SURFACE WATER SUPPLY OF THE SAN JOAQUIN RIVER BASIN, CALIFORNIA, 1895–1927

By H. D. McGLASHAN

INTRODUCTION

The measurement of the flow of the streams in California was begun by the State engineer in 1878, in accordance with the law requiring him "to investigate the problems of the irrigation of the plains, the condition and capacity of the great drainage lines of the State, and the improvement of the navigation of rivers." The work was restricted to a few localities in the Sacramento and San Joaquin River basins, the principal station being on the Sacramento at Collinsville.

The State engineer's office was discontinued in 1884, and practically no further stream studies were made in California until 1894, when engineers of the United States Geological Survey made a few measurements of streams in the semiarid parts of the States. The following year the Geological Survey established a station on the Kings River near Sanger and since that time has gradually extended the work, as funds were made available, until it now has records of flow at a large number of points on California streams.

The records to June 30, 1912, for the San Joaquin River Basin, were published in Water-Supply Paper 299. Subsequent records are contained in the annual series of water-supply papers as follows:

Year	Water-Supply Paper	Year	Water-Supply Paper	Year	Water-Supply Paper
1912	331	1917	461	1923	571
1913	361	1918	481	1924	591
1914	391	1919–20	511	1925	611
1915	411	1921	531	1926	631
1916	441	1922	551	1927	651

Most of these reports are in print and may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., or they may be consulted at the Geological Survey offices at 303 Customhouse, San Francisco, and 600 Federal Building, Los Angeles, and at the public libraries in the principal cities.

The records are summarized in this paper to make them readily available for reference. For detailed information of daily discharge, run-off in acre-feet, and station description giving location and equip-

ment of station and other pertinent facts reference should be made to the above-mentioned water-supply papers or to the files at the Geological Survey offices.

COOPERATION AND ACKNOWLEDGMENTS

Cooperation in stream measurements between the United States Geological Survey and the State of California was first provided for by the State legislature in an act approved March 16, 1903. Similar acts continued the cooperation until April 22, 1909, when an act placing cooperation between the State and the United States Geological Survey on a permanent basis was approved. This act provided as follows:

> The department of engineering is hereby empowered to carry on topographic surveys and investigations into matters pertaining to the water resources of the State along the lines of hydrography, hydro-economics and the use and distribution of water for agricultural purposes, and to that end, where possible and to the best interest of the State, shall enter into contracts for cooperation with the different departments of the Federal Government in such amounts as may be an equitable and necessary division of the work. The State Engineer, with the consent of the governor, may maintain and continue such investigations where there is available money not covered by cooperation contract. For the permanent maintenance of said surveys and investigations there is hereby continuously appropriated out of the general fund of the State treasury for each and every fiscal year, commencing with the date upon which this act becomes effective, the sum of $30,000.

Of this sum $9,000 was allotted annually to investigations of water resources. To supplement this fund and the Federal appropriation, the State Conservation Commission, State Board of Control (water powers), State Water Commission, and later the Department of Public Works through the divisions of engineering and irrigation and water rights have allotted additional money.

The State budget for 1928 and 1929 groups all State cooperation with the Geological Survey for investigations of water resources and provides a fund of $25,000 a year for the biennium. This cooperation is disbursed by the division of engineering and irrigation, Department of Public Works, through Edward Hyatt, jr., State engineer.

The earliest stream gaging work in the State was carried on under the direction of William Ham. Hall, State engineer, by C. E. Grunsky, who continued in charge until the State engineer's department was abolished. Work by the United States Geological Survey was begun in 1894, under the direction of F. H. Newell, chief hydrographer, by Arthur P. Davis and Joseph B. Lippincott. On the establishment of the United States Reclamation Service, in 1902, Mr. Lippincott became supervising engineer for California, and the field work was continued under his direction by William B. Clapp and Samuel G. Bennett, until the separation of the Reclamation Service from the

Geological Survey in 1906, when Mr. Clapp became district engineer On Mr. Clapp's death in December, 1911, H. D. McGlashan was appointed district engineer.

Much cooperation and many records have been furnished by other Federal bureaus, counties, municipalities, irrigation districts, permittees and licensees of the Federal Power Commission, private companies, and individuals to whom credit is given in the annual progress reports. (See list on p. 101.)

GEOGRAPHY OF THE SAN JOAQUIN BASIN [1]

California is traversed on the east and west by two approximately parallel ranges of mountains—the Sierra Nevada and the Coast Range—which converge at Mount Shasta on the north and at Tehachapi on the south and inclose the largest body of farming land in the State, the area often spoken of as the Great Valley of California. It is a gently sloping and practically unbroken plain, about 400 miles long and from a few miles to 80 miles wide, the average width being about 40 miles. The total area of the valley proper is 15,700 square miles, or 10,048,000 acres; including mountains and minor valleys it comprises more than 58,000 square miles. "On the east side the valley has since the beginning of Cretaceous time been bordered by the Sierra Nevada; on the west side diastrophic processes have gradually built up the barrier of the Coast Ranges, changing the depression from a gulf of the sea to a lake and from a lake to a drained valley. From the beginning of the Cretaceous period the Great Valley has been the depository of the enormous masses removed by erosion from the rising land on the east, and to a less degree also of the débris from the Coast Ranges." [2]

The Great Valley itself exhibits little diversity in its physical aspect. Such differences as exist between its north and south ends are climatic, or, if physical, are directly due to climatic differences. Among local physical features due to climatic differences may be mentioned the Tulare Basin, at the south end of San Joaquin Valley, which has been caused by the aridity of the region and the consequent extensive development of alluvial fans. Two of these fans, extending from the Kings River on the east side of the valley and Los Gatos Creek on the west side have coalesced in a low ridge south of which lie the Tulare Lake, and Kern Lake depressions. Basins differing in character and situation but originating nevertheless in climatic conditions are the overflow basins of the Sacramento and the lower San Joaquin Valleys, of which the Yolo Basin may be

[1] This section and the sections on geology and soils are taken mainly from "Preliminary report on the ground waters of San Joaquin Valley, California," by W. C. Mendenhall (U. S. Geol. Survey Water-Supply Paper 222).

[2] Lindgren, Waldemar, The Tertiary gravels of the Sierra Nevada of California: U. S. Geol. Survey Prof. Paper 73, p. 15, 1911.

mentioned as a type. These basins occupy the lowest portions of the flood plains just outside the ridges that form the immediate river banks.

The central valley opens to San Francisco Bay and thence to the Pacific through Carquinez Strait and the Golden Gate, and the combined waters of the Sacramento and San Joaquin systems discharge through these gateways. Other passes, like the Tehachapi, the Tejon, and Walker Pass, near the south end of San Joaquin Valley, and the Livermore Valley gateway, near Carquinez Strait, break the mountain barriers that surround the central lowland; but they are not so low nor so pronounced as the central tidal gateway. In general it may be said that the Great Valley is completely inclosed except for this opening.

The larger lobe of the central depression, extending southward from the Cosumnes River and Suisun Bay, is generally known as San Joaquin Valley, although it is not all drained directly by the San Joaquin River and its tributaries. The southern, more arid third of the depression, extending from the Kings River delta to the Tehachapi Mountains has no surface outlet under normal conditions, and the surface waters accumulate in the Tulare Lake depression and the Buena Vista Reservoir. Originally Kern Lake received part of the excess flow from the Kern River, but through the protection afforded by a restraining dike, water is kept out of it, except when unusually large floods break the restraining dam, and the original lake bottoms have become valuable grain lands.

The streams that drain into the valley from the Sierra Nevada carry practically all the water that reaches it. They are in every way more important than those that enter it from the west. They have larger drainage basins, longer courses, and they flow from higher mountains that have a much greater rainfall and a better protective covering of forest and brush; hence their discharge is many times greater and much less erratic than that of the west-side streams.

The total drainage area [3] tributary to the valley from the Sierra is 16,089 square miles and from the Tehachapi and Coast Ranges 4,293 square miles; the area of the valley floor is 11,513 square miles. The total area of the San Joaquin Basin is therefore 31,895 square miles.

The average run-off of the principal east-side streams north of the Kings River, with a combined drainage area of 7,543 square miles, is about 8,500,000 acre-feet; that of the Kings, Kaweah, Tule, and Kern Rivers, discharging into the Tulare Basin from a drainage area comprising 5,143 square miles, is about 3,000,000 acre-feet. The total discharge into the valley from 12,686 square miles of Sierra slopes is therefore about 11,500,000 acre-feet.

[3] Hall, W. H., Physical data and statistics of California, pp. 396 et seq.

The preponderance of east-side streams has given the valley floor its well-marked unsymmetrical form. The valley axis, the line of lowest depression, is throughout much nearer the western than the eastern foothills. In places it lies against the western hills, but elsewhere, as between Los Gatos and Cantua Creeks, the west-side slopes are 15 or 18 miles wide—at least half as wide as those on the east side. They are also steeper than those on the east. Grades of 20 or even 40 feet to the mile are not rare, but it is unusual for the grades to be less than 6 or 8 feet to the mile. On the east side 30 feet to the mile is about the maximum gradient, 5 feet or less being perhaps the average.

These conditions are due directly to the fact that the valley floor has been built up by the alluvial material eroded by the streams from the mountains east and west of the depression. The larger and more active streams have built flatter but more extensive alluvial fans—the type that mkes up the east-side slopes; the more erratic and torrential streams of smaller volume have built the steeper and less extensive fans that constitute the west-side slopes.

GEOLOGIC OUTLINE[4]

THE ROCKS OF THE VALLEY BORDERS

In simplest outline the geologic formations of the eastern border of San Joaquin Valley consist of granites and metamorphic sedimentary and igneous masses of pre-Cretaceous age, which have been called the "Bedrock series," overlain at the north and south ends of the valley, in an interrupted band occupying a zone of low relief between the Sierra proper and the valley proper, by a series of Tertiary sediments, entirely unaltered and including beds as old as the Eocene, although the great body of the material seems to be Miocene or Pliocene in age. Between the San Joaquin River and Porterville this zone of late sediments is missing, and the sands and gravels of the valley proper lie upon the flanks of the granite and metamorphic complex of the Sierra. Because of this hiatus the east-side Tertiary deposits are separated into two bodies, of which the northern extends from the Fresno River nearly to the Cosumnes, and the southern, conveniently designated as the Bakersfield area, extends from Deer Creek to the Cañada de las Uvas.

The northern area of Tertiary rocks, which is chiefly in the Milton-Merced region, includes a lower clayey series that has been called the Ione formation; a middle series consisting of andesitic sandstone, coarse volcanic breccias, and tuffaceous beds; and an upper gravelly series that is in places auriferous. This upper series usually occurs

[4] Abstract from a manuscript by H. R. Johnson on the geology of the borders of the San Joaquin Valley.

along the most westerly foothills and merges at many points with the gravels and soils of the valley floor.

The southern area contains alternating beds of soft sandstone, clay, and gravel, the uppermost beds being coarse, like those of the northern area, and in some places scarcely distinguishable from the alluvium of the valley itself.

The geology of the western margin of the valley contrasts in many ways with that of the eastern margin. The oldest rocks of the Diablo Range—the easternmost of the Coast Ranges—are altered igneous and sedimentary rocks, the latter known as the Franciscan formation. They extend along the axis of the range from a point southwest of Coalinga to San Francisco Bay. Overlying them on the valley side, but not continously, is a succession of sandstones, shales, and conglomerates of Cretaceous and oldest Tertiary (Eocene) age. These in turn are overlain by a diverse succession of middle and upper Tertiary rocks, locally of great thickness and usually but not always present. These rocks, like the older sediments beneath them, are sandstones, shales, and conglomerates, but as a rule they are less firmly indurated than the Eocene and Cretaceous rocks. They overlie the latter unconformably and contain many unconformities within themselves, with a resulting diversity in thickness and irregularity in extent of individual beds. These rocks include several bodies of siliceous shale, besides a great variety and abundance of sandstones and conglomerates. Towards the top of the section are beds that clearly represent fresh-water or subaerial deposition, undoubtedly much like that which is now taking place in Tulare Lake and in the west-side alluvial fans. As a whole the sedimentary strata dip toward the valley, although interruptions like the anticline of the Kettleman and McKittrick Hills vary the prevailing monoclinal dips. In general the structure of the valley border is more complex at the south end than along the middle and at the north.

The valley as a whole is a great structural trough and appears to have been such a basin since a time well back in the Tertiary period. Since it assumed its general troughlike form gradual subsidence, perhaps interrupted by periods of uplift, has continued and has been accompanied by deposition alternating, at least along what is now its western border, with intervals of erosion. This interrupted but on the whole continuous deposition seems to have been marine during early and middle Tertiary time; but during the later Tertiary and Pleistocene epoch, when presumably the valley had been at least roughly outlined by the growth of the Coast Ranges, fresh-water and terrestrial conditions became more and more predominant, until the relations of land and sea, of rivers and lakes, of coast line and interior, of mountain and valley, as they now exist, were gradually evolved As these conditions developed, the ancestors of the present rivers

probably brought to the salt and fresh water bodies that occupied the present site of the valley and its borders, or, in the latest phases of the development, to the land surface itself, the clays, sands, gravels, and alluvium that subsequently consolidated into the shales, sandstones, and conglomerates of the late Tertiary and Pleistocene formations, just as the present rivers are supplying the alluvium that is even now accumulating over the valley floor.

The very latest of these accumulations are the sand, silt, and gravel beds penetrated by the driller in his explorations for water throughout the valley. They are like the early folded sandstones, shales, and conglomerates exposed along the flanks of the valley, except that they are generally finer and are not yet consolidated or disturbed. The greater part or perhaps all of them accumulated as stream wash on the valley surface or in interior lakes like the present Tulare Lake, but a proportion of the older sediment that has gradually decreased (?) accumulated in the sea or in salt bays having free connection with the sea. These very latest geologic deposits, saturated below the ground-water level by the fresh water supplied chiefly by the Sierran streams, constitute the reservoirs drawn upon by the wells, whether flowing or pumped, throughout the valley.

The chemical character of the ground waters, as well as their occurrence and accessibility, is related to geology. Where the valley alluvium is derived from the Cretaceous and Tertiary beds of the Coast Ranges, rich in gypsum and other sulphates and carbonates which are relatively easily soluble, the ground waters that percolate through it will soon dissolve large quantities of the salts. Where the alluvium, on the other hand, is derived from the granites and metamorphic rocks of the Sierra, whose potassium, sodium, and calcium compounds are in the form of resistant silicates, the ground waters dissolve out these constituents slowly and under all ordinary conditions remain practically free from salts.

Obviously if the sands and gravels through which the ground waters percolate were deposited under such conditions that salts were deposited with them, as in the salt water of the sea or of bays like San Francisco Bay, or in interior lakes that are saline through evaporation, as is true of Tulare Lake, then the ground waters themselves will quickly become saline, although when they leave the mountains as surface waters, before their absorption by the alluvial fans, they may be as pure natural waters as are known in the world.

ORIGIN OF THE PRESENT VALLEY SURFACE

The lowland through the heart of California known as the Great Valley, whose origin as a depression appears, in accordance with the facts just outlined, to date well back into Tertiary time, owes

its actual surface to more recent action and to more obvious agents. That surface is, in brief, a combination of the surfaces of a great number of alluvial fans, originating at the mouths of the canyons through which the tributaries discharge from the mountains into the valley.

Each stream that enters the valley brings with it from the mountains a greater or smaller quantity of sand, gravel, or boulders. All or a part of this burden is deposited in the valley, and the deposit constitutes the alluvial fan of that particular stream. The apex of each fan is the mouth of the stream canyon. From this apex it broadens and flattens until it coalesces at its periphery with other fans. The stream that built it usually spreads delta-wise over it, discharging through a number of diverging channels into the trough of the valley. As a rule these spreading distributaries flow upon the surface of the fan, but some of the larger streams from the San Joaquin northward are incised into the valley floor in shallow trenches 100 feet or less in depth. This must be due to special conditions, such as recent change in volume of stream flow or an uplift of the land—conditions not yet understood.

The fans of different parts of the valley indicate by their mass and form the conditions of volume and distribution of rainfall under which they originated. The west-side fans, particularly those in the middle of the valley and near its south end, are steep and symmetrical, having forms characteristic of areas of low rainfall very irregularly distributed. The east-side fans are of much greater mass and lower slope, because the rivers that built them have a greater and less irregular flow. The Kern River fan has grown westward against the McKittrick Hills until it has isolated the Buena Vista Basin south of it. Before dams had been built, interfering with the natural conditions here, a shallow lake occupied the present site of Buena Vista Reservoir and the old bed of Kern Lake, and during seasons of unusually large rainfall there was overflow northward toward Tulare Lake. The basin occupied by Tulare Lake is likewise due to aridity of the valley and the consequent development of the Kings River and Los Gatos Creek fans. South of the low, broad ridge caused by the coalescing of these two fans is the Tulare Basin, in which a part of the surplus waters of the streams south of it accumulate. As a consequence of the flatness of this basin and the very erratic character of the supply that reaches it, the lake fluctuates widely in area during a series of years.

Northward from the Tulare Lake Basin the discharge in the spring is sufficiently great and sufficiently constant to prevent the formation of delta dams like those formed by the Kings River and Los Gatos Creek fans, and an open channel is maintained from the San Joaquin northward to Suisun Bay.

Along the lower course of the San Joaquin conditions resemble those in the Sacramento Valley—that is, they are the conditions usual along rivers draining humid rather than arid regions. Large areas are subject to regular annual inundation during the spring floods or are protected from this inundation only by the construction of artificial levees. The greater part of the water that inundates this area is supplied by the Sacramento system, but the greatest overflow occurs when the floods appear in the two systems at the same time.

The essential fact as to the present valley surface is that it is a direct result of stream action. It has everywhere been built up by deposition from the streams or from fluctuating lakes that are themselves dependent on the streams; and it is formed of materials brought by the streams from the mountainous parts of their drainage basins, where they are eroding instead of depositing. Throughout the south end of the valley its surface is a combination of alluvial-fan surfaces. At the north end of the valley these fans, less strikingly and less typically developed because of the greater precipitation there, still predominate along the valley borders, while the center of the valley is a flood plain of the usual type.

SOILS

As the valley surface has been molded by stream action into its present form, so the soils of the valley represent deposition by the rivers of materials washed out of the mountains they drain. This soil is modified in various ways after the streams have deposited it—by disintegration of the rock particles where the streams have left them; by the mingling of the products of vegetal decay where vegetation is abundant; or by chemical processes in place, such as the formation of "hardpans" or the accumulation of alkalies—but the soil in a particular place reflects closely the type of rock outcropping in the drainage basin of the stream on whose delta it is found.

For example, the soils of the deltas of the Kern and Kings Rivers are in large part of granitic origin, because granitic rocks form the greater part of the mountain drainage basin of each of these rivers. Their coarseness and the distribution of the coarse and fine materials are, to a certain extent, accidental, owing to the location of present or past channels of the streams across their deltas; but in steep alluvial fans the coarser and more bouldery soils occur nearer the mountains. In the fans of those east-side streams from the Merced northward, whose lower courses at least are cut through late Tertiary formations containing a large percentage of lavas and derived products, other types of soil result.

The west-side streams, draining mountains that are practically free from granites and similar rocks but that contain soft serpentines, shales, and sandstones, deposit fragments of those rocks in

their alluvial fans; and the result is a soil entirely different from that of the east side and south end of the valley. These shale, clay, serpentine, and sandstone fragments disintegrate much more quickly than the granitic sands that contain large proportions of such resistant minerals as quartz and feldspar, and the result is the mellow, loamy soil with its fragments of siliceous shale that makes much of the west slope of the valley and is so productive whenever water can be applied to it.

Soil of another general class occurs at a few places along the east side of the valley. This soil is not of alluvial-fan origin, brought into the valley by the streams from the surrounding mountains, but is due to the decay in place of the rocks underlying the particular area where it occurs. Soils of this class are found northeast of Fresno beyond Clovis, in some of the coves like Clark Valley, north of Reedley, and perhaps in other foothill valleys in the Porterville-Lindsay district. Some of the rolling grain lands in an area along the eastern border of Stanislaus and Merced Counties may also be regarded as derived from the decay of rock in place rather than from inwashed alluvial fan material, but as the rock is itself a late Tertiary sediment differing but little from the alluvial-fan material of the same area, the classification of the soils as residual rather than colluvial has no practical significance.

Another type of soil is simply fine beach sand. This type is best developed in an area surrounding Tulare Lake, and it represents the shore lines of that lake when it contained much more water than at present. In places this sand has been reworked by the wind—blown into inconspicuous dunes, as in the "Sand Ridge" near the Kings-Kern County line.

Finally, there are the soils of the "tule lands" and the "islands," the areas subject to overflow, particularly along the lower course of the San Joaquin and its tributaries but present, although less extensively developed, in other areas. These lands are black loams or adobes or impure peats and are very fertile when reclaimed.

The Bureau of Soils of the Department of Agriculture has made detailed surveys of certain areas in San Joaquin Valley. In the text of the reports and in the maps that accompany them the soils are classified in great detail on a physical basis, and by a proper study of this classification the geologic origin of most of the soils may be traced.

PRECIPITATION

The mean annual precipitation in the San Joaquin Basin varies with altitude, latitude, and longitude. The southern part of the central valley is strictly arid, the annual rainfall there being less than 5 inches; northward along the trough of the valley the rainfall gradually increases, and near the north end of the valley the

average annual rainfall is nearly 20 inches. The west-side slope has light rainfall, which increases with altitude up to about 5,000 feet and then decreases gradually up to the summit. The same progressive increase from south to north that exists in the valley continues along the summit. This is well shown by the total run-off from the northern and southern Sierra, which amounts to about 11,500,000 acre-feet annually. Of this amount 3,000,000 acre-feet is derived from about 7,500 square miles by the streams south of the upper San Joaquin and 8,500,000 acre-feet from about 5,100 square miles drained by the San Joaquin and its tributaries from the northern Sierra. The precipitation occurs during the "rainy season," which begins in the late fall and ends in early spring. Snowfall is heavy in the higher mountain region, and the snow does not disappear until late in the summer.

DRAINAGE

THE MAIN STREAM

The San Joaquin River rises in the high Sierra southeast of the Yosemite National Park, where it is formed by the junction of its Middle and South Forks in the northern part of T. 6 S., R. 25 E., Mount Diablo base and meridian. It flows southwestward to the trough of San Joaquin Valley and thence northwestward to Suisun Bay, into which it discharges about 50 miles by water from San Francisco.

The South Fork, which drains the larger area and is therefore considered the head of the main stream, rises in Martha Lake southwest of Mount Goddard, at an altitude of 11,007 feet, flows northwestward about 40 miles, then turns to the west and southwest to join the Middle Fork. This fork is 44 miles long. Its principal tributaries are Evolution, Piute, Bear, and Mono Creeks. The basin of the South Fork is bordered on the east by the Sierra Nevada, whose crest it touches for a distance of 40 miles. Altitudes range from 4,000 feet at the junction with the Middle Fork to more than 13,000 feet at the highest summits. The tributaries drain innumerable glacial lakelets, of which Wanda, Evolution, Desolation, Italy, and Muriel Lakes are more than 11,000 feet above sea level.

The principal tributaries of the San Joaquin below the junction of the South and Middle Forks drain parts of the west slope of the Sierra, take a course parallel to the upper San Joaquin—that is, southwest—and enter the San Joaquin from the east. In order from south to north these are the Fresno, Chowchilla, Merced, Tuolumne, Stanislaus, Calaveras, and Mokelumne Rivers. The principal streams from the Sierra south of the upper San Joaquin are, in order from north to south, the Kings, Kaweah, Tule, and

Kern Rivers. The Kaweah, Tule, and Kern Rivers are lost in the Tulare Lake depression, which, under normal conditions, sends no water to the San Joaquin River, but the Kings River at times discharges directly into the San Joaquin.

THE TRIBUTARIES

KERN AND TULARE LAKE BASINS

GENERAL FEATURES

The Tulare Lake Basin is situated near the south end of the San Joaquin Valley and embraces that part of the valley determined by the Kings River delta at the north and the Kern River delta at the south. These rivers leave the foothills and enter the valley near Fresno and Bakersfield, respectively. Strictly speaking, they are tributaries of the San Joaquin River, but in reality no water from the Kern River has reached the San Joaquin in recent years. Only a part of the water of the Kings River enters the San Joaquin.

Below the foothills the Kings River and Kern River channels roughly parallel each other in a southwesterly direction. They are about 90 miles apart, and their courses are approximately at right angles to the axis, or old trough, of the valley. During past centuries each of these streams has brought down an immense quantity of eroded material and deposited it in the valley along its course, the result of the deposition being the pronounced delta fans that extend completely across the valley as the Kings River and Kern River Ridges. The delta ridge formed by the Kern River extends westward to the McKittrick Hills and cuts off a small basin in the extreme south end of the San Joaquin Valley, which may be called Kern Basin. This basin contains several small lakes, of which Buena Vista Reservoir is the largest and occupies the lowest depression. Kern River drains into this basin.

North of the Kern River Ridge and south of the Kings River Ridge is another broad but shallow depression known as the Tulare Lake Basin or the "valley of the tules." Its lowest area lies in the trough of San Joaquin Valley and for several hundred years has been covered most of the time by a shallow, fresh-water lake. The lake was originally a delta swamp and has always fluctuated in depth and extent, depending on the season and the caprice of the delta rivers supplying it. Probably within the last hundred years the entire flow of the Kern, Tule, and Kaweah Rivers and a large part if not all of that of the Kings River has entered this lake; but at the present time only the Kaweah and the Tule, south of the Kings River and north of the Kern River, are wholly tributary to the Tulare Basin. At high stages the Kings River discharges part of its water into this basin, and sometimes overflow may reach it from the Kern River Basin at the south.

TULARE LAKE

Tulare Lake is a shallow body of water occupying the lowest depression of the Tulare Basin. It is about 30 miles directly south of Fresno and 40 miles northwest of Bakersfield. The lake is roughly rectangular in shape, its greatest length being from northwest to southeast. In November, 1907, when its margin was carefully determined, the lake had an area of about 274 square miles, a maximum depth of 12.4 feet, an average length of 20 miles, and a width of 13.5 miles; the water's edge was 3 miles from the town of Corcoran and about 12 feet below.

C. E. Grunsky, in Water-Supply Paper 17, says:

> Tulare Lake has frequently been under discussion as a source of water supply for irrigation. The following facts with reference to the fluctuations of its water surface will be of interest in connection with its availability for this purpose: In 1853, after several wet seasons, the lake was full, though probably not so high as subsequently, in 1862 or in 1868. From 1853 until 1861 there was a gradual subsidence of the low-water stage of the lake. The rate at which this occured can not now be determined. In the fall of 1861 the water surface of the lake was at the elevation 204 feet above sea level (low water of Suisun Bay), if the testimony of residents at the lake at that time, in reference to the rise of water the following winter, can be relied upon. The unusual heavy rainfall of the winter 1861–62 caused the lake to rise to the highest known stage, 220 feet. Its area was increased from about 300 to about 800 square miles, and 300,000,000,000 cubic feet, or 6,885,000 acre-feet, of water were added to its contents. It continued to overflow at least until the spring of 1863, but then rapidly fell to about 11 or 12 feet below its highest stage, which was its condition in the fall of 1867. The inflow of water during the wet winter of 1867-68 again brought the lake nearly, it not quite, to the high-water stage of 1861–62.
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> The water surface fluctuated between 211 and 217 feet in the years 1872 to 1876, then receded rapidly to the lowest known stage, 192 feet, in November, 1883. From that time to this [1899] the lake has not received sufficient water to cause it to overflow. It is generally believed that the diversion of water for irrigation purposes from Kern, Tule, Kaweah, and Kings Rivers has been the cause of the decrease of water volume in the lake, but this is not true. Although such diversion must produce some effect on the lake, the evidence that protracted low stages [before there was any irrigation] preceded the low stage of 1883 is conclusive. On the northeastern shore of the lake, close by the mouth of Mussel Slough, there is a group of tree stumps at an elevation of about 200 feet. These were found at the water's edge in 1882. They presented the appearance of having been broken off at a height of 3 or 4 feet above ground. They were well preserved and must have been under water for nearly 30 years succeeding the high stage of the lake of 1853. These stumps are a remnant of a grove of willow trees, 100 or more, some of which had grown to a diameter of 4 feet. It would not have been possible for these trees to attain such growth if the lake had not been at a low stage for many years in succession at some time preceding 1853. Moreover, Indian tradition is said to indicate a time when the lake was contracted to two ponds, between which a passage from the east to west side of the valley was possible.

For 25 years preceding 1898 the lake level was steadily lowered, in part as the result of the development of irrigation in the Tulare Basin, but chiefly because of the light precipitation in the tributary drainage basins. During this entire period, and particularly during the several

years immediately preceding 1898, the precipitation was generally below the normal. In that year the lake bed became practically dry, and after partly refilling in 1901, in 1905 it became completely dry. As the water receded, a constantly increasing area of exceedingly fertile land was uncovered. From time to time this land was leveed on the lake side and cultivated, and in the early spring of 1906 the entire lake bed was under cultivation.

On March 15, 1906, the first water of the season reached the lake bed at the mouth of the Kings River and began to spread over a large area of bottom land on which stood a crop of wheat almost matured; a few days later water from the Kaweah and Tule Rivers entered the lake bed, rapidly submerging an increasingly large area of wheat fields; on June 1 the water was 7 feet deep and covered about 200 square miles; on June 23 overflow water from the Kern River Basin cut through the sand ridge to the south and flowed into the lake, which for a few days afterward rose at the rate of 0.2 foot a day; on August 4 the water reached it greatest height for 1906, and the lake had an area of about 300 square miles and a maximum depth of 12.7 feet. The total rise of the lake in 1906 was 10.8 feet. After August 4, 1906, the lake level slowly subsided until December 9, then a rise began which continued until July, 1907, when the lake attained a maximum depth of 14 feet. Since July, 1907, the lake has been gradually subsiding and since April, 1923, it has been practically dry.

The lake bed resembles a large flat saucer; the flat, level area in the bottom is approximately 180 feet above mean sea level and covers about 55 square miles. The lowest point of the crest of the Kings River delta reached at the north is about 30 feet higher than the bottom of the lake. The lake basin will not overflow naturally until the lake has a maximum depth of nearly 30 feet and an area of nearly 1,000 square miles. Though classed as a tributary of the San Joaquin, the lake has sent no water to that stream since about 1876.[5]

KERN RIVER

The Kern River rises in glacial lakelets among the high peaks of the Sierra divide and on the Kings-Kern and Great Western divides. It flows directly southward about 70 miles, then southwestward to the mouth of its canyon a few miles northeast of Bakersfield, where it enters the south end of San Joaquin Valley. No water from the Kern River has reached the San Joaquin in recent years. Its total length from its source to Bakersfield is about 140 miles. The drainage area above the valley rim is 2,570 square miles.

The basin is the largest and most southerly of all the areas tributary to San Joaquin Valley from the Sierra; it extends farther east than any of the other basins, from which it differs also in that its axis trends

[5] For summary of history of Tulare Lake see Mendenhall, W. C., Preliminary report on the ground waters of San Joaquin Valley, Calif.: U. S. Geol. Survey Water-Supply Paper 222, p. 37, 1908.

north and south instead of east and west. It is long and comparatively narrow and lies west of the main high Sierra divide, but east of the secondary parallel crest called the Great Western divide, which separates it from the basins of the Kaweah and Tule Rivers and the southern foothill streams at the west. At the north it is separated from the Kings River Basin by a cross range about 15 miles long, known as the Kings-Kern divide.

Altitudes in the Kern River Basin range from a few hundred feet at the mouth of the river's lower canyon to more than 14,000 feet on the headwaters. More than 50 of the peaks in the basin exceed 13,000 feet in altitude, and many of the lakes that feed the upper stream are at an altitude of 11,000 feet or more.

Mount Whitney, the highest mountain in the United States proper, towering 14,496 feet above sea level, overlooks the northern part of the Kern River Basin from the east.

The principal tributary of the Kern River is its South Fork. Above the point of confluence the two streams are about equal in length and drainage area and flow parallel to each other and to the marginal rims.

The basin is divided into two lesser basins by a ridge that extends northward from the junction of the South Fork with the main stream to an intersection with the Sierra divide near Trail Peak, about 12 miles south of Mount Whitney. These two basins differ greatly in topography. The eastern basin is characterized by comparatively low, flat, and irregular hills, separated by many intervening meadows, large and small; it is drained by the South Fork. The western basin is characterized by high glaciated peaks and ridges and by deep canyons. It is drained by the main stream, which flows for a great part of its length through a narrow canyon. The Kern River Canyon proper is about 20 miles long, 1 mile wide at the top, and 1,500 to 2,000 feet deep. It begins at Junction Meadow, 7 miles west of Mount Whitney, at an altitude of 8,000 feet, and runs due south to Kern Lake. The bottom of the canyon is several hundred feet wide and the average gradient is 100 feet to the mile. The main canyon is intersected by short cross canyons, chiefly from the west. Above the junction of the Kern River and South Fork the canyons broaden into valleys of considerable size, especially on the South Fork; below the valleys, however, the main stream again enters a rough canyon, which it follows to its entrance into San Joaquin Valley.

The South Fork of the Kern River rises on the western slope of the Sierra in the western part of T. 17 S., R. 35 E., Mount Diablo base and meridian, 15 to 20 miles south of the headwaters of the main stream, at an altitude of 10,500 feet. It flows southward about 50 miles, then westward about 20 miles to its junction with the main stream at Isabella. The basin is characterized by comparatively low, flat, and irregular hills, separated by many intervening meadows. The runoff from this part of the Kern River Basin is much smaller than that

of the main branch. The basin of the South Fork affords many excellent reservoir sites. The principal tributaries are Mulkey, Monache, Soda, Fish, Chimney, Kelso, and Fay Creeks.

The mean annual precipitation in the Kern River Basin as a whole is small, partly because of the position of the basin in the southern region of the Sierra, which receives less rainfall than the central and northern regions, and partly because it lies east of the Great Western divide, which intercepts the moisture-laden winds. In the southern part of the basin the annual precipitation is probably less than 10 inches; in the central part it may range from 10 to 17 inches. Fully 80 per cent of the total summer flow of the river at the mouth of its canyon is derived from the precipitation on the mountain area which lies within 15 miles of the source of the river.

In the foothill region of the Kern River Basin the natural vegetation consists of grass and brush. At altitudes between 3,000 and 10,000 feet the soil supports timber and underbrush; at an altitude of 10,000 feet, however, the area is practically devoid of timber. The entire basin is included in national forests.

TULE RIVER

The Tule River drains a small, somewhat rectangular area lying south of the Kaweah River Basin, west of the Kern River Basin, and north of the Deer Creek Basin. Its length north and south averages 25 miles and its width averages 15 miles. The total drainage area above the rim of the valley is about 370 square miles.

The Tule River rises at an altitude of approximately 9,000 feet. The main stream is formed by the junction of North and Middle Forks 1 mile above Daunt post office and 15 miles northeast of Porterville. It flows southwestward to the point where it leaves the foothills 5 miles east of Porterville, and has a length of about 30 miles. The South Fork joins the main stream 8 miles below Daunt. The flood water passes westward through old channels in the river's alluvial fan to Tulare Lake, which it enters south of Corcoran.

KAWEAH RIVER

The Kaweah River drains an area comprising about 715 square miles, lying on the western slope of the Sierra in the northern part of Tulare County, south and west of the Kings River Basin, north of the Tule River Basin, and west of the upper Kern River Basin.

The main stream is formed 10 or 15 miles above the head of its delta by the confluence of the North, Middle, and South Forks, which rise in numerous small lakes nestling among high peaks on or near the divide, at an altitude of about 12,000 feet, and its course is southwestward throughout its length. Below the foothills it divides into several distributaries which cross the delta fan and enter Tulare Lake near Corcoran. Its total length above the delta is about 45 miles.

KINGS RIVER

The Kings River drains an area comprising about 1,840 square miles, lying on the western slope of the Sierra, south of the upper San Joaquin Basin and north of Kaweah and upper Kern Basins.

The main stream is formed well up in the mountains by the confluence of the North, Middle, and South Forks, which rise in numerous glacial lakelets nestling at the foot of glaciers and perpetual snow banks which protrude from the summits of high peaks on and near the crest of the Sierra. It flows southwestward to the mouth of its canyon at Piedra, 10 miles northeast of Sanger, and across its delta fan to the trough of San Joaquin Valley, about 6 miles west of Lemoore. From this point most of the low-water flow passes northwestward through Kings Slough to the San Joaquin River about 3 miles north of Mendota, but most of the flood flow passes southward to Tulare Lake. The total length of the river from its source to the mouth of its canyon is approximately 85 miles. Besides the three forks and their tributaries, the other principal tributaries are Dinkey and Big Creeks from the north and Mill Creek from the south.

FRESNO RIVER

The Fresno River rises on the western slope of the Sierra Nevada, in the Sierra National Forest, near the headwaters of the South Fork of the Merced River and flows in general southwestward, but its water reach the San Joaquin only during the high-water season. At other times the excess water not used for irrigation sinks in the sand of the river channel near Madera.

The principal tributaries, all small except during the rainy season, are Lewis Fork, North Fork, China, Crooks, and Coarse Gold Creeks in the foothills, and Willow Creek, which joins the main river below Madera.

Near the head of the river is a grove of big trees (*Sequoia gigantea*) known as the Nelder or Fresno grove.

Water is diverted from the headwater streams to feed the Madera Sugar Pine Lumber Co's flume, which is used to float lumber to Madera. Irrigation ditches take water at an altitude of about 4,500 feet, in the vicinity of Miami Mills, but only a small amount of water is used until the stream reaches the fertile valley land near Madera. A part of the flood waters could be stored by constructing a reservoir at Windy Gap, near the mouth of Crooks Creek. The river below this point has considerable fall and the development of power is practicable.

MERCED RIVER

The drainage basin of the Merced River lies on the western slope of the Sierra, north of the upper San Joaquin Basin and south of the Tuolumne Basin. It does not extend so far east as the other two

basins, and it touches the Sierra divide in only one point—Mount Lyell (altitude, 13,090 feet)—which is common to the three basins. The mountainous part of the basin lies almost wholly in Mariposa County; the foothill and valley parts are in Merced County. The basin is about 65 miles long from the rim of the valley to the crest and 20 to 25 miles wide, and its total area above the valley border is about 1,200 square miles.

The Merced River has its source in numerous small glacial lakes in the region about Mount Lyell and flows southwestward to its junction with the lower San Joaquin, about 5 miles northeast of Newman. It has a total length of approximately 135 miles, two-thirds of which is in the mountains. Its chief tributaries are Tenaya and Yosemite Creeks from the north and Illilouette and Bridalveil Creeks and the South Fork from the south.

TUOLUMNE RIVER

The Tuolumne River drains an area on the western slope of the Sierra, north of the Merced Basin and south of the Stanislaus Basin. For a distance of about 50 miles the Sierra divide separates this basin from the Mono Lake and Walker River Basins to the east. The length of the basin is about 105 miles, two-thirds of which is in the mountains. The total area of the mountainous part of the drainage basin is about 1,680 square miles—almost wholly in Tuolumne County.

The Tuolumne rises in numerous glacial lakes on or near the Sierra divide and flows southwestward to its junction with the San Joaquin, 10 miles west of Modesto. Its principal headwaters come from the glacier and lakes on the northern slope of Mount Lyell to the north and east of the headwaters of the Merced River. The course of the river is through beautiful upland meadows in its upper part, then through a canyon nearly 80 miles long, which has been cut out of solid granite. The upper part of this canyon, for a distance of about 25 miles, is from 3,000 to 4,000 feet deep, and is known as the Grand Canyon of the Tuolumne. At the lower end of the Grand Canyon is Hetch Hetchy Valley, now occupied by Hetch Hetchy Reservoir. Finally the river passes through the lower canyon into San Joaquin Valley, which it enters near La Grange. Its total length is about 150 miles.

Nearly all the tributaries of the Tuolumne River enter from the north. In order from east to west, the principal ones are Return, Rancheria, Falls, and Cherry Creeks, the Clavey River, the North Fork of the Tuolumne River, and Woods Creek. Eleanor Creek is tributary to Cherry Creek. The South Fork of the Tuolumne River is tributary to the main stream from the south. The Middle Fork is tributary to the South Fork.

STANISLAUS RIVER

The Stanislaus River drains a long, narrow basin lying on the western slope of the Sierra, north of the Tuolumne Basin, south of the Calaveras and Mokelumne Basins, and west of the Walker River Basin, from which it is separated for a distance of about 25 miles by the Sierra divide. The length of the basin from the valley rim to the crest of the divide is about 75 miles; its width averages about 12 miles in the foothills and less than 25 miles near the eastern border. The North Fork above and the main stream below form the boundary between Calaveras and Tuolumne Counties. The total drainage area above the valley is about 950 square miles.

The Stanislaus River has its source in small glacial lakes and on high peaks of the Sierra divide and flows southwestward to its junction with the lower San Joaquin 15 miles west of Modesto. It has a total length of about 120 miles, of which 80 miles is in the mountains and 40 miles in the valley. The main stream is formed by the confluence of its three principal forks heading well back in the mountains. The Middle Fork, the largest and most important, unites with the North Fork 12 miles north of Sonora and 30 or 35 miles above the valley rim; the South Fork joins the main stream 8 miles below the junction of the North and Middle Forks.

CALAVERAS RIVER

The Calaveras River is formed near San Andreas, in Calaveras County, by the confluence of its North and South Forks. The South Fork, which drains the larger area and is here considered the continuation of the main stream, rises on the east slope of Harmon Peak, in the southern part of T. 2 N., R. 12 E., Mount Diablo base and meridian, at an altitude of 2,000 feet, and flows in general northwestward 13 miles to its junction with the North Fork, from which the main stream flows southwestward, uniting with the San Joaquin a few miles west of Stockton. Its total length is about 80 miles—35 miles in the valley and 45 miles in the mountains. The total drainage area above the border of the San Joaquin Valley is about 500 square miles.

The basin is almost wholly a foothill region; the highest point is 6,000 feet in altitude, but only a very small part exceeds 4,000 feet. The hills are low and separated by small irregular valleys.

In the lower foothills the vegetation consists of grass, brush, and scrubby timber, chiefly oak; the upper part of the basin supports a heavy growth of timber. The Calaveras grove of big trees (*Sequoia gigantea*) is partly in this basin and partly in the Stanislaus Basin to the south.

The mean annual precipitation ranges from about 15 inches in the valley to 22 inches in the low foothills and 35 or 40 inches in the upper part of the basin; the little snow that falls in this area quickly disappears.

The river is torrential in winter and dry for a few months during the summer. It is not especially suitable for irrigation unless assisted by storage.

MOKELUMNE AND COSUMNES RIVERS

The Mokelumne River Basin lies on the western slope of the Sierra, north of the Calaveras and Stanislaus River Basins and south of the American River Basin. Strictly speaking the area drained by the Cosumnes River and several other small tributaries, which enter many miles west of the valley border, should be considered a part of the Mokelumne Basin; but this area contributes nothing to the flow of the Mokelumne River above the lower Sacramento and San Joaquin delta region. The total area of the basin above the valley rim, exclusive of that drained by the Cosumnes, is about 640 square miles.

The Mokelumne rises in glacial lakelets in Alpine County at an altitude of nearly 10,000 feet and flows southwestward to its junction with the lower San Joaquin, 25 miles northwest of Stockton. It has a total length of about 140 miles, of which approximately 90 miles is in the mountains. For the greater part of its course it forms a boundary between Amador County on the north and Calaveras County on the south. The principal branches are the North, Middle, and South Forks, which unite about 5 miles above Electra and nearly 40 miles above the rim of the valley. The Bear River is tributary to the North Fork from the north.

STREAM FLOW

GAGING STATIONS MAINTAINED IN THE SAN JOAQUIN RIVER BASIN

The following list comprises the gaging stations that have been maintained in the San Joaquin River Basin. The stations are arranged in downstream order, tributaries being indicated by indentions. A dash following the date indicates that the station was being maintained September 30, 1927.

Kern River near Kernville, Calif., 1912–
Kern River at Kernville, Calif., 1905–1912.
Kern River at Isabella, Calif., 1910–11, 1925–
Kern River near Bakersfield, Calif., 1893–1907, 1908–
  Kern River No. 3 Canal near Kernville, Calif., 1921–
  Salmon Creek near Kernville, Calif., 1922–23.
  Kern River Power Co.'s canal at Kernville, Calif., 1910–1914.
  Borel Canal at Tilley Creek, Calif., 1925–
  South Fork of Kern River near Onyx, Calif., 1911–1914, 1919–
  Erskine Creek near Isabella, Calif., 1911–12.
  Basin Creek near Havilah Calif., 1911–12.
  Tejon House Creek at Tejon ranch house, Calif., 1895–96.
  San Emigdio Creek at San Emigdio ranch house, Calif., 1894–95.
White River near Hot Springs, Calif., 1911–1913.
Deer Creek at Hot Springs, Calif., 1910–
  Tyler Creek near Hot Springs, Calif., 1911–1913.

North Fork of Middle Fork of Tule River near Springville, Calif., 1909–1912.
Tule River near Porterville, Calif., 1901–
South Fork of Middle Fork of Tule River near Springville, Calif., 1909–1912.
Bear Creek near Springville, Calif., 1911–1916.
South Fork of Tule River near Porterville, Calif., 1910–
Kaweah River near Three Rivers, Calif., 1903–
Kaweah River at McKay Point, near Lemon Cove, Calif., 1918–1921.
North Fork of Kaweah River at Kaweah, Calif., 1910–
South Fork of Kaweah River near Three Rivers, Calif., 1911–1924.
Kings River near Hume, Calif., 1921–
Kings River above North Fork, Calif., 1927–
Kings River at Piedra (near Sanger), Calif., 1895–
Kings River at Kingsburg, Calif., 1896–1897.
North Fork of Kings River below Meadowbrook, Calif., 1921–
North Fork of Kings River near Cliff Camp, Calif., 1921–
North Fork of Kings River below Rancheria Creek, Calif., 1927–
North Fork of Kings River above Dinkey Creek, Calif., 1920–
Helm Creek at Sand Meadow, Calif., 1922–
Rancheria Creek near Smith Meadow, Calif., 1924–
Dinkey Creek near Ockenden, Calif., 1911–12.
Dinkey Creek at Dinkey Meadows, Calif., 1921–
Dinkey Creek at mouth, Calif., 1920–
Deer Creek below East Fork, Calif., 1923–
Big Creek near Tollhouse, Calif., 1911–1913.
South Fork of San Joaquin River near Lake Florence, Calif., 1922–
South Fork of San Joaquin River near Hoffman Meadow, Calif., 1921–
San Joaquin River above Big Creek, Calif., 1922–
San Joaquin River near Friant, Calif., 1907–
San Joaquin River at Herndon, Calif., 1895–1901.
San Joaquin River near Newman, Calif., 1912–
San Joaquin River near Vernalis, Calif., 1922–
San Joaquin River at Lathrop, Calif., 1920–21.
Bear Creek near Vermilion Valley, Calif., 1921–
Mono Creek near Vermilion Valley, Calif., 1921–
Middle Fork of San Joaquin River at Miller Bridge, Calif., 1921–
North Fork of San Joaquin River below Iron Creek, Calif., 1921–
Iron Creek at mouth, Calif., 1922–23.
West Fork of Granite Creek near Timber Knob, Calif., 1922.
Granite Creek near Cattle Mountain, Calif., 1921–
Middle Fork of Granite Creek near Cattle Mountain, Calif., 1922–23.
East Fork of Granite Creek near Cattle Mountain, Calif., 1922–1925.
Jackass Creek near Jackass Meadow, Calif., 1921–
Jackass Creek near Fullers Meadow, Calif., 1924–25.
West Fork of Jackass Creek near Fullers Meadow, Calif., 1924–25.
Chiquito Creek near Mugler Meadows, Calif., 1924–25.
Chiquito Creek near Arnold Meadow, Calif., 1921–
Big Creek at mouth, near Big Creek, Calif., 1923–
Pitman Creek at Big Creek, Calif., 1922–
Stevenson Creek at Shaver, Calif., 1916–17, 1922–
Fresno Flume & Lumber Co.'s upper flume at Shaver, Calif., 1915–1917.
Fresno Flume & Lumber Co.'s lower flume at Shaver, Calif., 1916–17.
Southern Califorina Edison Co.'s flume at Shaver, Calif., 1922–1926.

Fresno River near Knowles, Calif., 1911–1913, 1915–
Chowchilla River near Buchanan Reservoir site, Calif., 1921–1923.
Merced River above Illilouette Creek, Calif., 1915.
Merced River at Happy Isles Bridge, near Yosemite, Calif., 1915–
Merced River at Yosemite, Calif., 1904–1908, 1912–1916.
Merced River at Pohono Bridge, near Yosemite, Calif., 1916–
Merced River at Horseshoe Bend, Calif., 1922–
Merced River at Exchequer, Calif., 1915–
Merced River near Merced Falls, Calif., 1901–1913, 1923–1926.
Merced River near Livingston, Calif., 1912, 1921–1923, 1925–
    Illilouette Creek near Yosemite, Calif., 1915.
    Tenaya Creek near Yosemite, Calif., 1904–1908, 1912–
    Yosemite Creek near Yosemite, Calif., 1904–1905, 1912–
    South Fork of Merced River near Wawona, Calif., 1911–1921.
Tuolumne River at Hetch Hetchy cabin, Calif., 1910–1916.
Tuolumne River at Hetch Hetchy dam site, Calif., 1910–1915.
Tuolumne River near Hetch Hetchy, Calif., 1915–
Tuolumne River near Buck Meadows, Calif., 1907–1909, 1912–
Tuolumne River near Jacksonville, Calif., 1923–
Tuolumne River above La Grange Dam, Calif., 1915–
Tuolumne River and canals near La Grange, Calif., 1895–1916.
Tuolumne River at Modesto, Calif., 1895–1896.
    Falls Creek near Hetch Hetchy, Calif., 1915–
    Cherry Creek at Eleanor trail crossing, Calif., 1901.
    Cherry Creek near Hetch Hetchy, Calif., 1910–
        Eleanor Creek at Eleanor trail crossing, Calif., 1901.
        Eleanor Creek near Hetch Hetchy, Calif., 1909–
    South Fork of Tuolumne River at Italian Flat, near Sequoia, Calif., 1924–
    South Fork of Tuolumne River at Harden ranch, near Sequoia, Calif., 1914–1918.
    South Fork of Tuolumne River near Oakland Recreation Camp, Calif., 1923–
    South Fork of Tuolumne River near Buck Meadows, Calif., 1916–1921.
        Golden Rock ditch near Sequoia, Calif., 1914–15.
        Middle Fork of Tuolumne River near Mather, Calif., 1924–
        Middle Fork of Tuolumne River near Buck Meadows, Calif., 1916–
        Woods Creek near Jacksonville, Calif., 1925–
        Sierra & San Francisco Power Co.'s canal near La Grange, Calif., 1908–1925.
        Modesto Canal near La Grange, Calif., 1907–
        Turlock Canal near La Grange, Calif., 1907–
Middle Fork of Stanislaus River at Sand Bar Flat, near Avery, Calif., 1905–
Stanislaus River near Knights Ferry, Calif., 1915–
Stanislaus River at Knights Ferry, Calif., 1903–1916.
Stanislaus River at Oakdale, Calif., 1895–1900.
    Relief Creek near Baker Station, Calif., 1910–1918.
    North Fork of Stanislaus River near Avery, Calif., 1914–1922.
        Utica Gold Mining Co.'s canal near Avery, Calif., 1915–1921.
    South Fork of Stanislaus River at Strawberry, Calif., 1911–1917.
    Oakdale Canal near Knights Ferry, Calif., 1914–
    South San Joaquin Canal near Knights Ferry, Calif., 1914–
    Stanislaus & San Joaquin Water Co.'s canal at Knights Ferry, Calif., 1907–1912.
Calaveras River at Jenny Lind, Calif., 1907–

Calaveras River near Stockton, Calif., 1925–26.
South Channel of Littlejohns Creek at Farmington, Calif., 1925–26.
Bear Creek near Clements, Calif., 1926–
Bear Creek near Lockeford, Calif., 1926–
North Fork of Mokelumne River above Moore Creek, Calif., 1926–
North Fork of Mokelumne River near West Point, Calif., 1917–18, 1924–
Mokelumne River at Electra, Calif., 1901–1904.
Mokelumne River near Lancha Plana, Calif., 1926–
Mokelumne River near Clements, Calif., 1905–
Mokelumne River at Woodbridge, Calif., 1924–
Mokelumne River near Thornton, Calif., 1926–
Middle Fork of Mokelumne River at West Point, Calif., 1911–
South Fork of Mokelumne River near Railroad Flat, Calif., 1911–
Licking Fork of Mokelumne River near Railroad Flat, Calif., 1911–1917.
Stockton-Mokelumne Canal at Woodbridge, Calif., 1926–
Dry Creek near Ione, 1911-12, 1926–
Dry Creek near Galt, Calif., 1927–
Sutter Creek near Volcano, Calif., 1924–1927.
Sutter Creek at Sutter Creek, Calif., 1922–
North Fork of Cosumnes River near Pleasant Valley, Calif., 1906, 1924.
North Fork of Cosumnes River near El Dorado, Calif., 1911–
Cosumnes River at Michigan Bar, Calif., 1907–
Camp Creek near Sly Park, Calif., 1923–24.
Camp Creek near Pleasant Valley, Calif., 1924.
Sly Park Creek at Park, Calif., 1906.

MAXIMUM AND MINIMUM DISCHARGES

Maximum and minimum discharges recorded for the San Joaquin River Basin, Calif.

Station	Period of record	Drainage area	Maximum discharge				Minimum discharge
			Date	Gage height	Discharge	Discharge per square mile	
		Sq. mi.		*Feet*	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*
Bear Creek near Vermilion Valley	1921–1927		June 4, 1922	5.97	920		1.2
Big Creek near Big Creek	1923–1927		June 23, 1925	6.25	[a]2,100		.1
Calaveras River at Jenny Lind	1907–1927	395	Jan. 31, 1911	14.00	69,600	176	0
Cherry Creek near Hetch Hetchy	1910–1927	114	do		[b]7,000	61.4	0
Chiquito Creek near Arnold Meadow	1921–1927		May 24, 1922	8.63	1,100		1.4
Cosumnes River at Michigan Bar	1907–1927	524	Feb. 6, 1925	11.20	23,800	45.4	0
Cosumnes River, North Fork of, near El Dorado	1911–1927	197	do	14.50	6,950	35.3	0
Deer Creek at Hot Springs	1910–1927		Jan. 24, 1914	2.90	420		.6
Deer Creek below East Fork	1925–1927	21.1	May 15, 1927	6.21	494	23.4	.3
Dinkey Creek at Dinkey Meadows	1921–1927	50.8	Nov. 26, 1926	7.62	2,660	52.4	.4
Dinkey Creek at mouth	1920–1927	13.6	Nov. 9, 1924	10.57	3,360	24.7	1.6
Dry Creek near Ione	1925–1927		Apr. 3, 1927	10.90	4,050		0
Eleanor Creek near Hetch Hetchy	1909–1927	79	Jan. 30, 1911	13.10	5,000	63.3	0
Falls Creek near Hetch Hetchy	1916–1927		June 10, 1917	5.60	1,240		0
Fresno River near Knowles	1911–1914 1916–1927		Feb. 21, 1917	6.00	4,500		0
Granite Creek near Cattle Mountain	1921–1927		June 27, 1922	8.83	2,210		0
Helm Creek at Sand Meadow	1922–1927	34.1	May 16, 1927	5.58	1,140	33.4	1.1
Jackass Creek near Jackass Meadows	1921–1927		May 24, 1922	9.58	418		0

[a] Storage at Huntington Lake. [b] Mean daily discharge.

Maximum and minimum discharges recorded for the San Joaquin River Basin, Calif.—Continued

Station	Period of record	Drainage area	Maximum discharge				Minimum discharge
			Date	Gage height	Discharge	Discharge per square mile	
		Sq. mi.		*Feet*	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*
Kaweah River near Three Rivers	1903–1927	520	Jan. 17, 1916	13.50	14,700	28.3	9.5
Kaweah River, North Fork of, at Kaweah	1910–1927	----------	Jan. 25, 1914	10.20	7,400	----------	0
Kaweah River, South Fork of, near Three Rivers	1911–1924	----------	Jan. 17, 1916	6.30	1,880	----------	.7
Kern River near Bakersfield	1896–1927	2,345	Jan. 26, 1914	----------	18,287	7.8	57
Kern River near Kernville	1912–1927	----------	Jan. 17, 1916	8.80	9,960	----------	----------
Kern River, South Fork of, near Onyx	1911–1914 1919–1926	----------	Jan. 25, 1914	7.10	2,360	----------	1.0
Kings River near Hume	1921–1927	----------	June 4, 1922	8.67	11,700	----------	63
Kings River at Piedra, near Sanger	1895–1927	1,740	Jan. 25, 1914	21.80	59,700	34.3	67
Kings River, North Fork of, near Cliff Camp	1921–1927	174	June 4, 1922	10.60	6,030	34.7	1.3
Kings River, North Fork of, above Dinkey Creek	1919–1927	246	------do------	12.18	6,080	24.7	4
Kings River, North Fork of, below Meadow Brook	1921–1927	35.3	------do------	5.02	870	24.6	.3
Merced River at Exchequer	1915–1927	1,020	Jan. 17, 1916	20.00	22,000	21.6	13
Merced River at Happy Isles Bridge	1915–1927	181	May 28, 1919	7.10	3,800	21.0	1.5
Merced River at Horseshoe Bend	1922–1927	----------	Feb. 6, 1925	15.48	14,000	----------	13
Merced River near Merced Falls	1901–1913 1923–1926	1,090	Jan. 30, 1911	21.05	37,200	34.1	0
Merced River at Pohono Bridge	1916–1927	----------	June 5, 1922	10.00	6,370	----------	3.3
Merced River at Yosemite	1904–1909 1912–1916	----------	June 1, 1915	9.10	4,010	----------	14
Merced River, South Fork of, near Wawona	1910–1922	131	Jan. 26, 1914	7.20	3,770	28.8	.2
Mokelumne River near Clements	1904–1927	631	Mar. 19, 1907	22.00	25,500	40.4	0
Mokelumne River, Middle Fork of, at West Point	1911–1927	----------	Jan. 23, 1914	10.00	2,550	----------	.2
Mokelumne River, North Fork of, near West Point	1917–1918 1924–1927	----------	Feb. 6, 1925	14.20	10,200	----------	2.5
Mokelumne River, South Fork of, near Railroad Flat	1911–1927	----------	Jan. 25, 1914	6.90	3,330	----------	1.4
Mono Creek near Vermilion Valley	1921–1927	----------	June 16, 1927	8.09	1,420	----------	8
Pitman Creek at Big Creek	1921–1927	27	June 1, 1922	3.53	1,110	41.1	.1
San Joaquin River above Big Creek	1922–1927	----------	June 5, 1922	17.34	18,000	----------	83
San Joaquin River near Friant	1907–1927	1,640	Jan. 25, 1914	21.72	46,200	28.2	44
San Joaquin River near Newman	1912–1927	----------	Jan. 27, 1914	18.00	20,700	----------	15
San Joaquin River, Middle Fork of, at Miller Bridge	1921–1927	----------	June 4, 1922	17.68	6,200	----------	27
San Joaquin River, North Fork of, below Iron Creek	1920–1927	----------	June 27, 1922	7.24	2,000	----------	1.4
San Joaquin River, South Fork of, near Hoffman Meadow	1921–1927	----------	June 5, 1922	15.21	5,930	----------	21
San Joaquin River, South Fork of, near Lake Florence	1921–1927	----------	June 4, 1922	13.75	3,460	----------	0
Stanislaus River near Knights Ferry	1903–1927	----------	Jan. 31, 1911	26.00	60,000	----------	----------
Stanislaus River, Middle Fork of, at Sand Bar Flat	1905–1927	329	Mar. 19, 1907	----------	[b] 9,760	29.7	[b] 30
Stanislaus River, North Fork of, near Avery	1914–1922	----------	May 11, 1915	8.70	5,250	----------	10
Stanislaus River, South Fork of, at Strawberry	1911–1917	54	June 8, 1915	5.40	1,450	26.9	3
Tenaya Creek near Yosemite	1904–1909 1912–1927	47	May 28, 1919	7.05	1,660	35.3	.5
Tule River near Porterville	1901–1927	266	Jan. 17, 1916	11.00	6,780	25.5	0
Tule River, South Fork of, near Porterville	1910–1927	----------	Jan. 26, 1914	8.00	2,750	----------	0
Tuolumne River near Buck Meadows	1907–1927	----------	Jan. 14, 1909	14.00	27,200	----------	13
Tuolumne River near Hetch Hetchy	1915–1927	----------	May 29, 1919	13.40	11,400	----------	1.3
Tuolumne River near Jacksonville	1923–1927	----------	Feb. 6, 1925	11.20	26,500	----------	37
Tuolumne River above La Grange dam	1915–1927	----------	Feb. 21, 1917	27.58	36,500	----------	1.4
Tuolumne River near La Grange	1907–1915	1,500	Jan. 31, 1911	16.45	60,300	40.2	----------
Tuolumne River, Middle Fork of, near Buck Meadows	1917–1927	----------	May 28, 1919	8.15	1,330	----------	0
Tuolumne River, South Fork of, near Oakland Recreation Camp	1923–1927	----------	Apr. 16, 1923	7.03	1,500	----------	1.9

[b] Mean daily discharge.

MONTHLY DISCHARGE

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.

Kern River near Kernville

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1911–12				290	262	308	422	1,070	1,570	482	241	177	
1912–13	178	184	174	184	208	279	544	1,120	892	508	454	338	423
1913–14	185	211	218	671	520	1,030	1,450	2,380	2,830	1,900	837	380	1,050
1914–15	319	259	263	276	318	529	938	1,400	2,580	1,170	371	260	724
1915–16	216	217	243	857	969	2,260	3,360	3,820	3,840	2,210	846	466	1,610
1916–17	529	398	359	382	488	653	1,420	1,990	2,760	1,260	540	312	925
1917–18	255	240	228	282	254	477	938	1,200	2,290	660	314	299	615
1918–19	444	298	289	251	294	414	1,080	2,200	1,230	482	233	177	618
1919–20	190	193	246	215	237	446	933	2,120	2,160	739	334	224	670
1920–21	242	258	257	272	365	576	420	850	1,310	199	5.56	7.70	396
1921–22	7.39	6.48	7.80	15.6	40.2	96.8	394	2,490	2,640	718	107	8.91	546
1922–23	7.32	5.46	8.34	5.29	12.2	11.7	239	1,140	574	220	7.77	8.10	188
1923–24	6.19	6.75	6.67	5.77	4.14	3.04	10.6	92.9	4.04	3.26	0	0	12.1
1924–25	0	21.6	4.94	.26	2.66	3.64	184	991	893	256	16.5	6.46	199
1925–26	4.43	4.06	3.85	3.44	3.69	3.40	372	872	167	5.83	3.20	1.21	121
1926–27	1.54	99.5	4.56	2.85	420	175	569	1,850	1,820	487	6.29	6.37	452
Average	172	160	154	229	275	454	830	1,600	1,720	706	270	167	570

NOTE.—Kern River No. 3 Canal began to divert water Mar. 7, 1921.

Kern River at Kernville

1904–5				203	301	505	694	1,420	2,050	880	297	200	
1905–6	182	203	231	579	459	984	1,680	2,840	4,490	4,540	1,890	728	1,570
1906–7	480	397	443	467	588	595	1,980	2,430	2,620	1,980	830	387	1,100
1907–8	434	366	366	358	400	610	734	1,300	952	603	480	346	579
1908–9	311	262	255	1,750	1,510	1,350	2,430	4,530	6,400	3,130	1,010	591	1,960
1909–10	402	438	740	763	590	1,030	1,350	1,770	1,230	625	331	291	797
1910–11	277	253	269	598	674	817	1,710	2,300	3,560	2,440	613	363	1,160
1911–12	330	306	265	271	267	325	471	1,030	1,660	497	254	178	488

Kern River at Isabella

1910–11	21.4	7.9	4.4	271	69.2	295	1,260	1,760	2,760	1,810	120	13.6	700
1911–12	21.7	14.9	15.7										
1925–26	2.17	2.32	2.40	2.34	3.05	3.62	463	825	208	3.85	1.11	1.85	127
1926–27	2.78	153	5.54	3.07	642	363	1,190	2,510	1,930	511	9.01	2.39	607

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

Kern River near Bakersfield

[Drainage area, 2,345 square miles]

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1893–94	534	518	516	661	717	1,001	1,495	1,607	1,085	700	334	248	785
1894–95	279	244	470	809	1,252	1,374	2,724	4,369	2,906	1,482	629	344	1,407
1895–96	327	346	403	747	617	951	972	1,401	2,456	1,346	486	304	863
1896–97	267	355	347	373	809	923	2,914	4,580	2,309	1,006	469	298	1,220
1897–98	340	355	422	363	434	388	710	735	551	244	120	116	398
1898–99	160	166	199	263	302	590	893	835	1,331	489	156	105	457
1899–1900	160	221	278	362	280	413	472	1,111	1,283	392	144	166	440
1900–1901	160	349	373	493	860	1,270	1,398	3,032	3,324	1,864	968	345	1,203
1901–2	317	377	323	283	371	790	1,805	1,787	2,165	706	312	197	786
1902–3	199	281	269	350	454	579	1,249	2,148	2,340	868	303	191	769
1903–4	174	203	201	195	346	667	1,005	1,841	1,746	646	467	267	638
1904–5	438	286	241	281	396	823	1,043	1,915	2,231	876	327	211	756
1905–6	207	236	261	693	626	2,063	2,910	5,859	7,704	6,503	2,299	973	2,528
1906–7	609	503	618	678	1,023	1,354	3,323	3,252	3,092				
1907–8						1,058	1,333	1,292	1,013	681	527	366	
1908–9	349	306	298	1,926	2,252	2,092	4,158	6,223	6,623	3,169	1,077	730	2,400
1909–10	508	577	1,176	1,196	881	1,384	1,729	2,077	1,335	684	394	289	1,020
1910–11	309	317	325	622	971	1,304	2,321	3,000	3,732	2,545	746	424	1,384
1911–12	413	365	352	379	370	457	626	1,309	1,696	539	271	183	579
1912–13	192	198	192	212	283	410	714	1,196	1,021	568	512	426	494
1913–14	218	258	270	1,895	1,127	1,671	2,436	3,426	3,379	2,087	897	424	1,510
1914–15	398	343	348	366	545	789	1,360	2,025	2,896	1,260	401	277	917
1915–16	235	250	314	2,803	3,521	6,149	8,096	7,693	6,583	3,662	923	568	3,390
1916–17	679	519	526	653	808	1,061	2,123	2,685	3,153	1,322	602	331	1,205
1917–18	292	311	315	308	334	782	1,252	1,280	2,298	729	338	295	711
1918–19	529	372	407	343	414	618	1,455	2,280	1,375	559	265	197	736
1919–20	225	233	298	280	314	657	1,401	2,584	2,316	825	365	251	813
1920–21	270	328	337	383	554	901	869	1,628	2,023	799	294	212	716
1921–22	214	218	352	499	609	853	1,418	3,940	3,401	1,442	603	400	1,160
1922–23	289	333	460	437	463	510	1,233	1,965	1,387	908	363	303	722
1923–24	252	241	225	222	238	259	480	679	236	134	96	92	263
1924–25	124	239	303	293	474	509	948	1,659	1,618	951	422	192	644
1925–26	210	207	238	196	282	402	1,110	1,604	832	302	155	118	472
1926–27	136	479	457	333	1,355	1,189	1,687	3,004	2,708	1,228	436	249	1,100
Average	303	319	367	603	736	1,066	1,755	2,530	2,475	1,258	506	306	1,015

Kern River No. 3 Canal near Kernville

1920–21						18.3	314	577	611	523	295	222	
1921–22	192	178	263	279	296	424	564	558	567	582	495	364	397
1922–23	269	272	341	309	299	395	574	625	626	599	322	280	410
1923–24	221	201	164	156	176	185	382	545	212	125	86.4	85.4	212
1924–25	115	173	200	202	318	392	560	575	576	558	369	173	351
1925–26	201	186	181	152	215	325	540	560	567	290	165	121	292
1926–27	132	224	270	232	374	584	584	566	583	603	391	241	399

Kern River and Kern River No. 3 Canal near Kernville

1920–21	242	258	257	272	365	595	735	1,430	1,920	722	300	229	610
1921–22	199	184	271	294	336	521	958	3,040	3,210	1,300	602	373	943
1922–23	276	278	349	314	311	406	812	1,770	1,200	823	329	288	598
1923–24	227	208	170	162	180	188	392	638	216	128	86.4	85.3	224
1924–25	115	194	205	202	321	396	745	1,560	1,470	813	385	180	550
1925–26	206	191	185	156	219	328	911	1,430	734	296	168	122	413
1926–27	134	324	275	235	793	759	1,150	2,420	2,400	1,090	397	247	850

Salmon Creek near Kernville

1921–22						15.5	39.7	63.6	25.3	6.73	3.24	1.79	
1922–23	2.12	4.72	6.34	6.53	8.14	18.5	39.3	24.4	8.18	2.19	1.87	2.32	10.4

Kern River Power Co.'s canal at Kernville

1909–10				545	571	584	592	592	586	575	363	291	
1910–11	267	253	270	353	504	560	589	589	589	589	558	363	457
1911–12	320	306	266	271	267	325	471	362	482	474	252	178	331
1912–13	177	179	177	179	203	317	212	528	598	519	339	328	314
1913–14	185	227	234		516	204		0	9.2	448	575	377	

Borel Canal at Tilley Creek

1925–26	187	182	191	167	240	359	529	548	517	278	148	108	288
1926–27	127	220	305	251	386	573	132	86.8	595	592	380	234	323

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

South Fork of Kern River near Onyx

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1911–12	38.2	51.5	62.6	56.8	55.3	65.8	114	201	67.5	26.6	11.6	14.5	63.9
1912–13	26.0	25.6	25.6	25.5	35.4	85.6	273	155	140	30.3	50.6	34.1	75.4
1913–14	25.1	39.1	47.7			344	932	846	273	82.0	70.8		
1918–19								229	80.6	34.5	17.2	18.7	
1919–20	24.8	32.9	50.3	49.7	60.2	104	268	544	142	46.9	19.0	18.3	114
1920–21	28.1	44.3	44.2	50.2	74.6	162	159	173	130	31.6	8.84	11.6	76.3
1921–22	19.9	27.9	44.4	54.1	87.7	173	443	887	278	76.2	48.4	28.7	181
1922–23	27.5	39.2	52.9	51.4	56.0	107	241	176	57.3	15.7	12.4	19.1	71.2
1923–24	24.7	29.7	26.7	27.3	32.9	36.5	56.7	13.5	1.0	1.0	1.0	1.0	20.9
1924–25	11.0	27.2	28.5	28.0	44.3	78.0	132	69.9	40.0	35.0	30.0	25.0	45.7
1925–26	19.4	37.7	25.9	20.9	21.3	65.4	225	90.6	14.4				
1926–27		53.0	23.8			216	620	521	147	46.2	29.2	28.7	

Erskine Creek near Isabella

1910–11					9	10	6	3	0.1	0	0	0.3	
1911–12	1	1.5	4	3	1	4	6	4	.5	.5	.1	.2	2.2

Basin Creek near Havilah

[Drainage area, 36.2 square miles]

1910–11					7.0	7.0	4.4	3.6	3.4	2.8	3.1	5.8	
1911–12	7.7	7.0	8	6	5	8	7	3	1	2	2	3	5.0

Tejon House Creek at Tejon ranch house

[Drainage area, 17 square miles]

1894–95				13.6	26.1	19.0	24.7	18.3	5.2	2.0	1.3	1.6	
1895–96	2.7	3.9	5.5	5.6	6.4	10.8	11.3	11.9	5.4				
1896–97	2.7	2.7											

San Emigdio Creek at San Emigdio ranch house

[Drainage area, 54 square miles]

1893–94												1.8	
1894–95	1.7	1.5	4.7	8.4	4.6	3.7	3.9	2.4	2.4	2.2	2.2	2.1	3.32
1895–96	2.3	3.0	3.3										

White River near Hot Springs

1910–11					8.44			3.77	1.46	0.22	0	0.03	
1911–12	0.38	0.68	1.02	2.52	1.96	3.75	7.45	5.20	2.50	1.20	0	0	2.22
1912–13	0	0	0	3.10	3.71	2.98	3.55	2.39	1.50	.67	.02	0	1.48

Deer Creek at Hot Springs

1910–11	3.42	4.11	5.83	10.4	10.1	17.4	17.7	11.6	5.76	2.25	1.67	1.78	7.67
1911–12	2.93	3.56	5.02	6.10	4.61	6.42	13.1	15.6	5.87	3.05	1.51	2.12	5.83
1912–13	2.72	4.98	5.72	5.07	5.65	6.58	8.71	6.16	4.38	1.93	1.95	2.10	4.65
1913–14	2.51	4.56	6.48	41.5	15.2	15.3	24.2	17.0	8.44	3.73	1.54	1.66	11.8
1914–15	2.81	3.73	6.12	6.85	12.0	13.0	18.3	45.2	24.6	8.66	3.38	2.72	12.3
1915–16		4.90	6.81	52.5	29.3	60.3							
1916–17			11.6	10.4	16.7	19.6		27.0	20.8	9.14	3.87	2.58	
1917–18	1.84	4.13	3.85	4.04	5.80	13.2	10.9	6.69	2.62	1.55	1.20	1.55	4.77
1918–19	3.80	4.46	4.47	3.42	9.78	16.1	18.0	14.2	6.10	1.91	2.17	2.34	7.20
1919–20	2.80	4.18	7.37	4.07	4.66	14.3	29.4	22.2	10.4	3.72	1.13	1.50	8.80
1920–21	2.0	4.0	5.84	5.08	9.18	21.1	20.9	26.2	19.3	8.13	3.18	2.87	10.7
1921–22	3.80			6.08	8.96	11.8	16.0	23.8	12.5	4.47	2.60	1.97	
1922–23				4.19	4.84	6.61	33.0	19.1	11.8	4.55	2.01	2.64	
1923–24					3.35	3.82		2.33	1.90	1.73	1.39	1.40	
1924–25	1.69				27.2	12.5	23.2	18.6	8.68	3.65	2.25	2.96	
1925–26	4.27	5.45	6.07	4.14	7.17	6.85	10.4	5.36	1.82	1.44	1.39	1.43	4.63
1926–27	1.92	4.85	4.49	4.36	24.2	15.8	18.3	13.8	6.21	1.99	1.39	1.70	8.13
Average	2.81	4.41	6.13	11.2	11.7	15.3	18.7	17.2	9.45	3.87	2.04	2.08	7.86

Tyler Creek near Hot Springs

1910–11					7.00	15.3	13.3	9.36	5.76	1.13	0.73	0.73	
1911–12	1.56	1.43	1.25				12.9	8.43	4.87				
1912–13								2.51	1.54	.38	.32	.08	

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

North Fork of Middle Fork of Tule River near Springville

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1908-9				352	78.9	77.7	155	262	189	58.7	19.1	16.8	
1909-10	14.7	19.7	90.2	53.2	36.9	68.2	84.7	70.5	28.8	15.1	10.4	9.98	42.0
1910-11	12.4	11.9	12.8		37.5	64.6	113	134	103	33.6	13.7	13.4	
1911-12	13.2	15.3	14.4	16.2	15.4	20.2	32.1	72.7	50.4	15.7	8.11	7.39	23.4
1912-13	8.78	9.26	8.58										

Tule River near Porterville

[Drainage area, 266 square miles]

1900-1901								418	240	61	19	17	
1901-2	29	43	50	45	159	362	571	343	190	43	21	15	156
1902-3	24	50	62	254	173	258	447	358	158	38	17	14	154
1903-4	17	24	28	30	121	283	279	262	74	17	9	20	97
1904-5	55	30	37	47.4	75.9	230	205	313	146	32.9	9.8	8.2	99.2
1905-6	12.6	42.4	94.2	500	200	1,370	772	1,080	972	362	84.3	47.4	461
1906-7	38.5	48.8	97.1	232	285	354	764	338	262	82.3	36.7	29.9	214
1907-8	46.0	53.0	106	116	264	296	178	164	79.8	20.0	10.3	18.5	113
1908-9	31.3	34.1	45.8	895	896	530	759	732	584	165	53.7	38.7	397
1909-10	44.5	88.5	596	343	180	217	229	154	53.5	18.1	6.6	10.6	162
1910-11	22.2	31.9	48.5	289	271	438	353	283	182	55	21.7	16.6	168
1911-12	24.8	42.9	47.7	65.0	58.5	88.7	163	198	113	13.7	2.84	5.27	68.6
1912-13	6.98	15.2	22.6	28.3	29.5	83.5	134	101	49.5	7.24	2.31	4.68	40.4
1913-14	3.45	37.4	67.9	722	258	232	268	268	162	40.4	10.2	6.67	173
1914-15	15.1	20.4	41.6	73.2	175	172	251	608	271	57.1	12.1	10.5	142
1915-16	9.45	29.4	61.7	947	577	842	651	540	311	101	36.5	20.1	344
1916-17	95.0	63.8	205	153	347	262	387	403	294	59.2	18.7	9.20	190
1917-18	15.1	28.3	35.5	38.6	51.6	208	150	94.5	32.9	2.72	.91	2.67	55.2
1918-19	7.97	24.0	45.3	40.5	117	220	263	196	45.4	4.22	.55	.31	80.1
1919-20	8.60	16.4	52.5	31.3	37.6	294	430	336	157	24.5	3.16	3.52	116
1920-21	14.3	28.4	50.0	80.7	153	234	162	249	150	17.8	1.60	.96	94.9
1921-22	5.47	13.0	92.5	135	271	238	317	523	230	37.5	5.72	1.76	155
1922-23	9.15	37.1	130	84.0	108	95.7	459	249	94.9	18.7	2.09	4.69	107
1923-24	13.5	19.3	26.1	31.3	33.4	43.0	105	34.0	1.21	.29	.20	.20	25.5
1924-25	2.94	48.7	83.5	75.8	153	150	278	216	85.2	15.4	1.96	2.42	92.2
1925-26	15.1	26.4	33.2	27.4	82.8	90.1	230	111	15.1	.48	.22	.09	52.2
1926-27	.60	116	61.5	62.2	456	285	309	294	119	15.4	.88	1.58	141
Average	21.8	38.9	85.4	206	213	303	351	328	188	48.5	14.4	11.5	150

South Fork of Middle Fork of Tule River near Springville

1908–9				301	77.3	71.7	134	247	167	36.5	14.2	11.7	
1909–10	11.1	19.7	42.1	45.2	29.7	36.3	40.4	31.2	15.3	9.25	5.17	6.36	24.3
1910–11	7.99	8.67	9.97		40.9	54.2	59.7	53.5	34.0	20.1	13.1	11.2	
1911–12	6.82	7.69	8.69	11.2	10.4	14.4	25.8	40.1	23.4	6.70	3.21	3.38	13.5
1912–13	4.93	6.68	6.70										

Bear Creek near Springville

1910–11					17.6	23.4	10.6	7.86	3.44	1.27	0.67	0.74	
1911–12	1.18	4.02	3.65	4.22	4.54	7.61	8.32	7.14	2.03	.65	.30	.50	3.67
1912–13	.87	1.51	1.94	2.85	4.54	5.42	5.63	2.55	1.20	.44	1.66	1.52	2.49
1913–14	.55	2.33	6.53	41.1	8.49	6.33	6.73	3.65	2.20	.97	.44	.62	6.69
1914–15	1.08	1.40	2.01	3.94	14.5	8.79	11.4	38.0	10.2	2.63	.75	.63	7.91
1915–16	.78	2.22	4.03	65.8	27.5	34.8	27.2	13.6	4.91	2.54	1.36	1.63	15.5

South Fork of Tule River near Porterville

1910–11		13.1	14.9	52.2	51.3	110	76.6	46.5	24.8	7.82	3.18	2.72	
1911–12	7.16	8.55	11.7	10	10	26.6	69.7	60.9	30.8	9.68	3.41	2.65	21.0
1912–13	4.63	9.17	9.03	15.3	17.0	26.8	30.8	16.9	11.5	4.92	1.82	2.56	12.5
1913–14	2.14	9.82	18.9	249	84.1	66.5	90.0	66.8	26.4	10.7	2.46	2.77	52.4
1914–15	5.31	6.80	13.3	23.4	51.4	51.9	72.6	232	71.4	22.4	7.07	4.30	46.8
1915–16	4.30	12.4	38.0	351	218	306	218	161	77.8	31.3	13.8	8.33	120
1916–17						83.9			62.2	21.6	9.45	4.51	
1917–18	5.33	9.15	9.79	11.5	27.2	51.7	33.5			1.83	.75	3.48	
1918–19	7.65	12.6	16.7	12.3	32.3	72.9	77.2	51.0	15.8	3.79	2.17	2.27	25.5
1919–20	5.06	6.22	35.9	9.23	15.0	104	157	62.3	33.1	11.8	5.24	7.0	37.6
1920–21	7	15	25	30	50	75	55	54.1	36.1	10.0	3.94	3.53	30.3
1921–22	4.43	5.60	29.1	31.8	62.9	67.8	82.4	97.0	52.3				
1922–23				25.7	29.8	28.1	158	56.6	31.3	12.4	6.84	6.08	
1923–24						15.8	31.8						
1924–25	2.12	20.2	41.3	27.8	70.3	55.8							
1926–27					159	84.8	78.7						
Average	5.01	10.7	22.0	65.3	62.7	76.7	88.0	82.3	39.5	12.4	5.01	4.18	43.3

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

Kaweah River near Three Rivers

[Drainage area, 520 square miles]

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1902–3								2,010	1,750	462	50	43	
1903–4	43	56	48	78	729	640	968	2,050	1,050	220	108	190	516
1904–5	511	117	95	116	258	553	783	1,390	1,350	303	76.6	45.2	466
1905–6	43.4	56.6	83.0	784	418	2,440	1,910	3,210	4,670	3,430	691	226	1,500
1906–7	120	119	245	412	600	1,030	1,960	1,950	2,030	1,020	261	90.4	820
1907–8	112	105	197	206	326	598	793	886	604	185	85.4	81.5	348
1908–9	98.5	71.6	85.2	1,500	1,390	868	1,510	2,640	3,650	1,140	260	111	1,110
1909–10	92.2	218	758	823	466	792	321	1,410	587	195	59.9	48.4	481
1910–11	72.1	71.2	107	869	645	1,140	1,270	1,730	2,050	842	186	78.7	755
1911–12	78.0	83.3	90.6	102	105	198	378	1,100	1,030	173	54.6	37.1	285
1912–13	38.1	51.0	47.1	81.6	137	251	636	1,110	725	254	174	151	305
1913–14	49.9	110	120	1,170	607	837	1,130	1,760	1,450	629	122	71.2	672
1914–15	69.9	58.2	80.5	135	345	439	888	1,690	1,770	500	104	57.2	511
1915–16	42.9	56.7	124	1,530	1,070	1,760	2,130	2,360	2,200	959	271	103	1,050
1916–17	319	145	283	279	690	580	1,190	1,660	2,010	497	128	56.6	651
1917–18	49.4	55.4	54.8	56.3	142	545	789	1,060	777	158	52.1	65.9	317
1918–19	161	143	143	108	340	428	1,110	1,610	494	116	39.2	39.4	394
1919–20	63.1	60.9	474	117	167	978	1,170	1,760	1,630	370	94.8	61.5	580
1920–21	127	147	156	269	427	890	829	1,450	1,430	326	66.0	43.8	513
1921–22	40.9	41.5	213	282	479	502	848	2,520	1,990	506	147	77.3	638
1922–23	66.5	131	330	248	270	361	1,130	1,800	1,050	446	87.9	90.1	501
1923–24	86.6	66.0	63.2	70.4	93.7	121	445	589	91.5	26.0	14.0	12.6	140
1924–25	43.6	184	168	179	378	447	924	1,510	1,080	339	96.7	54.6	450
1925–26	84.8	81.9	103	77.5	222	312	1,070	1,160	385	77.8	33.5	22.3	302
1926–27	25.3	390	210	202	1,050	816	1,330	1,970	1,480	444	96.2	53.7	668
Average	102	109	178	404	473	730	1,060	1,700	1,490	545	134	76.5	582

Kaweah River at McKay Point, near Lemon Cove

1918–19	135	101	123	90.1	241	418	878	1,360	435	85.6	7.90	0.77	323
1919–20	15.4	36.8	128	85.3	111	549	1,120	1,780	1,310	294	54.7	20.6	459
1920–21	50.6	109	148	245		682	738	1,330	1,330				

North Fork of Kaweah River at Kaweah

1910–11	----------	11.7	23.1	280	182	451	442	373	206	49.5	14.5	8.1	----------
1911–12	10.4	16.2	19.8	26.9	24.0	55.7	113	159	73.7	14.9	2.88	1.33	43.2
1912–13	4.1	7.3	10.8	20.3	33.8	63.4	129	105	56.6	16.0	5.12	6.77	38.1
1913–14	1.9	12.5	23.9	472	177	268	322	250	104	24.4	3.81	1.9	138
1914–15	5.20	5.09	15.4	32.2	108	137	265	389	175	36.7	8.57	1.77	98.0
1915–16	2.55	6.47	22.2	592	404	642	630	418	157	43.1	12.7	6.27	244
1916–17	66.5	24.4	71.5	72.1	248	192	333	343	193	36.4	12.2	6.00	132
1917–18	6.08	8.18	10.1	12 0	26.2	167	183	122	37.1	9.16	2.49	2.52	48.9
1918–19	9.63	14.9	25.5	19.4	66.1	120	213	135	31.1	8.03	3.40	2.73	53.8
1919–20	7.23	7.83	31.2	18.3	30.2	227	368	327	100	19.5	4.00	2.61	95.3
1920–21	12.2	19.9	28.9	67.0	124	251	223	248	131	19.6	5.99	5.39	94.5
1921–22	6.41	8.52	75.9	88.1	194	195	339	623	230	36.5	10.8	5.36	151
1922–23	7.44	20.7	94.5	66.3	87.6	124	431	312	118	26.4	8.73	8.37	109
1923–24	11.0	10.5	12.0	15.5	16.4	21.0	76.7	21.9	3.94	.31	.05	.04	15.7
1924–25	3.29	53.5	35.6	30.0	113	111	225	164	57.9	13.3	4.16	3.64	67.4
1925–26	7.21	8.68	9.87	8.69	48.8	90.4	276	151	27.9	4.68	.71	1.47	52.7
1926–27	1.95	220	53.6	57.7	440	257	400	331	90.3	18.5	4.48	3.11	154
Average	10.2	26.8	33.2	110	137	198	292	263	105	22.2	6.15	3.96	96.0

South Fork of Kaweah River near Three Rivers

1911–12	9.0	11.6	13.5	12.3	16.0	22.0	51.6	189	149	16.1	4.84	4.22	41.6
1912–13	5.06	8.25	7.06	9.19	12.1	21.7	65.4	198	86.1	16.0	8.30	11.0	37.5
1913–14	4.87	12.0	12.9	173	74.4	77.5	156	334	247	41.4	11.6	7.27	96.0
1914–15	6.77	6.18	8.44	16.2	47.9	39.2	89.1	276	340	46.0	13.7	9.50	74.8
1915–16	5.56	7.01	11.7	272	164	256	279	435	382	111	20.9	12.1	163
1916–17	32.3	19.8	52.5	43.4	82.4	77.4	167	241	296	44.2	14.6	9.87	89.8
1917–18	7.06	7.37	7.29	8.60	13.3	56.8	69.5	168	121	21.3	3.49	2.40	40.6
1918–19	7.19	19.9	20.6	15.4	37.9	65.7	108	268	68.1	9.76	2.78	3.44	52.4
1919–20	3.93	5.16	15.0	13.9	21.5	57.4	119	251	180	26.5	6.04	6.27	58.8
1920–21	8.79	14.5	23.5	100	77.2	79.0	103	230	197	29.8	7.69	3.59	72.7
1921–22	3.87	6.99	26.2	39.2	74.2	68.3	87.2	339	278	42.7	12.2	4.36	81.7
1922–23	6.63	15.8	36.7	27.6	32.2	35.1	113	244	109	30.3	7.09	7.94	55.6
1923–24	9.24	9.18	8.85	8.84	11.6	17.5	63.1	75.2	12.0	1.51	.90	.83	18.2
Average	8.48	11.1	18.8	56.9	51.1	67.2	113	250	190	33.6	8.78	6.37	67.9

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

Kings River near Hume

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1920–21												233	
1921–22	193	160	368	560	537	694	1,540	6,220	7,400	2,850	1,070	447	1,840
1922–23	222					646	1,400	4,370	3,140	2,140	587	380	
1923–24	250	155	104	131	160	182	858	1,650	511	241	113	77.6	370
1924–25	93.9	211	300	309	551	768					929	334	
1925–26			244	174			2,490	3,650	1,790				
1926–27	125	457	451	360	956	1,130	2,110	5,050	6,080	2,770	767	304	1,710

Kings River above North Fork

[Drainage area, 952 square miles]

1926–27							2,140	5,170	6,200	2,760	713	284	

Kings River at Piedra (near Sanger)

[Drainage area, 1,740 square miles]

1894–95												778	
1895–96	371	368	328	1,470	825	1,710	1,940	5,920	12,700	3,740	795	491	2,560
1896–97	350	538	466	437	1,630	1,880	5,320	14,500	6,140	2,180	739	329	2,870
1897–98	394	692	985	506	705	895	3,550	3,540	2,120	696	320	204	1,220
1898–99	320	231	315	513	660	2,160	4,510	3,570	6,080	1,410	411	215	1,700
1899–1900	378	638	991	1,690	748	1,710	2,100	5,880	5,130	1,280	398	301	1,770
1900–1901	309	1,310	726	4,340	3,320	2,960	4,490	11,100	14,400	6,260	2,290	534	4,330
1901–2	535	694	667	440	665	1,420	4,160	6,530	8,060	1,640	626	304	2,140
1902–3	265	451	497	930	930	1,470	3,290	9,550	7,880	1,950	560	224	2,330
1903–4	195	227	203	183	618	2,170	3,550	10,400	7,560	1,960	1,040	702	2,400
1904–5	1,900	620	354	447	899	1,840	2,730	5,890	6,450	1,860	448	198	1,970
1905–6	174	191	246	2,360	1,150	5,240	4,720	10,700	17,100	16,300	4,300	1,120	5,300
1906–7	516	397	700	1,360	1,740	4,110	7,000	9,200	10,400	7,560	1,970	554	3,790
1907–8	435	363	502	650	897	1,670	3,210	3,580	2,680	1,480	1,080	550	1,420
1908–9	405	312	323	3,260	3,120	2,050	4,810	9,860	14,300	6,110	1,460	642	3,890
1909–10	402	684	1,770	2,800	1,340	2,740	5,900	7,550	3,830	1,550	510	345	2,450
1910–11	333	301	414	2,560	2,580	4,380	5,250	8,410	12,600	7,770	1,600	646	3,900
1911–12	468	399	348	390	383	673	1,230	4,380	5,720	1,310	498	225	1,330
1912–13	225	235	167	233	380	632	1,950	4,780	3,420	1,700	1,110	709	1,300
1913–14	234	341	377	4,230	1,970	2,930	4,300	9,460	10,000	5,790	1,820	680	3,520
1914–15	534	345	250	391	1,550	1,620	3,740	6,320	10,500	3,790	747	383	2,510
1915–16	210	210	369	4,000	2,950	4,500	7,540	10,800	12,200	5,390	1,540	605	4,190
1916–17	1,120	641	680	699	2,180	1,500	3,860	6,510	9,820	3,180	972	299	2,610

1917–18	209	211	215	212	393	1,900	3,270	5,350	8,390	1,510	427	522	1,880
1918–19	1,400	542	572	402	856	1,260	3,450	7,480	2,540	884	299	189	1,660
1919–20	230	197	426	328	424	1,690	2,760	7,890	6,580	1,840	555	269	1,930
1920–21	418	535	589	821	1,120	2,160	3,100	6,350	7,470	2,100	479	270	2,120
1921–22	227	204	912	1,120	1,620	1,590	2,740	10,800	11,900	3,680	1,160	443	3,030
1922–23	232	393	1,100	914	991	1,320	3,500	8,160	5,120	2,830	678	462	2,150
1923–24	364	260	192	225	290	338	1,460	2,420	523	211	105	76.0	539
1924–25	125	350	466	451	1,110	1,390	3,230	6,450	4,920	1,940	720	216	1,780
1925–26	290	239	290	195	715	1,090	5,010	6,130	2,310	602	209	115	1,430
1926–27	124	1,010	724	645	2,860	2,120	4,040	8,650	8,590	3,170	757	316	2,740
Average	428	442	536	1,230	1,300	2,030	3,800	7,440	7,730	3,240	957	422	2,460

Kings River at Kingsburg

[Drainage area, 1,742 square miles]

1895–96								3,940	11,700	1,940	465	476	
1896–97	628	625	581	520	1,840	1,570	3,040	11,400	4,350	460	228	216	2,120
1897–98	350	676	765										

North Fork of Kings River below Meadowbrook

[Drainage area, 35.3 square miles]

1921–22	6.14	5.16	30.6					386	595	174	29.8	4.70	
1922–23	2.38	8.73	14.2	13.3	12.4	24.8	51.7	353	260	116	10.1	8.53	73.3
1923–24	8.67	3.80	1.75	1.78	4.11	5.31	55.8	138	12.3	2.02	.38	.37	19.6
1924–25	1.35	6.42	8.0	8.0	20.0	35.0	90.4	303	274	70.0	22.1	2.93	70.3
1925–26	10.2	6.21					190	305	95.6	15.2	1.61	.93	
1926–27	1.66	9.91	17	10	27	31.6	91.6	357	438	122	11.8	2.92	93.5

North Fork of Kings River near Cliff Camp

[Drainage area, 174 square miles]

1920–21												14.9	
1921–22	8.79	9.47	46.5	59.5	60.0	92.9	454	2,610	2,760	437	53.6	12.2	552
1922–23	8.02	31.8	72.5	75.9	91.7	213	484	2,110	1,020	275	27.6	29.5	371
1923–24	30.7	19.3	10.2	11.6	26.9	36.0	321	460	35.7	5.52	1.83	1.60	80.2
1924–25	13.4	47.2	50.0	49.2	109	249	673	1,590	829	210	56.9	12.2	325
1925–26	38.2	23.4	33.1	14.9	45.0	226	1,210	1,540	265	39.5	6.05	3.72	288
1926–27	6.84	133	77.1	69.7	177	246	742	2,240	1,820	254	26.5	10.2	484

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

North Fork of Kings River below Rancheria Creek

[Drainage area, 225 square miles]

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1926–27							904	2,460	1,960	288	42.4	25.6	

North Fork of Kings River above Dinkey Creek

[Drainage area, 246 square miles]

1919–20				36.7	53.5	216	581	2,260	1,240	112	17.8	10.3	
1920–21	52.1	70.9	75.2	109	194	498	923	1,750	1,600	171	15.9	12.3	456
1921–22	10.0	11.2	62.6	96.7	106	144	497	3,040	3,200	472	73.8	23.7	646
1922–23	19.4	53.6	130	111	132	286	678	2,560	1,310	327	39.8	41.2	477
1923–24	43.1	30.3	20.7	24.8	42.2	54.6	389	552	42.2	9.50	5.40	5.09	102
1924–25	21.5	71.8	79.6	67.0	182	323	873	2,000	990	197	64.9	16.1	408
1925–26	43.9	31.5	44.7	24.1	75.9	275	1,430	1,700	297	46.1	12.1	9.73	334
1926–27	12.4	215	116	107	397	397	994	2,630	2,040	300	40.1	19.8	605

Helm Creek at Sand Meadow

[Drainage area, 34.1 square miles]

1922–23	7.0	6.68	7.47	8.21	7.88	11.9	71.4	460	190	29.3	4.74	6.14	68.0
1923–24	6.42	4.48	3.05	3.01	4.79	8.03	58.9	67.4	4.72	1.86	1.39	1.57	13.8
1924–25	2.98	5.19	6.0	6.0	15.0	30.0	143	344	115	18.6	8.53	3.99	58.4
1925–26	8.30	5.82					232	314	35.3	6.44	2.69	2.27	
1926–27	3.13	6.25	10	6	22	25	121	503	275	21.3	3.79	3.30	83.6

Rancheria Creek near Smith Meadow

[Drainage area, 21.9 square miles]

1924–25	5.37	9.32	6.0	6.0	10.0	20.0	53.5	156	73.9	12.3	7.23	5.63	30.5
1925–26	7.18					16.9	87.9	149	32.3	8.47	6.27	4.59	
1926–27	4.62	16.4	10	9	24.9	29.4	73.4	246	192	27.3	11.3	6.75	54.2

Dinkey Creek near Ockenden

1910–11										241	20.4	12.4	
1911–12									228	17.4	3.3	2.3	

Dinkey Creek at Dinkey Meadows

[Drainage area, 50.8 square miles]

1921–22	3.96	9.98	27.1				360	1,080	790	82.4	9.80	2.52	
1922–23	3.06	16.9	38.8	39.8	51.5	123	267	493	236	55.5	6.70	9.83	112
1923–24	9.74	9.77	5.39	7.05	19.4	23.8	127	96.5	7.65	1.43	.55	.56	25.7
1924–25	8.03	31.3	33.9	27.4	78.7	118	243	319	145	23.4	5.33	2.26	86.2
1925–26	11.0	9.57	16.1	8.23	32.4	120	398	314	52.8	7.33	2.00	1.42	81.1
1926–27	1.74	98.0	51.3	43.0	148	163	334	504	307	36.2	5.05	2.89	141

Dinkey Creek at Mouth

[Drainage area, 136 square miles]

1919–20					66.4	206	422				17.8	9.43	
1920–21	50.7	74.2	79.2	115	167			725	462	65.5	11.6	11.0	
1921–22	8.05	9.50	76.0	106	127	169	461	1,540	1,020	145	32.9	11.5	309
1922–23	14.2	51.1	135	112	133	268	624	1,130	491	122	26.3	27.3	261
1923–24	25.8	24.6	18.2	24.8	44.8	54.0	252	174	16.6	3.84	2.29	1.96	53.5
1924–25	15.6	65.9	55.3	52.2	155	220	488	625	256	47.9	14.3	7.92	167
1925–26	23.3	19.7	31.2	19.0	58.5	197	683	511	91.6	17.4	5.08	3.52	138
1926–27	4.66	181	87.2	79.3	345	323	656	948	529	67.6	14.5	9.35	269

Deer Creek below East Fork

[Drainage area, 21.1 square miles]

1923–24	5.0	4.0	3.0	3.5	8.21	16.3	41.8	23.5	2.08	0.58	0.37	0.33	9.03
1924–25	2.54	12.6	15.0	13.0	30.0	41.0	83.5	133	43.7	7.76	2.07	1.25	32.1
1925–26	4.36	2.08					128	104	13.4	2.98	.67	.47	
1926–27	.62	21.5	21	17	30	40	114	220	109	10.6	2.04	1.14	49.0

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

Big Creek near Tollhouse

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1910–11							114	68.4	27.2	8.63	3.34	2.50	
1911–12	2.50	3.45	3.23	5.27	4.43	21.5	24.3	24.5	6.62	2.39	1.0	.93	8.37
1912–13	1.07	1.78	2.20	5.53	7.59	12.0	17.5	8.89	7.47	2.2	1.6	1.1	5.71

South Fork of San Joaquin River near Lake Florence

1921–22				55.9	65.9	87.7	233	1,090	2,070	1,070	317	102	
1922–23	30.5	53.5	78.1	72.7	62.8	87.6	191	933	887	737	201	111	289
1923–24	56.6	25.7	14.5	10.6	18.3	20.5	146	556	152	93.2	49.2	28.1	98.2
1924–25	16.2	25.3	29.0	30.8	68.8	124	190	776	292	11.4	.20	.08	131
1925–26	.26	.30	.19	.35	2.39	2.66	56.6	76.0	1.51	1.10	1.02	1.90	12.1
1926–27	9.73	1.77	1.90	1.97	12.2	20.2	94.0	601	935	94.1	10.0	6.90	149

NOTE.—Storage at Lake Florence, first diversion made Apr. 13, 1925.

South Fork of San Joaquin River near Hoffman Meadow

1921–22			89.8	145	165	268	764	2,650	4,040	1,920	528	188	
1922–23	82.3	111	167	162	179	293	617	2,020	1,730	1,410	372	225	617
1923–24	144	91.9	57.3	52.3	72.5	76.7	342	1,050	286	159	81.2	52.1	206
1924–25	43.1	75.1	91.6	95.5	204	344	614	1,810	1,490	627	193	61.5	472
1925–26	61.6	52.2	59.8	44.1	88.5	212	810	1,120	572	176	57.6	29.0	274
1926–27	39.8	96.6	107	85.1	227	316	632	1,830	2,550	819	196	81.2	581

NOTE.—Storage at Lake Florence, first diversion made Apr. 13, 1925.

San Joaquin River above Big Creek

1921–22							2,520	9,030	11,400	4,110	1,050	396	
1922–23	207	361	788	650	730	1,170	2,570	6,690	4,470	2,960	773	470	1,830
1923–24	405	264	170	190	278	298	1,230	2,240	526	274	152	112	513
1924–25	141	329	321	311	933	1,200	2,600	5,430	3,840	1,510	505	172	1,440
1925–26	235	194	237	176	483	1,090	3,990	4,000	1,530	451	160	97.4	1,050
1926–27	107	663	504	425	1,450	1,500	3,220	6,550	7,110	2,200	546	244	2,040

San Joaquin River near Friant

[Drainage area, 1,640 square miles]

1907–8		441	659	864	1,010	1,950	3,350	3,560	2,960	1,930	1,190	655	
1908–9	388	272	301	4,510	3,290	2,160	5,910	10,500	13,900	5,030	1,270	621	4,010
1909–10	407	833	3,580	3,060	1,560	3,050	6,310	7,730	3,990	1,620	644	869	2,800
1910–11	482	403	510	3,890	3,720	5,470	7,140	9,290	15,900	9,640	1,880	764	4,920
1911–12	526	470	381	489	462	897	1,260	4,140	6,180	1,550	618	376	1,440
1912–13	290	341	326	360	462	622	1,610	4,010	2,860	1,660	1,120	683	1,200
1913–14	208	374	466	4,210	2,610	3,810	6,630	9,380	10,200	6,370	2,310	905	3,960
1914–15	655	512	481	622	1,620	2,020	4,130	6,190	9,840	4,660	1,140	745	2,710
1915–16	434	393	617	2,810	2,460	5,490	8,010	8,980	9,610	4,700	1,480	754	3,810
1916–17	1,040	654	736	772	2,330	1,750	3,800	6,070	9,730	3,610	1,180	606	2,680
1917–18	413	368	319	333	663	2,430	3,000	5,000	8,300	1,960	696	818	2,020
1918–19	1,680	740	825	625	1,240	1,530	3,520	7,180	2,580	1,000	494	387	1,820
1919–20	364	313	489	438	503	1,640	2,710	6,620	5,500	1,800	738	490	1,800
1920–21	601	750	700	1,100	1,400	2,640	3,180	5,260	6,840	2,520	839	583	2,200
1921–22	427	387	1,030	1,100	1,730	1,680	3,250	10,100	12,300	4,390	1,380	729	3,210
1922–23	519	713	1,490	1,130	1,260	1,560	3,350	7,320	4,820	3,270	1,180	856	2,300
1923–24	785	554	450	437	393	419	1,400	2,480	635	335	264	213	698
1924–25	190	467	466	441	1,400	1,540	3,300	5,920	4,730	2,460	1,070	624	1,880
1925–26	637	654	664	403	1,050	1,450	4,840	5,000	2,430	957	639	586	1,610
1926–27	468	1,020	981	1,070	2,650	2,320	4,230	7,290	7,550	2,800	1,160	792	2,690
Average	553	533	774	1,430	1,590	2,220	4,050	6,600	7,040	3,110	1,060	653	2,510

San Joaquin River at Herndon

1894–95				2,880	2,570	2,780	5,830	13,100	10,700	4,530	1,420	1,080	
1895–96	420	362	373	2,120	1,180	2,610	2,680	5,390	11,800	4,180	1,050	534	2,720
1896–97	167	697	666	655	2,600	2,320	6,540	13,500	5,860	2,490	898	227	3,060
1897–98	279	872	968	658	842	908	2,940	3,210	2,720	959	480	363	1,270
1898–99	509	308	384	463	645	2,690	4,230	3,730	5,700	1,660	428	152	1,740
1899–1900	214	565	1,020	2,240	534	1,750	2,060	5,720	5,730	1,640	390	204	1,840
1900–1901	451	1,830	1,030	3,510	4,980	4,190	4,680	10,900	12,000	3,470	2,370	399	4,150
1901–2	489	702	872										

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

San Joaquin River near Newman

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1911–12								2,500	5,470	559	117	72.0	
1912–13	55.1	93.0	136	262	278	233	460	2,580	1,800	330	112	119	539
1913–14	55.0	141	416	8,360	10,000	6,980	7,930	10,100	14,200	8,800	1,370	299	5,690
1914–15	268	324	454	827	7,000	3,870	4,710	8,200	13,900	5,890	512	198	3,810
1915–16	154	175	525	7,030	11,800	13,000	11,800	14,200	12,400	6,540	1,260	380	6,580
1916–17	944	919	1,300	2,220	4,300	4,550	2,570	6,600	12,200	4,200	363	175	3,350
1917–18	142	161	213	228	955	7,520	4,470	4,190	7,330	1,300	177	149	2,240
1918–19	1,420	807	1,510	1,010	1,910	3,010	3,040	6,810	2,640	209	98.6	70.5	1,880
1919–20	87.7	112	366	353	307	1,700	2,020	5,070	5,840	598	142	84.3	1,390
1920–21	168	463	1,200	3,450	4,010	4,080	2,280	5,040	6,390	1,450	202	96.3	2,390
1921–22	97.5	116	1,520	3,840	8,860	6,920	4,900	10,400	15,700	5,990	487	169	4,880
1922–23	116	573	2,910	3,320	3,090	1,490	4,880	8,270	5,030	2,190	391	258	2,710
1923–24	450	426	560	524	566	291	676	604	92.5	29.1	21.3	26.7	355
1924–25	63.0	250	260	435	2,430	957	3,510	5,180	4,010	1,080	201	136	1,530
1925–26	209	400	708	584	2,020	860	4,060	2,410	1,090	203	91.0	86.0	1,050
1926–27	107	197	1,380	1,080	3,490	3,580	2,990	7,390	7,070	1,480	458	426	2,460
Average	289	344	897	2,230	4,070	3,940	4,020	6,220	7,200	2,550	375	172	2,720

San Joaquin River near Vernalis

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1921–22											1,390	784	
1922–23	877									4,780	1,470	1,340	
1923–24	2,590	1,320	1,570	1,480	1,400	1,030	1,480	1,280	575	420	420	416	1,170
1924–25	536	1,380	1,970	1,810						2,380	820	1,050	
1925–26	1,580	2,170	2,800						2,000	768	601	753	
1926–27	1,050	1,350	2,770	3,180						3,250	1,400	1,520	

San Joaquin River at Lathrop

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1920–21	1,090	2,170	3,850	7,590	8,530	8,710	6,420	11,600	13,100	3,560	1,310	750	5,700

Bear Creek near Vermilion Valley

1921–22			10.2	17.5	19.5	21.0	60.5	276	478	280	97.6	31.0	
1922–23	9.39	15.6	22.8	20.7	18.8	27.4	55.4	259	238	236	66.0	36.0	84.2
1923–24	18.3	10.2	6.0	4.5	7.0	9.0	56.6	177	42.2	12.2	3.15	1.63	29.2
1924–25	2.71	9.03	14.0	13.0	18.0	40.7	88.6	280	364	212	61.6	12.5	93.3
1925–26	13.0	8.72	13.0	8.0	18.0	35.0	172	294	200	62.5	14.2	4.59	70.3
1926–27	5.56	16.5	25	23	35	41.4	90.8	284	491	261	55.6	20.5	113

Mono Creek near Vermilion Valley

1921–22			25.4	32.1	35.9	38.1	99.8	601	890	399	113	43.8	
1922–23	21.4	30.6	41.1	43.4	35.5	59.6	127	469	423	343	93.2	54.0	146
1923–24	35.8	25.1	17.0	16.0	22.0	25.0	97.2	248	79.6	36.6	17.6	11.5	52.8
1924–25	11.3	22.1	25.0	22.0	28.0	72.5	165	491	575	312	99.9	30.0	155
1925–26	29.2	24.0	30.0	20.0	33.0	85.0	282	478	288	91.3	33.1	15.8	118
1926–27	14.9	32.0	35	30	50	72.2	179	562	829	415	109	37.8	198

Middle Fork of San Joaquin River at Miller Bridge

1921–22		53.9	129	173	182	244	587	2,640	4,000	1,680	389	161	
1922–23	82.5	116	194	177	191	321	608	2,140	1,580	1,120	305	190	588
1923–24	178	94.1	62.4	69.8	108	112	485	863	230	130	66.6	43.9	204
1924–25	57.0	124	124	103	245	373	859	1,930	1,650	789	274	96.1	553
1925–26	129	95.3	107	66.6	175	383	1,470	1,700	760	249	93.7	49.5	440
1926–27	43.8	166	188	162	318	374	886	2,150	2,790	1,100	288	127	716

North Fork of San Joaquin River below Iron Creek

1920–21										196	49.3	20.4	
1921–22	8.47	3.89	8.68	14.1	17.3	19.0	74.9	457	787	392	90.2	25.7	159
1922–23	8.13	14.4	20.3	21.3	19.2	52.0	90.5	424	336	290	78.0	46.2	117
1923–24	44.8	14.7	6.18	7.45	18.7	18.1	114	207	56.9	34.4	18.6	10.6	46.1
1924–25	15.9	34.3	25.1	16.9	31.0	76.3	165	403	401	217	71.7	15.8	123
1925–26	37.7	19.9	23.9	10.3	22.7	77.3	326	371	187	70.6	21.8	8.96	98.3
1926–27	6.32	29.3	31.4	25.3	34.7	51.8	151	373	549	278	69.6	22.4	135

Iron Creek at mouth

1922–23	1.0	2.0	3.5	3.5	3.5	8.0	14.0	70.0	55.0	40.0	9.5	5.5	18.1

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

West Fork of Granite Creek near Timber Knob

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1921–22				2.61	7.99	11.9	69.4	420	546	104	7.10	0.52	
1922–23	0.26	5.0	12.0	14.0	14.0	45.9	88.3	359	218	78.8	5.41	6.62	70.9
1923–24	12.0	5.47	2.8	3.1	12.0	14.0	95.0	120	5.0	.05	0	0	22.5
1924–25	2.0	15.0	14.0	10.0	24.0	65.0	160	310	170	35.0	12.0	.50	68.3

Granite Creek near Cattle Mountain

1921–22			1.02	5.17	10.1	16.6	104	743	1,030	185	9.52	0.56	
1922–23	0.27	7.02	17.9	20.8	20.6	71.1	150	651	402	137	6.52	8.79	125
1923–24	23.8	9.35	4.0	4.5	18.0	22.0	144	198	7.61	.14	0	0	36.0
1924–25	3.66	23.4	22.0	16.0	35.0	93.9	249	535	298	58.4	19.3	.95	113
1925–26	20.4	13.0	20.0	8.0	16.0	96.6	439	444	80.6	12.4	.16	0	96.1
1926–27	.16	11.8	33	27	40	80	229	592	559	90.8	4.08	.49	139

Middle Fork of Granite Creek near Cattle Mountain

1921–22						0.53	4.92	23.5	13.9	0.92	0.16	0	
1922–23	0	0	0	0	0.4	2.5	4.83	10.4	3.48	.48	0	.20	1.87

East Fork of Granite Creek near Cattle Mountain

1921–22				1.0	2.0	3.0	21.6	193	278	55.8	2.60	0.05	
1922–23	0	1.5	3.5	5.0	5.0	15.0	30.0	175	110	40.0	1.1	2.47	32.6
1923–24	8.0	2.50	.8	1.0	4.5	5.5	35.0	55.0	2.0	0	0	0	9.55
1924–25	1.0	5.0	5.0	4.0	8.0	20.0	55.0	150	80.0	17.0	6.0	.30	29.4

Jackass Creek near Jackass Meadow

1921–22			0.01	0.02	0.05	3.87	34.1	196	147	15.6	0.53	0.018	
1922–23	0	0.30	3.0	5.0	5.0	25.0	55.8	146	54.2	10.4	.20	.38	25.6
1923–24	1.42	1.02	.40	.60	3.46	4.94	27.9	17.9	.44	0	0	0	4.82
1924–25	.35	3.48	3.0	2.5	9.89	28.3	74.1	90.2	25.8	4.28	1.01	0	20.3
1925–26	1.81	1.47	2.95	1.00	2.00	26.5	102	64.6	7.22	.58	.003	0	17.5
1926–27	0	6.67	6.5	5.0	7.5	35	77.7	126	57.8	5.36	.08	.01	27.4

Jackass Creek near Fullers Meadow

1923–24						6	37.7	23.1	1.94	0.7	0.5	0.5	
1924–25	2.0	7.0	6.0	7.0	30.0	45.0	110	110	37.2	7.0	2.5	1.5	30.3

West Fork of Jackass Creek near Fullers Meadow

1923–24						4.0	5.14	2.71	1.2	0.7	0.6	0.7	
1924–25	2.0	3.0	3.0	3.5	9.0	10.0	11.0	6.20	3.77	2.0	1.5	1.2	4.64

Chiquito Creek near Mugler Meadows

1923–24						15.0	55.0	40.0	6.0	1.8	1.0	1.0	
1924–25	4.0	12.0	10.0	9.0	27.0	40.0	130	153	63.1	13.0	5.0	3.0	39.0

Chiquito Creek near Arnold Meadow

1921–22	5.37	6.42	19.2	37.4	32.6	57.3	193	681	503	82.3	20.2	9.02	138
1922–23	8.53	25.5	48.1	44.5	52.4	111	255	490	219	62.8	15.8	15.3	113
1923–24	16.4	15.5	12.7	15.0	28.4	28.3	103	70.4	10.2	3.28	1.76	1.75	25.5
1924–25	8.49	25.1	22.5	24.3	70.1	101	241	273	106	22.5	9.23	5.37	75.6
1925–26	14.1	12.2	16.5	11.4	26.2	94.6	312	220	43.3	11.6	3.75	2.77	64.0
1926–27	4.36	49.4	38.5	34.2	102	155	308	421	195	37.5	10.2	7.07	113

Big Creek at mouth, near Big Creek

1922–23									5.93	69.6	1.20	1.07	
1923–24	1.09	22.2	0.84	87.4	0.66	0.72	0.44	1.53	33.2	.34	.46	.35	12.5
1924–25	.38	.33	.36	.28	1.30	3.83	42.4	66.6	375	312	73.2	.18	73.2
1925–26	40.9	5.35	.34	.28	122	105	143	455	260	6.62	.32	.18	94.6
1926–27	.13	5.98	.30	.55	98.0	166	230	335	257	112	6.92	.27	101

Pitman Creek at Big Creek

1921–22					5.59	8.08	42.2	406	370	33.4	5.46	3.00	
1922–23	2.77	6.29	8.94	7.09	6.68	23.5	74.8	299	110	19.8	3.85	3.89	47.5
1923–24	3.46	3.59	2.19	2.77	4.65	6.05	42.6	41.1	4.38	1.17	.98	.98	9.48
1924–25	2.10	8.53	6.17	7.58	18.1	45.8	122	210	68.4	7.49	1.95	1.47	41.8
1925–26	2.84	2.90	4.30	2.10	4.02	24.4	163	175	24.2	1.95	.33	.21	33.9
1926–27	.51	10.8	11.0	8.79	25.9	46.5	127	297	137	12.1	1.04	.38	56.6

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

Stevenson Creek at Shaver

[Drainage area, 30.2 square miles]

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1916–17	9.76	10.2	13.1	10.9	29.0	147	245	198	53.2	9.65	10.5	5.36	61.9
1921–22								203	61.3	4.49	1.89	1.17	
1922–23	2.42	1.66	3.01	1.33	1.29	4.58	12.5	14.5	6.15	3.02	1.63	1.28	4.46
1923–24	4.14	3.88	.86	.52	.48	.37	1.00	.30	.07	0	0	0	.97
1924–25	.10	.71	.57	.42	2.98	.74	3.72	12.5	11.5	9.08	3.29	1.63	3.94
1925–26	.48	1.59	3.65	4.06	3.62	4.13	18.1	15.9	13.5	3.58	2.19	2.59	6.11
1926–27	2.05	45.5	33.5	1.46	40.7	14.7	14.1	.63	.26	.58	12.7	10.9	14.5

Fresno Flume & Lumber Co.'s upper flume at Shaver

1915–16			8.00	5.96	0	0	0	8.00	8.58	4.02	2.85	2.85	
1916–17	3.84	4.01	2.58	0	0	0	0	.74	1.90	2.96	5.95	5.97	2.34

Fresno Flume & Lumber Co.'s lower flume at Shaver

1915–16					0	0	0	13.0	14.5	12.4	5.11	6.67	
1916–17	12.5	15.6	12.5	0	10.5	14.0	14.4	17.2	13.8	7.33	7.90	8.69	11.2

Southern California Edison Co.'s flume at Shaver

1921–22						24.5	101	79.1	20.0	17.2	21.9	16.4	
1922–23	14.0	16.0	70.3	44.3	44.5	70.5	196	102	37.1	23.5	4.1	4.0	52.2
1923–24	1.10	3.11	46.5	5.09	21.7	20.3	38.4	3.20	2.24	1.62	1.31	1.32	12.1
1924–25	1.50	18.5	7.97	8.30	115	35.5	63.7	38.9	15.8	4.13	7.55	6.78	26.3
1925–26	6.31	30.4	0	0	40.8	38.3	118	37.6	8.80	44.3	1.27		

Fresno River near Knowles

1911–12	17.8	24.5	25.6	41.7	37.3	98.1	115	121	87.2	25.2	4.92	4.43	50.2
1912–13	4.38	15.5	11.9	17.9	23.8	43.6	69.9	66.9	40.0	7.60			
1915–16			39.3	526	444	613	222	148	118	49.2	11.5	7.08	
1916–17	31.5	27.4	76.8	78.7	526	218	190	151	106	48.3	13.2	5.20	120

1917–18	4.61	7.80	10.8	11.5	111	415	105	104	56.1	12.5	1.55	3.68	70.3
1918–19	11.0	14.4	16.5	22.2	203	161	154	109	28.5	3.57	.226	.037	59.3
1919–20	5.29	9.70	30.7	18.9	25.9	202	232	122	72.7	18.1	3.84	1.90	62.0
1920–21	16.0	28.5	35.8	198	164	171	142	129	72.4	15.2	2.30	2.82	81.0
1921–22	3.54	5.37	130	91.1	468	284	240	223	72.7	37.0	9.56	2.34	128
1922–23	4.34	34.9	189	187	133	107	347	190	108	48.2	10.3	8.63	114
1923–24	10.9	11.4	12.3	17.4	19.6	41.8	75.0	27.7	3.46	.06	0	0	18.3
1924–25	0	19.4	16.8	17.8	198	96.5	183	131	90.5	11.2	3.36	2.71	62.9
1925–26	6.03	9.47	11.2	19.1	86.0	55.7	211	93.3	23.3	3.75	.04	0	42.7
1926–27	.61	85.0	56.1	47.1	357	154	232	134	88.2	22.6	4.48	2.60	96.5
Average	8.92	22.6	47.3	92.5	200	190	180	125	69.1	21.6	5.02	3.19	75.4

Chowchilla River near Buchanan Reservoir site

1921–22	0	0	190	163	744	410	213	83.1	25.9	1.97	0	0	149
1922–23	0	17.9	226	261	184	79.3	279	64.1	25.9	5.2	0	0	94.5

Merced River above Illilouette Creek, near Yosemite

[Drainage area, 118 square miles]

1914–15												51.6	
1915–16	13.4	10.0	25.7										

Merced River at Happy Isles Bridge, near Yosemite

[Drainage area, 181 square miles]

1914–15												47.0	
1915–16	11.5	8.11	26.0	78.0	112	337	962	1,420	1,690	691	148	47.4	460
1916–17	176	59.6	49.6	36.7	66.4	118	463	974	2,050	666	154	51.0	405
1917–18	19.0	16.1	16.3	13.0	32.0	117	488	916	1,920	274	55.5	145	334
1918–19	267	69.3	70.5	36.0	56.1	100	576	1,810	498	137	32.8	13.2	308
1919–20	19.9	11.9	28.7	32.0	32.1	95.0	315	1,290	908	216	65.6	32 3	255
1920–21	76.8	94.9	79.4	98.9	139	300	588	1,170	1,620	490	75.5	25.6	396
1921–22	12.6	12.1	21.4	50.0	53.7	89.1	320	1,690	2,130	725	143	41.1	442
1922–23	22.8	38.3	68.7	78.9	83.4	160	406	1,440	1,120	585	117	85.0	352
1923–24	91.8	40.9	20.7	23.3	42.0	49.4	311	657	120	35.2	11.3	5.47	118
1924–25	12.6	72.8	80.4	70.0	145	260	618	1,540	1,300	484	154	21.3	397
1925–26	40.7	36.3	44.9	21.9	54.5	194	1,010	1,150	464	125	15.9	3.48	264
1926–27	3.26	52.4	84.1	66.1	138	230	562	1,420	1,620	490	87.7	25.3	399
Average	62.8	42.7	49.2	50.4	79.5	171	552	1,290	1,290	410	88.4	41.8	244

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

Merced River at Yosemite

[Drainage area, 236 square miles]

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1903-4											248		
1904-5									1,770	610	123	44.4	
1905-6									3,140	2,980	790	190	
1906-7	80.1	61.2	71.7	153	272	576		2,250	2,480	2,290	664	158	
1907-8	116	61.0	127	130				935	851	347			
1908-9	33.0	17.5	30.7										
1911-12					46.2	85.6	197	1,180	1,410	268	87.0	33.0	
1912-13	20.7	40.1	21.7	26.0	41.8	86.1	411	1,160	784	375	286	119	282
1913-14	20.5	27.4	31.0	178	179	492	918	2,350	2,190	1,100	331	64.1	659
1914-15	40.3	43.9	26.1	40.7	121	261	1,030	1,220	2,150	1,020	170	59.5	515
1915-16	23.2	21.0	41.4		165	490	1,420	2,010	2,240	810	171	60.3	

Merced River at Pohono Bridge, near Yosemite

1916-17			93.4	80.6	156	251	1,010	2,040	3,590	909	209	83.7	
1917-18	30.1	27.3	25.1	23.1	50.2	247	1,100	1,850	2,400	352	82.2	161	528
1918-19	345	131	122	68.7	127	202	1,280	3,050	775	180	54.4	30.2	533
1919-20	37.1	31.3	55.2	67.3	79.7	196	685	2,540	1,600	314	97.2	57.6	481
1920-21	137	168	155	199	305	681	1,250	2,260	2,370	630	99.1	43.5	692
1921-22	23.9	21.0	42.7	120	125	205	680	3,540	3,910	1,120	194	61.1	840
1922-23	39.8	71.3	145	158	167	371	927	2,680	1,610	856	156	115	611
1923-24	141	81.0	50.2	58.9	110	125	689	1,110	148	48.9	20.7	12.6	217
1924-25	27.5	165	159	143	325	589	1,400	2,830	1,940	695	221	48.1	713
1925-26	83.0	83.4	105	58.7	135	460	1,960	1,900	671	172	36.4	16.8	474
1926-27	14.9	119	168	142	337	523	1,230	2,890	2,650	662	122	42.3	742
Average	87.9	89.8	102	102	174	350	1,110	2,430	1,970	540	117	61.4	583

Merced River at Horseshoe Bend

1922-23			881	892	817	890	2,580	4,800	2,620	1,070	229	170	
1923-24	216	158	126	167	249	302	1,110	1,450	205	66.0	31.9	19.2	342
1924-25	72.1	355	345	332	1,650	1,190	2,760	4,110	2,400	776	261	70.1	1,190
1925-26	129	137	191	165	927	834	3,420	2,720	798	196	51.5	35.6	796
1926-27	41.7	492	400	448	2,090	1,300	2,940	4,760	3,780	851	180	65	1,440

Merced River at Exchequer

[Drainage area, 1,020 square miles]

1915–16			226	2,620	1,980	3,440	4,250	5,080	4,660	1,260	289	142	
1916–17	497	267	413	441	2,860	1,070	2,160	3,800	5,700	1,200	295	125	1,550
1917–18	77.4	85.8	101	100	799	3,020	2,340	3,190	3,280	482	104	198	1,150
1918–19	521	250	248	196	854	1,140	2,270	4,450	1,030	212	61.2	38.6	940
1919–20	55.0	60.5	189	169	224	1,310	2,020	4,210	2,470	396	139	76.8	945
1920–21	224	336	518	1,610	1,420	1,740	2,390	3,980	3,610	749	139	70.8	1,400
1921–22	50.7	58.5	715	652	2,940	1,910	2,090	6,770	6,720	1,400	252	102	1,960
1922–23	94.1	269	948	1,070	904	908	2,660	4,680	2,600	1,080	218	156	1,300
1923–24	215	152	129	166	261	314	1,130	1,480	212	61.3	29.9	20.5	348
1924–25	75.8	361	370	345	1,900	1,260	3,030	4,250	2,470	796	248	76.8	1,260
1925–26	129	137	191	155	1,130	895	2,870	1,340	1,450	1,180	622	33.7	839
1926–27	34.5	63.4	356	75.2	724	1,060	1,730	4,840	3,300	1,630	1,360	1,190	1,370
Average	179	185	367	633	1,330	1,510	2,410	4,010	3,130	871	313	186	1,190

NOTE.—Storage at Lake McClure began Apr. 20, 1926.

Merced River near Merced Falls

[Drainage area, 1,090 square miles]

1900–1901							2,690	5,420	5,390	2,100	704	183	
1901–2	265	399	577	236	749	1,360	2,460	3,800	3,140	481	191	88	1,150
1902–3	90	246	303	1,120	1,100	1,950	2,880	4,320	2,940	696	369	279	1,360
1903–4	275	381	369	189	1,240	2,260	2,710	5,800	3,290	909	380	325	1,510
1904–5	1,510	471	361	345	1,100	1,770	2,050	3,320	2,980	804	158	62.8	1,240
1905–6	59.0	66.4	97.5	1,840	1,060	4,660	3,500	6,530	8,410	6,260	948	254	2,810
1906–7	122	135	735	2,040	2,100	7,460	5,490	6,370	6,330	3,460	792	219	2,940
1907–8	135	154	308	517	496	1,040	1,870	2,000	1,270	488	203	93.9	715
1908–9	94.3	69.3	105	3,700	3,230	1,380	2,890	5,220	5,950	1,550	336	138	2,060
1909–10	133	531	1,680	2,260	974	1,930	4,010	4,070	1,360	391	132	191	1,470
1910–11	171	190	290	4,410	2,440	5,810	4,250	5,510	7,820	3,450	568	208	2,930
1911–12	167	177	161	262	254	604	774	2,510	2,890	482	156	87.2	710
1912–13	66.1	130	88.8	166	208	361	1,230	2,410	1,450	559	373	248	608
1913–14	49.4	103											
1922–23							2,810	5,150	2,790	1,090	209	162	
1923–24	239	153	147	182	254	293			201	70.6	30.6	14.4	
1924–25	65.1	339	267	320	1,740	1,080	3,110	4,680	2,660	703	216	73.7	1,260
1925–26	123	135	189	152	1,120	853							
Average	223	230	379	1,180	1,200	2,190	2,850	4,470	3,580	1,470	360	164	1,600

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

Merced River near Livingston

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1911–12										152	55.7	38.9	
1920–21							1,460	2,650	2,300	292	69.1		
1921–22							1,870	5,090	5,350	744	69.0	52.8	
1922–23	64.1	250	1,150	1,250	984	735	2,340	3,750	1,820	503	80.7	98.2	1,090
1925–26	118	169	255	220	1,100	296	2,320	257	133	79.5	64.3	57.0	415
1926–27	52	64.5	355	149	843	975	1,150	3,160	1,870	279	131	213	769

NOTE.—Record near Newman 1912; record at Meliken Bridge, 1921–1923.

Illilouette Creek near Yosemite

[Drainage area, 61.7 square miles]

1914–15												4.95	
1915–16	3.13	6.43	15.0										

Tenaya Creek near Yosemite

[Drainage area, 47 square miles]

1903–4											12.3		
1904–5									323	38.8	4.4	3.0	
1905–6									764	649	70.3	2.62	
1906–7	0.53	1.27		36	73	280		516	609	338	47.4	4.93	
1907–8	14	5.0	24					125	100	10.4	6.0		
1908–9	3.0	1.0	9										
1911–12					24.4	38.7	82.0	354	304	21.5	1.45	1.00	
1912–13	2.70	18.5			8.44	29.0	147	359	175	29.8	41	17.0	
1913–14	4.74	8.01	12.8	63.8	48.4	148	248	642	557	175	15.7	3.46	161
1914–15	4.88	5.86	4.45	10.9	36.7	74.2	241	369	549	116	11.2	2.63	119
1915–16	2.63	3.09	7.33		44.5	117	383	515	458	102	7.99	1.83	
1916–17	48.2	21.5	20.0	24.7	31.9	49.9	215	381	478	85	8.90	3.5	114
1917–18	2.13	2.12	3.14	2.66	7.95	44.1	178	342	356	18.5	2.24	3.67	80.2
1918–19	32.2	30.5	29.4	13.5	25.0	39.8	279	647	96.4	16.5	6.53	2.58	102
1919–20	3.28	2.95	12.5	22.3	22.9	51.0	133	592	289	28.0	4.05	3.76	97.6
1920–21	32.4	36.7	42.9	40.2	54.9	102	229	434	337	30.1	2.39	1.88	112
1921–22	2.11	2.40	3.13	20.0	20.5	35.4	100	693	690	93.8	11.8	2.18	140

1922-23	1.60	10.1	20.0	34.2	30.1	69.0	135	484	305	83.4	6.84	8.40	99.3
1923-24	19.4	12.6	6.36	12.0	24.3	26.2	143	168	13.3	3.16	2.25	2.15	36.0
1924-25	3.27	33.8	32.8	29.1	70.1	106	297	585	278	46.0	15.0	2.38	125
1925-26	11.0	16.5	26.9	9.76	28.9	90.6	368	295	62.1	8.03	2.25	2.15	76.8
1926-27	2.62	27.6	30.8	32.8	73.2	111	234	572	507	71.6	3.51	2.06	139
Average	10.6	13.3	17.3	25.1	36.8	83.1	213	448	363	98.2	13.5	3.75	108

Yosemite Creek at Yosemite

[Drainage area, 43.2 square miles]

1903-4											9.9		
1904-5									206	34.3	2.8	1.9	
1911-12					9.88	18.7	66.0	366	269	17.6	.65	.35	
1912-13	0.13	1.97	0.42	0.20	4.54	24.3	134	235	107	16.6	15.3	3.80	45.4
1913-14	.76	1.45	5.09	26.2	19.2	123	234	601	430	90.2	9.55	1.21	129
1914-15	3.90	2.06	1.03	2.20	9.88	52.3	209	402	428	69.5	3.75	.62	98.7
1915-16	.44	.12	3.42			96.9	397	497	447	74.5	7.41	1.18	
1916-17	23.0	14.3	10.9	15.3	21.9	39.8						.99	
1917-18	.13	.41	.83	.40	2.82	33	217	266	282	20.2	1.44	7.65	69.2

NOTE.—Occasional daily discharge record since 1918.

South Fork of Merced River near Wawona

[Drainage area, 131 square miles]

1910-11												33.2	
1911-12	27.7	55.0	147	217	253	124	266	1,100	1,060	78.6	15.7	16.2	279
1912-13	12.6	40.9	131	112	48.2	71.4	734	845	357				
1913-14	14.0	25.6	52.7	586	750	611	957	1,780	2,550	260	44.4	20	633
1914-15	19	23.0	152	530	246	286	921	1,330	1,350	171	27.7	8.08	422
1915-16	.39	1.10	43.8	115	280	1,350	1,750	2,100	1,890				
1916-17								960	1,300	146	26.3	14.6	
1917-18	13.8	15.7	16.0	16.5	43.0	243	583	876	663	96.1	15.1	62.7	221
1918-19	69.3	59.4	66.5	60	94.2	162	631	1,140	124	23.4	8.97	7.70	205
1919-20	13.9	13.1	47.6	57.2	60.3	199	417						
1920-21			87.9	160	233	411	584	783	649	100	14.5	10.8	
Average	21.3	29.2	82.7	206	223	384	760	1,210	1,100	125	21.8	21.7	352

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

Tuolumne River at Hetch Hetchy cabin

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1910–11	88.0	76.0	135	641	395	718	1,340	2,490	6,640	3,960	564	115	1,430
1911–12	69.5	60.8	34.1	89.9	105	212	443	1,980	3,100	684	138	52.5	579
1912–13			50.2	58.2	104	195	836	2,540	1,910		354	204	
1913–14	36.5	62.5	92.2	592	429	869	1,360	3,520	4,510	2,500	527	92.8	1,220
1914–15	74.6	68.4	44.5	77.7	255	488	1,320	2,140	4,250	1,620	186	69.2	883
1915–16	20.9	16.8	83.0	304	412	872	1,870	3,040	4,000	1,670	313	99.5	1,060

Tuolumne River at Hetch Hetchy dam site

[Drainage area, 459 square miles]

1910–11			185	851	539	869	1,670	3,140	7,860	4,620	566	123	
1911–12	72.5	65.1	36.6	99	131	259	543	2,380	3,270	749	145	55.6	650
1912–13	35.3	165	60.8	71.1	127	241	965	2,770	2,180	753	413	233	671
1913–14	36.8	71.9	119	695	475	1,010	1,620	4,550	5,430	3,060	616	102	1,490
1914–15	104	74.3	53.4	102	359	644	1,650	2,610	5,220	1,980	221		

Tuolumne River near Hetch Hetchy

1914–15				111	364	655	1,650	2,570	5,240	1,980	221	72.4	
1915–16	24.3	19.3	108	419	551	1,080	2,260	3,600	4,920	2,000	343	111	1,280
1916–17	561	239	243	183	338	473	1,320	2,600	6,310	1,950	250	71.5	1,210
1917–18	24.6	17.6	23.1	27.4	123	650	1,360	2,370	4,250	426	80.4	137	789
1918–19	464	219	198	91.8	236	423	1,640	5,340	1,600	279	56.6	22.0	886
1919–20	16.8	12.0	68.2	89.3	105	426	978	3,770	3,030	487	103	51.3	763
1920–21	242	285	316	377	521	866	1,400	3,280	4,540	995	114	30.5	1,080
1921–22	16.9	12.2	74.5	210	275	437	990	4,750	6,590	1,820	265	60.1	1,290
1922–23	29.7	77.2	289	294	287	370	722	890	2,930	1,630	1,200	5.83	729
1923–24	19.0	1.52	1.83	2.51	34.2	311	1,550	1,700	480	1,990	27.1	35.9	516
1924–25	13.8	94.8	174	234	98.7	11.2	569	4,640	3,870	1,250	607	648	1,020
1925–26	686	614	600	576	558	612	596	2,110	1,100	599	620	581	774
1926–27	697	644	594	566	505	681	757	1,370	5,350	1,580	622	613	1,160
Average	233	186	224	245	307	538	1,210	3,000	3,860	1,310	347	188	958

NOTE.—Storage at Hetch Hetchy Reservoir began in 1923.

Tuolumne River near Buck Meadows

1906–7												358	
1907–8	201	179	458	540	528	1,420	3,150	3,690	3,360	795	248	92.2	1,220
1908–9			155	4,900	2,020	1,460							
1912–13	42.1	460	141	236	379	625	2,230	5,400	3,540	991	450	304	1,240
1913–14	54.9	170	461	2,690	1,800	2,710	4,090	8,540	8,840	4,470	766	149	2,900
1914–15	183	229	211	402	1,140	1,910	3,940	5,830	8,380	3,060	291	83.1	2,130
1915–16	44.6	48.5				3,610	5,340	6,790	7,850	3,050	463	165	
1916–17	1,030	450	681	492	1,450	1,450	3,320	5,590	10,300	2,940	346	97.6	2,340
1917–18	39.5	40.0	93.5	104	473	2,050	3,570	4,800	6,550	587	112	203	1,550
1918–19	748	448	426	309	628	1,020	3,410	8,450	2,180	434	159	138	1,540
1919–20	134	79.7	226	269	314	999	2,390	6,740	4,740	736	228	146	1,420
1920–21	503	620	795	1,230	1,440	2,260	3,110	6,100	7,120	1,430	280	183	2,090
1921–22	136	112	288	560	1,030	1,370	2,850	9,270	11,100	2,780	453	245	2,510
1922–23	191	290	737	761	864	1,220	2,690	4,150	4,800	2,380	1,380	216	1,640
1923–24	237	216	191	211	325	552	2,250	2,770	585	2,120	107	121	810
1924–25	200	389	478	533	1,520	1,080	2,810	7,690	5,730	1,680	387	80.5	1,880
1925–26	136	99.5	174	107	282	651	2,420	3,090	830	74.0	42.4	40.7	663
1926–27	35.7	344	170	185	1,230	986	2,220	3,540	7,280	1,460	54.7	46.4	1,450
Average	245	261	355	846	964	1,490	3,110	5,780	5,820	1,810	360	157	1,690

Tuolumne River near Jacksonville

1922–23											1,440	274	
1923–24	288	255	254	300	482	686	2,660	3,060	621	2,210	122	125	924
1924–25	246	537	663	693	2,940	1,840	4,420	9,020	6,270	1,850	805	823	2,500
1925–26	931	847	1,010	931	1,580	1,870	4,260	4,300	1,740	790	732	733	1,640
1926–27	795	1,340	1,140	1,220	3,590	2,640	4,790	5,320	8,640	2,370	810	816	2,770

Tuolumne River above La Grange Dam

1914–15							5,210	7,600	9,560				
1915–16						6,550	7,240	7,990	8,490	3,180	560	238	
1916–17	1,160	604	1,080	877	4,030	2,290	4,720	7,110	11,400	3,240	432	150	3,080
1917–18	72.7	99.3	181	198	982	4,340	4,710	5,650	6,940	655	139	214	2,010
1918–19	827	545	542	411	1,300	1,790	4,340	9,190	2,350	489	186	154	1,850
1919–20	175	118	367	387	486	2,420	3,800	7,790	5,270	814	271	173	1,840
1920–21	616	812	1,170	3,290	2,860	3,670	4,180	7,210	7,700	1,520	324	225	2,790
1921–22	193	180	877	1,090	3,390	2,790	4,260	11,700	12,600	3,150	528	301	3,410
1922–23	270	383	1,700	1,710	1,350	1,750	3,160	3,740	3,840	2,610	1,920	1,300	1,980
1923–24	1,520	202	226	236	693	1,290	1,520	1,770	1,600	1,540	1,230	550	1,030
1924–25	429	438	588	483	435	1,660	4,540	8,690	5,610	1,820	1,360	1,370	2,290
1925–26	1,040	770	1,070	974	819	1,470	4,030	4,060	1,280	1,690	1,560	1,120	1,660
1926–27	957	922	1,010	1,230	2,490	3,040	4,260	5,160	7,790	2,130	1,480	1,330	2,640
Average	660	461	801	990	1,710	2,760	4,310	6,740	6,490	1,900	832	594	2,230

NOTE.—Record includes discharge of Sierra & San Francisco Power Co.'s canal prior to 1923–24; storage at Don Pedro Reservoir began in 1923.

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

Tuolumne River and canals near La Grange

[Drainage area, 1,500 square miles]

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1894–95												263	
1895–96	134	113	270	2,310	1,160	2,720	3,520	4,430	7,690	3,000	485	432	2,190
1896–97	120	1,140	1,080	1,230	5,170	4,030	7,740	11,900	5,670	2,180	237	86	3,380
1897–98	222	768	1,100	454	900	1,220	4,010	4,620	2,250	277	85	20	1,330
1898–99	52	39	256	487	740	3,620	5,190	4,510	6,060	1,010	145	33	1,840
1899–1900	505	2,430	3,050	2,380	967	2,340	2,390	6,800	5,290	694	43	11	2,240
1900–1901	1,230	2,540	1,330	3,350	7,200	3,720	3,960	8,040	9,390	3,700	784	175	3,780
1901–2	211	574	1,340	352	1,440	2,290	5,000	6,660	6,920	1,400	378	91	2,220
1902–3	113	676	809	2,070	1,790	3,370	6,010	8,300	7,810	1,420	263	105	2,730
1903–4	72	1,040	432	434	4,130	5,950	6,410	11,700	9,580	2,970	769	652	3,680
1904–5	3,540	808	463	745	1,930	3,490	4,020	5,930	5,970	1,340	212	78.1	2,380
1905–6	45.5	62.2	129	2,860	2,180	7,180	6,500	11,100	13,900	11,600	2,220	470	4,850
1906–7	216	243	1,470	2,460	4,240	11,200	9,810	10,500	11,200	8,210	2,140	496	5,180
1907–8	304	322	634	1,180	1,000	2,120	3,500	4,100	3,070	1,020	390	116	1,480
1908–9	219	218	362	6,550	4,930	2,860	5,670	8,400	10,800	3,410	489	151	3,670
1909–10	225	2,500	3,770	3,150	1,900	3,870	6,990	7,510	3,340	791	135	226	2,870
1910–11	210	282	587	6,070	3,970	7,300	7,360	8,390	13,800	7,340	1,040	262	4,720
1911–12	152	142	226	450	482	985	1,690	5,410	6,450	1,070	202	119	1,450
1912–13		446	204	358	521	867	2,910	6,370	4,060	1,170	520		
1913–14	63.4	227	249	6,770	3,520	3,820	5,260	9,230	9,100	4,210	853	195	3,630
1914–15	90.3	90.8	122	912	3,610	2,920	5,100	7,670	9,710	3,390	383	96.3	2,820
1915–16	78.7	61.0	180	3,600	3,190	5,970	6,780	7,470	7,880	2,950	547	157	3,230
Average	390	701	860	2,290	2,620	3,900	5,230	7,570	7,620	3,010	587	202	2,980

NOTE.—Prior to 1902 the above record is for the river only. Record for 1902 includes Turlock Canal. After 1902, records include Modesto and Turlock Canals. Records for 1908, 1911, and 1912–1916 also include the Sierra & San Francisco Power Co.'s canal.

Tuolumne River at Modesto

1894–95				4,830	3,920	3,160	5,820	11,800	9,160	3,830	848	615	
1895–96	152	255	283	3,080	1,180	2,720	3,580	5,180	11,600	4,120	575	574	2,780
1896–97	224	1,210	1,030										

Falls Creek near Hetch Hetchy

1915–16			20.4	86.9	76.1	169	364	468	653	256	31.5	9.64	
1916–17	110	40.3	64.1	34.7	48.6	70.1	222	407	825	263	21.7	3.91	176
1917–18	1.03	1.10	4.26	5.26	31.7	95.8	260	384	550	41.7	3.91	10.1	115
1918–19	75.3	41.1	35.8	15.7	46.1	68.7	288	674	160	14.7	1.41	.20	119
1919–20	.56	.31	19.9	21.7	25.2	70.6	159	532	423	53.2	4.99	2.00	109
1920–21	48.7	57.9	54	50.9	71.2	131	220	466	615	109	5.90	1.05	152
1921–22	.01	0	14.2	32.2	50.0	80.0	175	694	931	253	17.6	2.23	188
1922–23	1.85	14.5	54.6	45.6	44.9	88.0	194	574	445	236	16.5	15.0	145
1923–24	34.0	12.9	7.52	24.3	46.6	36.0	171	293	17.3	1.97	.14	.01	53.8
1924–25	17.6	52.9	59.6	35.3	118	132	286	644	571	149	26.3	4.20	175
1925–26	20.3	20.0	39.6	17.6	47.0	138	422	372	101	8.75	.38	0	98.9
1926–27	0	61.3	54.8	41.5	121	101	249	513	751	191	19.4	2.42	175
Average	28.1	27.5	35.7	34.3	60.5	98.4	251	502	504	131	12.5	4.23	137

Cherry Creek at Eleanor Trail Crossing

[Drainage area, 130 square miles]

1900–1901									1,200	653	93	32	

Cherry Creek near Hetch Hetchy

[Drainage area, 114 square miles]

1909–10							1,030	1,230	579	76.1	3.8	93.1	
1910–11	53.6	69.7	142	527	359	387	790	1,230	2,570	1,380	118	16.6	637
1911–12	8.36	20.0	10.8	46.7	60.7	104	257	1,090	1,150	131	8.1	21.3	242
1912–13	5.65	118	22.2	36.5	66.2	133	456	1,080	654	88.3	36.4	15.4	226
1913–14	1.4	58.1	118	430	258	509	756	1,780	1,750	731	75.3	10.8	541
1914–15	58.5	53.3	60.2	87.9	147	351	850	1,100	1,790	559	24.3	2.37	423
1915–16	.60	6.66	80.6	316	235	554	1,040	1,270	1,560	524	55.2	17.1	470
1916–17	230	93.4	154	90.1	157	213	623	1,090	1,980	513	36.2	3.52	431
1917–18	.64	3.61	36.6	28.8	105	304	812	1,110	1,260	93.9	3.74	49.9	317
1918–19	195	124	94.5	49.8	129	200	792	1,510	311	22.9	1.50	7.63	288
1919–20	14.8	3.47	73.3	78.5	91.3	248	518	1,390	923	101	10.2	2.45	288
1920–21	175	196	164	168	213	407	680	1,230	1,510	235	11.7	2.46	415
1921–22	1.05	.86	58.4	116	91.2	178	485	1,820	2,410	614	38.7	2.95	484
1922–23	11.1	87.2	209	131	136	293	594	1,490	1,020	420	27.0	58.1	374
1923–24	92.4	40.8	26.5	64.4	148	107	477	622	35.8	1.98	.41	.25	135
1924–25	103	187	164	102	354	358	794	1,550	1,040	224	65.0	12.0	412
1925–26	77.0	74.9	126	51.5	143	395	1,120	856	186	17.8	1.13	.39	254
1926–27	3.19	181	163	129	338	298	707	1,290	1,580	360	28.1	3.66	422
Average	60.7	77.5	100	144	178	296	710	1,260	1,240	338	30.3	17.8	374

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

Eleanor Creek at Eleanor Trail Crossing

[Drainage area, 81 square miles]

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1900–1901									824	275	52	8	

Eleanor Creek near Hetch Hetchy

[Drainage area, 79 square miles]

1909–10			358	288	174	495	794	542	230	36.5	6.1	9.09	
1910–11	15.6	30.4	107	425	307	369	731	884	1,210	484	65.4	12.4	386
1911–12	6.8	10.1	12.4	34.2	66.6	116	264	651	482	75.6	10.2	7.0	145
1912–13	2.5	65.5	23.6	33.6	78.4	128	443	536	293	72.7	22.4	25.8	144
1913–14	2.03	14.7	60.7	485	238	433	658	945	666	247	38.3	4.73	316
1914–15	9.24	33.2	32.7	65.3	146	295	621	805	710	185	18.2	2.10	243
1915–16	.081	.19	39.3	254	239	516	806	769	594	204	27.4	6.91	288
1916–17	157	58.9	145	80.5	154	207	567	806	936	217	18.0	2.45	279
1917–18	.19	.12	4.60	17.8	99.0	294	626	574	387	.21	11.8	12.9	169
1918–19	52.4	49.4	79.2	108	34.2	49.7	416	765	73.6	107	85.9	102	161
1919–20	89.0	45.9	20.9	51.5	48.5	1.70	372	836	327	77.4	84.4	68.6	169
1920–21	45.4	69.2	188	278	258	287	420	687	480	84.9	125	129	254
1921–22	99.1	78.3	19.6	60.7	96.1	18.4	358	1,260	981	184	102	144	284
1922–23	109	25.7	13.7	56.7	120	254	528	895	443	168	110	121	238
1923–24	71.7	135	121	63.9	25.7	56.1	44.5	243	46.0	71.3	71.4	78.3	86.2
1924–25	65.2	31.5	46.6	88.5	360	313	623	754	419	103	85.3	73.5	245
1925–26	81.0	82.6	81.8	118	17.0	154	705	358	107	123	97.0	153	174
1926–27	45.5	5.91	23.0	53.2	365	301	548	651	619	136	116	141	249
Average	50.1	43.3	76.5	142	157	238	529	720	500	143	60.8	60.8	225

NOTE.—Storage at Lake Eleanor began in 1919.

South Fork of Tuolumne River at Italian Flat, near Sequoia

1924–25	9.70	21.2	17.9	18.1	122	96.9	218	227	79.0	20.3	8.74	6.60	69.8
1925–26	8.61	9.75	13.2	10.9	50.9	62.5	228	119	26.9	8.56	3.18	2.84	45.0
1926–27	3.22	36.1	28.2	34.5	134	118	235	255	132	25.7	10.7	7.40	84.5

South Fork of Tuolumne River at Harden ranch, near Sequoia

1913–14					206	214	291	305	155	36.2	11.3	8.81	
1914–15	10.6	10.5	15.7	31.0	90.5	125	206	392	247	49.4	19.0	12.4	101
1915–16	10.4	14.2	30.4	229	172	402	354	306	149	35.4	16.6	13.4	144
1916–17	33.7	23.5	34.8	37.4	267	115	255	352	284	50.0	16.0	9.8	122
1917–18	8.61	10.5	15.5	4.36									

South Fork of Tuolumne River near Oakland recreation camp

1922–23							283	304	158	52.7	23.1	21.2	
1923–24	23.0	21.9	21.9	28.9	38.1	31.7	80.7	57.6	13.6	4.13	2.72	2.31	27.1
1924–25	11.9	29.8	34.7	38.0	178	121	250	237	92.8	27.7	13.8	10.3	86.3
1925–26	14.8	17.0	21.2	23.6	68.4	66.1	236	127	32.5	12.4	5.74	4.98	52.2
1926–27	7.32	53.8	37.0	44.5	197	140	291	273	137	29.5	14.1	11.2	102

South Fork of Tuolumne River near Buck Meadows

1916–17	49.5	31.9	59.8	59.0	374	223	412	640	718	87.1	17.5	8.33	221
1917–18	8.02	9.53	16.2	14.5	80.7	377	366	466	222	25.0	6.33	8.14	134
1918–19	15.4	23.1	24.4	25.5	95.7	126	303	489	77.6	11.1	3.80	4.97	100
1919–20	6.90	9.42	29.4	20.6	27.9	140	285	517	220	32.3	11.3	8.48	109
1920–21	23.6	42.3	55.4	195	182	286	316	574	380	40.4	9.05	6.78	176

Golden Rock ditch near Sequoia

1913–14				12.4	0	3.74	18.8	19.2	16.5	12.5	10.6	7.95	
1914–15	8.79	6.55	12.9	17.5	27.9	27.3	30.1	28.0	29.7				

Middle Fork of Tuolumne River near Mather

1924–25	3.28	8.76	8.90	12.8	56.5	62.4	188	328	123	25.4	5.69	1.95	68.7
1925–26	4.85	4.96	8.05	7.12	16.3	37.8	175	170	32.0	4.29	.32	.41	38.4
1926–27	.42	11.7	15.5	15.5	49.3	64.0	161	343	192	22.8	4.21	1.71	73.4

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

Middle Fork of Tuolumne River near Buck Meadows

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1916–17			26.0	23.7	122	79.0	151	318	419	56.8	10.4	3.47	
1917–18	2.10	3.67	5.92	5.34	27.2	111	141	257	146	17.1	3.13	3.44	60.4
1918–19	8.61	11.0	13.6	14.0	35.6	44.8	131	299	53.4	6.81	.58	.50	51.8
1919–20	2.68	6.92	13.2	10.2	13.1	48.6	94.6	260	131	19.0	2.91	1.59	50.4
1920–21	12.0	19.1	26.3	66.3	65.9	110	163	294	193	20.8	3.29	1.53	81.3
1921–22	1.16	2.40	23.0	25.5	79.8	85.6	123	457	467	70.9	13.4	3.93	113
1922–23	4.55	13.7	44.2	39.6	42.9	57.5	168	335	185	43.4	10.5	7.91	79.5
1923–24	10.7	9.15	8.50	12.2	17.9	17.2	60.6	83.9	11.9	.85	.12	.06	19.4
1924–25	4.09	12.0	13.6	17.2	107	86.2	226	374	136	27.6	5.81	3.11	84.1
1925–26	5.27	8.83	11.8	12.9	37.9	40.1	205	194	37.6	5.01	.43	.32	46.5
1926–27	.68	21.0	12.8	15.5	101	83.0	194	355	202	20.5	4.02	1.93	83.9
Average	5.18	10.8	18.1	22.0	59.1	69.4	151	293	180	26.3	4.96	2.53	67.0

Woods Creek near Jacksonville

1925–26	8.16	12.9	15.5	31.3	222	33.0	77.2	11.5	2.85	0.35	0.79	2.17	33.4
1926–27	3.42	64.9	32.9	108	360	97.4	240	26.5	13.7	2.80	1.89	2.50	77.2

Sierra & San Francisco Power Co.'s canal near La Grange

1907–8				10	10	11	20	31	36	35	40	31	
1908–9	35	40	45				44	51	47	36	29	32	
1909–10	37										61.2		
1910–11				60	60	60	60.9	65.0	62.5	59.5	63.3	58.9	
1911–12	57.8	62.2	49.6	57.9	56.8	50.5	57.6	37.4	55.3	56.6	60.8	54.9	54.7
1912–13	55.5	57.7	58.7	57.5	58.5	56.1	56.6	59.0	59.0	58.4	60.1	62.0	58.2
1913–14	58.2	61.4	60.5	37.9	52.5	59.0	59.7	61.0	63.4	61.1	58.1	62.1	57.9
1914–15	57.5	58.5	57.6	53.1	49.2	59.2	53.6	61.8	60.7	59.0	60.6	55.1	57.2
1915–16	62.0	60.0	56.7	45.8	48.0	57.1	63.2	65.0	67.4	67.9	67.9	52.4	59.5
1916–17	64.8	68.0	65.2	66.3	60.2	57.2	61.2	61.4	62.0	62.0	59.7	57.0	62.1
1917–18	59.8	59.0	61.1	61.0	63.7	58.4	62.5	59.8	67.0	65.3	61.7	60.2	61.6
1918–19	61.9	64.1	61.7	65.2	63.0	61.6	62.2	62.7	32.1	0	0	0	44.4
1919–20	35.8	67.6	64.6	69.1	69.0	60.5	68.0	67.3	53.6	0	0	37.7	49.3
1920–21	61.6	66.4	67.6	60.9	63.6	67.0	66.8	67.4	0	48.0	67.0	67.2	58.7
1921–22	66.4	65.9	38.5	65.2	46.0	64.5	64.4	69.9	69.1	68.2	66.8	66.1	62.7
1922–23	66.1	68.2	30.3	65.2	64.7	56.7	62.4	45.6	4.00	3.75	2.48	2.27	39.2
1923–24	1.16	2.01	.55	.65	.71	2.00	2.24	2.95	4.73	6.78	3.63	3.70	2.60
1924–25	1.53	3.24	2.83	2.77	2.56	1.55	2.80	2.07	3.17	3.55	4.88	2.19	2.76
1925–26	2.51	1.98	1.71										
Average	46.2	50.4	45.1	48.7	48.0	48.9	51.1	51.2	43.9	40.7	42.6	41.5	47.9

Modesto Canal near La Grange

1906–7				49.9	173	80.8	272	377	472	505	310	165	
1907–8	1.68	0	13.6	56.4	224	384	431	483	568	368	153	12.1	225
1908–9	0	0	35.0	189	110	159	449	501	521	523	160	44.8	224
1909–10	7.1	0	0	0	271	327	366	534	547	263	39.4	35.0	199
1910–11	36.6	0	0	0	54.8	292	512	577	591	575	335	63.3	253
1911–12	27.3	8.9	0	0	103	348	489	662	582	344	45.7	22.4	219
1912–13	0	0	111	234	219	288	699	704	704	354	85.0	142	295
1913–14	5.2	5.0	.6	148	297	409	410	609	671	601	396	17.5	298
1914–15	0	.09	0	23.6	111	491	557	627	731	636	108	29.2	277
1915–16	16.6	.99	0	0	1.12	84.7	581	872	872	753	155	11.4	280
1916–17	4.66	7.82	.91	0	368	589	830	801	954	754	88.6	0	366
1917–18	0	0	0	0	134	577	735	1,120	1,140	208	12.1	0	326
1918–19	.6	0	1.9	222	347	244	757	1,220	735	186	83.2	76.3	322
1919–20	37.2	0	0	0	0	48.1	1,150	1,300	1,130	317	128	113	351
1920–21	31.2	0	0	0	240	666	1,020	1,130	1,100	541	111	80.2	410
1921–22	7.87	0	0	0	401	307	643	1,120	1,030	828	188	102	385
1922–23	0	0	0	0	159	560	780	975	1,000	726	849	556	469
1923–24	237	0	0	44.4	339	429	567	665	530	561	432	117	327
1924–25	71.2	153	0	226	163	347	466	840	1,060	648	592	481	421
1925–26	253	0	70.3	270	160	426	650	1,010	450	743	641	388	424
1926–27	172	416	0	0	42.2	89.0	577	1,080	1,090	861	626	573	462
Average	45.5	29.6	11.7	69.7	187	340	616	819	785	538	264	144	327

Turlock Canal near La Grange

1906–7				0	15.1	42.9	166	562	669	686	667	324	
1907–8	58.8	0	0	2.74	72.8	341	701	734	758	534	197	32	286
1908–9	0	0	0	72.1	127	243	555	747	764	838	329	106	315
1909–10	155	0	0	0	161	456	592	205	178	528	95.6	121	208
1910–11	2.9	0	0	0	0	367	813	999	1,010	1,000	583	140	410
1911–12	56.5	0	0	0	173	548	636	998	1,030	638	96.0	41.6	352
1912–13	0	0	0	0	241	487	995	1,100	1,090	633	307	0	405
1913–14	0	0	0	0	0	281	1,030	1,400	1,090	0	242	115	347
1914–15	25.4	0	0	0	125	747	816	1,200	1,220	1,340	215	11.9	477
1915–16	0	0	0	5.8	206	382	1,100	1,620	1,620	1,350	324	90.5	558
1916–17	0	0	12.8	41.9	405	572	1,440	1,540	1,420	1,330	261	82.0	592
1917–18	8.39	0	81.8	130	433	348	993	1,680	1,470	454	64.8	69.7	476
1918–19	74.9	17.7	36.3	80.3	275	325	1,280	1,730	1,230	304	60.3	61.0	457
1919–20	51.8	0	0	259	372	629	1,200	1,630	1,550	525	129	26.4	529
1920–21	99.4	0	0	0	68.6	570	1,410	1,670	1,530	863	141	70.1	537
1921–22	23.7	35.8	29.0	0	0	360	850	1,750	1,570	1,270	282	124	527
1922–23	191	3.7	0	0	0	955	1,110	1,400	1,260	1,100	1,010	452	628
1923–24	435	42.5	2.52	0	299	835	919	1,080	1,090	1,000	810	447	583
1924–25	353	0	0	134	318	445	532	1,410	1,580	1,150	919	633	624
1925–26	282	0	0	111	461	587	1,230	1,470	862	1,040	1,060	603	644
1926–27	376	16.1	0	0	0	517	672	1,760	1,760	1,190	759	606	643
Average	110	5.79	8.12	39.8	179	478	907	1,270	1,180	846	407	198	480

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

Middle Fork of Stanislaus River at Sand Bar Flat, near Avery

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1905–6	73.2	64.5	76.8	328	356	827	1,670	3,170	3,970	2,790	692	219	1,190
1906–7	125	121	191	245	825	1,940	2,480	2,920	3,120	2,330	792	278	1,280
1907–8	189	125	140	161	161	424	919	997	886	475	208	94.0	398
1908–9	80.1	72.7	71.1	----------	----------	608	1,890	2,790	3,070	1,100	243	115	----------
1909–10	102	356	753	575	484	1,380	2,320	2,060	1,200	373	158	149	826
1910–11	164	168	205	461	701	971	2,140	2,720	3,610	1,650	322	203	1,110
1911–12	189	185	163	102	95.5	135	326	1,260	1,450	383	170	175	386
1912–13	199	123	80.5	80.3	120	198	742	1,330	994	347	227	209	389
1913–14	195	116	93.8	850	463	1,200	1,740	2,780	2,150	1,160	308	216	941
1914–15	222	223	120	109	350	745	1,970	2,530	2,800	1,310	301	249	911
1915–16	167	109	141	360	677	1,630	2,620	2,630	2,450	1,290	324	178	1,050
1916–17	242	236	288	318	450	548	1,690	2,470	3,130	1,330	346	244	941
1917–18	196	175	113	72.9	97.0	474	1,470	1,580	1,860	359	283	231	576
1918–19	231	240	222	145	198	289	1,110	1,490	432	276	284	209	428
1919–20	118	59.9	78.5	76.5	85.9	250	661	1,600	1,180	358	283	270	419
1920–21	142	201	249	327	417	936	1,200	1,770	1,950	596	277	276	695
1921–22	153	99.4	88.6	144	174	320	980	3,080	3,000	951	320	280	801
1922–23	234	124	210	224	246	436	1,040	1,810	1,290	797	291	271	583
1923–24	214	168	108	95.8	160	154	439	568	188	105	102	122	202
1924–25	96.0	235	231	207	859	814	1,830	2,590	1,900	794	310	249	841
1925–26	224	165	169	137	193	514	1,360	1,390	587	265	237	171	452
1926–27	89	187	248	242	593	660	1,359	2,188	2,055	810	298	240	746
Average	166	162	184	250	367	702	1,450	2,080	1,970	902	308	211	722

NOTE.—Record not corrected for storage at Relief Reservoir and diversion from South Fork of Stanislaus River.

Stanislaus River near Knights Ferry

1915–16	196	169	370	2,270	2,360	4,520	5,470	5,370	3,980	1,160	306	204	2,190
1916–17	367	313	632	551	2,570	1,420	3,480	5,370	5,970	1,400	336	299	1,880
1917–18	221	217	202	143	551	2,510	3,050	3,070	2,500	352	271	243	1,110
1918–19	262	304	293	244	862	1,000	3,180	4,650	883	276	253	200	1,030
1919–20	129	78.1	209	170	231	1,500	2,270	4,180	2,010	430	275	268	982
1920–21	226	450	810	1,890	1,690	2,560	3,020	4,420	3,940	821	288	289	1,700
1921–22	200	144	406	556	1,890	1,610	2,760	7,490	6,180	1,330	357	303	1,930
1922–23	285	315	1,240	1,230	967	1,180	3,260	5,240	2,640	1,150	334	345	1,520
1923–24	307	251	202	197	396	309	980	978	200	94.4	98.7	126	344
1924–25	147	470	534	498	2,670	1,830	4,060	5,500	2,830	840	302	262	1,650

1925–26	266	242	250	226	1,300	1,200	3,040	2,150	669	237	192	183	823
1926–27	47.5	121	21.1	646	2,850	2,060	4,220	5,020	3,850	1,140	926	777	1,790
Average	221	256	431	718	1,530	1,810	3,230	4,450	2,970	769	328	292	1,410

NOTE.—Record October, 1915, to January, 1916, from station at Knights Ferry and includes canals. Melones Reservoir completed Aug. 21, 1926.

Stanislaus River at Knights Ferry

[Drainage area, 935 square miles]

1902–3								3,520	3,580	640	142	32	
1903–4	44	638	267	199	4,710	6,140	5,390	9,550	4,560	1,300	372	261	2,780
1904–5	1,170	412	436	642	1,330	2,400	2,770	3,250	2,390	613	150	103	1,300
1905–6	97	91	131	2,470	2,070	5,330	5,330	8,090	9,340	5,210	910	309	3,280
1906–7	193	181	1,270	1,640	3,560	10,400	8,110	7,690	7,500	4,370	1,070	378	3,870
1907–8	274	206	353	522	518	1,160	2,390	2,220	1,360	501	208	117	819
1908–9	126	121	155	5,810	4,050	2,670	4,890	6,160	5,600	1,440	344	160	2,630
1909–10	179	1,010	2,280	2,280	1,610	3,800	5,210	3,780	1,570	438	194	197	1,880
1910–11	211	241	356	4,140	2,930	5,500	6,270	6,600	8,250	3,110	565	302	3,210
1911–12	204	307	274	313	237	466	765	3,200	2,610	364	98.6	191	753
1912–13	218	229	130	297	298	458	1,900	2,960	1,450	197	23.7	18.5	682
1913–14	64.7	158	280	4,270	2,900	3,130	4,350	6,420	3,840	900	4	4	2,190
1914–15	28.9	235	246	542	2,300	1,210	2,980	4,900	4,270	725	23.5	14.2	1,450
1915–16	13.9	73.1	354	2,270	2,270	4,520	5,420						
Average	217	300	502	1,950	2,210	3,630	4,290	5,260	4,330	1,520	316	161	2,070

Stanislaus River at Oakdale

[Drainage area, 1,051 square miles]

1894–95									5,690	1,780	330	638	
1895–96	176	179	198	1,810	782	2,460	3,270	4,720	6,540	1,290	385	332	1,850
1896–97	239	705	681	609	3,250	1,920	5,060	7,320	2,080	582	198	152	1,900
1897–98	176	255	411	207	389	572	1,810	1,380	647	167	66	61	512
1898–99	77	71	139	457	355	2,420	3,520	2,560	2,660	502	150	85	1,080
1899–1900	309	1,090	1,460	1,940	700	1,830	1,760	3,340	1,860	349	64	46	1,230
1900–1901	448	1,220	871										

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

Relief Creek near Baker Station

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1910–11	74.3	74.5	61.2							240	76.4	57.0	
1911–12	62.1	78.3	86.2				16.2	3.93	154	66.2	44.4	74.3	
1912–13	99.5	7.95	8.52	8.08	8.88	11.2	6.43	38.0	164	51.2	48.7	91.2	45.3
1913–14	106									207	56.7	82.2	
1914–15	103	112	26.4					94.6	234	167	56.5	126	
1915–16	59.0	32.8	31.8						235	181	53.1	40.8	
1916–17	54.1	73.5	44.4	65.4	26.8	11.0			303	254	41.2	84.0	
1917–18	67.2	77.4	46.8	7.56	0	0	8.13	15.6	365	87.6	125	63.9	72.0

North Fork of Stanislaus River near Avery

1913–14											57.0	58.1	
1914–15	54.9	46.0	55.2	64.5	165	462	1,280	2,000	1,450	229	62.6	59.4	495
1915–16	40.6	42.0	67.9	321	573	1,190	1,860	2,290	1,170	240	74.8	72.4	660
1916–17	74.9	75.0	152	101	229	359	1,250	1,430	1,700	229	71.7	70.3	477
1917–18	44.1	48.7	51.8	37.9	77.8	302	1,150	1,180	593	163	59.1	50.5	313
1918–19	45.9	54.5	86.0	57.9	128	234	907	1,580	262	70.9	48.0	33.3	294
1919–20	31.4	22.7	45.0	53.4	66.3	269	718	1,570	584	91.0	53.0	46.7	297
1920–21	59.0	310	270	254	310	764	1,110	1,720	1,390	155	78.8	56.8	540
1921–22	41.3	19.4	21.5	90.7	166	370	655	2,350	1,780	228	65.9	64.4	488

Utica Gold Mining Co.'s canal near Avery

1914–15									86.8	78.0	68.0	67.4	
1915–16	40.2	38.2	69.0	72.0	73.3	74.0	72.3	66.0	66.0	64.5	69.7	70.9	64.7
1916–17	68.5	69.6	69.8	66.0	70.0	77.7	86.7	84.0	84.0	74.4	67.3	67.0	73.7
1917–18	38.1	35.8	40.1	29.9	59.7	72.5	75.1	79.0	77.7	72.4	59.5	53.4	57.7
1918–19	43.9	54.0	59.5	48.3	53.2	54.0	54.0	54.0	54.2	60.2	48.6	36.7	51.7
1919–20	27.5	22.7	35.6	28.0	40.4	58.0	60.3	66.0	71.0	70.2	54.4	45.0	48.3
1920–21	50.6	60.6	70.0	70.0	70.0	72.5	75.2	67.7	69.8	67.0	65.5	46.6	65.4

South Fork of Stanislaus River at Strawberry

[Drainage area, 54 square miles]

1911–12		12.5	4.0	18.6	15.6	12.6	24.4	298	416	62.1	49.3	21.6	
1912–13	6.9	26.2	23.7	55.9	54.8	27.9	124	425	237	52.5			
1913–14	49.9	18.0	46.5	78.5	68.3	153	279	776	791	259	46.0	32	217
1914–15	16.4	19.3	25.8	73.1	67.4	119	293	413	842	210	35.5	13.6	177
1915–16	5.53	6.65	16.1	154	90.6	193	369	523	481	54.7	43.4	42.4	165
1916–17	48.3	59.5	70.7	104									

Oakdale Canal near Knights Ferry

1913–14									94.4	127	99.5	64.3	
1914–15	30.5	0	6.41	4.50	0	29.2	72.2	97.5	144	109	85.7	74.1	54.6
1915–16	44.2	7.70	0	0	0	2.31	92.0	172	183	169	107	69.4	70.7
1916–17	41.0	0	0	0	22.6	7.1	155	184	200	199	99.0	76.7	82.2
1917–18	43.3	0	0	0	20.9	0	87.8	210	208	112	84.3	67.9	69.7
1918–19	46.6	0	0	0	0	0	138	207	178	80.0	74.5	32.4	63.3
1919–20	69.2	41.0	0	0	11.2	0	100	225	240	121	83.9	81.4	81.1
1920–21	57.3	0	0	0	0	40.1	203	229	234	174	75.6	75.8	91.2
1921–22	57.5	0	0	0	0	0	119	235	235	207	96.5	92.8	87.4
1922–23	20.4	0	0	0	0	102	78.4	200	225	200	83.7	105	85.0
1923–24	28.7	0	0	0	13.4	92.1	173	195	49.8	25.8	24.0	30.6	52.8
1924–25	45.3	0	0	0	0	40.3	42.1	175	222	178	84.6	69.1	71.8
1925–26	41.3	0	0	0	0	79.0	118	225	157	58.0	38.5	35.4	63.1
1926–27	17.4	34.5	0	0	0	9.45	85.3	216	234	234	232	200	106
Average	41.8	6.40	.49	.35	5.24	30.9	113	198	186	142	90.6	76.8	75.3

South San Joaquin Canal near Knights Ferry

1913–14								270	450	598	280	161	
1914–15	191	4.8	5.0	90.0	4.8	116	333	526	757	647	236	211	262
1915–16	138	88.0	16.2	0	0	15.5	273	710	707	644	257	168	252
1916–17	162	77.8	60.5	57.9	95.4	298	661	648	643	602	245	187	312
1917–18	165	47.7	5.55	55.6	109	19.6	302	784	832	279	208	181	249
1918–19	218	189	124	98.1	30.7	446	715	967	633	232	224	133	336
1919–20	0	0	0	0	160	516	761	982	960	327	197	191	341
1920–21	59.7	2.33	0	0	381	494	896	906	980	616	215	220	396
1921–22	130	0	0	0	0	548	634	991	974	782	244	206	378
1922–23	181	0	0	0	324	480	798	961	926	650	249	186	396
1923–24	47.8	210	0	61.8	312	241	768	724	147	78.2	70.9	91.5	228
1924–25	60.3	103	0	359	24.8	341	452	946	993	657	226	188	364
1925–26	14.4	0	0	5.77	344	474	874	903	515	185	155	137	299
1926–27	0	0	0	362	39.8	217	504	981	946	859	725	621	440
Average	105	55.6	16.2	83.9	140	324	613	807	747	511	252	206	327

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

Stanislaus & San Joaquin Water Co.'s canal at Knights Ferry

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1906–7				24.4	12.3	22.2	18.4	49.5	80.7	94.9	65.9	84.8	
1907–8	73.3	17.0	20.4	26.1	24.9	22.8	67.4	95.8	98.2	91.9	62.3	37.1	53.0
1908–9	23.5	15.0	15.9	12.3	14.8	9.84	88.6	106	73.2	79.3	64.5	62.3	47.1
1909–10	64.4	42.5	46.6	44.6	48.4	47.3	54.8	88.7	89.0	64.3	41.6	49.1	56.8
1910–11	43.4	41.3	37.1	28.5	0	0	78.8	103	105	106	100	85.2	60.7
1911–12	66	3.5	0	0	.12	32.4	84.3	89.6	93.6	96.5	88.6	17.3	47.9

Calaveras River at Jenny Lind

[Drainage area, 395 square miles]

1906–7				1,570	1,920	5,420	712	255	157				
1907–8			102	343	265	214	102	51	37				
1908–9	0	28	89.3	3,070	2,020	811	375	110	55.2	14.0	2.9	2.3	548
1909–10	13.0	200	949	795	269	642	205	91.8	33.9	9.0	.4	0	267
1910–11	23.0	44.8	58.1	5,260	1,420	3,390	594	202	90.5	37.5	12.1	16.4	925
1911–12	38.5	58.6	76.3	177	93.3	244	142	121	67	6.5	1.7	13.8	86.7
1912–13	17.0	31.4	38.6	197	59.9	62.5	77.1	24.4	10.3	1.7	0	0	43.4
1913–14	0	7.4	146	2,350	1,530	286	158	73.5	34.6	10.4	.5	.5	377
1914–15	141	300	364	699	2,230	357	192	202	62.7	9.08	.76	4.20	368
1915–16	20	22.1	157	2,370	802	1,780	315	126	56	16	1.7	1.3	475
1916–17	42.2	45.5	324	653	3,330	808	392	328	69.5	9.26	.07	1.08	481
1917–18	1.30	17.4	33.4	53.7	473	2,750	134	39.6	0	0	0	0	293
1918–19	5.00	23.0	47.3	43.5	810	521	129	49.4	28.0	10.6	0	.83	135
1919–20	4.0	7.4	67.4	14.7	62.5	849	262	60.0	22.8	13.6	3.23	0	115
1920–21	8.23	109	470	2,900	576	407	123	69.4	21.4	.21	0	0	393
1921–22	0	1.4	222	244	1,960	681	485	148	40.0	6.4	.1	0	304
1922–23	3.77	93.2	1,040	540	474	171	398	227	43.3	10.2	3.06	5.90	251
1924–25	0	43.7	139	103	1,490	197	651	102	26.5	2.6	0	0	220
1925–26	2.08	17.8	33.4	38.7	702	75.5	243	23.0	2.81	0	0	0	90.2
1926–27	0	297	74.0	212	1,460	275	691	78.6	27.7	3.27	0	0	250
Average	17.7	74.9	233	1,080	1,100	997	319	119	44.3	8.91	1.47	2.57	312

Calaveras River near Stockton

1925–26	0	0	15.4	32.7	753	66.9	286	14.0	0	0	0	0	92.2

South Channel of Littlejohns Creek at Farmington

1925–26	0	0	0	0	225	0.7	9.37	0	0	0	0	0	18.1

Bear Creek near Clements

1926–27	0	14.3	1.18	20.5	88.0	5.86	9.90	0	0	0	0	0	11.1

Bear Creek near Lockeford

1926–27	0	18.1	1.24	22.4	98.2	6.25	13.0	0.01	0	0	0	0	12.6

North Fork of Mokelumne River above Moore Creek

1926–27	10.8	221						1,750	2,110	418	139	79.3	

North Fork of Mokelumne River near West Point

1916–17								2,310	3,670	727	145	98.1	
1917–18		83.9	109	87.9					1,100	114	96.5	121	
1923–24					183	131	739	912	84.4	35.9	16.5	70.2	
1924–25	44.0	211	284	278	895	814	1,860	3,200	1,840	363	201	119	840
1925–26	77.1	105	174	140	289	617	1,800	1,150	265	110	110	106	411
1926–27	35.2	300	379	426	868	814	1,700	2,900	2,970	474			

Mokelumne River at Electra

[Drainage area, 537 square miles]

1900–1				1,000	3,300	2,000	2,040	4,630	3,830	260	190	60	
1901–2	76	210	1,470										
1902–3									2,620	344	170	222	
1903–4	181	855	188	157	2,490	4,170	3,780	5,410	3,610	722	111	165	1,820
1904–5	827	189	315										

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

Mokelumne River near Lancha Plana

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1925–26										98.2	99.6	96.8	
1926–27	49.1	492	526	654	1,860	1,380	2,730	3,340	3,140	498	124	71.3	1,230

Mokelumne River near Clements

[Drainage area, 631 square miles]

1904–5				428	853	1,410	1,960	2,550	1,660	188	128	139	
1905–6	114	79.4	97.0	996	808	2,520	2,940	4,700	6,020	3,540	356	202	1,860
1906–7	190	248	876	1,140	2,780	4,880	4,430	4,220	4,720	3,330	703	257	2,310
1907–8	276	234	328	537	393	817	1,730	1,900	1,260	229	104	135	662
1908–9	142	124	161	2,910	2,260	1,670	2,810	3,710	4,310	824	115	77.3	1,590
1909–10	131	951	1,500	1,340	947	2,390	3,240	3,180	1,000	172	64.4	74.2	1,250
1910–11	107	170	356	2,400	2,570	3,310	4,310	4,260	5,570	1,910	268	156	2,120
1911–12	143	200	136	228	188	342	518	2,280	2,100	161	90.8	111	541
1912–13	85.5	522	171	368	356	352	1,410	2,410	930	171	136	107	585
1913–14	116	136	233	2,750	1,830	1,700	2,420	4,240	3,330	816	166	131	1,490
1914–15	132	134	205	318	1,350	999	2,240	3,550	3,880	715	92.8	107	1,140
1915–16	111	146	322	1,290	1,700	2,850	3,270	3,340	3,040	762	170	113	1,420
1916–17	206	198	449	326	1,250	967	2,250	3,370	4,440	765	152	95.4	1,200
1917–18	74.7	85.8	52.5	51.5	349	1,730	2,050	2,400	1,470	129	79.1	148	719
1918–19	223	207	204	168	848	838	2,450	4,010	568	90.4	80.2	87.0	814
1919–20	76.2	88.5	192	127	143	709	1,490	3,120	1,320	224	95.0	81.3	640
1920–21	156	335	561	1,280	1,100	1,760	2,060	3,550	2,990	332	126	96.0	1,190
1921–22	117	76.2	177	312	1,060	919	1,790	5,170	4,700	638	165	128	1,270
1922–23	130	180	957	752	600	705	2,140	3,660	1,740	464	148	152	971
1923–24	153	119	113	141	277	182	892	990	70.7	19.8	5.42	50.0	251
1924–25	86.8	306	400	366	1,930	1,330	2,750	3,860	2,090	341	166	133	1,140
1925–26	90.5	128	234	225	688	756	2,220	1,370	255	92.1	93.1	86.5	517
1926–27	47.8	481	531	663	1,880	1,300	2,630	3,280	3,070	509	156	98.0	1,210
Average	132	234	375	831	1,140	1,500	2,350	3,270	2,630	714	159	120	1,130

Mokelumne River at Woodbridge

1923–24									5.66	1.65	1.28	1.15	
1924–25	8.18	306	400								5.95	9.37	
1925–26		129	193		712	833		1,550	192	3.59	2.88	3.97	
1926–27	4.63	432	600	650	1,830	1,400	2,590	3,300	3,020	396	7.84	6.92	1,180

Mokelumne River near Thornton

1925–26											8.90	8.82	
1926–27	9.44										23.6	17.6	

Middle Fork of Mokelumne River at West Point

1911–12		12.7	15.4	33.7	21.6	47.7	41.5	80.2	26.2	8.0	6.0	6.28	
1912–13	6.14	12.0	12.5	24.6	26.7	32.2	81.7	50.4	16.5	4.73	3.66	3.59	22.8
1913–14	4.3	8.0	16.5	622	242	188	182	115	42.2	12.2	5.1	5.3	120
1914–15	6.55	7.33	9.63	28.4	168	120	172	244	77.4	19.0	7.86	5.88	71.4
1915–16	6.06	8.02	23.6	166	196	357	246	131	51.0	19.5	7.94	6.30	101
1916–17	15.8	15.3	41.3	41.1	198	116	203	193	95.8	21.1	8.31	5.54	78.5
1917–18	4.42	5.99	12.3	10.1	40.8	199	123	58.7	15.3	3.03	1.66	6.08	40.0
1918–19	7.73	10.8	12.3	13.5	78.1	78.0	130	58.6	12.1	3.00	1.18	2.15	33.5
1919–20	4.40	6.07	19.8	10.8	15.9	94.2	145	77.0	17.2	5.12	1.26	1.59	33.2
1920–21	10.5	23.4	55.3	130	131	213	135	92.9	36.8	8.65	2.74	2.63	69.9
1921–22	3.27	4.68	25.8	33.3	134	125	202	299	93.5	15.8	5.55	2.97	78.4
1922–23	5.01	14.7	100	65.4	68.8	70.4	204	89.7	32.2	9.60	4.04	3.98	55.5
1923–24	6.27	6.13	8.87	13.4	22.0	10.4	16.8	4.78	.95	.22	.20	.39	7.47
1924–25	4.85	12.4	23.5	19.0	213	84.6	205	103	31.2	6.91	2.06	2.32	57.7
1925–26	5.02	8.30	9.47	15.1	72.2	37.5	110	20.5	4.60	.72	.44	.51	23.2
1926–27	2.84	57.0	30.1	42.8	209	132	246	107	35.7	10.6	3.84	3.34	72.1
Average	6.21	13.3	26.0	79.3	115	119	153	108	36.8	9.26	3.86	3.68	57.6

South Fork of Mokelumne River near Railroad Flat

1911–12		9.41	8.68	18.7	11.3	28.9	34.7	64.4	23.4	7.71	5.35	5.47	
1912–13	5.97	7.92	7.35	17.4	18.2	24.8	53.7	40.8	15.5	7.44	4.66	4.47	17.3
1913–14	4.89	8.88	20.4	323	242	178	158	78.4	35.1	15.5	8.89	6.85	89.2
1914–15	7.69	8.20	11.5	31.1	198	122	198	259	71.2	28.2	12.7	8.58	78.8
1915–16	8.94	11.0	22.8	107	177	348	240	109	43.4	19.1	9.11	5.30	91.5
1916–17	11.6	11.6	32.7	20.0	144	98.6	201	204	86.9	28.2	11.6	8.37	70.9
1917–18	6.69	8.15	11.3	8.02	28.3	159	131	61.8	19.7	7.64	3.81	6.45	37.9
1918–19	7.65	12.1	11.5	12.5	70.8	63.2	111	56.4	14.8	5.75	4.54	5.64	31.0
1919–20	7.04	6.30	39.1	12.4	11.2	96.5	115	90.9	26.6	6.70	4.08	3.19	35.0
1920–21	13.8	34.3	45.4	159	137	160	132	89.3	45.9	14.6	8.42	7.32	70.3
1921–22	7.45	9.68	23.1	28.5	105	106	191	330	87.6	26.4	13.1	8.80	77.9
1922–23	10.6	17.8	90.7	67.5	68.3	77.5	242	101	41.2	18.4	9.27	8.72	62.5
1923–24	10.1	9.47	11.8	14.7	25.6	13.3	22.4	7.37	3.28	1.99	1.43	1.64	10.2
1924–25	10.4	17.0	24.5	20.4	174	82.4	192	94.4	38.3	16.4	9.18	7.60	56.2
1925–26	8.47	10.2	12.0	17.5	61.1	43.6	133	29.0	11.9	6.43	4.04	3.29	28.0
1926–27	3.82	50.7	27.4	38.5	197	128	228	96.3	35.3	17.4	9.13	8.00	68.8
Average	8.34	14.5	25.0	56.0	104	108	149	107	37.5	14.2	7.46	6.23	55.0

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

Licking Fork of Mokelumne River near Railroad Flat

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1911–12		2.22	2.85	3.90	2.66	5.27	6.70	8.08	2.49	0.80	0.60	0.78	
1912–13	2.0	2.30	1.68	4.26	5.21	4.55	12.2	3.94	1.34	.65	.3	.54	3.22
1914–15							23.9	23.6	8.63	3.83	2.02	1.56	
1915–16	1.70						20.8	8.50	4.76	2.82	1.49	1.52	
1916–17								21.0	6.54	2.98			
1917–18		2.90											

Stockton-Mokelumne Canal at Woodbridge

1925–26								88.2	95.9	63.0	66.8	66.4	
1926–27	37.3	0.42	0	0	0	0	0	110	172	150	123	77.3	56.2

Dry Creek near Ione

1911–12		16.9	17.5	90.8	19.9	157	68.8	38.9	0.50				
1925–26				10.9	365	53.4	123	9.06	0	0	0	0	
1926–27	0	89.1	38.6	166	716	192	409	34.6	3.69	0	0	0	133

Dry Creek near Galt

1926–27				179	797	191	414	29.9	1.10	0	0	0	

Sutter Creek near Volcano

1923–24						8.67	7.38	1.95	0.41	0.15	0.10	0.12	
1924–25	1.68	13.2	18.2	17.5	126	37.6	82.2	34.2	11.6	4.29	1.83	2.78	28.5
1925–26	3.34	5.50	7.51	7.88	61.5	16.4	32.7	9.33	2.32	1.05	.80	.85	12.0
1926–27	1.78	20.9	12.1	32.6	116	56.6	96.2	16.8	7.90	3.00	1.44	1.47	29.9

Sutter Creek at Sutter Creek

1921–22						118	93.9	42 6	15.9	2.44	4.17	2.24	
1922–23	5.36	32.0	326	186	97.6	63.3	155	44.2	21.8	8.72	4.61	5.62	79.3
1923–24	7.90	8.30	11.9	16.0	17.5	10.5	11.6	4.12	.81				
1924–25		29.1	11.1	20.3	278	57.5	146	53.5	16.8	6.73	1.98	1.57	
1925–26	4.96	10.1	13.5	14.8	127	28.4	52.9	11.5	3.73	.88	.91	1.27	21.7
1926–27	4.17	51.5	19.5	49.9	208	60.2	179	21.7	11.5	2.16	.76	.92	49.3

North Fork of Cosumnes River near Pleasant Valley

[Drainage area, 158 square miles]

1905–6						1,690	1,210	1,040	770	176	35.4		
1923–24					46.4	23.6	42.0	18.4					

North Fork of Cosumnes River near El Dorado

1910–11												19.7	
1911–12	29.3	37.0	37.5	89.6	55.2	171	184	389	139	22.5	6.81	24.8	99.1
1912–13	17.0	49.8	40.1	120	81.8	114	370	264	68.4	16.2	6.18	3.63	95.7
1913–14	5.6	23.9	106	1,660	843	582	563	352	140	21.7	3.4	3.1	357
1914–15	9.76	13.1	36.4	107	795	483	609	891	251	41.5	9.57	5.05	267
1915–16	6.14	23.3	106	792	926	1,200	791	394	170	33.4	8.73	6.03	369
1916–17	36.4	40.2	199	144	710	438	802	638	314	43.2	7.48	5.24	278
1917–18	5.35	19.7	34.2	32.9	161	710	567	241	57.2	3.98	2.08	17.3	154
1918–19	26.2	45.8	42.3	64.3	645	477	624	311	41.5	4.00	1.64	2.91	187
1919–20	6.66	8.10	73.5	46.5	51.4	446	542	335	65.9	11.9	2.52	3.16	133
1920–21	21.2	105	323	691	569	848	484	371	167	20.6	3.11	3.95	299
1921–22	5.79	15.5	101	144	689	607	839	1,030	338	36.4	5.34	2.85	315
1922–23	11.6	93.0	609	465	340	390	858	376	143	30.4	4.29	8.69	277
1923–24	22.8	22.1	29.2	51.0	99.7	48.5	74.0	23.8	3.41	.42	0	0	30.9
1924–25	15.5	58.8	109	103	928	350	873	446	117	10.3	2.17	4.42	246
1925–26	8.00	11.3	21.7	32.0	357	191	415	81.2	5.09	.39	0	.10	91.2
1926–27	5.56	112	101	240	994	554	915	369	140	17.1	2.52	2.77	282
Average	14.6	42.4	123	299	515	476	594	407	135	19.6	4.12	6.69	218

Monthly discharge, in second-feet, at stations in the San Joaquin River Basin, Calif.—Continued

Cosumnes River at Michigan Bar

[Drainage area, 524 square miles]

Year	October	November	December	January	February	March	April	May	June	July	August	September	Mean
1907–8		67.1	195	471	306	552	346	359	106	15.5	0	1.7	
1908–9	13.5	27	48.8	4,300	2,750	1,360	1,230	642	281	42.0	8.29	8.73	893
1909–10	25.9	243	1,130	1,320	1,050	2,210	1,150	414	96.1	20.9	5.0	10.1	639
1910–11	19.6	47.9	112	4,180	2,160	3,240	2,480	1,270	819	177	35.5	26.9	1,210
1911–12	46.0	72.3	77.9	213	129	347	347	701	278	31.9	11.9	33.6	191
1912–13	17.6	82.6	68.0	295	170	235	646	462	120	13.8	4.6	2.2	176
1913–14	4.0	32.6	307	3,700	1,960	1,130	1,040	637	264	41.4	5.0	5.2	754
1914–15	16.3	27.7	122	356	2,130	904	1,100	1,630	503	85.5	15.0	7.95	565
1915–16	9.24	33.5	236	2,080	2,130	2,490	1,390	722	323	56.6	8.74	7.48	787
1916–17	61.9	71.5	370	298	2,190	947	1,390	1,070	542	77.5	12.7	6.67	574
1917–18	7.08	27.0	50.2	48.0	375	1,780	894	404	102	8.08	1.50	24.1	310
1918–19	32.4	67.9	69.3	124	1,540	1,000	1,010	473	73.5	8.55	1.42	.84	358
1919–20	11.3	13.0	127	73.1	74.5	930	920	508	125	25.9	2.63	3.28	235
1920–21	49.8	188	631	1,610	1,070	1,440	808	623	289	40.9	4.63	3.60	562
1921–22	7.22	19.2	225	287	1,880	1,130	1,410	1,580	549	68.7	12.2	3.99	589
1922–23	18.4	201	1,690	1,240	813	643	1,660	659	263	64.2	11.9	13.6	606
1923–24	35.9	33.8	52.9	79.3	194	83.9	141	49.3	4.42	.12	0	0	55.6
1924–25	14.2	88.9	246	225	2,440	724	1,670	773	250	40.1	9.74	9.72	526
1925–26	22.5	34.8	64.2	67.6	930	367	814	189	29.1	3.69	.08	.58	204
1926–27	9.42	243	231	554	2,390	1,160	2,050	687	279	45.0	10.4	7.02	625
Average	22.2	81.1	303	1,080	1,330	1,130	1,120	693	265	43.4	8.06	8.86	519
Camp Creek near Sly Park													
1923–24		0.84	1.17	1.32	7.32	4.11	11.8	7.04	0.52	0.07	0	0	
Camp Creek near Pleasant Valley													
1923–24						35.1	9.98	22.5	5.62				
Sly Park Creek at Park													
1905–6							87.8	60.6	50.3				