14	do	.89
Apr. 22	do	2.28
Apr. 29	do	2.28
May 6	do	4.46
May 13	do	2.55
May 30	do	3.08
June 9	do	3.10
June 15	do	2.36
July 4	do	2.87
July 19	do	2.03
July 25	do	2.49
Aug. 5	do	1.12
Aug. 11	do	2.40
Aug. 21	do	2.65

*Discharge measurements of Temescal Creek at upper pipe line, Temescal Land and Water Company, Temescal, Riverside County.*

Date.	Hydrographer.	Dis-charge.
1899.		<i>Sec.-feet.</i>
Jan. 4	S. G. Lennett	0.99
Jan. 27	F. Rolfe	.74
Feb. 4	do	1.62
Feb. 11	do	.87
Feb. 18	do	3.67
Feb. 24	do	3.37
Mar. 3	do	3.87
Mar. 12	do	5.10
Mar. 16	do	3.56
Mar. 25	do	3.74
Mar. 31	do	4.16
Apr. 14	do	2.93
Apr. 22	do	3.71
Apr. 29	do	3.22
May 6	do	2.80
May 13	do	4.02
May 18	do	4.21
May 30	do	4.01
June 9	do	3.36
June 16	do	3.52
July 10	do	3.21
July 19	do	3.20
July 25	do	3.67
Aug. 11	do	1.48
Aug. 11	do	4.26
Aug. 21	do	3.84

*Discharge measurements of Evans ditch, Temescal Creek, Temescal, Riverside County.*

Date.	Hydrographer.	Dis-charge.
1899.		<i>Sec.-feet.</i>
July 1		3.75
August		3.00

## TORO CANYON.

*Discharge measurement of Toro Canyon, Santa Barbara County.*

Date.	Hydrographer.	Dis-charge.
1900.		<i>Sec.-feet.</i>
June 16	J. B. Lippincott	0.05

## TRABUCO CREEK.

*Discharge measurement of Trabuco Creek, Orange County.*

Date.	Hydrographer.	Dis-charge.
1899.		<i>Sec.-feet.</i>
May 24	F. Rolfe	a 1.08

a Ditch near San Juan Capistrano.

## TRUCKEE RIVER.

## TRUCKEE RIVER AT TAHOE, CAL.

Truckee River, the natural outlet of Lake Tahoe, leaves the lake at the city of Tahoe. About 500 feet from the lake there is a timber dam across the river, which has been maintained for more than twenty years for the purpose of controlling the discharge from the lake. During the early part of the year 1900 the gates in this dam were kept closed, not being opened until June 17, when a gage was placed in the stream for the purpose of recording the height of the water in the river. The gage is a vertical timber driven into the stream bed at the left bank, about 300 feet below the dam, and is spiked to the root of a tree growing on the bank. The bench mark is cut in the side of the tree, and is 4 feet above gage datum. The measurements are made from a cable and suspended car about one-fourth of a mile below the gage, which was placed as near the city of Tahoe as possible for the convenience of the observer. At the point of measurement the right bank is low, and is subject to overflow at very high stages of the stream, but the left bank is rather high. The channel is nearly straight for a short distance above and below the station, and the bed of the river, which is of gravel and coarse sand, is smooth and stable. The purpose of the station is to ascertain the actual outflow from Lake Tahoe, with a view to determining its value as a storage reservoir.

*Discharge measurements of Truckee River at outlet of Lake Tahoe, Placer County.*

Date.	Hydrographer.	Dis-charge.
1899.		<i>Sec.-feet.</i>
July 9	-----	136
Aug. 8	-----	75
Aug. 14	-----	56
Aug. 18	-----	49

*Discharge measurements of Truckee River at Tahoe, Placer County.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1900.		<i>Feet.</i>	<i>Sec.-feet.</i>
June 18	L. H. Taylor	0.75	92
June 30	do	1.45	2.40
July 12	do	1.60	2.77
Sept. 7	do	1.40	225
Oct. 23	do	.40	52
Oct. 23	do	.95	130
Oct. 23	do	1.15	158
1901.			
Sept. 5	C. V. Taylor	1.94	386
Sept. 12	do	1.85	356
Nov. 11	do	1.57	296
Nov. 11	do	1.23	187
Nov. 11	do	1.00	141
1902.			
Oct. 22	E. C. Murphy		320

*Discharge measurements of Truckee River one-half mile below Truckee.*

Date.	Hydrographer.	Dis-charge.
1900.		<i>Sec.-feet.</i>
June 3	-----	364
June 12	-----	264

*Estimated monthly discharge of Truckee River at Tahoe.*

[Drainage area, 519 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1895.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
July .....	1,185	442	914	56,200	1.76	1.90
August .....	441	393	425	26,111	.82	.94
September .....	392	357	374	22,244	.72	.80
October .....	496	344	415	25,538	.80	.92
November .....	471	408	437	26,002	.84	.94
December .....	253	246	250	15,388	.48	.56
1896.						
January .....	293	244	262	16,102	.50	.58
February .....	292	288	290	16,677	.56	.60
1900.						
March .....			0	0	0	0
April .....			0	0	0	0
May .....			0	0	0	0
June .....	236	0	52	3,106	.10	.11
July .....	260	0	214	13,131	.41	.47
August .....	260	211	232	14,261	.45	.53
September .....	224	177	196	11,667	.38	.43
October .....	177	155	159	9,781	.31	.36
November .....	200	0	135	8,047	.26	.29
December .....	99	0	81	4,981	.16	.18
1901.						
January .....	117	85	102	6,262	.20	.23
February .....	117	30	81	4,502	.16	.16
March .....	30	30	30	1,845	.06	.07
April .....	30	0	9	565	.02	.02
May .....	0	0	0	0	0	0
June .....	178	0	30	1,765	.06	.06
July .....	293	156	225	13,809	.43	.50
August .....	555	293	419	25,760	.81	.93
September .....	390	117	326	19,395	.63	.70
October .....	308	251	282	17,308	.54	.63
November .....	293	189	247	14,678	.48	.53
December .....	189	100	111	6,841	.21	.25
The year .....	555	0	155	112,730	.30	4.08

*Discharge measurements of tributaries of Truckee River at various points.*

## DEER CREEK, PLACER COUNTY.

Date.	Hydrographer.	Dis- charge.
1900.		<i>Sec.-feet.</i>
June 16		25.2

## SQUAW CREEK, PLACER COUNTY.

1900.		
June 5		81.4
June 16		46.0
Sept. 14		2.76

## DONNER CREEK, NEAR DONNER LAKE.

1900.		
May 16		127.8
May 29		73.4
July 13		1.09
Aug. 20		69.0
Sept. 13		19.2

## DONNER CREEK, NEAR TRUCKEE RIVER.

1900.		
May 24		324.5
June 3		127.0
June 12		98.9
July 13		14.7
1902.		
Oct. 22	E. C. Murphy	3.25

## COLD CREEK, NEVADA COUNTY.

1900.		
Sept. 13		1.35



*Discharge measurements of tributaries of Truckee River, etc.—Continued.*

## MARTIS CREEK.

Date.	Hydrographer.	Dis-charge.
1889.		<i>Sec. feet.</i>
June 1	-----	19
June 22	-----	7
1900.		
May 21	-----	24.51
June 4	-----	17.52
Sept. 14	-----	8.54

## JUNIPER CREEK AT CLINTON.

1889.		
May 30	-----	22
1900.		
June 6	-----	<sup>a</sup> 30
Sept. 15	-----	1.33

## JOE GRAY CREEK AT ICELAND.

1889.		
May 31	-----	88
1900.		
May 19	-----	30
July 28	-----	20.28
Sept. 15	-----	12.28

## ALDER CREEK AT FLORISTON.

1889.		
May 31	-----	42
1900.		
May 19	-----	<sup>a</sup> 30
July 25	-----	12.63
Sept. 10	-----	10.29

<sup>a</sup> Estimated.

*Discharge measurements of tributaries of Truckee River, etc.—Continued.*

## DOG VALLEY CREEK AT VERDI.

Date.	Hydrographer.	Dis-charge.
		<i>Sec.-feet.</i>
1889.		7
May 22		
1900.		.40
July 26		.79
Sept. 10		
1902.		7.14
Oct. 7	D. W. Hays	

## TRUCKEE RIVER AT ESSEX, WASHOE COUNTY, NEV.

1889.		2,330
May 20		2,570
May 21		2,510
May 22		1,716
May 29		350
June 20		

## SQUAW CREEK ABOUT HALFWAY FROM LAKE TAHOE.

1889.		92
June 3		81.4
June 5		46
June 16		15
June 22		2.76
Sept. 14		

## CREEK NEAR TAHOE TOLLGATE.

1889.		74
June 3		

## DONNER CREEK.

1889.		8
July 3		5
July 6		2
July 11		1
July 16		.9
Aug. 7		.2
Aug. 10		.3
Aug. 17		

*Discharge measurements of tributaries of Truckee River, etc.—Continued.*

## COLD CREEK THREE-QUARTERS OF A MILE BELOW DONNER LAKE.

Date.	Hydrographer.	Dis-charge.
1889.		<i>Sec. feet.</i>
June 28		11
July 3		10
July 6		5
July 11		1
Aug. 7		1
Aug. 10		1
Aug. 17		.7

## PROSSER CREEK.

1900.		
June 4		<i>a</i> 145
July 27		<i>a</i> 25
Sept. 9		<i>a</i> 9.54
1902.		
Oct. 23	E. C. Murphy	<i>b</i> 21.24

## LITTLE TRUCKEE RIVER AT BOCA.

1900.		
May 19		<i>c</i> 600
June 6		492
Aug. 16		8.94
Sept. 15		27.14

## HUNTER CREEK.

1900.		
June 7		40.7
Sept. 12		5.93

## INDEPENDENCE CREEK AT INDEPENDENCE LAKE.

1902.		
Oct. 24	E. C. Murphy	.27

*a* At mouth.*b* At Prosser.*c* Approximate.

*Discharge measurements of streams flowing into Lake Tahoe.*

## WARD CREEK.

Date.	Hydrographer.	Dis-charge.
1900.		<i>Sec. feet.</i>
May 5	-----	147

## BLACKWOOD CREEK.

1900.		
May 6	-----	140

## THREE SMALL STREAMS BETWEEN IDLEWILD AND MCKINNEY'S.

1900.		
May 6	-----	<i>a</i> 12

## M'KINNEY CREEK.

1900.		
May 6	-----	150

## GENERAL CREEK.

1900.		
May 7	-----	100

## MEIGGS CREEK.

1900.		
May 7	-----	130

## FIVE SMALL STREAMS BETWEEN MEEKS CREEK AND EMERALD BAY.

1900.		
May 7-8	-----	<i>a</i> 12

## EMERALD BAY CREEK.

1900.		
May 8	-----	60

*a* Estimated.

*Discharge measurements of streams flowing into Lake Tahoe—Continued.*

## CASCADE CREEK.

Date.	Hydrographer.	Dis-charge.
1900.		<i>Sec.-feet.</i>
May 8	-----	30

## TAYLOR CREEK.

1900.		
May 8	-----	160

## UPPER TRUCKEE RIVER.

1900.		
May 9	-----	350

## TEN SMALL STREAMS BETWEEN BIJOU AND GLEN BROOK IN NEVADA.

1900.		
May 10	-----	<sup>a</sup> 15

<sup>a</sup> Estimated.

## TRUCKEE RIVER AT NEVADA-CALIFORNIA STATE LINE.

This river has its source on the slopes of the Sierra Nevada in eastern California and flows northward, entering Lake Tahoe. This lake is at an elevation of 6,225 feet, and is the largest body of fresh water in the United States at this considerable altitude. The area of the lake itself is 193 square miles. As the State line between Nevada and California passes through the lake, a portion of it is in each State. The outlet of the lake is at Tahoe, Cal., and Truckee River from this point has a general northward course, receiving a number of important tributaries which contribute to its flow. There are a number of lakes at the headwaters of the branch stream, which have been surveyed and recommended as reservoir sites. The drainage area is mapped on the Pyramid Peak, Truckee, Carson, and Marklee-ville atlas sheets of the United States Geological Survey. The basin is now partially included in the Lake Tahoe forest reserve, set apart by Executive proclamation of April 13, 1899. September 7, 1899, a station was established on this river by L. H. Taylor, at the State line, 17 miles west of Reno, Nev. The gage is vertical, driven into the bed of the river and wired to a granite boulder. The bench mark

is the top of the rock to which the rod is fastened, and is at an elevation of 10 feet above gage datum. The channel is straight for a short distance above and below the station. The banks are not liable to overflow. The bed of the river is of gravel and cobbles and is quite stable.

*Discharge measurements of Truckee River at State line.*

Date.	Hydrographer.	Gage height.	Discharge.
1899.		<i>Feet.</i>	<i>Sec.-feet.</i>
Sept. 7	L. H. Taylor .....	2.0	303
1900.			
Apr. 10	L. H. Taylor .....	2.9	753
May 15	do .....	4.1	1,493
May 22	do .....	4.3	1,629
June 1	do .....	3.7	1,112
June 15	do .....	3.2	901
July 1	do .....	2.5	534
July 14	do .....	2.5	551
Sept. 6	do .....	2.3	447
Oct. 2	do .....	1.9	318
1901.			
Feb. 13	C. V. Taylor .....	1.5	298
Feb. 27	do .....	4.5	2,474
Mar. 11	do .....	3.4	1,262
June 9	do .....	3.9	1,741
July 13	do .....	2.6	811
Aug. 16	do .....	2.1	528
Sept. 3	do .....	2.2	570
Sept. 14	do .....	2.0	478
Nov. 9	do .....	1.95	437
Dec. 14	do .....	1.75	353
1902.			
Apr. 10	C. V. Taylor .....		1,492
May 10	do .....		2,384

*Estimated monthly discharge of Truckee River at Nevada-California State line.*

[Drainage area, 955 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1899.	<i>Sec. feet.</i>	<i>Sec. feet.</i>	<i>Sec. feet.</i>	<i>Acre-feet.</i>	<i>Sec. feet.</i>	<i>Inches.</i>
September 17-30 .....	363	295	303	18, 030	0.32	0.36
October .....	632	295	354	21, 767	.37	.43
November .....	1, 566	295	581	34, 572	.61	.68
December .....	328	264	295	18, 139	.31	.36
1900.						
January .....	897	295	392	24, 103	0.41	0.47
February .....	363	264	318	17, 661	.33	.34
March .....	1, 131	295	797	49, 006	.83	.96
April .....	1, 409	735	902	53, 673	.94	1.05
May .....	1, 885	1, 196	1, 528	93, 953	1.60	1.84
June .....	1, 409	328	950	56, 529	.99	1.10
July .....	533	401	459	28, 223	.48	.55
August .....	486	328	396	24, 349	.41	.47
September .....	486	205	367	21, 838	.38	.42
October .....	897	234	481	29, 575	.50	.58
November .....	897	328	480	28, 562	.50	.56
December .....	1, 131	205	407	25, 025	.43	.50
The year .....	1, 885	205	623	452, 497	.65	8.80

#### TRUCKEE RIVER AT VISTA, NEV.

On the lower courses of this river there are considerable stretches of irrigable land which, however, have not yet been developed to their fullest extent. The drainage basin is peculiar in that its mountainous collecting area is located in the State of California, while the lands which can be irrigated are situated in Nevada. This may lead in the future to certain legal difficulties, but not to the extent that it would if there were agricultural lands in both States. Truckee River, after entering Nevada, flows in a general easterly and then northerly direction, emptying into Pyramid Lake. The drainage area is mapped on the Pyramid Peak, Truckee, Markleeville, Carson, Reno, and Wadsworth atlas sheets of the United States Geological Survey. The station at Vista, Nev., was established August 18, 1899, by L. H. Taylor, and is located 7 miles east of Reno. The rod is spiked to posts driven into the bed of the river. The bench mark is on a bluff of rock 500 feet east of the gage, and is at an elevation of 17.50 feet

above gage datum. A new bench mark was established March 14, 1901, on the top of a 2 by 2 inch plug driven 2 feet into the ground at the upper end of the inclined gage on the left bank. Its elevation is 9.60 feet above the datum of the gage. Both banks are high and not liable to overflow. The bed is rocky and not subject to change.

*Discharge measurements of Truckee River at Vista, Nev.*

[L. H. Taylor, hydrographer.]

Date.	Gage height.	Discharge.
	<i>Feet.</i>	<i>Sec.-feet.</i>
1899.		
September 5 .....	2.0	105
October 28 .....	2.75	477
1900.		
April 25 .....	3.30	7.57
May 14 .....	3.80	9.89
May 23 .....	4.30	1,326
June 9 .....	3.80	967
June 14 .....	4.10	1,150
June 19 .....	2.90	471
June 28 .....	2.70	372
July 2 .....	2.20	207
July 10 .....	2.05	138
July 24 .....	2.00	99
August 22 .....	2.30	198
September 28 .....	2.25	226
1901.		
February 22 .....	6.35	3,077
March 14 .....	3.85	<sup>a</sup> 899
March 20 .....	3.88	<sup>a</sup> 911
June 21 .....	4.10	1,165
July 12 .....	2.70	417
August 15 .....	2.20	198
September 2 .....	2.50	325
September 14 .....	2.40	276
November 13 .....	3.05	584
December 15 .....	2.78	448

<sup>a</sup> Results too small.



*Estimated monthly discharge of Truckee River at Vista, Nev.*

[Drainage area 1,519 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1890.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
April .....			4,496			
May .....			5,990			
June .....			4,162			
July .....			2,198			
August .....			952			
September .....			682			
October .....			742			
November .....			765			
December .....			750			
1891.						
January .....			<sup>a</sup> 700			
February .....			<sup>a</sup> 650			
March .....			<sup>a</sup> 650			
April .....			1,523			
May .....			2,765			
June .....			1,905			
July .....			945			
August .....			485			
September .....			558			
October .....			561			
November .....			503			
December .....			508			
The year .....			980			
1892.						
January .....			593			
February .....			505			
March .....			723			
April .....			854			
May .....			937			

<sup>a</sup> Estimated.

*Estimated monthly discharge of Truckee River at Vista, Nev.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1899.	<i>Sec.feet.</i>	<i>Sec.feet.</i>	<i>Sec.feet.</i>	<i>Acre-feet.</i>	<i>Sec.feet.</i>	<i>Inches.</i>
August 18-31			114			
September	188	74	152	9,073	0.10	0.11
October	1,066	144	378	23,251	.25	.29
November	1,123	355	516	30,713	.34	.38
December	709	331	456	28,019	.30	.35
1900.						
January	1,210	380	479	29,445	0.32	0.36
February	529	380	426	23,671	.28	.29
March	1,094	454	857	52,668	.56	.65
April	1,239	479	756	44,982	.50	.56
May	1,477	843	1,257	77,289	.83	.95
June	1,239	259	709	42,201	.47	.52
July	307	74	110	6,746	.07	.08
August	283	61	122	7,513	.08	.09
September	283	105	192	11,449	.13	.14
October	1,123	258	430	26,456	.28	.33
November	1,298	331	566	33,660	.37	.42
December	1,268	429	554	34,049	.36	.42
The year	1,477	61	538	390,129	.35	4.81
1901.						
January	1,505	418	661	40,644	0.44	0.50
February	4,213	418	1,486	82,529	.98	1.02
March	2,209	938	1,328	81,657	.87	1.01
April	1,942	747	1,380	82,117	.91	1.01
May	4,213	1,410	2,145	131,894	1.42	1.63
June	1,942	854	1,263	75,155	.83	.93
July	995	146	425	26,133	.28	.32
August	492	128	315	19,369	.21	.23
September	467	251	329	19,577	.22	.24
October	720	370	477	29,330	.31	.36
November	882	467	557	33,144	.37	.41
December	1,287	322	510	31,357	.34	.39
The year	4,213	128	906	652,906	.60	8.05

## TULE RIVER.

Tule River drains a portion of the western slope of the Sierra Nevada. Its watershed is somewhat less productive of run-off than that of Kaweah River, which joins it on the north, and much less elevated and snow covered than Kings River basin.

The waters of this stream are all appropriated during the irrigation season, and a portion of them are used in irrigating valuable orange lands in the vicinity of Porterville, Cal.

The gaging station is located about 8 miles east of Porterville, at a point just below the wagon bridge near the McFarland ranch, and about 1 mile above the mouth of the South Fork of Tule River. The station was established April 18, 1901. The gage rod is situated on the right bank of the river, 100 feet below the bridge. The zero of the gage is 8 feet below a spike driven into a large cottonwood tree. The area of the watershed above the gaging station is approximately 300 square miles.

*Discharge measurements of Tule River.*

Date.	Hydrographer.	Dis-charge.	Location.
		<i>Sec. feet.</i>	
Nov. 18, 1895	J. B. Lippincott .....	32.1	In Pioneer canal.
Nov. 18, 1895	do .....	28.4	River below canal.
	Total .....	60.5	
Sept. 2, 1900	S. G. Bennett .....	4.3	Canal.
Sept. 2, 1900	do .....	4.7	River.
	Total .....	9.0	
Oct. 3, 1902	L. M. Lawson .....	7.0	Canal.
Oct. 3, 1902	do .....	8.2	River.
	Total .....	15.2	
Oct. 3, 1902	L. M. Lawson .....	14.0	At headworks, Pioneer canal.
Oct. 3, 1902	do .....	7.0	1 mile below intake, Pioneer canal.
July 19, 1901	A. E. Chandler .....	19.8	Below intake of Pioneer canal.
Oct. 3, 1902	L. M. Lawson .....	8.2	
May 23, 1901	W. N. Frickstad .....	152.0	Rockford Bridge, 6 miles west of Porterville.
June 28, 1901	A. E. Chandler .....	164.6	14 miles above Porterville.

*Discharge measurements of Tule River, Tulare County.*

Date.	Hydrographer.	Dis-charge.	Location.
1902.		<i>Sec.-feet.</i>	
Sept. 30	E. T. Perkins .....	2.6	Middle Fork, trail crossing below location of Doyle's headworks.
Sept. 30	.....do .....	14.0	Middle Fork 100 yards above head Doyles ditch.
Oct. 1	.....do .....	24.0	Middle Fork at trail crossing near junction with East Fork.
Oct. 1	.....do .....	15.0	East Fork 100 yards above mouth.
Oct. 3	.....do .....	10.0	East Fork at trail crossing Nelsons to Indian Reservation.
Oct. 2	.....do .....	3.0	South Fork 6 miles below Indian Agency.
Oct. 3	.....do .....	3.2	South Fork near Tom Wheaton's ranch.
Oct. 3	L. M. Lawson .....	( <i>a</i> )	South Fork at junction of North Fork.
Oct. 3	.....do .....	4.0	Pioneer canal at Porterville.

*a* Dry.*Discharge measurements of Tule River at McFarlands Bridge, above mouth of South Fork.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1901.		<i>Feet.</i>	<i>Sec.-feet.</i>
Apr. 18	S. G. Bennett .....	2.5	233
May 22	J. B. Lippincott .....	2.85	338
June 10	.....do .....	2.65	311
June 28	A. E. Chandler .....	2.00	148
July 29	S. G. Bennett .....	1.23	30
Oct. 18	.....do .....	1.00	18
Dec. 9	.....do .....	1.44	58
1902.			
Feb. 5	.....do .....	1.33	43
Mar. 8	.....do .....	2.2	156
May 15	.....do .....	3.03	371
Oct. 2	L. M. Lawson .....	.92	15

*Discharge measurements of Lower Tule canal at Tulare Lake.*

Date.	Hydrographer.	Dis-charge.
1901.		<i>Sec. feet.</i>
June 24	A. E. Chandler .....	198.2

*Discharge measurements of Pioneer canal, Tulare County.*

Date.	Hydrographer.	Dis-charge.	Location.
1898.		<i>Sec. feet.</i>	
Sept. 1	P. M. Baier .....	6.0	
1899.			
Sept. 5	S. G. Bennett .....	13.1	200 feet below headworks.
Sept. 5	do .....	8.43	1 mile below headworks.
Sept. 5	do .....	7.06	2 miles below headworks.
1902.			
Oct. 3	L. M. Lawson .....	14.0	At headworks.
Oct. 3	do .....	7.0	1 mile below headworks.

*Discharge measurements of South Fork of Tule River at mouth, 7 miles east of Porterville, Tulare County.*

Date.	Hydrographer.	Dis-charge.
1901.		<i>Sec. feet.</i>
June 10	J. B. Lippincott .....	47.3
July 29	S. G. Bennett .....	a.5
1902.		
May 15	do .....	103.0

a Estimated.

*Estimated monthly discharge of Tule River at Porterville.<sup>a</sup>*

[Drainage area, 437 square miles.]

Month.	Discharge.			Total discharge	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
1878.						
November .....			131	7,795	0.30	0.33
December .....			131	8,055	.30	.35
1879.						
January .....			57	3,505	0.13	0.15
February .....			87	4,832	.20	.21
March .....			61	3,751	.14	.16
April .....			118	7,021	.27	.30
May .....			105	6,456	.24	.28
June .....			350	20,826	.80	.89
July .....			35	2,152	.08	.09
August .....			26	1,599	.06	.07
September .....			26	1,547	.06	.07
October .....			74	4,550	.17	.20
November .....			140	8,330	.32	.36
December .....			271	16,663	.62	.71
The year .....			113	81,232	.25	3.49
1880.						
January .....			577	35,478	1.32	1.52
February .....			1,040	59,821	2.38	2.57
March .....			1,079	66,344	2.47	2.84
April .....			1,289	76,701	2.95	3.28
May .....			1,040	63,946	2.38	2.75
June .....			721	42,902	1.65	1.84
July .....			350	21,520	.80	.92
August .....			87	5,349	.20	.23
September .....			44	2,618	.10	.11
October .....			44	2,705	.10	.12
November .....			87	5,177	.20	.22
December .....			219	13,466	.50	.58
The year .....			548	396,027	1.25	16.98

<sup>a</sup>Authority, California State engineering department from November, 1878, to October, 1884.

*Estimated monthly discharge of Tule River at Porterville—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1881.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January			219	13,466	0.50	0.58
February			437	24,270	1.00	1.04
March			437	26,870	1.00	1.15
April			874	52,006	2.00	2.23
May			874	53,740	2.00	2.31
June			437	26,003	1.00	1.12
July			219	13,466	.50	.58
August			175	10,760	.40	.46
September			87	5,177	.20	.22
October			66	4,058	.15	.17
November			57	3,392	.13	.15
December			66	4,058	.15	.17
The year			329	237,266	.75	10.18
1882.						
January			87	5,349	0.20	0.23
February			109	6,053	.25	.26
March			306	18,815	.70	.81
April			660	39,273	1.51	1.68
May			1,748	107,480	4.00	4.61
June			660	39,273	1.51	1.68
July			437	26,870	1.00	1.15
August			131	8,055	.30	.35
September			66	3,927	.15	.17
October			44	2,705	.10	.12
November			66	3,927	.15	.17
December			66	4,058	.15	.17
The year			365	265,785	.83	11.40

Estimated monthly discharge of Tule River at Porterville—Continued.

Month.	Discharge.			Total discharge.	Per square mile.	Depth.
	Maximum.	Minimum.	Mean.			
1883.	Sec.-feet.	Sec.-feet.	Sec.-feet.	Ave.-feet.	Sec.-feet.	Inches.
January	87	87	87	5,349	0.20	0.23
February	87	87	87	4,832	.20	.21
March	437	437	437	26,870	1.00	1.15
April	656	656	656	39,034	1.50	1.67
May	874	874	874	53,740	2.00	2.31
June	874	874	874	52,006	2.00	2.23
July	350	350	350	21,521	.80	.92
August	87	87	87	5,349	.20	.23
September	66	66	66	3,927	.15	.17
October	44	44	44	2,705	.10	.12
November	44	44	44	2,618	.10	.11
December	66	66	66	4,058	.15	.17
The year			306	222,009	.70	9.52
1884.						
January	262	1,748	1,748	16,109	0.60	0.69
February	1,311	80,610	80,610	4.00	3.46	4.31
March	874	52,006	52,006	2.00	2.23	2.33
April	2,185	134,350	134,350	5.00	5.76	5.81
May	3,059	182,023	182,023	7.00	7.81	6.92
June	2,622	161,220	161,220	6.00	6.92	2.31
July	874	53,740	53,740	2.00	2.31	.89
August	350	20,826	20,826	.80	.89	.46
September	175	10,760	10,760	.40	.46	
October						



*Estimated monthly discharge of Tule River at McFarlands Bridge near Porterville,  
Tulare County.*

[Drainage area, 437 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1901.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>
May .....	875	298	418	25,702	0.96	1.10
June .....	408	126	240	14,281	.55	.61
July .....	126	30	61	3,751	.14	.16
August .....	30	18	19	1,168	.04	.04
September .....	23	10	17	1,012	.04	.04
October .....	109	18	29	1,783	.07	.08
November .....	71	35	43	2,559	.10	.11
December .....	64	39	50	3,074	.11	.13
1902.						
January .....	51	34	45	2,767	.10	.12
February .....	1,415	45	159	8,830	.36	.37
March .....	2,735	144	362	22,259	.83	.95
April .....	4,615	249	571	33,977	1.31	1.46
May .....	408	273	343	21,090	.79	.91
June .....	324	78	190	11,306	.43	.48
July .....	78	26	43	2,644	.10	.12
August .....	33	18	21	1,291	.05	.06
September .....	17	14	15	893	.03	.03
October .....	93	14	24	1,476	.05	.06
November .....	144	27	50	2,975	.11	.12
December .....	204	45	62	3,812	.14	.16
The year .....	4,615	14	157	113,320	.36	4.84

**TUMITUS CREEK.**

*Discharge measurement of Tunitus Creek, San Mateo County.*

Date.	Hydrographer.	Discharge.
1893.		<i>Sec.-feet.</i>
Oct. 17	W. W. Brier .....	a 1.14

## TUNIS CREEK.

*Discharge measurement of Tunis Creek, Kern County.*

Date.	Hydrographer.	Dis-charge.
1896.		<i>Sec.-feet.</i>
June 4	J. B. Lippincott .....	1.98
Dec. 15	do .....	.7

*a* At mouth.

## TUOLUMNE RIVER.

HETCH HETCHY DAM SITE, HETCH HETCHY VALLEY.

The entire drainage of Tuolumne River above Lagrange is about 1,500 square miles, some 400 square miles of which lie above the Hetch Hetchy dam site, the elevation of which is 3,630 feet above sea level. This upper drainage area consists of high granite mountains culminating in Mount Dana, Mount Gibbs, and Mount Lyell.

A gaging station was established at this point May 30, 1901, by J. B. Lippincott, for the city of San Francisco.

For detailed description of Hetch Hetchy reservoir site see Twenty-first Annual Report of U. S. Geological Survey, Part IV, page 450.

*Discharge measurements of Tuolumne River, Hetch Hetchy Valley, Tuolumne County.*

Date.	Hydrographer.	Gage height.	Dis-charge.	Location.
1899.		<i>Feet.</i>	<i>Sec.-feet.</i>	
July 31	H. Ramel .....		238.0	
Aug. 5	do .....		230.0	
Aug. 12	do .....		131.0	
Aug. 19	do .....		101.0	
Aug. 23	do .....		69.0	
1901.				
Aug. 13	J. B. Lippincott and W. W. Cockins, jr. ....		472.0	Ford in Hetch Hetchy Valley.
Aug. 29	W. W. Cockins, jr. ....	12.93	190.5	Do.
Sept. 5	do .....	12.65	155.7	Do.
Sept. 14	do .....	12.42	77.5	Do.
Oct. 5	do .....	12.92	115.6	Do.
Oct. 11	do .....	12.60	88.0	Do.
Aug. 25	do .....	13.28	231.3	1,000 feet above dam site.
Sept. 28	do .....	13.11	144.7	Do.
1902.				
Aug. 29	E. T. Perkins .....		66.0	Upper end Hetch Hetchy Valley.

*Discharge measurements of Tuolumne River at Hetch Hetchy dam site.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1901.		<i>Feet.</i>	<i>Sec.-feet.</i>
June 29	C. A. Miller and W. W. Cockins, jr -----	36.00	7,621.00
July 4	C. A. Miller -----	30.00	3,296.00
July 12	do -----	26.10	2,720.00
July 21	do -----	24.17	1,886.00
July 29	W. W. Cockins, jr -----	21.50	1,160.00
Aug. 2	do -----	20.33	1,137.00
Aug. 13	J. B. Lippincott -----	15.70	754.00
Sept. 20	W. W. Cockins, jr -----	12.32	66.12

*Discharge measurements of Tuolumne River at old bridge above Rancheria Creek, Tuolumne County.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1901.		<i>Feet.</i>	<i>Sec.-feet.</i>
July 13	C. A. Miller -----		1,849
Aug. 26	W. W. Cockins, jr -----		160
Sept. 28	do -----		120
Oct. 11	do -----		60

*Discharge measurements of Rancheria Creek (tributary to Tuolumne River) at old sheep bridge, Tuolumne County.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1901.		<i>Feet.</i>	<i>Sec.-feet.</i>
Aug. 26	W. W. Cockins, jr -----		36.2
1902.			
Aug. 29	E. T. Perkins -----		a 7.0

*a* At head of falls.

## CHERRY RIVER AT ELEANOR TRAIL CROSSING.

Cherry River is a tributary of the Tuolumne and enters that stream  $12\frac{1}{2}$  miles below Hetch Hetchy Valley. The area drained is 130 square miles.

A gaging station was established at the point where Eleanor trail crosses the river, on May 26, 1901, by J. B. Lippincott, for the city of San Francisco.

*Discharge measurements of Cherry Creek, a tributary of Tuolumne River, at Eleanor trail crossing.*

Date.	Hydrographer.	Gage height.	Discharge.
1901.		<i>Feet.</i>	<i>Sec.-feet.</i>
July 8	C. A. Miller	11.40	915.0
July 17	do	10.40	510.0
Aug. 9	W. W. Cockins, jr	8.75	112.0
Aug. 19	do	9.10	132.0
Aug. 20	do	8.40	107.0
Aug. 24	do	8.10	43.0
Sept. 1	do	7.80	17.5
Sept. 7	do	7.70	6.1
Sept. 17	do	7.00	4.3
Sept. 22	do	7.06	4.5
Sept. 26	do	9.05	141.0
Oct. 3	do	8.96	120.0
Oct. 10	do	8.00	43.0
1902.			
Aug. 30	E. T. Perkins		<sup>a</sup> 4.4
Aug. 30	do		6.0

<sup>a</sup>1,500 feet below trail crossing.

#### ELEANOR CREEK AT ELEANOR TRAIL CROSSING.

Eleanor Creek is a tributary of Cherry River and enters that stream 6 miles above its mouth. The elevation of the outlet of Lake Eleanor is 4,655 feet above sea level. The drainage area above the gaging station is 81 square miles, and consists of high granite mountains culminating in Richardson Peak, elevation 9,845 feet; Haystack Peak, elevation 9,966 feet; and an unnamed peak, elevation 10,510 feet. The average elevation of the drainage basin is probably 7,500 feet.

A gaging station was established at the outlet of Lake Eleanor June 1, 1901, by J. B. Lippincott, for the city of San Francisco.

For a detailed description of Lake Eleanor reservoir site see Thirteenth Annual Report of the U. S. Geological Survey, Part III, page 402.

*Discharge measurements of Eleanor Creek at inlet to Lake Eleanor, Tuolumne County.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1901.		<i>Feet.</i>	<i>Sec. feet.</i>
June 11	C. A. Miller		<i>a</i> 226.0
Do	do		<i>b</i> 74.0
	Total		300.0
July 16	C. A. Miller		<i>a</i> 121.0
Do	do		<i>b</i> 23.0
	Total		144.0
Aug. 18	W. W. Cockins, jr		<i>a</i> 75.0
Do	do		<i>b</i> 11.6
	Total		86.6
Aug. 27	W. W. Cockins, jr		<i>a</i> 8.3
Do	do		<i>b</i> 1.5
	Total		9.8
Oct. 1	W. W. Cockins, jr		<i>a</i> 47.6
Do	do		<i>b</i> 7.4
	Total		55.0

*a* West Branch.*b* East Branch.

*Discharge measurements of Eleanor Creek at outlet of Lake Eleanor, Tuolumne County.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1901.		<i>Feet.</i>	<i>Sec. feet.</i>
June 10	C. A. Miller	8.67	411.0
June 22	do	9.76	793.0
July 8	J. B. Lippincott	8.57	310.0
July 16	C. A. Miller	7.92	263.0
July 18	do	7.80	225.0
July 27	W. W. Cockins, jr	7.45	145.0
Aug. 3	do	7.10	84.0
Aug. 10	do	6.92	75.0
Aug. 17	do	6.48	30.0
Aug. 19	do	6.68	42.0
Aug. 23	do	6.47	32.0
Aug. 27	do	6.26	17.8
Aug. 30	do	6.05	13.9

*Discharge measurements of Eleanor Creek, etc.—Continued.*

Date.	Hydrographer.	Gage height.	Discharge.
1901.		<i>Feet.</i>	<i>Sec.-feet.</i>
Sept. 6	W. W. Cockins, jr	5.90	6.22
Sept. 14	do	5.70	4.08
Sept. 21	do	5.72	5.02
Sept. 26	do	5.85	5.77
Oct. 3	do	6.40	34.5
Oct. 10	do	6.21	21.2

*Discharge measurements of Tuolumne River.*

Date.	Hydrographer.	Discharge.	Location.
1902.		<i>Sec.-feet.</i>	
Aug. 22	E. T. Perkins	6.0	North Fork at headworks, Goldwin Mining Co.'s canal.
Aug. 27	do	152.0	$\frac{1}{2}$ mile above junction of South Fork.
Do	do	20.0	South Fork, $\frac{1}{2}$ mile above junction of main river.
Aug. 29	do	.5	Tiltill Creek at trail crossing.
Do	do	89.0	Lower end Hetch Hetchy Valley.
Aug. 31	do	3.0	100 yards below bridge, Middle Fork.
Sept. 2	do	23.0	Above falls, lower end Tuolumne Meadows.
Aug. 25	do	22.0	Jacksonville.
Aug. 26	do	159.0	Ward's ferry.
Aug. 28	L. M. Lawson	150.0	Jacksonville, Tuolumne County.
Aug. 27	do	4.0	Mining Company's ditch at Lagrange, Stanislaus County.
Do	do	105.0	Turlock canal.

*Discharge measurements of Frog Creek at inlet Eleanor Lake, Tuolumne County, Cal.*

Date.	Hydrographer.	Discharge.	Location.
1901.		<i>Sec.-feet.</i>	
June 12	C. A. Miller	116.0	
July 17	do	33.	
Aug. 18	W. W. Cockins, jr.	5.7	
Aug. 27	do	1.0	
Oct. 1	do	4.9	

*Discharge measurements of Falls Creek at Lake Vernon (upper end), Tuolumne County, Cal.*

Date.	Hydrographer.	Dis-charge.	Location.
1901.		<i>Sec.-feet.</i>	
Aug. 12	J. B. Lippincott . . .	36.5	Tiltill trail crossing.
Sept. 5	W. W. Cockins, jr.	9.8	
Sept. 19	----do-----	3.0	
Oct. 4	----do-----	16.0	
1902.			
Aug. 29	E. T. Perkins-----	4.0	100 yards above junction with Tuolumne.

TUOLUMNE RIVER AT LAGRANGE.

This river rises on the western slope of the Sierra Nevada in California and drains the country located between Stanislaus River on the north and Merced River on the south. The northern half of the Yosemite National Park includes a portion of its drainage basin. The river is fed largely from small mountain lakes occurring high in the drainage basin, where snow remains on the mountain slopes throughout the year. 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 water could be stored during the irrigation season. The gaging station, established August 29, 1895, is located at the wagon bridge in the town of Lagrange, Cal. The rod is vertical and is bolted to the right-hand pier of the bridge. The bench mark is a nail driven into the bottom of the west post of the fifth bent south of the south iron cylinder, and is 15.31 feet above gage datum. The station is located below the high dam of the Turlock and Modesto irrigation districts, and also below the head of the canal of the Lagrange Hydraulic Mining Company. This latter canal diverts water from the left bank of the river 14 miles above Lagrange dam. This water is used for hydraulic mining, and partly returns above the gaging station, depending on the convenience of the miners. During 1898 water was first turned down the Turlock Canal in small quantity, and was used for puddling the banks and testing dams of certain reservoirs. Whenever measurements at the gaging station were made, the Turlock Canal and the mining company's canal were also measured. The channel at the station, both above and below the bridge, is straight for several hundred feet, and the velocity of the stream is rather uniform. Both banks are high and not subject to overflow.

*Discharge measurements of Tuolumne River at Lagrange, Stanislaus County.*

Date.	Hydrographer.	Gage height.	Discharge.
1895.		<i>Feet.</i>	<i>Sec.-feet.</i>
Aug. 29	J. B. Lippincott	4.4	299.00
Sept. 14	do	5.8	1,824.00
Nov. 28	do	4.2	129.00
1896.			
Apr. 15	J. A. Vogleson	6.95	4,236.00
May 4	H. Crowe	7.0	4,004.00
June 17	do	9.3	8,274.00
Sept. 4	do	4.9	671.00
Oct. 30	J. B. Lippincott	4.45	361.00
1897.			
Feb. 15	do	5.8	1,864.00
May 29	do	9.25	11,594.00
July 12	A. Q. Campbell	5.7	1,839.00
Sept. 7	do	4.0	95.00
Oct. 30	do	4.73	534.00
Dec. 20	J. B. Lippincott	4.85	614.00
1898.			
May 31	do	5.9	1,887.00
Apr. 18	do	7.18	5,762.00
July 30	do	3.95	103.00
Oct. 7	do	4.2	<div style="display: flex; align-items: center;"> <span style="font-size: 3em; margin-right: 5px;">{</span> <div> <i>a</i> 30.00  <i>b</i> 24.00  <i>c</i> 83.00 </div> </div>
	Total		137.00
1899.			
Mar. 3	J. B. Lippincott	5.0	774.00
Apr. 20	S. G. Bennett	7.55	5,712.00
Apr. 21	do	7.85	6,943.00
May 19	do	6.72	3,616.00
June 6	do	8.47	8,964.00
June 29	do	6.15	2,347.00
Aug. 3	do	3.70	23.00
Sept. 11	do	3.58	<div style="display: flex; align-items: center;"> <span style="font-size: 3em; margin-right: 5px;">{</span> <div> <i>c</i> 12.00  <i>a</i> 29.00  <i>b</i> 24.00 </div> </div>
	Total		65.00

<sup>a</sup> Turlock Canal.

<sup>b</sup> La Grange Ditch and Hydraulic Mining Company's Canal.

<sup>c</sup> River.



*Discharge measurements of Tuolumne River, etc.—Continued.*

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-feet.</i>
1900.			
April 5	S. G. Bennett -----	6.08	<div> <div>a2, 286.00</div> <div>b 129.00</div> <div>c 24.00</div> </div>
	Total -----		2, 439.00
May 20	S. G. Bennett -----	8.4	8, 720.00
June 22	do -----	7.09	<div> <div>c4, 629.00</div> <div>a 9.50</div> <div>b 12.50</div> </div>
	Total -----		4, 651.00
Aug. 11	S. G. Bennett -----		<div> <div>c 17.00</div> <div>a 117.00</div> <div>b 12.00</div> </div>
	Total -----		146.00
Sept. 8	S. G. Bennett -----		<div> <div>a 35.00</div> <div>b 9.05</div> <div>c 10.90</div> </div>
	Total -----		54.95
Dec. 27	S. G. Bennett -----	5.32	964.00
1901.			
Jan. 29	S. G. Bennett -----	5.75	1, 419.00
Apr. 7	do -----	6.10	<div> <div>c2, 382.00</div> <div>b 7.00</div> </div>
	Total -----		2, 389.00
June 12	J. B. Lippincott -----	7.63	6, 470.00
Aug. 2	S. G. Bennett -----	5.45	1, 354.00
Aug. 31	do -----	4.30	248.00
1902.			
Mar. 6	S. G. Bennett -----	6.00	<div> <div>c2, 351.00</div> <div>a 103.00</div> <div>b 5.00</div> </div>
	Total -----		2, 459.00

*a* River.    *b* Turlock Canal.    *c* La Grange Ditch and Hydraulic Mining Company's canal.

*Discharge measurements of Tuolumne River, etc.—Continued.*

Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-feet.</i>
May 13	S. G. Bennett	8.35	$\left\{ \begin{array}{l} a 9,476.00 \\ b 253.00 \\ c 5.00 \end{array} \right.$
	Total		9,734.00
Aug. 27	L. M. Lawson		$\left\{ \begin{array}{l} a 15.00 \\ b 105.00 \\ c 4.00 \end{array} \right.$
	Total		124.00

*a* River. *b* Turlock Canal. *c* La Grange Ditch and Hydraulic Mining Company's canal.

*Estimated monthly discharge of Tuolumne River exclusive of canals at Lagrange, Stanislaus County.*

[Drainage area 1,501 square miles.]

Month.	Discharge.			Total dis-charge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1895.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
August						
September	2,182	78	263	15,635	0.18	0.20
October	299	78	134	8,231	.09	.10
November	129	112	113	6,698	.08	.08
December	1,004	129	270	16,614	.18	.21
1896.						
January	7,610	350	2,312	142,159	1.54	1.78
February	1,780	1,080	1,164	66,954	.78	.84
March	11,798	1,006	2,725	167,578	1.82	2.10
April	7,990	2,670	3,522	209,574	2.34	2.60
May	10,100	2,670	4,429	272,371	2.95	3.40
June	9,320	5,140	7,692	457,705	5.13	5.74
July	5,330	960	3,003	184,677	2.00	2.31
August	3,050	227	485	29,828	.32	.37
September	1,620	132	432	25,742	.29	.32
October	350	75	120	7,366	.08	.09
November	5,710	227	1,135	67,543	.75	.83
December	3,620	670	1,083	66,603	.72	.83
The year <i>a</i>	11,798	75	2,342	1,698,100	1.56	21.21

*a* During 1896 there was no water in the Turlock Canal, and the Lagrange Ditch and Hydraulic Mining Company's Canal was flowing 32 second-feet approximately. The Lagrange Ditch and Hydraulic Mining Company's Canal was flowing approximately 35 second-feet during 1895.

*Estimated monthly discharge of Tuolumne River, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1897.	<i>Sec. feet.</i>	<i>Sec. feet.</i>	<i>Sec. feet.</i>	<i>Acre-feet.</i>	<i>Sec. feet.</i>	<i>Inches.</i>
January .....	3,930	660	1,231	75,692	0.82	0.94
February .....	13,200	1,840	5,172	287,238	3.45	3.59
March .....	10,800	2,500	4,032	247,920	2.69	3.10
April .....	13,500	3,280	7,735	460,263	5.15	5.75
May .....	14,700	9,600	11,923	733,121	7.94	9.15
June .....	9,300	2,500	5,673	337,566	3.78	4.22
July .....	4,840	480	2,181	134,105	1.45	1.67
August .....	570	76	237	14,573	.16	.18
September .....	140	28	86	5,117	.06	.07
October .....	750	76	222	13,650	.15	.17
November .....	3,540	260	768	45,699	.51	.57
December .....	4,060	570	1,104	67,883	.74	.85
The year <i>a</i> .....	14,700	28	3,364	2,422,827	2.24	30.26
1898.						
January .....	750	300	454	27,916	0.30	0.35
February .....	2,500	300	900	49,983	.60	.63
March .....	2,060	750	1,224	75,261	.82	.94
April .....	7,800	1,270	4,014	238,849	2.67	2.78
May .....	6,960	2,280	4,620	284,075	3.08	3.55
June .....	3,280	750	2,247	133,705	1.50	1.73
July .....	750	88	277	17,032	.19	.21
August .....	100	76	85	5,226	.06	.07
September .....	88	0	20	1,190	.01	.01
October .....	88	32	52	3,197	.03	.04
November .....	82	16	39	2,321	.03	.03
December .....	2,060	32	256	15,741	.17	.20
The year <i>b</i> .....	7,800	0	1,182	854,496	.79	10.54

*a* There was no discharge from the Turlock Canal during the year 1897 past the Lagrange gaging station; it was wasted into the river above. For flow of the Lagrange Ditch and Hydraulic Mining Company's Canal, see special measurements of that canal.

*b* During the year 1898 the Turlock Canal was not discharging any material amount of water past the Lagrange gaging station, and the Lagrange Ditch and Hydraulic Mining Company's Canal was carrying about 24 second-feet.

*Estimated monthly discharge of Tuolumne River, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1899.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	1,940	110	487	29,945	0.32	0.37
February .....	1,440	410	740	41,098	.49	.51
March .....	21,800	570	3,616	222,341	2.41	2.78
April .....	8,040	2,285	5,193	309,004	3.46	3.86
May .....	8,680	2,080	4,513	277,495	3.01	3.47
June .....	9,960	2,285	6,660	360,594	4.04	4.51
July .....	2,490	330	1,010	62,103	.67	.77
August .....	570	45	145	8,916	.10	.11
September .....	45	15	33	1,964	.02	.02
October .....	2,285	5	505	31,051	.34	.39
November .....	6,400	660	2,428	144,476	1.62	1.81
December .....	8,040	850	3,047	187,354	2.03	2.04
The year <sup>a</sup> .....	21,800	5	2,315	1,676,341	1.54	20.64
1900.						
January .....	13,160	1,060	2,384	146,586	1.59	1.83
February .....	1,300	750	967	53,704	.64	.67
March .....	3,100	950	2,343	144,065	1.56	1.80
April .....	4,320	1,440	2,389	142,155	1.59	1.77
May .....	9,320	3,100	6,796	417,870	4.53	5.23
June .....	8,680	2,285	5,291	314,836	3.53	3.94
July .....	1,740	140	694	42,672	.46	.53
August .....	140	0	43	2,644	.03	.03
September .....	110	0	11	655	.01	.01
October .....	5,760	35	1,228	75,507	.82	.94
November .....	14,440	410	2,536	150,902	1.69	1.89
December .....	2,080	850	1,332	81,902	.89	1.02
The year <sup>b</sup> .....	14,440	0	2,160	1,573,498	1.45	19.66

<sup>a</sup> For record of discharge of Turlock Canal beginning July 1, 1899, see Turlock Canal. Lagrange Ditch and Hydraulic Mining Company's Canal discharged about 24 second-feet during the year.

<sup>b</sup> For discharge of Turlock Canal for 1900 see Turlock Canal. Lagrange Ditch and Hydraulic Mining Company's Canal, January 1 to June 23, 24 second-feet; from June 24 to October 20, 12 second-feet; and from October 21 to December 31, 10 second-feet.

*Estimated monthly discharge of Tuolumne River, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1901.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	18,280	560	3,351	206,145	2.23	2.57
February .....	19,240	1,440	7,204	400,090	4.80	5.00
March .....	7,080	2,080	3,720	228,733	2.48	2.86
April .....	7,080	1,740	3,961	235,696	2.64	2.94
May .....	13,160	4,075	8,036	494,114	5.35	6.18
June .....	13,160	4,900	9,387	558,566	6.25	6.97
July .....	9,960	1,440	3,701	227,566	2.47	2.85
August .....	2,080	200	784	48,206	.52	.60
September .....	350	55	175	10,413	.12	.13
October .....	1,590	0	211	12,974	.14	.16
November .....	1,300	300	574	34,155	.38	.43
December .....	5,800	200	1,339	82,332	.89	1.02
The year <sup>a</sup> .....	19,240	0	3,537	2,538,990	2.37	31.71
1902.						
January .....	850	200	352	21,644	0.23	0.26
February .....	6,780	250	1,443	80,140	.96	1.00
March .....	5,810	1,180	2,103	129,308	1.40	1.61
April .....	12,630	1,320	4,735	281,752	3.15	3.51
May .....	11,360	2,470	6,334	389,462	4.22	4.86
June .....	11,360	3,140	6,519	387,907	4.34	4.84
July .....	2,690	350	998	61,365	.66	.76
August .....	300	0	91	5,595	.06	.07
September .....	200	35	89	5,296	.06	.07
October .....	560	15	113	6,948	.08	.09
November .....	2,690	250	676	40,225	.45	.50
December .....	2,690	350	809	49,743	.54	.62
The year .....	12,630	0	2,022	1,459,385	1.35	18.19

<sup>a</sup>Record for Turlock Canal for 1901 is incomplete. The Lagrange Ditch and Hydraulic Mining Company's Canal discharged from January 1 to March 31, 10 second-feet; April 1 to July 28, 7 second-feet, and flow was not material after that.

*Discharge measurements of Lagrange Ditch and Hydraulic Mining Company's Canal.*

Date.	Hydrographer.	Dis-charge.
1896.		<i>Sec. feet.</i>
Apr. 15	J. A. Vogleson .....	32.0
1897.		
May 29	J. B. Lippincott .....	22.0
Oct. 30	A. Q. Campbell .....	6.2
Dec. 20	J. B. Lippincott .....	24.0
1898.		
Apr. 18	J. B. Lippincott .....	<sup>a</sup> 30.0
May 31	.....do .....	26.0
July 30	.....do .....	24.0
Oct. 7	.....do .....	24.0
1899.		
Mar. 3	J. B. Lippincott .....	24.0
Apr. 21	S. G. Bennett .....	23.5
June 29	.....do .....	24.0
Aug. 3	.....do .....	24.0
Sept. 11	.....do .....	24.0
1900.		
Apr. 5	S. G. Bennnett .....	24.0
June 22	.....do .....	12.5
Aug. 11	.....do .....	12.0
1901.		
Apr. 7	S. G. Bennett .....	7.2
Aug. 31	.....do .....	4.5

<sup>a</sup> Estimated.

*Discharge measurements of Turlock canal, Lagrange, Stanislaus County, Cal.*

Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
1897.			
Sept. 7	A. Q. Campbell		43.0
1898.			
Oct. 7	J. B. Lippincott		30.0
1899.			
Apr. 21	S. G. Bennett		10.0
May 20	do		61.0
June 6	do		10.0
June 29	do	0.75	18.0
Aug. 4	do	1.70	85.0
Sept. 9	do	1.0	29.0
1900.			
Apr. 6	S. G. Bennett	2.0	129.0
June 22	do	.50	9.5
Aug. 11	do	1.90	117.0
Sept. 8	do	1.15	35.0
1901.			
Aug. 31	S. G. Bennett	.0	.0
1902.			
May 13	S. G. Bennett	2.92	253.0
July 23	do	3.0	260.0
Aug. 27	L. M. Lawson	2.6	105.0

*Estimated monthly discharge of Turlock canal at Lagrange, Stanislaus County.*

Month.	Discharge.		
	Maximum.	Minimum.	Mean.
1899.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>
July .....	48	1	11
August .....	86	1	55
September .....	34	8	19
October .....	10	1	7
November .....	3	0	1
December .....	0	0	0
1900.			
January .....	0	0	0
February .....	133	28	62
March .....	133	64	84
April .....	133	0	90
May .....	133	133	133
June .....	133	9	71
July .....	133	0	120
August .....	133	0	57
September .....	36	0	26
October .....	0	0	0
November .....	0	0	0
December .....	0	0	0
The year .....	133	0	54
1902.			
January .....	0	0	0
February .....	0	0	0
March .....	286	0	187
April .....	360	0	268
May .....	380	0	325
June .....	420	400	406
July .....	460	215	405
August .....	367	105	287
September .....	47	0	0
October .....	0	0	0
November .....	0	0	0
December .....	0	0	0
The year .....	460	0	156



*Discharge measurements of Tuolumne River at Modesto, Stanislaus County.*

Date.	Hydrographer.	Gage height.	Discharge.
1895.		<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 8	J. B. Lippincott	7.7	3,003
Mar. 21	do	6.75	2,429
May 1	do	10.25	6,078
May 2	do	12.9	13,546
June 27	do	13.0	9,308
Aug. 27	A. P. Davis	4.0	294
Nov. 30	J. B. Lippincott	3.42	213
1896.			
Apr. 14	J. A. Vogleson	7.9	3,745
July 4	C. C. Babb	9.6	3,719
Sept. 5	H. Crowe	4.5	362
Oct. 31	J. B. Lippincott	3.92	375

*Estimated monthly discharge of Tuolumne River at Modesto, Stanislaus County.<sup>a</sup>*

[Drainage area, 1,635 square miles.]

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1878.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
November			65	3,868	0.04	0.04
December			65	3,996	.04	.05
1879.						
January			478	29,391	0.29	0.33
February	14,230		1,876	104,187	1.15	1.20
March	6,920	830	2,797	171,980	1.71	1.97
April	8,360	2,350	4,456	265,150	2.73	3.04
May	8,230	2,740	5,086	312,726	3.11	3.59
June	11,870	4,670	7,061	420,158	4.32	4.79
July	4,670	570	1,977	121,560	1.21	1.39
August			183	11,252	.11	.13
September			39	2,321	.02	.02
October			30	1,844	.02	.02
November			101	6,010	.06	.07
December	4,790	140	903	55,523	.55	.63
The year			2,082	1,502,102	1.27	17.18

<sup>a</sup> Authority, California State engineering department from 1878 to 1884, inclusive.

*Estimated monthly discharge of Tuolumne River, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1880.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	1,290	170	409	25,148	0.25	0.29
February .....	5,150	130	625	35,950	.38	.41
March .....	1,550	370	832	51,157	.51	.59
April .....	19,300	770	7,141	424,918	4.37	4.87
May .....	16,300	6,280	10,371	637,687	6.34	7.31
June .....	17,050	10,340	14,075	837,521	8.61	9.61
July .....	13,220	3,295	7,618	468,412	4.66	5.37
August .....	2,960	300	1,233	75,814	.75	.86
September .....			134	7,973	.08	.09
October .....			56	3,443	.03	.03
November .....			35	2,082	.02	.02
December .....	5,020		1,095	67,328	.67	.77
The year .....			3,635	2,637,433	2.22	30.22
1881.						
January .....	22,900	2,640	2,884	177,330	1.76	2.03
February .....	5,020	2,440	6,755	375,153	4.13	4.30
March .....	10,340	3,290	2,879	177,022	1.76	2.03
April .....	10,200	4,790	6,260	372,495	3.83	4.27
May .....	8,630	3,540	7,274	447,261	4.45	5.13
June .....	3,970	690	5,225	310,909	3.20	3.57
July .....	1,380		1,996	122,729	1.22	1.41
August .....			391	24,041	.24	.28
September .....			125	7,437	.08	.09
October .....			130	7,993	.08	.09
November .....			193	11,484	.12	.13
December .....			620	38,122	.38	.44
The year .....			2,894	2,071,976	1.77	23.77



*Estimated monthly discharge of Tuolumne River, etc.—Continued.*

Month.	Discharge.			Total discharge.	Run-off.	
	Maximum.	Minimum.	Mean.		Per square mile.	Depth.
1895.	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Acre-feet.</i>	<i>Sec.-feet.</i>	<i>Inches.</i>
January .....	16, 130	1, 398	4, 828	296, 900	3. 22	3. 70
February .....	19, 650	1, 322	3, 915	217, 430	2. 61	2. 72
March .....	10, 785	1, 710	3, 165	194, 610	2. 11	2. 43
April .....	10, 012	3, 255	5, 824	346, 570	3. 88	4. 33
May .....	16, 000	6, 097	11, 798	725, 400	7. 87	9. 07
June .....	12, 530	5, 616	9, 163	545, 110	6. 11	6. 82
July .....	6, 692	1, 550	3, 831	235, 540	2. 55	2. 94
August .....	1, 550	285	848	52, 125	. 57	. 65
September .....	5, 616	200	615	36, 600	. 41	. 46
October .....	200	120	152	9, 346	. 10	. 12
November .....	500	210	255	14, 985	. 17	. 19
December .....	730	180	283	17, 405	. 19	. 22
The year .....	19, 650	120	3, 719	2, 692, 021	2. 45	33. 65
1896.						
January .....	13, 868	246	3, 080	189, 370	2. 05	2. 37
February .....	1, 880	950	1, 182	68, 007	. 79	. 86
March .....	11, 798	1, 006	2, 725	167, 578	1. 82	2. 10
April .....	14, 873	1, 970	3, 577	212, 828	2. 38	2. 66
May .....	14, 754	2, 550	5, 180	318, 500	3. 45	3. 98
June .....	14, 754	6, 990	11, 648	693, 104	7. 09	7. 87
July .....	8, 735	1, 306	4, 121	253, 408	2. 75	3. 17
August .....	1, 118	300	575	35, 392	. 38	. 44
September .....	2, 918	220	574	34, 191	. 38	. 43
October .....	474	180	224	13, 797	. 15	. 17
November .....	7, 802	273	1, 210	72, 012	. 81	. 90
December .....	3, 560	516	1, 028	63, 247	. 69	. 79
The year .....	14, 754	180	2, 927	2, 121, 434	1. 90	25. 74

## TWIN CREEKS.

*Discharge measurements of East Twin Creek in Canyon, San Bernardino County.*

Date.	Hydrographer.	Dis- charge.
1898.		<i>Sec.-feet.</i>
June 11	J. B. Lippincott .....	{ <i>a</i> 1.95
		{ <i>b</i> .11
	Total .....	2.06
Sept. 9	J. B. Lippincott .....	<i>a</i> .43
Sept. 9	do .....	<i>b</i> .30
	Total .....	.73
1899.		
Mar. 24	S. G. Bennett .....	<i>a</i> 3.88
Mar. 24	do .....	<i>b</i> .50
	Total .....	4.38
Aug. 25	S. G. Bennett .....	<i>a</i> .58
Aug. 25	do .....	<i>b</i> .16
	Total .....	.74
1900.		
July 12	S. G. Bennett .....	{ <i>a</i> .62
		{ <i>b</i> .15
	Total .....	.77
Oct. 1	W. W. Cockins, jr. ....	{ <i>a</i> .36
		{ <i>b</i> .21
	Total .....	.57
1902.		
Apr. 4	S. G. Bennett .....	{ <i>c</i> 4.7
		{ <i>b</i> .2
	Total .....	4.9
Sept. 4	W. B. Clapp .....	.4
	<i>a</i> Ditch.	<i>b</i> Tunnel.
		<i>c</i> Creek.

*Discharge measurements of West Twin Creek in Canyon, San Bernardino County.*

Date.	Hydrographer.	Dis-charge.
1898.		<i>Sec.-feet.</i>
June 11	J. B. Lippincott.....	$\left\{ \begin{array}{l} a \text{ 1.06} \\ b \text{ .68} \\ c \text{ .40} \end{array} \right.$
	Total.....	2.14
Sept. 9	J. B. Lippincott.....	.38
1899.		
Mar. 21	S. G. Bennett.....	3.00
Aug. 25	do.....	.20
1900.		
July 12	do.....	.22
Oct. 1	W. W. Cockins, jr.....	.16
1902.		
Apr. 4	S. G. Bennett.....	3.20
Sept. 4	W. B. Clapp.....	.13

<sup>a</sup> Pipe line to Waterman Ranch.

<sup>b</sup> Flume to Settlers.

<sup>c</sup> Hot Springs at Old Ranch.

WALKER RIVER.

*Discharge measurements of Walker River, East Fork.*

Date.	Hydrographer.	Dis-charge.	Location.
1902.		<i>Sec.-feet.</i>	
July 24	L. H. Taylor.....	196.5	10 miles below Bridgeport.
Aug. 27	D. W. Hays.....	79.5	Lower end Bridgeport Valley.
Oct. 6	do.....	57.6	Below all diversions in California.
July 26	F. H. Olmsted.....	119.8	Robinson Creek below Twin Lakes.
Aug. 21	D. W. Hays.....	75.7	Do.
Do	do.....	43.2	Buckeye Creek west of Bridgeport.
Oct. 6	do.....	24.0	Robinsons Creek, Twin Lakes.
Do	do.....	20.0	Buckeye Creek, Buckeye Springs.
Oct. 7	do.....	4.2	Somers, southwest of Bridgeport.
Do	do.....	7.12	Green Creek above Standard Dam.
Oct. 5	do.....	5.7	Virginia Creek bridge at Hunttoon Ranch.

*Discharge measurements of Walker River, West Fork.*

Date.	Hydrographer.	Dis-charge.	Location.
1902.		<i>Sec.-feet.</i>	
July 22	F. H. Olmsted .....	417.0	3 miles above Larsens.
Do	do .....	15.5	Silver Creek.
July 23	do .....	10.5	Quinton Creek.
Do	do .....	71.5	Leavitt.
July 24	do .....	95.0	At Middle Fork.
July 25	L. H. Taylor .....	330.6	Upper end Antelope Valley.
Aug. 23	D. W. Hays .....	69.7	Do.
Oct. 4	do .....	69.8	Do.
Aug. 8	do .....	221.8	Bridge above tollhouse.

*Discharge measurement of Big Walker River, Leavitts, Mono County.*

Date.	Hydrographer.	Dis-charge.	Location.
1896.		<i>Sec.-feet.</i>	
Oct. 18	J. B. Lippincott .....	45	

*Discharge measurement of Little Walker River, Hardys, Mono County.*

Date.	Hydrographer.	Dis-charge.	Location.
1896.		<i>Sec.-feet.</i>	
Oct. 17	J. B. Lippincott .....	39	
1902.			
July 24.	F. H. Olmsted .....	101.6	Blackburns Junction.

## WARD AND WARREN DITCH.

See San Bernardino Valley.

## WARM CREEK.

WARM CREEK, HAWES AND TALMADGE DITCH.

See San Bernardino Valley.

## WARM CREEK, M'KENZIE DITCH.

See San Bernardino Valley.

## WARM CREEK, MEEKS AND DAILY DITCH.

See San Bernardino Valley.

## WARM CREEK, RABEL DITCH (DAM).

See San Bernardino Valley.

## WARM CREEK, SHAY OR STOUT DITCH.

See San Bernardino Valley.

## WHITE CREEK.

*Estimated monthly discharge of White Creek at base of foothills, Tulare County.<sup>a</sup>*

[Drainage area, 90 square miles.]

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1879.	<i>Second-feet.</i>	<i>Acre-feet.</i>	<i>Second-feet.</i>	<i>Inches.</i>
January .....	7	430	0.08	0.09
February .....	12	666	.14	.14
March .....	6	369	.07	.08
April .....	23	1,368	.25	.28
May .....	16	984	.18	.21
June .....	5	297	.06	.07
July .....	0	-----	0	0
August .....	0	-----	0	0
September .....	0	-----	0	0
October .....	0	-----	0	0
November .....	23	1,368	.25	.28
December .....	45	2,767	.50	.58
The year .....	11	8,249	.13	1.73

<sup>a</sup>The entire record is estimated from records of neighboring drainage basins. Authority, California State engineering department.



*Estimated monthly discharge of White Creek, etc.—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1880.	<i>Second-feet.</i>	<i>Acre-feet.</i>	<i>Second-feet.</i>	<i>Inches.</i>
January .....	108	6,640	1.20	1.38
February .....	207	11,906	2.30	2.48
March .....	234	14,388	2.60	3.00
April .....	261	15,530	2.90	3.24
May .....	180	11,067	2.00	2.31
June .....	45	2,677	.50	.56
July .....	5	307	.06	.07
August .....	0		0	0
September .....	0		0	0
October .....	0		0	0
November .....	18	1,071	.20	.22
December .....	45	2,767	.50	.58
The year .....	92	66,353	1.02	13.84
1881.				
January .....	45	2,767	0.50	0.58
February .....	90	4,998	1.00	1.04
March .....	90	5,534	1.00	1.15
April .....	90	5,355	1.00	1.12
May .....	90	5,534	1.00	1.15
June .....	45	2,677	.50	.56
July .....	0		0	0
August .....	0		0	0
September .....	0		0	0
October .....	0		0	0
November .....	0		0	0
December .....	11	676	.12	.14
The year .....	38	27,541	.42	5.74

*Estimated monthly discharge of White Creek, etc.—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off.	
			Per square mile.	Depth.
1882.	<i>Second-feet.</i>	<i>Acre-feet.</i>	<i>Second-feet.</i>	<i>Inches.</i>
January .....	11	676	0.12	0.14
February .....	14	777	.15	.16
March .....	45	2,767	.50	.58
April .....	45	2,677	.50	.56
May .....	9	553	.10	.12
June .....	0		0	0
July .....	0		0	0
August .....	0		0	0
September .....	0		0	0
October .....	9	553	.10	.12
November .....	14	833	.15	.17
December .....	5	307	.06	.07
The year .....	13	9,143	.14	1.92
1883.				
January .....	14	861	0.15	0.17
February .....	14	777	.15	.16
March .....	72	4,427	.80	.92
April .....	45	2,677	.50	.56
May .....	36	2,213	.40	.46
June .....	0		0	0
July .....	0		0	0
August .....	0		0	0
September .....	0		0	0
October .....	9	553	.10	.12
November .....	9	535	.10	.11
December .....	14	861	.15	.17
The year .....	18	12,904	.19	2.67

*Estimated monthly discharge of White Creek, etc.—Continued.*

Month.	Mean discharge.	Total discharge.	Run-off	
			Per square mile.	Depth.
1884.	<i>Second-feet.</i>	<i>Acre-feet.</i>	<i>Second-feet.</i>	<i>Inches.</i>
January	45	2,767	0.50	0.58
February	270	15,530	3.00	3.24
March	270	16,601	3.00	3.45
April	180	10,710	2.00	2.23
May	36	2,213	.40	.46
June	45	2,677	.50	.56
July	0		0	0
August	0		0	0
September	0		0	0
October	0		0	0

## WHITEWATER RIVER.

*Discharge measurements of Whitewater River and tributaries at various points, San Bernardino and Riverside counties.*

Date.	Hydrographer.	Discharge.	Locality
		<i>Sec. feet.</i>	
Feb. 15, 1898	J. B. Lippincott	7.42	South Fork at tunnel.
Mar. 4, 1899	do	2.52	Do.
Feb. 16, 1898	do	14.24	Main river at foot of Bear Valley trail.
Feb. 17, 1898	do	4.64	North Fork at mouth.
Do	do	.82	Middle Fork at mouth.
Do	do	17.77	Main river 2 miles above mouth.

*Discharge measurements of Bear Valley Ditch, Riverside County.*

Date.	Hydrographer.	Discharge.	Locality.
		<i>Sec. feet.</i>	
Feb. 17, 1898	J. B. Lippincott	3.05	$\frac{1}{4}$ mile northeast of ranch house.
Sept. 28, 1899	do	5.20	At headgate.
Sept. 29, 1899	do	2.49	1 mile below headgate.

*Discharge measurements of Bear Valley and Palm Spring joint headworks, mouth of Canyon, Riverside County.*

Date.	Hydrographer.	Dis-charge.
		<i>Sec. feet.</i>
Sept. 7, 1898	J. B. Lippincott .....	9.35
Aug. 25, 1899	S. G. Bennett .....	6.34

## WHITING DITCH.

See San Bernardino Valley.

## WILLOW CREEK.

See Susan River.

## YUBA RIVER.

*Discharge measurements of Yuba River.*

Date.	Hydrographer.	Dis-charge.	Locality
1878.		<i>Sec. feet.</i>	
Dec. 9	State engineering department.	510	Marysville.
Dec. 12	do .....	510	3 miles below Smartsville.
1879.			
Feb. 14	do .....	18,000	Marysville.
Mar. 6	do .....	25,750	Do.
Mar. 9	do .....	11,500	Do.
Mar. 12	do .....	9,500	Do.
Mar. 19	do .....	7,000	Do.
Aug. 28	do .....	600	Smartsville to Marysville.

*Discharge measurements of Yuba River below Parks Bar Bridge, Smartsville,  
Yuba County, Cal.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1900.		<i>Feet.</i>	<i>Sec.-feet.</i>
June 28	H. D. H. Connick	3. 15	1,212
June 29	do	2. 95	1,086
July 11	do	2. 65	820
July 12	do	2. 65	811
July 13	do	2. 60	774
July 22	do	2. 42	622
July 23	do	2. 50	686
July 24	do	2. 50	673
Aug. 7	do	2. 23	537
Aug. 8	do	2. 30	571
Aug. 14	do	2. 25	534
Aug. 28	do	2. 20	474
Sept. 14	do	2. 60	736
1902.			
Sept. 1	Chas. A. Miller		487

*Discharge measurements of Yuba River, North Fork, above power company's  
dam, Yuba County, Cal.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1900.		<i>Feet.</i>	<i>Sec.-feet.</i>
July 3	H. D. H. Connick	2. 05	606
July 6	do	1. 95	567
July 17	do	1. 70	438
July 18	do	1. 65	419
July 27	do	1. 65	366
July 29	do	1. 60	371
July 31	do	1. 60	364
Aug. 9	do	1. 55	328
Aug. 10	do	1. 57	322
Aug. 29	do	1. 48	282
Aug. 30	do	1. 48	285

*Discharge measurements of Yuba River, Middle Fork, at Freemans Bridge, Yuba County, Cal.*

Date.	Hydrographer.	Gage height.	Dis-charge.
1900.		<i>Feet.</i>	<i>Sec.-feet</i>
July 1	H. D. H. Connick .....	2.40	191
July 3	do .....	2.35	180
July 4	do .....	2.30	185
July 7	do .....	2.57	162
July 29	do .....	2.30	109
Aug. 11	do .....	2.17	79
Aug. 12	do .....	2.15	78
Aug. 29	do .....	2.20	69
Aug. 30	do .....	2.20	68
Sept. 18	do .....	2.15	64

*Discharge measurements of Yuba River, Yuba County, Cal.*

Date.	Hydrographer.	Dis-charge.	Locality.
1902.		<i>Sec.-feet.</i>	
Aug. 29	S. G. Bennett .....	58	South Fork, at Eldorado bridge.
Aug. 30	Chas. A. Miller .....	55	South Fork, at Bridgeport bridge.
Sept. 1	do .....	32	Excelsior Mining and Irrigation canal, at Pleasant Valley.
	Total .....	87	
Aug. 29	S. G. Bennett .....	58	South Fork, 75 feet above Edwards bridge.
Do	do .....	9.3	South Fork, North Columbia, Eureka Lake Company's canal.
Do	do .....	7.0	South Fork, North Bloomfield ditch.
Aug. 30	do .....	52	Middle Fork, $\frac{1}{4}$ mile below Delihi mine.
Sept. 1	do .....	64	Middle Fork, 300 feet below Freemans bridge.
Do	do .....	221	North Fork, Bay Counties Electric Co.'s flume, below headgate.

### MAXIMUM FLOOD MEASUREMENTS.

The following flood measurements are given as having probable interest to the engineer in connection with the designing of bridges and of spillways for reservoirs. It is not intended that these should be considered as the maximum floods that will ever occur on these drainage basins. They are rather given as a record of the largest observed volumes known to the author. It is, of course, exceedingly difficult to measure accurately a river in great flood, and it seldom falls to the fortune of a hydrographer to be present at the maximum flood wave, but it is believed that these data may be valuable for the purposes mentioned:

Gila River at Florence, Ariz., February, 1891; 17,750 square miles drainage area; discharge, 102,500 second-feet, or 7.5 second-feet per square mile.

Salt River, Arizona, February, 1891; area of drainage, 12,000 square miles; flood discharge, 300,000 second-feet, or 24.6 second-feet per square mile.

Gila River at Gila bend, February, 1891, probable flood discharge, 250,000 second-feet.

Mormon Canyon, Los Angeles County, 15½ square miles drainage; elevation from 1,000 to 3,800; flood discharge by Schuyler from 700 to 800 second-feet, or 48.5 second-feet per square mile.

Sweetwater River, 186 square miles drainage area; January, 1895, 18,150 second-feet, or 97.5 second-feet per square mile.

Tuolumne River at La Grange dam, drainage area, 1,501 square miles; elevations to 14,000 feet; flood discharge, 46,000 second-feet, or 30.6 second-feet per square mile.

Yuba River, South Fork, at Bowman dam, elevation, 5,500 feet; drainage area, 19 square miles; discharge, 5,000 to 7,000 second-feet from melting snow, or 316 second-feet per square mile.

Cherry Creek, Colorado, area, 175 square miles; flood discharge, 10,000 second-feet, or 57 second-feet per square mile.

*Maximum floods measured by the United States Geological Survey, 1896-1901.*

Date.	Stream.	Locality.	Area of watershed	Maximum measurements.	Discharge per square mile
			<i>Sq. miles.</i>	<i>Sec. feet.</i>	<i>Sec. feet</i>
	Arroyo Seco (Salinas).	Above diversion	218	24,050	110.23
1885	Kern	Near Bakersfield	2,345	9,380	4.00
1901	King	Red Mountain	1,742	43,930	25.21
1901	Mokelumne	Electra	640	13,213	20.64
1896	Sacramento	Jellys Ferry	9,134	130,050	14.23
1900	San Antonio	Near Jolon (above Pinkerton dam site).	322	15,315	47.56
1901	San Gabriel	Azusa	222	6,250	28.15
1901	San Joaquin	Herndon	1,637	21,372	13.05
1900	San Lorenzo		235	10,269	42.00
1900	Santa Ana	Warm Spring	188	1,564	8.32
1899	Stanislaus	Oakdale	1,051	13,940	13.26
1900	Stony Creek	Julian's ranch	760	18,000	23.76+
1899	Tuolumne	Lagrange	1,501	21,800	14.52

*a* Gage height, 14. February, 1902, gage height reached 15.7.

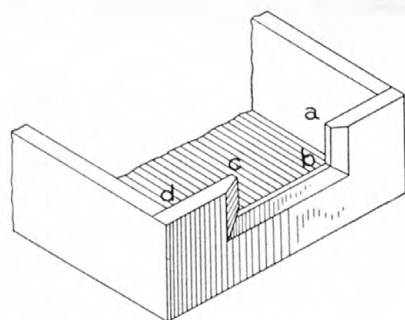


FIG. 4.—Figure showing construction of weir.

It has been found that the usual method of measuring the head on weirs, as practiced by water companies and water users, is to use an ordinary foot rule divided into inches and sixteenths. As no general weir table is available for heads so measured, the following has been prepared.



## WEIR

The following conditions should be observed in construction of weir:  
depth of box or canal, and distance  $c d$  of opening from side of canal

*Discharges in second-feet, rectangular weirs*

[Formula Q = 3.33

	Head.		Length of weir.										
	Inches.	Feet.	4 in.	6 in.	9 in.	12 in.	15 in.	18 in.	24 in.	2 ft. 6 in.	3 ft.	3 ft. 6 in.	4 ft.
1	$\frac{1}{16}$	0.005											
2	$\frac{1}{8}$	.010	0.0011	0.0017	0.0025	0.00353							
3	$\frac{3}{16}$	.015	.0021	.0032	.0048	.00648							
4	$\frac{1}{4}$	.021	.0033	.0050	.0075	.00997	0.0125	0.0150	0.0200	0.0250	0.0300	0.0350	0.0400
5	$\frac{5}{16}$	.026	.0046	.0069	.0104	.0139	.0173	.0209	.0279	.0349	.0419	.0489	.0559
6	$\frac{3}{8}$	.031	.0060	.0091	.0137	.0183	.0229	.0275	.0367	.0459	.0551	.0643	.0735
7	$\frac{7}{16}$	.036	.0075	.0114	.0172	.0230	.0288	.0346	.0462	.0578	.0694	.0810	.0926
8	$\frac{1}{2}$	.042	.0092	.0139	.0210	.0281	.0352	.0422	.0564	.0706	.0847	.0989	.113
9	$\frac{9}{16}$	.047	.0110	.0166	.0250	.0335	.0419	.0504	.0673	.0842	.101	.118	.135
10	$\frac{5}{8}$	.052	.0128	.0194	.0293	.0392	.0491	.0590	.0788	.0986	.118	.138	.158
11	$\frac{11}{16}$	.057	.0147	.0223	.0337	.0451	.0566	.0680	.0908	.114	.136	.159	.182
12	$\frac{3}{4}$	.062	.0167	.0254	.0384	.0514	.0644	.0774	.103	.129	.155	.181	.207
13	$\frac{13}{16}$	.068	.0187	.0285	.0432	.0579	.0725	.0872	.117	.146	.175	.205	.234
14	$\frac{7}{8}$	.073	.0209	.0318	.0482	.0646	.0810	.0974	.130	.163	.196	.229	.261
15	$1\frac{1}{16}$	.078	.0231	.0352	.0534	.0716	.0897	.108	.144	.181	.217	.253	.290
16	1	.083	.0254	.0387	.0587	.0788	.0988	.119	.159	.199	.239	.279	.319
17	$1\frac{1}{8}$	.088	.0277	.0423	.0642	.0862	.108	.130	.174	.218	.262	.305	.349
18	$1\frac{1}{4}$	.094	.0301	.0460	.0699	.0938	.118	.142	.189	.237	.285	.333	.381
19	$1\frac{3}{8}$	.099	.0325	.0498	.0757	.102	.128	.153	.205	.257	.309	.361	.413
20	$1\frac{1}{2}$	.104	.0349	.0536	.0816	.110	.138	.166	.222	.278	.334	.389	.445
21	$1\frac{5}{8}$	.109	.0375	.0576	.0877	.118	.148	.178	.238	.298	.359	.419	.479
22	$1\frac{3}{4}$	.115	.0401	.0616	.0939	.126	.159	.191	.255	.320	.385	.449	.514
23	$1\frac{7}{8}$	.120	.0427	.0657	.100	.135	.169	.204	.273	.342	.411	.480	.549
24	$1\frac{9}{8}$	.125	.0454	.0699	.107	.144	.180	.217	.291	.364	.438	.511	.585
25	$1\frac{11}{8}$	.130	.0481	.0742	.113	.152	.192	.231	.309	.387	.465	.544	.622
26	$1\frac{5}{4}$	.135	.0508	.0784	.120	.161	.203	.244	.327	.410	.493	.576	.659
27	$1\frac{13}{8}$	.140	.0536	.0829	.127	.171	.215	.259	.346	.434	.522	.610	.698
28	$1\frac{3}{2}$	.146	.0564	.0873	.134	.180	.226	.273	.365	.458	.551	.644	.736
29	$1\frac{15}{8}$	.151	.0593	.0919	.141	.190	.238	.287	.385	.483	.581	.678	.776
30	$1\frac{7}{4}$	.156	.0622	.0965	.148	.199	.251	.302	.405	.508	.611	.714	.816
31	$1\frac{17}{8}$	.161	.0651	.101	.155	.209	.263	.317	.425	.533	.641	.749	.857
32	2	.167	.0680	.106	.162	.219	.276	.332	.446	.559	.672	.786	.899
33	$2\frac{1}{8}$	.172	.0710	.111	.170	.229	.288	.348	.466	.585	.704	.822	.941
34	$2\frac{1}{4}$	.177	.0740	.115	.177	.239	.301	.364	.488	.612	.736	.860	.984
35	$2\frac{3}{8}$	.182	.0769	.120	.185	.250	.315	.379	.509	.638	.768	.898	1.027
36	$2\frac{1}{2}$	.187	.0799	.125	.193	.260	.328	.395	.531	.666	.801	.936	1.071
37	$2\frac{5}{8}$	.193	.0830	.130	.201	.271	.341	.412	.553	.694	.834	.975	1.116
38	$2\frac{3}{4}$	.198	.0862	.135	.208	.282	.355	.428	.575	.722	.868	1.015	1.161
39	$2\frac{7}{8}$	.203	.0893	.140	.216	.293	.369	.445	.597	.750	.902	1.055	1.207
40	$2\frac{1}{2}$	.208	.0924	.145	.224	.303	.383	.462	.620	.778	.937	1.095	1.253
41	$2\frac{9}{8}$	.213		.150	.233	.315	.397	.479	.643	.808	.972	1.136	1.300
42	$2\frac{1}{2}$	.219		.155	.241	.326	.411	.496	.667	.837	1.007	1.178	1.348
43	$2\frac{11}{8}$	.224		.161	.249	.337	.425	.514	.690	.867	1.043	1.219	1.396
44	$2\frac{3}{4}$	.229		.166	.257	.349	.440	.531	.714	.897	1.079	1.262	1.444

## TABLES.

The depth  $a b$  of weir (fig. 4, see p. 411) must not be over one-third must not be less than depth  $a b$ .

with end contractions; original computation.

( $L - 2 H$ )  $H^{\frac{3}{2}}$ .

Length of weir—Continued.											Addition for increase of length.		
5 ft.	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.	1 m.	1 ft.	
											0.00029	0.00354	1
											0.00054	0.00650	2
0.0500	0.0600	0.0700	0.0800	0.0900	0.100	0.120	0.140	0.160	0.180	0.200	.00083	.01001	3
.0698	.0838	.0976	.112	.126	.140	.168	.196	.224	.252	.280	.00117	.0140	4
.0918	.110	.129	.147	.166	.184	.221	.258	.294	.331	.368	.00153	.0184	5
.116	.139	.162	.185	.209	.232	.278	.324	.371	.417	.463	.00193	.0232	6
.141	.170	.198	.226	.255	.283	.340	.396	.453	.510	.566	.00236	.0283	7
.169	.203	.236	.270	.304	.338	.405	.473	.541	.608	.676	.00282	.0338	8
.198	.237	.277	.316	.356	.395	.475	.554	.633	.712	.791	.00330	.0396	9
.228	.273	.319	.365	.410	.456	.547	.639	.730	.821	.913	.00380	.0457	10
.260	.312	.364	.416	.468	.520	.624	.728	.832	.936	1.040	.00433	.0520	11
.293	.351	.410	.469	.527	.586	.703	.821	.938	1.055	1.173	.00489	.0587	12
.327	.392	.458	.524	.589	.655	.786	.917	1.048	1.179	1.310	.00546	.0656	13
.362	.435	.509	.582	.654	.726	.872	1.017	1.162	1.308	1.453	.00606	.0727	14
.399	.479	.559	.640	.720	.800	.960	1.120	1.280	1.441	1.601	.00667	.0801	15
.437	.525	.613	.700	.788	.876	1.051	1.227	1.402	1.578	1.753	.00731	.0877	16
.476	.572	.667	.763	.859	.954	1.145	1.337	1.528	1.719	1.910	.00796	.0956	17
.516	.620	.724	.827	.931	1.035	1.242	1.449	1.657	1.864	2.071	.00864	.104	18
.557	.669	.781	.893	1.005	1.117	1.341	1.565	1.789	2.013	2.237	.00933	.112	19
.600	.720	.841	.961	1.081	1.202	1.443	1.684	1.925	2.166	2.407	.01005	.120	20
.643	.772	.901	1.030	1.160	1.289	1.547	1.805	2.064	2.322	2.580	.0108	.129	21
.687	.825	.963	1.101	1.239	1.377	1.654	1.930	2.206	2.482	2.758	.0115	.138	22
.732	.879	1.026	1.174	1.321	1.468	1.762	2.057	2.351	2.645	2.940	.0123	.147	23
.778	.935	1.091	1.248	1.404	1.561	1.874	2.186	2.499	2.812	3.125	.0130	.156	24
.825	.991	1.157	1.323	1.489	1.655	1.967	2.319	2.650	2.982	3.314	.0138	.166	25
.873	1.049	1.224	1.400	1.576	1.751	2.102	2.454	2.805	3.156	3.507	.0146	.176	26
.922	1.107	1.293	1.478	1.664	1.849	2.220	2.591	2.962	3.333	3.704	.0155	.185	27
.971	1.167	1.362	1.558	1.753	1.949	2.340	2.731	3.122	3.513	3.904	.0163	.195	28
1.022	1.228	1.433	1.639	1.845	2.050	2.462	2.873	3.284	3.696	4.107	.0171	.206	29
1.073	1.289	1.505	1.721	1.937	2.153	2.586	3.018	3.450	3.882	4.314	.0180	.216	30
1.125	1.352	1.579	1.805	2.032	2.258	2.711	3.165	3.618	4.071	4.524	.0189	.227	31
1.178	1.416	1.653	1.890	2.127	2.365	2.839	3.314	3.788	4.263	4.737	.0198	.237	32
1.232	1.480	1.728	1.976	2.225	2.473	2.969	3.465	3.962	4.458	4.954	.0207	.248	33
1.286	1.546	1.805	2.064	2.323	2.582	3.101	3.619	4.138	4.656	5.174	.0216	.259	34
1.342	1.612	1.882	2.153	2.423	2.693	3.234	3.775	4.316	4.856	5.397	.0225	.270	35
1.398	1.680	1.961	2.243	2.525	2.806	3.370	3.933	4.497	5.050	5.623	.0235	.282	36
1.455	1.748	2.041	2.334	2.627	2.921	3.507	4.093	4.680	5.266	5.853	.0244	.293	37
1.512	1.817	2.122	2.427	2.731	3.036	3.646	4.256	4.865	5.475	6.085	.0254	.305	38
1.570	1.887	2.203	2.520	2.837	3.153	3.787	4.420	5.053	5.686	6.320	.0264	.317	39
1.629	1.958	2.286	2.615	2.943	3.272	3.929	4.586	5.244	5.901	6.558	.0274	.329	40
1.689	2.029	2.370	2.711	3.051	3.392	4.074	4.755	5.436	6.118	6.799	.0284	.341	41
1.749	2.102	2.455	2.808	3.161	3.514	4.219	4.925	5.631	6.337	7.043	.0294	.353	42
1.810	2.175	2.540	2.906	3.271	3.636	4.367	5.098	5.828	6.559	7.290	.0304	.365	43

*Discharges in second-feet, rectangular*

Head.		Length of weir.												
Inches.	Feet.	4 in.	6 in.	9 in.	12 in.	15 in.	18 in.	24 in.	2 ft. 6 in.	3 ft.	3 ft. 6 in.	4 ft.	4 ft. 6 in.	
45	2 $\frac{1}{8}$	.234	.....	0.171	0.206	0.300	0.455	0.549	0.738	0.927	1.116	1.305	1.494	1.683
46	2 $\frac{1}{4}$	.240	.....	.177	.274	.372	.469	.567	.762	.958	1.153	1.348	1.543	1.739
47	2 $\frac{3}{8}$	.245	.....	.182	.283	.384	.484	.585	.787	.989	1.190	1.392	1.594	1.795
48	3	.250	.....	.187	.291	.395	.499	.604	.812	1.020	1.228	1.436	1.644	1.852
49	3 $\frac{1}{10}$	.255	.....	.193	.300	.407	.515	.622	.837	1.051	1.266	1.481	1.695	1.910
50	3 $\frac{1}{5}$	.260	.....	.198	.309	.420	.530	.641	.862	1.083	1.305	1.526	1.747	1.968
51	3 $\frac{1}{4}$	.266	.....	.204	.318	.432	.546	.660	.888	1.116	1.343	1.571	1.799	2.027
52	3 $\frac{1}{2}$	.271	.....	.209	.327	.444	.561	.679	.913	1.148	1.383	1.617	1.852	2.087
53	3 $\frac{3}{8}$	.276	.....	.205	.336	.456	.577	.698	.939	1.181	1.422	1.664	1.905	2.147
54	3 $\frac{7}{10}$	.281	.....	.220	.345	.469	.593	.717	.966	1.214	1.462	1.711	1.959	2.207
55	3 $\frac{4}{5}$	.286	.....	.226	.354	.481	.609	.737	.992	1.247	1.502	1.758	2.013	2.268
56	3 $\frac{9}{10}$	.292	.....	.232	.363	.494	.625	.756	1.018	1.281	1.543	1.805	2.068	2.330
57	3 $\frac{11}{10}$	.297	.....	.....	.372	.507	.641	.776	1.045	1.315	1.584	1.853	2.123	2.392
58	3 $\frac{1}{2}$	.302	.....	.....	.381	.520	.658	.796	1.072	1.349	1.625	1.902	2.178	2.455
59	3 $\frac{3}{4}$	.307	.....	.....	.391	.532	.674	.816	1.100	1.383	1.667	1.950	2.234	2.518
60	3 $\frac{7}{8}$	.312	.....	.....	.400	.545	.691	.836	1.127	1.418	1.709	2.000	2.291	2.581
61	3 $\frac{8}{10}$	.318	.....	.....	.409	.558	.708	.857	1.155	1.453	1.751	2.049	2.347	2.646
62	3 $\frac{9}{10}$	.323	.....	.....	.419	.572	.724	.877	1.183	1.488	1.794	2.099	2.405	2.710
63	3 $\frac{11}{10}$	.328	.....	.....	.428	.585	.741	.898	1.211	1.524	1.837	2.150	2.463	2.775
64	4	.333	.....	.....	.438	.598	.758	.919	1.239	1.559	1.880	2.200	2.521	2.841
65	4 $\frac{1}{10}$	.338	.....	.....	.448	.612	.776	.940	1.267	1.595	1.923	2.251	2.579	2.907
66	4 $\frac{1}{5}$	.344	.....	.....	.457	.625	.793	.961	1.296	1.632	1.967	2.303	2.638	2.974
67	4 $\frac{1}{4}$	.349	.....	.....	.467	.638	.810	.982	1.325	1.668	2.011	2.355	2.698	3.041
68	4 $\frac{1}{2}$	.354	.....	.....	.477	.652	.828	1.003	1.354	1.705	2.056	2.407	2.758	3.109
69	4 $\frac{3}{5}$	.359	.....	.....	.486	.666	.845	1.025	1.383	1.742	2.101	2.459	2.818	3.177
70	4 $\frac{2}{3}$	.365	.....	.....	.496	.680	.863	1.046	1.413	1.779	2.146	2.512	2.879	3.245
71	4 $\frac{7}{10}$	.370	.....	.....	.506	.693	.881	1.068	1.442	1.817	2.191	2.565	2.940	3.314
72	4 $\frac{4}{5}$	.375	.....	.....	.516	.707	.899	1.090	1.472	1.854	2.237	2.619	3.001	3.384
73	4 $\frac{9}{10}$	.380	.....	.....	.....	.721	.917	1.112	1.502	1.892	2.283	2.673	3.063	3.454
74	4 $\frac{11}{10}$	.385	.....	.....	.....	.735	.935	1.134	1.532	1.930	2.329	2.727	3.126	3.524
75	4 $\frac{1}{2}$	.390	.....	.....	.....	.749	.953	1.156	1.562	1.969	2.375	2.782	3.188	3.595
76	4 $\frac{3}{4}$	.396	.....	.....	.....	.764	.971	1.178	1.593	2.008	2.422	2.837	3.252	3.666
77	4 $\frac{7}{8}$	.401	.....	.....	.....	.778	.989	1.201	1.624	2.047	2.469	2.892	3.315	3.738
78	4 $\frac{8}{10}$	.406	.....	.....	.....	.793	1.009	1.224	1.655	2.086	2.517	2.949	3.380	3.811
79	4 $\frac{9}{10}$	.411	.....	.....	.....	.807	1.028	1.246	1.686	2.125	2.565	3.004	3.444	3.883
80	5	.417	.....	.....	.....	.821	1.045	1.269	1.717	2.164	2.612	3.060	3.508	3.956
81	5 $\frac{1}{10}$	.422	.....	.....	.....	.836	1.064	1.292	1.748	2.205	2.661	3.117	3.573	4.030
82	5 $\frac{1}{5}$	.427	.....	.....	.....	.850	1.082	1.315	1.779	2.244	2.709	3.174	3.638	4.103
83	5 $\frac{1}{4}$	.432	.....	.....	.....	.864	1.101	1.337	1.810	2.284	2.757	3.230	3.703	4.177
84	5 $\frac{1}{2}$	.437	.....	.....	.....	.879	1.120	1.361	1.843	2.324	2.806	3.288	3.770	4.252
85	5 $\frac{3}{5}$	.443	.....	.....	.....	.893	1.138	1.383	1.874	2.364	2.855	3.345	3.836	4.326
86	5 $\frac{2}{3}$	.448	.....	.....	.....	.908	1.158	1.407	1.906	2.405	2.904	3.404	3.903	4.402
87	5 $\frac{7}{10}$	.453	.....	.....	.....	.923	1.177	1.431	1.939	2.447	2.954	3.462	3.970	4.478
88	5 $\frac{4}{5}$	.458	.....	.....	.....	.938	1.196	1.455	1.971	2.488	3.005	3.521	4.038	4.555
89	5 $\frac{9}{10}$	.463	.....	.....	.....	.953	1.216	1.479	2.004	2.530	3.055	3.581	4.106	4.632
90	5 $\frac{11}{10}$	.469	.....	.....	.....	.968	1.235	1.502	2.037	2.571	3.105	3.640	4.174	4.708
91	5 $\frac{1}{2}$	.474	.....	.....	.....	.983	1.255	1.526	2.070	2.613	3.156	3.700	4.243	4.786
92	5 $\frac{3}{4}$	.479	.....	.....	.....	.998	1.274	1.550	2.103	2.655	3.207	3.760	4.312	4.864
93	5 $\frac{7}{8}$	.484	.....	.....	.....	1.014	1.295	1.575	2.137	2.698	3.259	3.821	4.382	4.943
94	5 $\frac{8}{10}$	.490	.....	.....	.....	1.029	1.314	1.599	2.170	2.740	3.310	3.881	4.451	5.021

*weirs with end contractions—Continued.*

Length of weir—Continued.											Addition for increase of length.	
5 ft.	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.	1 in.	1 ft.
1.871	2.249	2.627	3.005	3.383	3.761	4.516	5.272	6.028	6.783	7.539	0.0315	0.378
1.934	2.324	2.715	3.105	3.496	3.886	4.667	5.448	6.229	7.010	7.792	.0325	.391
1.997	2.400	2.804	3.207	3.610	4.013	4.820	5.627	6.433	7.240	8.047	.0336	.403
2.060	2.477	2.893	3.309	3.725	4.142	4.974	5.807	6.639	7.472	8.304	.0347	.416
2.125	2.554	2.983	3.413	3.842	4.271	5.130	5.989	6.847	7.706	8.565	.0358	.429
2.190	2.632	3.075	3.517	3.960	4.402	5.287	6.172	7.058	7.943	8.828	.0369	.443
2.255	2.711	3.167	3.623	4.079	4.535	5.446	6.358	7.270	8.182	9.093	.0380	.456
2.321	2.791	3.260	3.729	4.199	4.668	5.607	6.546	7.484	8.423	9.362	.0391	.469
2.388	2.871	3.354	3.837	4.320	4.803	5.769	6.735	7.701	8.666	9.632	.0402	.483
2.455	2.952	3.449	3.946	4.442	4.939	5.932	6.926	7.919	8.913	9.906	.0414	.497
2.524	3.034	3.545	4.055	4.566	5.076	6.097	7.118	8.140	9.161	10.182	.0425	.511
2.592	3.117	3.641	4.166	4.690	5.215	6.264	7.313	8.362	9.411	10.460	.0437	.525
2.661	3.200	3.739	4.277	4.816	5.355	6.432	7.509	8.586	9.664	10.741	.0449	.539
2.731	3.284	3.837	4.390	4.943	5.495	6.601	7.707	8.813	9.918	11.024	.0461	.553
2.801	3.369	3.936	4.503	5.070	5.638	6.772	7.907	9.041	10.176	11.310	.0473	.567
2.872	3.454	4.036	4.617	5.199	5.781	6.944	8.108	9.271	10.435	11.598	.0485	.582
2.944	3.540	4.136	4.733	5.329	5.925	7.118	8.311	9.503	10.696	11.889	.0497	.596
3.016	3.627	4.238	4.849	5.460	6.071	7.293	8.515	9.737	10.960	12.182	.0509	.611
3.088	3.714	4.340	4.966	5.592	6.218	7.470	8.722	9.973	11.225	12.477	.0522	.626
3.162	3.802	4.443	5.084	5.725	6.366	7.648	8.929	10.211	11.493	12.774	.0534	.641
3.235	3.891	4.547	5.203	5.859	6.515	7.827	9.139	10.451	11.763	13.074	.0547	.656
3.310	3.981	4.652	5.323	5.994	6.695	8.007	9.350	10.692	12.034	13.376	.0559	.671
3.384	4.071	4.757	5.443	6.130	6.816	8.189	9.562	10.935	12.308	13.681	.0572	.686
3.460	4.161	4.863	5.565	6.267	6.969	8.373	9.776	11.180	12.584	13.988	.0585	.702
3.535	4.253	4.970	5.688	6.405	7.122	8.557	9.992	11.427	12.862	14.296	.0598	.717
3.612	4.345	5.078	5.811	6.544	7.277	8.743	10.209	11.676	13.142	14.608	.0611	.733
3.689	4.438	5.186	5.935	6.684	7.433	8.930	10.428	11.926	13.423	14.921	.0624	.749
3.766	4.531	5.296	6.060	6.825	7.590	9.119	10.648	12.178	13.707	15.237	.0637	.765
3.844	4.625	5.405	6.186	6.967	7.748	9.309	10.870	12.432	13.993	15.554	.0650	.781
3.922	4.719	5.516	6.313	7.110	7.906	9.500	11.093	12.687	14.281	15.874	.0664	.797
4.001	4.814	5.627	6.440	7.253	8.066	9.692	11.318	12.944	14.570	16.196	.0677	.813
4.081	4.910	5.739	6.569	7.398	8.227	9.886	11.545	13.203	14.862	16.520	.0691	.829
4.161	5.007	5.852	6.698	7.544	8.390	10.081	11.772	13.464	15.155	16.847	.0705	.846
4.242	5.104	5.967	6.829	7.691	8.553	10.278	12.002	13.727	15.451	17.176	.0719	.862
4.323	5.201	6.080	6.959	7.838	8.717	10.475	12.233	13.990	15.748	17.506	.0732	.879
4.404	5.299	6.195	7.090	7.986	8.882	10.673	12.464	14.256	16.047	17.838	.0747	.896
4.486	5.398	6.311	7.223	8.136	9.048	10.873	12.698	14.523	16.348	18.173	.0760	.912
4.568	5.497	6.427	7.356	8.285	9.215	11.074	12.933	14.791	16.650	18.509	.0775	.929
4.650	5.596	6.543	7.489	8.436	9.382	11.275	13.168	15.061	16.954	18.846	.0789	.946
4.733	5.697	6.661	7.624	8.588	9.551	11.479	13.406	15.333	17.260	19.187	.0803	.964
4.816	5.797	6.778	7.759	8.740	9.721	11.682	13.644	15.606	17.567	19.529	.0817	.981
4.901	5.899	6.897	7.895	8.894	9.892	11.888	13.885	15.881	17.877	19.874	.0832	.998
4.986	6.002	7.017	8.033	9.045	10.064	12.096	14.127	16.159	18.190	20.221	.0846	1.016
5.071	6.105	7.138	8.171	9.204	10.238	12.304	14.371	16.438	18.504	20.571	.0861	1.033
5.157	6.208	7.259	8.310	9.361	10.412	12.514	14.616	16.718	18.820	20.922	.0876	1.051
5.243	6.312	7.380	8.449	9.518	10.586	12.724	14.861	16.999	19.136	21.273	.0891	1.069
5.329	6.416	7.503	8.589	9.676	10.762	12.936	15.109	17.282	19.455	21.628	.0906	1.087
5.416	6.521	7.626	8.730	9.835	10.939	13.149	15.358	17.567	19.776	21.985	.0921	1.105
5.504	6.627	7.750	8.872	9.995	11.117	13.363	15.608	17.853	20.098	22.343	.0935	1.123
5.592	6.733	7.873	9.014	10.155	11.295	13.577	15.858	18.140	20.421	22.702	.0951	1.141

*Discharges in second-feet, rectangular*

	Head.		Length of weir.											
	Inches.	Feet.	4 in.	6 in.	9 in.	12 in.	15 in.	18 in.	24 in.	2 ft. 6 in.	3 ft.	3 ft. 6 in.	4 ft.	4 ft. 6 in.
95	5 $\frac{1}{16}$	0.495	-----	-----	-----	1.044	1.334	1.624	2.203	2.783	3.362	3.942	4.521	5.101
96	6	.500	-----	-----	-----	1.060	1.354	1.649	2.237	2.826	3.415	4.003	4.592	5.181
97	6 $\frac{1}{16}$	.505	-----	-----	-----	-----	1.374	1.673	2.271	2.869	3.467	4.065	4.662	5.260
98	6 $\frac{1}{8}$	.510	-----	-----	-----	-----	1.394	1.697	2.304	2.912	3.519	4.126	4.733	5.340
99	6 $\frac{3}{16}$	.515	-----	-----	-----	-----	1.414	1.722	2.339	2.955	3.572	4.188	4.805	5.421
100	6 $\frac{1}{2}$	.521	-----	-----	-----	-----	1.434	1.747	2.372	2.999	3.624	4.250	4.876	5.502
101	6 $\frac{5}{16}$	.526	-----	-----	-----	-----	1.455	1.772	2.407	3.043	3.678	4.313	4.948	5.584
102	6 $\frac{3}{8}$	.531	-----	-----	-----	-----	1.475	1.798	2.442	3.087	3.732	4.377	5.021	5.666
103	6 $\frac{7}{16}$	.536	-----	-----	-----	-----	1.495	1.822	2.476	3.131	3.785	4.430	5.093	5.747
104	6 $\frac{1}{2}$	.542	-----	-----	-----	-----	1.516	1.848	2.511	3.175	3.839	4.502	5.166	5.830
105	6 $\frac{9}{16}$	.547	-----	-----	-----	-----	1.537	1.873	2.547	3.220	3.893	4.565	5.240	5.913
106	6 $\frac{5}{8}$	.552	-----	-----	-----	-----	1.557	1.898	2.581	3.264	3.947	4.621	5.313	5.996
107	6 $\frac{3}{4}$	.557	-----	-----	-----	-----	1.577	1.924	2.616	3.309	4.002	4.696	5.387	6.080
108	6 $\frac{7}{8}$	.563	-----	-----	-----	-----	1.598	1.949	2.652	3.354	4.057	4.756	5.461	6.164
109	6 $\frac{1}{2}$	.568	-----	-----	-----	-----	1.619	1.975	2.687	3.400	4.112	4.824	5.536	6.248
110	6 $\frac{5}{8}$	.573	-----	-----	-----	-----	1.640	2.001	2.723	3.445	4.167	4.883	5.611	6.333
111	6 $\frac{3}{4}$	.578	-----	-----	-----	-----	1.661	2.027	2.759	3.491	4.223	4.955	5.686	6.418
112	7	.583	-----	-----	-----	-----	1.682	2.053	2.795	3.536	4.278	5.021	5.762	6.504
113	7 $\frac{1}{16}$	.589	-----	-----	-----	-----	1.703	2.079	2.830	3.582	4.334	5.088	5.837	6.589
114	7 $\frac{1}{8}$	.594	-----	-----	-----	-----	1.725	2.106	2.867	3.628	4.391	5.155	5.914	6.676
115	7 $\frac{1}{8}$	.599	-----	-----	-----	-----	1.746	2.132	2.904	3.675	4.447	5.219	5.991	6.763
116	7 $\frac{1}{4}$	.604	-----	-----	-----	-----	1.767	2.158	2.940	3.722	4.504	5.286	6.067	6.849
117	7 $\frac{1}{4}$	.609	-----	-----	-----	-----	1.788	2.184	2.976	3.768	4.560	5.352	6.144	6.936
118	7 $\frac{3}{8}$	.615	-----	-----	-----	-----	1.809	2.210	3.012	3.815	4.617	5.419	6.221	7.023
119	7 $\frac{1}{2}$	.620	-----	-----	-----	-----	1.830	2.236	3.049	3.861	4.674	5.486	6.298	7.111
120	7 $\frac{1}{2}$	.625	-----	-----	-----	-----	1.851	2.263	3.085	3.908	4.731	5.554	6.376	7.199
121	7 $\frac{9}{16}$	.630	-----	-----	-----	-----	-----	2.290	3.123	3.956	4.789	5.622	6.455	7.288
122	7 $\frac{3}{4}$	.635	-----	-----	-----	-----	-----	2.316	3.160	4.003	4.846	5.690	6.533	7.376
123	7 $\frac{7}{8}$	.641	-----	-----	-----	-----	-----	2.343	3.196	4.050	4.904	5.758	6.611	7.465
124	7 $\frac{1}{2}$	.646	-----	-----	-----	-----	-----	2.370	3.234	4.098	4.963	5.827	6.691	7.555
125	7 $\frac{1}{2}$	.651	-----	-----	-----	-----	-----	2.397	3.271	4.146	5.021	5.895	6.770	7.645
126	7 $\frac{3}{8}$	.656	-----	-----	-----	-----	-----	2.423	3.308	4.193	5.079	5.964	6.849	7.734
127	7 $\frac{1}{2}$	.661	-----	-----	-----	-----	-----	2.451	3.346	4.242	5.138	6.034	6.929	7.825
128	8	.667	-----	-----	-----	-----	-----	2.477	3.384	4.290	5.196	6.103	7.009	7.915
129	8 $\frac{1}{16}$	.672	-----	-----	-----	-----	-----	2.505	3.422	4.339	5.256	6.173	7.090	8.007
130	8 $\frac{1}{16}$	.677	-----	-----	-----	-----	-----	2.532	3.459	4.387	5.315	6.242	7.170	8.098
131	8 $\frac{3}{16}$	.682	-----	-----	-----	-----	-----	2.559	3.498	4.436	5.374	6.313	7.251	8.189
132	8 $\frac{1}{8}$	.688	-----	-----	-----	-----	-----	2.586	3.535	4.484	5.433	6.383	7.332	8.281
133	8 $\frac{5}{16}$	.693	-----	-----	-----	-----	-----	2.614	3.574	4.534	5.494	6.454	7.414	8.374
134	8 $\frac{3}{8}$	.698	-----	-----	-----	-----	-----	2.642	3.613	4.583	5.554	6.525	7.496	8.467
135	8 $\frac{7}{16}$	.703	-----	-----	-----	-----	-----	2.669	3.650	4.632	5.614	6.596	7.577	8.559
136	8 $\frac{1}{2}$	.708	-----	-----	-----	-----	-----	2.697	3.689	4.682	5.674	6.667	7.660	8.652
137	8 $\frac{9}{16}$	.714	-----	-----	-----	-----	-----	2.725	3.728	4.732	5.735	6.739	7.742	8.746
138	8 $\frac{3}{4}$	.719	-----	-----	-----	-----	-----	2.752	3.766	4.781	5.795	6.810	7.824	8.839
139	8 $\frac{7}{8}$	.724	-----	-----	-----	-----	-----	2.780	3.805	4.831	5.856	6.882	7.908	8.933
140	8 $\frac{1}{2}$	.729	-----	-----	-----	-----	-----	2.808	3.844	4.881	5.918	6.955	7.991	9.028
141	8 $\frac{1}{4}$	.734	-----	-----	-----	-----	-----	2.836	3.884	4.932	5.979	7.027	8.075	9.123
142	8 $\frac{3}{4}$	.740	-----	-----	-----	-----	-----	2.863	3.922	4.981	6.040	7.089	8.158	9.217
143	8 $\frac{1}{2}$	.745	-----	-----	-----	-----	-----	2.891	3.961	5.032	6.102	7.172	8.242	9.312
144	9	.750	-----	-----	-----	-----	-----	2.919	4.001	5.082	6.164	7.245	8.327	9.408

*weirs with end contractions—Continued.*

Length of weir—Continued.											Addition for increase of length.	
5 ft.	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.	1 in.	1 ft.
5.680	6.839	7.998	9.157	10.316	11.475	13.793	16.111	18.429	20.747	23.065	0.0966	1.159
5.769	6.947	8.124	9.301	10.478	11.656	14.010	16.365	18.720	21.074	23.429	.0981	1.177
5.858	7.054	8.250	9.446	10.641	11.837	14.229	16.620	19.012	21.404	23.795	.0997	1.196
5.948	7.162	8.376	9.591	10.805	12.020	14.448	16.877	19.306	21.735	24.164	.101	1.214
6.038	7.271	8.504	9.737	10.970	12.203	14.669	17.135	19.601	22.067	24.533	.103	1.233
6.128	7.386	8.631	9.883	11.135	12.386	14.890	17.393	19.897	22.400	24.903	.104	1.252
6.219	7.490	8.760	10.031	11.301	12.572	15.113	17.654	20.195	22.736	25.277	.106	1.271
6.311	7.600	8.889	10.179	11.468	12.758	15.336	17.915	20.494	23.073	25.652	.107	1.289
6.402	7.710	9.018	10.327	11.635	12.944	15.560	18.177	20.794	23.411	26.028	.109	1.308
6.494	7.822	9.149	10.477	11.804	13.132	15.787	18.442	21.097	23.752	26.407	.111	1.328
6.587	7.934	9.280	10.627	11.974	13.320	16.014	18.707	21.401	24.094	26.787	.112	1.347
6.679	8.045	9.411	10.777	12.143	13.509	16.241	18.973	21.705	24.437	27.169	.114	1.366
6.773	8.158	9.543	10.929	12.314	13.700	16.470	19.241	22.012	24.783	27.554	.115	1.385
6.866	8.271	9.676	11.081	12.485	13.890	16.700	19.509	22.319	25.129	27.938	.117	1.405
6.961	8.385	9.809	11.234	12.658	14.083	16.931	19.780	22.629	25.478	28.327	.119	1.424
7.055	8.500	9.944	11.388	12.832	14.276	17.164	20.052	22.941	25.829	28.717	.120	1.444
7.150	8.614	10.078	11.542	13.005	14.469	17.397	20.324	23.252	26.180	29.107	.122	1.464
7.245	8.729	10.213	11.696	13.180	14.663	17.631	20.598	23.565	26.532	29.499	.124	1.484
7.341	8.845	10.348	11.852	13.355	14.859	17.866	20.873	23.880	26.887	29.894	.125	1.504
7.438	8.962	10.485	12.009	13.532	15.056	18.103	21.150	24.197	27.244	30.291	.127	1.524
7.534	9.078	10.622	12.165	13.709	15.252	18.340	21.427	24.514	27.601	30.688	.129	1.544
7.631	9.195	10.759	12.323	13.886	15.450	18.578	21.705	24.833	27.961	31.088	.130	1.564
7.728	9.313	10.897	12.481	14.065	15.649	18.817	21.985	25.154	28.322	31.490	.132	1.584
7.826	9.430	11.034	12.639	14.243	15.848	19.056	22.265	25.474	28.683	31.892	.134	1.604
7.923	9.548	11.173	12.798	14.422	16.047	19.297	22.546	25.796	29.046	32.295	.135	1.625
8.022	9.667	11.312	12.958	14.603	16.249	19.539	22.830	26.121	29.412	32.703	.137	1.645
8.121	9.787	11.453	13.119	14.785	16.451	19.783	23.115	26.447	29.779	33.111	.139	1.666
8.220	9.907	11.593	13.280	14.967	16.653	20.027	23.400	26.774	30.147	33.520	.141	1.687
8.319	10.027	11.734	13.442	15.149	16.857	20.272	23.687	27.102	30.517	33.932	.142	1.708
8.419	10.148	11.876	13.604	15.332	17.061	20.517	23.974	27.431	30.887	34.344	.144	1.728
8.519	10.269	12.018	13.767	15.516	17.266	20.764	24.263	27.762	31.260	34.759	.146	1.749
8.619	10.390	12.160	13.930	15.700	17.471	21.011	24.552	28.093	31.633	35.174	.148	1.770
8.721	10.512	12.303	14.095	15.886	17.678	21.260	24.843	28.426	32.009	35.592	.149	1.791
8.821	10.634	12.447	14.259	16.072	17.884	21.510	25.135	28.760	32.385	36.010	.151	1.813
8.924	10.758	12.591	14.425	16.259	18.093	21.761	25.429	29.097	32.764	36.432	.153	1.834
9.025	10.881	12.736	14.591	16.446	18.312	22.012	25.723	29.434	33.144	36.855	.155	1.855
9.128	11.005	12.881	14.758	16.635	18.511	22.265	26.018	29.772	33.525	37.278	.156	1.877
9.230	11.128	13.026	14.924	16.823	18.721	22.517	26.314	30.110	33.906	37.703	.158	1.898
9.334	11.254	13.173	15.093	17.013	18.933	22.773	26.613	30.453	34.292	38.132	.160	1.920
9.437	11.379	13.321	15.262	17.204	19.145	23.029	26.912	30.795	34.678	38.561	.162	1.942
9.541	11.504	13.467	15.431	17.394	19.358	23.284	27.211	31.138	35.065	38.992	.164	1.963
9.645	11.630	13.615	15.600	17.586	19.571	23.541	27.512	31.482	35.452	39.423	.165	1.985
9.749	11.757	13.764	15.771	17.778	19.785	23.799	27.813	31.828	35.842	39.856	.167	2.007
9.853	11.883	13.912	15.941	17.970	19.999	24.057	28.115	32.174	36.232	40.290	.169	2.029
9.959	12.010	14.061	16.112	18.164	20.215	24.317	28.420	32.522	36.624	40.727	.171	2.051
10.065	12.138	14.211	16.285	18.358	20.432	24.578	28.725	32.872	37.019	41.166	.173	2.073
10.171	12.267	14.362	16.458	18.554	20.649	24.841	29.032	33.224	37.415	41.606	.175	2.096
10.276	12.394	14.512	16.630	18.748	20.866	25.102	29.338	33.574	37.810	42.046	.177	2.118
10.383	12.523	14.663	16.804	18.944	21.085	25.365	29.646	33.927	38.208	42.489	.178	2.140
10.490	12.653	14.815	16.978	19.141	21.304	25.630	29.956	34.282	38.607	42.933	.180	2.163

*Discharges in second-feet, rectangular*

	Head.		Length of weir.											
	Inches.	Feet.	4 in.	6 in.	9 in.	12 in.	15 in.	18 in.	24 in.	2 ft. 6 in.	3 ft.	3 ft. 6 in.	4 ft.	4 ft. 6 in.
145	9 $\frac{1}{16}$	0.755	-----	-----	-----	-----	-----	-----	4.040	5.133	6.226	7.319	8.411	9.504
146	9 $\frac{1}{8}$	.760	-----	-----	-----	-----	-----	-----	4.080	5.184	6.288	7.392	8.496	9.600
147	9 $\frac{3}{16}$	.765	-----	-----	-----	-----	-----	-----	4.120	5.235	6.351	7.466	8.581	9.697
148	9 $\frac{1}{4}$	.771	-----	-----	-----	-----	-----	-----	4.160	5.286	6.413	7.540	8.667	9.794
149	9 $\frac{5}{16}$	.776	-----	-----	-----	-----	-----	-----	4.199	5.338	6.476	7.614	8.753	9.891
150	9 $\frac{3}{8}$	.781	-----	-----	-----	-----	-----	-----	4.239	5.389	6.539	7.689	8.839	9.988
151	9 $\frac{7}{16}$	.786	-----	-----	-----	-----	-----	-----	4.280	5.441	6.602	7.763	8.925	10.086
152	9 $\frac{1}{2}$	.792	-----	-----	-----	-----	-----	-----	4.320	5.492	6.665	7.838	9.011	10.184
153	9 $\frac{9}{16}$	.797	-----	-----	-----	-----	-----	-----	4.360	5.544	6.729	7.913	9.097	10.282
154	9 $\frac{5}{8}$	.802	-----	-----	-----	-----	-----	-----	4.400	5.596	6.792	7.988	9.184	10.380
155	9 $\frac{11}{16}$	.807	-----	-----	-----	-----	-----	-----	4.440	5.648	6.856	8.064	9.271	10.479
156	9 $\frac{3}{4}$	.812	-----	-----	-----	-----	-----	-----	4.482	5.701	6.921	8.140	9.359	10.579
157	9 $\frac{13}{16}$	.818	-----	-----	-----	-----	-----	-----	4.522	5.754	6.985	8.216	9.447	10.678
158	9 $\frac{7}{8}$	.823	-----	-----	-----	-----	-----	-----	4.563	5.806	7.049	8.292	9.534	10.777
159	9 $\frac{15}{16}$	.828	-----	-----	-----	-----	-----	-----	4.604	5.858	7.113	8.368	9.623	10.877
160	10	.833	-----	-----	-----	-----	-----	-----	4.644	5.911	7.177	8.444	9.711	10.977



*weirs with end contractions*—Continued.

Length of weir—Continued.											Addition for increase of length.	
5 ft.	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.	1 in.	1 ft.
10.597	12.782	14.967	17.153	19.338	21.534	25.894	30.235	34.636	39.007	43.378	0.182	2.185
10.704	12.913	15.121	17.329	19.537	21.745	26.161	30.577	34.994	39.410	43.826	.184	2.208
10.812	13.043	15.274	17.505	19.735	21.966	26.428	30.889	35.351	39.813	44.274	.186	2.231
10.920	13.174	15.428	17.681	19.935	22.188	26.696	31.203	35.710	40.217	44.724	.188	2.254
11.029	13.306	15.582	17.859	20.135	22.412	26.965	31.518	36.071	40.624	45.177	.190	2.277
11.138	13.438	15.737	18.037	20.336	22.636	27.235	31.834	36.433	41.032	45.631	.192	2.300
11.247	13.570	15.892	18.215	20.537	22.860	27.505	32.150	36.795	41.440	46.085	.194	2.323
11.356	13.702	16.048	18.393	20.739	23.084	27.776	32.467	37.158	41.849	46.540	.196	2.346
11.466	13.835	16.204	18.573	20.941	23.310	28.048	32.785	37.523	42.261	46.998	.197	2.369
11.576	13.969	16.361	18.753	21.145	23.537	28.321	33.105	37.890	42.674	47.458	.199	2.392
11.687	14.102	16.517	18.933	21.348	23.764	28.594	33.425	38.256	43.087	47.918	.201	2.415
11.798	14.237	16.676	19.145	21.553	23.992	28.870	33.747	38.625	43.503	48.380	.203	2.439
11.909	14.372	16.834	19.296	21.758	24.221	29.145	34.070	38.995	43.919	48.844	.205	2.462
12.020	14.506	16.992	19.478	21.963	24.449	29.421	34.392	39.364	44.330	49.307	.207	2.486
12.132	14.642	17.151	19.661	22.170	24.680	29.699	34.718	39.737	44.756	49.775	.209	2.510
12.244	14.777	17.310	19.843	22.377	24.910	29.976	35.043	40.109	45.175	50.242	.211	2.533



## RAINFALL TABLES.

The following records of precipitation are arranged alphabetically by counties:

*Record of precipitation at Tamarack, Alpine County.*

[Latitude, 38° 37'; longitude, 119° 58'; elevation, 8,030 feet. Authority, P. C. Huntington.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1898-1899.....							12.80	2.50	1.75	0.00	0.00	0.00	17.05
1899-1900.....	0.00	6.10	4.25	8.10	3.00	2.85	6.65	4.60	0.65	0.00	0.00	0.00	36.20
1900-1901.....	0.00	3.30	8.50	2.05	13.65	15.90	4.30	6.40	.95	0.39	T.	3.17	58.71
1901-1902.....	1.60	2.69	3.22	2.38	3.37	13.00	11.35	4.60	1.68	0.00	0.00	0.00	43.89
3-year mean.....													46.27

a Year incomplete.

*Record of precipitation at Jackson, Amador County.*

[Latitude, 38° 21'; longitude, 120° 45'; elevation, 1,975 feet. Authority, Richard Webb.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1877-78.....	0	0.70	2.00	1.45	8.45	13.04	5.55	1.97	0.24	0.04	0	0	33.44
1878-79.....	0.05	.97	.86	.70	5.56	5.26	6.97	4.97	2.19	.25	0	0	27.78
1879-80.....	0	2.92	4.33	5.38	2.30	3.44	3.51	13.59	2.41	0	0	0	37.88
1880-81.....	0	.15	.60	10.47	8.86	4.77	2.11	2.96	0	.05	0	0	29.97
1881-82.....	.58	1.38	1.82	5.32	3.86	3.89	7.71	3.72	.49	.10	0	0	28.87
1882-83.....	.75	5.62	3.34	1.44	3.61	1.95	3.85	2.25	4.63	0	0	0	27.44
1883-84.....	.90	1.43	1.48	1.59	4.02	8.58	9.41	7.65	.99	1.85	0	0	37.90
1884-85.....	.26	1.70	.10	14.64	1.89	.27	.26	1.34	.15	.59	0	0	21.20
1885-86.....	.23	0	12.80	2.78	7.97	.75	4.54	8.04	0	0	.01	0	37.12
1891-92.....			1.08	8.03	3.21	3.03	4.89	2.70	3.85	.46	0		27.25
1892-93.....	.40		7.48	5.52						0	.04	0	13.44
1893-94.....	1.34	.50	5.28	3.35	9.88	10.84	2.52	1.38	4.15	1.48	T.	T.	40.72
1894-95.....	1.10	3.68	1.10	15.50	12.04	6.22	3.86	3.92	2.68	0	.07	T.	50.17
1895-96.....	1.14	.28	.93	3.67	8.79	.43	5.18	10.89	2.11	0	.04	0.18	33.64
1896-97.....	.23	1.35	8.78	4.61	4.77	5.04	7.66	1.46	.03	1.10	0	.12	35.15
1897-98.....	.19	3.05	2.25	3.18	1.47	4.91	1.18	1.11	1.64	.43	0	0	19.41
1898-99.....	.40	1.04	2.11	2.70	5.20	.57	14.69	1.49	1.07	1.00	0	.07	30.25
1899-1900.....	0	5.86	5.81	7.45	2.37	2.15	4.37	3.52	1.83	.06	0	0	33.42
1900-1901.....	.41	2.74	8.32	2.24	7.13	11.24	2.58	3.83	1.18	.08	T.	T.	39.74
1901-2.....	3.39	2.62	3.64	3.22	1.25	9.36	4.37	2.71	1.99	.15	0	T.	32.70
18-year mean.....					3.82								33.16

a Year incomplete.

*Record of precipitation at Cherokee, Butte County.*

[Latitude, 39° 38'; longitude, 121° 34'; elevation, 1,200 feet. Authority, L. Glass.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1871-72.....	0	2.95	5.41	10.09	10.58	12.25	2.33	3.11	0.45	0.56	0	0	47.73
1872-73.....	0	0	3.89	8.46	3.21	9.18	.59	2.14	.88	0	0	0	28.35
1873-74.....	0	.94	5.02	16.48	9.79	6.74	7.36	3.57	1.58	.11	0	0	51.59
1874-75.....	0	4.65	14.28	.43	10.84	.38	1.90	1.16	.66	1.04	0	0	35.34
1875-76.....	0	.24	10.41	6.96	8.48	11.95	13.36	2.66	.23	0	1.19	0	55.48
1876-77.....	.25	10.19	-----	-----	7.70	3.10	3.84	.75	1.51	1.28	-----	-----	a 28.62
1877-78.....	0	1.72	4.32	3.60	19.63	20.00	8.87	3.53	1.14	.60	.10	.45	63.96
1878-79.....	1.52	2.09	2.39	.69	8.26	9.09	18.23	5.66	3.66	.35	0	.28	52.22
1879-80.....	2.60	4.20	12.64	3.88	3.16	2.20	18.07	2.79	0	0	0	0	49.54
1880-81.....	0	0	.42	16.84	14.95	7.31	2.34	1.49	1.16	0	0	0	44.51
1881-82.....	.90	2.92	.39	6.79	4.04	8.32	6.47	4.59	0	0	0	0	34.42
1882-83.....	1.31	3.23	4.65	3.72	1.42	1.31	8.10	3.12	6.98	0	0	0	33.84
1883-84.....	0	5.21	1.06	1.17	6.69	6.16	11.89	9.27	.80	3.87	0	0	46.12
12-year mean.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	45.26

a Year incomplete.

*Record of precipitation at Cherokee Reservoir, Butte County.*

[Latitude, 39° 38'; longitude, 121° 33'; elevation, 1,200 feet. Authority, L. Glass.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1873-74.....	0	0	5.80	18.25	13.07	8.15	10.78	4.83	1.03	0	0	0	61.91
1874-75.....	0	5.99	16.99	1.15	12.47	.61	3.76	.10	1.10	2.00	0	0	44.17
1875-76.....	0	1.00	15.20	11.26	11.03	13.08	15.94	3.48	1.00	0	1.00	.73	73.72
1876-77.....	1.28	12.90	0	0	11.10	3.62	6.62	1.62	2.53	1.87	.80	0	42.34
1877-78.....	0	2.22	5.70	3.98	23.54	24.00	12.01	4.98	1.67	0	0	.68	78.78
1878-79.....	1.98	2.40	3.12	0	8.89	10.28	21.06	7.68	5.06	.50	0	0	60.97
6-year mean.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	60.32

*Record of precipitation at Fouts Springs, Colusa County.*

[Latitude, 39° 20'; longitude, 122° 40'; elevation 1,650 feet. Authority, John F. Fouts and S. E. Stites.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1885-86.....	(0.00)	0.20	19.43	4.85	9.29	2.00	1.65	5.01	0.50	T.	0	0	42.93
1886-87.....	0	.70	.20	2.83	2.00	7.88	2.12	1.66	T.	T.	T.	0	17.39
1887-88.....	T.	0	1.25	4.35	10.83	.70	5.00	(3.33)	2.14	0.65	(0.00)	(0.00)	28.25
1892-93.....	-----	-----	-----	-----	2.08	7.11	5.17	1.95	-----	-----	-----	-----	a 16.31
1900-1901.....	-----	-----	-----	5.41	12.57	4.06	-----	.79	-----	-----	-----	-----	a 22.83
3-year mean.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	29.52

a Year incomplete.

*Record of precipitation at Little Stony, Colusa County.*

[Latitude, 39° 25'; longitude, 122° 30'; elevation, ———feet. Authority, C. M. Polley.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1884-85.....	-----	-----	-----	8.40	1.29	1.04	0	1.38	0	1.19	0	0	<i>a</i> 13.30
1885-86.....	0	0.27	13.29	3.51	3.44	0	1.10	3.89	-----	-----	-----	-----	<i>a</i> 25.50

*a* Year incomplete.*Record of precipitation at Mount Diablo, Contra Costa County.*

[Latitude, 37° 53'; longitude, 121° 54'; elevation, 3,848 feet. Authority, Pacific Railway system, J. S. Hall.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1874-75.....	-----	-----	-----	-----	-----	0	0.63	T.	0.33	0.62	0	0	<i>a</i> 1.58
1875-76.....	0.00	0.18	9.19	3.11	5.60	4.95	6.23	0.65	(.39)	(.33)	.03	0	30.66
1876-77.....	T.	2.95	.27	0	4.63	1.89	1.11	.02	.45	.03	0	0	11.35
2-year mean	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	21.01

*a* Year incomplete.*Record of precipitation at Eldorado, Eldorado County.*

[Latitude, 38° 41'; longitude, 120° 51'; elevation, 1,609 feet. Authority, Pacific Railway system.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1888-89.....	-----	-----	-----	4.00	0.31	0.38	8.41	1.60	7.50	0.12	0	0	<i>a</i> 22.32
1889-90.....	0	7.46	6.32	14.94	12.48	5.67	10.04	3.00	3.45	0	0	.01	63.37
1890-91.....	1.77	.10	0	5.48	1.07	6.93	6.71	3.52	.93	.95	0	0	27.46
1891-92.....	.09	.85	1.08	9.09	3.48	5.75	7.24	3.61	4.91	.15	0	0	36.25
1892-93.....	.08	2.04	7.80	10.33	5.40	2.56	8.02	3.13	1.51	0	0	0	40.87
1893-94.....	1.14	.65	4.58	4.26	8.74	11.90	2.25	1.63	3.93	1.00	0	0	40.13
1894-95.....	.67	3.52	1.05	14.37	14.25	4.18	3.94	4.06	2.34	0	0	0	48.38
1895-96.....	1.41	0	.78	3.79	13.82	.15	7.80	9.56	2.59	0	0	.03	39.93
1896-97.....	.41	1.00	9.49	3.62	3.51	4.50	7.63	1.65	.23	.55	0	0	32.59
1897-98.....	.17	2.54	2.21	2.88	1.43	2.19	.86	.53	2.67	.60	0	0	16.08
1898-99.....	.37	.95	2.45	2.70	4.60	.57	13.10	1.02	1.80	1.57	0	.06	29.19
1899-1900.....	0	7.18	6.19	6.73	3.87	1.99	5.15	3.40	1.70	0	0	0	36.21
1900-1901.....	.10	3.26	8.11	2.23	6.90	8.73	1.69	5.54	.89	0	0	0	37.45
1901-2.....	2.41	1.89	2.91	3.40	1.11	10.75	4.31	2.46	.82	.62	0	0	30.68
13-year mean	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	36.81

*a* Year incomplete.





*Record of precipitation at Shingle Springs, Eldorado County.*

[Latitude, 38° 39'; longitude, 120° 55'; elevation, 1,427 feet. Authority, M. Phelps and Pacific Railway System.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1849-50.....	0	0.08	5.65	10.04	13.07	2.15	6.80	0.45	0.02	0	0	0	38.26
1850-51.....	1.23	.10	.65	2.70	4.80	.40	2.10	4.80	.40	0	0	0	17.18
1851-52.....	.40	.30	2.45	7.80	3.20	.50	9.60	7.25	1.00	0	0	0	32.50
1852-53.....	0	.50	7.20	11.40	13.70	2.40	8.20	3.00	1.10	0.05	0	0	47.55
1853-54.....	1.20	.75	6.40	4.10	4.40	3.40	4.30	5.40	.20	.30	0	0	30.45
1854-55.....	0	3.72	2.70	3.50	3.20	1.10	2.50	2.10	.68	0	0	0	19.50
1855-56.....	.70	0	2.40	5.70	4.10	.80	3.40	1.20	.20	.10	0	0	18.60
1856-57.....	0	0	2.15	6.35	6.50	7.05	1.94	0	.42	.35	0.35	0	25.11
1857-58.....	0	.42	4.04	1.99	2.37	2.69	4.00	1.70	.20	.60	0	0	18.01
1858-59.....	0	3.25	.50	6.20	1.22	12.00	5.81	1.82	1.51	0	0	0	32.31
1859-60.....	0	.15	11.16	2.40	2.20	1.15	4.71	3.40	2.10	.02	.80	0	28.09
1860-61.....	0	1.20	.50	7.43	3.78	4.60	8.34	.20	.15	.05	0	0	26.25
1861-62.....	0	0	6.90	11.22	34.13	6.75	6.90	7.34	4.10	1.90	2.53	0	81.80
1862-63.....	0	.78	.37	2.84	1.45	4.96	4.01	2.76	2.10	0	0	0	19.27
1863-64.....	0	0	2.05	6.30	7.29	3.21	.63	3.94	.85	0	0	0	24.27
1864-65.....	0	.08	9.94	9.13	5.13	5.63	1.13	2.50	.89	0	0	0	34.43
1865-66.....	0	.45	6.84	2.57	11.08	3.46	6.21	1.31	4.88	.18	0	0	36.98
1866-67.....	0	0	4.73	18.77	9.17	7.51	4.09	6.01	.01	0	0	0	50.29
1867-68.....	.82	2.24	7.17	23.76	12.12	3.70	14.39						a 64.20
1885-86.....				4.99	10.77	.69	3.84	9.51	.71				a 30.51
1886-87.....		1.66	.93	3.50	1.67	12.21	1.45		.06	0			a 21.48
1887-88.....	.49	T.	1.08	6.18	8.82	1.08	4.22	.43	.18	.31	0	0	22.79
1888-89.....	0	0	4.45	4.45	.40	.70	9.01	1.98	7.80	0	0	0	28.79
1889-90.....	0	8.73	7.85	17.35	13.50	6.70	10.48	2.75	3.65	0	0	0	71.01
1890-91.....	1.50	.08	0	5.40	1.40	7.65	7.97	3.80	1.60	.70	0	0	30.10
1891-92.....	.04	.70	1.10	7.58	2.55	6.43	4.95	2.26	1.98	0	0	0	27.59
1892-93.....	.15	2.30	7.85	8.25	4.97	4.17	9.78	2.95	.95	0	0	0	41.37
1893-94.....	.85	.40	4.98	3.30	7.07	9.40	1.60	1.03	3.25	.25	0	0	32.13
1894-95.....	0	3.55	.99	14.50	11.33	4.48	1.98	3.20	1.70	0	0	0	41.73
1895-96.....	1.40	.15	2.53	3.56	14.07	.30	6.33	8.21	1.79	0	0	0	38.34
1896-97.....	.25	1.05	11.75	7.18	4.25	12.75	7.00	.97	.22	.30	0	0	45.72
1897-98.....	0	2.15	1.40	3.25	.93	3.80	.05	.40	2.10	.52	0	0	14.60
1898-99.....	.25	.80	1.90	3.05	4.87	.37	14.13	.60	1.28	1.25	0	.15	28.65
1899-1900.....	0	6.25	6.29	7.30									a 19.84
30-year mean.....													33.46

a Year incomplete.

*Record of precipitation at Jacinto, Glenn County.*

[Latitude, 39° 35'; longitude, 122° 00'; elevation, 110 feet.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1892-93.....	0.62	1.21	6.32	8.13	4.20	2.99	3.71	0.87	1.44	0	0	0	29.49
1893-94.....	.47	.06	2.67	1.61	4.50	1.47	.89	.51	1.24	0	0	0	13.42
1894-95.....	1.20	1.33	.35	8.69	8.73	1.86	1.74	2.49	.22	0	0.36	0	26.97
1895-96.....	2.33	0	1.10	.94	9.37	.24	2.92	4.03	.69	0	0	0.52	22.14
1896-97.....	.63	.68	3.06	5.28	3.78	3.54	1.72	.77	.60	0.44	0	0	20.50
1897-98.....	0	2.12	1.16	1.40	.76	3.42	31	2.07	0	0	0	0	11.24
1898-99.....	.35	.41	0.49	1.39	6.36	0	4.29	.36	1.21	.53	0	0	15.39
1899-1900.....	0	2.68	4.40	3.40	3.06	.17	1.27	1.68	.72	0	0	0	17.38
1900-1901.....	0	2.42	5.00										a 7.42
8-year mean.....													19.57

a Year incomplete.

*Record of precipitation at Julians, on Stony Creek, Glenn County.*

[Latitude, 39° 35'; longitude, 122° 30'; elevation, 750 feet. Authority, Mrs. Lee Julian.]

Year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1900-1901.....	-----	-----	-----	-----	-----	4.26	0.12	1.24	0.50	0	0	0	a6.12
1901-2.....	1.07	0.60	3.18	0.82	0.85	9.27	3.24	2.37	2.06	0	0	0	23.46

a Year incomplete.

*Record of precipitation at Christmas Prairie, Humboldt County.*

[Latitude, 40° 55'; longitude, 124° 00'; elevation, 3,000 feet. Authority, J. H. Blake.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1883-84.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.56	0.24	0.01	a 1.81
1884-85.....	3.23	2.17	1.37	26.44	8.79	8.39	1.45	3.30	1.34	1.57	0	0	58.05
1885-86.....	.93	1.65	31.99	18.85	16.59	6.30	6.51	12.97	2.83	0	1.17	0	99.79
1886-87.....	0	4.72	3.93	13.73	15.97	20.92	5.00	-----	-----	-----	-----	-----	a 64.27
2-year mean	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	78.92

a Year incomplete.

*Record precipitation at Bishop Creek, Inyo County.*

[Latitude, 37° 21'; longitude, 118° 22'; elevation, 4,450 feet. Authority, Pacific Railway System.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1883-84.....	0.12	0.11	0	0.38	0.62	0.64	0.94	0.05	0	0	0	0	2.86
1884-85.....	0	0	0	1.00	0	0	.67	.14	0	0	0	0	1.81
1885-86.....	0	.02	0.35	0	1.03	0	.50	.38	0	0	0	0	2.28
1886-87.....	0	0	0	.29	.65	1.58	0	.35	0.55	0.35	0	0	3.68
1887-88.....	.15	.15	.05	1.10	1.37	.47	.05	0	0	.35	0.20	0	3.89
1888-89.....	0	0	1.72	.40	.10	.50	1.46	.12	.30	0	0	0	4.60
1889-90.....	0	.03	.35	1.20	4.75	.30	0	0	0	0	0	0.50	7.13
1890-91.....	.69	0	0	1.00	0	3.70	.28	0	2.90	0	0	.03	8.60
1891-92.....	.19	0	0	3.52	.10	.70	1.10	0	.25	T.	0	0	5.86
1892-93.....	0	.20	1.42	2.27	1.22	1.12	.15	0	0	0	1.05	T.	7.43
1893-94.....	.19	0	.10	.49	.30	.75	.09	.05	T.	.35	T.	.23	2.55
1894-95.....	T.	0	0	1.18	1.10	.50	.22	.29	.15	.11	.21	.07	3.83
1895-96.....	T.	.16	.15	T.	1.07	0	.60	.05	.03	0	.57	.06	2.69
1896-97.....	.05	T.	T.	.16	.32	1.67	1.75	0	.12	T.	.01	.05	4.13
1897-98.....	.09	.39	T.	.49	.05	.13	T.	.21	.27	T.	T.	.06	1.69
1898-99.....	.41	0	.21	.11	1.65	0	T.	.64	.02	0	0	.05	3.09
1899-1900.....	0	.14	.05	1.05	.49	.01	.54	.60	.34	.12	T.	0	3.34
1900-1901.....	.39	.03	2.69	.17	4.89	1.01	T.	.50	1.29	T.	0	.93	11.90
1901-2.....	0	.81	.61	.12	.07	.55	1.53	.61	.06	0	T.	.12	4.48
19-year mean	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.52

a Year incomplete.

*Record of precipitation at Camp Independence, Inyo County.*

[Latitude, 36° 50'; longitude, 118° 10'; elevation, 4,598 feet. Authority, United States War Department.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1865-66.....			0	0.65	2.42	0	0	0.16					<i>a</i> 3.23
1866-67.....	0	0.32	0	2.27	0	1.63	4.76	.53	0.76	0	0.01	1.15	11.43
1867-68.....	0.07	.32	0.21	12.19	5.46	0	0	.40	.71	0	.10	0	19.46
1868-69.....	0	.74	.44	1.17	.16	0	.32	.11	.36	0	.03	0	3.33
1869-70.....	0	0	.14	0	.20	1.36	0	.21	.27	0	.35	.10	2.63
1870-71.....	0	1.10	0	1.00	0	1.28	0	0	0	.30	0	0	3.68
1871-72.....	0	0	.65	4.70	0	.30	.28	.55	.18	0	.28	.12	7.06
1872-73.....	0	0	0	1.18	0	.40	0	0	0	0	0	.05	1.63
1873-74.....	.10	0	0	3.40	2.40	1.00	0	0	0	.01	.15	0	7.06
1874-75.....	.40	.80	.40	0	1.73	0	0	0	0	0	0	0	3.33
1875-76.....	.01	0	.66	.62	1.51	.70	.87	0	0	.15	.19	.56	5.27
1876-77.....	.16	.26	0	0	.76	0	0	.59	.69	0	0	0	2.46
1891-92.....							.62		.96	.07	T.	T.	<i>a</i> 1.65
1892-93.....	0	.35	.23	1.61	1.51	2.91	.98	.02	T.	0	.77	T.	8.38
1893-94.....	T.	0	.10	.75	.12	.42	.09	.02	.10	.11	.12	.51	2.34
1894-95.....	T.	0	0	1.89	1.24	1.18	.12	T.	.01	T.	T.	.04	4.48
1895-96.....	T.	.83	.67	.08									<i>a</i> 1.58
1896-97.....													
1897-98.....							0	.16	.23	T.	T.	.11	<i>a</i> .50
1898-99.....	.20	0	.10	.20	.54	T.	.01	.02	.03	.37	.01	.06	1.54
1899-1900.....	T.	.30	.85	.56	.31	.05	.67	.62	.22	.04	.08	T.	3.70
1900-1901.....	.75	.01	1.34	.13	2.81	.64	.05	T.	.36	0	.10	.32	6.51
1901-2.....	0	.65	.22	.06	.04	1.69	1.05	.17	.04	.01	.17	.13	4.23
18-year mean.....													5.47

*a* Year incomplete.*Record of precipitation at Keeler, Inyo County.*

[Latitude, 36° 25'; longitude, 117° 59'; elevation, 3,622 feet. Authority, Pacific Railway System.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1883-84.....								0.20	1.60	0.80	0	0.20	<i>a</i> 2.80
1884-85.....	0	0	0	0.70	0	0	0.12	.82	0	.08	0	.11	1.83
1885-86.....	0	0.25	0.65	.36	0.49	0.14	.60	.40	0	0	.14	.08	3.11
1886-87.....	0	.01	.08	0	T.	.93	0	1.14	.04	T.	.52	0	2.72
1887-88.....	1.08	.84	.01	.48	.70	1.21	.30	.12	.30	.20	.17	.10	5.51
1888-89.....	.06	0	1.68	.82	.04	T.	.52	.12	.06	.01	0	T.	3.31
1889-90.....	.08	.56	.05	.56	.42	.01	T.	.10	.20	0	T.	1.71	3.69
1890-91.....	.03	.03	.12	.22	0	1.00	2.01	0	.37	.30	.06	.02	5.06
1891-92.....	.19	.04	0	.31	.26	.19	.32	0	.53	T.	0	0	1.87
1892-93.....	T.	.81	.11	.54	.71	.75	1.50	0	T.	0	1.41	T.	5.83
1893-94.....	T.	T.	.03	1.48	T.	.29	.01	T.	T.	T.	.11	0	1.92
1894-95.....	0	0	0	1.05	.35	1.15	T.	.25	T.	T.	T.	T.	2.80
1895-96.....	T.	0	0	T.	.45	0	T.	T.	.15	T.	.25	1.42	2.27
1896-97.....	.50	T.	0	.25	.10	.27	.13	0	T.	0	0	.19	1.44
1897-98.....	.14	.15	T.	T.	0	0	0	.05	0	0	0	0	.34
1898-99.....	T.	0	T.	.30	.40	.45	0	.01	T.	.50	T.	T.	1.66
1899-1900.....	0	T.	1.75	T.	T.	0	.16	1.25	.23	T.	.10	T.	3.49
1900-1901.....	.35	.09	.45	0	.75	.25	0	T.	.40	0	0	.90	3.19
1901-2.....	0	.50	0	0	T.	.25	1.25	0	0	0	T.	T.	2
18-year mean.....													2.89

*a* Year incomplete.



*Record of precipitation at Bear Valley, Kern County.*

[Latitude, 35° 10'; longitude, 118° 30'; elevation, 4,000 feet. Authority, Philip Fickert, Tehachapai.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1894-95.....	1.48	6.38	1.25	22.37	29.22	6.64	7.42	3.25	6.57	0	0.04	0.20	84.82
1895-96.....	5.18	1.25	2.08	9.45	25.39	1.66	14.47	18.32	10.03	0	.72	.68	89.23
1896-97.....	2.13	2.57	18.35	8.02	4.18	16.05	19.12	3.35	.80	-----	-----	-----	<i>a</i> 74.57
1897-98.....	-----	-----	-----	5.96	3	10.44	-----	1.65	3.93	2	0	T.	<i>a</i> 26.98
1898-99.....	.73	3.07	6.26	3.44	11.95	3.20	23.34	2.51	4	1.01	0	.93	60.44
1899-1900.....	0	14.16	11.91	12.81	2.77	1.34	1	5.05	2.47	0	0	0	51.51
1900-1901.....	0	1.76	2.71	.32	1.91	5.30	2.75	1.77	1.43	0	T.	0	17.95
1901-2.....	0	1.27	.56	.90	3.20	5	5.36	3.48	.75	0	0	0	20.52
6-year mean.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	54.08

*a* Year incomplete.*Record of precipitation at Caliente, Kern County.*

[Latitude, 35° 17'; longitude, 118° 41'; elevation, 1,200 feet. Authority, Pacific Railway System.]

Year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1875-76.....	-----	-----	-----	-----	-----	2.02	1.66	0.53	T.	0	0	T.	<i>a</i> 4.21
1876-77.....	0	0.52	T.	0	1.08	.47	1.08	1.27	(0.52)	0	0	0	4.94
1877-78.....	0	0	0.84	2.31	3.81	4.47	2.69	3.20	.03	0	0	0	17.35
1878-79.....	0	.42	.10	.10	.20	.34	.33	1.43	.20	0.04	0	0	3.16
1879-80.....	0	1.08	1.77	3.46	2.37	1.51	1.09	3.53	.23	0	0	0	15.04
1880-81.....	0	0	0.35	3.56	1.61	1.54	1.91	.64	.23	0	0	0	9.84
1881-82.....	0.13	0.81	.30	.51	1.51	3.30	.73	1.59	.69	.56	0	0	10.13
1882-83.....	0	1.01	.69	.37	.04	1.76	.82	2.42	1.07	0	0	0	8.18
1883-84.....	.08	.76	.05	(1.81)	2.00	4.98	5.00	2.90	1.10	1.28	0	0	19.96
1884-85.....	0	.22	.25	3.25	.25	0	.45	3.00	1.05	0	0.05	0	8.52
1885-86.....	0	.05	3.88	1.33	1.59	.66	2.62	2.65	0	0	T.	0	12.78
1886-87.....	0	T.	1.45	1.33	.38	2.79	.07	2.66	.21	0	0	0	8.89
1887-88.....	0	.63	.05	1.43	.87	1.14	1.50	0	.81	0	0	0	6.43
1888-89.....	0	0	6.14	2.18	.59	.20	3.15	.60	0	0	0	0	12.86
1889-90.....	0	1.35	1.05	3.65	(1.25)	1.15	1.10	0	1.62	0	0	0	11.17
1890-91.....	.52	0	0	4.30	.19	2.83	.40	1.60	0	0	0	0	9.84
1891-92.....	.27	.05	T.	3.73	.75	1.00	4.25	.30	1.00	.50	0	0	11.85
1892-93.....	0	0	0	2.80	1.00	2.15	3.71	.70	0	0	0	0	10.36
1893-94.....	0	.10	.20	3.45	3.30	1.40	1.60	.20	.50	.70	0	0	11.45
1894-95.....	.60	.20	.25	4.39	5.28	3.10	1.67	.85	.87	0	0	0	17.21
1895-96.....	0	2.31	1.51	1.20	2.53	.25	3.30	1.58	.56	0	.05	.29	13.58
1896-97.....	0	1.00	.55	3.55	1.25	4.96	2.41	.35	.13	0	0	0	14.20
1897-98.....	0	.90	0	2.02	1.67	.70	1.45	.76	1.40	0	0	0	8.90
1898-99.....	.10	0	.45	.68	1.73	.41	3.26	.28	1.13	0	0	0	8.04
1899-1900.....	0	.25	1.52	.64	.50	.98	.80	1.75	2.35	0	0	0	8.79
1900-1901.....	0	0	2.13	0	.89	2.10	.35	1.33	1.18	0	0	0	7.98
1901-2.....	0	0	0	0	1.70	3.80	3.65	2.76	.11	(.12)	0	0	12.08
26-year mean.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	10.91

*a* Year incomplete.

*Record of precipitation at Fort Tejon, Kern County.*

[Latitude, 34° 55'; longitude, 118° 44'; elevation, 3,245 feet. Authority, United States War Department, and J. G. Stitt, Bakersfield.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1854-55.....							1.58	3.78	0.61	0		0	a 5.97
1855-56.....	0.99	0.05	0	7.50	4.41	7.88	2.24	4.98	4.62	0	0	0.30	32.97
1856-57.....	.08	.05	3.12	6.54	.37	.95	0	.04	.63	0	.07	.12	11.97
1857-58.....	0	2.11	1.04	4.50	2.60	.75	7.39	5.37	.09	1.20	0	.35	25.40
1858-59.....	.44	2.62	.25	3.07	.29	1.69	1.22	2.37	0	0	0	.07	12.02
1859-60.....	8.58	.16	1.02	0	.22	.25	.20	.60	.20	.21	.01	.16	11.61
1860-61.....					.73	.31	.26	T.	.43			T.	a 1.73
1861-62.....													
1862-63.....												T.	
1863-64.....	2.02	1.00	.71	4.32	.42	0	1.84	1.80	1.09	.04	T.	.10	13.34
1894-95.....						3.08	2.14	1.44	1.31	0	0	0	a 7.97
1895-96.....	0	1.46	1.42	1.25	3.07	.40	4.01	3.33	2.05	.22	.26	.30	17.77
1896-97.....	.53	1.63	1.74	4.47	3.52	5.14	3.63	.95	0	0	0	0	21.61
1897-98.....	0	1.39	0	1.72	1.89	1.55	1.36	.40	.30	0	0	0	8.61
1898-99.....	.60	0	.65	.73	2.57	.50	2.99	.55	.25	.78	0	0	9.62
1899-1900.....	.05	1.10	1.71	1.40	2.12	.66	.85	1.82	1.57	0	0	0	11.28
1900-1901.....	1.06	0	1.71	.50	1.80	5.86	1.97	.78	.90	0	0	T.	14.58
1901-2.....	.05	1.61	.26	T.									a 1.92
12-year mean.....													15.90

a Year incomplete.

*Record of precipitation at Isabella, Kern County.*

[Latitude, 35° 48'; longitude, 118° 25'; elevation, 2,600 feet. Authority, Stephen Barton, Isabella.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1895-96.....						0.10	1.93	0.89	0.04	0.06	2.57	0.01	a 5.60
1896-97.....	0.32	1.17	0.48	0.70									a 2.67
1897-98.....	.15	0	0	1.24	0.54	.99	.58	.06	.54	0	0	0	4.10
1898-99.....	.04	0	0	.33	1.95	.19	1.89	.28	.25	.45	0	0	5.38
1899-1900.....	0	.78	.85	.78	1.10	.65	.65	.73	1.06	0	0	.02	6.62
1900-1901.....	.30	.24	5.53	.05	1.20	2.74	.33	.36	1.98	0	0	.99	13.72
1901-2.....	0	.64	.13	0	.34	6.05	2.27	1.02	.05	0	0	0	10.50
5-year mean.....													8.06

a Year incomplete.

*Record of precipitation at Keene, Kern County.*

[Latitude, 35° 12'; longitude, 118° 40'; elevation, 2,705 feet. Authority, Pacific Railway System.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1877-78.....	0	0	0	1.75	4.37	7.49	2.72	2.10	0	0	0	0	18.43
1878-79.....	0	0.47	0	.74	.67	.55	.83	1.97	0	0	0	0	5.23
1879-80.....	0	.50	1.43	5.37	2.36	1.21	1.15	4.07	0.12	0	0	0	16.21
1880-81.....	0	.22	.26	3.43	2.12	2.42	1.96	.72	.19	0	0	0	11.32
1881-82.....	0.58	.21	.96	.30	1.40	2.57	1.42	1.44	.60	0.10	0	0	9.58
1882-83.....	0	1.40	.25	.47	.17	3.31	2.55	2.04	.86	0	0	0	11.05
1883-84.....	0	.45	.16	1.06	2.14	7.46	4.80	3.16	3.23	1.79	0	0	24.25
1884-85.....	0	2.55	.36	5.22	.30	.13	.65	1.47	.11	.10	0.06	T.	10.95
1885-86.....	0	.28	3.73	.46	2.02	.64	2.93	2.84	0	T.	T.	0.02	12.92
1886-87.....	0	T.	1.95	1.10	.51	3.20	.92	2.73	T.	.20	T.	0	10.61
1887-88.....	.12	1.32	.50	1.72	1.30	1.70	2.69	.78	2.03	0	.68	0	12.84
1888-89.....	0	0	1.28	2.29	.36	0	3.74	.95	1.77	0	0	.28	10.67
1889-90.....	.42	2.23	1.30	5.17	3.15	1.97	1.98	.50	1.30	0	0	1.40	19.42
1890-91.....	.41	0	.10	3.57	.23	6.59	1.30	1.30	1.35	.05	0	0	14.90
1891-92.....	.22	0	.08	6.37	1.65	2.22	4.10	1.86	.60	1.07	0	0	18.17
1892-93.....	0	.16	.65	1.98	2.20	3.26	6.70	1.30	T.	0	1.05	0	17.30
1893-94.....	.14	.35	.18	1.50	3.60	1.65	2.25	.55	.40	.20	0	0	10.82
1894-95.....	.35	.05	.30	4.59	6.03	2.71	2.40	1.95	1.25	0	0	0	19.63
1895-96.....	0	1.37	1.65	1.90	.82	0	2.47	2.82	1.30	0	.15	.40	12.88
1896-97.....	0	0	1.01	2.94	2.28	7.49	3.17	.14	0	.59	0	0	17.62
1897-98.....	0	1.01	0	3.02	1.73	.75	2.04	.35	1.12	0	0	0	10.02
1898-99.....	.03	0	.40	.62	.41	1.17	4.10	.66	1.18	.79	0	0	9.36
1899-1900.....	0	.61	3.16	.90	.92	1.12	.54	2.57	1.55	0	0	0	11.37
1900-1901.....	.27	.70	1.94	0	.99	5.35	1.30	1.19	.80	0	0	.89	13.43
1901-2.....	0	.45	.26	.30	1.56	6.91	4.80	2.70	.45	0	0	0	17.43
25-year mean.....													13.86

*Record of precipitation at Kernville, Kern County.*

[Latitude, 35° 45'; longitude, 118° 27'; elevation, 2,600 feet. Authority, Stephen Barton and A. Brown, Kernville.]

Year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1893-94.....					1.10	1.88	0.42	0.17	0.53	0	0	0.01	4.11
1894-95.....	0.60	0	0	5.31	5.10	1.55	1.80	.37	0	0	0	0	14.73
1895-96.....	0	0.50	0.35	.40	3.52	0	1.54	.86	0	0.20	2.25	.05	10.27
1896-97.....	0	1.48	.41	.85	3.40	3.60	2.57	.10	0	0	0	0	12.41
1897-98.....	0	.45	1.14	11.32	.58	.99	.58	T.	.54	0	0	0	15.60
1898-99.....	.04	0	0	.33	1.15	.19	1.89	.28	.25	.45	0	0	5.38
1899-1900.....	0	.78	.85	.73	.80	.53	.58	.52	.90	0	0	0	5.69
1900-1901.....	.79	.10	5.09	0	1.35	2.92	.15	.31	1.62	0	0	.70	13.03
1901-2.....	0	.72	.15	0	.30	3.07	2.10	.74	.10	.00	.00	.00	7.18
7-year mean.....													11.02

aYear incomplete.

*Record of precipitation at Mount Breckinridge, Hanlon, Kern County.*

[Latitude, 35° 25'; longitude, 118° 35'; elevation, 6,750 feet. Authority, G. Otterman.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total
1896-97			2.26	5.95	2.70	5.12	7.72	0	0.40	0.10	0	0	$a$ 4.25
1897-98 <sup>b</sup>													
1898-99						1.79	3.17						$a$ 4.96

a Year incomplete.

<sup>b</sup> No record kept in 1898.

*Record of precipitation at Taylor's ranch, Weldon, Kern County.*

[Latitude, 35° 30'; longitude, 118° 17'; elevation, 2,640 feet. Authority, Geo. E. Carleton and Annie Alexander, Weldon.]

[illegible]

<sup>a</sup> Year incomplete.

*Record of precipitation at Tehachapai, Kern County.*

[Latitude, 35° 06'; longitude, 118° 26'; elevation, 3,964 feet. Authority, Pacific Railway System.]

[illegible]

*Record of precipitation at Tejon Ranch, Kern County.*

[Latitude, 35° 01'; longitude, 118° 45'; elevation, 1,450 feet. Authority, R. M. Pogson, Bakersfield.]

[illegible]

<sup>a</sup>Year incomplete.

*Record of precipitation at Bartlett Springs, Lake County.*

[Latitude, 39° 10'; longitude, 122° 45'; elevation, 2,375 feet. Authority, J. E. McMahon.]

[illegible]

<sup>a</sup> Year incomplete.

*Record of precipitation at Kono Tayee, Lake County.*

[Latitude, 39° 5'; longitude, 122° 43'; elevation, 1,350 feet. Authority, R. S. Floyd.]

[illegible]

*Record of precipitation at Lakeport, Lake County.*

[Latitude, 123° 0'; longitude, 33° 0'; elevation, 1,325 feet. Authority, D. C. Rumsey.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Total.
1900-1901.....	0	4.25	5.55	4.20	9.20	3.95	1.25	2.15	0.62	0	0	0	31.17
1901-2.....	.88	2.20	4.18	0	3.00	12.86	3.70	3.30	2.45	0	0	0	32.57
2-year mean.....													31.86

*Record of precipitation at Middletown, Lake County.*

[Latitude, 38° 46'; longitude, 122° 37'; elevation, 1,300 feet. Authority, Leon Lake.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1879-80.....	0.91	1.36	8.38	9.59	7.07	2.48	4.64	22.21	1.76	0	0	0	58.40
1880-81.....	0	0.06	0.02	21.86	17.85	5.95	1.83	2.52	0.29	0.34	0	0	50.72
1881-82.....	.55	1.26	1.05	8.09	2.86	6.80	4.60	2.57	.65	0	0	0	28.43
1882-83.....	.90	2.93	5.07	1.47	2.25	1.92	7.25	3.69	3.97	0	0	0	29.45
1883-84.....	2.55	1.36	.57	2.34	8.25	5.25	12.82	8.36	.06	3.28	0	0	44.84
1884-85.....	.50	2.08	.05	22.93	2.54	1.37	12.82	8.42	.30	2.98	0	0	53.99
1885-86.....	.15	.54	19.42	6.60	13.61	0.32	0.70	1.32	0	.27	0	0	42.93
1886-87.....				3.96	2.25	10.74	1.71	8.03	1.64	0			<sup>a</sup> 28.33
1892-93.....	.91	2.05	15.64	14.77	6.25	7.82	9.32	3.88	1.49	0	0	0	62.13
1893-94.....	.78	.36	3.06	3.36	14.37	8.32	2.09	2.65	2.06	.89	0	0	37.94
1894-95.....	1.28	3.18	1.92	20.52	28.90	3.40	5.87	1.77	1.75	0	0.10	0	68.69
1895-96.....	1.86	0	3.06	5.59	25.78	.06	5.79	8.54	2.23	0	.01	0.10	53.02
1896-97.....	.48	1.10	7.55	11.21									<sup>a</sup> 20.34
11-year mean.....													48.23

<sup>a</sup> Year incomplete.*Record of precipitation at Susanville, Lassen County.*

[Latitude, 40° 23'; longitude, 120° 35'; elevation, 4,195 feet. Authority, T. B. Sanders.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1885-86.....	0.71	0.50	5.92	3.23	4.27	0.92	2.70	1.70	1.28	1.22	0.57	0.30	23.32
1886-87.....		1.32		2.23		5.57							<sup>a</sup> 9.12
1887-88.....													
1888-89.....	.71	.01	1.45	1.89	.03	.60	4.81	1.07	6.26	1.55	.05	0	18.43
1889-90.....	0	4.18	2.74	8.55	8.72	4.71	4.60	1.03	1.51	.14	0	.15	36.36
1890-91.....	.15	T.	.35	3.47	1.00	7.84	2.49	.80	2.41	1.65	.55	T.	20.71
1891-92.....	.65	.45	1.10	4.91	1.77	2.66	2.80	2.80	1.35	.98	0	0	19.77
1892-93.....	.71	.83	10.66	6.80	4.82	3.53	1.55	1.83	.67	0	T.	T.	31.40
1893-94.....	1.65	.60	1.80	.95	6.10	3.53	2.35	.95	1.55	.75	0	.20	20.43
1894-95.....	.30	1.96	.40	8.66	10.29	3.00	1.26	.50	1.50	T.	T.	.20	28.07
1895-96.....	3.00	.10	1.95	2.91	6.94	.05	3.23	5.10	2.22	T.	.20	.20	25.90
1896-97.....	1.33	.50	3.88	2.96	5.99	4.25	2.60	.30	.90	.42	0	.08	23.21
1897-98.....	.55	2.65	3.13	2.22	.45	2.38	.35	.24	.54	1.02	0	.08	13.61
1898-99.....	.10	.80	1.74	.65	2.90	.31	3.32	.92	1.42	0	0	.46	12.62
1899-1900.....	0	5.21	2.70	3.59	1.50	1.22	2.97	.90	.64	.40	.63	.02	19.78
1900-1901.....	.25	2.67	3.29	2.00	4.76	3.17	1.50	1.57	.92	.27	0	1.77	22.17
1901-2.....	.59	2.28	1.72	1.89	.70	5.14	2.56	1.31	.35	0	.54	.09	17.17
15-year mean.....													22.20

<sup>a</sup> Year incomplete.

*Record of precipitation at Azusa, Los Angeles County.*

[Latitude, 34° 8'; longitude, 117° 54'; elevation, 630 feet. Authority, H. F. Parkinson.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1897-98.....	0	4.25	0.25	T.	1.75	1.25	0.81	0.25	2.63	T.	T.	0	11.19
1898-99.....	.06	T.	T.	0.50	2.81	T.	2.49	T.	T.	1.25	0	T.	7.11
1899-1900.....	T.	2.55	1.79	1.00	1.31	T.	1.71	1.05	2.79	0	0	0	12.20
1900-1901.....	.13	.34	10.25	0	3.77	4.86	.50	.73	1.91	T.	T.	T.	22.49
1901-2.....	T.	2.35	.67	T.	2.24	2.84	3.90	.38	.18	.08	T.	0	12.73
5-year mean.....													13.14

*Record of precipitation at Calabasas, Los Angeles County.*

[Latitude, 34° 09'; longitude, 118° 38'; elevation, 925 feet. Authority, J. G. Chapman.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1901-2.....				0	1.28	4.35	2.17	0	0	0	0	0	7.80

*Record of precipitation at Colby's Camp, Los Angeles County.*

[Latitude, 118° 05'; longitude, 34° 15'; elevation, 3,875 feet. Authority, D. W. Colby, Pasadena.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1898-99.....					2.90	0.25	2.75	0.17	0.60	0.79	0	0	7.46
1899-1900.....	0	3.66	1.25	1.26	1.15	0	2.00	1.38	3.25	0	0	0	13.95
1900-1901.....	0.25	.45	8.15	0	6.94	13.54	.67	2.65	1.10	.10	0	0.25	34.10
1901-2.....	.10	3.15	0	0	2.50	3.15	3.55	1.84	.20	.10	0	0	14.59
3-year mean.....													20.88

a Year incomplete.

*Record of precipitation at Follows Camp (Azusa), Los Angeles County.*

[Latitude, 34° 14'; longitude, 117° 49'; elevation, 1,800 feet. Authority, R. M. Follows, Azusa.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1895-96.....				1.02	2.77	T.	6.55	0.70	0.36	0	0.07	1.10	a 12.57
1896-97.....	T.	2.95	1.03	1.61	5.43	10.39	8.25	.15	.28	T.	0	.07	30.16
1897-98.....	.45	7.85	.20	.27	0	9.80	0	.85	6.16	1.03	0	.53	27.14
1898-99.....	0	0	1.70	.70	3.59	.84	2.49	.12	0	.91	0	0	10.35
1899-1900.....	.12	3.03	1.64	.44		T.	2.40	1.77	2.98				a 12.38
1901-2.....			.80	.15									a .95
3-year mean.....													22.55

a Year incomplete.

*Record of precipitation at La Liebre, Los Angeles County.*

[Latitude, 34° 46'; longitude, 118° 40'; elevation, 3,170 feet. Authority, J. W. Forbes, Neonack.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1896-97					3.67	4.01	2.30	0.10					<sup>a</sup> 10.08
1897-98		0.50		0.40	.53	.38	.81	0	0.45	0	0	0	<sup>a</sup> 3.07
1898-99	0.20	0	0	.66	1.79	.04	2.26	.09	.04	0.27	0	0	5.35
1899-1900	.05	1.47	0.90	.46	1.24								<sup>a</sup> 4.12

<sup>a</sup> Year incomplete.*Record of precipitation at Los Angeles, Los Angeles County.*

[Latitude, 34° 03'; longitude, 118° 15'; elevation, 330 feet. Authority, Signal Service and Weather Bureau.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1871-72						2.25	0.43	0.97	0.10	0	0	0.22	<sup>a</sup> 3.97
1872-73	0	0	0	4.42	2.08	7.19	.05	0	0	0	0	1.06	14.80
1873-74	0	0	0.74	5.74	5.51	9.77	1.09	.45	.42	0	0	0	23.72
1874-75	0.06	1.81	1.89	.20	17.22	.15	.22	.07	.05	0	0	0	21.67
1875-76	0	0	7.57	.82	6.54	7.92	3.41	.45	.03	0	0	0	26.74
1876-77	0	.40	0	0	3.48	.01	.83	.26	.30	0	0	0	5.28
1877-78	0	.86	.45	3.93	3.33	7.68	2.57	1.71	.66	0.07	0	0	21.26
1878-79	0	.14	0	4.70	3.59	.97	.49	1.19	.24	.03	0	0	11.35
1879-80	0	.93	3.44	6.53	1.33	1.56	1.45	5.06	.04	0	T.	T.	20.34
1880-81	0	.14	.67	8.40	1.43	.36	1.66	.46	.01	0	0	T.	13.13
1881-82	T.	.82	.27	.52	1.01	2.66	2.66	1.83	.63	T.	0	0	10.40
1882-83	T.	.05	1.82	.08	1.62	3.47	2.87	.15	2.02	.03	T.	0	12.11
1883-84	0	1.42	0	2.56	3.15	13.37	12.36	3.58	.39	1.39	0.02	.02	38.26
1884-85	T.	.39	1.07	4.65	1.05	.01	.01	2.01	.06	T.	T.	T.	9.25
1885-86	.05	.30	5.55	1.65	7.78	1.41	2.52	2.32	.01	.11	.27	.21	22.18
1886-87	.11	.02	1.18	.26	.20	9.25	.29	2.36	.20	.07	.07	T.	14.01
1887-88	.18	.17	.80	2.68	6.04	.80	3.17	.12	.05	.01	.04	.10	14.16
1888-89	.03	.40	4.02	6.26	.25	.92	6.48	.27	.65	.01	T.	.28	19.57
1889-90	.34	6.96	1.35	15.80	7.83	1.36	.66	.22	.03	.02	0	.03	34.60
1890-91	.06	.03	.13	2.32	.25	8.56	.41	1.26	.31	0	T.	0	13.33
1891-92	.06	0	0	1.99	.88	3.19	3.39	.22	2.06	.06	0	.01	11.86
1892-93	0	.33	4.40	4.18	6.29	2.27	8.52	.19	.06	.03	0	0	26.27
1893-94	T.	.75	.20	3.65	.94	.49	.37	.13	.20	T.	T.	.01	6.74
1894-95	.73	.02	0	4.62	5.84	.46	3.77	.46	.19	.01	T.	T.	16.10
1895-96	T.	.24	.80	.78	3.23	T.	2.97	.19	.30	T.	.02	.01	8.54
1896-97	T.	1.30	1.66	2.12	3.70	5.62	2.31	.02	.10	T.	T.	0	16.83
1897-98	0	2.47	.01	.05	1.26	.51	.98	.03	1.75	T.	.07	T.	7.13
1898-99	.02	.09	T.	.12	2.64	.04	1.81	.18	.04	.58	0	.01	5.53
1899-1900	T.	1.59	.90	.90	1.17	T.	.99	.54	1.81	T.	T.	T.	7.90
1900-1901	T.	.26	6.53	T.	2.49	4.38	.45	.68	1.50	T.	T.	.09	16.38
1901-2	.03	1.88	.46	0	1.62	3.35	2.98	.16	.03	T.	0	0	10.51
30-year mean													16.00

<sup>a</sup> Year incomplete.



*Record of precipitation at Magic Hill, No. 1, Los Angeles County.*

[Latitude, 34° 23'; longitude, 118° 22'; elevation, 2,820 feet. Authority, B. L. Hutchins, Burbank.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1897-98.....			0.10	0.30	0.25	0.61	0	0.34	0.29	1.80	1.35	0.52	a 5.56
1898-99.....	3.12				1.60	.15	2.07	.14	1.65	.05	0	0	a 8.78
1899-1900.....	.07	2.25	1.07	1.20	1.34	0	1.67	2.05	4.40	.06	.04	0	14.15
1900-1901.....	.54	.71	6.53	0	6.71	6.68	.78	1.79	.57				b 24.31

*a* Year incomplete.*b* Record stopped.*Record of precipitation at Manzana, Los Angeles County.*

[Latitude, 34° 45'; longitude, 118° 35'; elevation, 2,850 feet. Authority, E. A. Silrey.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1893-94.....					0.21	0.37	0.36	T.	0.35	0.17	0	0.10	a 1.56
1894-95.....	0.49	0	0	3.60	2.79	0	1.36	0.08	T.	0	0	0	8.32
1895-96.....	0	0.40	0.48	.18	1.09	0	1.70	.63	T.	0	0	.10	4.58
1896-97.....	0	.61	.30	1.46	2.70	3.04	1.71	.04	.01	T.	T.	.28	10.15
1897-98.....	0	.21	T.	.14	.63	.02	.47	0	.24	0	0	0	1.71
1898-99.....	T.	0	0	.50	1.15	T.	1.35	.04	.09	.04	0	0	3.17
1899-1900.....	0	1.27	.71	.29	1.11	.10	.93	.42	.38	0	0	.08	5.29
1900-1901.....	.10	.09	2.55	0	3.20	6.68	.25	.61	.12	0	0	.65	14.25
1901-2.....	T.	2.02	.20	T.	.67	1.52	1.14	0	.15	T.	0	0	5.70
8-year mean.....													6.65

*a* Year incomplete.*Record of precipitation at Mount Lowe (Echo Mountain post-office), Los Angeles County.*

[Latitude, 34° 15'; longitude, 118° 07'; elevation, 3,200 feet. Authority, Louis Swift and Edgar L. Larkin.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1895-96.....				1.35	2.85	0.10	4.10	0.60	0.30	0	0	0	a 9.30
1896-97.....	0	2.39	1.55	2.17	6.42	7.47	6.67	.19	.87	0.10	0.15	0	27.98
1897-98.....	0	2.57	.40	.22	1.55	2.22	1.65	2.70	2.17	0	0	0	13.48
1898-99.....	0.25	.30	0	.98	3.29	0	3.40	.20	1.90	.40	0	0	10.72
1899-1900.....	0	3.00	2.85				2.90	2.15	4.05	.40	T.	0	a 15.35
1900-1901.....	.25	1.66	11.71	0	7.55	5.42	1.18	1.14	4.45	.75	0	0	34.11
1901-2.....	0	4.18	1.05	.23	1.88	3.48	5.97	1.35	.33	.30	0	0	18.77
5-year mean.....													21.01

*a* Year incomplete.*Record of precipitation at Mount Sister Elsie, Los Angeles County.*

[Latitude, 34° 17'; longitude, 118° 14'; elevation, 5,021 feet. Authority, L. T. Rowley, Monte Vista.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1898-99.....					2.95	0.12	3.37	0.58	0.08	0.78	0	0	a 7.88
1899-1900.....	0.35	2.10	1.34	0.41	.85	0	1.87	1.30	3.02	0	0	T.	11.24
1900-1901.....	.69	.81	6.70	0	8.92	12.13	.95	3.60	1.93				c 35.13

*a* Year incomplete.*c* Record discontinued.

*Record of precipitation at Newhall, Los Angeles County.*

[Latitude, 34° 25'; longitude, 118° 33'; elevation, 1,268 feet. Authority, Pacific Railway System.]

[illegible]

NOTE.—February and October, 1889, and May, 1890, estimated by War Department.

*Record of precipitation at Palmdale (Headworks), Los Angeles County.*

[Latitude, 34° 25'; longitude, 118° 03'; elevation, 3,290 feet. Authority, Burt. Cole and S. T. Berkley.]

[illegible]

*Record of precipitation at San Fernando, Los Angeles County.*

[Latitude, 34° 16'; longitude, 118° 26'; elevation, 1,066 feet. Authority, Pacific Railway System.]

[illegible]

*Record of precipitation at San Gabriel Electric Company's power house, Azusa,  
Los Angeles, County.*

[Latitude, 34° 09'; longitude, 117° 54'; elevation, 1,000 feet. Authority, San Gabriel Electric Company.]

[illegible]

*Record of precipitation at San Gabriel Electric Company's headgate, Los Angeles County.*

[Latitude, 34° 13'; longitude, 117° 52'; elevation, 1,100 feet. Authority, San Gabriel Electric Company.]

[illegible]

*Record of precipitation at San Gabriel Electric Company's Sierra power house,  
Los Angeles County.*

[Latitude, 34° 13'; longitude, 117° 40'; elevation, 2,750 feet. Authority, San Gabriel Electric Company.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1900-1901.....	-----	-----	-----	-----	10.35	8.15	0.78	0.36	2.78	0.01	0	0	a 22.43
1901-2.....	0	3.99	0.97	0.24	2.13	3.45	7.53	1.13	.20	.11	.63	0	19.78

a Year incomplete.

*Record of precipitation at Coulterville, Mariposa County.*

[Latitude, 37° 43'; longitude, 120° 12'; elevation, 1,660 feet. Authority, N. C. Ray.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1898-99.....	0	0	0.76	2.04	4.69	0.46	8.85	0.53	0.34	0.97	0	0	18.64
1899-1900.....	0	4.37	5.70	3.32	2.01	.60	1.47	2.90	1.14	.33	0	0	21.84
1900-1901.....	0.18	3.82	8.27	1.39	4.99	8.04	1.28	.66	3.29	T.	T.	T.	31.92
1901-2.....	1.35	1.92	2.09	1.39	0	0	0	0	0	.09	0	T.	6.82
4-year mean.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	19.81

*Record of precipitation at Yosemite, Mariposa County.*

[Latitude, 37° 45'; longitude, 119° 35'; elevation, 4,063 feet. Authority, Galen Clark.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1896-97.....	0.85	1.36	6.19	9.33	6.62	11.53	16.32	0.40	0.62	0.16	-----	-----	a 53.38

a Year incomplete.

*Record of precipitation at Camp Wright, Mendocino County.*

[Latitude, 39° 45'; longitude, 123° 00'; elevation, 1,800 feet. Authority, U. S. War Department.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1864-65.....	0.03	0.85	6.19	12.20	3.64	4.88	3.57	0.36	0.43	0	0	0	32.15
1865-66.....	.81	.87	16.67	2.05	15.83	4.30	11.80	1.05	-----	-----	-----	-----	a 53.38
1866-67.....	0	0	5.92	24.67	8.92	7.85	2.38	3.10	.01	0	0	0	52.85
1867-68.....	1.56	3.75	6.38	29.03	8.61	5.89	9.11	3.25	.71	1.58	0	0	69.87
1868-69.....	.05	.25	2.79	6.63	13.57	4.13	3.80	4.51	.55	0	0	0	36.28
1869-70.....	1.42	.84	5.38	8.06	7.03	6.61	2.40	2.02	.39	0	0	0	34.15
1870-71.....	0	0	1.28	1.19	2.66	4.60	7.10	1.07	1.96	0	0	0	19.86
1871-72.....	.50	.31	4.03	16.64	11.52	19.78	5.34	.66	.12	.04	0	0.20	59.14
1872-73.....	0	.36	5.20	7.24	3.55	6.92	2.91	1.13	.04	.30	0.10	0	27.75
1873-74.....	.05	.34	4.98	15.50	12.94	5.46	7.26	3.72	1.16	.26	.01	0	51.68
1874-75.....	0	5.61	12.99	2.27	9.83	1.06	1.76	.59	2.32	0	0	0	36.43
10-year mean.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	42.02

a Year incomplete.



*Record of precipitation at Jolon, Monterey County.*

[Latitude, 36° 00'; longitude, 121° 15'; elevation, 960 feet. Authority, F. T. Tidball.]

[illegible]

*Record of precipitation at Matthews Ranch, near King City, Monterey County.*

[Latitude, 36° 15'; longitude, 121° 00'; elevation, 333 feet. Authority, J. L. Matthews.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1901-2			1.37	0.10	0.71	3.74	2.38	0.81					9.11

*Record of precipitation at Priests Valley, Monterey County.*

[Latitude, 36° 12'; longitude, 120° 45'; elevation, 2,250 feet. Authority, A. J. Myers and Mrs. Martin Griffin, Soledad.]

[illegible]

*Record of precipitation at Salinas City, Monterey County.*

[Latitude,  $36^{\circ} 41'$ ; longitude,  $121^{\circ} 36'$ ; elevation, 45 feet. Authority, Dr. E. K. Abbott.]

[illegible]<sup>a</sup> Year incomplete.

*Record of precipitation at San Ardo, Monterey County.*

[Latitude, 36° 09'; longitude, 121° 10'; elevation, 452 feet. Authority, Pacific Railway System.]

[illegible]

*Record of precipitation at Boca, Nevada County.*

[Latitude, 39° 24'; longitude, 120° 06'; elevation, 5,531 feet. Authority, Pacific Railway System.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1869-70.....						3.85	1.82	0.81	0.55	0.26	0.12	0	7.41
1870-71.....	0	0.80	0.04	1.10	2.50	2.32	1.60	.45	0	.10	2.00	0	10.91
1871-72.....	0	0	.60	7.30	3.00	.90	.10	1.50	.10	0	0	0	13.50
1872-73.....	0	0	.20	2.60	1.80	4.10	.10	.10	.75	0	0	0	9.65
1873-74.....	0	0	0	4.30	4.70	2.40	6.20	.80	.60	0	.60	0	19.60
1874-75.....	.10	2.15	3.70	.60	6.30	0	.65	.60	0	.40	T.	0	14.50
1875-76.....	0	T.	1.56	1.65	8.10	3.60	4.72	.70	.10	0	.22	0.01	20.66
1876-77.....	.01	.25	.02	0	5.22	0	.46	.95	.36	.10	0	0	7.37
1877-78.....	0	0	1.50	.30	3.94	6.74	.86	1.30	0	.13	.08	0	14.85
1878-79.....	.17	.99	1.60	0	5.47	2.92	4.80	2.08	.45	0	0	0	18.48
1879-80.....	0	.20	.98	4.18	0	3.00	2.90	6.95	.75	0	0	0	18.96
1880-81.....	0	0	0	3.74	0	0	.12	0	0	0	0	0	3.86
1881-82.....	.14	.10	1.20	1.00	3.90	3.60	10.20	1.00	0	0	0	0	21.14
1882-83.....	0	.80	.90	.60	1.15	2.20	1.70	.90	1.80	0	0	0	10.05
1883-84.....	.14	2.45	.50	.60	4.60	6.30	5.10	1.90	.30	1.40	0	0	23.29
1884-85.....	T.	.80	0	8.20	1.00	.10	.10	1.50	0	.30	0	0	12.00
1885-86.....	0	0	2.40	2.98	8.35	.85	4.40	1.30	.50	0	.15	0	20.93
1886-87.....	.10	.70	.70	.70	2.40	12.70	0	1.80	T.	.26	.15	T.	19.51
1887-88.....	0	0	.30	3.74	4.18	1.00	2.40	.10	.51	.10	.15	.30	12.92
1888-89.....	.12	0	.95	1.45	4.18	3.63	1.15	.10	3.90	0	0	0	15.48
1889-90.....	.14	1.50	4.55	19.85	14.60	5.40	5.45	1.50	.70	.26	0	0	53.95
1890-91.....	0	.70	0	3.65	1.25	11.80	2.50	1.70	.84	.26	.15	0	22.85
1891-92.....	.60	0	.25	8.30	.70	3.35	1.70	2.70	3.10	.70	0	0	21.40
1892-93.....	0	1.50	8.35	6.95	4.55	8.90	4.00	1.90	1.35	0	0	.05	37.55
1893-94.....	.55	.25	2.42	3.70	5.10	7.55	.75	1.00	.33	T.	0	T.	21.65
1894-95.....	T.	.61	.50	11.80	8.36	1.20	.45	.70	.90	T.	0	T.	24.52
1895-96.....	.97	.11	.01	1.52	7.75	.50	6.30	6.65	3.10	.25	1.15	.18	28.49
1896-97.....	.35	0	2.47	1.80	2.20	6.35	8.35	.10	.50	.40	0	.50	23.02
1897-98.....	T.	2.10	2.80	2.72	1.55	2.90	2.50	1.30	.85	1.00	0	0	17.72
1898-99.....	.01	1.28	1.84	1.58	6.80	1.85	7.95	.85	2.40	.10	0	.98	25.64
1899-1900.....	0	4.42	2.59	4.53	1.57	.60	3.52	4.27	1.10	2.67	T.	1.22	26.49
1900-1901.....	.66	3.04	5.73	4.58	7.17	6.76	2.24	2.04	1.86	0	0	.08	34.16
1901-2.....	.40	.80	1.15	3.77	1.30	2.50	2.70	T.	T.	0	.10	6	12.72
32-year mean													19.33

"Year incomplete.



*Record of precipitation at Bowman's dam, Nevada County.*

[Latitude, 39° 27'; longitude, 120° 39'; elevation, 5,400 feet. Authority, H. C. Perkins and W. H. Radford.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Total.
1871-72 .....	0	0.98	7.88	38.20	12.98	27.08	7.52	4.57	1.09	1.04	0.88	0	102.22
1872-73 .....	0.25	.73	5.43	17.41	5.73	16.17	3.82	3.20	2.65	0	.06	0	55.45
1873-74 .....	0	1.24	4.37	23.47	21.53	9.98	17.73	5.47	3.93	.45	0	0.08	88.25
1874-75 .....	0	4.54	15.35	1.58	16.91	.25	5.18	.83	2.85	2.38	.25	0	50.12
1875-76 .....	0	3.09	23.43	10.77	17.62	11.70	18.01	5.92	.99	.36	1.28	0	93.17
1876-77 .....	.41	10.76	.53	0	14.33	3.18	7.49	3.17	3.33	1.17	0	0	44.37
1877-78 .....	0	1.52	8.26	1.71	17.00	21.21	10.07	2.57	2.06	.10	.09	.13	64.72
1878-79 .....	0	2.83	5.36	1.30	14.50	14.28	20.97	9.57	3.93	.71	.05	.10	73.60
1879-80 .....	0	3.41	9.62	15.00	9.27	8.17	9.51	31.72	8.90	0	0	0	95.60
1880-81 .....	0	0	.65	25.05	27.82	15.08	7.29	4.44	1.22	0	0	0	81.55
1881-82 .....	2.33	6.09	4.25	10.78	11.46	7.47	15.17	7.96	1.16	0	0	0	66.67
1882-83 .....	2.94	11.47	6.51	4.32	5.06	5.28	12.79	5.15	0	0	0	0	53.52
1883-84 .....	2.45	5.03	2.46	5.20	13.50	19.45	18.02	12.44	2.01	3.53	0	0	84.09
1884-85 .....	1.08	3.04	0	46.57	4.49	3.74	.80	6.41	1.57	2.64	0	0	70.34
1885-86 .....	1.26	0	24.96	8.66	17.84	2.99	7.24	13.22	3.20	0	0	0	79.37
1886-87 .....	0	2.25	1.76	6.95	7.46	21.60	2.27	5.81	1.93	.76	0	0	50.79
1887-88 .....	0	0	1.25	8.97									a 10.22
1894-95 .....						8.77	9.65		9.15	0	T.	.37	a 27.94
1895-96 .....	10.12	.45	2.81	11.20	29.85	1.92	14.95	18.45	8.98	.11	.09	1.00	99.93
1896-97 .....	2.05	2.83	19.40	10.31	4.88	18.31	18.91	2.85	.92	4.04	0	T.	84.50
1897-98 .....	.61	4.74	5.35	5.31	3.01	12.23	2.63	2.10	3.95	2.12	0	0	42.05
1898-99 .....	.55	2.64	7.51	3.22	14.11	2.54	26.31	1.73	4.80	1.04	0	1.15	65.60
1899-1900 .....	0	16.27	12.53	15.72	9.60	4.44	10.77	6.62	2.67	.40	.02	0	79.04
1900-1901 .....	1.38	12.98	11.47	8.15	14.30	18.79	4.67	5.99	1.73	T.	T.	.05	79.51
1901-2 .....	4.12	4.28	7.54	8.01	2.40	21.08	9.26	5.96	2.76	.46	.09	T.	65.96
23-year mean													72.63

a Year incomplete.

*Record of precipitation at Grass Valley, Nevada County.*

[Latitude, 39° 13'; longitude, 121° 4'; elevation, 2,000 feet. Authority, Mr. Lontzenhuser and B. F. Berriman.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1872-73.....	0	0	0	13.13	4.01	12.52	1.39	2.32	2.56	0	0	0	35.93
1873-74.....	0	0.83	2.99	19.01	13.71	6.93	11.71	3.76	1.05	0.10	0	0	60.09
1874-75.....	0	2.95	15.91	1.08	15.56	1.39	4.14	.29	1.18	2.28	0	0	44.78
1875-76.....	0	.97	16.99	7.44	12.01	10.75	12.47	2.80	1.23	0	.65	0	65.31
1876-77.....	0.06	8.72	.62	0	10.18	2.44	4.79	1.14	1.40	.74	0	0	30.09
1877-78.....	0	1.21	3.78	1.74	15.74	17.76	10.18	2.78	.59	0	0	0	53.78
1878-79.....	.68	2.09	2.54	.75	10.72	11.51	18.07	7.08	3.08	.30	0	0.08	56.90
1879-80.....	0	2.79	6.54	8.86	6.40	4.83	4.07	2.33	6.23	.09	0	0	42.14
1880-81.....	0	.04	.30	22.69	19.20	8.50	3.33	1.85	.05	1.50	0	0	57.46
1881-82.....	1.25	3.71	3.52	8.21	6.03	6.30	7.96	5.27	1.18	0	0	0	43.43
1882-83.....	1.88	7.88	4.78	2.83	3.05	2.97	9.25	2.38	5.77	0	0	0	40.79
1883-84.....	1.44	3.03	1.48	2.31	7.80	10.27	13.98	10.98	1.00	2.30	0	0	54.59
1884-85.....	.98	3.30	.05	28.39	3.65	1.76	.83	3.17	.16	.90	0	0	43.19
1885-86.....	2.65	0	19.27	6.36	12.40	1.43	4.83	11.38	1.09	0	0	0	59.41
1886-87.....	0	1.66	.67	5.46	3.38	15.72	1.69	6.54	.64	.52	0	0	36.13
1887-88.....	.26	0	1.38	6.85	11.81	2.59	5.22	.50	.38	2.26	.08	0	31.33
1888-89.....	.55	0	4.29	8.70	.64	1.08	12.95	3.87	7.21	.40	0	0	39.69
1889-90.....	0	12.49	8.76	21.08	18.64	10.02	13.69	3.52	3.10	.02	0	0	91.32
1890-91.....	1.95	0	0	5.51	1.54	13.70	6.22	2.98	2.06	1.27	.90	0	36.13
1891-92.....	.21	1.00	1.76	10.26	4.70	7.15	6.61	6.37	6.49	0	0	0	44.55
1892-93.....	.23	2.72	13.44	11.22	7.31	6.83	12.40	5.80	1.30	0	T.	0	61.25
1893-94.....	1.64	1.49	8.77	5.55	11.24	11.72	2.96	1.67	3.46	2.05	T.	.03	50.58
1894-95.....	1.01	4.91	1.38	16.55	22.26	6.18	5.01	3.38	3.46	0	.25	.24	64.63
1895-96.....	3.87	.02	1.17	7.27	20.34	.93	6.94	12.47	4.87	.13	.02	.13	58.16
1896-97.....	1.53	1.72	13.65	5.78	3.65	14.40	8.47	2.25	.10	.62	.04	.03	52.24
1897-98.....	.51	3.07	4.56	3.97	1.44	8.36	.52	(.90)	2.53	1.27	T.	T.	27.13
1898-99.....	.61	2.08	4.31	2.73	10.76	.47	19.60	1.70	2.72	.83	0	.42	46.23
1899-1900.....	0	10.33	11.58	11.35	6.90	2.54	7.40	3.92	1.31	.65	.04	.03	56.05
28-year mean													49.41

*Record of precipitation at Malakoff mine, Nevada County.*

[Latitude, 39° 22'; longitude, 120° 50'; elevation, 3,200 feet. Authority, R. D. Wheeler.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1886-87.....	0	2.39	0.80	5.32	5.06	18.12	2.27	7.52	0.89	0.49	0	0	42.86
1887-88.....	0.64	0	1.68	8.26	12.14	2.67							a 25.39
1894-95.....					24.40	7.28	7.01	5.18	6.03	0	0.14	0.41	a 50.45
1895-96.....	6.22	.56	2.27	7.36	24.11	1.36	10.20	17.78	6.61	T.	.06	.15	76.68
1896-97.....	1.90	2.33	17.42	7.02									a 28.67
2-year mean													59.77

a Year incomplete.

*Record of precipitation at Nevada City, Nevada County.*

[Latitude, 39° 16'; longitude, 121° 2'; elevation, 2,500 feet. Authority, J. S. Brown.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1863-64.....	0	0	1.00	3.50	0.90	0.50	5.38	3.25	2.75	0	0	0.75	18.03
1864-65.....	0	0	17.05	17.42	9.71	4.38	2.09	1.75	1.31	0	0	0	53.71
1865-66.....	0.59	2.03	14.29	1.95	15.47	5.60	14.24	.59	4.50	0	0	0	59.26
1866-67.....	0	0	9.61	32.70	14.21	10.00	6.23	6.88	1.93	0	0	0	81.56
1867-68.....	1.91	3.63	16.11	41.95	11.01	6.36	23.30	7.22	1.50	2.27	0	0	115.26
1868-69.....	.34	.43	1.49	10.62	16.85	12.62	6.96	5.72	1.62	.04	0	0	56.69
1869-70.....	.15	.50	4.67	6.29	9.23	14.48	7.58	4.70	.65	.36	0.03	0	48.64
1870-71.....	0	3.82	4.32	5.32	11.08	6.23	5.41	5.55	3.26	.33	0	0	45.35
1871-72.....	0	.79	5.00	27.31	18.16	16.67	5.28	3.76	.17	1.08	0	0	78.22
1872-73.....	0	.55	4.05	12.25	2.82	12.40	1.96	2.47	2.20	0	0	0	38.70
1873-74.....	0	.67	1.35	24.27	11.16	7.32	12.20	4.51	1.32	.11	0	0	62.91
1874-75.....	0	3.06	15.08	.90	16.57	2.11	3.97	.27	1.56	2.43	0	0	45.95
1875-76.....	0	1.75	16.56	5.90	12.47	12.41	13.88	2.17	1.53	0	0	0	60.67
1876-77.....	.41	9.85	1.04	0	10.26	2.45	4.18	1.43	1.97	.72	.71	0	33.02
1877-78.....	0	1.35	4.31	2.65	17.62	16.61	10.05	2.80	1.05	0	0	0	56.44
1878-79.....	.69	2.32	2.88	.96	11.62	10.97	19.28	5.90	3.83	.43	0	.05	58.93
1879-80.....	0	3.15	5.50	8.76	6.67	5.48	5.09	22.54	5.58	.15	0	0	62.92
1880-81.....	0	.06	.28	24.78	18.88	6.25	4.44	1.70	0	1.47	0	0	57.87
1881-82.....	1.38	3.03	2.53	9.14	7.29	5.42	9.21	4.39	.52	0	0	0	42.91
1882-83.....	2.22	7.65	5.34	3.87	2.39	3.06	14.27	2.98	6.92	0	0	0	48.70
1883-84.....	1.28	3.60	1.62	2.84	9.08	12.01	14.70	12.07	1.67	2.47	.07	0	61.41
1884-85.....	1.87	3.61	0	27.92	4.39	1.69	.53	3.23	.21	1.36	0	0	44.81
1885-86.....	1.62	0	21.55	6.77	13.66	1.54	6.92	12.49	1.23	0	0	.07	65.85
1886-87.....					3.51	12.64	4.80	7.24	.70	.37	0	0	a 29.26
1887-88.....	.71	0	1.70	7.53	11.32	3.52	7.14	.68	.42	2.40	0	0	35.42
1888-89.....	.06	0	4.69	8.44	T	2.59	14.68	5.20	7.62	.58	.08	0	43.94
1889-90.....	0	13.05	8.55	24.50	24.05	10.07	13.40	3.11	3.35	.01	0	0	100.09
1890-91.....	2.04	.04	.04	6.38	2.18	18.66	3.64	2.93	1.92	.73	0	0	38.56
1891-92.....	.04	.90	1.42	9.56	6.48	6.04	7.27	7.17	5.80	.20	0	T.	44.88
1892-93.....	.26	.95	13.87	14.19	8.02	8.29	12.75	6.22	1.33	0	T.	0	65.88
1893-94.....	1.71	1.25	7.78	5.23	11.71	10.85	3.26	2.17	3.54	1.85	0	T.	49.35
1894-95.....	1.21	4.83	1.38	20.61	22.87	5.53	5.12	3.82	3.42	0	.15	.29	69.23
1895-96.....	3.36	0	1.87	6.14	19.61	.99	7.39	13.63	4.88	T.	.05	.05	57.97
1896-97.....	1.55	2.18	12.63	6.46	4.38	13.63	9.13	2.08	.22	.82	0	T.	53.08
1897-98.....	.60	3.36	4.38	3.17	1.92	9.91	.87	.95	2.73	1.27	0	T.	29.16
1898-99.....	.37	1.96	3.49	2.27	9.12	.49	15.88	1.52	2.61	.91	0	.29	38.91
1899-1900.....	0	10.24	10.85	10.27	7.81	2.36	7.51	4.83	1.90	.03	T.	0	55.80
1900-1901.....	.55	5.52	9.22	4.00	11.52	13.12	2.35	5.59	1.29	0	T.	.04	53.20
1901-2.....	3.36	4.16	5.45	5.35	1.91	18.28	5.02	4.66	1.47	.24	0	0	49.90
38-year mean													54.98

a Year incomplete.

NOTE.—Record from January, 1887, to February, 1892, inclusive, from J. F. Colley.



*Record of precipitation at Truckee, Nevada County.*

[Latitude, 39° 19'; longitude, 120° 01'; elevation, 5,820 feet. Authority, Pacific Railway System.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1869-70.....						6.18	4.35	0.12	2.40	0.80	1.30		<sup>a</sup> 15.15
1870-71.....	0	0	0.51	1.67	4.80	4.23	3.18	2.00	.28	.35	0	0	17.02
1871-72.....	0.20	0.02	5.35	16.23	3.42	10.49	3.63	4.11	.60	.30	0	0	44.35
1872-73.....	0	.40	.60	3.74	3.78	9.55	1.69	1.36	.55	0	T.	0	21.67
1873-74.....	0	.11	.42	8.70	9.54	6.15	9.35	2.61	.68	.11	.56	0.07	38.30
1874-75.....	.04	2.44	3.54	.60	8.50	.20	1.20	.90	0	1.81	.40	.03	19.66
1875-76.....	T.	.62	8.94	4.90	9.85	5.50	6.95	1.83	.84	.01	.05	.03	39.52
1876-77.....	.03	3.64	.07	.05	9.45	.39	1.84	1.03	1.12	.36	0	0	17.98
1877-78.....	.04	0	1.66	.24	5.97	11.80	2.07	.80	1.17	.10	0	.28	24.13
1878-79.....	.23	.75	2.14	.50	7.70	2.68	5.25	1.55	.45	0	0	0	21.25
1879-80.....	.07	1.40	3.78	4.98	2.95	4.65	4.65	12.74	2.50	0	.16	0	37.88
1880-81.....	0	0	.45	9.51	5.71	2.13	1.86	.49	.40	1.26	.18	0	21.99
1881-82.....	.25	2.50	2.70	3.80	6.40	4.95	12.05	1.89	.85	.98	.60	0	36.97
1882-83.....	0	.85	1.04	.80	1.55	3.05	1.65	2.19	1.13	0	.53	0	12.79
1883-84.....	.28	2.46	2.50	1.62	6.65	11.20	5.38	3.90	.14	1.02	0	.10	35.25
1884-85.....	.78	1.50	0	13.14	1.80	.54	.56	2.04	.08	0	0	.25	20.69
1885-86.....	.47	0	6.95	2.22	7.08	.50	2.90	1.78	.60	.56	.89	0	23.95
1886-87.....	T.	.85	1.10	2.29	3.43	12.25	.36	2.00	2.04	.37	.40	T.	25.09
1887-88.....	0	0	.30	4.80	2.35	0	0	T.	.70	.80	.72	.20	9.87
1888-89.....	.28	0	2.38	1.58	.80	1.40	2.51	1.01	4.51	0	0	0	14.47
1889-90.....	0	3.13	3.29	2.51	16.20	8.90	7.29	.45	1.44	0	0	.22	43.43
1890-91.....	.80	.45	0	3.70	1.22	8.36	3.92	2.17	2.90	.46	0	0	23.98
1891-92.....	.98	.05	.45	6.34	2.65	2.80	3.00	2.96	4.20	.95	0	0	24.38
1892-93.....	.29	.37	5.73	8.15	5.44	8.02	5.18	3.73	1.79	0	0	0	38.70
1893-94.....	1.22	.35	3.96	2.82	8.06	10.95	2.65	2.15	1.05	T.	0	0	33.21
1894-95.....	.13	1.12	.60	13.95	11.13	1.92	1.72	.50	2.40	0	0	0	33.47
1895-96.....	1.32	.34	.50	2.96	7.07	.40	4.67	9.36	.54	0	.15	.34	27.65
1896-97.....	.32	.40	3.86	2.50	2.35	7.97	2.84	.30	T.	.18	0	0	20.72
1897-98.....	T.	.55	3.20	3.15	1.05	3.65	2.05	.25	.30	0	0	0	14.20
1898-99.....	.40	.06	2.95	1.50	7.80	2.70	9.50	1.10	.75	0	0	.92	27.68
1899-1900.....	0	6.49	2.80	1.80	2.63	.80	4.20	1.90	.80	1.01	0	0	22.43
1900-1901.....	0	1.02	2.50	2.70	5.00	7.97	2.50	1.80	.70	0	0	0	24.19
1901-2.....	.50	2.78	3.63	1.55	1.10	3.30	5.60	1.28	.55	0	.45	1.10	21.84
32-year mean.....													23.21

<sup>a</sup> Year incomplete.

NOTE.—During July, 1902, there was also 3 feet of snow at Truckee.

*Record of precipitation at Alta, Placer County.*

[Latitude, 39° 13'; longitude, 120° 49'; elevation, 3,612 feet. Authority, Pacific Railway System.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1869-70.....						13.75	6.56	3.73	1.32	0.66			<sup>a</sup> 26.02
1870-71.....	0	0	2.75	3.94	5.21	5.45	7.03	3.50	1.50	0	0	0	29.35
1871-72.....	0	0	T.	6.50	11.25	13.85	.45	.38	0	0	0	0	32.43
1872-73.....	0	0.25	.19	6.50	1.65	10.00	.95	3.03	0	0	0	0	22.57
1873-74.....	0.40	0	.90	15.59	12.66	7.17	3.76	5.75	1.27	0	0	0	47.50
1874-75.....	0	3.92	12.86	.09	13.17	.01	3.40	.40	.12	2.00	0	0	35.97
1875-76.....	0	.02	18.52	8.30	7.70	4.72	9.08	1.07	1.80	0	0.02	0	51.23
1876-77.....	0	7.00	.70	0	10.00	2.35	6.10	2.60	2.61	.80	0	0	32.16
1877-78.....	0	1.70	3.90	1.00	9.10	14.80	11.65	2.50	.33	0	0	0	44.98
1878-79.....	.60	2.96	4.18	1.00	12.80	13.10	24.30	7.73	2.45	0	0	0	69.12
1879-80.....	0	1.50	9.53	10.02	2.70	4.90	3.10	11.60	2.90	0	0	0	46.25
1880-81.....	0	0	1.00	13.80	21.00	11.80	3.50	.50	0	0	0	0	51.60
1881-82.....	1.12	4.50	5.60	13.60	5.93	6.40	15.40	3.20	1.15	.80	0	0	57.70
1882-83.....	2.70	7.65	5.64	2.31	4.08	1.60	9.06	3.43	6.07	0	0	0	42.54
1883-84.....	.60	1.60	2.05	3.10	3.50	8.60	7.00	5.20	.50	3.00	0	0	35.15
1884-85.....	.12	1.00	0	14.08	1.50	.60	.10	2.48	0	1.00	(b)		<sup>a</sup> 20.88
14-year mean.....													42.75

<sup>a</sup> Year incomplete.<sup>b</sup> Alta ceased reporting after June, 1885.

*Record of precipitation at Auburn, Placer County.*

[Latitude, 38° 53'; longitude, 121° 05'; elevation, 1,363 feet. Authority, Pacific Railway System.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1869-70.....						7.31	3.92	2.63	0.45	0.81	0	0	<sup>a</sup> 15.12
1870-71.....	0	0	0	0.46	7.21	2.36	1.85	3.57	2.06	0	0	0	17.51
1871-72.....	0	0.54	2.80	13.55	6.80	9.35	3.59	2.50	.65	.22	0	0	40.00
1872-73.....	0	.38	3.13	8.43	3.74	7.44	.53	1.22	.32	0	0	0	25.19
1873-74.....	0	.34	1.25	11.97	7.46	4.14	6.26	2.56	.57	0	0	0	34.55
1874-75.....	0	1.57	9.64	.82	10.00	.44	2.73	.10	.61	1.82	0	0	27.73
1875-76.....	0	.85	11.39	6.05	7.56	5.62	10.10	1.97	.61	0	0.41	0.21	44.77
1876-77.....	0	4.52	.65	0	6.94	1.47	2.14	.72	1.53	.27	0	0	18.24
1877-78.....	0	.99	2.46	1.55	10.61	10.19	7.60	1.75	.98	0	0	0	36.13
1878-79.....	0.50	.89	1.53	.91	6.34	7.16	8.78	5.94	2.43	.46	0	0	34.94
1879-80.....	0	2.33	3.82	7.88	3.13	4.90	2.62	13.02	3.85	0	0	0	41.55
1880-81.....	0	0	.25	13.91	9.61	8.20	2.43	1.38	0	1.40	0	0	37.18
1881-82.....	.92	2.72	3.01	5.87	4.60	4.99	6.05	4.63	.53	.28	0	0	33.60
1882-83.....	.84	5.19	4.08	1.65	2.86	1.06	5.19	.70	4.07	0	0	0	25.64
1883-84.....	1.70	2.51	1.00	2.52	5.33	7.63	10.17	8.02	.85	1.23	0	0	40.96
1884-85.....	.56	2.25	0	16.37	1.74	1.27	.57	2.10	0	.70	0	0	25.56
1885-86.....	.64	0	15.24	4.05	8.25	0	4.10	9.38	.65	0	0	0	42.31
1886-87.....	0	.89	1.26	4.88	2.04	12.38	1.50	4.34	.30	0	0	T.	27.59
1887-88.....	1.09	0	1.22	4.90	7.07	1.40	3.25	.80	.40	1.55	0	(T.)	21.68
1888-89.....	.30	0	4.20	5.82	.33	.52	9.57	1.36	4.65	0	0	0	26.75
1889-90.....	0	5.75	4.85	11.94	8.97	3.96	8.08	2.83	2.30	0	0	0	48.68
1890-91.....	2.63	.14	0	5.13	.88	6.80	5.40	2.23	.88	.69	0	0	24.78
1891-92.....	0	1.33	.95	7.36	4.00	4.91	5.96	3.11	4.55	0	0	0	32.17
1892-93.....	.15	1.76	6.13	8.99	5.33	4.74	9.20	3.71	.78	0	0	0	40.79
1893-94.....	.70	1.11	5.32	3.88	6.96	9.89	1.95	1.35	2.77	1.38	T.	T.	35.31
1894-95.....	.67	3.87	7.09	13.56	12.99	4.14	3.09	3.38	1.88	0	T.	.13	50.80
1895-96.....	2.04	.12	1.04	3.39	11.88	.49	6.21	7.66	2.42	.43	.14	.25	36.07
1896-97.....					2.78	11.40	8.05	1.51	.28	.17	0	T.	<sup>a</sup> 24.19
1897-98.....	.20	2.83	2.22	3.50	1.13	6.44	.32	.49	2.26	.97	T.	0	20.36
1898-99.....	.26	1.75	3.59	2.75	4.78	.17	13.25	.51	1.28	1.43	0	.03	29.80
1899-1900.....	0	5.94	9.00	5.47	5.47	2.11	3.69	3.42	2.19	T.	0	0	37.29
1900-1901.....	.45	4.50	6.38	2.01	7.82	8.84	1.25	4.83	.88	0	T.	0	36.96
1901-02.....	2.39	5.71	4.86	3.95	1.70	12.72	4.80	3.10	.80	.50	T.	.02	40.55
31-year mean													33.40

<sup>a</sup> Year incomplete.

*Record of precipitation at Cisco, Placer County.*

[Latitude, 39° 19'; longitude, 120° 33'; elevation, 5,939 feet. Authority, Pacific Railway System.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1869-70.....						13.46	3.70	0.65	0.40			0	<sup>a</sup> 18.21
1870-71.....	0	1.20	2.80	4.40	6.40	8.40	2.40	3.05	4.95	0.85	0	0	34.45
1871-72.....	0.40	.20	6.20	24.89	6.50	12.55	3.98	6.05	1.14	1.03	0.53	T.	63.47
1872-73.....	0	.60	2.65	9.51	5.60	14.00	1.60	1.60	1.50	0	0	0	37.06
1873-74.....	0	.55	1.35	14.40	7.70	7.00	14.00	4.10	3.10	0	0	0	52.20
1874-75.....	.50	2.70	7.07	.50	8.40	.45	4.80	.90	.82	2.05	0	0	28.19
1875-76.....	0	1.75	8.55	5.30	18.50	22.20	17.20	.70	1.20	T.	0	0	75.40
1876-77.....	0	2.48	4.20	0	7.20	.30	.53	2.87	3.71	.80	0	0	22.00
1877-78.....	0	.60	4.52	1.30	9.60	11.85	2.00	2.00	4.00	0	0	0	35.87
1878-79.....	.20	1.45	1.85	1.25	9.30	10.34	16.42	5.50	2.90	.30	.03	0.04	49.58
1879-80.....	0	2.10	8.17	8.92	4.80	7.10	7.60	11.90	3.90	.03	0	0	54.52
1880-81.....	.01	.82	.62	16.33	33.46	12.91	6.10	4.81	0	3.30	0	0	78.36
1881-82.....	2.16	2.93	3.60	8.76	11.71	8.50	25.30	5.60	.91	.48	0	0	69.95
1882-83.....	.83	8.28	3.75	2.88	.90	4.85	9.25	3.50	6.96	0	0	0	41.20
1883-84.....	0	1.50	2.20	2.70	8.40	12.00	14.65	10.10	0	3.45	0	0	55.00
1884-85.....	1.40	2.32	0	25.05	2.30	1.28	2.20	3.95	.30	.95	0	0	39.75
1885-86.....	.50	0	17.05	4.87	14.75	2.40	7.40	7.50	1.45	0	0	0	55.92
1886-87.....	0	1.45	1.05	6.10	4.90	22.85	.80	3.95	.40	0	T.	0	41.50
1887-88.....	.15	0	1.60	8.80	9.75	2.72	6.10	2.20	1.50	1.20	0	0	34.02
1888-89.....	.68	.15	5.38	9.88	1.40	9.97	2.70	1.65	8.10	.47	0	0	40.38
1889-90.....	0	11.72	9.54	25.57	22.90	14.90	8.70	1.50	2.50	.30	0	0	97.63
1890-91.....	3.11	.55	0	7.90	2.20	11.88	6.45	3.70	2.25	3.75	.20	0	41.99
1891-92.....	.21	1.00	1.76	2.83	5.10	7.61	8.55	6.30	8.30	1.40	0	0	43.06
1892-93.....	.30	.95	12.60	11.20	3.20	8.50	7.78	0	1.60	T.	0	0	46.13
1893-94.....	0	0	5.38	8.80	16.45	18.65	5.30	3.55	2.60	0	0	0	60.73
1894-95.....	.10	.90	1.50	21.60									<sup>a</sup> 24.10
1895-96.....													
1896-97.....					3.90	10.20	15.20	7.00				0	<sup>a</sup> 36.30
1897-98.....	.49	2.48	14.00	.50	3.80	5.60	1.30	9.00	3.40	1.10	0	0	42.67
1898-99.....	.83	2.10	4.80	1.10	10.70	2.60	19.56	1.30	2.10	2.10	0	.50	47.69
1899-1900.....	0	12.83	13.47	12.14	8.40	6.43	9.56	4.85	1.53	.60	.15	0	70.96
1900-1901.....	.33	7.57	10.43	7.50	10.95	22.45	4.70	4.40	3.25	0	0	0	71.58
1901-02.....	2.41	3.27	5.38	8.80	1.54	14.17	5.40	1.80	.90	.40	T.	T.	44.07
29-year mean													50.88

<sup>a</sup>Year incomplete.

*Record of precipitation at Colfax, Placer County.*

[Latitude, 39° 08'; longitude, 120° 57'; elevation, 2,421 feet. Authority, Pacific Railway System.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1869-70.....	-----	-----	-----	-----	-----	5.55	5.41	3.19	0.25	-----	0	0	a 14.40
1870-71.....	0	1.21	2.58	3.94	7.24	4.85	4.30	4.03	2.55	0.13	0	0	30.83
1871-72.....	0	0	4.25	9.80	10.02	13.68	4.69	3.40	.61	.40	0	T.	46.85
1872-73.....	T.	0	3.99	10.48	2.90	11.12	1.24	1.81	2.04	0	T.	0	33.58
1873-74.....	0	0	2.27	18.84	10.93	6.62	10.12	3.53	1.31	0	0	0	53.62
1874-75.....	0	3.36	13.89	1.12	12.32	.19	3.23	.20	1.90	0	0	0	36.21
1875-76.....	0	.95	14.84	7.10	10.40	7.20	14.39	3.23	1.42	T.	0	0	59.53
1876-77.....	0	7.98	.62	0	9.29	1.76	4.36	1.36	1.67	.57	0	T.	27.61
1877-78.....	0	.95	3.38	1.76	13.10	12.21	9.22	1.79	.42	T.	0	0	42.83
1878-79.....	0.56	0	2.08	.85	8.73	8.87	14.62	6.57	2.91	.27	0	0	45.46
1879-80.....	0	2.94	4.68	9.16	4.53	6.60	2.85	21.09	4.29	0	0	0	56.14
1880-81.....	0	T.	0	16.47	15.59	9.30	3.83	1.53	T.	1.31	0	0	48.03
1881-82.....	1.63	1.38	3.40	8.01	9.09	7.11	6.97	3.98	1.13	.13	0	0	42.83
1882-83.....	.40	2.96	4.03	3.60	1.68	3.23	7.98	2.93	5.92	0	0	0	32.73
1883-84.....	1.08	2.97	1.34	2.32	7.57	9.73	12.27	10.94	1.38	3.01	0	0	52.61
1884-85.....	.80	2.55	T.	23.60	2.85	1.66	.68	2.29	0	1.18	0	0	35.61
1885-86.....	.62	0	15.48	6.77	12.17	.34	3.69	10.86	1.08	0	0	0	51.01
1886-87.....	0	1.96	.46	6.12	2.99	9.24	1.51	4.92	.72	0	0	0	27.92
1887-88.....	.68	.84	1.61	6.00	13.28	2.18	2.80	.95	.17	2.69	0	0	31.20
1888-89.....	.25	.10	3.28	9.57	.50	.90	13.90	3.00	9.14	.25	0	0	40.89
1889-90.....	0	9.95	9.60	21.85	17.90	8.00	14.70	3.95	3.85	0	0	0	89.80
1890-91.....	2.75	T.	0	4.54	1.95	14.60	9.60	2.45	1.70	2.60	0.90	0	40.89
1891-92.....	0	.40	1.06	11.04	4.85	7.55	7.45	5.73	6.14	.60	0	0	44.82
1892-93.....	.53	2.20	1.55	16.95	7.62	5.68	12.80	4.22	1.30	0	0	0	52.85
1893-94.....	.85	1.23	9.32	5.08	13.43	9.76	3.60	4.48	3.45	2.45	0	0.03	54.08
1894-95.....	1.00	5.75	0	24.17	20.57	5.55	4.76	0	4.80	0	0	.28	66.88
1895-96.....	2.29	0	1.77	8.85	23.23	.93	6.36	16.15	5.39	0	0	.10	65.07
1896-97.....	1.64	1.62	14.39	5.58	4.15	15.86	7.46	0	0	.85	0	0	51.55
1897-98.....	T.	3.86	3.28	5.80	1.80	9.61	1.89	1.38	2.98	1.50	0	0	32.10
1898-99.....	.36	1.42	4.46	3.01	9.29	.87	20.73	1.16	2.41	1.72	0	.30	45.73
1899-1900.....	0	9.63	13.06	12.83	6.41	4.38	7.79	5.74	3.12	.10	0	0	65.06
1900-1901.....	1.00	7.33	12.27	3.96	13.91	15.75	2.65	6.55	1.91	0	0	0	65.33
1901-02.....	2.95	4.45	4.82	5.45	.98	18.14	7.11	4.84	.90	.70	0	.02	50.36
32-year mean	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	47.44

a Year incomplete.



*Record of precipitation at Emigrant Gap, Placer County.*

[Latitude, 39° 17'; longitude, 120° 40'; elevation, 5,230 feet. Authority, Pacific Railway System.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1869-70							6.39	3.16	0.46	0.04	0	0	a 10.05
1870-71	0	1.63	3.00	6.30	5.75	7.15	2.75	2.80	3.34	.41	0	0	33.13
1871-72							14.58	6.08	4.44	.27	0	0	a 25.37
1872-73	0	.50	.20	15.65	6.30	18.50	2.70	1.58	3.34	0	0.01	0	48.78
1873-74	0	1.25	2.70	17.30	10.02	10.42	22.12	.50	.63	.63	0	0	65.57
1874-75	0	2.00	1.00	.40	5.85	.20	2.90	1.00	2.50	1.50	0	0	17.35
1875-76	0	0	9.10	3.90	14.80	5.70	7.30	2.70	1.50	.80	.30	0	46.10
1876-77	0	1.75	.60	0	4.30	.05	.50	.50	1.20	.83	T.	0	9.73
1877-78	0	.32	5.44	1.62	15.72	16.87	7.17	3.87	.53	0	0	0	51.54
1878-79	.65	2.25	3.04	.75	15.43	13.21	21.69	7.76	2.81	.34	0	0	67.93
1879-80	0	3.30	5.11	12.33	10.10	9.88	9.75	21.76	3.42	.06	0	0	75.71
1880-81	0	0	.30	15.38	25.69	5.42	5.49	4.63	.37	2.54	0	0	59.82
1881-82	1.70	6.68	2.90	5.64	10.03	9.46	16.60	2.60	1.55	.40	0	0	57.50
1882-83	.60	7.95	2.15	3.31	3.22	4.00	10.06	3.30	4.90	0	0	0	39.49
1883-84	1.25	3.66	1.20	3.15	8.22	10.20	15.18	10.84	2.10	2.77	0	0	58.57
1884-85	.91	1.93	0	31.20	2.68	2.15	.40	3.89	.20	1.83	0	0	45.19
1885-86	.53	0	18.69	7.38	18.28	1.97	6.90	11.90	2.73	T.	0	0	68.38
1886-87	0	2.96	.40	8.00	4.12	18.80	2.03	6.17	1.02	1.14	0	0.13	44.77
1887-88	.05	3.00	1.50	7.70	17.05	3.92	5.42	3.30	2.23	3.04	.62	0	47.83
1888-89	.10	0	1.77	7.39	1.10	1.10	5.69	2.29	8.61	.38	0	0	28.43
1889-90	0	11.81	11.41	20.85	16.90	9.80	13.15	1.72	3.37	0	0	0	89.01
1890-91	.32	.65	0	6.20	1.70	7.88	4.55	3.15	2.70	2.40	0	0	29.55
1891-92	0	.20	2.40	12.90	5.42	7.46	5.70	3.00	5.60	.70	0	0	43.38
1892-93	.10	1.70	15.02	19.97	5.50	6.38	10.05	5.71	.69	0	0	0	65.12
1893-94	1.20	2.00	5.95	9.19	10.10	15.50	18.00	2.62	1.60	2.29	0	0	68.45
1894-95	0	2.41	.90	9.19	17.90	1.40	.50	1.60	1.20	0	0	0	35.10
1895-96	.31	2.41	1.90	4.00	17.40	7.88	8.00	11.50	1.20	.30	T.	0	54.90
1896-97					2.70	2.96	12.80	1.40	T.			0	a 19.86
1897-98			5.56				1.20	1.10					a 7.86
25-year mean													50.05

a Year incomplete.

*Record of precipitation at Iowa Hill (Strawberry Flat), Placer County.*

[Latitude, 39° 07'; longitude, 120° 49'; elevation, 2,825 feet. Authority, C. F. Macy.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1878-79.....	-----	-----	-----	-----	12.50	12.50	18.25	7.87	3.25	0.25	0	0	a 54.62
1879-80.....	0	3.50	3.63	13.35	5.90	6.10	7.88	18.87	6.25	0	0	0	64.58
1880-81.....	0	.75	.75	20.80	20.75	10.50	4.62	3.15	.13	2.12	0	0	63.57
1881-82.....	2.50	4.25	3.90	10.56	8.92	6.80	10.43	7.59	1.55	.73	0	0	57.23
1882-83.....	.35	8.50	6.63	2.69	4.37	4.24	10.63	3.67	7.22	0	0	0	48.30
1883-84.....	.75	4.54	2.02	3.75	8.05	11.26	16.50	13.22	1.60	2.52	0	0	64.21
1884-85.....	1.60	2.43	0	24.22	3.03	1.48	.68	2.93	.05	1.60	0	0	38.02
1885-86.....	1.20	0	15.82	6.14	10.89	.68	6.46	12.19	1.87	0	0	T.	55.25
1886-87.....	0	2.28	.80	5.75	3.61	15.61	2.23	6.55	.78	0	0	0.05	37.66
1887-88.....	.48	0	.95	6.52	11.73	2.41	4.59	1.47	1.14	2.60	0.06	T.	31.95
1888-89.....	.35	0	3.78	8.14	.58	.71	12.12	4.20	8.26	.22	.05	.06	38.47
1889-90.....	0	9.20	8.49	21.04	20.87	10.74	14.12	3.02	3.48	.08	0	T.	91.04
1890-91.....	2.29	.35	0	7.34	1.96	10.52	8.28	3.55	2.03	2.13	.83	0	39.28
1891-92.....	.30	.98	1.51	11.64	4.01	5.36	7.11	6.02	6.57	.41	0	0	43.91
1892-93.....	.51	2.51	8.21	11.88	6.91	5.80	12.94	6.69	1.44	0	T.	0	56.89
1893-94.....	1.81	1.35	8.30	5.37	11.07	12.25	4.20	2.10	4.03	1.64	T.	.51	52.63
1894-95.....	.78	4.06	1.48	17.57	18.64	5.57	4.60	3.93	3.92	0	.03	.27	60.85
1895-96.....	2.91	.17	1.61	5.87	17.77	.70	10.93	14.01	4.58	0	.11	.06	58.72
1896-97.....	1.00	.49	13.42	5.13	3.44	15.83	11.33	2.15	.15	1.32	0	0	54.26
1897-98.....	.45	3.09	3.49	5.31	2.04	8.10	1.68	.99	2.83	1.49	T.	0	29.47
1898-99.....	.44	1.87	4.03	2.84	6.93	.83	18.06	1.15	2.41	1.15	0	.32	40.03
1899-1900.....	0	9.18	9.08	8.15	4.43	3.39	6.40	4.59	2.59	.10	.05	0	47.96
1900-1901.....	.99	5.67	9.65	3.16	9.94	12.61	1.98	6.55	.96	0	T.	.07	51.58
1901-2.....	4.12	3.98	4.72	6.08	1.15	15.75	7.54	3.90	1.04	.66	0	.15	49.09
23-year mean	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	51.08

aYear incomplete.



*Record of precipitation at Towles, Placer County.*

[Latitude, 39° 18'; longitude, 120° 38'; elevation, 3,704 feet. Authority, Pacific Railway System.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1885-86.....	0.80	0	14.40	7.00	9.80	0.50	5.10	3.80	0	0	0	0	41.40
1886-87.....	0	0.80	.80	3.00	4.35	11.60	1.10	1.20	T.	0	T.	0	22.85
1887-88.....	0	0	.90	1.06	20.14	1.71	0	0	0	1.06	0.08	0	24.95
1888-89.....	0	1.11	1.08	1.01	.45	.90	.60	0	0	0	0	0	5.15
1889-90.....	0	6.03	4.11	11.40	19.40	14.60	3.00	0	1.00	0	1.00	0	60.54
1890-91.....	.10	1.02	8.10	8.03	1.81	14.65	10.52	2.59	2.86	2.52	1.40	0	53.60
1891-92.....	1.08	1.72	2.23	11.18	4.95	7.16	9.32	7.78	8.10	.75	0	0	54.27
1892-93.....	.93	2.74	12.54	17.33	9.06	8.65	16.61	7.98	2.34	0	0	0	78.18
1893-94.....	2.75	1.76	10.62	6.78	13.76	10.10	5.39	2.42	2.06	2.15	0	0	57.79
1894-95.....	1.20	5.60	1.60	13.88	19.05	7.24	4.60	5.15	4.76	0	0	0	63.08
1895-96.....	4.25	.80	2.16	7.61	21.34	1.08	14.03	15.66	7.21	0	T.	0	74.14
1896-97.....	8.04	1.08	3.12	6.07	5.25	13.34	5.48	2.48	.30	1.30	0	0	46.46
1897-98.....	.10	1.78	9.29	4.61	2.95	8.29	.50	.50	3.18	2.09	0	0	33.29
1898-99.....	.48	2.85	5.35	3.36	8.54	.90	19.51	1.48	2.49	1.60	0	1.14	47.70
1899-1900.....	0	9.08	10.90	10.64	8.04	19.06	3.07	1.02	.10	0	0	0	61.91
1900-1901.....	.10	8.16	18.06	11.60	5.99	14.16	6.08	0	1.10	0	0	0	65.25
1901-2.....	20.01	1.10	19.10	15.91	1.75	22.25	1.11	.50	1.52	0	0	0	82.25
17-year mean.....													51.54

*Record of precipitation at Laporte, Plumas County.*

[Latitude, 39° 41'; longitude, 120° 59'; elevation, 5,000 feet. Authority, Weather Bureau.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1893-94.....								3.05	2.00	3.49	T.	0.17	<sup>a</sup> 8.71
1894-95.....	1.13	8.87	1.32	15.47	22.01	6.65	6.12	4.00	8.55	0	1.41	.29	75.82
1895-96.....	8.42	.69	3.35	9.98	32.43	2.84	16.20	16.63	9.32	.09	.31	.25	100.51
1896-97.....	2.29	3.09	23.87	12.88	6.04	17.92	13.51	3.12	0.71	3.94	0	T.	87.37
1897-98.....	1.26	4.84	9.34	6.63	2.53	13.04	1.62	1.49	4.64	2.73	T.	.04	48.16
1898-99.....	0.94	3.31	6.67	3.36	12.95	2.96	25.26	2.92	4.43	1.48	0	.82	64.83
1899-1900.....	0	18.30	15.96	16.23	11.95	5.66	12.24	6.51	2.57	.36	.06	T.	89.84
1900-1901.....	.61	13.02	14.30	8.79	17.25	18.35	6.24	7.48	2.09	T.	T.	.05	88.18
1901-2.....	5.26	4.82	9.10	8.16	2.64	33.50	10.09	9.59	2.28	.64	.02	T.	86.10
8-year mean.....													80.10

<sup>a</sup> Year incomplete.

*Record of precipitation at Mumford Hill, Plumas County.*

[Latitude, 39° 53'; longitude, 121° 05'; elevation, 4,750 feet. Authority, J. A. Edman, Meadow Valley.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1876-77.....	-----	-----	-----	-----	11.40	5.00	5.13	2.50	3.00	1.72	0.52	0	<i>a</i> 29.27
1877-78.....	0	1.10	3.05	2.10	18.15	26.52	9.44	2.10	1.85	0	.30	0.70	65.31
1878-79.....	2.10	2.75	5.15	3.75	12.38	12.62	30.15	6.53	3.60	1.13	0	.29	80.45
1879-80.....	0	4.01	7.20	14.16	10.06	7.96	5.18	23.54	6.42	0	0	.90	79.43
1880-81.....	0	0	.76	24.34	16.57	13.28	3.60	3.21	.84	.54	0	0	63.14
1881-82.....	1.36	3.28	4.32	11.23	9.94	8.60	10.75	7.48	2.05	0	0	0	59.01
1886-87.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	44.20
1889-90.....	1.50	18.77	10.83	29.40	31.33	18.44	20.25	6.33	2.00	0	0	0	138.85
1890-91.....	1.50	.75	1.10	8.18	2.00	22.65	7.90	3.17	2.39	1.95	1.25	0	52.84
1891-92.....	.50	1.50	2.06	13.60	5.45	5.12	5.40	6.35	6.03	0	0	0	46.01
1892-93.....	.32	2.61	22.70	24.98	11.47	13.07	13.89	8.43	3.23	.16	0	0	100.86
1893-94.....	1.79	1.27	9.46	4.40	17.46	16.48	7.08	3.94	2.85	2.26	0	1.45	68.44
1894-95.....	1.17	6.54	2.26	24.00	26.11	5.83	10.59	3.80	7.18	0	0	.27	87.75
1895-96.....	9.35	1.13	3.48	9.22	32.70	1.20	13.33	16.25	7.20	0	.08	.22	94.16
1896-97.....	1.43	2.53	16.64	11.13	5.44	13.80	12.07	1.59	.06	2.14	0	0	66.83
1897-98.....	.70	3.78	8.17	5.21	1.73	12.74	1.41	1.25	4.94	2.11	0	0	42.04
1898-99.....	.26	2.27	4.10	1.94	13.12	3.01	17.04	2.35	2.92	.64	0	1.64	49.29
1899-1900.....	0	15.38	13.09	11.89	10.99	3.10	8.95	6.24	1.63	.61	0	.05	71.93
1900-1901.....	.20	12.51	13.13	7.70	16.79	15.36	4.94	5.62	1.34	0	0	.50	78.09
1901-2.....	4.86	4.27	8.85	6.81	2.38	25.42	10.60	6.77	2.49	0	.13	.02	72.60
19-year mean	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	71.64

*a* Year incomplete.*Record of precipitation at Banning, Riverside County.*

[Latitude, 33° 56'; longitude, 116° 55'; elevation 2,317 feet. Authority, Pacific Railway System.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1878-79.....	0	0	0	1.08	2.37	0.66	0	1.48	0	0	0	0	5.59
1879-80.....	0	0.02	2.84	4.55	.75	1.59	2.77	2.40	0	0	0	0	14.92
1880-81.....	0	.52	.87	-----	-----	-----	-----	-----	-----	-----	-----	-----	<i>a</i> 1.39
1898-99.....	-----	-----	-----	-----	2.70	.72	2.14	.08	0.01	0.48	0	0	<i>a</i> 6.13
1899-1900.....	0	.69	2.23	.88	1.29	.05	1.19	2.22	1.80	0	0	0	10.35
1900-1901.....	0.10	.47	3.94	0	4.12	6.46	.81	.60	1.21	0	0	1.19	18.90
1901-2.....	0	1.17	.50	0	2.74	4.83	4.63	1.00	.06	T.	0.14	0	15.07
6-year mean	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	11.82

*a* Year incomplete.

*Record of precipitation at Beaumont, Riverside County.*

[Latitude, 33° 55'; longitude, 117° 00'; elevation, 2,530 feet. Authority, Pacific Railway System.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1887-88					1.39	1.18	5.78	0.87	0.40	0	0	0.50	a 10.12
1888-89	0	0.30	3.92	4.19	1.15	1.95	5.27	.61	.29	0	0	0	17.68
1889-90	0	1.53	.67	11.03	3.71	4.74	1.13	1.15	1.05	0	0.15	.15	25.40
1890-91	1.04	0	.43	2.74	0	8.70	1.07	1.72	2.43	0	0	.87	19.00
1891-92	.48	0	.23	2.43	.96	3.53	3.18	.37	1.87	0	0	0	13.45
1892-93	0	0	1.65	1.95	2.97	2.66	9.67	.40	0	0	0	.18	19.48
1893-94	0	1.45	0	4.34	.30	2.09	.35	.32	.43	0	0	0	9.28
1894-95	.42	0	0	8.89	11.49	2.28	2.72	1.24	T.	0	0	0	27.04
1895-96	0	.14	1.90	.34	1.68	.65	4.48	0	.82	0	.25	.31	10.57
1896-97	0	2.24	1.05	.30	5.00	5.91	4.69	0	0	0	0	0	19.10
1897-98	0	0	0	.43	1.58	.75	1.95	1.00	3.00	0	0	0	8.71
1898-99	0	0	0	1.20	2.64	1.02	1.40	.35	.10	1.07	0	0	7.78
1899-1900	0	.88	2.85	.89	1.45	0	1.16	2.33	1.72	0	0	0	11.28
1900-1901	.25	.38	3.98	0	4.08	4.77	.35	.35	1.80	0	0	.51	16.47
1901-2	0	1.56	.43	0	2.51	3.59	4.14	1.07	.24	0	.05	0	13.59
14-year mean													15.60

a Year incomplete.

*Record of precipitation at San Geronio Pass, Riverside County.*

[Latitude, 33° 54'; longitude, 117° 02'; elevation, 2,560 feet. Authority, J. J. Ring and M. Murray.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1874-75				0.40	1.00	0.60			0	T.	0	0	a 2.00
1875-76	0.03	0	1.33	1.23	9.31	5.54	6.26	0.99	.20	0	0.03	0.12	25.04
1876-77	.19	.18	0	0	5.55	2.03	3.93	2.59	3.93	0	.30	T.	18.70
1877-78	.03	1.30	.80	4.28	6.03	10.49	4.40	6.81	1.33	0.26	.03	.20	35.96
1878-79	0	0	.97	.92	2.88	1.78	.55	3.23	.01	.62	0	.22	11.18
1879-80	0	1.00	4.10	9.39	1.78	2.81	3.04	6.94	.14	0	T.	.09	29.29
1880-81													
1881-82	0	.50	1.33	10.27	2.48	1.86	3.39	3.62	.35	0	.94	0	24.74
1882-83	0	.53	1.33	.42	3.30	7.29	4.38	4.21	.35	1.30	0	.62	23.73
1883-84													
1884-85													
1885-86					2.97	1.73	3.07	1.24	0	0	0	0	a 9.01
1886-87	0	0	.58	3.36	.06	5.07	.08	2.94	.14	0	.07	0	12.30
1887-88	0	1.23	1.51										a 2.74
8-year mean													22.62

a Year incomplete.

*Record of precipitation at Whitewater, Riverside County.*

[Latitude, 33° 54'; longitude, 116° 39'; elevation, 1,123 feet. Authority, Pacific Railway System.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1877-78	0	0	0	1.30	1.40	0.98	0.45	2.35	0	0	0	0	6.48
1878-79	0	T.	.18	.46	1.30	.28	.34	.30	0	0	0	0	2.86
1879-80	0	0	1.62	2.08	.51	.42	.20	.12	0.01	0	0	0.25	5.21
1880-81	0	0 15	.34	1.70	0	0	2.25	.01	0	0	0	.46	4.91
1881-82	0	T.	0	0	0	.48	.20	.16	0	0	0	0	.84
1882-83	0	0	.57	0	.15	.34	.80	.55	0	0	0	0	2.41
1883-84	0	.78	0	1.92	1.10	6.96	3.05	0	0	0	0	0	13.81
7-year mean													5.22

NOTE.—Whitewater ceased reporting after August, 1884.

*Record of precipitation at Sacramento, Sacramento County.*

[Latitude, 38° 35'; longitude, 121° 30'; elevation, 71 feet. Authority, Signal Service and Weather Bureau.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1849-50.....	0.25	1.50	2.25	12.50	4.50	0.50	10.00	4.25	0.25	0	0	0	36.00
1850-51.....	0	0	0	0	.65	.35	1.88	1.14	.69	0	0	0	4.71
1851-52.....	1.00	.18	2.14	7.07	.58	.12	6.40	.19	.30	0	0	0	17.98
1852-53.....	0	0	6.00	13.41	3.00	2.00	7.00	3.50	1.45	0	0	0	36.36
1853-54.....	0	.01	1.50	1.54	3.25	8.50	3.25	1.50	.21	0.31	0	0	20.07
1854-55.....	0	1.01	.65	1.15	2.67	3.46	4.20	4.32	1.15	.01	0	0	18.62
1855-56.....	0	0	.75	2.00	4.92	.69	1.40	2.13	1.84	.03	0	0	13.76
1856-57.....	0	.20	.65	2.40	1.38	4.80	.67	0	0	.35	0.01	0	10.46
1857-58.....	0	.66	2.41	6.63	2.44	2.46	2.88	1.21	.20	.10	0	0	18.99
1858-59.....	0	3.01	.15	4.34	.96	3.91	1.64	.98	1.04	0	.03	0	16.06
1859-60.....	.02	0	6.48	1.83	2.31	.93	5.11	2.87	2.49	.02	.55	0	22.61
1860-61.....	.06	.91	.18	4.28	2.67	2.92	3.32	.48	.59	.13	0	0	15.54
1861-62.....	0	0	2.17	8.64	15.04	4.26	2.80	.82	1.81	.01	0	0.01	35.56
1862-63.....	0	.36	0	2.33	1.73	2.75	2.36	1.69	.35	0	0	0	11.57
1863-64.....	0	0	1.49	1.82	1.08	.19	1.30	1.08	.74	.09	0	.08	7.87
1864-65.....	0	.12	6.72	7.87	4.78	.71	.48	1.37	.46	0	0	0	22.51
1865-66.....	.08	.48	2.43	.36	7.70	2.01	2.02	.48	2.25	.10	.02	0	17.93
1866-67.....	0	0	2.43	9.51	3.44	7.10	1.01	1.80	.01	0	0	0	25.30
1867-68.....	.01	0	8.81	12.85	6.04	3.15	4.35	2.31	.27	T.	0	0	32.79
1868-69.....	0	0	.77	2.61	4.79	3.63	2.94	1.24	.65	.01	0	0	16.64
1869-70.....	T.	2.12	.85	1.96	1.37	3.24	1.64	2.12	.27	T.	T.	0	13.57
1870-71.....	0	.02	.58	.97	2.08	1.92	.69	1.45	.76	T.	0	0	8.47
1871-72.....	T.	.21	1.22	10.59	4.04	4.74	1.94	.61	.28	.02	0	0	23.65
1872-73.....	T.	.22	1.93	5.39	1.23	4.36	.55	.51	0	T.	.02	T.	14.21
1873-74.....	0	.31	1.21	10.01	5.20	1.86	3.05	.89	.37	T.	T.	0	22.90
1874-75.....	.05	2.26	3.80	.44	8.70	.55	.80	T.	T.	1.10	0	0	17.70
1875-76.....	0	.44	6.20	5.52	4.99	3.75	4.15	1.10	.15	0	.21	.02	26.53
1876-77.....	T.	3.45	.30	0	2.77	1.04	.56	.19	.64	.01	T.	T.	8.96
1877-78.....	0	.73	1.07	1.43	9.26	8.04	3.09	1.07	.17	0	0	0	24.86
1878-79.....	.29	.55	.51	.47	3.18	3.88	4.88	2.66	1.30	.13	T.	T.	17.85
1879-80.....	0	.88	2.05	3.41	1.64	1.83	1.79	14.20	.76	0	T.	0	26.47
1880-81.....	0	0	.05	11.81	6.14	5.06	1.37	1.64	T.	.50	T.	0	26.57
1881-82.....	.30	.55	1.88	3.27	1.89	2.40	3.78	1.99	.35	.10	T.	0	16.51
1882-83.....	.57	2.63	3.22	1.13	2.23	1.11	3.70	.67	2.85	0	0	0	18.11
1883-84.....	.90	.97	.61	.44	3.43	4.46	8.14	4.32	.06	1.45	0	T.	24.78
1884-85.....	.60	2.01	0	10.45	2.16	.49	.08	.68	T.	.11	T.	0	16.58
1885-86.....	.08	.02	11.34	5.76	7.95	.29	2.68	4.08	.07	0	0	0	32.27
1886-87.....	0	.68	.21	2.21	1.12	6.28	.94	2.53	T.	0	0	T.	13.97
1887-88.....	.02	0	.45	2.09	4.81	.57	3.04	.10	.40	.08	T.	T.	11.56
1888-89.....	.55	0	4.28	4.63	.15	.33	6.25	.26	3.25	.25	0	0	19.95
1889-90.....	0	6.02	3.15	7.82	6.62	4.06	3.00	1.33	1.80	0	0	T.	33.80
1890-91.....	.80	T.	0	3.34	.53	6.61	1.78	2.04	.66	.05	T.	0	15.81
1891-92.....	.10	.10	.48	3.28	1.78	2.84	3.02	1.20	2.38	T.	0	0	15.18
1892-93.....	.18	.70	6.60	4.90	3.27	2.66	3.51	1.08	1.05	0	T.	T.	23.95
1893-94.....	.22	.12	2.92	1.76	4.17	3.92	.74	.34	1.70	.46	T.	T.	16.35
1894-95.....	.88	1.06	.48	8.86	8.42	1.84	1.20	.86	.51	0	.04	T.	24.15
1895-96.....	1.26	.17	1.54	1.54	9.76	.09	2.57	5.34	.92	0	T.	.20	23.39
1896-97.....	.31	.55	3.56	1.76	3.66	4.15	2.54	.25	.30	.04	0	.01	17.13
1897-98.....	.16	1.96	.61	1.64	.98	3.19	.04	.28	1.50	.14	0	0	10.50
1898-99.....	.36	.64	.61	2.30	3.94	.04	6.02	.10	.54	.49	0	.02	15.06
1899-1900.....	0	4.46	2.62	2.91	3.54	.32	1.61	1.88	2.88	T.	T.	0	20.22
1900-1901.....	0	1.74	4.50	1.38	3.70	5.32	.48	2.23	.80	T.	T.	T.	20.15
1901-2.....	.56	1.56	2.68	1.19	.95	6.52	1.99	1.36	.45	.01	0	T.	17.27
53-year mean													19.62

*Record of precipitation at Barstow, San Bernardino County.*

[Latitude, 34° 51'; longitude, 116° 59'; elevation, 2,150 feet. Authority, W. L. Burbeck, Geo. R. Gooding, G. W. Fetts, and others.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1888-89					0.14	0.04	0.93	0	0.12	0	0	0.13	<i>a</i> 1.36
1889-90	0.07	0.23	0.70	3.87	.36	.15	T.	.07	0	0	0	.15	5.60
1890-91	.59	0	.05	.52	0	2.47	T.	.05	T.	0	T.	.06	3.74
1891-92	.08	0	T.	.25									<i>a</i> .33
1892-93					.11	.27	.77	.06	T.	0	1.10	0	<i>a</i> 2.31
1893-94	0	.22	T.	.72	.02	.21	.06	0	.22	T.	T.	0	1.45
1894-95	0	0	0	.92	1.06	0	.20	0	0	0	0	0	2.18
1895-96	0	.33	T.	0	.16	0	.08	0	0	0	.07	.87	1.51
1896-97	0	1.55	.25	.30	2.15	.65	.11	0	0	T.	0	.18	5.19
6-year mean.													3.28
1901-2							0	0	0	0	0	0	<i>a</i> 0

<sup>a</sup> Year incomplete.

*Record of precipitation at Deep Creek, San Bernardino County.*

[Latitude, 34° 15'; longitude, 17° .07'; elevation, 5,200 feet. Authority, Arrowhead Reservoir Company.]

[illegible]

<sup>a</sup>Year incomplete.

*Record of precipitation at Bear Valley dam, San Bernardino County.*

[Latitude, 34° 15'; longitude, 116° 58'; elevation, 6,500 feet.]

[illegible]



*Record of precipitation at Glen Ranch, San Bernardino County.*

[Latitude, 34° 50'; longitude, 117° 30'; elevation, 3,112 feet. Authority, Jas. M. Applewhite, Cajon.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1899-1900.....	0.10	0.03	0.96	1.00	2.15	0.10	3.84	1.35	1.69	0.02	0.01	0	11.25
1900-1901.....	.31	.46	9.39	0	6.53	9.78	.43	1.40	.96	0	0	0	29.26
1901-2.....	0	2.61	.58	.10	1.73	3.67	5.54	.53	0	.24	0	0	15.00
3-year mean.	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	18.50

*Record of precipitation at Holcomb Creek, San Bernardino County.*

[Latitude, 34° 17'; longitude, 117° 05'; elevation, 5,220 feet. Authority, Arrowhead Reservoir Company.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1894-95.....	-----	-----	-----	-----	10.06	0.61	4.86	0.62	0	0	0	0	a 16.15
1895-96.....	0	0	1.66	0.41	1.56	T.	3.24	1.02	0.25	0	0	0.47	8.61
1896-97.....	0	1.70	1.05	1.82	3.35	7.89	3.42	0	.11	0.20	0	0	19.54
1897-98.....	0.38	3.32	1.09	.90	3.05	.52	1.27	.10	1.46	0	0	.66	12.75
1898-99.....	0	0	.57	.48	-----	-----	-----	-----	-----	-----	-----	-----	a 1.05
1899-1900.....	-----	-----	-----	-----	.38	.21	1.14	1.25	1.20	-----	-----	-----	a 4.18
3-year mean.	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	13.63

a Year incomplete.

*Record of precipitation at Little Bear Valley, San Bernardino County.*

[Latitude, 34° 15'; longitude, 117° 13'; elevation, 5,150 feet. Authority, Arrowhead Reservoir Company.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1893-94.....	1.21	1.49	2.55	7.61	2.48	2.25	3.16	0.62	1.34	0.12	0.04	0.31	23.18
1894-95.....	.52	.38	0	20.12	-----	-----	-----	-----	-----	-----	-----	-----	a 21.02
1896-97.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
1897-98.....	-----	-----	-----	-----	3.80	1.38	2.49	.25	4.56	-----	0	-----	a 12.48
1898-99.....	-----	T.	.62	.74	-----	-----	-----	-----	-----	-----	-----	-----	a 1.36
1899-1900.....	-----	-----	-----	-----	1.39	.43	3.42	3.11	4.63	-----	-----	-----	a 12.98

a Year incomplete.

*Record of precipitation at Mill Creek "A," San Bernardino County.*

[Latitude, 34° 05'; longitude, 116° 54'; elevation, 5,000 feet. Authority, Redlands Electric Light and Power Company.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1899-1900.....	-----	-----	-----	-----	2.52	0.43	2.28	4.49	-----	-----	-----	-----	a 9.72
1900-1901.....	-----	-----	9.05	-----	4.32	6.00	.71	.39	1.85	0	0	1.20	a 23.52
1901-2.....	0	1.95	.82	0	-----	-----	-----	-----	-----	-----	-----	-----	a 2.77

a Year incomplete.

*Record of precipitation at Mill Creek "B," San Bernardino County.*

[Latitude, 34° 04'; longitude, 116° 58'; elevation, 2,915 feet. Authority, Redlands Electric Light and Power Company.]

[illegible]

*a* Year incomplete.

*Record of precipitation at Morse's house, San Bernardino County.*

[Latitude, 34° 12'; longitude, 117° 12'; elevation, 5,350 feet. Authority, Arrowhead Reservoir Company.]

[illegible]

*a* Year incomplete.

*Record of precipitation at Rancho del Jurupa, San Bernardino County.*

[Latitude, 34° 02'; longitude, 117° 27'; elevation, 1,000 feet. Authority, United States post hospital.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1882-83	0	0	2.89	7.50	0.25	0.67	3.15	0.33	1.14	0	0	0.18	16.11
1883-84	0	0	.44	2.04	1.64	2.34	3.09	-----	-----	-----	-----	-----	9.55

*a* Year incomplete.

*Record of precipitation at Redlands, San Bernardino County.*

[Latitude, 34° 03'; longitude, 117° 10'; elevation, 1,335 feet. Authority, Pacific Railway System.]

[illegible]

*Record of precipitation at Rings Station, San Bernardino County.*

[Latitude, 34° 02'; longitude, 116° 46'; elevation, 4,300 feet. Authority, John J. Ring.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1874-75.....	0.09	0.61	2.55	0.78	5.64	2.08	0.58	0.37	0	0	0	0	12.70
1875-76.....	.43	T.	4.06	.25	9.31	5.54	6.23	.99	0.20	0	0.03	0	27.04
1876-77.....	.19	.18	0	0	5.75	2.33	3.93	2.59	3.93	0	.30	0	19.20
1877-78.....	0	1.30	0.80	4.03	6.03	10.49	4.41	6.86	1.33	0.26	.03	0.20	35.74
1878-79.....	0	0	.97	1.52	2.88	5.11	.55	3.23	0	0	0	0	14.26
1879-80.....	0	1.00	4.10	9.39	1.78	2.81	3.04	1.39	.14	0	0	.09	23.74
1880-81.....	0	.50	1.05	10.27	2.48	1.86	3.39	2.93	.35	0	.94	0	23.77
1881-82.....	0	1.30	.08	.42	3.30	7.29	5.38	4.21	.35	1.30	0	0	23.63
8-year mean.													22.51

*Record of precipitation at Santa Ana Canyon, San Bernardino County.*

[Latitude, 34° 09'; longitude, 117° 07'; elevation, 3,000 feet. Authority, Edison Electric Company.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1899-1900.....	-----	-----	-----	-----	-----	-----	0.74	5.87	-----	-----	-----	-----	a 6.61
1900-1901.....	-----	-----	-----	-----	5.53	7.82	1.10	1.38	1.36	-----	-----	-----	a 17.19

a Year incomplete.

*Record of precipitation at Squirrel Inn, San Bernardino County.*

[Latitude, 34° 12'; longitude, 117° 15'; elevation, 5,300 feet. Authority, Arrowhead Reservoir Company.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1893-94.....	0.38	1.90	5.00	8.93	4.00	3.23	3.54	1.17	1.37	0.23	0	0.62	30.37
1894-95.....	.50	.34	0	16.38	14.22	5.35	9.58	2.53	0	0	0	0	48.90
1895-96.....	0	0	2.92	1.98	4.51	0	5.60	.98	.89	0	0	.38	17.26
1896-97.....	0	3.20	1.60	2.23	7.65	13.31	12.17	.13	3.03	.20	0	0	43.52
1897-98.....	0	0	-----	-----	4.98	1.95	2.98	.68	6.50	-----	0	-----	a 17.09
1898-99.....	.05	.37	.70	1.35	-----	-----	-----	-----	-----	-----	-----	-----	a 2.47
1899-1900.....	-----	-----	-----	-----	1.73	.26	3.04	4.81	6.37	-----	-----	-----	a 16.21
4-year mean.													35.01

a Year incomplete.

*Record of precipitation at Upper Holcomb Valley, San Bernardino County.*

[Latitude, 34° 18'; longitude, 116° 55'; elevation, 7,200 feet. Authority, Arrowhead Reservoir Company.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1897-98.....	-----	-----	-----	-----	2.60	0.40	1.50	0.50	-----	-----	-----	-----	a 5.00

a Year incomplete.

*Record of precipitation at Campo, San Diego County.*

[Latitude, 32° 37'; longitude, 116° 30'; elevation, 2,660 feet. Authority, A. Campbell, Campo.]

[illegible]

<sup>a</sup> Year incomplete.

<sup>b</sup>Cloudburst; rain gage washed away. Record incomplete.

*Record of precipitation at Cuyamaca Reservoir, San Diego County.*

[Latitude, 33° 00'; longitude, 116° 40'; elevation, 4,800 feet. Authority, San Diego Flume Company.]

[illegible]

*Record of precipitation at Descanso, San Diego County.*

[Latitude, 32° 50'; longitude, 116° 40'; elevation, 3,500 feet. Authority, E. W. Hulburt, Descanso.]

[illegible]

*Record of precipitation at Julian, San Diego County.*

[Latitude, 33° 04'; longitude, 116° 36'; elevation, 4,500 feet. Authorities, J. S. Beck and Mrs. S. L. Harritt.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1879-80.....	0	0	2.13	4.50	1.50	5.75	9.25	7.50	0	0	0	0	30.63
1880-81.....	0	0	2.25	2.75	5.13	4.88	8.13	2.75	0	0	0	0	25.89
1881-82.....	0	0	1.88	6.88	5.13	3.38	7.13	4.88	0	0	0	0	29.28
1882-83.....	0	0	5.13	6.25	10.04	6.63	9.13	4.13	0	0	0	0	41.31
1883-84.....	0	2.75	0	6.00	2.25	20.63	15.63	10.63	3.63	0	0	0	61.52
1889-90.....					6.12	10.39	3.63	1.11	2.54	0	0	1.25	<sup>a</sup> 25.04
1890-91.....	1.25	0	2.00	6.36	.07	19.32	2.09	2.66	3.00	0	0	.89	37.64
1891-92.....	.81	0	2.25	8.61	6.17	6.69	1.54	6.11	3.55	0.41	0	.11	36.25
1892-93.....		.56	1.53	2.81	3.76	3.72	14.42	.66	.62	0	1.65	.41	30.14
1893-94.....	.03	2.20	3.25	4.00	4.40	2.77	4.19	.32	.68	.04	.17	.34	22.39
1894-95.....	.21	T.	0	9.38	16.32	3.80	5.04	.95	.45	T.	T.	.70	36.85
1895-96.....	0	.70	2.60	.75	4.55	.40	6.10	1.40	.10	0	.17	.34	17.11
11-year mean													33.55

<sup>a</sup> Year incomplete.

*Record of precipitation at Laguna, San Diego County.*

[Latitude, 32° 50'; longitude, 116° 31'; elevation, 5,440 feet. Authority, Arch. Campbell, Campo.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1884-85.....								2.10	1.36	0.17	0	1.87	<sup>a</sup> 5.50
1885-86.....		0.44	2.71	0.60						0	0.21	2.43	<sup>a</sup> 6.39
1886-87.....	0	.29	1.40	0									<sup>a</sup> 1.69
1890-91.....									.60	0	1.15	2.83	<sup>a</sup> 4.58
1894-95.....				9.97	17.44	2.87	2.70	0	.45	0	0	0	<sup>a</sup> 33.43
1895-96.....	0		6.40		3.55		5.60	1.55	.25	0	1.50	3.83	22.68
1896-97.....	0	3.35	2.48	2.74	3.60	1.08							<sup>a</sup> 13.25
1897-98.....	0.03	2.50	0	1.80		8.10		4.44		0	0	0	16.87
1898-99.....	0	0				16.00		0	0	0	0	0	<sup>a</sup> 16.00
1899-1900.....	0	1.85	2.70	1.65	3.30	.37	1.00	3.80	2.19	.30	0	0	17.16
1900-1901.....	.20	.40	6.20	0	5.60	8.60	.95	.71	2.09	0	.42	1.25	26.42
1901-2.....	0	1.42	.54	.35	.40	.35	6.15	1.05	.11	.21	2.32	.48	13.38
5-year mean.													19.30

<sup>a</sup> Year incomplete.

*Record of precipitation at Nellie, San Diego County.*

[Latitude, 33° 20'; longitude, 116° 55'; elevation, 5,240 feet. Authority, N. A. Clark.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1901-2.....		2.55	1.75	0.55	17.60	7.34	10.21	2.20	0.25	0	0.06	0	<sup>a</sup> 42.51

<sup>a</sup> Year incomplete.

*Record of precipitation at San Diego, San Diego County.*

[Latitude, 32° 45'; longitude, 117° 8'; elevation, 69 feet. Authorities, U. S. War Department and Weather Bureau.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1849-50.					0	1.13	1.00	0.09	0	0.68	0	0	a 2.90
1850-51.	0	0.19	2.82	1.93	0.03	1.51	.34	.87	0.71	.01	0	0	8.41
1851-52.	0.02	.01	.25	3.74	.58	1.84	1.87	.85	.32	0	0	0.40	9.88
1852-53.	0	.06	1.45	4.50	.50	.20	1.52	.25	2.10	.05	0	.21	10.84
1853-54.	0	0	1.28	1.77	.99	2.56	1.88	.89	.18	.01	0.07	1.36	10.99
1854-55.	.09	.27	.04	3.29	1.97	3.59	1.30	1.52	.06	0	0	.04	12.17
1855-56.	0	.11	2.15	.41	1.27	1.86	1.59	2.17	.29	0	0	0	9.85
1856-57.	.07	0	1.22	1.30	.26	1.76	0	.04	.08	.03	0	.02	4.78
1857-58.	.01	.49	2.16	1.30	1.52	.44	1.24	.17	0	.19	0	.04	7.56
1858-59.	.10	.47	.28	3.10	0	1.89	.20	.36	.17	0	.02	0	6.59
1859-60.	0	.18	1.49	1.79	.72	1.49	.15	.65	.04	.05	.14	0	6.70
1860-61.	0	0	2.88	2.99	.82	.79	.05	.04	0	.19	0	0	7.76
1861-62.	1.59	.05	1.19	3.20	5.56	1.39	.97	1.05	.16	.48	.11	0	15.75
1862-63.	0	.89	.05	.93	.32	1.09	.33	.13	.02	0	0	0	3.76
1863-64.	.36	0	.73	.04	.04	2.50	.20	.01	1.25	.01	.11	0	5.25
1864-65.	0	.04	2.41	1.04	1.28	3.00	0	.56	0	.01	1.29	0	9.63
1865-66.	0	.02	.52	.84	5.05	3.43	1.47	.11	.09	0	0	.10	11.63
1866-67.	0	0	.24	1.82	2.32	.85	7.88	.48	.04	0	0	.30	13.93
1867-68.	0	.34	.45	3.06	3.37	1.63	.73	1.20	.15	0	.51	0	11.44
1868-69.	.05	0	2.00	1.52	2.88	1.88	1.98	.53	.33	0	.05	0	11.22
1869-70.	0	.05	2.32	.94	.54	.77	.33	.20	.28	0	.04	.07	5.54
1870-71.	0	1.54	.18	.42	.52	1.35	.01	.70	.34	0	0	0	5.06
1871-72.	0	0	1.33	1.39	.99	2.63	.46	.26	.12	0	0	.18	7.36
1872-73.	0	0	0	1.40	.44	4.15	.11	.10	.03	0	0	1.95	8.18
1873-74.	0	0	.77	5.46	3.11	3.73	1.20	.34	.34	0	.12	0	15.07
1874-75.	.11	.53	.88	.55	2.38	.37	.45	.12	.20	.02	0	.21	5.82
1875-76.	.39	0	2.25	.41	2.47	2.44	1.78	.06	.05	.05	.03	.06	9.99
1876-77.	.03	.08	.04	.15	1.05	.18	1.44	.26	.43	0	0	0	3.66
1877-78.	0	.81	.06	3.89	1.45	4.83	1.41	2.91	.58	.16	0	0	16.10
1878-79.	0	.96	0	1.57	3.54	1.04	.10	.60	T.	.07	0	0	7.88
1879-80.	0	.29	2.77	6.30	.61	1.50	1.43	1.34	.06	.06	.09	.32	14.77
1880-81.	0	.53	.28	4.15	.52	.45	1.88	1.35	.04	.05	0	.01	9.26
1881-82.	.04	.24	.12	.30	4.53	2.55	1.02	.45	.18	.07	0	T.	9.50
1882-83.	.01	.41	.39	.13	1.09	.95	.41	.31	1.14	.08	0	0	4.92
1883-84.	0	2.01	.20	1.82	1.34	9.05	6.23	2.84	2.17	.31	0	T.	25.97
1884-85.	.07	.35	.11	5.12	.35	.02	.78	1.20	.61	.06	T.	.13	8.80
1885-86.	T.	.31	1.56	.71	6.95	1.51	3.73	1.95	.04	.07	T.	T.	16.83
1886-87.	0	.05	.95	.10	.04	4.51	.02	2.14	.47	.04	.01	T.	8.33
1887-88.	T.	T.	2.08	1.14	1.96	1.48	2.79	.10	.22	.04	.01	T.	9.82
1888-89.	.04	.26	1.83	2.84	1.72	1.80	2.20	.19	.03	.10	T.	.04	11.05
1889-90.	T.	2.12	.12	7.71	2.79	1.70	.41	.05	.08	0	0	0	14.98
1890-91.	.65	.01	.72	1.61	1.21	4.84	.27	.76	.35	.05	T.	0	10.47
1891-92.	.08	.04	.10	1.29	1.58	2.96	.96	.41	1.15	.13	0	.05	8.75
1892-93.	T.	.22	.94	.69	.78	.47	5.50	.22	.39	T.	T.	0	9.21
1893-94.	0	.11	.91	1.91	.29	.49	1.05	.11	.09	.01	0	.04	5.01
1894-95.	.01	T.	0	2.26	7.33	.53	1.43	.11	.19	0	0	0	11.86
1895-96.	.01	.27	1.19	.27	1.27	.02	2.89	.25	.03	.01	T.	.13	6.34
1896-97.	T.	.97	.98	2.18	3.13	2.72	1.58	.02	.12	T.	.01	T.	11.71
1897-98.	T.	1.06	.02	.32	1.71	.06	.91	.22	.66	.02	0	0	4.98
1898-99.	.07	0	.15	.87	2.34	.30	.85	.29	.10	.27	0	.07	5.31
1899-1900.	0	.35	.86	.65	.69	.03	.53	1.26	1.45	.08	0	T.	5.90
1900-1901.	T.	.30	1.43	0	2.08	4.77	1.07	.01	.77	.02	T.	T.	10.45
1901-2.	.06	.28	.41	.02	1.70	1.57	1.86	.21	.06	T.	.32	T.	7.09
52-year mean													9.50

a Year incomplete.

*Record of precipitation at Warners, San Diego County.*

[Latitude, 33° 5'; longitude, 116° 40'; elevation, 2,894 feet. Authority, Charles E. McGary.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1900-1901			1.93		2.58	5.98	0.35	0.20	0.97				12.01

<sup>a</sup> Year incomplete.

*Record of precipitation at Santa Barbara, Santa Barbara County.*

[Latitude, 34° 25'; longitude, 119° 40'; elevation, 100 feet. Authority, United States War Department and Weather Bureau.

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1867-68.....	0	0	2.31	12.67	3.97	2.00	1.08	2.44	.72	0	0	0	25.19
1868-69.....	0	0	1.25	4.26	3.26	2.12	4.22	.46	.20	0	0	0	15.77
1869-70.....	0	0.30	.65	.57	.25	5.87	.83	.99	.74	0.07	0	0	10.27
1870-71.....	0	1.04	.27	1.41	.86	2.92	.02	2.02	.37	0	0	0	8.91
1871-72.....	0	.09	1.83	6.56	2.53	1.81	.18	1.80	0	.14	0	0.02	14.96
1872-73.....	0.05	0	0	4.34	.58	5.48	.05	0	0	0	0	0	10.50
1873-74.....	0	0	.27	5.26	4.54	3.17	.78	.28	.14	0	0	0	14.44
1874-75.....	0	1.91	1.30	0	14.84	.18	.38	.10	0	0	0	0	18.71
1875-76.....	0	0	6.53	.31	7.56	5.67	2.73	.27	0	0	0	0	23.07
1876-77.....	0	.32	0	0	2.72	0	.82	.18	.45	0	0	0	4.49
1877-78.....	0	0	1.32	3.12	7.17	11.73	2.47	3.34	.29	.07	0	0	29.51
1878-79.....	0	.32	0	5.16	5.24	.71	.34	1.60	.21	0	0	0	13.58
1879-80.....	0	.41	1.62	4.57	1.30	10.86	1.15	5.73	0	0	0	0	25.64
1880-81.....	0	.25	.28	9.73	2.83	.30	1.25	.59	0	0	0	0	15.23
1881-82.....	.44	1.47	.33	.95	1.13	2.38	5.74	1.63	0	.20	0	0	14.27
1882-83.....	0	.37	.77	.10	2.18	2.92	3.64	.29	2.79	.35	0	0	13.41
1883-84.....	0	1.32	0	2.76	6.33	9.68	9.77	2.60	.39	1.62	0	0	34.47
1884-85.....	0	1.02	.79	6.62	1.23	.07	.35	3.00	0	0	0	0	13.08
1885-86.....	0	.19	9.84	2.47	5.12	1.19	2.03	3.40	0	0	0	0	24.24
1886-87.....	0	.39	.87	.86	.31	8.64	.13	1.43	.33	.03	0	0	12.99
1887-88.....	.38	.31	1.10	4.43	10.15	1.30	3.86	.16	.02	T.	T.	T.	21.71
1888-89.....	.03	.07	5.62	5.59	.29	1.29	7.31	.49	.76	.13	0	0	21.58
1889-90.....	0	8.65	3.21	10.64	5.32	2.96	1.10	.31	.18	0	0	0	32.37
1890-91.....	1.50	0	.48	3.53	.50	8.82	1.65	1.90	0	0	0	0	18.38
1891-92.....	.18	0	0	2.26	1.04	2.48	3.36	.34	.62	0	0	0	10.28
1892-93.....	0	.42	3.70	7.31	4.52	3.55	7.53	.38	0	0	0	0	27.41
1893-94.....	0	.62	T.	3.50	.65	.50	.22	.35	.86	0	.15	0	6.85
1894-95.....	1.36	.78	.11	4.16	6.25	.67	1.99	.46	.02	.05	T.	0	15.85
1895-96.....	0	.55	.77	.93	6.84	0	2.37	1.78	.08	.05	.40	0	13.77
1896-97.....	0	.92	3.51	2.92	4.35	3.65	2.73	.02	0	0	0	0	18.10
1897-98.....	0	1.44	0	0	.63	1.39	.28	T.	1.25	0	T.	0	4.99
1898-99.....	3.17	.14	0	.36	4.48	0	2.78	.64	0	.78	0	0	12.35
1899-1900.....	0	2.06	1.97	2.35	2.32	.05	1.58	.42	1.90	.01	.02	T.	12.68
1900-1901.....	.04	.15	3.99	.02	4.86	3.65	.16	2.07	.34	.10	.06	.09	15.53
1901-2.....	.36	2.42	1.16	T.	1.36	4.40	2.89	1.40	.07	0	0	0	14.06
35-year mean													16.82



*Record of precipitation at Mount Hamilton (Lick Observatory), Santa Clara County.*

[Latitude,  $37^{\circ} 20'$ ; longitude,  $121^{\circ} 38'$ ; elevation, 4,440 feet. Authority, Lick Observatory.]

[illegible]

*a* Year incomplete.

*Record of precipitation at Delta, Shasta County.*

[Latitude, 41° 00'; longitude, 122° 23'; elevation, 1,138 feet. Authority, Pacific Railway System.]

[illegible]



*Record of precipitation at Fort Crook, Shasta County.*

[Latitude, 40° 10'; longitude, 121° 20'; elevation, 3,390 feet. Authority, U. S. War Department.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1857-58.....					2.23	4.38	2.57	1.28	0.13	0.34	0	0.03	a 10.96
1858-59.....	0.04	3.67	1.32	6.39	1.81	5.96	4.06	1.26	.60	0	0	.05	25.16
1859-60.....	1.80	0	3.85	1.00	2.14	.27	5.10	3.09	3.06	.44	2.22	0	22.97
1860-61.....	.23	2.97	1.33	5.04	1.20	4.78	4.03	1.82	1.33	.66	0	0	23.39
1861-62.....	0	.09	6.18	9.75	8.22	4.89	3.53	2.64	2.59	2.45	.02	0	40.36
1862-63.....	.40	.09	0	1.81	3.60	3.09	2.80	1.00	1.40	0	0	0	13.19
1863-64.....	0	.39	.06	2.00	1.10	0	.58	1.00	1.34	.35	0	0	6.82
1864-65.....	0	1.05	7.00	7.47	3.16	2.16	2.23	1.20	1.30	.60	0	0	26.17
1865-66.....	1.02	1.55	8.75				8.25	.87					a 20.44
1866-67.....	0	0	.80	11.75	5.27	4.44	.75	1.86	.50	.30	0	0	25.67
1867-68.....	.80	.73	1.12							1.67	.16	0	a 4.48
1868-69.....	0	.50	.56	3.25	2.85		4.82	1.56					a 13.54
8-year mean.....													22.97

a Year incomplete.

*Record of precipitation at Redding, Shasta County.*

[Latitude, 40° 33'; longitude, 122° 27'; elevation, 565 feet. Authority, Pacific Railway System.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1890-91.....					1.68	9.95	3.05	2.31	3.17	1.91	0.75	0	a 22.82
1891-92.....	0.13	0.02	0.08	8.36	1.19	1.32	1.41	2.31	3.23	.20	0	0	18.25
1892-93.....	0	2.46	8.96	14.27	4.18	4.75	9.17	3.94	1.35	0	0	0	49.08
1893-94.....	3.05	.27	7.60	3.97	9.69	7.65	3.20	2.60	1.31	.65	0	0.42	40.41
1894-95.....	1.59	5.85	.99	15.35	12.84	3.08	2.78	.99	2.61	0	.95	T.	47.03
1895-96.....	3.24	.01	2.12	4.36	14.52	.79	4.17	4.05	8.97	.35	T.	.38	42.96
1896-97.....	.81	1.99	6.30	8.98	4.42	6.80	5.29	3.02	0	1.59	0	0	39.20
1897-98.....	.15	1.36	1.69	3.60	.54	3.77	0	.76	3.64	.15	0	T.	15.66
1898-99.....	.13	1.56	2.23	2.35	9.66	1.04	8.86	.61	.82	2.46	0	.08	29.80
1899-1900.....	0	4.83	8.50	4.18	6.45	2.86	3.68	2.59	3.12	1.38	T.	.16	37.75
1900-1901.....	2.48	6.47	3.03	3.14	6.33	5.52	.57	5.11	.41	T.	.01	T.	33.07
1901-2.....	3.11	3.08	6.45	4.37	1.37	19.97	4.73	4.69	2.94	0	.01	.03	50.75
11-year mean.....													36.72

a Year incomplete.

*Record of precipitation at Sims, Shasta County.*

[Latitude, 41° 05'; longitude, 122° 21'; elevation, 1,387 feet. Authority, Pacific Railway System.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1887-88.....							4.74	1.00	2.53	4.37	0.14	0	a 12.78
1888-89.....	0.10	0		9.21	0.42			1.87	3.55	2.73	0	0	a 17.88
1889-90.....	0	28.57	13.32	19.85	17.84	18.30	19.83	5.53	2.64	.65	0	0	126.53
1890-91.....	1.44	0	0	8.80	4.01	5.29	2.85	6.03	4.36	2.17	.40	0	35.35
1891-92.....	1.50	4.08	3.51	7.36	1.12	4.39	8.81	8.39	7.27	.74	.19	0	47.36
1892-93.....	1.24	1.64	13.39	26.92	3.50	4.39	8.94	9.67	4.57	T.	0	0	74.26
1893-94.....				3.48	10.98	4.40	6.37	1.00	3.42	2.52	T.	0.36	a 32.53
1894-95.....	2.80	1.65											a 4.45
4-year mean.....													70.88

a Year incomplete.



*Record of precipitation at Fort Jones, Siskiyou County.*

[Latitude, 41° 35'; longitude, 122° 51'; elevation, 2,570 feet. Authority, U. S. War Department.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1852-53.....					3.78	1.38	3.39	1.02	1.17	0.41	0.13		a 11.28
1853-54.....	0.20	0.48	4.47	1.19	.54	2.62	.75	1.99	.21	.63	.20	0.21	13.49
1854-55.....	0	4.18	.48	1.13	1.58	3.83	5.24	1.50	.87	.08	0	0	18.89
1855-56.....	.20	1.40	1.77	6.47	1.59	.42	1.18	1.84	2.77	.60	0	.20	18.44
1856-57.....	0	.13	1.78	8.93	3.62	7.59	2.35	0	.69	1.86	0	0	26.95
1857-58.....	.60	.80	4.47	4.24	6.15	8.78	3.69	1.15	1.55	.60	0	0	32.03
5-year mean.....													21.96

a Year incomplete.

*Record of precipitation at Hornbrook, Siskiyou County.*

[Latitude, 41° 50'; longitude, 122° 50'; elevation, 2,154 feet. Authority, Pacific Railway System.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1887-88.....	0.15	0.12	0.92	2.58	1.16	1.08	0.61	T.	2.58	2.74	0.15	0.17	12.26
1888-89.....	.32	0	2.57	2.94	.60	.10	2.07	0.43	2.34	0	0	0	11.37
1889-90.....	0	1.95	2.93	2.92	6.00	9.91	.70	.20	.44	.60	.85	.46	26.96
1890-91.....	0	0	0	1.90	.35	2.99	.67	.90	2.40	1.60	.35	0	11.16
1891-92.....	.55	.65	.70	4.55	.70	.35	1.40	1.50	.50	.60	0	0	11.50
1892-93.....	.45	.68	2.65	3.98	1.05	1.15	.30	1.50	1.20	T.	.95	0	13.91
1893-94.....	.80	1.60	4.17	3.33	3.20	.70	1.50	0	3.78	1.12	0	0	20.20
1894-95.....	0	1.30	.70	2.30	2.40	.20	2.69	.20	1.20	1.50	.60	.60	13.69
1895-96.....	.55	0	.60	2.95	6.30	.90	2.47	2.00	1.80	0	.80	.57	18.94
1896-97.....	.58	2.02	6.04	5.85	.85	2.10	.80	.40	0	0	0	0	18.64
1897-98.....	0	.60	4.48	3.18	2.95	.10	0	0	.81	0	0	0	12.12
1898-99.....	.28	1.45	3.02	.77	2.17	.63	3.90	0	.10	1.10	0	T.	12.42
1899-1900.....	0	1.27	4.66	2.80	3.24	.02	6.10	.57	.46	.55	0	0	19.67
1900-1901.....	0	3.81	3.96	3.13	3.60	2.13	.10	0	.13	0	0	.10	16.96
1901-2.....	1.10	.70	1.17	.93	0	4.96	.55	1.11	1.27	.51	T.	.60	12.90
15-year mean.....													15.51

*Record of precipitation at Montague, Siskiyou County.*

[Latitude, 41° 44'; longitude, 122° 31'; elevation, 2,542 feet. Authority, Pacific Railway System.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1888-89.....	0.61	0.16	0.98	0.30	0.50	0.04	1.78	0.55	1.70	0.60	0	0	7.22
1889-90.....	0	3.20	1.60	3.74	3.70	6.05	3.60	.33	.82	1.15	0	0.35	24.54
1890-91.....	.90	0	0	1.40	.70	2.33	.75	.45	1.74	1.25	.45	0	9.97
1891-92.....	.15	.20	.35	1.83	.10	T.	.75	.40	1.40	0	.35	0	5.53
1892-93.....	0	0	1.25	2.21	.51	1.88	.87	1.75	.44	0	0	0	8.91
1893-94.....	.72	.44	3.05	2.34	2.72	2.13	2.28	.05	2.50	1.04	0	0	17.27
1894-95.....	0	1.00	.54	1.75	2.25	.55	.40	0	.81	0	T.	0	7.30
1895-96.....	.44	0	.56	1.58	3.40	.40	1.49	.81	.96	0	0	.48	10.12
1896-97.....	0	0	2.25	1.43	1.49	2.66	1.35	0	0	1.11	0	0	10.29
1897-98.....	0	0	.76	1.63	.30	1.63	.10	0	.80	0	0	0	5.22
1898-99.....	0	.16	2.18	.20	.72	.22	1.50	.20	.60	.53	0	.56	6.87
1899-1900.....	0	.90	3.15	2.95									a 7.00
11-year mean.....													10.29

a Year incomplete.

*Record of precipitation at Scott Valley, Siskiyou County.*

[Latitude, 41° 45'; longitude, 123° 02'; elevation, 2,570 feet. Authority, Isaac Titcomb.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1858-59.....												0.50	a 0.50
1859-60.....	0.87	1.00	4.33	0.75	2.59	1.25	4.12	0.75	2.00	0.50	1.62	.24	20.02
1860-61.....	.49	2.22	2.00	5.74	1.12	2.50	2.50	3.00	.54	.30	0	0	20.41
1861-62.....	0	.51	11.56	10.63	9.29	3.75	1.32	2.00	1.00	.80	.10	0	40.96
1862-63.....	.02	.15	.12	1.90	4.75	1.75	2.45	2.00	.40	1.93	.25	.09	15.81
1863-64.....	.40	.25	1.85	6.17	2.07	.43	.82	2.70	.51	.31	0	.63	16.14
1864-65.....	.04	.31	6.00	12.75	1.87	2.40	1.30	.32	.05	.75	.35	.02	26.16
1865-66.....	1.15	1.33	9.79	1.21	6.59	3.50	9.20	.02	1.72	.62	.50	.47	36.10
1866-67.....	0	.08	2.51	11.75	9.12	2.02	.64	1.34	.41	.04	0	.26	28.17
1867-68.....	.40	.88	1.75	9.68	3.06	1.50	3.70	1.14	.18	1.06	0	0	23.35
1868-69.....	.06	.50	.77	2.80	5.76	1.13	1.32	3.61	1.52	.69	.13	0	18.29
1869-70.....	1.00	.01	3.04	3.56	5.00	2.91	1.73	1.37	1.12	.13	0	0	19.87
1870-71.....	.01	.02	1.00	3.50	1.86	2.47	1.62	2.27	.55	.26	.35	0	13.91
1871-72.....	.37	.05	1.62	7.68	4.18	6.94	1.40	.34	.25	.03	.01	.01	22.88
1872-73.....	.41	.16	2.67	3.38	1.33	3.00	1.05	1.50	.27	.03	.03	.05	13.88
1873-74.....	.37	.94	1.71	4.49	6.38	1.80	3.65	1.55	.71	.13	.01	.09	21.83
1874-75.....	0	1.55	4.33	.43	3.13	.17	1.79	.35	.75	.12	.38	.05	13.05
1875-76.....	0	4.45	7.31	7.33	2.26	3.33	3.94	.71	1.19	.18	.34	1.50	32.54
1876-77.....	1.02	3.75	.54	.01	1.71	4.23	3.10	1.23	1.48	.71	.12	.02	17.92
1877-78.....	.01	.45	.67	1.62	9.72	6.53	3.74	.27	.20	.12	.01	.06	23.40
1878-79.....	.36	2.81	2.16	1.14	3.25	3.54	8.39	2.66	1.40	.27	.38	.47	26.83
1879-80.....	.11	.81	4.64	4.58	10.62	2.32	2.65	5.39	1.32	.02	.37	.07	32.90
1880-81.....	0	.18	.32	6.76	13.95	6.53	.79	1.19	.17	1.04	.54	.04	31.51
1881-82.....	.76	3.53	2.40	4.60	4.48	5.69	2.22	2.45	1.29	.08	2.49	0	29.99
1882-83.....	1.44	2.86	2.72	3.75	2.58	1.51	1.11	3.25	2.65	0	.40	.63	22.90
1883-84.....	.66	2.41	1.11	4.75	4.28	3.14	3.45	3.06	1.65	.87	1.62	.01	27.01
1884-85.....	.60	1.04	.16	8.18	2.50	3.49	.11	1.98	1.40	1.40	1.16	.01	22.03
1885-86.....	.83	.53	10.24	3.26	7.22	1.32	1.32	3.23	1.77	.03	2.13	.85	32.73
1886-87.....	0	1.85	.78	6.67	5.18	4.96	1.07	2.63	.94	.36	.37	.18	24.99
1887-88.....	.36	.09	1.75	5.88	6.18	1.77	2.43	.18	1.80	4.21	.60	.11	25.36
1888-89.....	.58	.40	1.94	1.59	2.71	.50	4.35	2.56	4.71	.19	1.11	0	20.64
1889-90.....	0	3.95	3.37	12.84	21.81	11.10							a 53.07
30-year mean.....													24.05

a Year incomplete.

*Record of precipitation at Sissons, Siskiyou County.*

[Latitude, 41° 27'; longitude, 122° 25'; elevation, 3,555 feet. Authority, Pacific Railway System.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1881-82.....	0.99	2.53	3.34	8.54	6.35	2.90	1.74	1.65	0.60	0	0	0	28.64
1882-83.....	1.19	4.44	3.20	1.65	.99	1.10	10.15	6.15	0	0	0	0	28.87
1888-89.....	.40	3.70	2.17	2.91	.60	.40	16.27	.63	2.40	0.23	0	0	29.71
1889-90.....	0	16.45	5.80	16.13	5.69	9.33	5.30	2.98	2.75	.44	0	0	64.87
1890-91.....	1.20	.13	0	3.18	.40	7.17	.61	3.64	2.65	.44	0.60	0	20.02
1891-92.....	.32	.30	.35	11.20	2.34	.66	4.19	5.38	3.74	.39	0	0	28.87
1892-93.....	1.71	1.03	8.75	9.57	3.10	2.80	2.77	2.60	2.66	.03	0	0	35.02
1893-94.....	.68	.61	4.25	2.87	10.72	2.60	3.45	.70	2.85	2.25	0	0	30.98
1894-95.....	.99	3.65	1.70	11.13	9.12	1.24	3.84	1.27	2.05	0	.55	0	35.54
1895-96.....	4.65	3.70	.70	4.31	21.09	.21	4.16	3.55	3.02	0	.13	0.31	45.83
1896-97.....					2.59	4.86	.43	.53	0	.15	0	0	a 8.56
1897-98.....	0	2.31	2.62	3.72	0	10.45	4.70	1.05	6.13	1.03	.13	0	32.14
1898-99.....	0	0	1.70	2.10	5.55	1.03	2.98	.23	1.32	.89	0	1.32	17.12
1899-1900.....	0	4.01	10.83	5.67	8.64	1.04	9.92	3.49	2.05	1.24	0	.16	47.05
1900-1901.....	.67	10.76	4.52	3.80	11.97	8.99	.62	2.73	.95	0	.26	.36	45.63
1901-2.....	2.08	1.93	6.58	2.77	1.83	21.73	4.14	5.08	2.87	T.	.38	4.16	53.55
15-year mean.....													36.26

a Year incomplete.

*Record of precipitation at Walla Walla Creek, Siskiyou County.*

[Latitude, 41° 42'; longitude, 122° 55'; elevation, 3,000 feet. Authority, S. Titecomb.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1888-89.....					1.86	0.25	3.85	1.66	3.46	0.19	1.11	0	a 12.38
1889-90.....	0	3.95	3.37	8.09	11.86	9.10	4.93	1.24	1.29	.28	0	0.85	44.96
1890-91.....	1.84	.10	.19	3.85	1.70	6.13	2.03	1.11	3.28	.99	.22	.40	21.84
1891-92.....	1.18	.39	1.10	12.40	2.38	.47	2.39	2.94	1.29	.76	.35	0	25.65
1892-93.....	.82												a .82
3-year mean.....													30.82

a Year incomplete.

*Record of precipitation at Yreka, Siskiyou County.*

[Latitude, 41° 45'; longitude, 122° 32'; elevation, 2,635 feet. Authority, Dr. L. Antevinh.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1871-72.....	0.33	1.24	1.98	2.61	3.83	1.91	1.67	2.04	0.44	0	0.14	0	16.19
1872-73.....	.25	1.55	1.43	3.92	1.28	1.77	.40	.90	.60	0	0	0	12.10
1873-74.....	.44	.55	1.17	2.20	3.78	1.62	1.49	.74	.34	0.44	0	0	12.77
1874-75.....	0	1.29	2.16	0	4.35	.19	1.49	.17	.51	.30	.07	0	10.53
1875-76.....	0	3.34	5.29	6.07	2.00	1.93	2.07	.42	.65	.20	.32	0.19	22.48
1876-77.....	.90	3.05	.43	.26	1.20	3.24	1.48	.74	1.56	.65	.18	0	13.69
1877-78.....	.90	.20	3.84	.95	6.12	3.91	2.80	.37	.56	0	.75	0	20.40
1878-79.....	.25	.45	1.15	.45	1.53	1.41	3.96	1.56	1.42	.39	.22	.15	12.94
1879-80.....	.25	.77	2.32	7.23	2.43	.61	1.20	2.23	.41	.15	0	0	17.00
1880-81.....	0	.13	.10	2.42	11.78	2.58	.19	.48	0	1.23	0	0	18.91
1881-82.....	.30	3.24	.68	1.60	1.81	1.96	.42	1.20	1.02	0	0	0	12.23
1882-83.....	.90	1.88	1.89	2.09	1.38	.47	.53	1.26	1.76	0	.33	.25	12.74
1883-84.....	.33	1.35	.66	2.95	2.10	1.20	2.34	1.41	1.40	1.78	1.33	.51	17.36
1884-85.....	.33	0	.79	6.19	1.16	2.94	0	1.12	3.65	1.66	.58	0	18.42
1885-86.....	.49	.29	2.98	2.10	4.03	.91	.74	1.78	1.05	0	1.51	.15	16.03
1886-87.....	0	1.69	.30	4.14	3.21	3.01	.41	2.35	1.42	.84	1.28	.31	18.96
1887-88.....	.21	0	1.04	1.99	4.90	1.19	1.16	.11	1.12	2.39	.24	0	14.35
1888-89.....	.87	.34	1.13	0	1.30	1.30	2.12	1.32	1.70	.10	.94	0	11.12
1889-90.....	0	3.53	2.23	4.08	3.59	8.89	3.09						a 25.41
1890-91.....						3.59	1.15	.93	1.48	1.36	.41	0	a 8.92
1891-92.....	.82	.43	2.20	3.92	1.65	.15	1.02	1.02	1.20	.87	.31	0	13.59
1892-93.....	.61	.05	3.37	3.64	1.20	2.53	1.53	2.10	.87	.32	.58	.08	16.88
1893-94.....	1.12	.54	7.83	2.11	7.59	3.22	3.32	.10	3.31	.70	.77	.41	31.02
1894-95.....	.01	1.60	.57	5.40	5.30	1.03	2.26	.81	1.59	0	.43	.68	19.68
1895-96.....	.82	T.	.86	4.31	7.37	1.08	1.89	2.28	2.75	.81	.73	1.01	23.91
1896-97.....	.52	.89	5.02	3.70	.42	3.89	2.18	.39	.58	1.51	0	.20	19.30
1897-98.....	.12	.68	2.94	3.76	.83	1.44	.42	.48	2.08	.10	.62	.05	12.92
1898-99.....	.14	.51	2.74	1.04	2.75	1.95	1.77	.21	.62	.61	.03	.12	12.49
1899-1900.....	.07	2.34	5.00	3.80	1.35	2.13	1.12	.42	.37	1.36	0	1.35	19.31
1900-1901.....	.43	3.66	2.00	3.23	8.12	2.86	.98	.40	.52	0	.01	.95	23.16
1901-2.....	1.24	1.28	1.81	3.09	.39	6.68	1.53	1.21	1.08	.03	.19	.01	18.54
20-year mean.....													16.88

a Year incomplete.

*Record of precipitation at Weaverville, Trinity County.*

[Latitude, 40° 46'; longitude, 123° 25'; elevation, 2,162 feet. Authority, George E. Noonan.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1869-70.....	1.06	1.03	8.01	6.15	10.11	9.64	2.05	1.06	0.22	0	0	0	39.33
1870-71.....	.64	1.39	6.41	9.43	8.16	11.19	3.02	1.73	1.03	0.14	0	0	43.14
1871-72.....	.29	.40	11.50	3.52	19.62	15.09	3.11	2.43	.84	.17	0	0.25	57.22
1872-73.....	.35	.78	3.01	6.32	6.51	4.29	2.78	.50	.27	0	0	0	24.81
1873-74.....	1.80	4.39	4.02	9.57	15.40	4.41	3.12	3.58	2.67	.70	0	0	49.06
1874-75.....	0	1.57	10.30	1.32	6.59	.46	2.14	.19	1.22	.93	0	0	24.72
1875-76.....	0	2.82	15.39	11.94	9.69	9.49	8.23	2.79	1.63	.15	0.47	0	62.60
1876-77.....	.67	7.38	1.50	.29	6.27	6.24	4.52	2.26	1.62	1.72	.02	.21	32.70
1877-78.....	0	1.83	8.72	6.50	19.83	16.20	8.53	2.42	1.07	.07	.02	.03	65.22
1878-79.....	1.28	1.80	3.58	4.91	2.02	6.48	12.84	4.05	4.02	.68	.02	.03	41.71
1879-80.....	.03	2.08	8.09	13.20	6.64	2.59	4.72	10.78	1.46	.23	.38	.36	50.56
1880-81.....	0	.55	1.49	14.14	18.61	11.05	1.21	3.13	1.15	.99	0	0	52.32
1881-82.....	.93	3.77	2.58	8.00	4.19	6.90	3.62	2.44	1.29	0	0	0	33.72
1882-83.....	1.38	8.36	.78	5.05	4.46	1.50	3.24	5.00	3.72	0	0	0	33.49
1883-84.....	.88	2.45	1.50	4.97	8.81	3.56	5.10	6.29	1.60	2.93	.13	0	38.22
1884-85.....	.44	.11	16.56	6.78	3.68	3.70	.15	2.78	.51	1.41	0	0	36.12
1885-86.....	-----	-----	-----	-----	8.71	.80	2.94	-----	-----	-----	-----	-----	a 12.45
16-year mean	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	42.85
1893-94.....	-----	-----	-----	-----	11.47	5.02	4.60	-----	2.22	-----	-----	-----	a 23.31

a Year incomplete.

*Record of precipitation at Milo, Tulare County.*

[Latitude, 36° 15'; longitude, 118° 50'; elevation, 3,200 feet. Authority, Henry Murphy.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1900-1901.....	-----	-----	-----	-----	5.74	4.06	1.33	2.45	3.36	0	0	0	a 16.94
1901-2.....	0.51	1.80	1.47	0.27	1.00	6.47	4.33	1.69	.54	0	T.	0	18.08

a Year incomplete.

*Record of precipitation at Mountain Home, Tulare County.*

[Latitude, 36° 10'; longitude, 118° 48'; elevation, 6,680 feet. Authority, Fred Moller and N. T. Bailey.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1895-96.....	-----	-----	-----	-----	14.36	0.84	8.93	8.63	1.30	2.70	0.65	0.50	a 37.91
1896-97.....	-----	0.60	0.40	1.95	5.70	7.45	6.07	.40	1.85	.20	.25	0	a 24.87
1897-98.....	0.10	2.45	.73	3.31	-----	-----	-----	-----	-----	-----	-----	-----	a 6.59

a Year incomplete.

*Record of precipitation at Porterville, Tulare County.*

[Latitude, 36°; longitude, 119°; elevation, 461 feet. Authority, Southern Pacific Company, M. F. Murphy, agent.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1892-93.....	-----	-----	0.54	2.43	0.83	1.85	3.68	0.27	0	0	0	0	<i>a</i> 9.60
1893-94.....	0	0	.07	.61	1.52	.83	.70	.32	0.42	1.09	0	0	5.56
1894-95.....	0.43	.15	.04	3.13	3.82	1.54	1.70	.41	.35	0	0	0	10.97
1895-96.....	0	.23	1.71	.51	1.61	T.	.67	.82	.13	0	.69	0	6.37
1896-97.....	0	.65	.94	.93	1.96	2.46	2.00	.30	.42	0	0	0	9.66
1897-98.....	0	1.19	.50	.89	.75	1.55	.68	0	.55	0	0	0	6.11
1898-99.....	2.10	0	.27	.35	1.01	.17	2.92	.19	.10	.85	0	T.	7.96
1899-1900.....	0	1.08	.88	.91	.97	.16	.89	1.94	2.41	0	T.	0	9.24
1900-1901.....	T.	.04	3.44	.30	2.74	1.78	.30	2.19	1.97	0	0	T.	12.76
1901-2.....	.41	.45	.71	T.	.84	2.96	2.28	1.53	.15	0	T.	0	9.33
10-year mean.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.76

*a* Year incomplete.

*Record of precipitation at Crockers (Sequoia post-office), Tuolumne County.*

[Latitude, 37° 50'; longitude, 119° 53'; elevation, 4,452 feet. Authority, H. R. Crocker.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1895-96.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.10	<i>a</i> 3.10
1896-97.....	0.14	2.30	9.18	5.41	6.56	15.97	21.80	1.33	0	0.75	0	0	63.44
1897-98.....	.45	6.09	2.70	3.80	2.60	7.15	3.74	1.10	3.74	0	0	0	31.37
1898-99.....	1.58	1.87	1.85	2.12	11.72	1.80	18.09	1.60	.15	1.65	0	0	42.43
1899-1900.....	0	11.50	7.45	12.18	5.98	1.18	<i>b</i> 4.28	3.56	1.80	.47	0	0	48.40
1900-1901.....	.62	9.71	17.43	1.39	16.99	15.71	3.03	6.35	3.81	0	0	0	75.04
1901-2.....	3.28	4.59	3.90	2.50	2.33	15.03	8.55	6.54	1.80	0	0	.11	48.63
6-year mean.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	51.55

*a* Year incomplete.

*b* March, 1900, violent hailstorm.

*Record of precipitation at Dering Creek (30 miles east of Sonora), Tuolumne County.*

[Latitude, 38° 00'; longitude, 119° 40'; elevation, 7,000 feet.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1898-99.....	-----	1.85	2.88	2.78	9.95	2.77	17.08	0.12	-----	-----	-----	-----	<i>a</i> 37.43

*a* Year incomplete.







*Record of precipitation at Frazier mine, Ventura County.*

[Latitude, 34° 45'; longitude, 118° 00'; elevation, 8,000 feet. Authority, Harry C. Porter.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1894-95.....									0.40	0	0	0	a 0.40
1895-96.....	0	0.30	0.90	0.68	2.94	0	3.12	2.22	1.03	0	0.15	3.73	15.07
1896-97.....	0	1.47	.73	4.07	7.37	6.33	4.05	.16	.28	0	.02	.48	24.96
1897-98.....	0.33	1.00	T.	1.35									a 2.68
1898-99.....										0.60	.0		a .60
2-year mean.....													20.02

a Year incomplete.

*Record of precipitation at Mutch Flat, Ventura County.*

[Latitude, 34° 38'; longitude, 119° 03'; elevation, 4,850 feet. Authority, Burt Snedden Griffen.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1893-94.....	0.22	1.70	0	4.10	0.54	1.41	0.30	0.13	0.79	0	0	0	9.19
1894-95.....	0	.85	0	7.33	9.80	.78	2.95	0	0	0	0	0	21.71
1895-96.....	0	.65	1.60	1.10	4.58	0	4.79	3.50	.52	0	0.30	0	17.04
1896-97.....	0	1.75	1.50	2.80	9.10	3.50	3.59	0	0	0	.30	0	22.54
1897-98.....	0	1.75	0	.15	.60	1.00	.80	0	.60	0.40	0	0	5.30
1898-99.....	1.80	0	0	.30	2.25	0	2.50	.50	0	0	0	0	7.35
1899-1900.....	0	2.00	1.30	2.25	2.80	0	1.95	.40	1.80	0	0	0	12.50
1900-1901.....	0	0	5.10	0	7.00	4.60	.25	1.10	.58	0	0	0	18.63
1901-2.....	0	2.85	.65	0	.75	3.23	2.80	1.41	0	0	0	0	11.69
9-year mean.....													13.96

*Record of precipitation at Nordhoff, Ventura County.*

[Latitude, 34° 27'; longitude, 119° 08'; elevation, 1,200 feet. Authority, R. Robinson, J. W. Wolf, and H. Lathrop.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1886-87.....	0	0.36	1.10	0.78	0.22	16.81	0.44	1.88	0.18				a 21.77
1887-88.....			1.63	5.29	7.46	1.28	5.47	.54	.26				a 21.93
1888-89.....		0	5.96	7.22	0								a 13.18
1890-91.....											0	0	a 0
1901-92.....	0.25	0	T.	2.58	.67	2.75	3.68	.47	1.39	0	0	0	11.79
1892-93.....	0	1.08	1.35	8.75	5.80	3.64	7.75	.45	T.	0	0	0	28.82
1893-94.....	0	.61	T.	3.45	.68	.74	.29	.19	.97	0	0.03	0	6.96
1894-95.....	.03	.45	0	6.39	8.61	.46	3.66	.39	0	0	0	0	19.99
1895-96.....	0	.10	1.09	0	5.78	0	3.42	1.72	0	0	.22	T.	12.33
1896-97.....	0	1.38	1.03	3.00	4.11	7.16	2.91	0	0	0	0	0	19.59
1897-98.....							.43	0		0	0	0	a .43
1898-99.....	0	.13			3.98		2.71	.27	0	0		0	a 7.09
1899-1900.....													17.13
1900-1901.....													36.37
1901-2.....	.25	4.38	1.25	0	1.37	5.50	4.13	2.50	0	0	0	0	19.38
9-year mean.....													19.15

a Year incomplete.

*Record of precipitation at Smith's ranch, Ventura County.*

[Latitude, 34° 44'; longitude, 118° 47'; elevation, 4,000 feet. Authority, William Smith, Gorman Station.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1898-99					0.82	1.00	1.45	0	0	0	0	0	a 3.27
1899-1900	0	0.95	0.65	0.35	1.20	0	1.12	0.12	0.75	0	0	0	5.14
1900-1901	0.15	0	3.10	0	2.35	2.25	.10	.32	.45	0	0	0.95	9.67
1901-2	.10	.25	.20	0									a .55
2-year mean													7.41

a Year incomplete.

*Record of precipitation at Snedden's ranch, Ventura County.*

[Latitude, 34° 41'; longitude, 119° 03'; elevation, 4,900 feet. Authority, Burt Snedden Griffin.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1892-93											0.14	0.02	a 0.16
1893-94	0.03	0.72	0	4.45	1.31	0.65	0.45	0.16	0.75	0	0	1.15	9.67
1894-95	.75	0	0	6.99	6.31	.49	1.50	.11	0	0	0	0	16.15
1895-96	0	.16	0.91	.55	3.47	0	5.02	3.79	.57	0	.25	T.	14.72
1896-97	.33	1.10	1.35	2.40	8.30	2.92	2.71	.02	0	0	.25	.20	19.58
1897-98	.14	.70	0	.05	.60	.41	.65	0	.54	0.35	0	0	3.44
1898-99	1.75	0	0	.30	2.65	0	1.50	.50	0	0	0	0	6.70
1899-1900	0	1.50	.47	.27	1.40	T.	1.45	.50	1.40	0	0	0	6.99
1900-1901	0	0	4.52	0	3.70	3.80	.10	1.10	.47	0	0	0	13.69
1901-2	0	1.75	1.75	0	.56	2.95	1.85	.50	0	0	0	0	9.36
9-year mean													11.14

a Year incomplete.

*Record of precipitation at Upper Lake, Ventura County.*

[Latitude, 34° 41'; longitude, 119° 03'; elevation, 4,900 feet. Authority, U. S. Weather Bureau.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1890-91												0	a 0
1891-92	0.95	0.62	0.71	7.35	3.93	2.50	3.18	2.84	3.71	0.49	0	0	26.28
1892-93	T.	1.17	3.50	5.30	4.08	5.19	5.47	2.37	1.04	0	T.	0	28.12
1893-94	.85	.47	4.83	2.82	10.43	6.21	1.80	1.46	1.02	1.12	0	T.	31.01
1894-95	.53	2.05	1.13	11.62	14.92	4.15	3.20	1.41	1.39	0	0.05	T.	40.45
1895-96	.46	T.	3.50	5.30	11.18	.80	2.39	6.01	2.07	0	T.	0.87	32.58
1896-97	.42	1.04	5.07	6.47	3.45	6.35	4.58	.42	.22	.97	.05	0	29.04
1897-98	.08	1.67	2.38	2.61	.93	4.57	.36	.43	1.90	.58	0	T.	15.51
1898-99	.60	1.01	1.66	1.34	8.16	.25	5.59	.90	1.00	.05	0	.03	20.59
1899-1900	0	3.49	6.33	9.79	3.98	1.31	3.53	2.13	.81	.35	T.	0	31.72
1900-1901	.03	3.96	5.08	3.63	6.44	4.75	1.06	2.43	.70	0	T.	T.	28.08
1901-2	1.11	1.09	4.35	2.09	1.35	12.82	3.87	2.85	1.60	0	0	.07	31.20
11-year mean													28.60

a Year incomplete.

*Record of precipitation at Ventura, Ventura County.*

[Latitude, 34° 20'; longitude, 119° 20'; elevation, 50 feet. Authority, Mr. Saxby.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1873-74.....	0	0	0.50	4.50	3.75	4.75	1.00	0	0.50	0	0	0	15.00
1874-75.....	0	0.50	.75	0	13.75	.12	.12	0	0	0	0	0	15.24
1875-76.....	0	0	5.00	.25	7.75	5.75	2.25	0	0	0	0	0	21.00
1876-77.....	0	0	0	0	3.60	0	.50	0.37	.75	0	0	0	11.62
1877-78.....	0	0	3.65	0	4.10	8.51	1.45	2.26	.25	0	0	0	20.22
1878-79.....	0	.34	0	4.07	4.67	1.09	.23	2.14	.25	0	0	0	12.79
1879-80.....	0	.57	1.91	4.98	1.41	7.63	1.95	3.61	0	0	0	0	22.06
1880-81.....	0	.25	.84	8.19	2.47	.18	1.53	.45	0	0	0	0	13.91
1881-82.....	0.06	1.98	.25	.81	.60	2.79	4.20	1.23	.06	0	0	0	11.98
1882-83.....	0	.31	.71	.10	3.48	2.35	1.95	.18	2.41	0.02	0	0	11.51
1883-84.....	0	1.00	0	4.46	7.38	9.96	9.44	2.06	.13	1.70	0	0	36.13
1884-85.....	0	.38	.84	4.95	1.25	.23	1.58	.23	0	0	.0	0	9.46
1885-86.....	0	.03	.33	1.03	6.16	.34	2.27	1.97	.09	0	0	0	20.22
1886-87.....	0	.02	.94	.64	.20	11.08	.39	1.37	.11	0	0	0	14.75
1887-88.....	.06	.02	2.71	2.86	8.19	1.62	4.51	.34	0	0	0	0	20.31
1888-89.....	0	.04	4.47	4.39	.20	1.46	5.64	0	.65	0	0	0	16.85
1889-90.....	0	4.45	2.85	11.04	5.01	1.85	.45	0	0	0	0	0.03	25.68
1890-91.....	.84	0	.40	2.69	.45	7.12	3.10	.60	.16	0	0	0	15.36
1891-92.....	.98	0	0	1.75	1.05	4.54	.29	0	0	0	0	0	8.61
1892-93.....	0	.70	2.15	5.80	3.17	3.02	7.88	.42	.40	0	0	0	23.54
1893-94.....	0	.85	.25	2.04	.81	.50	.27	.17	.50	0	0	0	5.39
1894-95.....	.95	.10	0	3.13	5.25	1.00	3.17	.47	.86	.07	0	0	15.00
22-year mean.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	16.25

*Record of precipitation at Rumsey, Yolo County.*

[Latitude, 38° 51'; longitude, 122° 14'; elevation, — feet. Authority, Pacific Railway System.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1888-89.....	0.80	0	6.55	5.15	0.95	1.35	8.20	1.40	2.45	0.15	0	0	27.00
1889-90.....	0	7.90	4.13	12.07	12.01	4.52	5.32	1.17	1.29	0	0	0	48.41
1890-91.....	.35	0	0	3.91	.87	13.60	1.16	1.92	1.28	0	0	0	23.09
1891-92.....	.85	0	.35	4.98	3.49	2.84	3.02	1.21	2.78	0	0	0	19.52
1892-93.....	0	1.03	10.57	11.37	4.80	5.42	5.77	1.76	.77	0	0	0	41.49
5-year mean.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	31.90

*Record of precipitation at Colgate, Yuba County.*[Latitude, 39° 22'; longitude, 121° 10'; elevation, 650 feet.<sup>a</sup> Authority, Bay Counties Power Company.]

Year.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Total.
1900-1901.....	0	6.79	7.45	0	6.98	5.07	2.11	0	0.08	0	0	0	28.48
1901-2.....	1.48	3.61	4.39	5.31	1.44	18.22	4.23	4.10	.80	0	0	0	43.58
2-year mean.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	36.03

<sup>a</sup>Gage at bottom of canyon 1,000 feet deep.

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