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SURFACE WATER SUPPLY OF HAWAII

JULY 1, 1913, TO JUNE 30, 1915

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Prepared in cooperation with the
Territory of Hawaii



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SURFACE WATER SUPPLY OF HAWAII, JULY 1, 1913, TO JUNE 30, 1915.

By G. K. LARRISON.

AUTHORITY FOR INVESTIGATIONS.

This volume contains results of measurements of the flow of certain streams and ditches and records of rainfall and evaporation in the Territory of Hawaii for the biennial period ending June 30, 1915. The investigations leading to the report were made by the United States Geological Survey in cooperation with the Territory of Hawaii, under the general sanction of the organic law of the Survey (Stat. L., vol. 20, p. 394), which contains the following paragraph:

Provided, That this officer [the Director] shall have the direction of the geological survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

As water is the most abundant and most valuable of the minerals, the investigation of water resources is authorized under the provision for examining mineral resources. The work has been supported since the fiscal year ending June 30, 1895, by appropriations in successive sundry civil bills passed by Congress under the following item:

For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

On April 4, 1913, the governor of the Territory of Hawaii approved the following acts providing (act 56) for the creation and maintenance of a division of hydrography under the board of agriculture and forestry and (act 57) appropriating the revenues from water licenses for the use of the board of commissioners of agriculture and forestry toward forest protection and hydrographic surveying.

Section 1 of act 56 reads:

The board of agriculture and forestry is hereby authorized to create and maintain a division of hydrography for the investigation and determination of the water resources of the Territory by the gaging of streams and rainfall and other means, in cooperation with the United States Geological Survey or otherwise, and in furtherance thereof to take over and exercise the functions of the Territory in the conduct of the present hydrographic survey of the Territory.

Section 2 provides that this act shall take effect on July 1, 1913. Section 1 of act 57 reads:

All revenues derived from water licenses, issued by the Territory, during the period beginning July 1, 1913, and ending June 30, 1915, whether by way of rentals or otherwise, shall constitute and be held as a special fund in the treasury of the Territory to be disbursed on warrants of the auditor issued on approved vouchers of the president of the board of commissioners of agriculture and forestry. Such moneys shall be apportioned and applied from time to time by the board of commissioners of agriculture and forestry, acting with the approval of the governor, equally between the division of forestry and the division of hydrography to the following general purposes, and not otherwise:

1. For the protection of forest reservations, established or set apart according to law, against damage by fire, animals, and otherwise by means of fences and any other means whatsoever, and for the expenditures of the division of forestry.

2. For the development and maintenance of the hydrographic survey throughout the Territory.

Each voucher against said fund shall designate the general purpose for which it is drawn.

Section 2 provides that this act also shall take effect on July 1, 1913.

COOPERATION.

TERRITORY OF HAWAII.

Under the authority conferred by the Federal and Territorial legislation, the Director of the United States Geological Survey and the governor of the Territory of Hawaii entered into a cooperative agreement, dating from July 1, 1910, for "the gaging of streams and the determination of the water supply of the Territory of Hawaii."¹

The principal features of this agreement are:

1. The United States Geological Survey assumes the responsibility of gathering, analyzing, and publishing the data.

2. All notes, maps, and data gathered during the progress of the work are at all times open to inspection by the representative of the Territory, and if they are not entirely satisfactory the agreement can be terminated.

3. Accounts for payment of salaries, travel, and subsistence, supplies, or other expenses necessary to the completion of the work shall be rendered in the manner required by the laws and regulations of the contracting parties, and vouchers shall be preferred to either party for payment according as it may be convenient or according to the balance remaining in the respective allotments.

4. The cost of publication is borne entirely by the Geological Survey.

All records, unless otherwise stated, have been collected and published under this cooperative agreement with the Territory of Hawaii, which has borne from 60 to 80 per cent of the cost thereof.

¹ The United States Geological Survey also cooperated with the Territory of Hawaii in mapping several islands. The whole of the islands of Kauai and Oahu and a part of the island of Hawaii have been mapped.

Until June 30, 1913, the Territory of Hawaii was represented in the cooperation by the board of conservation; thereafter the Territory was represented by the board of commissioners of agriculture and forestry.

OTHER COOPERATION.

Special investigations have been made in cooperation with the Hawaiian Department of the United States Army, the city and county of Honolulu, and private persons and corporations.

This cooperation has been of the following classes:

1. Expense of work, equipment or installation, paid entirely or in part by the cooperating party, or by direct reimbursement to the field men.

2. Records collected by employees of a cooperating party but under supervision of and by methods of the Survey.

3. Assistance given in the collection of records, as furnishing transportation, subsistence, equipment.

4. Records furnished by a cooperating party, collected by his methods and under his supervision.

Cooperation of class 4, in which responsibility for the accuracy of the records has not rested with the Survey, has been acknowledged in the descriptions of the various stations. Cooperation of the other classes is hereby gratefully acknowledged as follows: The Hawaiian Sugar Co., Mr. Charles Rice, Makee Sugar Co., Kauai Electric Co., Waimea Sugar Co., and Lihue Plantation Co. for records on Kauai; the United States Army Constructing Quartermaster Department, the Wahiawa Water Co., Kahuku Plantation, Laie Plantation, Koolau Agricultural Co., Waiahole Water Co., Kaneohe Ranch Co., and Maunawili ranch for records on Oahu; Wailuku Sugar Co., Pioneer Mill Co., Olowalu Sugar Co., and Honolulu ranch for records on Maui.

SCOPE OF WORK.

The investigations of stream and ditch flow in the Territory are not complete, nor do they include all the streams and ditches that might advantageously be studied. They include, however, as many of the streams and ditches on the four larger islands as the available appropriations would allow. It is essential that records of stream flow should be kept during a period long enough to determine within reasonable limits the range of flow from the maximum to the minimum. The length of such a period manifestly varies for different streams. Experience has shown that the records should be kept from 20 to 30 years.

In the performance of this work an effort is made to reach the highest degree of precision possible with a rational expenditure of time and money. In all engineering work there is a point beyond which refinement is needless and wasteful, and this statement applies

with especial force to stream-measurement work in Hawaii. It has been found, however, that it is possible to obtain records which are sufficiently accurate, although many of those presented in this report are for periods too short to admit of definite conclusions.

Special intensive investigations of the discharge of many streams which are of major importance for domestic water supply, power, and irrigation have been made.

Investigations of ditch seepage and other losses, in many localities, were made in cooperation with the United States Army and private corporations.

FIELD METHODS OF MEASURING STREAM FLOW.

BASE DATA.

In making plans for power, irrigation, municipal water supply, and other projects involving the use of water from surface streams it is necessary to have data from which both the total flow of the stream and its distribution from day to day throughout the year can be determined. The data necessary for obtaining such information are daily gage heights, which give the fluctuations of rise and fall of the stream, and measurements of discharge at various stages, from which a rating curve and table can be prepared, giving the discharge for any stage. Such a rating is possible from the fact that so long as the conditions at the controlling point in the stream remain the same the discharge will be approximately the same for any given gage height.

The determination of a discharge is termed a discharge measurement, and points at which discharge measurements are made and records of daily fluctuations of stage are kept for determining the daily flow are termed gaging stations.

Gaging stations may be divided into two classes, known as weir stations and velocity-area stations. At weir stations the head of water on the crest of the weir is measured and the discharge computed by means of a formula. The discharge at velocity-area stations is obtained by measuring the velocity of the current and the area of the cross section, the product of the two giving the discharge.

The data presented in this paper were collected at both weir and velocity-area stations.

WEIR MEASUREMENTS.

Unquestionably a weir properly constructed and of a type for which accurate coefficients have been determined is one of the most convenient and reliable means of measuring small quantities of water. In practice, however, weirs rarely conform to the requirements imposed by the experimenter who derived the coefficients. If the crest of the weir is sharp and clean and sufficiently above the bottom

of the leading channel, and the end contractions are complete and velocity of approach is wanting or negligibly small, and if the head on crest is measured at a distance back of the overfall of at least the weir crest length, the Francis formula will give good results. On the other hand, if these essential conditions are not complied with, especially if velocity of approach is considerable and the contractions are imperfect, the Francis formula will not give accurate results. This is particularly true if the weir is improperly constructed and water leaks around and under it, as so frequently happens in practice.

Observations made on various types of weirs in Hawaii show that of the weirs in use in the Territory not all are giving accurate results. If the error is known so that corrections can be made the trouble is largely mitigated, but faulty weir records are too often accepted without investigation of their accuracy.

VELOCITY-AREA METHOD.

The velocity-area method of measurement consists of determining the mean or average velocity of the water past a given cross section. The area of the cross section at right angles to the direction of flow is determined by soundings spaced to develop the contour of the stream bed. The depths are recorded and also their distances from some arbitrarily chosen point on one side of the stream.

The method of making the soundings depends on the size and stage of the stream. On ditches and small streams, where depths and velocities are not large, a graduated rod may be used to advantage; on large streams, which must be measured from bridges or cables, a lead weight and sounding line must be used. The weights are of different sizes— $6\frac{1}{2}$, 10, or 15 pounds—according to the swiftness of the current, and are torpedo shaped, so as to offer as little resistance as possible to the moving water.

On streams with beds which are permanent or nearly so a standard cross section is usually constructed from careful soundings and referred to the zero of the gage, so that the depth for any stage can be found by adding the gage height at that stage to the depth below the zero of the gage. This method is especially useful at high stages, when it is difficult to make accurate soundings.

After the cross-section area of the stream has been measured by soundings and horizontal distances, the velocity is determined at a number of points. These measurements of velocity should be made at frequent intervals across the stream and close enough to take account of any abrupt change in the velocity. For convenience, the velocities are usually observed in the same verticals at which soundings are made. On some streams fairly good measurements of velocities may be made by means of subsurface floats. This method is applicable, however, only to channels of uniform cross-section area

over a considerable distance and is very unsatisfactory for use on natural streams like those of Hawaii.¹

The velocity of flow is best determined by the current meter, which is a form of water wheel actuated by the current, and of such size and shape that it can easily be placed at any point in the stream.

The new type of penta-recording current meter consists of six cups attached to a vertical shaft which revolves on a conical hardened-steel point when immersed in moving water. The revolutions are indicated electrically or acoustically. The rating, or relation between the velocity of moving water and the revolutions of the wheel, is determined for each meter by drawing it through still water for a given distance at different speeds and noting the number of revolutions for each run. From these data a rating table is prepared which gives the velocity in feet per second of moving water for any number of revolutions in a given time interval. The ratio of revolutions per second to velocity of flow in feet per second is very nearly a constant for all speeds and is approximately 0.45.

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

The two principal multiple-point methods in general use are the vertical velocity curve and 0.2 and 0.8 depth.

In the vertical velocity-curve method a series of velocity determinations are made in each vertical at regular intervals, usually about 10 to 20 per cent of the depth apart. By plotting these velocities as abscissas and their depths as ordinates and drawing a smooth curve among the resulting points, the vertical velocity curve is developed. This curve shows graphically the magnitude and changes in velocity from the surface to the bottom of the stream. The mean velocity in the vertical is then obtained by dividing the area bounded by this velocity curve and its axis by the depth. This method of obtaining the mean velocity in the vertical is probably the best known, but on account of the length of time required to make a complete measurement its use is largely limited to the determination of coefficients for purposes of comparison.

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

¹ Further information regarding the float method is given in Water-Supply Paper 95 and in textbooks on stream flow.

much as 1 per cent from the result obtained by the vertical velocity-curve method. It is very extensively used in the regular practice of the United States Geological Survey.

In the single-point method the meter is held either at the depth of the thread of mean velocity or at an arbitrary depth for which the coefficient for reducing to mean velocity has been determined or must be assumed.

Extensive experiments by means of vertical velocity curves show that the thread of mean velocity lies between 0.5 and 0.7 total depth. In general practice the thread of mean velocity is considered to be at 0.6 depth, and at this point the meter is held in most of the measurements made by the single-point method. A large number of vertical velocity curve measurements, taken on many streams and under varying conditions, show that the average coefficient for reducing the velocity obtained at 0.6 depth to mean velocity is practically unity. The variation of the coefficient from unity under some conditions is, however, greater than in the 0.2 and 0.8 method and the general results are not so satisfactory.

In the other principal single-point method the meter is held near the surface, usually 1 foot below, or low enough to be out of the effect of the wind or other disturbing influences. This is known as the sub-surface method. The coefficient for reducing subsurface velocity to mean velocity has been found to be in general from about 0.85 to 0.95, depending on the stage, velocity, and conditions in the channel. The higher the stage the larger the coefficient. This method is especially adapted for measurements of floods or of streams in which the velocity is so great that the meter can not be kept in the correct position for the other methods.

The vertical integration method consists in moving the meter at a slow but uniform speed from the surface to the bottom and back again to the surface and noting the number of revolutions and the time taken in the operation. This method has the advantage that the velocity at each point of the vertical is measured twice. It is useful as a check on the point methods. In using the Price meter great care should be taken that the vertical movement of the meter is not rapid enough to vitiate the accuracy of the resulting determination of velocity.

In practical work on rough streams, such as exist in Hawaii, the meter should be held at 0.6 depth for depths of 1 foot or less. For greater depths the meter should be held at two points in the vertical, 0.2 and 0.8 from the surface.

When the mean velocities in the different verticals have been found, the average of two adjacent means is taken as the mean velocity for that individual section. The area of the section is computed by multiplying the width of the section by the mean depth.

The discharge of each section is then the product of the area multiplied by the mean velocity, and the total discharge of the stream results from summing up the discharge of the individual sections. In practice the work is tabulated in such a way as to render the computation very simple.¹

Current-meter measurements are not practicable where there are eddies, cross currents, swirls, or passages for the water underneath stones. It is usually possible, however, to improve the channel by removing boulders and rocks, so that a satisfactory measuring section may be obtained, even on rough, steep streams such as exist in Hawaii.

Three kinds of velocity-area gaging stations are in general use in Hawaii, according to the means provided for making the observations of depth and velocity. They are wading, bridge, and cable stations.

A wading station is one at which measurements are made only by wading; that is, no means exist for getting above the water at any stage except by wading. Such stations are usually on ditches or wide, shallow streams, which do not fluctuate greatly in flow. Frequently, however, measurements are made at low stages by wading, even though other means exist for making measurements at higher stages.

A bridge station is one at which the meter is used from a bridge. In some places highway or other bridges are available from which to make measurements, but generally they are not at the right place on the stream. Special bridges are then built.

A cable station is one at which measurements are made from a cable spanning the stream. Cable stations are used on large streams, such as Hanapepe, Wailua, and Hanalei rivers on the island of Kauai and Wailuku River on the island of Hawaii. The cable supports the car from which a man works above the water. Distances are marked off on the cable itself or on a small auxiliary cable stretched taut above it.

A suitable place for a gaging station having been selected, a staff gage is set in the edge of the stream, either in a vertical or inclined position, but graduated vertically into tenths, half-tenths, or hundredths of feet. The gage is securely fastened to rocks or trees to prevent displacement by floods and is so placed that the zero, or reference datum, is well below extreme low water. The datum is also referred to a permanent bench mark as an additional precaution. A water-stage recorder is then installed or an observer is engaged to read and record the height of water morning and evening, and the mean of the two readings is used as the mean gage height for the day. Owing to the rapid rise and fall of most of the streams in Hawaii, two

¹ For a discussion of methods of computing the discharge of a stream see *Engineering News*, June 25, 1908.

gage-height readings a day will not as a rule give a true mean for the 24 hours. For this reason, and also owing to the fact that many of the gaging stations are necessarily situated in the mountains at points remote from all habitations and difficult of access, it has generally been found necessary to use water-stage recorders. These instruments are of various types, some requiring weekly visits and others operating for a month without attention.

The essential features of water-stage recorders are a float free to rise and fall with fluctuations of the water surface, a device for transferring the motion of the float to the record sheet (either directly or through a reducing mechanism), the recording device, and the clock. The instruments may be designed for any range of stage. Those used by the United States Geological Survey in Hawaii are designed for ranges up to as high as 36 feet, but so far those having a 20-foot range have been found to be sufficient for any stage.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the “run-off” or “discharge”—is expressed in various terms, each of which has become associated more or less definitely with a certain class of work. These terms may be divided into two groups: (1) Those which represent a rate of flow, as “second-feet,” “gallons per minute,” “gallons per day,” “miner’s inches,” and “run-off in second-feet per square mile,” and (2) those which represent the actual quantity of water, as “run-off in depth in inches,” “million gallons,” and “acre-feet.” They may be defined as follows:

“Second-foot” is an abbreviation for cubic foot per second, and is the unit for the rate of discharge of water flowing in a stream 1 square foot in cross section at a rate of 1 foot per second. It is generally adopted as the fundamental unit in the measurement of flowing water and is the “natural” unit, as the foot and the second are the units used in making the physical determinations. Other units may be computed from this by the use of factors given in the table of equivalents.

“Gallons per minute” is generally used in connection with pumping and city water supply, the United States gallon of 231 cubic inches being the unit of quantity and 1 minute the unit of time.

The “miner’s inch” is the unit for the rate of discharge of water that passes through an orifice 1 inch square under a head which varies locally. It is commonly used by miners and irrigators throughout the West, and is defined by statutes in each State in which it is used.

“Second-feet per square mile” is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

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

An "acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

In the Territory of Hawaii the unit most commonly used in connection with the measurement of water is the "million gallons." This is used with two meanings—(1) to indicate a rate of flow and (2) to express an actual quantity of water. In the former sense "million gallons per day" is inferred, 1,000,000 gallons being taken as the unit of quantity and 24 hours as the unit of time. With this meaning the term is generally used in connection with pumping and irrigation. In the latter sense "million gallons" as an absolute quantity is used in the measurement of storage capacities of reservoirs.

The following convenient approximate relations exist between second-feet, million gallons per day, and acre-feet: 1 second-foot flowing 24 hours equals about 2 acre-feet; 1,000,000 gallons equals about 3 acre-feet; and 1 second-foot equals approximately two-thirds million gallons per day.

"Man's water" is an irrigator's term also in common use in Hawaii. It signifies the amount of water that one irrigator can properly handle in the field. It varies greatly, being dependent upon the condition of the furrows, the age of the crop, and the skill and individuality of the irrigator.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

Table for converting discharge in second-feet into run-off in acre-feet.

Discharge (second- feet).	Run-off (acre-feet).				
	1 day	28 days.	29 days.	30 days.	31 days.
1	1.983	55.54	57.52	59.50	61.49
2	3.967	111.1	115.0	119.0	123.0
3	5.950	166.6	172.6	178.5	184.5
4	7.934	222.1	230.1	238.0	246.0
5	9.917	277.7	287.6	297.5	307.4
6	11.90	333.2	345.1	357.0	368.9
7	13.88	388.8	402.6	416.5	430.4
8	15.87	444.3	460.2	476.0	491.9
9	17.85	499.8	517.7	535.5	553.4

NOTE.—For part of a month multiply run-off for one day by number of days.

- 1,000,000 United States gallons per day equals 1.55 second-feet.
- 1,000,000 United States gallons equal 3.07 acre-feet.
- 1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.
- 1 second-foot for one year (365 days) covers 1 square mile 1.131 feet or 13.572 inches deep.
- 1 second-foot for one year (365 days) equals 31,536,000 cubic feet.
- 1 second-foot for one year (365 days) equals 724 acre-feet.
- 1 second-foot equals about 1 acre-inch per hour.
- 1 second-foot for one day covers 1 square mile 0.03719 inch deep.
- 1 second-foot for one day equals 1.983 acre-feet.
- 1,000,000 cubic feet equals 22.95 acre-feet.
- 1 acre-foot equals 325,850 gallons.
- 1 inch deep on 1 square mile equals 2,323,200 cubic feet.
- 1 inch deep on 1 square mile equals 0.0737 second-foot per year.
- 1 foot equals 0.3048 meter.
- 1 mile equals 1.60935 kilometers.
- 1 mile equals 5,280 feet.
- 1 acre equals 0.4047 hectare.
- 1 acre equals 43,560 square feet.
- 1 acre equals 209 feet square, nearly.
- 1 square mile equals 2.59 square kilometers.
- 1 cubic foot equals 0.0283 cubic meter.
- 1 cubic foot equals 7.48 gallons.
- 1 cubic foot of water weighs 62.5 pounds.
- 1 cubic meter per minute equals 0.5886 second-foot.
- 1 horsepower equals 550 foot-pounds per second.
- 1 horsepower equals 76.0 kilogram-meters per second.
- 1 horsepower equals 746 watts.
- 1 horsepower equals 1 second-foot falling 8.80 feet.
- 1½ horsepower equals about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11} = \text{net horsepower on water}$
 wheel realizing 80 per cent of theoretical power.

OFFICE METHODS OF COMPUTING AND STUDYING DISCHARGE AND RUN-OFF.

At the end of each year the field or base data for current-meter gaging stations, consisting of water-stage record sheets, records of gage-readings and discharge measurements, and notes from observers' books are assembled. The measurements are plotted on cross-section paper and rating curves are drawn wherever feasible. The rating tables prepared from these curves are then applied to the tables of daily gage heights to obtain the daily discharge, and from these applications the tables of monthly discharge and run-off are computed.

Rating curves are drawn and studied with special reference to the class of channels which they represent. The discharge measurements for all classes of stations, when plotted with gage heights in feet as ordinates and discharges in million gallons per day as abscissas,

define rating curves which are generally more or less parabolic in form.

For every rating table the following assumptions are made for the period of application of the table: (a) That the discharge is a function of and increases gradually with the stage; (b) that the discharge is the same whenever the stream is at a given stage, and hence such changes in conditions of flow as may have occurred during the period of application are either compensating or negligible, except that the rating, as stated in the footnote of each table, is not applicable for periods during which the channel was obstructed; (c) that the increased and decreased discharge due to change of slope on rising and falling stages is either negligible or compensating.

As already stated, the gaging stations may be divided into several classes, as indicated in the following paragraphs:

The stations of class 1 represent the most favorable conditions for an accurate rating and are also the most economical to maintain. The bed of the stream is usually composed of rock and is not subject to the deposit of sediment and loose material. This class includes also many stations located in a pool below which is a permanent rocky riffle that controls the flow like a weir. If the control is sufficiently high and close to the gage to prevent cut and fill at the gaging point from materially affecting the slope of the water surface, the gage height will, for all practical purposes, be a true index of the discharge. Discharge measurements made at such stations usually plot within 2 or 3 per cent of the mean discharge curve, and the rating developed from that curve represents a very high degree of accuracy.

Class 2 comprises mainly stations on streams flowing through rough, mountainous country. The beds of such streams are, as a rule, comparatively permanent during low and medium stages, and when the flow is sufficiently well defined by an adequate number of discharge measurements before and after each flood the stations of this class give nearly as good results as those of class 1. As it is seldom possible to make measurements covering the time of change at flood stage, the assumption is often made that the curves before and after the flood converged to a common point at the highest gage height recorded during the flood. Hence the only uncertain period occurs during the period of actual change in conditions of flow.

Class 3 includes stations where the stream bed is of a shifting character, or the controlling section below the gage frequently changes owing to cutting out by the current and the filling in of sand, gravel, and drift. On some streams in Hawaii changes are caused by the growth of vegetation in the stream bed. No absolute rule can be laid down for stations of this class. Each rating curve must be based mainly on measurements of the current year, the engineer

being guided largely by the history of the station and the following general law: If all measurements ever made at a station of this class are plotted on cross-section paper, they will define a mean curve which may be called a standard curve. It has been found in practice that if after a change caused by high stage a relatively constant condition of flow occurs at medium and low stages, all measurements made after the change will plot on a smooth curve which is practically parallel to the standard curve with respect to ordinates or gage heights. The parallelism of rating curves is the fundamental law of all ratings and estimates at stations with semi-permanent and shifting channels. It is not absolutely true, but, with few exceptions, answers all the practical requirements of estimates made at low and medium stages after a change at a high stage. This law appears to hold equally true whether the change occurs at the measuring section or at some controlling point below. The change is, of course, fundamentally due to change in the channel caused by cut or fill, or both, at or near the measuring section. For all except small streams the changes in section usually occur at the bottom. The following simple but typical examples illustrate this law:

(a) If 0.5 foot of planking were to be nailed on the bottom of a well-rated wooden flume of rectangular section, there would result, other conditions of flow being equal, new curves of discharge, area, and velocity, each plotting 0.5 foot above the original curves when referred to the original gage. In other words, this condition would be analogous to a uniform fill or cut in a river channel which either reduces or increases discharge, area, and velocity for any gage height.

In practice, however, such ideal conditions rarely exist.

(b) If cut or fill occurs at the measuring section, there is a marked tendency toward decrease or increase, respectively, of the velocity. In other words, the velocity has a compensating effect, and if the compensation is exact at all stages the discharge at a given stage will be the same under both the new and the old conditions.

(c) If change along the crest of a weir or rocky control is uniform, the area curve will remain the same as before the change, and it can be shown that here again the change in velocity curve is such that it will produce a new discharge curve essentially parallel to the original discharge curve with respect to their ordinates.

In actual practice, of course, such simple changes of section do not occur. The changes are complicated and lack uniformity, a cut at one place being largely offset by a fill at another, and vice versa. If these changes are very radical and involve large percentages of the total area—as, for example, on small streams—a wide departure from the law of parallelism of rating curves may result. In complicated changes of section the corresponding changes in velocity

which tend to produce a new parallel discharge curve may interfere with each other materially, causing eddies, boils, backwater, and radical changes in slope. In such extreme conditions, however, the measuring section would more properly fall under class 4 and would require very frequent measurements of discharge. Special stress is laid on the fact that in the lack of other data to the contrary the utilization of this law will yield the most probable results.

Slight changes at low or medium stages of an oscillating character are usually averaged by a mean curve drawn among them parallel to the standard curve, and if the individual measurements do not vary more than 5 per cent from the rating curve the results are considered good for stations of this class.

Class 4 comprises stations on streams with soft, muddy, or sandy beds. Good results can be obtained from such sections only by frequent discharge measurements, the frequency ranging from a measurement every two or three weeks to a measurement every day, according to the rate of diurnal change in conditions of flow. These measurements are plotted and a mean or standard curve drawn among them. It is assumed that there is a different rating curve for every day of the year and that this rating is parallel to the standard curve with respect to their ordinates. On the day of a measurement the rating curve for that day passes through that measurement. For days between successive measurements it is assumed that the rate of change is uniform, and hence the ratings for the intervening days are equally spaced between the ratings passing through the two measurements. This method must be modified or abandoned altogether under special conditions. Personal judgment and a knowledge of the conditions involved can alone dictate the course to pursue in such cases.

After the computations have been completed they are entered in tables and carefully studied and intercompared to eliminate or account for all gross errors so far as possible. Missing records are filled in, so far as feasible, by means of comparison with records for adjacent streams. The attempt is made to complete years or periods of discharge, thus eliminating fragmentary and disjointed records. Full notes accompanying such estimates follow the daily and monthly discharge tables.

EXPLANATION OF TABLES.

For each regular current-meter gaging station are given in general the following data: Description of station, list of discharge measurements, table of daily discharge, and table of monthly and yearly discharge and run-off in acre-feet and million gallons.

All rates of flow are expressed as million gallons per day.

In addition to statements regarding the location and installation of current-meter stations, the descriptions give information in regard to any conditions that may affect the constancy of the relation of gage height to discharge, covering such points as shifting channels and backwater; information regarding diversions which decrease the total flow at the measuring section, the utilization of the water, the maximum and minimum stages and discharges, and the accuracy and reliability of the records.

The discharge-measurement table gives the results of the discharge measurements made during the year, including the date, name of hydrographer, gage height, and discharge in second-feet and million gallons per day.

The table of daily discharge gives the discharge in million gallons per day corresponding to the observed gage height as determined from the rating table, the number of significant figures used varying with the size of the discharge.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day on which the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage at which the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise in the column headed "Minimum" the quantity given is the mean flow for the day on which the mean gage height was lowest. The columns headed "Mean" give the average flow in million gallons per day and in cubic feet per second during the month. The "total in million gallons" and "total in acre-feet" given in the columns under these heads are computed from the mean discharge in million gallons per day.

Owing to the volcanic origin of the Hawaiian Islands, there is such wide diversity in the character and porosity of the rocks in various drainage basins, that no general relation between rainfall and run-off (of any value) can be determined. For this reason information concerning area of drainage basins has been omitted in the descriptions of the stations.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

The accuracy of stream-flow data depends (1) on permanence of the relation between discharge and stage, and (2) on the accuracy of observations of stage, measurements of discharge, and interpretation of data.

The statement of accuracy in the station description is based on the probable accuracy of the rating curve, the reliability of the gage height record, the range of the fluctuation in stage, and knowledge

of local conditions. Estimates rated as "good," "fair," "poor," or "approximate," are considered accurate within probable errors of 5, 10, 15, and 20 per cent, respectively.

It should be borne in mind that the observations in each succeeding year may be expected to throw new light on data already collected and published.

DIVISION OF WORK.

The data presented in this volume were collected and prepared for publication under the direction of G. K. Larrison, district engineer, Honolulu, by C. T. Bailey, J. C. Dort, E. O. Christiansen, W. V. Hardy, R. C. Rice, Howard Kimble, H. A. R. Austin, D. E. Horner, G. R. White, E. E. Goo, R. M. S. Goo, and John Kaheaku.

GAGING STATIONS MAINTAINED IN HAWAII.

The following list comprises the gaging stations maintained in Hawaii by the United States Geological Survey and cooperative parties. The stations are arranged by stream basins and appear in systematic order for the several islands, tributaries of main streams being indicated by indentation. The date refers to the years or parts of years for which records are available. A dash following the date indicates that the station was being maintained June 30, 1915.

KAUAI ISLAND.

Waimea River near Waimea, 1910-

Poomau River:

Kawaikoi Stream near Waimea, 1909-

Waiaikoali Stream near Waimea, 1909-1912.

Mohihi Stream near Waimea, 1909-1912.

Waiālae River near Waimea, 1910-

Kekaha ditch at Camp No. 1, near Waimea, 1910-

Kekaha ditch at flume No. 3, near Waimea, 1910-1912.

Kekaha ditch at siphon, near Waimea, 1910-1912.

Kekaha ditch at tunnel No. 12, near Waimea, 1910-1914.

Waimea ditch near Waimea, 1911-1913.

Kamenehune ditch near Waimea, 1911-

Makaweli River near Waimea, 1911-

Halekua Stream near Waimea, 1912-13.

Olokele River:

Olokele ditch at tunnel No. 12, near Makaweli, 1904-

Olokele ditch at weir near Makaweli, 1912-

Poowaiomahaihai ditch near Waimea, 1911-1913.

Hanapepe River above Hanapepe Falls, near Eleele, 1911-12.

Hanapepe River at Koula, near Eleele, 1910-

Hiloa ditch near Eleele, 1911-

East Branch Hanapepe River below Hanapepe Falls, near Eleele, 1911-12.

Hanapepe ditch at Hanapepe Falls, near Eleele, 1911-

Hanapepe ditch at Koula, near Eleele, 1910-

Hanapepe ditch at weir, near Hanapepe, 1910-

Huleia River near Lihue, 1912-

Hanamaulu River at Kapaia, near Lihue, 1911-

Wailua River:

South Fork of Wailua River at siphon, near Lihue, 1910-11.

South Fork of Wailua River near Lihue, 1911-

Hanamaulu ditch near Lihue, 1910-

Lihue ditch near Lihue, 1910-

North Fork of Wailua River near Lihue, 1910-1914.

North Fork of Wailua River at 650 feet elevation, near Lihue, 1914-

Kanaha ditch near Lihue, 1910-

East Branch of North Fork of Wailua River, near Lihue, 1912-

Uhau Iole Stream at 750 feet elevation, near Lihue, 1912.

Keahua Stream at 750 feet elevation, near Lihue, 1912.

Kawi Stream at 750 feet elevation, near Lihue, 1912.

Konohiki Stream at Makakualele weir (mauka), near Kapaa, 1911-1913.

Kaehulua Stream at Kuhinoa (mule stable) weir, near Kapaa, 1911-1913.

South Fork of Kaehulua Stream at Wainamuamu weir, near Kapaa, 1911-12.

North Fork of Kaehulua Stream at Wainamuamu weir, near Kapaa, 1911-1913.

Kapaa River near Kealia, 1910-

Akulikuli Spring near Kealia, 1911-1913.

Kapahi ditch at Kapahi, near Kealia, 1909-

Tunnel ditch at Kapahi, near Kapaa, 1909-1911.

Kapaa ditch at Kapahi, near Kapaa, 1909-1911.

Pipe ditch at Kapahi, near Kapaa, 1909-1911.

Kealia Stream:

Kaneha ditch near Kealia, 1909-1913.

Anahola River at 1,140 feet elevation, near Kealia, 1912.

Anahola River near Kealia, 1910. 1912-

Anahola River at Kiokala dam, near Kealia, 1910-1912.

Anahola ditch above Kaneha reservoir, near Kealia, 1914-

Anahola ditch at Kiokala, near Kealia, 1909-1914.

Anahola ditch at Makai weir, near Kealia, 1909-1911.

Kalihiwai River near Hanalei, 1914-

Kalihiwai River near Kilauea, 1912-1914.

Hanalei River at 625 feet elevation, near Hanalei, 1914-

Hanalei River near Hanalei, 1911-

China ditch near Hanalei, 1911-

Kuna ditch near Hanalei, 1912-1913.

Lumahai River near Hanalei, 1914-

Lumahai River near Wainiha, 1912.

Waioli Stream near Hanalei, 1914-

Wainiha River near Hanalei, 1914-

Wainiha River, East Channel, near Wainiha, 1912-

Wainiha River, West Channel, near Wainiha, 1911-

Wainiha canal at intake, near Wainiha, 1910-1912.

Wainiha canal at tunnel No. 18, near Wainiha, 1911.

Wainiha canal at tailrace, near Wainiha, 1911.

OAHU ISLAND.

Kalihi Stream near Honolulu, 1913-

Nuuanu Stream at Luakaha weir in upper Nuuanu Valley, near Honolulu, 1903, 1910-1913.

Nuuanu Stream below Reservoir No. 2 wasteway, near Honolulu, 1913-

Nuuanu Stream at Kuakini Street, near Honolulu, 1911-1912.

Lulumaha ditch at upper Nuuanu Reservoir, near Honolulu, 1911-1913.

Pauoa Stream at upper Pauoa Valley, near Honolulu, 1911-1913.

Kahuawai Spring near Honolulu, 1912-1914.

Manoa Stream at upper Manoa Valley, near Honolulu, 1910-1913.

Manoa Stream at College of Hawaii, near Honolulu, 1909-

West Branch of Manoa Stream near Honolulu, 1913-

East Branch of Manoa Stream near Honolulu, 1913-

East Manoa ditch near Honolulu, 1915-

Palolo Stream:

Pukele Stream at Mahoe springs, near Honolulu, 1912-13.

Waiomao Stream at upper Palolo Valley, near Honolulu, 1911-1913.

Waiomao Stream above Pukele, near Honolulu, 1911-12.

Waimanalo ditch below main reservoir, near Waimanalo, 1912-13.

Pump ditch near Waimanalo, 1912.

Makawao ditch near Kailua, 1912-

Kailua Stream near Kailua, 1912-

Wong Leong's ditch near Kailua, 1912-

Makawao Stream near Kailua, 1912-

Makawao Spring near Kailua, 1914.

Kaimi Stream near Kailua, 1912-

Main Spring near Kailua, 1914.

Kamakalepo Stream near Kailua, 1912-

Pohakea Stream near Kailua, 1912-14.

Kahanaiki Stream in Kailua Valley, near Kailua, 1912.

Kahanaiki Stream near Kailua, 1914-

South Branch Kahanaiki Stream near Kailua, 1913-

North Branch Kahanaiki Stream near Kailua, 1913-

Kahanaiki ditch in Kailua Valley, near Kailua, 1912-13.

Kaneohe Stream near Kaneohe, 1914-

Young Mau ditch near Kaneohe, 1914-

Ahlo ditch near Kaneohe, 1914-

Hooleinaiwa Stream near Kaneohe, 1914-

Piho Stream near Kaneohe, 1914-

Kuou Stream near Kaneohe, 1914-

Kuou ditch near Kaneohe, 1914-

Luluku Stream near Kaneohe, 1914-

North Luluku ditch near Kaneohe, 1914-

Kawa Stream near Kaneohe, 1914-

Heeia Stream:

Wing Wo Tai ditch near Heeia, 1914-

Hop Tuck ditch near Heeia, 1914-

Lee ditch near Heeia, 1914-

Haiku Stream near Heeia, 1914-

Reservoir ditch near Heeia, 1914-

Waipio ditch near Heeia, 1914-

Iolekaa Stream near Heeia, 1914-

Waiahole Stream below powerhouse near Waiahole, 1915-

Waiahole Stream near Waiahole, 1911-

Waiahole Stream at Waiahole, near Waikane, 1911-12.

Waihi Stream near Waikane, 1911.

Halona Stream near Waikane, 1911.

Waianu Stream near Waikane, 1911.

Waikane Stream near Waikane, 1911-12.

Kahana Stream near Kahana, 1914—

East Branch Kahana Stream near Kahana, 1914—

Punaluu Stream at 539 feet elevation, near Punaluu, 1915—

Punaluu Stream at 250 feet elevation, near Punaluu, 1914—

Punaluu Stream near Hauula, 1906-7.

Kaluanui Stream near Hauula, 1906—

Kaipapau Stream near Hauula, 1906-7.

Koloa Stream near Laie, 1914—

Wailele Stream near Laie, 1914—

East Branch of Kahawainui Stream near Laie, 1914—

East Branch of Malaekahana Stream near Kahuku, 1914—

Middle Branch of Malaekahana Stream near Kahuku, 1914—

Kaukonahua Stream:

North Fork of Kaukonahua Stream near Wahiawa, 1911.

Right Branch of North Fork of Kaukonahua Stream near Wahiawa, 1913—

Left Branch of North Fork of Kaukonahua Stream near Wahiawa, 1913—

South Fork of Kaukonahua Stream above U. S. Army Reservoir, near Wahiawa, 1911, 1913—

South Fork of Kaukonahua Stream below U. S. Army Reservoir, near Wahiawa, 1914—

U. S. Army ditch at Reservoir, near Wahiawa, 1914—

Wahiawa Reservoir ditch near Wahiawa, 1910-11.

MAUI ISLAND.

West Maui.

Iao Stream near Wailuku, 1910—

Maniania ditch near Wailuku, 1909-1913.

Waiehu Stream:

South Waiehu Stream near Wailuku, 1910—

South Waiehu ditch near Wailuku, 1912—

North Waiehu Stream near Wailuku, 1912—

North Waiehu ditch near Wailuku, 1910-11.

Waihee Stream near Waihee, 1910-1912, 1913—

Waihee canal near Waihee, 1910-1912.

Waihee canal at weir, near Wailuku, 1911-12.

Spreckels ditch near Waihee, 1910-1913.

Spreckels ditch at Waiale weir, near Wailuku, 1910-11.

Kahakuloa Stream at Kahakuloa, near Waihee, 1912-13.

Kahakuloa Stream near Honokahau, 1913-14.

Honokahau Stream near Honokahau, 1913—

Honokahau ditch at intake, near Honokahau, 1907-1913.

Honokahau ditch above Honolua Stream, near Honokahau, 1910-11.

Honokahau ditch at Honokawai weir, near Lahaina, 1910-1912.

Honolua Stream at Honolua ranch, 1911.

Honolua Stream near Honokahau, 1913—

Honolua ditch near Honokahau, 1911-12.

Honokawai Stream near Lahaina, 1911; 1912—

Honokawai Stream at weir No. 1, near Lahaina, 1901.

Honokawai ditch near Lahaina, 1912—

Kahoma Stream near Lahaina, 1911-12, 1913—

Kahoma Stream at weir No. 1, near Lahaina, 1901.

Kahoma Stream at weir No. 2, near Lahaina, 1901.

Kahoma development tunnel near Lahaina, 1911—

- Lahainaluna Stream near Lahaina, 1911-
 Lahainaluna weir No. 1 near Lahaina, 1901.
 Lahainaluna weir No. 2 near Lahaina, 1901.
 Lahainaluna ditch near Lahaina, 1913-14.
 Kauaula Stream near Lahaina, 1912, 1913-
 Kauaula Stream at weir No. 3, near Lahaina, 1901.
 Kauaula ditch near Lahaina, 1911-
 Kauaula Stream, North Fork, at weir No. 1, near Lahaina, 1901.
 Kauaula Stream, South Fork, at weir No. 2, near Lahaina, 1901.
 Launiupoko Stream near Lahaina, 1911-
 Olowalu Stream near Olowalu, 1913.
 Olowalu ditch near Olowalu, 1911-
 Ukumehame Stream near Olowalu, 1911-12, 1913-
 Waikapu Stream near Waikapu, 1910-
 Palolo (Everett) ditch near Waikapu, 1910-
 South Side Waikapu ditch near Waikapu, 1910-

East Maui.

Koolau ditch region:

- Hanawi Stream near Nahiku, 1914-
 West Branch of Kopiliula Stream near Keanae, 1914-
 East Wailuaiki Stream near Keanae, 1913-
 West Wailuaiki Stream near Keanae, 1914-
 East Wailuanui Stream near Keanae, 1914-
 West Wailuanui Stream near Keanae, 1913-
 Koolau ditch near Keanae, 1910-1912.
 Koolau ditch at Alo division weir, near Huelo, 1908-1911.

Spreckels ditch region:

- Honomanu Stream near Keanae, 1913-
 Haipuaena Stream near Huelo, 1910-
 Puohakamoa Stream near Huelo, 1910-
 Alo Stream near Huelo, 1910-
 Waikamoi Stream near Huelo, 1910-
 Oopuola Stream near Huelo, 1910-
 Spreckels ditch at station No. 1, near Huelo, 1910-1913.
 Spreckels ditch at station No. 2, near Huelo, 1911-1913.
 Spreckels ditch at station No. 3, near Huelo, 1910-1913.
 Spreckels ditch at station No. 4, near Huelo, 1910-1913.
 Spreckels ditch at station No. 5, near Huelo, 1911-1913.
 Spreckels ditch at station No. 6, near Huelo, 1911-1913.
 Spreckels ditch at station No. 7, near Huelo, 1911-12.
 Spreckels ditch at station No. 8, near Huelo, 1911-1913.

Center ditch region:

- Center ditch near Huelo, 1910-1912.

Hamakua ditch region:

- Naililihaele Stream near Huelo, 1910-1912; 1913-
 Kailua Stream near Huelo, 1910-1912; 1913-
 Oaui Stream near Huelo, 1910-11; 1913-
 Hoolawaliili Stream near Huelo, 1911-
 Hoolawanui Stream near Huelo, 1911-
 Honopou Stream near Huelo, 1910-
 Halehaku Stream at dam, near Huelo, 1910-11.
 Halehaku Stream weir near Huelo, 1910-1912.
 Opana Stream near Huelo, 1910-1912.

Opana ditch near Huelo, 1910-1912.

New Hamakua ditch at Naililihale weir, near Huelo, 1910-1912.

New Hamakua ditch at Halehaku weir, near Huelo, 1910-

New Hamakua ditch at station No. 1, near Huelo, 1912.

New Hamakua ditch at station No. 2, near Huelo, 1912.

New Hamakua ditch at station No. 3, near Huelo, 1912.

New Hamakua ditch at station No. 4, near Huelo, 1912.

New Hamakua ditch at station No. 5, near Huelo, 1912.

Old Hamakua ditch at Opana weir, near Huelo, 1910-

Kaluanui ditch at Puuomalei, near Hamakuapoko, 1910-1912.

Lowrie ditch at Opana weir, near Huelo, 1910-

Haiku ditch at Peahi weir, near Huelo, 1910-

HAWAII ISLAND.

Hilo group:

81 stations at 2,700 feet elevation, in forest back of Hilo, 1911-1913.

Wailuku River near Hilo, 1911-1913.

Honolii River at Kaiwiki, near Hilo, 1911-1913.

Honolii ditch at Kaiwiki, near Hilo, 1911.

Kawainui River at Kawainui, near Pepeekeo, 1911-12.

4 stations at Piuhonua, near Hilo, 1912.

Hamakua group:

Waipio River below Koiawe, near Waipio, 1911-12.

Waipio River below Waima, near Waipio, 1911-12.

Waipio River at 360 feet elevation, near Waipio, 1901-2.

New Hamakua ditch at Waima Stream, near Waipio, 1912.

New Hamakua ditch at main weir, near Kukiuhale, 1910-

Hamakua ditch at main weir, at Puualala, Waimea, 1913.

Kawainui Branch of Waipio River, near Waipio, 1911-12.

Kawainui Stream at 2,120 feet elevation, near Waipio, 1901-2.

Kawainui Stream at 1,435 feet elevation, near Waipio, 1901-2.

Kawainui Stream at 775 feet elevation, near Waipio, 1901-2.

Branch No. 3 of Kawainui Stream at 1,700 feet elevation, near Waipio, 1901-2.

Branch No. 2 of Kawainui Stream at 1,405 feet elevation, near Waipio, 1901-2.

Branch No. 1 of Kawainui Stream at 1,380 feet elevation, near Waipio, 1901-2.

Alakahi Stream at 1,200 feet elevation, near Waipio, 1901-2.

Alakahi Stream at 730 feet elevation, near Waipio, 1901-2.

Koiawe Stream at 1,120 feet elevation, near Waipio, 1901-2.

Koiawe Stream at 610 feet elevation, near Waipio, 1901-2.

Waima Stream at 790 feet elevation, near Waipio, 1901-2.

Waima Stream at 385 feet elevation, near Waipio, 1901-2.

Kohala group:

Honokane Stream:

East Branch of Honokane Stream at 1,300 feet elevation, near Honokane, 1901.

East Branch of Honokane Stream at 770 feet elevation, near Honokane, 1901.

West Branch of Honokane Stream at 1,370 feet elevation, near Honokane, 1901.

West Branch of Honokane Stream at 775 feet elevation, near Honokane, 1901.

Kohala ditch near Kohala, 1901-1913.

Kehana ditch at Honokane Mauka, near North Kohala, 1912-13.

GAGING-STATION RECORDS.

ISLAND OF KAUAI.

WAIMEA RIVER NEAR WAIMEA, KAUAI.

LOCATION.—250 feet above ford, about 2 miles north of Waimea.

RECORDS AVAILABLE.—July 9, 1910, to June 30, 1915.

GAGE.—Vertical and inclined staff installed October 5, 1911; read twice daily; July 9, 1910, to October 4, 1911, staff gage about a mile downstream.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

CHANNEL AND CONTROL.—One channel at all stages; straight for 500 feet above and below gage; banks high; bed of stream is sandy. Control composed of sand, gravel, and boulders; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 14.5 feet November 12 to 13, 1913; (discharge, computed from extension of rating curve, approximately 6,460 million gallons per day or 10,000 second-feet); channel practically dry at times.

DIVERSIONS.—Large number of diversions above station.

REGULATION.—By diversions.

UTILIZATION.—All water passing this station is wasted, as none is diverted below.

ACCURACY.—Estimates July 1 to November 13, 1913, and September 27, 1914, to June 30, 1915, based on well-defined rating curves; fair for all but very low stages, which are approximate. On account of uncertainty as to date of the change in control and stage discharge relation, the estimates November 14, 1913, to September 26, 1914, are poor.

Discharge measurements of Waimea River near Waimea, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—June 16.	J. C. Dort.....	3.93	a 0.8	0.5
Oct. 6...	D. E. Horner.....	5.99	253	164
1915—May 14.	W. V. Hardy.....	3.96	8.85	.55
June 15	do.....	4.19	8.4	5.4
19	D. E. Horner.....	7.26	844	545
19	do.....	6.34	399	258
20	W. V. Hardy.....	5.21	83	53
21	D. E. Horner.....	4.67	36	24

a Estimated.

Discharge, in million gallons per day, of Waimea River near Waimea, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	22	1.0	241	0.4	183	0.5	0.5	122	93	80	80	15
2.....	257	.9	25	.4	159	.5	.5	122	86	69	69	13
3.....	119	.7	16	.4	118	.5	.5	122	80	64	64	9.5
4.....	370	.6	13	42	4.3	.5	11	114	74	46	64	8.0
5.....	352	1.1	49	39	2.6	.5	215	114	1.5	33	54	6.5
6.....	107	1.0	2.1	37	1.8	.5	130	107	1.5	26	46	5.0
7.....	98	1.1	1.0	1.2	1.4	.5	240	1.5	1.0	26	42	4.0
8.....	13	.9	.8	2,160	1.4	.5	1,215	1.5	.5	23	36	2.2
9.....	1.4	.9	.6	207	1.4	.5	215	.5	.5	23	33	1.5
10.....	1.4	1.0	.6	179	1.2	.5	114	.5	.5	19	28	1.0
11.....	1.2	1.0	.5	171	4.3	39	107	.5	.5	15	26	.5
12.....	1.0	1.0	.5	50	6,400	215	100	.5	.5	13	23	.5
13.....	30	4.3	.5	48	6,460	130	93	.5	.5	11	21	.5
14.....	743	1.4	.6	45	5,870	122	86	.5	.5	9.5	21	.5
15.....	118	11	.6	42	5,670	114	80	93	.5	8.0	19	.5
16.....	43	1.9	.6	34	5,570	114	74	74	.5	6.5	17	.5
17.....	0	12	.6	30	215	2.2	74	69	1,240	3.0	15	.5
18.....	1.7	9.0	.6	27	168	2.2	64	64	168	2.2	13	.5
19.....	1.4	1.4	2.3	26	158	2.2	59	59	130	1.5	11	.5
20.....	52	1.0	2.1	25	158	1.5	54	54	122	1.5	9.5	.5
21.....	2.6	1.0	.8	23	158	1.5	1.5	39	100	1.0	240	.5
22.....	2.1	1.0	1.8	349	148	1.5	1.0	39	39	.5	74	.5
23.....	1.4	.9	1.4	846	28	1.0	.5	36	13	855	42	.5
24.....	.8	1.0	1.2	206	26	1.0	.5	36	11	179	36	.5
25.....	.7	2.1	1.1	179	23	1.0	.5	33	8.0	158	80	.5
26.....	1.4	1.2	1.1	167	23	1.0	.5	33	6.5	139	28	.5
27.....	1.4	1.0	414	49	21	.5	215	30	4.0	122	26	.5
28.....	1.3	1.0	107	47	19	.5	148	100	2,040	114	23	.5
29.....	1.1	122	102	44	.5	.5	139	.....	168	107	23	.5
30.....	1.2	40	19	2.3	.5	.5	130	.....	158	100	21	.5
31.....	1.1	112	.....	2.1	.....	.5	130	.....	93	.....	19	.....
1914-15.												
1.....	0.5	0.5	5.0	228	74	107	80	2.2	1.0	1.5	100	1.0
2.....	1.0	.5	3.0	191	64	17	74	2.2	1.0	1.0	59	1.0
3.....	1.0	.5	3.0	154	19	2,560	50	2.2	1.0	1.0	50	59
4.....	.5	.5	3.0	117	11	1,080	33	2.2	1.0	1.0	33	8.0
5.....	.5	168	15	80	1.5	215	23	26	1.0	1.0	28	39
6.....	.5	39	265	139	1.5	265	17	86	1.0	74	17	11
7.....	.5	13	15	64	21	139	15	59	1.0	28	9.5	5.0
8.....	.5	13	13	114	1.5	86	13	21	1.0	3.0	5.0	5.0
9.....	11	1.5	11	13	2.2	100	8.0	4.0	1.0	1.5	4.0	5.0
10.....	23	13	9.5	23	1.5	215	6.5	2.2	1.0	1.5	3.0	4.0
11.....	33	1.5	11	13	1.5	107	5.0	17	1.0	1.5	2.2	3.0
12.....	33	1.5	340	19	4.0	74	9.5	252	1.0	1.5	15	3.0
13.....	30	1.0	69	9.5	4.0	59	6.5	93	1.0	1.0	4.0	3.0
14.....	28	.5	69	4.0	13	50	5.0	202	1.0	1.0	1.0	2.2
15.....	26	1.0	64	4.0	50	33	4.0	9.5	1.0	1.0	1.0	1.5
16.....	64	1.5	64	3.0	5.0	30	3.0	114	1.0	228	1.0	202
17.....	46	1.5	.5	1.5	1.5	28	3.0	139	1.0	130	1.0	280
18.....	39	1.0	148	3.0	1.5	19	3.0	46	1.0	46	1.0	190
19.....	36	.5	15	1.5	1.0	228	3.0	21	.5	9.5	1.5	158
20.....	33	.5	5.0	1.5	4.0	325	2.2	9.5	.5	42	1.5	64
21.....	30	.5	1.5	1.5	1.5	295	2.2	130	.5	107	1.5	15
22.....	28	46	.5	1.5	1.5	139	4.0	86	1.0	168	1.5	8.0
23.....	28	168	.5	1.5	1.5	80	4.0	36	1.5	295	1.5	5.0
24.....	39	168	.5	1.5	74	69	2.2	13	1.5	442	1.5	5.0
25.....	46	33	.5	1.5	46	190	2.2	4.0	4.0	640	1.5	6.5
26.....	33	3.0	3,510	1.5	17	130	2.2	2.2	1.5	880	1.0	5.0
27.....	36	3.0	215	1.5	168	74	2.2	1.5	1.5	114	1.0	3.0
28.....	33	1.5	215	1.5	107	512	2.2	1.5	1.5	107	1.0	3.0
29.....	.5	54	355	1.5	93	265	2.2	.....	1.5	93	1.0	3.0
30.....	46	64	265	1.5	130	86	1.5	.....	1.0	74	1.0	3.0
31.....	46	46	.....	64	.....	69	1.5	.....	1.0	.....	1.0	.....

NOTE.—Discharge determined as follows: July 1 to Nov. 13, 1913, from well-defined curve based on measurements made in 1912, no measurements having been made in 1913; Nov. 14, 1913, to June 30, 1915, from curve poorly defined to Sept. 26, 1914, and well defined thereafter. Discharge for low-water periods, Nov. 29 to Dec. 10, Dec. 27, 1913, to Jan. 3, 1914, Jan. 23-26, Feb. 9-14, Mar. 8-16, Apr. 22, June 11 to July 1, July 4-8, July 29, Aug. 1-4, 14, 19-21, Sept. 17, 22-25, Oct. 1-4, 1914, and Mar. 19-21, 1915, estimated as approximately 0.5 million gallons per day (0.8 second-foot) from measurement made June 16, 1914. Either the observer's low-water readings were in error or the gage height of zero flow on the rating curve for this period should be at about 3.0 feet. No discharge July 17, 1913. Discharge tabulated for Nov. 14 to Dec. 31, 1913, supersedes that published in Water Supply Paper 373, p. 27.

Monthly discharge of Waimea River near Waimea, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	743	0.0	75.7	117	2,350	7,200
August.....	122	.6	10.9	16.9	336	1,040
September.....	414	.5	33.6	52.0	1,010	3,090
October.....	2,160	.4	164	254	5,080	15,600
November.....	6,490	.5	1,060	1,640	31,700	97,600
December.....	215	.5	24.4	37.7	757	2,320
January.....	1,180	.5	118	183	3,660	11,200
February.....	122	.5	52.4	81.1	1,470	4,500
March.....	2,040	.5	150	232	4,640	14,300
April.....	355	.5	58.5	905	1,760	53,900
May.....	240	9.5	40.4	62.5	1,250	3,840
June.....	15	.5	2.52	3.90	76	232
The year.....	6,460	0	148	229	54,100	215,000
1914-15.						
July.....	64	.5	24.9	38.5	772	2,370
August.....	168	.5	27.3	42.2	847	2,600
September.....	3,510	.5	190	294	5,690	17,500
October.....	228	1.5	40.7	63	1,260	3,870
November.....	168	1.0	30.7	47.5	922	2,880
December.....	2,560	17	247	382	7,650	23,500
January.....	80	1.5	12.6	19.5	390	1,200
February.....	252	1.5	49.4	76.4	1,380	4,240
March.....	4.0	.5	1.15	1.78	36	109
April.....	880	1.0	116	179	3,500	10,700
May.....	100	1.0	11.3	17.5	351	1,080
June.....	280	1.0	36.7	56.8	1,100	3,380
The year.....	3,510	.5	65.5	101	23,900	73,400

KAWAIKOI STREAM NEAR WAIMEA, KAUAI.

LOCATION.—Eight miles northeast of Knudsen's mountain house and about 27 miles by horse trail north of Waimea.

RECORDS AVAILABLE.—April 13, 1909, to June 30, 1915.

GAGE.—Barrett & Lawrence water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

CHANNEL AND CONTROL.—One channel at all stages; straight for 100 feet above and below station; banks high and wooded. Control composed of rock ledge and large boulders; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during biennial period, 7.7 feet at 4 p. m. September 26, 1914 (discharge, computed from extension of rating curve, approximately 650 million gallons per day, or 1,000 second-feet); minimum stage recorded, 1.55 feet October 3 to 6, 1913 (discharge, 2.6 million gallons per day, or 4.0 second-feet.)

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Irrigation of sugar cane, rice, and taro; power development and domestic supply.

ACCURACY.—Estimates July 1, 1913, to August 30, 1914, good for stages below 20 million gallons per day. All other estimates for the biennial period only fair owing to instability of control and lack of sufficient discharge measurements to define good rating curves.

Discharge measurements of Kawaiikoi Stream near Waimea, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—July 7	W. V. Hardy.....	2.68	50	33
1914—May 30	D. E. Horner.....	2.12	20	13
Sept. 3	J. C. Dort.....	2.17	17	11
Dec. 11	D. E. Horner.....	2.65	61	39
1915—Apr. 9	W. V. Hardy.....	2.46	36	23
May 14	D. E. Horner.....	2.00	12	7.9
June 11	do.....	1.91	8.3	5.4

Discharge, in million gallons per day, of Kawaikoi Stream near Waimea, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1	9.0	5.8	22	5.2	2.9	17	3.8	-----	12	50	53	16
2	9.0	5.2	16	4.5	45	13	4.5	-----	8.0	29	126	16
3	8.4	5.2	10	2.9	36	20	31	-----	7.1	17	56	10
4	13	4.5	5.2	2.6	10	52	136	-----	6.2	31	29	9.0
5	16	4.5	5.2	2.6	7.8	71	31	-----	24	87	19	24
6	15	4.5	5.2	2.6	5.8	82	26	-----	26	38	29	17
7	30	7.1	5.2	48	53	34	154	-----	16	21	31	10
8	14	13	5.2	53	17	32	143	-----	10	17	31	9.0
9	11	13	4.5	12	16	20	108	-----	21	14	38	19
10	9.0	7.8	4.5	8.4	11	14	-----	-----	10	14	31	16
11	8.4	5.8	4.5	7.8	52	12	-----	-----	8.0	12	19	9.0
12	19	12	5.8	6.5	77	11	-----	6.2	7.1	11	14	8.0
13	74	14	5.8	4.5	44	10	-----	9.0	6.2	10	12	9.0
14	41	25	9.0	4.5	14	9.7	-----	10	6.2	9.0	10	10
15	14	19	6.5	4.5	9.7	9.7	-----	12	-----	9.0	53	8.0
16	11	63	5.2	3.9	43	9.7	-----	19	-----	9.0	34	7.1
17	9.7	17	4.5	3.2	70	9.0	-----	10	-----	10	44	7.1
18	8.4	12	19	3.2	53	9.0	-----	9.0	-----	22	29	12
19	12	7.1	11	3.2	123	8.4	-----	8.0	-----	73	17	26
20	21	5.8	6.5	3.2	48	7.8	-----	7.1	-----	76	21	41
21	13	5.2	7.1	3.2	20	7.1	-----	6.2	-----	41	17	24
22	9.7	4.5	9.0	3.2	59	7.1	-----	6.2	12	53	16	50
23	8.4	4.5	5.2	4.2	98	7.1	-----	5.4	12	73	11	14
24	9.0	18	2.9	7.8	111	6.5	-----	5.4	11	62	21	10
25	10	12	3.9	12	65	6.5	-----	4.5	14	24	34	14
26	9.0	12	3.2	7.8	28	5.8	-----	4.5	11	76	16	59
27	7.8	12	2.9	7.1	20	5.2	-----	36	10	90	29	19
28	5.8	8.4	3.2	4.5	16	5.2	-----	53	84	21	26	14
29	5.8	14	3.2	3.2	18	5.8	-----	-----	26	12	16	11
30	5.8	13	2.6	2.9	23	5.8	-----	19	11	19	10	10
31	5.8	23	-----	2.9	-----	7.1	-----	16	-----	24	-----	-----
1914-15.												
1	31	10	9.0	30	25	-----	16	8.0	-----	5.9	-----	4.2
2	17	-----	8.0	27	19	-----	12	5.9	-----	4.2	-----	4.2
3	36	-----	10	37	14	-----	12	5.0	-----	3.5	-----	4.2
4	38	-----	14	51	-----	-----	11	14	-----	3.5	-----	74
5	47	26	42	70	-----	-----	9.5	27	-----	36	-----	48
6	31	16	34	57	-----	-----	9.5	11	-----	70	-----	11
7	21	14	17	48	-----	-----	9.5	45	-----	23	-----	12
8	22	17	14	76	-----	-----	8.0	16	-----	11	-----	36
9	16	34	15	34	-----	-----	8.0	8.0	-----	27	-----	14
10	19	22	9.0	25	-----	-----	8.0	34	-----	9.5	-----	8.0
11	12	12	8.0	21	-----	37	21	51	-----	5.9	-----	-----
12	9.0	11	54	18	-----	42	12	80	-----	5.0	-----	-----
13	8.0	8.0	15	16	-----	30	12	63	19	5.0	-----	-----
14	8.0	8.0	12	13	-----	23	9.5	60	9.5	5.0	8.0	-----
15	8.0	7.1	23	14	-----	21	11	42	5.9	84	8.0	-----
16	8.0	8.0	9.0	18	-----	19	8.0	66	5.0	84	8.0	-----
17	8.0	8.0	14	18	-----	18	8.0	57	5.0	29	7.0	-----
18	21	6.2	51	14	-----	14	7.0	23	4.2	25	7.0	-----
19	16	6.2	12	13	-----	112	5.9	17	4.2	42	7.0	-----
20	9.0	6.2	9.0	13	-----	84	5.9	51	4.2	34	5.9	-----
21	8.0	8.0	7.0	12	-----	66	19	-----	4.2	96	5.9	-----
22	6.2	47	6.0	12	-----	27	11	-----	8.0	66	5.9	-----
23	11	80	6.0	12	-----	21	5.9	-----	8.0	38	5.9	-----
24	11	41	118	10	-----	54	5.9	-----	19	199	5.0	-----
25	24	16	97	10	-----	39	5.0	-----	9.5	117	5.0	-----
26	12	19	222	10	-----	34	5.0	-----	5.9	159	5.0	-----
27	9.0	14	60	32	-----	66	17	-----	4.2	96	5.0	-----
28	11	29	51	21	-----	112	7.0	-----	4.2	34	4.2	-----
29	62	29	60	25	-----	34	5.9	-----	3.5	-----	4.2	-----
30	21	53	45	63	-----	23	5.0	-----	3.5	-----	4.2	-----
31	21	19	-----	51	-----	19	17	-----	17	-----	4.2	-----

NOTE.—Discharge determined from rating curves applicable as follows: July 1, 1913, to Aug. 30, 1914, well defined below 20 million gallons per day, fairly well defined between 20 and 120 million gallons per day (31 and 186 second-feet); Aug. 31 to Sept. 26, 1914, and Sept. 27 to Dec. 19, 1914, poorly defined; Dec. 20, 1914, to June 30, 1915, fairly well defined below 40 million gallons per day (62 second-feet). No gage records for days for which discharge is not given.

Monthly discharge of Kawaikoi Stream near Waimea, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	74	5.8	14.3	22.1	443	1,360
August.....	63	4.5	12.2	18.9	378	1,160
September.....	22	2.6	6.80	10.5	204	626
October.....	53	2.6	7.91	12.2	245	753
November.....	123	2.9	39.9	61.7	1,200	3,670
December.....	82	5.2	16.8	26.0	520	1,600
January 1-9.....	154	3.8	70.8	110	637	1,960
February 12-28.....	53	4.5	12.4	19.2	212	647
March 1-14, 22-31.....	84	6.2	16.0	24.8	383	1,180
April.....	90	9.0	34.1	52.8	1,020	3,140
May.....	126	10	29.8	46.1	925	2,840
June.....	59	7.1	16.9	26.1	508	1,560
1914-15.						
July.....	62	6.2	18.7	28.9	581	1,780
August 1, 5-31.....	80	6.2	20.5	31.7	575	1,760
September.....	222	6.0	35.0	54.2	1,050	3,220
October.....	76	10	28.1	43.5	871	2,670
November.....						
December 11-31.....	112	14	42.6	65.9	885	2,750
January.....	21	5.0	9.92	15.3	308	944
February 1-20.....	80	5.0	34.2	52.9	684	2,100
March 13-31.....	19	3.5	7.58	11.7	144	442
April 1-28.....	199	3.5	48.8	75.5	1,370	4,190
May 1-31.....	8.0	4.2	5.85	9.05	105	323
June 1-10.....	74	4.2	21.6	33.4	216	663

WAIALAE RIVER NEAR WAIMEA, KAUAI.

LOCATION.—Three miles northeast of F. Gay's mountain house and about 20 miles northeast of Waimea by horse trail.

RECORDS AVAILABLE.—August 1, 1910, to June 30, 1915.

GAGE.—Barrett & Lawrence water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from cable.

CHANNEL AND CONTROL.—One channel at all stages; straight for 50 feet above and below station; right bank slopes gently; left bank steep and high. Control composed of boulders; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 4.6 feet at 11.30 p. m. September 26, 1914 (discharge, computed from extension of rating curve, approximately 300 million gallons per day, or 464 second-feet); minimum stage recorded, 0.75 foot March and April, 1915 (discharge 1.4 million gallons per day, or 2.2 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Irrigation of sugar cane, rice and taro, and domestic supply.

ACCURACY.—Estimates July 1 to November 13, 1913, fair. Estimates November 14, 1913, to September 26, 1914, poor on account of lack of sufficient discharge measurements to properly define a rating curve. Rating curve for September 27, 1914, to June 30, 1915, well defined below 40 million gallons per day; estimates below that limit are good; estimates above 40 million gallons per day, fair.

Discharge measurements of Waialae River near Waimea, Kauai, during the years ending June 30, 1914 and 1915.

[Made by D. E. Horner.]

Date.	Gage height (feet).	Discharge.		Date.	Gage height (feet).	Discharge.	
		Second-feet.	Million gallons per day.			Second-feet.	Million gallons per day.
1914—June 4.....	1.01	10	6.5	1915—Apr. 5.....	0.82	3.0	1.9
Oct. 8.....	1.54	38	24	May 20.....	.93	3.8	2.5
				June 15.....	1.09	8.9	6.0

Discharge, in million gallons per day, of Waialae River near Waimea, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	16	4.5	19	3.6	4.9	23	14	12	8	10	10	12
2.....	32	4.1	26	3.4	5.2	18	14	10	6	6	26	11
3.....	28	3.9	20	2.8	19	18	10	10	4	2	18	11
4.....	25	3.9	8.4	2.8	7.1	20	10	10	4	2	10	10
5.....	32	3.6	7.1	2.8	6.4	28	40	12	4	2	10	28
6.....	20	3.7	7.1	2.8	6.4	44	20	12	5	5	8	31
7.....	16	4.1	7.1	3.7	9.0	20	16	14	5	2	6	12
8.....	16	4.5	6.5	68	10	18	72	14	4	2	8	31
9.....	11	4.7	4.7	17	26	14	87	12	4	2	40	16
10.....	7.1	4.7	4.7	7.1	17	14	28	10	4	2	14	18
11.....	5.9	4.7	3.9	6.5	70	14	14	12	4	2	8	8
12.....	5.2	4.7	3.7	5.9	79	14	10	12	3	2	6	6
13.....	5.2	6.5	3.7	37	81	14	28	10	3	2	6	6
14.....	9.0	9.7	3.7	23	28	12	16	10	3	2	6	6
15.....	8.4	11	3.7	17	26	10	18	8	2	2	6	6
16.....	6.4	16	3.7	13	28	10	23	12	34	2	6	6
17.....	5.4	11	3.7	9.7	28	10	23	6	18	2	6	6
18.....	5.2	10	3.7	9.0	23	12	14	6	6	4	6	6
19.....	5.4	6.5	3.7	17	61	12	34	5	4	2	6	18
20.....	5.4	5.2	3.7	12	58	12	18	4	4	3	10	16
21.....	5.9	4.4	3.7	10	23	12	12	5	4	5	10	16
22.....	4.9	4.7	3.6	11	28	12	10	5	4	3	26	40
23.....	4.7	4.7	3.6	20	54	10	10	5	4	37	8	26
24.....	4.7	4.3	3.4	15	54	10	8	5	4	10	6	18
25.....	4.7	4.5	3.2	19	54	12	8	5	4	12	26	18
26.....	4.7	4.3	2.8	14	40	12	8	6	3	4	16	14
27.....	4.7	4.1	2.6	18	18	12	34	5	2	16	15	28
28.....	4.7	11	3.9	9.0	23	12	23	8	28	16	15	12
29.....	4.7	44	3.6	8.4	47	12	14	-----	10	4	14	10
30.....	4.7	12	3.6	7.1	61	12	12	-----	4	3	14	10
31.....	4.5	21	-----	5.2	-----	14	10	-----	2	-----	13	-----
1914-15.												
1.....	10	6	10	46	-----	20	4.7	2.4	2.4	1.4	15	2.4
2.....	10	6	6	24	-----	3.5	4.7	2.4	2.4	1.4	3.5	2.4
3.....	10	5	14	24	-----	-----	4.6	2.4	2.4	1.4	3.0	3.5
4.....	10	5	6	36	-----	-----	4.5	2.4	2.0	1.4	2.4	4.5
5.....	10	50	10	22	-----	-----	4.5	2.4	2.0	1.6	2.4	3.5
6.....	8	31	58	17	-----	-----	4.5	2.4	2.0	1.6	2.4	4.5
7.....	8	14	23	22	-----	10	5.5	2.4	1.6	1.4	2.5	4.5
8.....	10	14	18	24	-----	7.0	5.5	2.4	1.6	1.4	2.5	4.5
9.....	6	10	18	22	-----	7.0	5.5	2.4	1.6	1.6	2.6	3.5
10.....	16	6	18	15	3.0	27	5.5	2.4	1.6	1.4	2.6	3.5
11.....	10	6	26	10	3.0	15	4.5	2.4	1.6	1.4	2.6	3.5
12.....	6	8	79	10	3.0	10	4.5	20	1.6	1.4	2.7	3.5
13.....	5	6	40	10	2.4	8.4	4.5	12	1.6	1.4	2.7	3.5
14.....	5	5	31	10	5.5	7.0	4.5	20	1.6	1.4	2.7	3.5
15.....	6	5	54	10	4.5	7.0	3.5	7.0	1.6	2.4	2.8	5.5
16.....	14	5	20	8.4	2.4	7.0	3.5	3.5	1.6	7.0	2.8	39
17.....	5	5	16	8.4	2.4	5.5	3.5	4.5	1.6	2.4	2.9	39
18.....	5	5	26	8.4	2.4	5.5	3.5	3.5	1.4	2.4	2.9	46
19.....	4	5	20	8.4	2.4	5.4	3.5	2.4	1.4	3.0	3.0	50
20.....	4	5	16	8.4	2.4	5.4	3.0	3.0	1.4	3.0	3.0	17
21.....	4	5	16	8.4	2.4	5.3	3.0	15	1.4	3.0	3.0	7.0
22.....	4	16	16	8.4	2.4	5.3	3.0	12	1.4	8.4	3.5	5.5
23.....	4	44	16	8.4	2.4	5.2	3.0	7.0	1.4	10	3.0	3.5
24.....	4	26	72	8.4	8.4	5.2	3.0	4.5	1.4	24	3.0	3.5
25.....	28	6	124	8.4	4.5	5.1	2.4	3.5	1.4	39	3.0	3.0
26.....	18	18	151	8.4	3.5	5.0	2.4	3.0	1.4	71	3.0	3.0
27.....	6	6	87	8.4	30	5.0	2.4	2.4	1.4	53	3.5	2.4
28.....	5	6	30	8.4	22	4.9	2.4	2.4	1.4	7.0	3.5	2.4
29.....	10	14	36	8.4	12	4.9	2.4	-----	1.4	22	3.5	2.4
30.....	28	26	46	8.4	27	4.9	2.4	-----	1.4	5.5	2.4	2.4
31.....	12	44	-----	-----	-----	4.8	2.4	-----	1.4	-----	2.4	-----

NOTE.—Discharge determined from rating curves applicable as follows: July 1 to Nov. 13, 1913, fairly well defined below 40 million gallons per day (62 second-feet); Nov. 14, 1913, to Sept. 26, 1914, poorly defined; Sept. 27, 1914, to June 30, 1915, well defined below 40 million gallons per day (62 second-feet). Discharge interpolated May 27 to June 3, Dec. 19, 1911, to Jan. 3, 1915, and May 6 to 19, 1915.

Discharge tabulated Nov. 14 to Dec. 31, 1913, supersedes that published in Water-Supply Paper 373, p. 30.

Monthly discharge of Waialae River near Waimea, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	32	4.5	10.2	15.8	318	970
August.....	44	3.6	7.93	12.3	246	754
September.....	26	2.6	6.06	9.38	182	558
October.....	68	2.8	12.9	20.0	401	1,230
November.....	81	4.9	33.2	51.4	995	3,060
December.....	44	10	15.1	23.4	467	1,440
January.....	87	8	21.2	32.8	658	2,020
February.....	14	4	8.75	13.5	245	752
March.....	34	2	6.39	9.89	198	608
April.....	37	2	5.60	8.66	168	516
May.....	40	6	12.2	18.9	379	1,160
June.....	40	6	15.2	23.5	456	1,400
The year.....	87	2	12.9	20.0	4,710	14,500
1914-15.						
July.....	28	4	9.19	14.2	285	874
August.....	50	5	13.3	20.6	413	1,270
September.....	151	6	36.8	56.9	1,100	3,390
October.....	46	8.4	14.3	22.1	428	1,320
November 10-30.....	30	2.4	7.05	10.9	148	454
December 1-2, 7-31.....	27	3.5	7.64	11.8	206	633
January.....	5.5	2.4	3.77	5.83	117	359
February.....	20	2.4	5.43	8.40	152	467
March.....	2.4	1.4	1.63	2.52	50	155
April.....	71	1.4	9.44	14.6	283	869
May.....	15	2.4	3.25	5.03	101	309
June.....	50	2.4	9.41	14.6	282	866

KEKAHA DITCH AT CAMP NO. 1, NEAR WAIMEA, KAUAI.

LOCATION.—700 feet below intake, about 8 miles north of Waimea.

RECORDS AVAILABLE.—November 8, 1907, to June 30, 1915.

GAGE.—Vertical staff; read once daily.

DISCHARGE MEASUREMENTS.—Made by an 8-foot sharp-crested weir. Computations made by weir formula have been checked by current-meter measurements.

CHANNEL AND CONTROL.—Ditch is cut in clay and gravel; channel straight for 20 feet above weir. Pool at weir is narrow and there is some velocity of approach.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 29½ inches April, 1910 (discharge, 66 million gallons per day, or 102 second-feet); ditch occasionally dry.

DIVERSIONS.—Diverts part of flow of Waimea River.

REGULATION.—By head gates.

UTILIZATION.—Irrigation of sugar cane.

ACCURACY.—There is some velocity of approach at weir, but results of measurements by current meter agree very closely with those obtained by weir formula. Estimates for low and medium stages good, but as gage was read only once daily estimates for high stages may be in error owing to fluctuation of stage.

COOPERATION.—Gage-height record copied from records of Kekaha Sugar Co.

Discharge, in million gallons per day, of Kekaha ditch at camp No. 1, near Waimea, Kauai, for the years ending June 30, 1908, 1909, 1910, 1913, 1914, and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1907-8.								
1.....			13	48			27	28
2.....		43	37		37		27	28
3.....		43	37	43	37		5	28
4.....		43	37	43	37		22	28
5.....		43		43	37		22	28
6.....		43	37	43	37		22	28
7.....		43	37	43	13	6	22	28
8.....	37		40	43		6	22	28
9.....	37	40			37	6	22	28
10.....		37	40	13	37	6	5	28
11.....	48	37	40	37	13	6	22	28
12.....	48	37		37		5	22	28
13.....	43	37	40	13		24	22	28
14.....	37	37	40	13		37	24	27
15.....	37	37	43	13		30	24	27
16.....	48	37	43			30	24	27
17.....		37	43	13		30	5	27
18.....	43	37	37	13		30	26	27
19.....		37		13		30	26	27
20.....	55	37	37	13		30	28	43
21.....	55	13	37	13		30	28	37
22.....	55		43	13		30	28	32
23.....	55	37	43			32	28	37
24.....	55	37	37	37		32	5	43
25.....	55		37	37		27	28	43
26.....	55	37		37		5	28	37
27.....	55	37	34	37		27	28	37
28.....	55	13	34			27	28	34
29.....	43		34			27	28	32
30.....	43	37	33			27	28	32
31.....		37	33				32	

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908-9.												
1.....	32	40	32	27	24	34		43	37	27		30
2.....	32	43	32	27	24	30	24	37	37	32		30
3.....	32	43	42	27	24	27	43	37	37	32		28
4.....	30	43	32	27	24	26	33	37	37	17		28
5.....	37	43	30		24	26	31	37	37	32	27	31
6.....	37	43	28		24	24	28	37	37	32	46	30
7.....	32	43	28	43	23	36	27	13	37	34	46	30
8.....	32	43	27	32	24	32	26	34	37	37	46	35
9.....	30	32	24	32	23	28	46	34	37	37	46	31
10.....	30	34	24	43	24	52	43	32	32	37	46	30
11.....	27	32	24	43	49	44	6	31	32	37	42	43
12.....	27	30	24	43	43	52	17	30	13	37	37	40
13.....	26	43	24	49	27	40	17	13	13	37	37	40
14.....	26	43	24	42	24	30	9	24		37	37	40
15.....	26	43	33	32	23	27	37	37		37	37	36
16.....	26		49	30	23	24	32	32		37	37	36
17.....	26		49	30	23	24	6	32		34	40	38
18.....	26		40	28	26	31	6	27		36	36	37
19.....	26		32	27	23	38	15	27		36	36	44
20.....	43		32	30	23	52	27	27		34	37	49
21.....	37	20	32	40	22	52	32	27		34	37	52
22.....	32	27	32	34	21	52	32	27	13	32	36	52
23.....	40	24	32	32	21	40	32	32	13	32	36	55
24.....	30	27	32	27	21	43	36	32	13	32	32	49
25.....	32	24	40	32	23	52	37	32	27	32	32	55
26.....	32	43	36	38	23	52	37	37	27	32	31	43
27.....	30	24	30	52	22	52	37	37	27	34	32	36
28.....	32		30	52	36	52	37	37	27	34	31	44
29.....	32		27	52	55	52	43		27	46	38	49
30.....	30	32	27	37	52	52	43		27	49	32	43
31.....	31	27		31		49	43		27		31	

Discharge, in million gallons per day, of Kekaha ditch at camp No. 1, near Waimea, Kauai, for the years ending June 30, 1908, 1909, 1910, 1913, 1914, and 1915—Con.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1909-10.												
1.....	55	54	38	55	50	21	17	40	39	65	47	61
2.....	55	49	37	38	50	25	17	40	39	65	46	61
3.....	43	40	33	32	50	37	32	40	39	66	52	61
4.....	37	37	32	46	48	43	32	40	37	66	47	61
5.....		34	46	28	40	44	32	40		66	59	53
6.....	43	32	34	27	34	49	32	40		66	61	48
7.....	55	32	31	28	30	46	32	40		66	65	40
8.....	55	31	33	29	28	34	32	40		66	65	40
9.....	55	35	47	27	27	31	32	40		66	65	61
10.....	55	32	50	24	26	40	32	40		55	65	61
11.....	55	31	54	23	26	46	32	40		48	61	61
12.....	52	32	32	22	42	31	32	40	37	43	61	61
13.....	49	34	30		46	30	32	40	36	37		61
14.....	49		36	24	40		32	40	36	37		61
15.....		55	31	42	34	26	32	40	34	36		61
16.....		40	58	51	32	23	32	40	33	34		61
17.....	32	44	56	32	27	22	32	40	33	34		61
18.....	52	50	49	27	27	22	32	40	33	66	37	61
19.....	55	46	32	24	24	49	32	40	34	63	48	61
20.....	56	55	36	24	24	49	32	40	39	61	48	61
21.....	55	52	33	60	24	49	32	40	47	66	48	61
22.....	52	55	31	45	23	49	32	40	58	66	48	61
23.....	43	58	28	34	23	49	32	40	65	66	46	61
24.....	42	60	40	58	22	50	32	40	65	66	43	52
25.....	44	55	32	60	22	17	32	40	65	66	37	58
26.....	54	46	27	60	22	24	32	40	58	65	36	61
27.....	55	37	27	58	22	32	32	40	61	66	36	61
28.....	55	34	50	58	22	32	32	29	65	66	33	52
29.....	55	37	56		22	24	32		65	63	40	58
30.....	55	37	60	43	21	24	40		65	53	61	58
31.....	55	41		42		21	40		63		61	
1912-13.												
1.....	24	30	58	29	60	60	32	42	36	60	54	44
2.....	24	24	58	24	37	60	58	32	33	60	43	52
3.....	23	23	58	23	28	55	58	29	31	60	57	58
4.....	23	22	53	30	24	55	52	27	31	58	46	58
5.....	23	22	37	23	26	58	40	27	30	48	38	58
6.....	23	40	34	21	37	58	36	28	30	38	36	50
7.....	26	26	58	19	26	58	37	48	30	34	48	49
8.....	34	24	52	19	24	58	47	60	30	33	45	43
9.....	26	48	40	24	58	58	57	47	40	44	47	48
10.....	58	48	34	29	60	52	60	50	31	60	38	58
11.....	58	30	32	29	43	52	60	60	28	60	48	58
12.....	58	48	32	24	34	43	60	52	26	60	55	58
13.....	37	34	32	24	29	40	60	41	24	60	60	58
14.....	58	46	29	22	26	34	60	36	24	60	60	58
15.....	58	58	25	19	24	34	57	31	24	60	60	54
16.....	46	53	24	19	53	37	60	31	24	60	60	43
17.....	34	32	23	19	36	38	48	30	24	59	57	37
18.....	41	26	22	58	29	34	40	43	27	60	60	34
19.....	30	24	26	58	61	34	34	58	28	60	60	34
20.....	28	22	23	58	52	60	42	52	37	60	49	35
21.....	24	22	22	58	58	55	40	56	40	56	42	32
22.....	24	37	22	58	58	60	36	48	52	50	38	32
23.....	23	55	22	58	60	60	36	34	54	46	36	31
24.....	23	58	21	46	65	60	42	58	58	50	34	30
25.....	34	43	21	32	47	60	34	58	60	53	33	30
26.....	26	34	21	58	37	60	32	58	60	57	33	50
27.....	39	58	19	58	32	60	40	54	60	46	34	58
28.....	26	58	19	46	29	48	36	44	60	41	33	58
29.....	23	40	19	58	30	40	29		60	57	32	50
30.....	23	58	19	34	65	37	27		49	60	32	37
31.....	48	58		61		34	59		53		31	

Discharge, in million gallons per day, of Kekaha ditch at camp No. 1, near Waimea, Kauai, for the years ending June 30, 1908, 1909, 1910, 1913, 1914, and 1915—Con.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	58	28	57	22	27	24	30	24	58	49	55	55
2.....	56	27	60	22	40	24	30	24	54	46	55	55
3.....	58	27	60	23	58	24	40	36	39	46	55	55
4.....	58	24	40	22	54	24	52	50	36	46	55	55
5.....	58	22	31	22	44	28	52	52	36	46	55	55
6.....	58	22	27	23	37	32	52	50	58	46	55	55
7.....	58	23	28	38	48	34	52	48	58	49	55	56
8.....	54	38	28	56	54	37	52	44	52	52	55	58
9.....	44	43	26	58	54	37	52	43	50	54	31	58
10.....	37	40	26	49	58	40	52	41	54	55	40	58
11.....	34	31	23	50	58	42	52	40	40	54	43	57
12.....	30	27	23	40	58	44	52	38	34	50	43	50
13.....	58	55	22	45	58	46	52	43	34	49	49	46
14.....	58	52	26	58	54	43	52	49	36	48	49	48
15.....	56	58	24	34	58	42	52	48	39	46	50	46
16.....	48	56	23	28	58	40	52	52	43	44	54	44
17.....	42	58	22	27	58	38	52	52	37	49	55	38
18.....	37	55	33	29	58	37	52	52	37	55	55	38
19.....	34	38	32	33	58	36	37	48	37	55	55	54
20.....	52	32	23	27	58	34	24	42	37	55	55	58
21.....	54	28	24	26	58	33	24	37	37	55	55	58
22.....	37	28	34	48	58	32	52	36	37	55	55	58
23.....	38	26	27	50	58	35	52	24	37	55	55	58
24.....	32	24	22	37	58	33	52	24	42	55	55	58
25.....	35	58	22	37	58	32	52	24	43	55	55	58
26.....	36	38	22	37	58	32	52	28	43	55	55	58
27.....	36	33	22	37	58	32	37	33	43	55	55	58
28.....	32	44	22	35	58	31	24	58	18	55	55	58
29.....	30	59	26	32	58	30	24	-----	13	55	55	55
30.....	34	60	23	28	-----	30	24	-----	18	55	55	45
31.....	30	57	-----	24	-----	30	24	-----	37	-----	55	-----
1914-15.												
1.....	48	57	58	13	58	58	24	44	40	42	58	28
2.....	58	46	48	18	58	58	24	38	38	30	58	27
3.....	58	46	58	24	56	33	37	36	34	28	58	27
4.....	58	57	50	24	46	-----	37	36	33	26	58	42
5.....	58	60	52	24	40	-----	48	37	34	40	58	58
6.....	58	60	59	24	48	13	58	49	35	58	58	56
7.....	56	59	60	24	58	13	57	58	35	58	56	46
8.....	55	60	55	24	44	13	55	58	34	43	51	58
9.....	55	60	54	24	36	13	55	50	34	50	45	56
10.....	56	60	48	31	34	24	54	50	35	43	46	40
11.....	56	60	58	44	32	37	55	50	34	33	52	32
12.....	49	57	56	50	32	37	58	48	33	30	56	30
13.....	41	48	59	46	50	37	56	55	38	30	49	30
14.....	36	37	59	47	58	37	55	58	42	28	46	31
15.....	36	34	59	43	58	37	55	58	36	50	41	52
16.....	46	33	58	41	54	37	55	58	32	58	37	58
17.....	48	33	48	46	38	37	52	58	31	58	37	58
18.....	48	31	59	48	36	37	49	58	29	58	37	58
19.....	55	30	59	42	34	37	48	58	28	58	34	58
20.....	48	30	53	43	34	37	46	58	28	58	34	58
21.....	36	29	46	44	33	37	54	58	28	58	33	58
22.....	33	42	49	38	31	37	58	58	36	58	32	48
23.....	32	59	51	36	29	37	50	58	42	58	32	43
24.....	49	59	51	34	42	34	44	58	47	58	32	54
25.....	58	58	37	34	58	32	40	51	54	58	31	54
26.....	58	59	-----	33	58	37	37	44	36	58	30	40
27.....	54	59	-----	31	58	37	52	42	33	58	30	40
28.....	46	54	-----	54	58	37	48	41	30	58	30	37
29.....	50	59	-----	38	58	37	38	-----	28	58	29	37
30.....	60	59	-----	47	58	37	37	-----	27	58	28	36
31.....	60	59	-----	58	-----	31	58	-----	27	-----	30	-----

NOTE.—Discharge computed by Francis's formula: $Q=3.33LH^{\frac{3}{2}}$ where $L=8$ feet; current meter measurements made during 1910 to 1913 show a close agreement with this formula. Discharge for period July 1, 1910, to Dec. 31, 1911, was published in Water-Supply Paper 318, p. 61; that for Jan. 1 to June 30, 1912, was published in Water-Supply Paper 336, p. 41. No water in ditch Aug. 16-20, 28, 29, Oct. 5, 6, 1908; Mar. 5 to 11, May 13 to 17, 1910; Nov. 30, 1913; Sept. 28-30; Dec. 4 and 5, 1914. No record for periods for which discharge is not given, except as noted above.

Monthly discharge of Kekaha ditch at camp No. 1, near Waimea, Kauai, for the years ending June 30, 1908, 1909, 1910, 1913, 1914, and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1907-8.						
November 8-9, 11-16, 18, 20-30.....	55	37	48.0	74.3	959	2,950
December 2-7, 9-21, 23-24, 26-28, 30-31.....	43	13	36.7	56.8	953	2,930
January 1-4, 6-11, 13-18, 20-25, 27-31.....	43	13	37.3	57.7	1,010	3,090
February 1, 3-8, 10-15, 17-22, 24-27.....	48	13	28.6	44.3	658	2,020
March 2-7, 9-11.....	37	13	31.7	49.0	285	876
April 7-30.....	37	5	22.5	34.8	540	1,660
May.....	32	5	22.8	35.3	708	2,170
June.....	43	27	31.1	48.1	933	2,860
The period (190 days).....	55	5	31.8	49.2	6,040	18,600
1908-9.						
July.....	43	26	31.0	48.0	961	2,950
August 1-15, 21-27, 30-31.....	43	20	35.2	54.5	846	2,590
September.....	49	24	31.6	48.9	948	2,910
October 1-4, 7-31.....	52	27	35.8	55.4	1,040	3,190
November.....	55	21	27.3	42.2	818	2,510
December.....	52	24	39.5	61.1	1,220	3,760
January.....	46	6	29.4	45.5	882	2,710
February.....	43	13	31.5	48.7	882	2,710
March 1-13, 22-31.....	37	13	28.3	43.8	651	2,000
April.....	49	17	34.5	53.4	1,040	3,180
May 5-31.....	46	27	37.1	57.4	1,000	3,070
June.....	55	28	39.5	61.1	1,180	3,640
The period (343 days).....	55	6	33.4	51.7	11,500	35,200
1909-10.						
July 1-4, 6-14, 17-31.....	56	32	50.6	78.3	1,420	4,350
August 1-13, 15-31.....	60	31	42.5	65.8	1,280	3,910
September 1-30.....	60	27	39.3	60.8	1,180	3,620
October 1-12, 14-28, 30-31.....	60	22	38.7	59.9	1,120	3,440
November.....	50	21	30.9	47.8	928	2,840
December 1-13, 15-31.....	50	17	34.6	53.5	1,040	3,190
January.....	40	17	31.5	48.7	978	3,000
February.....	40	39	40.0	61.9	1,120	3,440
March 1-4, 12-31.....	65	33	47.8	74.0	1,150	3,520
April.....	66	34	58.3	90.2	1,750	5,370
May 1-12, 18-31.....	65	33	50.6	78.3	1,320	4,040
June.....	61	40	58.0	89.7	1,740	5,340
The period (346 days).....	66	17	43.4	67.1	15,000	46,100
1912-13.						
July.....	58	23	33.7	52.1	1,040	3,210
August.....	58	22	38.7	59.9	1,200	3,680
September.....	58	19	31.8	49.2	965	2,930
October.....	61	19	36.7	56.8	1,140	3,490
November.....	65	24	41.6	64.4	1,250	3,830
December.....	60	34	50.1	77.5	1,550	4,770
January.....	60	27	45.5	70.4	1,410	4,330
February.....	60	27	44.1	68.2	1,230	3,790
March.....	60	24	38.5	59.6	1,190	3,660
April.....	60	33	53.7	83.1	1,610	4,940
May.....	60	31	45.1	69.8	1,400	4,290
June.....	58	30	46.5	71.9	1,400	4,280
The year.....	65	19	42.1	65.1	15,400	47,200
1913-14.						
July.....	58	30	44.6	69.0	1,380	4,240
August.....	60	22	39.1	60.5	1,210	3,720
September.....	60	22	29.3	45.3	878	2,700
October.....	58	22	35.4	54.8	1,100	3,370
November 1-29.....	58	27	54.2	80.9	1,570	4,280
December.....	46	24	34.1	52.8	1,060	3,240
January.....	52	24	43.8	67.8	1,360	4,170
February.....	58	24	40.7	63.0	1,140	3,500
March.....	58	13	39.9	61.7	1,240	3,800
April.....	55	44	51.5	79.7	1,540	4,740
May.....	55	31	52.4	81.1	1,620	4,990
June.....	58	38	53.4	82.6	1,600	4,920
The period (364 days).....	60	13	43.1	66.7	15,700	48,200

Monthly discharge of Kekaha Stream at camp No. 1, near Waimea, Kauai, for the years ending June 30, 1908, 1909, 1910, 1913, 1914, and 1915—Continued.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-feet (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914-15.						
July.....	60	32	50.3	77.8	1,560	4,790
August.....	60	29	50.1	77.5	1,550	4,770
September 1-25.....	60	37	53.8	83.2	1,340	4,130
October.....	58	13	36.4	56.3	1,130	3,460
November.....	58	29	46.2	71.5	1,390	4,250
December 1-3, 6-31.....	58	13	34.1	52.8	988	3,080
January.....	58	24	48.2	74.6	1,490	4,590
February.....	58	36	50.9	78.8	1,420	4,370
March.....	54	27	34.5	53.4	1,070	3,280
April.....	58	26	48.6	75.2	1,460	4,470
May.....	58	28	42.1	65.1	1,310	4,010
June.....	58	27	45.0	69.6	1,350	4,140
The period (358 days).....	60	13	44.9	69.5	16,100	49,300

KEKAHA DITCH AT TUNNEL NO. 12, NEAR WAIMEA, KAUAI.

LOCATION.—A quarter of a mile below mouth of tunnel No. 12 and 2 miles north of Waimea.

RECORDS AVAILABLE.—April 7, 1908, to November 30, 1914.

GAGE.—Vertical staff, read once daily.

DISCHARGE MEASUREMENTS.—There is a 6-foot sharp-crested weir at this station, but current meter has been used to determine discharge as conditions at the weir are not very good.

CHANNEL AND CONTROL.—Pool at weir.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 34 inches August 17, 1909 (discharge, 56 million gallons per day, or 87 second-feet); ditch occasionally dry.

DIVERSIONS.—Diverts part of flow from Waimea River.

REGULATIONS.—By head gates.

UTILIZATION.—Irrigation of sugar cane.

ACCURACY.—Rating curve well defined; estimates for low and medium stages are good; estimates for higher stages are probably somewhat in error owing to fluctuation in stage not shown by the gage readings.

COOPERATION.—Gage-height records copied from records of Kekaha Sugar Co.

Discharge, in million gallons per day, of Kekaha ditch at tunnel No. 12, near Waimea, Kauai, for the years ending June 30, 1908, 1909, 1910, 1913, 1914, and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Apr.	May.	June.	Date.	Apr.	May.	June.	Date.	Apr.	May.	June.
1908.				1908.				1908.			
1.....		26	30	11.....	7	21	26	21.....	17	28	30
2.....		26	30	12.....		21	26	22.....	24	28	30
3.....		8	30	13.....	17	22	24	23.....	30	28	30
4.....		21	28	14.....	22	21	24	24.....	30	8	36
5.....		20	28	15.....	22	24	24	25.....	26	26	36
6.....		20	28	16.....	30	24	24	26.....	8	26	34
7.....	7	21	30	17.....	22	8	24	27.....	26	26	34
8.....	7	20	30	18.....	22	24	26	28.....	26	28	32
9.....	7	20	28	19.....	22	24	26	29.....	23	26	28
10.....	7		26	20.....	22	26	36	30.....	26	28	26
								31.....		30	

Discharge, in million gallons per day, of Kekaha ditch at tunnel No. 12, near Waimea, Kauai, for the years ending June 30, 1908, 1909, 1910, 1913, 1914, and 1915—Con.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908-9.												
1.....	26	26	26	16	22	26	.....	40	34	38	.....	24
2.....	25	32	31	15	22	24	14	34	36	30	.....	24
3.....	23	34	28	10	22	22	28	32	36	32	.....	24
4.....	23	36	28	11	20	22	26	32	36	14	.....	23
5.....	30	34	21	.....	20	21	23	32	36	32	.....	26
6.....	28	37	23	.....	20	19	22	32	36	34	36	23
7.....	26	36	23	.....	20	25	22	.....	34	42	36	23
8.....	24	36	22	28	20	21	22	30	32	38	38	26
9.....	23	30	22	28	20	23	24	28	36	40	38	23
10.....	23	30	22	24	20	38	34	28	32	40	36	23
11.....	22	28	20	34	38	38	.....	26	32	40	38	32
12.....	22	23	20	34	30	40	12	26	18	40	32	30
13.....	22	28	20	36	23	32	18	23	.....	36	32	32
14.....	22	26	20	30	22	26	7	30	.....	36	34	28
15.....	22	24	26	26	21	23	36	32	.....	34	32	26
16.....	22	.....	34	23	20	22	30	30	.....	34	32	28
17.....	22	.....	38	23	20	21	.....	28	.....	34	32	30
18.....	21	.....	30	23	21	20	9	24	.....	34	32	32
19.....	22	.....	18	22	20	28	24	23	.....	36	30	30
20.....	30	.....	24	32	21	38	23	23	.....	34	32	38
21.....	34	.....	26	23	19	44	26	23	.....	38	32	40
22.....	26	24	20	26	18	40	26	23	15	36	30	40
23.....	28	24	24	26	18	32	26	26	17	34	26	42
24.....	24	24	24	22	18	26	28	28	17	34	26	34
25.....	24	30	32	26	18	18	30	26	17	32	24	40
26.....	24	32	28	34	18	42	32	32	23	34	24	36
27.....	24	23	23	42	18	38	32	35	23	32	24	26
28.....	18	.....	22	42	20	44	34	34	23	34	24	24
29.....	23	.....	19	40	42	40	38	.....	26	34	26	36
30.....	22	26	19	30	40	40	36	.....	26	34	30	34
31.....	22	24	.....	24	.....	36	40	.....	26	.....	24	.....
1909-10.												
1.....	40	38	24	38	34	16	10	27	26	45	30	45
2.....	40	38	30	30	34	17	10	30	25	44	30	45
3.....	34	40	23	30	34	26	28	30	25	41	32	45
4.....	30	36	26	26	34	32	28	28	25	40	30	44
5.....	.....	26	34	22	26	34	23	28	.....	37	32	41
6.....	30	24	26	20	24	32	23	28	.....	38	37	39
7.....	36	22	22	20	23	26	27	28	.....	39	37	28
8.....	40	22	24	20	20	18	23	28	.....	37	39	32
9.....	40	22	24	20	18	12	19	28	.....	37	41	47
10.....	40	20	34	18	17	14	19	28	.....	28	41	47
11.....	38	20	26	18	17	18	25	28	.....	27	40	43
12.....	40	19	.....	17	26	11	26	30	25	27	40	45
13.....	38	20	22	17	34	8	26	28	25	25	.....	47
14.....	34	.....	23	23	26	.....	23	28	26	25	.....	44
15.....	.....	32	23	22	24	14	25	26	26	25	.....	47
16.....	.....	34	38	42	22	14	26	27	26	25	.....	43
17.....	.....	56	38	26	20	14	26	26	26	30	.....	44
18.....	38	36	32	22	18	14	26	25	25	41	26	44
19.....	40	34	22	20	18	30	23	27	23	39	34	44
20.....	42	34	23	19	17	32	23	27	26	34	41	44
21.....	42	38	24	38	17	32	23	27	26	34	40	44
22.....	40	42	22	36	17	28	25	27	34	37	39	45
23.....	36	42	20	24	17	32	25	27	44	37	37	44
24.....	32	42	20	38	17	32	25	27	42	37	34	41
25.....	32	42	20	32	17	36	25	30	42	41	30	44
26.....	40	30	23	32	17	.....	23	28	42	42	28	45
27.....	44	23	22	30	16	23	22	26	37	42	28	45
28.....	42	23	24	30	16	17	22	26	41	39	26	41
29.....	42	28	42	.....	16	18	23	.....	47	40	26	47
30.....	42	24	44	.....	16	.....	27	.....	43	34	43	44
31.....	40	30	.....	30	.....	14	30	.....	41	.....	45	.....

Discharge, in million gallons per day, of Kekaha ditch at tunnel No. 12, near Waimea, Kauai, for the years ending June 30, 1908, 1909, 1910, 1913, 1914, and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1912-13.												
1.....	25	26	45	25	41	47	.....	44	34	49	46	28
2.....	21	23	45	24	26	47	36	32	34	50	46	40
3.....	21	22	46	21	22	23	46	28	30	49	50	26
4.....	21	21	43	26	20	39	46	26	30	46	44	46
5.....	21	20	31	21	20	47	36	28	28	36	36	52
6.....	31	32	28	20	29	51	32	30	27	44	30	48
7.....	26	23	46	20	20	50	32	32	26	32	48	44
8.....	32	23	34	21	20	46	32	40	26	28	46	42
9.....	23	45	34	21	50	48	46	50	42	26	42	36
10.....	47	43	28	25	46	44	44	40	30	52	40	50
11.....	47	32	25	24	39	44	46	32	26	48	.....	52
12.....	50	39	26	23	29	40	46	51	24	50	20	49
13.....	37	30	23	23	26	38	50	42	24	52	11	49
14.....	47	41	23	23	20	34	50	34	24	52	50	49
15.....	45	47	22	19	20	33	48	32	23	52	46	44
16.....	39	45	22	19	43	33	49	30	23	49	50	38
17.....	30	30	22	19	29	33	44	30	23	50	52	32
18.....	34	23	24	44	24	32	36	42	23	52	52	30
19.....	28	22	22	37	45	28	32	50	28	49	49	28
20.....	26	21	21	43	41	39	28	48	32	48	46	30
21.....	24	20	20	45	50	47	34	49	42	50	41	30
22.....	23	30	20	50	50	50	36	46	38	48	38	30
23.....	23	42	20	47	47	50	34	36	46	42	36	28
24.....	23	45	20	41	46	50	32	44	42	42	32	26
25.....	31	36	19	23	41	46	40	52	48	40	32	26
26.....	23	26	19	43	31	46	38	52	53	46	31	30
27.....	30	23	19	43	26	46	30	49	50	40	32	46
28.....	23	46	19	39	25	41	38	44	50	36	26	52
29.....	22	34	19	34	22	41	28	.....	46	46	30	50
30.....	22	45	19	26	46	32	26	.....	46	48	28	34
31.....	47	46	.....	43	.....	32	49	.....	42	.....	28	.....
1913-14.												
1.....	44	23	44	20	24	.....	26	26	42	38	42	40
2.....	44	23	52	20	23	23	27	28	40	34	44	42
3.....	48	23	48	22	49	23	27	24	36	38	44	40
4.....	50	23	42	20	46	23	46	40	32	40	40	40
5.....	49	22	28	19	46	23	46	40	32	42	42	40
6.....	49	21	26	18	34	32	42	42	36	44	42	40
7.....	48	22	24	20	34	28	42	40	42	40	42	38
8.....	46	24	23	42	50	34	46	40	42	42	42	44
9.....	42	42	23	42	46	34	49	38	42	42	44	41
10.....	34	40	23	42	46	34	42	36	40	42	38	42
11.....	30	28	22	35	49	36	44	36	40	42	42	42
12.....	26	24	21	40	50	42	44	34	32	42	36	42
13.....	44	44	22	30	53	40	44	34	30	42	36	40
14.....	52	44	22	44	50	40	42	38	28	40	40	40
15.....	49	46	23	32	50	38	44	36	30	38	40	40
16.....	44	46	22	26	49	36	44	40	36	38	42	40
17.....	38	40	20	23	50	34	42	38	36	38	42	34
18.....	32	49	21	23	49	34	40	36	30	36	36	34
19.....	30	38	36	24	49	32	42	38	32	42	40	34
20.....	36	28	23	26	49	32	24	36	28	44	42	48
21.....	44	24	21	26	46	30	23	36	34	42	40	46
22.....	34	23	21	34	46	32	23	36	32	44	42	44
23.....	28	22	26	46	49	30	40	34	30	46	40	42
24.....	26	23	24	30	49	30	40	21	30	46	42	42
25.....	26	44	21	34	50	30	42	21	36	46	42	44
26.....	32	34	20	40	49	28	40	21	38	42	40	40
27.....	32	28	23	42	48	30	40	28	36	42	40	42
28.....	28	28	19	36	46	28	22	42	19	42	40	40
29.....	26	44	23	32	48	27	22	.....	42	40	40	42
30.....	26	48	23	26	.....	26	28	.....	17	42	44	40
31.....	26	42	.....	.....	.....	26	26	.....	28	.....	42	.....

Discharge, in million gallons per day, of Kekaha ditch at tunnel No. 12, near Waimea, Kauai, for the years ending June 30, 1908, 1909, 1910, 1913, 1914, and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Date.	July.	Aug.	Sept.	Oct.	Nov.
1914.						1914.					
1.....	37	46	49	-----	48	16.....	30	26	49	38	44
2.....	43	40	42	-----	44	17.....	42	26	42	38	38
3.....	42	34	46	-----	46	18.....	34	26	42	42	32
4.....	40	40	44	24	44	19.....	42	24	48	38	28
5.....	42	44	42	23	36	20.....	40	24	44	38	36
6.....	42	48	48	26	32	21.....	32	23	42	40	32
7.....	43	44	50	24	44	22.....	30	23	44	36	28
8.....	44	44	46	24	40	23.....	26	49	40	38	24
9.....	44	46	44	24	34	24.....	32	49	36	32	32
10.....	41	48	44	24	32	25.....	46	46	38	32	44
11.....	42	46	46	30	30	26.....	44	46	-----	30	49
12.....	42	46	44	36	30	27.....	38	46	-----	30	49
13.....	34	40	48	40	40	28.....	38	46	-----	44	49
14.....	32	34	49	40	42	29.....	38	46	-----	38	52
15.....	34	30	50	38	48	30.....	42	46	-----	32	49
						31.....	44	46	-----	38	-----

NOTE.—Discharge determined from a well-defined rating curve. Discharge for period July 1, 1910, to Dec. 31, 1911, was published in Water-Supply Paper 318, p. 66; that for period Jan. 1 to June 30, 1912, was published in Water-Supply Paper 336, p. 44. No water in ditch Aug. 16-21, 1908; Mar. 5-11 and May 13-17, 1910; Nov. 30, 1911; Mar. 29 and Sept. 26 to Oct. 2, 1914. No gage record for periods for which discharge is not given except as noted above.

Monthly discharge of Kekaha ditch at tunnel No. 12, near Waimea, Kauai, for the years ending June 30, 1908, 1909, 1910, 1913, 1914, and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1908.						
April 7-30.....	30	7	19.6	30.3	450	1,380
May 1-9, 11-31.....	30	8	22.6	35.0	679	2,080
June.....	36	24	28.8	44.6	864	2,650
The period (83 days).....	36	7	24.0	37.1	1,990	6,110
1908-9.						
July.....	30	18	24.1	37.3	747	2,290
August 1-15, 22-27, 30-31.....	37	23	29.0	44.9	667	2,050
September.....	38	18	24.4	37.8	733	2,250
October 1-4, 7-31.....	42	10	26.8	41.5	750	2,300
November.....	42	18	22.4	34.7	671	2,060
December.....	44	18	30.0	46.4	929	2,850
January 2-10, 12-16, 18-31.....	40	7	25.8	39.9	722	2,220
February 1-6, 8-28.....	40	23	28.9	44.7	780	2,390
March 1-12, 22-31.....	36	15	27.8	43.0	611	1,880
April.....	42	14	34.7	53.7	1,040	3,190
May 6-31.....	38	24	30.8	47.7	800	2,460
June.....	42	23	29.9	46.3	897	2,750
The period (336 days).....	44	7	27.8	43.0	9,350	28,700
1909-10.						
July 1-4, 6-14, 18-31.....	44	30	38.2	59.1	1,030	3,170
August 1-13, 23-31.....	56	19	31.2	48.3	937	2,870
September 1-11, 13-30.....	44	20	26.7	41.3	775	2,380
October 1-28.....	42	17	26.2	40.5	760	2,330
November.....	34	16	21.7	33.6	652	2,000
December 1-13, 15-25, 27-29, 31.....	36	8	21.9	33.9	614	1,880
January.....	30	10	23.5	36.4	729	2,240
February.....	30	25	27.6	42.7	773	2,370
March.....	47	23	32.0	49.5	768	2,360
April.....	45	25	35.5	54.9	1,060	3,270
May.....	45	26	34.8	53.8	906	2,780
June.....	47	28	43.3	67.0	1,300	3,990
The period (342 days).....	56	8	30.1	46.6	10,300	31,600

Monthly discharge of Kekaha ditch at tunnel No. 12, near Waimea, Kauai, for the years ending June 30, 1908, 1909, 1910, 1913, 1914, and 1915—Continued.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1912-13.						
July.....	50	21	30.4	47.0	942	2,890
August.....	47	20	32.3	50.0	1,000	3,070
September.....	46	19	26.8	41.5	804	2,470
October.....	50	19	30.1	46.6	932	2,860
November.....	50	20	33.1	51.2	994	3,050
December.....	51	23	41.2	63.7	1,280	3,920
January 2-31.....	50	26	38.8	60.0	1,160	3,570
February.....	52	26	39.8	61.6	1,110	3,420
March.....	53	23	34.2	52.9	1,060	3,250
April.....	52	26	45.1	69.8	1,350	4,150
May 1-10, 12-31.....	52	11	38.6	59.7	1,160	3,550
June.....	52	26	38.8	60.0	1,160	3,570
The period (363 days).....	53	11	35.7	55.2	13,000	39,800
1913-14.						
July.....	52	26	37.5	58.0	1,160	3,570
August.....	49	21	32.6	50.4	1,010	3,100
September.....	52	19	26.2	40.5	788	2,410
October 1-30.....	46	18	30.5	47.2	914	2,810
November 1-30.....	53	23	45.9	71.0	1,330	4,080
December 2-31.....	42	23	31.2	48.3	935	2,870
January.....	49	22	36.9	57.1	1,140	3,510
February.....	42	21	34.2	52.9	959	2,940
March 1-28, 30-31.....	42	17	33.5	51.8	1,010	3,080
April.....	46	34	41.3	63.9	1,240	3,800
May.....	44	36	40.9	63.3	1,270	3,890
June.....	46	34	40.8	63.3	1,220	3,760
The period (361 days).....	53	17	35.9	55.5	13,000	39,800
1914-15.						
July.....	46	26	38.7	59.9	1,200	3,680
August.....	49	23	39.4	61.0	1,220	3,750
September 1-25.....	50	26	44.7	69.2	1,120	3,430
October 3-31.....	44	23	33.3	51.5	965	2,960
November.....	52	24	39.2	60.7	1,180	3,610
The period (146 days).....	52	23	38.9	60.2	5,680	17,400

KAMENEHUNE DITCH NEAR WAIMEA, KAUAI.

LOCATION.—200 feet below wire suspension bridge across Waimea River, about 3 miles above Waimea; reached by wagon road up the right side of Waimea River.

RECORDS AVAILABLE.—October 9, 1911, to June 30, 1915.

GAGE.—Vertical staff on right bank; read once daily.

DISCHARGE MEASUREMENTS.—Made from plank.

CHANNEL AND CONTROL.—Straight for 50 feet above and below gage; mud bottom.

Control fairly permanent, but discharge relation is affected by growth of aquatic plants in channel; current sluggish.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 1.9 feet January 14 and 27, 1914 (discharge, 5.2 million gallons per day, or 8.0 second-feet); ditch occasionally dry.

DIVERSIONS.—Diverts from Waimea River.

REGULATION.—By head gates.

UTILIZATION.—Irrigation of rice and taro.

ACCURACY.—Estimates poor owing to instability of discharge relation due to growth of aquatic plants in channel and to frequent cleaning of ditch.

Discharge measurements of Kamenehune ditch near Waimea, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—July 28	W. V. Hardy.....	0.37	0.62	0.45
1914—June 16	J. C. Dort.....	.60	1.0	.7
1915—May 14	W. V. Hardy.....	.73	.90	.6
June 15	.....do.....	1.29	1.9	1.2
19	D. E. Horner.....	1.70	3.9	2.6
20	W. V. Hardy.....	1.52	3.0	1.9

Discharge, in million gallons per day, of Kamenehune ditch near Waimea, Kauai, for the years ending June 30, 1912, 1913, 1914, and 1915.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1911-12.												
1					0.8	1.3	2.8	1.9	1.6	2.6	0.1	1.6
2					.8	1.5	2.2	1.3	1.6	2.2	.2	1.6
3					.8	1.2	1.1	1.9	2.6	1.9	.1	1.3
4					.6	1.3	.7	2.5	2.0	.9	.1	.9
5					.8	1.2	.7	2.2	1.6	3.0	1.6	1.6
6					.6	1.2	.5	1.9	2.2	3.0	.8	.7
7					.6	1.2	1.6	1.6	2.2	2.6	.8	.7
8					.6	1.7	1.3	1.3	1.9	2.6	.8	.6
9				0.6	.6	1.3	1.3	1.3	2.0	3.0	.8	.6
10				.5	.6	1.3	1.3	1.9	2.2	2.6	.8	.8
11				.5	.7	2.7	1.3	1.1	2.2	2.2	.8	.8
12				.9	1.2	1.7	1.2	.9	2.2	2.2	.8	.9
13				.8	1.1	1.9	1.1	.9	1.8	2.0	.8	.9
14				.6	2.3	1.2	1.9	1.9	2.2	1.9	.8	.9
15				.8	1.9	2.5	1.4	1.8	1.6	1.3	3.0	.9
16				.6	1.7	1.6	1.1	1.3	1.6	2.6	2.2	.7
17				.7	2.3	1.3	1.3	1.3	1.6	1.3	1.9	.7
18				1.0	2.5	1.6	1.3	1.1	1.3	2.2	1.9	.7
19				1.2	2.7	1.2	1.2	1.1	.9	1.6	.4	.7
20				.5	2.5	1.2	1.2	1.2	2.2	1.0	.2	.8
21				.6	2.4	1.2	1.6	2.6	1.6	.5	.2	.9
22				.6	2.3	1.0	1.8	3.2	1.0	.7	.2	1.1
23				.5	2.3	2.3	1.6	2.4	.7	.8	1.0	.6
24				1.2	.8	1.8	2.6	2.4	.5	.8	2.6	.5
25				1.9	2.7	1.0	2.2	1.6	2.6	.8	3.4	1.9
26				1.0	2.5	1.2	1.9	1.6	2.2	1.3	1.6	2.2
27				1.0	2.5	1.2	2.8	1.9	1.3	1.3	1.2	2.2
28				1.0	2.3	1.0	1.6	2.6	1.3	.1	3.6	1.8
29				1.0	1.5	1.7	1.9	1.2	.9	.4	3.2	1.8
30				.8	1.3	1.3	1.8		.8	.4	1.8	.9
31				.8		1.0	1.3		2.8		1.6	
1912-13.												
1	0.7	0.5	2.2	0.2	1.9	3.6	0.7	0.6	0.4	0.3	0.6	0.5
2	.7	.5	2.6	.3	1.3	3.6	2.6	.8	.7	2.5	.5	.5
3	.7	.7	1.9	.3	.9	4.0	1.6	.7	1.3	1.8	1.6	2.6
4	.7	.5	1.4	.2	.8	.5	1.3	.9	1.0	.7	1.4	2.5
5	.7	.7	1.0	.5	.4	.5	1.3	.7	1.1	.7	.9	1.9
6	.7	.5	4.0	.5	.2	.5	1.3	.6	1.0	.6	.8	1.6
7	.7	.5	3.2	.6	.2	.5	1.2	.7	.7	.3	.7	1.6
8	.7	.7	1.6	.6	.2	.7	.8	1.6	1.2	.3	.5	1.2
9	1.1	1.1	1.2	.6	3.0	.8	2.2	.7	1.2	1.0	.5	1.2
10	3.4	1.0	.6	.9	1.6	.7	1.8	.5	1.1	.7	.3	3.6
11	2.8	.9	.2	1.3	.6	1.1	2.8	2.5	.8	3.2	.3	1.8
12	1.9	1.1	.2	1.3	.5	1.2	2.2	.9	.5	1.9	3.6	1.6
13	1.3	2.8	.1	.6	.4	.9	2.8	1.3	.2	4.2	4.6	1.4
14	4.0	.5	.1	.6	.3	1.1	1.0	1.1	.3	1.3	2.8	1.1
15	2.5	2.5		.2	.2	1.0	.8	1.1	.4	1.1	1.6	
16	2.4	1.9		.2	3.4	1.8	1.4	1.2	.3	.9	1.4	.9
17	2.2	1.6	.1	1.0	3.2	1.4	.6	.9	.3	.8	.8	.7
18	1.8	.5		1.9	2.6	1.3	.3	1.0	.5	.5	1.2	.6
19	.9	.5		1.3	1.9	1.9	.6	1.3	.8	.5	.9	.8
20	.6	.5		1.3	1.3	1.9	2.8	.8	.5	.4	.9	.6
21	.5	.4	.2	2.6	1.1	2.8	.6	1.1	.5	1.4	.9	.6
22	.5	.3	.2	3.0	1.1	1.3	.6	.7	.4	1.3	.7	.5
23	.4	.3	.2	3.4	1.0	1.1	.5	.3	.3	1.0	.6	.5
24	.4	2.6	.2	2.2	.7	1.2	.4	3.2	3.6	.7	.5	.5
25	.3	.9	.2	2.6	.5	1.3	.3	1.9	1.6	.8	.9	.4
26	.3	.6	.2	3.4	.5	1.1	.9	1.3	1.2	.5	.9	1.9
27	.3	3.6	.2	1.9	.5	.7	.8	1.0	.4	.3	.8	1.3
28	.5	2.6	.2	1.3	.5	.9	.8	.6	.2	.3	.7	1.1
29	.5	.9	.3	1.2	1.4	.9	.7		.5	1.0	.7	1.1
30	.5	3.6	.2	2.2	.5	1.1	.7		.2	.9	.7	1.0
31	2.5	2.8		2.6		1.0	1.8		.3		.7	

Discharge, in million gallons per day, of Kamenehune ditch near Waimea, Kauai, for the years ending June 30, 1912, 1913, 1914, and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.	1.3	0.2	3.6	0.8	1.0	0.5	0.2	0.5	0.7	0.6	0.9	1.9
2.	1.8	.2	1.6	.8	1.0	.4	.2	.5	.6	.5	.9	1.8
3.	1.4	.2	2.4	.7	.9	.4	.2	.4	.6	.4	.8	1.6
4.	1.4	.2	2.4	1.0	.8	.3	2.5	.4	.5	.4	.8	1.4
5.	1.4	.2	1.8	.9	.7	.3	3.6	.4	.5	.3	.7	1.3
6.	1.2	.2	.8	.9	.3	.3	3.2	.4	.4	.2	.6	1.2
7.	1.1	.3	.7	.8	.3	.2	4.0	.4	.4	.2	.6	1.2
8.	.9	.2	.4	1.8	.3	.2	4.0	.3	.4	.2	.5	1.2
9.	.7	.2	.9	1.6	.2	.2	4.2	.3	.4	.2	.5	1.1
10.	.7	.2	.9	1.4	.2	.2	4.0	.3	.3	.2	.4	1.1
11.	.4	.3	.8	1.3	.9	.2	3.4	.2	.3	.2	.3	1.0
12.	.2	.2	.8	1.2	.3	.2	3.2	.2	.3	.2	.3	1.0
13.	1.4	.5	.8	1.2	.3	2.5	3.2	.2	.2	.2	.3	.9
14.	1.9	.2	1.0	1.1	.2	2.2	5.0	.2	.2	.2	.2	.8
15.	1.4	.6	.9	1.0	.2	1.9	5.0	.7	.2	.2	.2	.7
16.	1.1	.4	.9	.8	.2	1.8	5.0	.7	.2	.6	.2	.7
17.	.5	1.1	1.0	.6	.2	1.8	5.0	.5	4.2	.6	.2	.6
18.	.4	1.2	.6	.6	.2	1.6	4.8	.5	.7	.5	.2	.6
19.	.3	.8	1.5	.5	1.1	1.3	4.8	.4	.6	.5	.2	.5
20.	1.2	.7	1.1	.4	1.1	1.2	4.6	.4	.6	.5	.2	.5
21.	.7	.7	.7	.4	.9	1.2	4.6	.4	.6	.5	.2	.4
22.	.6	.7	.6	1.8	.9	1.2	4.6	.4	.5	.4	4.6	.4
23.	.3	.6	.6	1.8	.8	1.1	4.4	.4	.4	.4	4.0	.3
24.	.3	.6	.6	1.6	.8	1.1	4.2	.3	.4	.4	4.0	.3
25.	.2	.9	.5	1.4	.7	.9	4.2	.3	.3	.4	3.8	.3
26.	.5	.7	.2	1.4	.7	.8	4.2	.2	.2	.3	3.6	.2
27.	.5	.4	1.8	1.2	.6	.7	5.2	.2	.2	.3	3.4	.2
28.	.4	.4	1.6	1.1	.6	.6	.9	.7	1.4	.3	3.2	.2
29.	.4	2.5	1.4	1.0	.6	.6	.6		.9	.3	2.8	.2
30.	.3	1.4	1.1	.9	.6	.5	.7		.7	.3	2.5	.2
31.	.3	2.2		.9		.4	.5		.6		2.4	
1914-15.												
1.	0.2	0.7	1.1	3.6	3.6	2.5	0.9	0.5	0.2	0.2	1.6	0.5
2.	.2	.7	1.0	3.6	1.9	1.6	.8	.2	.2	.2	2.0	.5
3.	.2	.9	1.0	3.4	2.0	2.6		.2	.2	.4	1.8	.4
4.	.2	.8	1.0	3.4	2.2		.6	.2	.2	.4	1.0	1.0
5.	.2	2.8	.7	3.4	1.9		.5	.9	.2	.4	1.4	2.6
6.	.2	1.9	3.2	4.2	1.9		.7	.8	.1	2.2	2.2	1.2
7.	.2	1.6	1.4	2.8	1.4		.7	.6	.2	1.3	.8	.8
8.	.9	1.4	1.3	3.4	2.6		.6	.7	.1	.6		.8
9.	1.1	1.2	1.2	2.5	1.3		.5	.3	.1	.7		
10.	1.0	1.3	1.1	1.9	1.4	.6	.5	.2		.6	1.0	
11.	1.0	1.2	1.1	1.0	1.0	.6	.4	1.0		.4	.9	.2
12.	.9	1.1	4.4	.2	1.8	1.2	1.2	1.4		.5	.6	
13.	.9	.3	3.4	.7	2.2	1.9	1.0	.8		.8	1.0	
14.	.8	.2	2.8	1.9	2.8	.9	.9	1.8		.9	.7	
15.	.8	.2	2.8	1.9	2.6	.6	.8	.8		.8	.5	
16.	1.6	.3	2.6	1.8	1.8	.6	.7	1.8		3.6	.5	2.7
17.	1.4	.3	.8	1.6	1.1	.9	.6	1.8	.2	2.8	.5	2.5
18.	1.4	.3	3.6	2.4	1.0	.9	.5	.6	.1	2.0	.7	1.8
19.	1.3	.3	1.9	1.9	.9	2.4	.4	.3	.1	1.6	.8	2.4
20.	1.2	.2	1.6	1.9	1.0	.7	.4	.9	.1	2.4	.6	1.9
21.	1.2	.2	1.4	2.0	.8	.7	.4	2.4	.1	2.4	.2	1.8
22.	1.0	2.4	1.2	1.6	.7	.2	.5	1.9	.4	2.8	.2	.4
23.	1.1	3.2	.7	1.6	.7	1.6	.7	1.4	.3	3.2	.2	.2
24.	1.4	3.2	.7	1.8	4.2	1.8	.4	1.3	.5	3.4	.2	.1
25.	1.4	2.4	.7	1.6	2.6	3.0	.3	.8	.7	3.4	.2	1.3
26.	1.3	.7	4.6	1.4	1.6	2.8	.2	.7	.2	3.4	.2	.4
27.	1.1	.7	4.0	1.3	3.2	1.9	.2	.3	.1	1.8	.4	.1
28.	1.0	.7	4.0	1.3	2.5	3.8	.4	.2	.1	1.8	.8	.2
29.	.9	2.5	3.8	1.2	2.2	1.4	.1		.1	1.8	.7	.2
30.	1.4	2.8	3.6	1.1	2.6	1.0	.4		.2	1.8	.7	.2
31.	1.6	2.2		3.4		1.0	.5		.2		.5	

NOTE.—Discharge determined from rating curves applicable as follows: Oct. 9, 1911, to Feb. 20, 1912, and February 21 to May 25, 1912, poorly defined; May 26 to Sept. 6, 1912, fairly well defined; Sept. 7 to Nov. 16, 1912, poorly defined; Nov. 17, 1912, to Dec. 3, 1914, fairly well defined; Dec. 10, 1914, to June 5, 1915, poorly defined; June 6-30, 1915, fairly well defined above 1 million gallons per day (1.5 second-feet). Estimates for period Oct. 9 to Dec. 31, 1911, supersede those published in Water-Supply Paper 318, p. 60. No water in ditch (or no flow), Sept. 15, 16, 18-20, 1912; Dec. 4-9, 1914; Mar. 10-16, May 8, 9, June 9, 10, 12-15, 1915.

Monthly discharge of Kamenehune ditch near Waimea, Kauai, for the years ending June 30, 1912, 1913, 1914, and 1915.

Month.	Discharge.			Total run-off.		
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1911-12.						
October 9-31.....	1.9	0.5	0.83	1.28	19	59
November.....	2.7	.6	1.54	2.38	46	142
December.....	2.7	1.0	1.45	2.24	45	138
January.....	2.8	.5	1.54	2.38	48	147
February.....	3.2	.9	1.72	2.66	50	153
March.....	2.8	.5	1.72	2.66	53	164
April.....	3.0	.1	1.65	2.55	49	152
May.....	3.6	.1	1.27	1.96	39	121
June.....	2.2	.5	1.08	1.67	32	99
The period (266 days)	3.6	.1	1.44	2.23	382	1,180
1912-13.						
July.....	4.0	.3	1.20	1.86	37	114
August.....	3.6	.3	1.23	1.90	38	117
September 1-14, 17, 21-30.....	4.0	.1	.90	1.39	22	69
October.....	3.4	.2	1.32	2.04	41	126
November.....	3.4	.2	1.09	1.69	33	100
December.....	4.0	.5	1.37	2.12	42	130
January.....	2.8	.3	1.23	1.90	38	117
February.....	3.2	.3	1.07	1.66	30	92
March.....	3.6	.2	.76	1.18	24	72
April.....	4.2	.3	1.06	1.64	32	98
May.....	4.6	.3	1.10	1.70	34	105
June.....	3.6	.4	1.22	1.89	36	112
The period (360 days)	4.6	.1	1.13	1.75	407	1,250
1913-14.						
July.....	1.9	.2	.82	1.27	25	78
August.....	2.5	.2	.62	.96	19	59
September.....	3.6	.2	1.13	1.75	34	104
October.....	1.8	.4	1.06	1.64	33	101
November.....	1.1	.2	.59	.91	18	54
December.....	2.8	.2	.87	1.35	27	83
January.....	5.2	.2	3.38	5.23	105	322
February.....	.7	.2	.39	.60	11	34
March.....	4.2	.2	.60	.93	18	57
April.....	.6	.2	.35	.54	10	32
May.....	4.6	.2	1.40	2.17	44	133
June.....	1.9	.2	.79	1.22	24	73
The year.....	5.2	.2	1.01	1.56	368	1,130
1914-15.						
July.....	1.6	.2	.94	1.45	29	89
August.....	3.2	.2	1.25	1.93	39	119
September.....	4.6	.7	2.09	3.23	63	192
October.....	4.2	.2	2.12	3.28	66	202
November.....	4.2	.7	1.92	2.97	58	177
December 1-3, 10-31.....	3.8	.2	1.49	2.31	37	114
January.....	1.2	.1	.57	.88	18	54
February.....	2.4	.2	.89	1.38	25	76
March 1-9, 17-31.....	.7	.1	.20	.31	5	15
April.....	3.6	.2	1.62	2.51	49	149
May 1-7, 10-31.....	2.2	.2	.79	1.22	23	70
June 1-8, 11, 16-31.....	2.7	.1	1.01	1.56	24	74
The period (344 days)	4.6	.1	1.26	1.95	436	1,330

MAKAWELI RIVER NEAR WAIMEA, KAUAI.

LOCATION.—Half a mile above confluence with Waimea River and 2 miles northeast of Waimea. Reached by wagon road up Makaweli River.

RECORDS AVAILABLE.—October 6, 1911, to June 30, 1915.

GAGE.—Vertical staff on right bank; read once daily.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

CHANNEL AND CONTROL.—One channel at all stages; straight for 500 feet above and below gage; banks are low, with gentle slope; current swift. Control composed of boulders; fairly permanent between extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 10.7 feet at noon November 26, 1914 (discharge, approximately 4,300 million gallons per day, or 6,650 second-feet); minimum stage recorded, 3.0 feet December 16–19, 1912 (discharge, 1.9 million gallons per day, or 3.0 second-feet).

DIVERSIONS.—There are many small diversions above station for irrigation of sugar cane, rice, and taro.

REGULATION.—By diversion.

UTILIZATION.—Water passing station is wasted.

ACCURACY.—Estimates July 1 to November 25, 1913, and September 27, 1914, to June 30, 1915, based on well-defined rating curves; fair except for extreme floods.

Estimates November 26, 1913, to September 26, 1914, poor on account of lack of sufficient measurements to properly define a rating curve.

Discharge measurements of Makaweli River near Waimea, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—July 8...	D. E. Horner.....	3.00	12	8.0
Nov. 13.	J. C. Dort.....	3.20	28	18
1915—May 14.	W. V. Hardy.....	2.81	8.1	5.2
June 15.	do.....	2.94	14	8.7
19.	D. E. Horner.....	5.02	404	261
19.	do.....	4.26	191	123
20.	W. V. Hardy.....	3.74	86	55
21.	D. E. Horner.....	3.22	28	18

Discharge, in million gallons per day, of Makaweli River near Waimea, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	14	6.5	19	16	53	17	7	11	10	22	22	22
2.....	16	7.8	17	22	52	17	7	8	11	19	22	22
3.....	47	7.1	16	16	50	17	7	10	11	17	30	22
4.....	30	6.5	16	32	52	17	8	8	11	126	27	22
5.....	36	6.5	11	28	45	17	8	15	11	119	19	19
6.....	15	5.2	10	24	45	15	17	13	10	27	19	112
7.....	12	5.2	10	23	48	15	8	13	10	27	19	112
8.....	11	5.8	10	401	48	15	254	13	11	19	19	112
9.....	12	5.2	9.7	207	54	13	50	11	10	22	15	112
10.....	12	5.2	9.0	168	60	13	10	11	11	19	17	104
11.....	12	4.5	8.4	53	2,040	13	10	8	11	19	15	22
12.....	12	4.5	8.4	50	1,240	13	8	7	11	22	17	19
13.....	12	4.5	7.8	47	165	13	11	6	11	41	15	19
14.....	12	3.9	7.8	48	107	13	11	6	254	119	22	17
15.....	12	3.9	7.1	96	99	13	8	6	84	126	22	24
16.....	12	3.9	6.5	92	76	13	7	6	30	158	24	22
17.....	12	4.5	6.5	123	69	13	6	11	24	126	24	24
18.....	12	4.5	7.1	63	87	13	6	11	24	119	17	22
19.....	12	4.5	7.8	60	90	11	6	10	24	119	19	22
20.....	12	3.9	7.1	53	92	13	6	11	22	60	19	22
21.....	10	3.9	6.5	52	87	13	6	11	22	55	17	22
22.....	9.7	3.9	6.5	49	90	13	15	11	22	50	17	495
23.....	5.2	4.5	6.5	50	97	11	13	11	22	90	15	176
24.....	4.5	4.5	7.1	48	99	11	13	11	22	78	176	84
25.....	4.5	3.9	6.5	48	3,340	11	150	11	19	77	158	55
26.....	4.5	3.9	5.8	47	1,280	11	112	13	17	185	112	50
27.....	5.2	3.9	2.6	48	223	11	97	11	34	17	22	50
28.....	5.8	3.9	3.9	52	176	11	66	11	158	19	24	27
29.....	4.5	3.9	3.9	52	158	6	34	-----	97	19	22	27
30.....	5.2	45	2.6	52	17	7	13	-----	30	19	19	17
31.....	5.2	48	-----	52	-----	7	11	-----	19	-----	20	-----
1914-15.												
1.....	13	11	126	46	34	335	31	8.5	7.0	6.0	31	5.0
2.....	13	11	30	46	38	92	17	8.5	7.0	6.0	31	5.0
3.....	11	7	34	46	38	1,950	14	8.5	7.0	6.0	28	5.0
4.....	10	7	8	42	34	910	12	7.0	14	6.0	28	5.0
5.....	84	7	8	38	34	472	10	7.0	8.5	10	28	5.0
6.....	10	7	7	38	31	122	12	7.0	7.0	14	28	5.0
7.....	8	13	7	198	31	73	14	7.0	7.0	10	28	5.0
8.....	8	11	22	198	28	56	14	7.0	7.0	10	79	5.0
9.....	8	11	22	189	171	42	10	7.0	7.0	10	208	4.5
10.....	8	10	34	162	137	38	12	7.0	7.0	8.5	137	4.5
11.....	7	8	7	85	25	38	10	7.0	7.0	8.5	31	4.5
12.....	7	8	6	79	22	38	10	7.0	7.0	8.5	6.0	4.5
13.....	7	7	4	79	17	34	10	7.0	7.0	8.5	5.0	4.5
14.....	15	7	15	79	17	28	10	28	6.0	8.5	6.0	4.5
15.....	15	7	22	79	15	25	14	14	6.0	67	6.0	4.5
16.....	72	104	22	79	15	20	14	7.0	6.0	38	5.0	129
17.....	78	11	22	99	15	15	10	7.0	6.0	38	5.0	114
18.....	72	10	22	99	15	15	85	7.0	6.0	34	5.0	85
19.....	72	10	22	99	7.0	171	85	7.0	7.0	34	5.0	171
20.....	126	6	104	38	7.0	99	85	7.0	7.0	34	5.0	122
21.....	126	4	19	38	8.5	38	12	51	6.0	34	5.0	17
22.....	119	3	17	31	7.0	38	12	34	7.0	28	5.0	10
23.....	17	3	27	31	7.0	46	12	12	6.0	28	5.0	10
24.....	19	2	27	31	99	34	12	12	7.0	56	5.0	10
25.....	11	22	30	34	34	34	12	8.5	7.0	137	5.0	10
26.....	11	22	4,280	34	20	31	12	8.5	7.0	472	5.0	8.5
27.....	8	22	1,310	31	17	34	8.5	8.5	7.0	171	5.0	8.5
28.....	8	22	700	31	122	73	8.5	8.5	7.0	56	5.0	8.5
29.....	13	22	322	31	129	38	8.5	-----	7.0	34	5.0	10
30.....	15	112	285	31	122	31	8.5	-----	7.0	34	5.0	10
31.....	13	104	-----	31	-----	31	8.5	-----	8.5	-----	5.0	-----

NOTE.—Discharge determined from rating curves applicable as follows: July 1 to Nov. 25, 1913, well defined; Nov. 26, 1913, to Sept. 26, 1914, poorly defined; Sept. 27, 1914, to June 30, 1915, well defined below 500 million gallons per day (774 second-feet).

Monthly discharge of Makaweli River near Waimea, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	47	4.5	12.6	19.5	389	1,200
August.....	48	3.9	7.51	11.6	233	714
September.....	19	2.6	8.47	13.1	254	780
October.....	401	16	70.1	108	2,170	667
November.....	3,340	17	338	523	10,100	31,100
December.....	17	6	12.8	19.8	396	1,220
January.....	254	6	31.8	49.2	985	3,030
February.....	15	6	10.2	15.8	285	876
March.....	254	10	34.3	53.1	1,060	3,260
April.....	185	17	65.2	101	1,960	6,000
May.....	176	15	32.4	50.1	1,000	3,080
June.....	495	17	62.5	96.7	1,880	5,750
The year.....	3,340	2.6	56.9	88.0	20,700	57,700
1914-15.						
July.....	126	7	32.4	50.1	1,000	3,080
August.....	112	2	19.7	30.5	611	1,870
September.....	4,280	4	252	390	7,560	23,200
October.....	198	31	70.1	108	2,170	6,670
November.....	137	7.0	43.2	66.8	1,300	3,980
December.....	1,950	15	161	249	5,000	15,300
January.....	85	8.5	19.1	29.6	594	1,820
February.....	51	7.0	11.3	17.5	316	971
March.....	14	6.0	7.10	11.0	220	675
April.....	472	6.0	47.2	73.0	1,420	4,350
May.....	208	5.0	24.5	37.9	760	2,330
June.....	171	4.5	26.5	41.0	795	2,440
The year.....	4,280	2	59.6	92.2	21,700	66,700

OLOKELE DITCH AT TUNNEL NO. 12, NEAR MAKAWELI, KAUAI.

LOCATION.—About 2 miles below intake, 10 miles northeast of Makaweli.

RECORDS AVAILABLE.—July 24, 1904, to June 30, 1915.

GAGE.—Vertical staff; read once daily.

DISCHARGE MEASUREMENTS.—Made from plank across ditch.

CHANNEL AND CONTROL.—Concrete flume of rectangular section; ditch is mostly in rock tunnel; straight for 50 feet above and below gage. Control probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded 3.93 feet, the gage height of discharge measurement of June 18, 1915 (discharge, 71 million gallons per day, or 110 second-feet); water sometimes shut off.

DIVERSIONS.—Ditch diverts all low-water flow of Olokele River.

REGULATION.—Flow regulated by head gates.

UTILIZATION.—Irrigation of sugar cane and domestic supply.

ACCURACY.—Estimates based on a rating curve well defined between 20 and 80 million gallons per day; good within these limits. Estimates September 27 to October 4, 1914, fair.

COOPERATION.—Gage-height record furnished by Hawaiian Sugar Co.

Discharge measurements of Olokele ditch at tunnel No. 12, near Makaweli, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1914—Dec. 29	J. C. Dort.....	2.15	49	31
1915—Mar. 27	W. V. Hardy.....	2.31	55	36
May 15	do.....	2.17	46	30
June 18	do.....	3.92	111	71

Discharge, in million gallons per day, of Olokele ditch at tunnel No. 12, near Makaweli, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	68	33	59	36	30	25	30	35	39	32	32	35
2.....	68	37	47	33	33	39	30	35	37	50	52	68
3.....	68	33	47	30	57	41	30	35	32	37	37	35
4.....	68	33	39	30	39	44	35	37	32	32	32	30
5.....	68	30	39	28	44	44	68	32	32	39	30	68
6.....	50	30	47	68	68	68	37	32	43	46	30	68
7.....	57	41	39	48	33	44	54	32	35	35	39	48
8.....	44	50	36	68	57	36	66	30	32	32	68	68
9.....	39	63	44	68	65	36	68	30	32	28	68	50
10.....	36	36	36	44	61	33	41	30	32	28	46	54
11.....	36	36	33	39	68	33	35	30	30	28	35	68
12.....	33	33	44	44	39	33	35	30	30	28	32	43
13.....	68	50	33	68	68	33	57	30	30	28	30	39
14.....	47	54	33	61	65	33	37	30	68	28	28	41
15.....	47	44	33	54	68	33	35	46	35	28	28	32
16.....	41	37	36	63	68	36	66	35	54	28	41	68
17.....	37	37	33	37	68	30	66	30	50	28	35	32
18.....	36	36	33	36	48	33	41	30	37	48	32	32
19.....	37	33	33	41	68	33	48	30	32	30	35	68
20.....	41	33	30	33	68	33	50	30	30	57	68	46
21.....	36	68	30	33	61	30	37	30	32	54	50	57
22.....	39	37	36	33	50	33	35	30	30	39	68	52
23.....	36	36	30	39	50	30	35	30	30	68	39	54
24.....	44	33	30	33	68	30	32	30	30	50	41	68
25.....	68	65	30	41	68	30	32	30	30	68	68	57
26.....	68	47	30	37	68	30	32	30	30	39	39	68
27.....	52	37	30	37	68	30	32	30	30	68	39	68
28.....	59	44	36	44	48	30	37	63	61	63	68	41
29.....	68	68	33	33	44	30	39	.....	48	39	50	35
30.....	37	68	30	30	14	30	37	.....	39	32	41	32
31.....	36	68	.....	30	.....	30	41	.....	35	.....	35	.....
1914-15.												
1.....	41	57	57	9	68	46	46	41	39	35	68	28
2.....	41	41	43	9	68	68	46	41	39	35	68	30
3.....	32	68	59	9	68	68	43	41	37	35	48	28
4.....	35	50	43	9	50	50	43	41	63	35	39	28
5.....	54	68	43	68	57	28	43	57	50	35	39	50
6.....	39	68	68	68	68	28	43	43	46	68	37	35
7.....	32	68	59	68	68	28	43	54	43	39	35	35
8.....	46	68	48	68	68	28	43	54	39	46	32	52
9.....	68	46	68	63	50	28	43	43	46	35	32	35
10.....	39	52	59	54	46	68	43	68	39	35	32	30
11.....	46	46	68	48	63	46	48	57	39	32	68	30
12.....	35	48	68	46	50	52	46	68	37	32	39	30
13.....	32	39	68	41	66	50	50	52	37	32	35	30
14.....	39	35	68	43	52	50	46	68	37	32	32	51
15.....	32	32	68	41	52	46	43	48	37	48	32	50
16.....	46	32	54	54	46	46	43	54	37	68	32	52
17.....	57	30	68	68	43	46	43	57	37	54	32	52
18.....	63	61	68	48	43	46	43	43	35	39	68	52
19.....	35	54	50	68	43	68	43	41	35	39	35	52
20.....	32	68	48	68	43	17	41	41	35	37	37	52
21.....	30	32	50	57	41	28	48	68	35	35	41	48
22.....	30	68	46	46	43	28	46	68	39	48	32	61
23.....	30	68	46	43	43	28	43	68	37	52	35	37
24.....	43	68	68	41	68	28	43	50	41	68	32	54
25.....	68	41	68	41	57	28	43	43	39	68	30	32
26.....	63	68	28	41	68	28	41	41	35	68	30	32
27.....	46	48	9	41	68	28	41	41	35	68	30	32
28.....	63	48	9	50	68	28	41	39	35	28	30	32
29.....	66	59	9	43	68	28	41	.....	35	68	30	37
30.....	61	68	9	52	68	28	41	.....	35	68	30	37
31.....	63	68	.....	68	.....	28	41	.....	35	.....	30	.....

NOTE.—Discharge determined from a rating curve well defined between 20 and 80 million gallons per day (31 and 124 second-feet).

Monthly discharge of Olokele ditch at tunnel No. 12, near Makaweli, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	68	33	48.8	75.5	1,510	4,640
August.....	68	30	43.5	67.3	1,350	4,140
September.....	59	30	36.3	56.2	1,090	3,340
October.....	68	28	42.5	65.8	1,320	4,040
November.....	68	14	55.1	85.3	1,650	5,070
December.....	68	25	34.6	53.5	1,070	3,290
January.....	68	30	42.5	65.8	1,320	4,040
February.....	63	30	32.9	50.9	922	2,830
March.....	68	30	36.7	56.8	1,140	3,490
April.....	68	28	40.6	62.8	1,220	3,740
May.....	68	28	43.1	66.7	1,340	4,100
June.....	68	30	50.8	78.6	1,520	4,680
The year.....	68	14	42.3	65.4	15,500	47,400
1914-15.						
July.....	68	30	45.4	70.2	1,410	4,320
August.....	68	30	53.8	83.2	1,670	5,120
September.....	68	9	50.6	78.3	1,520	4,660
October.....	68	9	47.5	73.5	1,470	4,520
November.....	68	41	56.8	87.9	1,700	5,230
December.....	68	17	39.2	60.7	1,220	3,730
January.....	50	41	43.6	67.5	1,350	4,150
February.....	68	39	51.1	79.1	1,430	4,390
March.....	63	35	39.0	60.3	1,210	3,710
April.....	68	28	46.1	71.3	1,380	4,240
May.....	68	30	38.4	59.4	1,190	3,650
June.....	61	28	40.1	62.0	1,200	3,690
The year.....	68	9	45.9	71.0	16,800	51,400

OLOKELE DITCH AT WEIR NEAR MAKAWELI, KAUAI.

LOCATION.—About 5 miles below intake and 7 miles northeast of Makaweli.

RECORDS AVAILABLE.—January 1, 1912, to June 30, 1915.

GAGE.—Vertical staff showing head on weir; read once daily.

DISCHARGE MEASUREMENTS.—Made by 12-foot sharp-crested weir, with end contractions; computations checked by current-meter measurements.

CHANNEL AND CONTROL.—Pool at weir.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 22½ inches July 3 and November 26, 1913 (discharge, 65 million gallons per day, or 101 second-feet); ditch occasionally dry.

DIVERSIONS.—Diverts all low-water flow of Olokele River.

REGULATION.—By head gates.

UTILIZATION.—Irrigation of sugar cane and for domestic supply.

ACCURACY.—Conditions for measurement by weir good; estimates good for low and medium stages; estimates for high stages may be in error, owing to fluctuation of stage not shown by the gage readings.

COOPERATION.—Gage-height record copied from records of Hawaiian Sugar Co.

Discharge, in million gallons per day of Olokele ditch at weir near Makaweli, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	62	38	51	29	27	27	30	35	46	33	32	38
2.....	64	34	44	32	27	31	29	32	34	43	37	46
3.....	65	31	42	29	45	42	30	31	31	35	39	41
4.....	64	30	37	27	42	47	39	31	29	32	32	32
5.....	57	31	42	27	40	45	36	30	30	32	29	34
6.....	50	33	45	30	41	49	45	30	34	37	28	57
7.....	45	43	40	45	40	51	43	30	36	33	31	54
8.....	40	43	34	56	40	38	56	30	31	29	45	54
9.....	37	40	33	59	43	33	60	29	29	27	59	57
10.....	35	36	31	54	59	32	49	29	28	27	54	56
11.....	35	33	31	45	60	31	36	29	27	27	44	45
12.....	40	48	32	43	56	31	34	28	27	27	32	44
13.....	49	49	29	44	58	31	43	28	28	27	27	45
14.....	45	49	29	56	57	31	39	30	34	26	27	39
15.....	42	39	29	59	56	31	34	31	43	26	28	33
16.....	41	40	30	47	59	30	43	42	35	26	34	31
17.....	38	34	29	40	59	30	57	34	45	27	35	37
18.....	37	33	29	34	57	30	50	30	39	29	40	35
19.....	42	33	28	38	60	31	42	29	33	37	32	45
20.....	38	35	28	34	64	31	50	28	30	38	38	54
21.....	35	40	32	31	60	31	41	28	30	49	48	54
22.....	35	35	30	33	56	32	35	28	29	43	57	48
23.....	37	36	27	36	60	30	33	28	28	54	45	49
24.....	44	45	27	34	63	29	32	28	27	59	37	51
25.....	48	45	27	36	64	29	31	28	27	57	48	58
26.....	51	42	27	35	65	29	30	27	27	44	49	46
27.....	44	46	26	33	60	29	33	28	27	49	43	57
28.....	40	57	27	33	50	29	45	33	31	58	48	46
29.....	44	57	38	33	45	28	42	.....	50	44	52	35
30.....	36	54	31	29	34	28	37	.....	42	34	44	32
31.....	33	55	.....	28	.....	28	36	.....	33	.....	42	.....
1914-15.												
1.....	39	54	57	28	58	55	38	38	35	30	59	26
2.....	43	46	47	45	57	62	20	37	37	30	52	27
3.....	35	48	56	45	50	60	41	37	33	30	39	27
4.....	42	48	47	48	49	47	40	37	42	30	35	26
5.....	45	57	45	54	56	33	36	40	47	30	36	45
6.....	49	63	55	55	58	27	37	40	47	42	33	34
7.....	38	63	51	59	49	29	39	34	36	45	31	32
8.....	42	61	49	58	44	31	43	40	37	32	29	41
9.....	45	51	44	52	43	38	38	37	35	30	29	41
10.....	45	50	47	45	45	50	39	41	35	30	29	29
11.....	50	45	60	42	45	45	.....	51	34	30	33	27
12.....	36	51	59	40	45	46	39	51	33	29	49	27
13.....	31	40	64	38	46	44	51	51	33	30	32	27
14.....	30	34	64	38	51	42	42	51	33	30	29	29
15.....	34	32	63	40	44	42	39	48	33	30	28	32
16.....	41	30	57	45	41	41	38	43	32	57	27	51
17.....	43	30	54	48	39	41	38	46	30	55	29	60
18.....	43	33	57	45	39	42	38	44	30	38	32	58
19.....	41	41	56	48	38	39	34	42	31	33	43	59
20.....	32	39	54	47	38	22	36	.....	31	33	33	61
21.....	29	41	52	45	38	24	38	54	31	33	34	54
22.....	27	46	50	40	39	27	45	61	32	40	30	45
23.....	30	59	43	38	45	28	39	51	33	39	31	41
24.....	46	62	51	38	56	33	37	45	33	49	29	33
25.....	46	54	62	38	55	32	37	39	32	59	27	36
26.....	58	50	44	39	61	32	37	36	33	62	27	29
27.....	49	54	17	41	63	33	37	35	31	61	27	29
28.....	48	45	.....	42	63	31	37	34	31	45	27	29
29.....	55	51	.....	43	62	27	37	.....	31	45	29	36
30.....	61	59	18	46	59	28	37	.....	31	60	27	31
31.....	60	61	.....	59	.....	37	37	.....	31	.....	27	.....

NOTE.—Discharge computed by Francis's formula $Q=3.33 (L-.2H) H^{3/2}$, where $L=12$ feet. Discharge, July 1 to Dec. 31, 1913, has been recomputed and differs slightly from equivalent values in second-feet published in Water Supply Paper 373, p. 35. No record Sept. 28, 29, 1914, Jan. 11, and Feb. 20, 1915.

Monthly discharge of Olokele ditch at weir near Makaweli, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acro-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	65	33	44.3	68.5	1,370	4,210
August.....	57	30	40.6	62.8	1,260	3,860
September.....	51	26	32.8	50.7	985	3,020
October.....	59	27	38.4	59.4	1,190	3,650
November.....	65	27	51.6	79.8	1,550	4,750
December.....	51	27	33.0	51.1	1,020	3,140
January.....	60	29	40.0	61.9	1,240	3,810
February.....	42	27	30.1	46.6	844	2,590
March.....	50	27	32.9	50.9	1,020	3,130
April.....	59	26	37.0	57.2	1,110	3,410
May.....	59	27	39.9	61.7	1,240	3,800
June.....	58	31	45.1	69.8	1,350	4,150
The year.....	65	26	38.8	60.0	14,200	43,500
1914-15.						
July.....	61	27	42.4	65.6	1,310	4,030
August.....	63	30	48.3	74.7	1,500	4,600
September 1-27, 30.....	64	17	50.8	78.6	1,420	4,370
October.....	59	28	44.8	69.3	1,390	4,260
November.....	63	38	49.2	76.1	1,480	4,530
December.....	62	22	37.7	58.3	1,170	3,590
January 1-10, 12-31.....	51	20	38.1	58.9	1,140	3,510
February.....	61	34	43.1	66.7	1,160	3,570
March.....	47	30	34.0	52.6	1,050	3,230
April.....	62	29	39.6	61.3	1,190	3,650
May.....	59	27	33.0	51.1	1,020	3,140
June.....	61	26	37.4	57.9	1,120	3,440
The period (361 days).....	64	17	41.4	64.1	15,000	45,900

HANAPEPE RIVER AT KOULA, NEAR ELEELE, KAUAI.

LOCATION.—200 feet above ford, half a mile above the siphon at Koula, and 5 miles north of Eleele.

RECORDS AVAILABLE.—August 18, 1910, to June 30, 1915.

GAGE.—Friez water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from cable.

CHANNEL AND CONTROL.—One channel at all stages; straight for 200 feet above and 400 feet below gage; banks high and wooded. Control composed of boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 9.0 feet at 11.30 p. m. September 26, 1914 (discharge, computed from extension of rating curve, approximately 5,000 million gallons per day, or 7,740 second-feet); minimum stage recorded, 0.95 foot December 30-31, 1913 (discharge, 7.1 million gallons per day, or 11 second-feet).

DIVERSIONS.—Hanapepe ditch diverts part of flow above station.

REGULATION.—By diversions only.

UTILIZATION.—Flow at low stages is diverted for irrigation of sugar cane, rice, and taro.

ACCURACY.—Estimates July 1, 1913, to May 8, 1914, based on a continuous gage-height record and a rating curve well defined below 100 million gallons per day; good below that limit and fair for higher stages. Estimates May 9, 1914, to June 30, 1915, based on a fairly well-defined curve; fair for all stages.

Discharge measurements of Hanapepe River at Koula, near Eleele, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1913—Oct. 14	D. E. Horner.....	1.56	46	30
1914—Jan. 20	W. V. Hardy.....	1.08	15	9.9
Aug. 17	J. C. Dort.....	1.08	20	13
Sept. 12	.....do.....	2.57	303	196
25	.....do.....	3.45	583	377
Nov. 1	.....do.....	1.55	74	48
Dec. 3	.....do.....	4.50	1,423	918
1915—June 22	D. E. Horner.....	1.32	37	24
22	.....do.....	1.24	32	20

Discharge, in million gallons per day, of Hanapepe River at Koula, near Eleele, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	56	43	33	9.7	9.0	81	8.0	8.0	9.0	14	10	144
2.....	179	19	47	84	19	63	8.0	8.0	9.0	10	12	114
3.....	68	9.0	26	7.8	12	56	8.0	8.0	8.0	9.0	9.0	28
4.....	76	8.4	10	7.8	8.4	43	8.0	8.0	8.0	8.0	9.0	18
5.....	89	7.8	9.7	7.8	9.0	19	9.0	8.0	12	9.0	9.0	56
6.....	32	8.4	28	34	13	34	8.0	8.0	10	9.0	9.0	68
7.....	23	12	13	43	9.0	39	9.0	8.0	9.0	8.0	12	62
8.....	15	11	9.0	272	8.4	16	30	8.0	9.0	8.0	340	136
9.....	14	9.0	9.0	127	61	15	34	8.0	9.0	8.0	332	74
10.....	13	8.4	8.4	36	111	13	9.0	8.0	8.0	9.0	36	45
11.....	12	7.8	8.4	49	286	9.7	8.0	8.0	8.0	8.0	16	45
12.....	11	17	8.4	34	390	9.0	8.0	9.0	9.0	8.0	13	50
13.....	39	16	8.4	78	293	9.0	9.0	9.0	9.0	8.0	12	21
14.....	15	15	8.4	41	81	9.0	8.0	9.0	17	8.0	12	18
15.....	14	9.7	9.0	28	57	8.4	8.0	14	9.0	8.0	18	14
16.....	14	8.4	8.4	22	59	7.8	19	10	99	9.0	18	21
17.....	12	8.4	7.8	14	39	7.8	45	9.0	19	9.0	16	14
18.....	12	7.8	7.8	19	34	8.4	12	9.0	9.0	10	12	16
19.....	13	7.8	8.4	9.7	193	7.8	37	9.0	8.0	8.0	12	93
20.....	23	7.8	7.8	9.0	222	7.8	15	9.0	8.0	10	107	114
21.....	12	21	7.8	12	81	7.8	9.0	9.0	8.0	12	242	74
22.....	10	8.4	7.8	28	84	7.8	9.0	9.0	8.0	17	107	320
23.....	9.7	7.8	7.8	19	108	7.1	9.0	9.0	8.0	130	40	86
24.....	11	8.4	7.8	39	119	7.1	9.0	9.0	8.0	55	40	153
25.....	26	16	7.8	57	227	7.1	8.0	9.0	8.0	27	107	62
26.....	44	12	7.8	47	159	7.1	8.0	9.0	8.0	14	40	107
27.....	16	9.7	7.8	34	85	7.1	55	9.0	9.0	114	68	74
28.....	9.7	28	17	22	56	7.1	15	12	27	27	100	32
29.....	19	92	7.8	9.7	235	7.1	9.0	.....	10	12	45	24
30.....	9.0	25	7.8	9.7	145	7.1	9.0	.....	9.0	10	28	36
31.....	9.0	80	.....	9.7	.....	7.1	9.0	.....	9.0	.....	21	.....
1914-15.												
1.....	32	56	50	200	93	153	32	9	9	9	50	9
2.....	18	40	114	253	121	368	28	9	9	9	24	9
3.....	24	50	56	153	50	1,350	18	9	9	9	16	9
4.....	24	40	32	144	21	440	12	9	21	9	14	13
5.....	62	395	74	93	24	320	11	9	12	10	11	10
6.....	36	128	190	68	107	210	11	11	11	28	10	9
7.....	36	86	74	93	40	144	11	9	10	10	10	11
8.....	36	62	45	100	21	100	10	9	18	9	10	32
9.....	50	45	68	62	16	68	10	9	14	9	10	11
10.....	100	32	68	50	16	56	10	13	10	9	10	10
11.....	36	100	56	40	24	40	10	12	10	9	80	10
12.....	21	40	286	28	21	36	10	13	9	10	13	10
13.....	14	28	275	24	21	28	11	9	9	12	10	10
14.....	16	21	540	24	14	24	9	10	9	9	10	11
15.....	14	16	231	21	13	21	9	9	9	74	9	40
16.....	74	14	80	28	12	18	9	9	9	62	10	128
17.....	32	14	74	40	12	16	9	9	9	18	10	86
18.....	50	28	86	18	12	16	9	9	9	10	18	144
19.....	14	32	68	24	12	114	9	9	9	10	14	286
20.....	12	32	62	24	11	93	9	14	9	9	10	86
21.....	12	28	62	24	11	62	13	107	9	9	10	36
22.....	11	144	36	16	11	45	9	74	10	9	9	24
23.....	18	286	56	14	12	45	9	16	9	9	9	13
24.....	18	107	380	14	18	45	9	14	13	14	9	12
25.....	200	68	600	13	18	45	9	10	9	114	9	11
26.....	50	62	1,380	13	80	45	9	10	9	700	9	10
27.....	36	32	480	13	264	40	9	9	9	460	9	10
28.....	45	36	171	16	297	68	9	9	9	153	9	13
29.....	264	74	200	107	264	56	9	.....	9	220	9	11
30.....	286	200	264	107	600	36	9	.....	9	107	9	21
31.....	114	162	.....	50	.....	36	9	.....	9	.....	9	.....

NOTE.—Discharge determined from rating curves applicable as follows: July 1, 1913, to May 8, 1914, well defined below 100 million gallons per day (155 second-feet); May 9, 1914, to June 30, 1915, fairly well defined.

Monthly discharge of Hanapepe River at Koula, near Elelee, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	179	9.0	29.2	45.2	905	2,780
August.....	92	7.8	17.7	27.4	550	1,680
September.....	47	7.8	12.1	18.7	363	1,110
October.....	272	7.8	36.9	57.1	1,140	3,510
November.....	390	8.4	107	166	3,210	9,850
December.....	81	7.1	17.5	27.1	543	1,660
January.....	55	8.0	14.5	22.4	449	1,380
February.....	14	8.0	8.93	13.8	250	767
March.....	99	8.0	12.8	19.8	398	1,220
April.....	130	8.0	19.9	30.8	596	1,830
May.....	340	9.0	59.7	92.4	1,850	5,680
June.....	320	14	70.6	109	2,120	6,500
The year.....	390	7.1	33.9	52.5	12,400	38,000
1914-15.						
July.....	286	11	56.6	87.6	1,760	5,380
August.....	395	14	79.3	123	2,460	7,540
September.....	1,380	32	205	317	6,160	18,900
October.....	253	13	60.5	93.6	1,870	5,760
November.....	606	11	74.5	115	2,240	6,860
December.....	1,350	16	133	206	4,140	12,700
January.....	32	9	11.3	17.5	350	1,080
February.....	107	9	16.0	24.8	448	1,370
March.....	21	9	10.3	15.9	318	980
April.....	700	9	71.0	110	2,130	6,540
May.....	80	9	14.5	22.4	449	1,380
June.....	286	9	36.5	56.5	1,100	3,360
The year.....	1,380	9	64.1	99.2	23,400	71,800

HILOA DITCH NEAR ELELEE, KAUAI.¹

LOCATION.—335 feet below intake, which is just above confluence of main and east branches of Hanapepe River, about 8 miles north of Elelee.

RECORDS AVAILABLE.—November 22, 1911, to June 30, 1915.

GAGE.—Vertical staff; read once daily except on Sundays.

DISCHARGE MEASUREMENTS.—Made from plank across ditch at gage.

CHANNEL AND CONTROL.—Cut in clay and gravel; straight for 20 feet above and below gage; discharge relation affected at times by backwater from confluence with Hanapepe ditch. Control shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 2.80 feet December 23, 1912 (discharge, 41 million gallons per day, or 63 second-feet); ditch occasionally dry.

DIVERSIONS.—Diverts all low flow of main branch of Hanapepe River above Hanapepe Falls.

REGULATION.—By head gates.

UTILIZATION.—Irrigation of sugar cane and domestic supply.

ACCURACY.—Except for period October 27, 1913, to March 16, 1914, estimates based on fairly well defined rating curves, and are fair for low and medium stages; estimates for high stages probably somewhat in error owing to fluctuation in stage not shown by the gage readings.

Discharge measurements of Hiloa ditch near Elelee, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1913—Oct. 14	D. E. Horner.....	2.18	46	29
1914—Jan. 21	W. V. Hardy.....	1.67	29	18
Aug. 17	J. C. Dort.....	1.95	33	21
Nov. 1	.....do.....	2.10	39	25
1915—June 22	D. E. Horner.....	2.28	46	30

¹ Described in Water-Supply Paper 373 (p. 38) as "at Hanapepe Falls, near Elelee."

Discharge, in million gallons per day, of Hiloa ditch near Eleele, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	28	19	26	19	18	5.5	16	17	16	12	17	24
2.....	28	25	26	18	21	5.0	16	16	14	19	17	24
3.....	28	23	27	17	24	4.8	16	16	14	12	15	24
4.....	29	21	25	17	18	4.5	17	15	13	12	13	24
5.....	30	20	27	25	18	24	18	15	13	12	12	27
6.....	28	22	28	31	28	24	16	14	18	13	12	28
7.....	26	24	25	26	22	-----	16	14	15	11	12	30
8.....	25	23	22	29	16	22	32	14	14	11	35	32
9.....	26	25	23	28	23	22	28	14	14	10	31	28
10.....	25	22	20	27	30	22	18	14	13	10	27	26
11.....	22	19	19	27	30	22	17	14	13	10	23	27
12.....	22	29	23	28	26	20	16	14	13	10	22	24
13.....	23	26	19	28	26	20	18	16	13	10	18	25
14.....	23	25	20	25	24	19	16	14	28	10	16	24
15.....	24	23	21	27	26	18	15	16	30	10	15	22
16.....	28	20	19	29	25	18	28	18	32	11	23	28
17.....	22	19	19	25	24	18	30	15	26	10	20	24
18.....	21	19	19	24	24	20	29	14	14	19	16	21
19.....	21	18	19	23	26	18	28	14	12	16	16	28
20.....	22	19	18	21	26	18	28	14	12	13	33	24
21.....	22	28	18	21	24	18	18	14	12	16	26	24
22.....	21	22	19	20	26	18	18	14	12	16	28	24
23.....	20	19	18	25	26	16	16	14	11	21	25	25
24.....	23	24	17	25	26	16	16	13	11	22	26	26
25.....	27	28	17	-----	28	15	16	13	11	20	28	26
26.....	30	25	17	-----	22	16	15	14	11	24	25	25
27.....	26	21	17	20	20	16	24	13	11	27	25	25
28.....	22	23	18	26	18	16	15	18	30	27	28	24
29.....	28	31	18	20	18	16	18	-----	21	23	26	24
30.....	21	27	18	18	12	16	16	-----	12	16	26	24
31.....	21	26	-----	18	-----	16	18	-----	12	-----	25	-----
1914-15.												
1.....	25	26	25	-----	25	25	21	18	16	15	30	16
2.....	24	26	25	-----	29	27	20	18	16	15	29	16
3.....	23	27	25	-----	27	17	20	18	18	15	28	16
4.....	23	25	26	-----	24	-----	20	18	26	15	28	16
5.....	24	33	25	-----	24	-----	20	20	26	15	26	20
6.....	25	24	24	25	29	-----	20	18	24	28	22	20
7.....	25	25	24	21	25	18	22	18	21	18	20	20
8.....	26	26	24	21	24	19	20	18	18	16	20	32
9.....	32	26	26	19	24	26	20	18	26	15	19	20
10.....	26	25	25	21	24	24	20	28	20	15	18	16
11.....	27	27	25	24	25	27	20	24	18	14	34	16
12.....	25	25	26	26	26	27	22	26	16	14	26	16
13.....	23	26	26	26	26	26	24	20	16	20	22	18
14.....	26	26	27	26	25	26	20	19	16	16	20	20
15.....	25	25	25	26	24	25	20	18	16	28	18	20
16.....	27	24	23	26	22	25	20	18	16	28	19	36
17.....	27	22	23	28	21	25	20	18	16	28	20	34
18.....	29	26	24	27	20	24	20	18	16	23	28	30
19.....	26	28	26	26	19	26	18	16	16	18	28	32
20.....	22	29	26	25	19	23	18	18	16	16	22	31
21.....	20	23	25	27	18	18	24	22	17	16	26	30
22.....	19	27	25	25	20	17	20	26	18	15	20	32
23.....	17	26	25	24	19	16	18	28	16	15	20	20
24.....	24	25	25	23	26	16	18	30	24	20	20	30
25.....	30	22	26	22	20	16	18	20	16	28	18	22
26.....	28	25	-----	22	25	16	18	18	16	32	18	20
27.....	25	-----	-----	22	25	16	18	18	16	22	16	19
28.....	27	26	-----	25	25	1	18	12	16	26	16	18
29.....	33	25	-----	22	26	5	18	-----	15	32	18	26
30.....	29	24	-----	24	27	22	18	-----	15	28	17	22
31.....	26	24	-----	27	-----	22	18	-----	15	-----	16	-----

NOTE.—Discharge determined from rating curves applicable as follows: July 1 to Oct. 26, 1913, fairly well defined; Oct. 27, 1913, to Mar. 16, 1914, poorly defined; Mar. 17 to Dec. 29, 1914, and Dec. 30, 1914, to June 30, 1915, fairly well defined. No water in ditch Oct. 25, 26, Dec. 7, 1913, Sept. 26 to Oct. 5, Dec. 4, 5, and probably Dec. 6, 1914. Gate closed Dec. 28, 1914; discharge represents leakage. Discharge interpolated for Sundays and holidays when gage was not read.

Monthly discharge of Hiloa ditch near Eleele, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July	30	20	24.6	38.1	762	2,340
August	31	18	23.1	35.7	715	2,200
September	28	17	20.7	32.0	622	1,910
October 1-24, 27-31	31	17	23.7	36.7	887	2,110
November	30	12	23.2	35.9	695	2,140
December 1-6, 8-31	24	4.5	16.8	26.0	504	1,550
January	32	15	19.6	30.3	608	1,860
February	18	13	14.7	22.7	411	1,260
March	32	11	15.8	24.4	491	1,500
April	27	10	15.1	23.4	453	1,390
May	35	12	22.0	34.0	681	2,090
June	32	21	25.4	39.3	761	2,340
The period (362 days)	35	4.5	20.4	31.6	7,390	22,700
1914-15.						
July	33	17	25.4	39.3	788	2,420
August	33	22	25.6	39.6	793	2,440
September 1-25	27	23	25.0	38.7	626	1,920
October 6-31	28	19	24.2	37.4	630	1,930
November	29	18	23.8	36.8	713	2,190
December 1-3, 7-31	27	1	20.5	31.7	575	1,760
January	24	18	19.7	30.5	611	1,870
February	30	12	20.0	30.9	561	1,720
March	26	15	18.0	27.8	557	1,710
April	32	14	20.3	31.4	610	1,870
May	34	16	22.0	34.0	682	2,090
June	36	16	22.8	35.3	684	2,100
The period (352 days)	36	1	22.2	34.3	7,330	24,000

HANAPEPE DITCH AT HANAPEPE FALLS, NEAR ELEELE, KAUAI

LOCATION.—250 feet below intake, 345 feet above confluence with Hiloa ditch, and 8 miles northeast of Eleele.

RECORDS AVAILABLE.—January 21, 1914, to June 30, 1915. November 22, 1911, to January 20, 1914, at station 150 feet below present gage.

GAGE.—Vertical staff installed January 21, 1914; read once daily except on Sundays. November 22, 1911, to January 20, 1914, vertical staff 150 feet below present gage at different datum.

DISCHARGE MEASUREMENTS.—Made in flume.

CHANNEL AND CONTROL.—Wooden flume; discharge relation affected at times by backwater caused by inflow of Hiloa ditch.

EXTREMES OF DISCHARGE.—Maximum stage recorded at present site, 2.2 feet at 8 a. m. May 9, 1914 (discharge, 17 million gallons, or 26 second-feet); ditch occasionally dry.

DIVERSIONS.—Diverts all low-water flow of East Branch of Hanapepe River.

REGULATIONS.—By head gates.

UTILIZATION.—Irrigation of sugar cane and domestic supply.

ACCURACY.—Rating curve fairly well defined and estimates fair except for high stages.

Backwater from inflow of Hiloa ditch occurred at this station whenever the gage in Hiloa ditch read 2.2 feet or over; computations corrected accordingly. See footnote to daily-discharge table.

Discharge measurements of Hanapepe ditch at Hanapepe Falls, near Eleele, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1914—Jan. 21	W. V. Hardy.....	1.40	13	8.6
Aug. 17	J. C. Dort.....	1.77	20	13
Nov. 1	do.....	1.80	21	14
1915—June 22	W. V. Hardy.....	1.66	17	11

Discharge, in million gallons per day, of Hanapepe ditch at Hanapepe Falls, near Elecle, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	Date.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914.							1914.						
1.....		7.4	8.1	6.2	9.2	12	16.....		6.8	12	6.2	11	12
2.....		7.4	6.2	6.2	8.6	14	17.....		6.2	9.8	5.1	10	13
3.....		7.4	6.2	6.2	8.0	12	18.....		6.2	7.4	7.4	9.2	12
4.....		7.4	6.2	5.6	7.4	11	19.....		6.2	6.8	7.7	8.6	14
5.....		6.8	6.2	6.2	6.8	12	20.....		6.2	6.2	8.0	14	12
6.....		6.8	6.8	6.8	6.8	11	21.....	8.6	6.2	6.2	8.0	12	12
7.....		6.8	6.2	6.2	6.8	11	22.....	8.0	6.2	6.2	7.4	11	13
8.....		6.8	6.2	5.6	16	11	23.....	8.0	6.2	6.2	13	11	14
9.....		6.8	6.2	5.6	17	11	24.....	7.4	6.2	6.2	12	12	14
10.....		6.8	6.2	5.6	14	12	25.....	7.4	6.2	6.2	12	12	13
11.....		6.8	5.6	5.6	11	12	26.....	7.4	6.2	6.2	12	11	13
12.....		6.8	5.6	5.6	11	12	27.....	11	6.2	6.2	11	12	12
13.....		8.0	5.6	5.6	9.8	12	28.....	9.2	10	13	11	11	12
14.....		6.8	12	5.1	9.2	12	29.....	8.0		9.0	9.8	11	12
15.....		6.8	12	5.1	8.6	12	30.....	7.4		6.2	8.6	11	12
							31.....	8.0		6.2		12	
Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	
1914-15.													
1.....	13	13	14		14	12	8.6	8.0	7.4	6.2	9.0	7.4	
2.....	12	14	14		14	16	9.1	8.0	7.4	6.2	10	7.4	
3.....	13	14	14		13	12	9.5	8.0	8.0	6.2	12	6.8	
4.....	13	13	13		12		10	8.0	12	6.2	11	6.8	
5.....	13	16	15		12		9.8	7.4	9.2	6.2	11	7.4	
6.....	13	13	14	12	12		9.8	7.4	8.6	13	10	7.7	
7.....	12	13	14	12	12	8.0	9.8	7.4	8.0	7.4	9.8	8.0	
8.....	13	13	13	12	12	9.8	9.8	7.4	7.4	6.2	9.8	13	
9.....	12	12	14	11	12	12	9.2	7.4	9.2	6.2	9.7	9.2	
10.....	13	12	14	11	12	12	9.2	9.8	8.0	6.2	8.6	8.0	
11.....	11	12	14	12	12	10	9.2	11	7.4	6.2	15	7.4	
12.....	12	12	14	12	12	10	10	8.6	7.4	6.2	12	7.4	
13.....	12	12	15	12	12	11	10	7.4	7.4	6.2	9.8	8.6	
14.....	13	13	15	12	12	11	9.2	7.4	7.1	6.2	9.2	9.8	
15.....	13	14	14	12	12	11	9.2	7.4	6.8	14	8.6	8.6	
16.....	11	14	13	12	12	11	8.6	7.4	6.8	14	8.6	12	
17.....	12	13	14	12	11	11	8.6	7.4	6.8	12	8.6	11	
18.....	13	13	14	12	11	11	8.6	7.4	6.8	10	10	10	
19.....	13	12	14	13	11	11	8.6	7.4	6.8	8.0	11	11	
20.....	13	12	14	12	10	9.8	8.6	7.4	6.8	8.0	9.8	10	
21.....	12	13	14	11	9.8	8.6	9.8	10	7.1	7.4	10	10	
22.....	12	13	13	12	9.9	8.6	8.6	13	7.4	6.8	8.6	11	
23.....	11	14	13	12	10	8.6	8.6	12	6.8	6.8	8.6	11	
24.....	13	15	13	12	14	8.6	8.6	11	9.8	8.6	8.6	11	
25.....	12	13	15	12	11	8.6	8.6	8.6	6.8	9.3	8.0	9.8	
26.....	12	13		12	14	8.6	8.0	8.0	6.8	10	8.0	9.2	
27.....	12	13		12	16	8.6	8.0	7.4	6.8	7.4	7.4	8.9	
28.....	12	13		13	13	.95	8.0	7.4	6.5	7.4	7.4	8.6	
29.....	12	13		12	13	4.6	8.0		6.2	12	7.4	9.2	
30.....	12	14		12	12	8.6	8.0		6.2	9.8	7.4	8.6	
31.....	13	15		13		8.6	8.0		6.2		7.4		

NOTE.—Discharge determined from a rating curve fairly well defined between 6 and 16 million gallons per day (9 and 25 second-feet). No water in ditch Sept. 26 to Oct. 5 and Dec. 4 to 6, 1914. Gate closed Dec. 28, 1914; discharge shown for that day represents leakage. Discharge for days on which gage in Hiloa ditch read 2.2 feet or over (27 million gallons per day or 42 second-feet, from Mar. 17 to Dec. 29, 1914, and 30 million gallons per day, or 46 second-feet, for remainder of the period) reduced to allow for probable effect of backwater. Discharge interpolated for Sundays and holidays, when gage was not read.

Monthly discharge of Hanapepe ditch at Hanapepe Falls, near Eleele, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean			
1914.						
January 21-31.....	11	7.4	8.22	12.7	90	277
February.....	10	6.2	6.81	10.5	191	585
March.....	13	5.6	7.29	11.3	226	694
April.....	13	5.1	7.55	11.7	226	695
May.....	17	6.8	10.6	16.4	329	1,010
June.....	14	11	12.2	18.9	367	1,120
The period (161 days).....	17	5.1	8.88	13.7	1,430	4,380
1914-15.						
July.....	13	11	11.5	17.8	358	1,090
August.....	16	12	13.2	20.4	409	1,260
September 1-25.....	15	13	13.9	21.5	348	1,070
October 6-31.....	13	11	12.0	18.6	312	957
November.....	16	9.8	12.1	18.7	363	1,110
December 1-3, 7-31.....	16	.95	9.70	15.0	272	834
January.....	10	8.0	8.95	13.8	278	851
February.....	13	7.4	8.39	13.0	235	721
March.....	12	6.2	7.48	11.6	232	712
April.....	14	6.2	8.21	12.7	246	756
May.....	15	7.4	9.43	14.6	292	897
June.....	13	6.8	9.16	14.2	275	843
The period (352 days).....	16	.95	10.3	15.9	3,620	11,100

HANAPEPE DITCH AT KOULA, NEAR ELEELE, KAUAI.

LOCATION.—At the first flume below siphon at Koula, 4 miles below intake and 4 miles north of Eleele.

RECORDS AVAILABLE.—January 1, 1910, to June 30, 1915.

GAGE.—Vertical staff; read once daily.

DISCHARGE MEASUREMENTS.—Made in flume.

CHANNEL AND CONTROL.—Wooden flume; straight for 20 feet above and below gage; some vegetable growth on bottom and sides of flume; control fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 4.97 feet November 30, 1913 (discharge, 67,000,000 gallons per day, or 104 second-feet); ditch occasionally dry.

DIVERSIONS.—Diverts part of flow of Hanapepe River.

REGULATION.—By head gates.

UTILIZATION.—Domestic supply and irrigation of sugar cane.

ACCURACY.—Estimates based on a fairly well-defined rating curve; fair for low and medium stages; estimates for high stages probably somewhat in error owing to fluctuation of stage not shown by the gage readings.

Discharge measurements of Hanapepe ditch at Koula, near Eleele, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1914—Aug. 17	J. C. Dort.....	3.08	48	31
1915—June 22	W. V. Hardy.....	3.02	53	34

Discharge, in million gallons per day, of Hanapepe ditch at Koula, near Eleele, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	33	25	33	24	25	60	25	24	21	20	26	33
2.....	33	33	33	22	30	53	24	22	20	20	26	33
3.....	33	28	33	21	30	46	27	22	19	20	23	33
4.....	33	26	32	19	26	39	26	22	18	19	22	33
5.....	33	26	33	19	26	32	25	21	18	22	21	33
6.....	33	25	33	32	33	32	24	22	22	22	20	33
7.....	33	32	33	32	25	28	26	20	20	19	21	33
8.....	33	32	29	34	24	23	32	20	19	18	33	33
9.....	33	30	28	33	32	23	33	20	18	18	33	33
10.....	30	18	26	32	33	24	26	20	18	18	33	33
11.....	30	18	25	32	33	28	24	20	18	18	33	33
12.....	29	25	28	33	33	28	23	20	18	18	32	33
13.....	33	33	23	33	31	28	25	22	18	18	29	33
14.....	32	33	25	32	34	28	23	20	25	18	27	33
15.....	32	30	26	32	34	28	22	24	25	18	26	33
16.....	30	26	23	32	34	27	32	24	32	18	32	33
17.....	31	25	23	31	34	27	33	22	32	18	30	33
18.....	31	24	24	30	34	28	30	20	23	24	28	33
19.....	28	23	25	28	34	27	32	20	21	20	26	33
20.....	30	17	28	27	33	26	31	19	20	22	33	33
21.....	30	33	21	25	32	26	27	19	20	22	33	33
22.....	28	28	23	26	34	26	25	19	19	22	33	33
23.....	25	25	21	33	34	26	23	19	18	32	33	33
24.....	29	25	21	33	34	26	22	19	18	33	33	33
25.....	33	32	21	32	25	26	22	19	18	33	33	33
26.....	33	32	20	31	21	25	21	19	18	29	33	33
27.....	33	25	21	30	22	25	22	18	18	33	33	33
28.....	29	28	31	30	22	25	30	24	32	32	33	33
29.....	32	33	28	27	45	25	26	23	23	31	33	33
30.....	28	33	21	25	67	25	24	20	20	26	33	33
31.....	26	33	26	26	25	25	26	19	19	33	33	33
1914-15.												
1.....	34	33	34	34	34	34	14	26	25	22	33	24
2.....	34	33	34	34	34	33	16	26	24	21	33	23
3.....	34	34	34	34	34	26	14	26	25	21	33	22
4.....	32	33	34	34	34	30	28	26	33	21	33	27
5.....	34	34	34	34	33	30	30	28	31	21	31	26
6.....	34	34	34	34	33	29	23	29	33	30	24	24
7.....	34	34	34	34	34	20	30	26	26	24	28	27
8.....	34	34	34	26	33	18	30	26	28	22	28	33
9.....	34	33	34	26	33	33	30	26	32	21	26	27
10.....	34	33	34	27	32	29	32	27	27	21	26	24
11.....	34	34	34	33	33	30	30	26	20	33	22	22
12.....	33	34	34	33	33	31	32	25	20	33	22	22
13.....	33	34	34	33	34	34	27	24	25	31	22	22
14.....	34	33	34	33	32	33	30	26	23	23	28	26
15.....	34	34	34	33	32	33	29	26	23	28	27	27
16.....	34	33	34	33	31	33	29	26	23	33	26	33
17.....	34	33	34	33	30	33	28	26	23	33	27	33
18.....	34	34	33	33	30	33	28	25	23	26	32	33
19.....	34	34	34	33	29	28	25	22	22	25	33	33
20.....	33	34	34	34	29	28	26	22	22	24	31	26
21.....	32	34	34	34	28	14	34	32	22	22	32	33
22.....	18	34	34	34	28	14	28	33	26	22	28	32
23.....	31	34	34	34	29	14	28	33	23	22	29	32
24.....	34	34	34	34	33	14	28	33	32	28	28	32
25.....	34	34	34	33	30	14	27	28	24	33	26	28
26.....	34	34	33	33	33	14	27	26	22	33	26	27
27.....	34	34	33	33	29	27	26	22	33	25	27	27
28.....	34	34	34	34	27	27	25	22	22	26	26	26
29.....	34	33	34	34	27	27	27	22	33	25	30	30
30.....	34	33	34	29	15	27	27	22	33	24	27	27
31.....	26	33	34	34	14	27	27	22	22	23	23	23

NOTE.—Discharge determined from a rating curve fairly well defined above 23 million gallons per day (36 second-feet). Discharge interpolated Oct. 11, 12, 25-27, Nov. 29, Dec. 1-4, 7, 12, 14, 1913. No water in ditch Mar. 12, 13, Sept. 18, 20, Sept. 26 to Oct. 7, Nov. 12, 28, 29, Dec. 6, 10, 11, 19, 20, 27-29, 1914, and Apr. 28, 1915.

Monthly discharge of Hanapepe ditch at Koula, near Elele, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	33	25	30.9	47.8	959	2,940
August.....	33	17	27.6	42.7	856	2,630
September.....	33	20	26.4	40.8	791	2,430
October.....	34	19	28.9	44.7	896	2,750
November.....	67	21	31.8	49.2	954	2,930
December.....	60	23	29.5	45.6	915	2,810
January.....	33	21	26.2	40.5	811	2,490
February.....	24	18	20.7	32.0	580	1,780
March 1-11, 14-31.....	32	18	21.1	32.6	612	1,880
April.....	33	18	22.7	35.1	681	2,090
May.....	33	20	29.6	45.8	917	2,820
June.....	33	33	33.0	51.1	990	3,040
The period (363 days).....	67	17	27.4	42.4	9,960	30,600
1914-15.						
July.....	34	18	32.9	50.9	1,020	3,130
August 1-29.....	34	33	33.7	52.1	977	3,000
September 1-17, 19, 21-25.....	34	34	34.0	52.6	782	2,400
October 8-31.....	34	26	32.5	50.3	781	2,390
November 1-11, 13-27, 30.....	34	28	31.6	48.9	853	2,620
December 1-5, 7-9, 12-18, 21-26, 30-31.....	34	14	24.7	38.2	568	1,740
January.....	34	14	27.5	42.5	852	2,620
February.....	33	23	27.5	42.5	770	2,360
March.....	33	22	24.9	38.5	773	2,370
April 1-27, 29-30.....	33	20	25.6	39.6	743	2,280
May.....	33	23	28.8	44.6	894	2,740
June.....	33	22	27.6	42.7	828	2,540
The period (337 days).....	34	14	29.2	45.2	9,840	30,200

HULEIA RIVER NEAR LIHUE, KAUAI.

LOCATION.—About 300 feet above stone bridge where wagon road from Lihue to the rice plantation crosses stream; about 4 miles southeast of Lihue.

RECORDS AVAILABLE.—May 8, 1912, to June 30, 1915.

GAGE.—Vertical staff for low water; inclined staff for high water; read once daily.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—One channel at all stages; straight for 200 feet above and below gage, current sluggish at low stages; right bank low with gentle slope; left bank high and steep. Control composed of large bowlders and rock ledge; fairly permanent between extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 10.2 feet March 23, 1913 (discharge, approximately 176 million gallons per day, or 272 second-feet); minimum stage recorded, 6.1 feet April 2 to 4, 1915 (discharge, 2.8 million gallons per day, or 4.3 second-feet).

DIVERSIONS.—Several above station.

REGULATION.—None except by diversions.

UTILIZATION.—Irrigation of sugar cane, rice, and taro.

ACCURACY.—Estimates poor because of lack of sufficient discharge measurements to define changes in discharge relation.

Discharge measurements of Huleia River near Lihue, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1914—Jan. 22	W. V. Hardy.....	6.53	15	10
Nov. 11	J. C. Dort.....	6.89	23	15
Dec. 26	.....do.....	6.56	14	8.7

Discharge, in million gallons per day, of Huleia River near Lihue, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	9.0	5.0	9.0	3.9	7.8	45	7.8	6.3	6.3	6.3	6.3	65
2.....	30	7.8	7.1	3.9	43	43	7.8	6.3	6.3	6.3	6.3	36
3.....	16	6.3	6.3	3.9	16	47	7.8	6.3	6.3	6.3	6.3	18
4.....	9.7	5.0	5.2	5.0	13	41	7.8	6.3	6.3	7.8	6.3	14
5.....	7.8	5.0	5.0	6.4	12	36	7.8	6.3	6.3	12	6.3	9.7
6.....	7.1	5.0	5.0	7.1	12	34	7.8	6.3	6.3	7.8	7.0	8.8
7.....	6.5	5.0	5.0	7.8	14	52	7.8	6.3	6.3	7.0	8.8	7.8
8.....	6.3	5.0	5.0	112	12	45	7.8	6.3	6.3	6.3	75	7.0
9.....	5.6	5.0	5.0	123	12	39	9.7	6.3	6.3	6.3	23	7.0
10.....	5.6	5.0	5.0	28	20	34	7.8	6.3	6.3	6.3	12	7.0
11.....	5.6	5.0	5.0	12	28	18	7.8	6.3	5.6	6.3	8.8	6.3
12.....	5.1	5.0	5.0	9.0	36	15	7.8	6.3	5.6	6.3	7.8	6.3
13.....	5.0	5.0	5.0	7.8	23	12	7.8	5.6	5.0	6.3	7.8	6.3
14.....	5.0	4.8	5.0	7.8	16	10	7.8	5.6	5.0	6.3	7.8	7.0
15.....	5.0	4.4	4.8	7.1	43	9.7	7.8	5.6	5.0	6.3	7.0	6.3
16.....	5.0	4.0	4.8	7.1	12	9.0	7.8	5.6	61	6.3	7.0	6.3
17.....	5.0	4.0	4.8	7.1	25	7.8	7.8	5.6	7.8	6.3	7.0	6.3
18.....	5.0	3.9	4.8	15	25	7.8	7.8	5.6	7.0	6.3	6.3	6.3
19.....	5.0	3.9	4.4	7.1	16	7.8	7.8	5.6	6.3	7.0	61	6.3
20.....	5.0	3.9	4.4	7.1	75	7.8	7.8	5.6	6.3	8.8	47	8.8
21.....	5.0	3.9	5.2	6.4	85	7.8	7.8	5.6	6.3	18	36	9.7
22.....	5.0	3.9	5.0	6.4	47	7.8	7.0	5.6	6.3	43	9.7	75
23.....	5.0	3.9	4.4	7.8	61	7.8	7.0	5.6	6.3	9.7	7.8	36
24.....	5.0	3.9	4.0	14	41	7.8	6.3	5.6	6.3	8.8	7.8	12
25.....	5.0	3.9	3.9	48	70	7.8	6.3	5.6	6.3	7.8	7.8	12
26.....	5.0	3.9	3.9	45	61	7.8	6.3	6.3	8.8	7.8	7.8	11
27.....	5.0	3.9	3.9	23	47	7.8	39	6.3	7.0	7.0	8.8	9.7
28.....	5.0	3.9	3.9	16	39	7.8	7.8	6.3	47	7.0	65	9.7
29.....	5.0	9.0	3.9	10	32	7.8	7.8	.....	7.8	6.3	75	8.8
30.....	5.0	7.8	3.9	9.7	32	7.8	7.0	.....	6.3	6.3	23	8.8
31.....	5.0	6.3	.....	7.8	.....	7.8	6.3	.....	6.3	.....	20	.....
1914-15.												
1.....	7.8	8.8	9.7	60	11	65	6.0	3.6	3.6	3.2	5.4	4.8
2.....	7.8	7.0	8.8	65	8.4	60	6.0	3.6	3.6	2.8	60	4.8
3.....	7.8	8.8	7.8	65	6.8	70	6.0	3.6	3.6	2.8	18	5.4
4.....	7.8	7.8	9.7	60	6.0	60	6.0	3.6	3.6	2.8	7.6	4.8
5.....	7.8	52	9.7	52	13	65	5.4	3.6	3.6	4.8	6.0	4.8
6.....	7.8	12	7.8	62	60	70	5.4	3.6	3.6	4.2	5.4	4.8
7.....	7.8	12	11	65	52	52	5.4	3.6	3.6	3.6	4.8	4.8
8.....	11	9.7	9.7	60	44	46	4.8	3.6	3.6	3.6	4.8	4.8
9.....	9.7	19	8.8	60	13	40	4.8	3.6	3.6	3.6	4.8	4.8
10.....	12	14	7.8	58	11	34	5.4	3.6	3.6	3.6	4.8	4.8
11.....	58	24	7.8	52	32	28	5.4	3.6	3.6	3.6	4.8	4.8
12.....	43	14	7.8	11	28	21	5.4	3.6	3.6	3.6	4.8	4.8
13.....	12	9.7	9.7	7.6	21	13	5.4	3.6	3.6	4.2	4.8	4.8
14.....	9.7	9.7	14	6.8	15	12	5.4	3.6	3.6	4.2	4.8	4.8
15.....	7.8	9.7	36	6.0	13	9.2	5.4	3.6	3.6	4.8	4.8	4.8
16.....	7.8	9.7	32	6.0	12	8.4	4.8	3.6	3.6	4.2	4.8	4.8
17.....	7.0	9.7	18	6.0	11	7.6	4.8	3.6	3.6	3.6	4.8	4.8
18.....	7.0	9.7	13	6.0	11	6.8	4.2	3.6	3.6	3.6	4.8	4.8
19.....	6.3	9.7	12	5.4	10	75	3.6	3.6	3.6	3.6	4.8	4.8
20.....	7.8	9.7	12	5.4	9.2	36	3.6	3.6	3.6	3.6	4.8	4.8
21.....	7.8	9.7	12	4.8	7.6	15	3.6	3.6	3.6	3.6	4.8	4.8
22.....	7.8	8.8	14	4.8	6.8	7.6	3.6	3.6	3.6	3.6	4.8	4.8
23.....	7.8	7.8	15	4.8	6.0	7.6	3.6	3.6	3.6	3.6	4.8	4.8
24.....	7.8	7.0	65	4.8	6.0	6.8	3.6	3.6	3.6	3.6	4.8	4.8
25.....	7.8	7.0	68	4.8	6.0	6.0	3.6	3.6	3.6	3.6	4.8	4.8
26.....	7.0	6.3	75	4.8	6.0	6.0	3.6	3.6	3.2	26	4.8	4.8
27.....	12	6.3	52	4.8	6.0	6.0	3.6	3.6	3.2	60	4.8	4.8
28.....	8.8	6.3	52	4.8	65	6.0	3.6	3.6	3.2	32	4.8	4.8
29.....	7.8	7.0	60	4.8	58	6.0	3.6	.....	3.2	7.6	4.8	4.8
30.....	9.7	7.8	58	4.8	75	6.0	3.6	.....	3.2	6.0	4.8	4.8
31.....	7.8	52	.....	6.0	.....	6.0	3.6	.....	3.2	.....	4.8	.....

NOTE.—Discharge determined from a poorly defined rating curve.

Monthly discharge of Huleia River near Lihue, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	30	5.0	6.75	10.4	209	642
August.....	9.0	3.9	4.91	7.60	152	467
September.....	9.0	3.9	4.92	7.61	148	453
October.....	123	3.9	18.8	29.1	582	1,790
November.....	85	7.8	32.5	50.3	976	2,990
December.....	52	7.8	19.6	30.3	607	1,860
January.....	39	6.3	8.60	13.3	266	818
February.....	6.3	5.6	5.98	9.25	167	514
March.....	61	5.0	9.43	14.6	292	897
April.....	43	6.3	8.68	13.4	260	799
May.....	75	6.3	19.1	29.6	594	1,820
June.....	75	6.3	14.6	22.6	439	1,340
The year.....	123	3.9	12.9	20.0	4,690	14,400
1914-15.						
July.....	58	6.3	11.2	17.3	346	1,070
August.....	52	6.3	12.7	19.6	393	1,210
September.....	75	7.8	24.2	37.4	726	2,230
October.....	65	4.8	24.9	38.5	773	2,370
November.....	65	6.0	21.0	32.5	630	1,930
December.....	75	6.0	27.7	42.9	858	2,640
January.....	6.0	3.6	4.61	7.13	143	439
February.....	3.6	3.6	3.60	5.57	101	302
March.....	3.6	3.2	3.52	5.45	109	339
April.....	60	2.8	7.45	11.5	224	685
May.....	60	4.8	7.17	11.1	222	686
June.....	5.4	4.8	4.82	7.46	145	444
The year.....	75	2.8	12.8	19.8	4,670	14,300

SOUTH FORK OF WAILUA RIVER NEAR LIHUE, KAUAI.¹

LOCATION.—One mile above Waiehu Falls and about 7 miles northeast of Lihue.

RECORDS AVAILABLE.—December 10, 1911, to June 30, 1915.

GAGE.—Friez water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from cable.

CHANNEL AND CONTROL.—One channel at all stages; straight for 600 feet above and below station; right bank is steep and high; left bank slopes gently. Control composed of gravel and small boulders; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 14.75 feet at 7 p. m. September 26, 1914 (discharge, computed from extension of rating curve, approximately 10,000 million gallons per day, or 15,500 second-feet); minimum stage recorded, 3.09 feet February 14 to 15, 1912 (discharge, 2.9 million gallons per day, or 4.5 second-feet).

DIVERSIONS.—Several diversions above station for irrigation and power development.

REGULATION.—By diversions above station.

UTILIZATION.—Water going to waste except for a small amount used for irrigation of rice and taro.

ACCURACY.—Estimates are based on rating curves fairly well defined for low and medium stages and a continuous gage-height record; fair for all stages except extreme floods.

Discharge measurements of South Fork of Wailua River near Lihue, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1914—Jan. 23	W. V. Hardy.....	3.25	43	28
June 7	J. C. Dort.....	3.75	128	82
22	do.....	8.20	3,440	2,220
Aug. 8	do.....	4.04	200	129
25	do.....	3.80	146	94
Sept. 14	do.....	5.20	559	361
14	do.....	6.10	1,060	685
1915—Feb. 18	D. E. Horner.....	2.60	14	9.3
Mar. 18	W. V. Hardy.....	2.51	11	7.0
June 24	D. E. Horner.....	3.28	88	57

¹ Described in Water-Supply Papers 318 (pp. 94-95), 336 (pp. 66-68), and 373 (pp. 46-47), as "above Waiehu Falls, near Lihue."

Discharge, in million gallons per day, of South Fork of Wailua River near Lihue, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date	July.	Aug	Sept	Oct.	Nov.	Dec	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	122	83	131	8.0	69	.....	37	37	28	48	80	.....
2.....	264	50	168	12	76	.....	37	37	20	48	.....	.....
3.....	106	32	140	17	69	.....	42	37	20	24	.....	.....
4.....	106	27	62	17	69	.....	37	37	20	20	.....	.....
5.....	122	27	56	17	69	.....	48	37	32	60	.....	.....
6.....	62	27	122	69	69	.....	42	24	42	48	.....	.....
7.....	50	32	90	62	69	.....	48	20	24	24	.....	.....
8.....	50	32	50	492	69	.....	226	20	37	20	.....	186
9.....	50	27	44	440	198	.....	186	16	24	20	.....	124
10.....	38	27	38	140	242	73	87	16	16	20	.....	108
11.....	38	27	38	122	457	80	80	16	16	20	.....	132
12.....	38	38	32	106	682	73	87	16	16	24	.....	140
13.....	98	56	27	149	562	73	73	16	13	24	.....	94
14.....	56	50	27	106	220	66	66	13	28	20	.....	87
15.....	50	44	38	131	158	66	80	13	32	16	.....	108
16.....	50	32	32	98	158	66	206	28	132	20	.....	94
17.....	44	27	27	98	140	66	167	16	60	20	.....	108
18.....	38	22	27	114	131	66	80	13	28	28	.....	124
19.....	38	27	27	83	582	60	80	13	24	20	.....	176
20.....	69	27	22	69	.....	54	73	13	24	16	.....	206
21.....	44	98	17	122	.....	54	42	13	20	24	.....	124
22.....	38	44	27	158	.....	54	32	13	20	28	.....	590
23.....	32	32	8.0	83	.....	54	28	13	16	278	.....	186
24.....	38	32	12	140	.....	54	28	13	16	116	.....	246
25.....	90	50	17	106	.....	48	28	16	16	66	.....	116
26.....	149	38	17	83	.....	54	28	13	32	60	.....	176
27.....	76	27	8.0	69	.....	48	246	13	32	140	.....	149
28.....	50	62	8.0	131	.....	48	101	20	80	108	.....	108
29.....	83	168	8.0	76	.....	42	54	.....	80	80	.....	101
30.....	50	76	12	83	.....	42	42	.....	60	80	.....	108
31.....	50	168	.....	83	.....	42	42	.....	54	.....	.....	.....
1914-15.												
1.....	108	158	140	385	250	298	48	44	12	8.0	223	29
2.....	94	108	226	303	270	279	48	44	12	8.0	154	26
3.....	94	124	140	223	205	260	66	48	12	8.0	130	36
4.....	94	124	108	205	123	241	66	48	29	12	109	70
5.....	91	478	186	170	138	223	66	52	12	12	85	56
6.....	88	236	278	162	292	303	66	44	29	102	66	44
7.....	85	176	167	196	214	410	66	40	17	32	61	48
8.....	82	132	132	205	154	281	66	40	20	12	52	154
9.....	79	108	167	154	196	196	61	40	52	10	48	75
10.....	77	94	158	154	116	170	52	61	23	8.0	44	52
11.....	75	236	140	130	102	123	61	70	14	8.0	130	44
12.....	73	140	325	116	90	90	61	80	12	8.0	66	44
13.....	60	124	278	109	85	85	66	61	10	66	52	40
14.....	66	108	478	102	80	80	56	52	10	32	44	44
15.....	60	87	325	109	70	75	56	42	10	85	40	66
16.....	246	73	149	109	66	70	56	32	8.0	162	36	170
17.....	124	73	132	116	70	70	56	22	8.0	96	36	146
18.....	176	108	158	90	66	66	52	12	8.0	56	80	146
19.....	94	101	116	96	61	123	52	12	10	52	75	348
20.....	73	94	158	90	61	85	48	10	10	36	52	138
21.....	60	87	176	102	61	80	66	96	12	26	52	102
22.....	60	236	108	85	56	85	52	85	12	29	48	85
23.....	66	338	186	80	61	96	48	40	12	29	48	70
24.....	87	206	915	80	80	96	48	56	14	44	44	61
25.....	236	108	1,260	75	66	96	48	29	17	96	40	56
26.....	108	116	3,420	75	130	75	48	20	10	815	44	56
27.....	94	80	1,500	75	385	61	44	17	8.0	990	36	61
28.....	94	80	398	80	385	70	48	14	8.0	250	32	85
29.....	362	158	336	70	336	56	52	.....	8.0	325	32	90
30.....	512	267	348	80	317	56	56	.....	6.5	292	29	85
31.....	289	312	.....	130	.....	52	48	.....	8.0	.....	29	.....

NOTE.—Discharge determined from rating curves applicable as follows: July 1 to Nov. 19, 1913, fairly well defined below 200 million gallons per day (309 second-feet); Sept. 27, 1914, to June 30, 1915, fairly well defined below 400 million gallons per day (619 second-feet). Discharge interpolated July 5-11, Dec. 1-4, 1914, and Feb. 14-17, 1915. No records for periods for which discharge is not given. Estimates July 1 to Dec 31, 1913, supersede those published in Water-Supply Paper 373, p. 47.

Monthly discharge of South Fork of Wailua River near Lihue, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	264	32	80.3	124	2,490	7,640
August.....	168	22	48.7	75.4	1,510	4,630
September.....	168	8.0	44.4	68.7	1,330	4,090
October.....	492	8.0	112	173	3,480	10,700
November 1-18.....	682	69	215	333	4,090	12,500
December 10-31.....	80	42	58.3	90.2	1,280	3,940
January.....	246	28	79.1	122	2,450	7,530
February.....	37	13	19.7	30.5	552	1,690
March.....	132	13	34.3	53.1	1,060	3,260
April.....	278	16	50.7	78.4	1,520	4,670
June 8-30.....	590	87	156	241	3,590	11,000
1914-15.						
July.....	512	60	126	195	3,910	12,000
August.....	478	73	157	243	4,870	14,900
September.....	3,420	108	420	650	12,600	38,700
October.....	385	70	134	207	4,150	12,700
November.....	385	56	153	237	4,580	14,100
December.....	410	52	140	217	4,350	13,300
January.....	66	44	55.7	86.2	1,730	5,300
February.....	96	10	43.2	66.8	1,210	3,710
March.....	52	6.5	14.0	21.7	434	1,330
April.....	990	8.0	124	192	3,710	11,400
May.....	223	29	65.1	101	2,020	6,190
June.....	348	26	84.2	130	2,530	7,750
The year.....	3,420	6.5	126	195	46,100	141,000

HANAMAULU DITCH NEAR LIHUE, KAUAI.

LOCATION.—In flume 180 feet below point where Kauai Electric Co.'s power line crosses the South Fork of Wailua River, about 6 miles northwest of Lihue.

RECORDS AVAILABLE.—July 1, 1910, to June 30, 1915.

GAGE.—Vertical staff; read once daily. New datum September 30, 1911.

DISCHARGE MEASUREMENTS.—Made in flume.

CHANNEL AND CONTROL.—Wooden flume; straight for 20 feet above and below gage aquatic plants grow on bottom and sides of flume. Control is rock section at end of flume; probably permanent; discharge relation changed by repairs to flume and ditch between October 1, 1914, and January 2, 1915.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 2.80 feet August 6, 1913 (discharge, 36 million gallons per day, or 56 second-feet); ditch occasionally dry.

DIVERSIONS.—Ditch diverts part of flow of South Fork of Wailua River.

REGULATION.—By head gates.

UTILIZATION.—Irrigation of sugar cane and domestic supply.

ACCURACY.—Estimates fair for all stages; rating curves well defined but only one gage reading daily.

Discharge measurements of Hanamaulu ditch near Lihue, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1914—Nov. 10	J. C. Dort.....	1.23	11	7
1915—Feb. 17	D. E. Horner.....	2.34	29	19
June 25	do.....	2.14	24	16

Daily discharge, in million gallons per day, of Hanamaulu ditch near Lihue, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	26	25	24	26	16	.....	21	21	23	26	28	12
2.....	25	23	25	25	15	.....	21	21	23	26	29	12
3.....	25	23	25	22	16	.....	21	23	23	26	28	12
4.....	26	25	24	21	9.7	.....	21	23	23	26	28	12
5.....	26	25	24	21	9.7	.....	21	23	24	27	28	11
6.....	26	36	25	26	9.7	.....	20	23	23	27	27	26
7.....	26	25	26	30	9.7	.....	22	23	23	26	27	26
8.....	26	25	26	30	9.7	.....	6.6	23	23	26	30	25
9.....	25	25	25	21	9.7	.....	6.6	23	23	26	14	25
10.....	25	23	25	21	9.7	7.8	6.6	23	33	26	29	22
11.....	25	23	25	26	9.7	7.8	12	23	30	26	28	26
12.....	25	23	26	26	7.1	7.8	12	23	21	23	21	26
13.....	23	26	26	23	7.1	21	15	23	24	21	27	26
14.....	23	26	23	22	7.8	21	15	23	24	20	27	27
15.....	23	26	23	22	9.7	21	15	21	24	20	27	27
16.....	23	26	23	23	9.7	21	15	21	25	18	27	27
17.....	23	25	23	23	21	21	16	22	24	18	27	26
18.....	23	25	23	23	21	16	16	22	23	29	26	26
19.....	23	25	23	16	21	15	21	23	23	27	26	26
20.....	26	25	23	23	21	15	21	23	23	26	28	26
21.....	26	26	23	23	8.4	15	21	23	23	26	28	26
22.....	23	25	26	23	8.4	15	21	22	23	25	29	21
23.....	23	25	26	23	.....	15	21	22	23	24	28	21
24.....	28	25	26	21	.....	15	21	26	22	24	29	27
25.....	28	25	26	21	.....	15	21	26	22	21	29	27
26.....	29	25	25	21	.....	15	20	26	23	21	29	27
27.....	26	25	25	21	.....	15	20	26	24	21	29	28
28.....	26	25	25	21	.....	21	23	23	24	26	29	28
29.....	23	26	25	21	3.2	21	23	.....	24	28	12	28
30.....	23	24	25	21	3.2	21	23	.....	24	28	12	28
31.....	23	24	.....	21	.....	21	23	.....	24	.....	12	.....
1914-15.												
1.....	28	27	19	.....	.....	.....	.....	18	18	15	12	18
2.....	28	27	19	.....	.....	.....	.....	18	18	15	7.7	18
3.....	28	27	19	.....	.....	.....	17	18	19	15	7.7	18
4.....	28	27	19	.....	.....	.....	16	12	19	15	9.6	19
5.....	28	28	20	.....	.....	.....	16	13	19	15	6.8	18
6.....	27	27	27	.....	.....	.....	16	18	19	18	17	18
7.....	28	20	27	.....	.....	.....	16	18	19	17	17	18
8.....	30	20	27	.....	.....	.....	16	18	19	19	17	19
9.....	30	20	27	.....	.....	.....	17	17	19	18	17	18
10.....	30	26	27	.....	.....	.....	17	19	19	17	17	18
11.....	30	16	27	.....	.....	.....	17	19	18	16	19	18
12.....	28	16	29	.....	.....	.....	17	19	18	16	16	18
13.....	27	16	28	.....	.....	.....	17	19	18	19	16	18
14.....	26	13	29	.....	.....	.....	17	19	18	18	17	18
15.....	26	13	28	.....	.....	.....	17	18	17	19	17	18
16.....	26	13	26	.....	.....	.....	17	18	17	17	17	19
17.....	26	13	26	.....	.....	.....	17	18	17	17	17	18
18.....	28	13	28	.....	.....	.....	17	17	17	16	17	18
19.....	27	13	28	.....	.....	.....	17	17	17	16	18	18
20.....	27	13	28	.....	.....	.....	17	17	16	16	16	17
21.....	27	13	28	.....	.....	.....	19	20	16	16	17	16
22.....	27	17	25	.....	.....	.....	18	19	17	16	16	16
23.....	27	17	25	.....	.....	.....	18	19	17	16	16	16
24.....	28	17	29	.....	.....	.....	18	19	20	16	16	16
25.....	28	19	.....	.....	.....	.....	18	18	16	16	16	16
26.....	29	19	.....	.....	.....	.....	18	18	16	17	15	16
27.....	30	19	.....	.....	.....	.....	18	18	16	9.1	18	16
28.....	28	19	.....	.....	.....	.....	18	18	15	17	18	16
29.....	27	19	.....	.....	.....	.....	17	.....	15	21	18	16
30.....	27	19	.....	.....	.....	.....	13	.....	15	17	18	16
31.....	27	19	.....	.....	.....	.....	19	.....	16	.....	18	.....

NOTE.—Discharge determined from rating curves applicable as follows: July 1, 1913, to Sept. 24, 1914, fairly well defined; Jan. 3 to June 30, 1915, well defined. No water in ditch Nov. 23-28, Dec. 1-9, 1913, and Sept. 25-30, 1914. Discharge interpolated Mar. 29 and 30, 1914. No record for period Oct. 1, 1914, to Jan. 2, 1915.

Monthly discharge of Hanamaula ditch near Lihue, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	29	23	24.9	38.5	771	2,370
August.....	36	23	25.2	39.0	780	2,400
September.....	26	23	24.6	38.1	739	2,260
October.....	30	16	22.8	35.3	707	2,170
November 1-22, 29-30.....	21	3.2	11.4	17.6	273	840
December 10-31.....	21	7.8	16.5	25.5	363	1,110
January.....	23	6.6	18.1	28.0	562	1,720
February.....	26	21	23.0	35.6	644	1,980
March.....	33	21	23.8	36.8	738	2,260
April.....	29	18	24.5	37.9	734	2,260
May.....	30	12	25.7	39.8	798	2,440
June.....	28	11	21.8	33.7	653	2,010
The period (350 days).....	36	3.2	22.2	31.3	7,760	23,800
1914-15.						
July.....	30	26	27.8	43.0	861	2,640
August.....	28	13	18.9	29.2	585	1,800
September 1-24.....	29	19	25.6	39.6	615	1,890
January 3-31.....	19	13	17.1	26.5	495	1,520
February.....	20	12	17.8	27.5	499	1,530
March.....	20	15	17.4	26.9	540	1,660
April.....	21	9.1	16.5	25.5	495	1,520
May.....	19	6.8	15.6	24.1	485	1,480
June.....	19	16	17.4	26.9	522	1,600
The period (265 days).....	30	6.8	19.3	29.9	5,100	15,600

LIHUE DITCH NEAR LIHUE, KAUAI.

LOCATION.—At point where Kauai Electric Co.'s power line crosses ditch, $1\frac{1}{2}$ miles below intake, and about 5 miles northwest of Lihue.

RECORDS AVAILABLE.—July 1, 1910, to June 30, 1915.

GAGE.—Vertical staff; read once daily.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel cut in clay and gravel; ditch clean with low grade. Discharge relation sometimes affected by backwater caused by inflow of Kanaha ditch 260 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 1.64 feet at 6.50 a. m., April 8, 1915 (discharge, 10 million gallons per day, or 15 second-feet); ditch occasionally dry.

DIVERSIONS.—Part of flow is diverted above station into a ditch at lower level.

REGULATION.—By head gates.

UTILIZATION.—Irrigation of sugar cane and domestic supply.

ACCURACY.—Estimates poor, owing to variable effect of backwater on discharge relation.

Discharge measurements of Lihue ditch near Lihue, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1914—Nov. 10	J. C. Dort.....	1.25	6.8	4.4
1915—Feb. 17	D. E. Horner.....	1.46	11	7.0
June 25	.....do.....	1.33	6.5	4.2

Discharge, in million gallons per day, of Lihue ditch near Lihue, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	6.2	6.3	6.6	6.6	5.7	-----	3.0	-----	6.8	3.6	4.8	4.2
2.....	6.2	6.5	7.0	6.5	5.7	-----	3.0	-----	4.2	4.2	4.8	4.2
3.....	5.9	6.0	6.9	6.2	5.8	-----	3.0	-----	4.2	4.2	4.8	4.2
4.....	6.1	5.9	6.5	6.1	5.7	-----	3.0	-----	4.2	4.2	4.8	4.2
5.....	6.1	5.8	7.2	6.1	5.2	-----	3.0	-----	7.6	6.1	4.2	6.1
6.....	6.1	5.8	7.2	6.4	4.3	-----	3.6	3.6	5.4	6.8	4.2	4.8
7.....	6.1	5.7	6.7	7.0	4.3	-----	4.2	3.6	4.8	5.4	4.8	4.8
8.....	6.1	5.7	6.7	7.8	4.3	-----	1.0	3.6	4.8	4.8	4.8	4.8
9.....	5.8	6.3	6.6	6.7	4.2	-----	7	3.0	4.2	4.2	4.8	4.8
10.....	5.8	5.8	6.6	6.4	4.2	-----	7	3.0	4.2	4.2	4.8	4.8
11.....	5.7	5.7	6.2	7.4	4.3	-----	5	4.8	4.2	4.2	5.4	4.8
12.....	5.9	5.7	6.2	7.4	4.8	-----	5	4.8	4.2	4.2	5.4	4.8
13.....	6.1	6.5	6.7	7.2	4.8	-----	5	4.8	3.6	4.2	5.4	4.8
14.....	6.1	6.2	6.5	6.9	4.8	-----	5	4.8	3.6	4.2	5.4	4.8
15.....	6.1	6.1	6.5	6.9	4.8	-----	5	5.4	3.6	4.2	4.8	4.8
16.....	6.1	6.5	6.2	6.7	4.8	-----	5	5.4	8.4	4.2	4.8	4.8
17.....	6.1	6.2	6.2	6.9	5.2	1.6	5	5.4	4.8	4.2	4.8	4.8
18.....	6.1	5.8	6.2	6.9	5.2	1.6	-----	5.4	4.8	6.8	4.8	4.8
19.....	6.1	6.2	6.2	2.4	5.2	1.6	-----	5.4	4.8	5.4	4.8	4.8
20.....	6.3	6.3	6.1	6.7	5.2	1.6	-----	4.8	5.4	4.8	5.4	4.8
21.....	6.3	6.7	6.5	6.7	5.2	4.5	-----	4.8	4.8	4.8	6.1	4.8
22.....	5.8	6.7	6.5	7.0	4.1	4.5	-----	4.8	4.8	5.4	6.1	3
23.....	5.8	6.6	6.5	6.5	4.1	4.5	-----	4.8	4.2	4.4	6.1	3
24.....	6.3	6.2	6.3	6.3	4.1	4.5	-----	4.8	4.2	5.4	6.1	4.2
25.....	6.7	6.1	6.2	6.4	4.1	4.6	-----	4.8	4.2	4.8	6.1	4.2
26.....	6.7	6.2	6.2	6.6	4.0	4.6	-----	4.8	4.8	4.8	6.8	4.2
27.....	6.7	6.2	6.1	6.7	4.0	4.7	-----	4.8	6.8	4.8	6.8	4.2
28.....	6.5	6.3	6.6	6.5	4.1	4.7	-----	8.4	8.4	5.4	7.6	4.8
29.....	6.4	6.7	6.5	6.5	4.1	4.7	-----	-----	4.2	4.8	6.8	3.6
30.....	6.3	7.0	6.5	6.2	4.5	4.7	-----	-----	4.2	4.8	4.2	4.8
31.....	6.3	6.9	-----	6.2	-----	4.7	-----	-----	3.0	-----	4.2	-----
1914-15.												
1.....	4.8	4.8	4.8	-----	-----	0.6	4.4	6.9	6.2	9.2	5.6	5.4
2.....	4.8	4.8	4.8	-----	-----	.8	3.8	6.9	6.2	8.4	5.0	5.4
3.....	4.8	4.8	4.2	-----	-----	.3	3.8	6.9	6.9	9.2	5.6	5.4
4.....	4.8	4.8	4.8	-----	-----	.2	3.8	6.9	6.9	8.4	-----	6.1
5.....	4.8	5.4	5.4	-----	-----	1.1	3.8	6.9	6.9	8.4	-----	6.1
6.....	4.8	5.4	4.8	-----	6.2	1.1	3.3	6.9	6.9	8.4	2.6	6.1
7.....	4.8	4.8	4.8	-----	6.2	1.1	3.3	6.9	6.9	7.6	3.6	6.1
8.....	5.4	4.8	4.8	-----	3.8	.8	3.3	6.9	6.9	10	4.2	6.1
9.....	5.4	4.8	4.8	-----	2.8	.8	3.8	6.9	7.6	10	4.2	6.1
10.....	5.4	4.8	4.8	-----	4.4	.8	4.4	7.6	6.9	9.2	4.2	5.4
11.....	5.4	2.6	4.8	-----	4.4	1.1	4.4	7.6	7.6	9.2	6.1	5.4
12.....	4.8	4.8	5.4	-----	4.4	1.1	4.4	7.6	6.9	9.2	4.8	5.4
13.....	4.8	4.8	4.8	-----	4.4	2.8	4.4	7.6	7.6	10	4.8	5.4
14.....	4.2	4.2	5.4	-----	6.9	3.8	4.4	7.6	7.6	9.2	4.8	5.4
15.....	4.2	4.2	5.4	-----	6.9	4.4	3.8	6.9	8.4	9.2	4.8	4.8
16.....	4.2	4.2	5.4	-----	6.9	3.8	3.8	6.9	8.4	10	4.2	4.8
17.....	4.2	4.2	5.4	-----	6.9	4.4	4.4	6.9	7.6	9.2	4.8	5.4
18.....	5.4	4.8	5.4	-----	6.9	4.4	5.0	6.9	8.4	9.2	4.2	5.4
19.....	5.4	4.2	4.8	-----	6.9	1.7	5.0	6.9	8.4	8.4	4.2	6.1
20.....	4.8	3.6	6.1	-----	6.9	.3	5.0	6.9	8.4	8.4	4.2	4.8
21.....	4.8	3.6	5.4	-----	6.9	1.7	5.0	6.2	8.4	9.2	5.4	4.2
22.....	4.8	3.6	5.4	-----	6.9	2.4	5.0	6.2	8.4	8.4	5.4	3.6
23.....	4.8	3.6	4.8	-----	6.9	2.4	5.0	5.6	8.4	8.4	4.8	3.6
24.....	4.8	4.2	6.1	-----	6.9	2.0	5.0	6.2	8.4	9.2	4.8	3.0
25.....	5.4	4.2	-----	-----	6.9	2.0	5.0	6.9	8.4	9.2	4.8	4.8
26.....	4.8	4.8	-----	-----	6.9	1.7	5.6	6.9	8.4	9.2	4.8	4.8
27.....	4.8	4.2	-----	-----	6.9	4.4	6.2	6.2	8.4	-----	5.4	4.2
28.....	4.8	4.2	-----	-----	7.6	3.8	6.2	6.2	8.4	-----	5.4	4.2
29.....	4.8	4.8	-----	-----	1.4	3.8	6.2	-----	8.4	3.8	5.4	4.2
30.....	4.8	4.8	-----	-----	.6	3.8	6.2	-----	9.2	6.2	5.4	4.2
31.....	4.8	4.8	-----	-----	-----	3.8	6.9	-----	8.4	-----	5.4	-----

NOTE.—Discharge determined from rating curves applicable as follows: July 1 to Dec. 31, 1913, and Jan. 1 to Sept. 24, 1914, poorly defined; Nov. 6, 1914, to May 3, 1915, and May 6 to June 30, 1915, fairly well defined. No record for periods for which discharge is not given.

Monthly discharge of Lihue ditch near Lihue, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	6.7	5.7	6.15	9.52	191	585
August.....	7.0	5.7	6.21	9.61	193	591
September.....	7.2	6.1	6.50	10.1	195	596
October.....	7.8	2.4	6.54	10.1	203	622
November.....	5.8	4.0	4.69	7.26	141	432
December 17-31.....	4.7	1.6	3.85	5.96	58	177
January 1-17.....	4.2	.5	1.69	2.61	29	88
February 6-28.....	8.4	3.0	4.77	7.38	110	337
March.....	8.4	3.0	4.98	7.71	154	474
April.....	6.8	3.6	4.82	7.46	144	444
May 1-8, 13-31.....	7.6	4.2	5.31	8.22	165	505
June.....	6.1	.3	4.34	6.71	130	400
The period (330 days).....	8.4	.3	5.19	8.03	1,710	5,250
1914-15.						
July.....	5.4	4.2	4.86	7.52	151	462
August.....	5.4	2.6	4.44	6.87	138	422
September 1-24.....	6.1	4.2	5.11	7.91	123	376
November 6-30.....	7.6	.6	5.71	8.83	143	438
December.....	4.4	.2	2.17	3.36	67	206
January.....	6.9	3.3	4.66	7.21	145	443
February.....	7.6	5.6	7.14	11.0	200	614
March.....	9.2	6.2	7.77	12.0	241	739
April 1-26, 29-30.....	10	3.8	8.73	13.5	244	750
May 1-3, 6-31.....	6.1	2.6	4.79	7.41	139	426
June.....	6.1	3.0	5.06	7.83	152	466
The period (319 days).....	10	.2	5.46	8.45	1,740	5,340

NORTH FORK OF WAILUA RIVER NEAR LIHUE, KAUAI.

LOCATION.—300 feet below confluence of main and east branches of the stream, about 12 miles north of Lihue.

RECORDS AVAILABLE.—August 1, 1910, to September 25, 1914, when station was discontinued.

GAGE.—Friez water-stage recorder installed December 28, 1910, to replace original staff washed out October 28, 1910. New datum.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge at gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for 75 feet above and below gage; right bank low and wooded; left bank steep and rocky; current sluggish. Control composed of boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 9.3 feet at 6 a. m. September 25, 1914 (discharge, computed from extension of the rating curve, approximately 2,500 million gallons per day, or 3,870 second-feet); minimum stage recorded: 0.42 foot September 26 to 27, 1912 (discharge, 12 million gallons per day, or 18 second-feet).

DIVERSIONS.—Kanaha ditch diverts part of flow above the station.

REGULATION.—None except by diversion above.

UTILIZATION.—Irrigation of sugar cane, rice, and taro, and for domestic supply.

ACCURACY.—Estimates poor, as rating curve is poorly defined and gage-height record is of doubtful accuracy at times.

The following discharge measurement was made by W. V. Hardy:

January 23, 1914: Gage height, 0.54 foot; discharge, 27 million gallons per day (42 second-feet).

Discharge, in million gallons per day, of North Fork of Wailua River near Lihue, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	61	27	61	21	35	131	22	28	22	22	50	420
2.....	173	23	118	19	75	109	22	28	19	19	111	233
3.....	72	22	97	17	50	142	22	25	17	15	63	105
4.....	77	21	50	17	37	138	22	25	19	22	41	78
5.....	67	21	39	16	34	145	37	22	19	88	30	94
6.....	50	21	72	40	37	129	22	22	25	22	28	78
7.....	44	23	54	37	54	94	83	19	22	30	50	68
8.....	36	25	39	238	40	80	406	19	22	25	704	117
9.....	30	27	35	115	119	72	152	17	19	22	424	88
10.....	28	23	28	63	138	67	63	17	19	22	144	68
11.....	27	21	26	78	255	59	45	17	17	19	88	73
12.....	30	32	27	69	381	58	58	17	15	19	68	83
13.....	58	30	25	93	255	55	50	17	15	19	58	63
14.....	41	41	23	72	112	50	34	17	25	19	50	58
15.....	37	26	25	54	82	49	34	19	17	17	50	50
16.....	35	41	23	57	69	47	58	19	63	17	58	63
17.....	28	27	21	48	63	46	100	17	30	15	58	54
18.....	23	24	21	50	65	46	50	17	19	25	37	54
19.....	33	32	19	37	169	45	50	17	17	14	54	100
20.....	50	22	19	32	228	38	34	17	15	17	88	124
21.....	28	37	22	94	426	40	30	17	14	22	265	83
22.....	24	27	26	85	274	35	28	17	14	54	130	366
23.....	23	22	17	50	222	30	25	17	13	124	63	144
24.....	25	22	18	100	187	28	25	17	14	63	111	160
25.....	54	29	17	54	326	27	25	17	14	34	111	88
26.....	70	25	17	42	272	27	22	17	25	28	78	117
27.....	46	23	17	43	166	26	168	17	17	78	287	88
28.....	26	57	37	72	141	26	73	34	78	50	223	63
29.....	55	111	19	44	368	23	45	.....	30	34	111	54
30.....	28	57	19	45	196	21	41	.....	19	34	117	58
31.....	25	75	.....	41	.....	23	34	.....	15	.....	100	.....

Date.	July.	Aug.	Sept.	Date.	July.	Aug.	Sept.	Date.	July.	Aug.	Sept.
1914.				1914.				1914.			
1.....	58	63	88	11.....	63	144	68	21.....	41	50	100
2.....	54	58	144	12.....	50	73	176	22.....	34	94	73
3.....	54	58	94	13.....	45	73	233	23.....	41	160	144
4.....	54	68	78	14.....	50	58	320	24.....	41	124	492
5.....	94	160	78	15.....	54	50	176	25.....	117	88	704
6.....	73	100	152	16.....	144	45	105	26.....	50	78	.....
7.....	68	73	88	17.....	83	45	105	27.....	54	63	.....
8.....	88	58	63	18.....	94	73	105	28.....	58	78	.....
9.....	78	63	73	19.....	54	58	78	29.....	124	111	.....
10.....	105	58	83	20.....	45	54	124	30.....	168	168	.....
								31.....	94	168	.....

NOTE.—Discharge determined from a poorly defined rating curve. Discharge interpolated May 9, 1914.

Monthly discharge of North Fork of Wailua River near Lihue, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	173	23	45.3	70.1	1,400	4,310
August.....	111	21	32.7	50.6	1,010	3,110
September.....	118	17	34.5	53.4	1,030	3,180
October.....	238	16	59.5	92.1	1,840	5,660
November.....	423	34	163	252	4,880	15,000
December.....	145	21	61.5	95.2	1,910	5,850
January.....	406	22	60.6	93.8	1,880	5,770
February.....	34	17	19.6	30.3	549	1,680
March.....	78	13	22.2	34.3	689	2,110
April.....	124	15	33.0	51.1	989	3,040
May.....	794	28	124	192	3,850	11,800
June.....	420	50	110	170	3,290	10,100
The year.....	704	13	63.9	98.9	23,300	71,600
1914.						
July.....	168	34	73.5	114	2,280	6,990
August.....	168	45	84.3	130	2,610	8,020
September 1-25.....	704	63	158	244	3,940	12,100

NORTH FORK OF WAILUA RIVER AT ELEVATION 650 FEET, NEAR LIHUE, KAUAI.

LOCATION.—One mile above intake of Kanaha ditch and 10 miles northwest of Lihue.

RECORDS AVAILABLE.—September 21, 1914, to June 30, 1915.

GAGE.—Stevens water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from cable.

CHANNEL AND CONTROL.—One channel at all stages; straight for 80 feet above and 50 feet below gage; right bank steep and high; left bank low with gentle slope. Control composed of boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded: 9.5 feet at 6.30 p. m. September 26, 1914 (discharge, computed from extension of rating curve, approximately 2,200 million gallons per day, or 3,400 second-feet); minimum stage recorded, 1.5 feet February and March, 1915 (discharge, 16 million gallons per day, or 25 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Part of flow is diverted for irrigation of sugar cane, but most of it is wasted.

ACCURACY.—Record is broken as the recorder did not operate satisfactorily, but estimates given are based on a well-defined rating curve and continuous gage-height record and are good for all stages.

Discharge measurements of North Fork of Wailua River at elevation 650 feet, near Lihue, Kauai, during the year ending June 30, 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1914—Sept. 22	J. C. Dort	2.28	83	54
23	do.	2.15	71	46
23	do.	2.91	188	121
23	do.	2.67	154	99
24	do.	4.20	612	396
24	do.	3.58	395	255
24	do.	5.25	1,120	724
24	do.	4.40	607	392
24	do.	3.25	295	191
Oct. 21	do.	2.01	61	39
Nov. 23	D. E. Horner	1.72	34	22
1915—Jan. 19	do.	1.56	27	18
Mar. 18	W. V. Hardy	1.50	25	16
June 7	do.	2.22	94	61
8	do.	2.30	108	70
25	D. E. Horner	1.78	44	28

Discharge, in million gallons per day, of North Fork of Wailua River at elevation 650 feet, near Lihue, Kauai, for the year ending June 30, 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	May.	June.
1				81	25	16	20		
2				114	25	16	18		
3				460	22	16	20		
4				158	22	18	35		
5				68	22	22	28		
6				48	22	16	28		
7				41	22	18	20		
8				35	22	16	35		63
9				32	20	16	32		32
10				41	20	28	22		28
11				30	20	25	20		25
12				28	25	38	18		22
13				25	20	28	20		22
14		35		25	20	30	18		25
15				22	18	20	18		41
16				22	20	22	16		59
17				22	20	20	16		52
18				20	20	18	16	96	76
19				44	18	18			81
20				35	18	30			55
21	63	41		25	20	52			44
22	55			22	18	35			44
23	114		96	20	18	32			35
24	300			20	18	41			35
25	371			20	18	25			30
26	685			20	18	22			30
27	256			18	18	20			30
28	102		68	35	18	20			44
29			86	22	18				38
30			215	20	18				38
31				25	18				

NOTE.—Discharge determined from a well-defined rating curve. No record for periods for which discharge is not given; water-stage recorder did not operate satisfactorily.

Monthly discharge of North Fork of Wailua River at elevation 650 feet, near Lihue, Kauai, for the year ending June 30, 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
September 21-28.....	685	55	243	376	1,950	5,970
December.....	460	18	51.5	79.7	1,600	4,900
January.....	25	18	20.0	30.9	621	1,900
February.....	52	16	24.2	37.4	678	2,080
March 1-18.....	35	16	22.2	34.3	400	1,230
June 8-30.....	81	22	41.3	63.9	949	2,920
The period.....					6,200	19,000

KANAHUA DITCH NEAR LIHUE, KAUAI.

LOCATION.—500 feet above point where Kauai Electric Co.'s power line crosses the ditch, and about 9 miles north of Lihue.

RECORDS AVAILABLE.—August 6, 1910, to June 30, 1915.

GAGE.—Vertical staff; read once daily. New datum May 28, 1913.

DISCHARGE MEASUREMENTS.—Made in flume 100 feet above gage.

CHANNEL AND CONTROL.—Cut in soft lava rock; straight for 30 feet above and for 10 feet below gage. Control composed of soft lava rock; fairly permanent between times of cleaning ditch.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 2.6 feet July 24 to 26, 1913 (discharge, 22 million gallons per day, or 34 second-feet); ditch occasionally dry.

DIVERSIONS.—Diverts part of flow of North Fork of Wailua River.

REGULATION.—By head gates.

UTILIZATION.—Irrigation of sugar cane and for domestic supply.

ACCURACY.—Estimates based on fairly well-defined rating curves; fair for low and medium stages; estimates for high and fluctuating stages poor, as gage is read only once daily.

Discharge measurements of Kanaha ditch near Lihue, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1914—Jan. 23	W. V. Hardy.....	1.90	23	15
24	do.....	2.10	24	16
Nov. 29	D. E. Horner.....	2.08	23	15
Dec. 26	J. C. Dort.....	.94	9.7	6.2
31	do.....	1.47	16	10
1915—Feb. 17	D. E. Horner.....	2.14	23	15
Mar. 18	W. V. Hardy.....	2.16	24	16
May 17	do.....	2.06	23	15
June 9	do.....	2.31	27	17

Discharge, in million gallons per day, of Kanaha ditch near Lihue, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	20	19	22	19	20	.....	14	15	15	13	19	15
2.....	22	20	20	19	20	.....	14	15	14	13	20	13
3.....	20	20	20	18	20	.....	14	15	14	16	19	15
4.....	20	19	20	18	18	.....	15	15	14	17	19	15
5.....	20	19	20	18	17	.....	16	15	15	19	18	15
6.....	20	19	22	20	17	.....	17	17	15	19	19	17
7.....	20	18	21	21	17	.....	17	17	15	18	19	17
8.....	20	18	20	22	17	.....	16	17	14	17	20	15
9.....	20	20	20	20	17	.....	15	17	14	17	13	18
10.....	20	18	20	20	18	.....	15	17	13	17	18	17
11.....	19	18	20	20	18	.....	15	16	13	16	18	15
12.....	20	18	18	21	19	.....	15	15	15	19	18	17
13.....	20	21	20	22	18	7.3	15	16	15	14	18	17
14.....	20	21	19	22	20	7.3	15	16	19	15	18	17
15.....	20	21	19	21	20	7.3	15	16	19	16	18	17
16.....	20	22	19	21	20	7.3	15	15	19	15	18	17
17.....	20	18	19	20	20	7.3	15	15	17	15	18	17
18.....	20	18	18	20	20	7.3	15	15	15	18	18	17
19.....	20	19	19	20	20	9.4	12	15	15	18	18	18
20.....	20	20	19	20	20	9.4	12	15	16	18	20	17
21.....	20	22	19	21	19	9.4	15	15	17	18	20	18
22.....	18	22	19	20	14	9.4	15	15	16	19	19	15
23.....	19	20	19	20	14	10	15	15	16	20	19	17
24.....	22	20	19	21	14	10	16	15	15	19	19	18
25.....	22	20	19	21	14	10	15	14	15	19	19	18
26.....	22	19	18	21	14	10	14	14	15	19	19	18
27.....	22	19	18	20	14	10	14	14	16	19	19	18
28.....	21	19	18	21	14	12	15	16	19	19	20	14
29.....	20	22	19	21	14	14	15	.....	17	19	19	13
30.....	20	22	20	20	14	14	15	.....	17	19	16	17
31.....	20	22	.....	20	.....	14	15	.....	15	.....	16	.....
1914-15.												
1.....	17	19	19	.....	17	12	8.8	12	20	14	16	16
2.....	19	19	19	.....	1.5	13	11	12	15	14	15	16
3.....	19	19	18	.....	17	7.4	11	13	15	14	14	16
4.....	19	19	19	.....	16	3.9	10	13	16	14	12	16
5.....	19	20	20	.....	16	.....	10	14	16	14	12	16
6.....	19	19	19	.....	1.5	5.3	10	14	16	14	15	16
7.....	19	18	19	.....	17	6.0	10	14	16	14	14	17
8.....	19	18	19	.....	16	4.6	11	13	16	14	14	17
9.....	19	18	18	.....	16	5.0	11	14	16	16	14	16
10.....	19	18	19	.....	16	3.9	13	19	16	15	14	16
11.....	19	20	18	.....	16	3.9	13	19	15	14	15	16
12.....	19	19	20	.....	16	3.2	14	18	15	16	15	16
13.....	18	19	19	.....	16	3.6	13	16	15	16	13	15
14.....	18	18	20	.....	17	2.8	13	16	19	15	14	15
15.....	19	18	20	.....	16	2.8	14	14	19	17	15	17
16.....	19	18	20	.....	16	2.2	15	14	19	17	15	16
17.....	18	19	20	.....	14	8.8	13	8.1	20	15	16	16
18.....	19	19	20	.....	14	8.1	13	8.1	19	16	17	16
19.....	18	19	19	.....	14	9.8	13	20	20	16	15	16
20.....	17	19	20	.....	14	8.4	13	14	19	16	16	16
21.....	16	19	20	.....	14	7.8	14	17	19	16	16	16
22.....	16	19	20	.....	14	7.0	14	17	19	16	16	16
23.....	16	19	20	.....	13	7.4	14	16	15	16	15	16
24.....	19	19	20	.....	15	8.8	12	16	15	16	15	16
25.....	19	19	.....	.....	14	9.5	12	16	16	16	15	16
26.....	19	19	.....	.....	14	6.4	12	15	17	11	15	16
27.....	20	19	.....	.....	15	9.8	12	14	16	16	15	16
28.....	19	19	.....	.....	15	9.5	12	17	15	16	16	16
29.....	19	20	.....	.....	15	8.8	12	.....	19	16	15	16
30.....	19	19	.....	.....	15	10	12	.....	15	16	14	16
31.....	19	19	.....	.....	.....	9.8	12	.....	19	.....	14	.....

NOTE.—Discharge determined from fairly well-defined rating curves applicable as follows: July 1 to Nov. 30, 1913; Dec. 13, 1913, to Sept. 24, 1914, and Nov. 1, 1914, to June 30, 1915. No water in ditch Dec. 1-12, 1913, and Sept. 25-30, 1914. No record Oct. 1-31, 1914. Discharge interpolated July 28, Sept. 7, 14, 21, 28, 29, Dec. 14, 16, 21, 28, 1913; Jan. 25, 26, Feb. 9, 15, 22, Mar. 1, 8, 15, 22, 23, Apr. 26, May 24, July 12 and Aug. 2, 1914. Estimates July 1 to Dec. 31, 1913, supersede those published in Water-Supply Paper 373, p. 53.

Monthly discharge of Kanaha ditch near Lihue, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.			Second-foot (mean).	Total run-off.	
	Million gallons per day.				Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	22	18	20.2	31.3	627	1,920
August.....	22	18	19.8	30.6	613	1,880
September.....	22	18	19.4	30.0	583	1,790
October.....	22	18	20.3	31.4	628	1,930
November.....	20	14	17.4	26.9	521	1,600
December 13-31.....	14	7.3	9.76	15.1	185	569
January.....	17	12	14.9	23.1	461	1,420
February.....	17	14	15.4	23.8	432	1,320
March.....	19	13	15.6	24.1	484	1,480
April.....	20	13	17.3	26.8	520	1,590
May.....	20	13	18.4	28.5	571	1,750
June.....	18	13	16.4	25.4	492	1,510
The period (353 days).....	22	7.3	17.3	26.8	6,120	18,800
1914-15.						
July.....	20	16	18.5	28.6	573	1,760
August.....	20	18	18.9	29.2	585	1,800
September 1-24.....	20	18	19.4	30.1	465	1,430
November.....	17	1.5	14.4	22.3	431	1,330
December.....	13	.6	6.78	10.5	210	645
January.....	15	8.8	12.2	18.9	378	1,160
February.....	20	8.1	14.8	22.9	413	1,270
March.....	20	15	17.0	26.3	527	1,620
April.....	17	11	15.2	23.5	456	1,400
May.....	17	12	14.7	22.7	457	1,400
June.....	17	15	16.0	24.8	481	1,470
The period (328 days).....	20	.6	15.2	23.5	4,980	15,300

EAST BRANCH OF NORTH FORK OF WAILUA RIVER NEAR LIHUE, KAUAI.

LOCATION.—400 feet above confluence with North Fork, 600 feet above the gaging station on the North Fork, and about 8 miles north of Lihue.

RECORDS AVAILABLE.—July 27, 1912, to June 30, 1915.

GAGE.—Stevens water-stage recorder, December 31, 1914, to June 30, 1915; staff 250 feet below present site July 27, 1912, to September 30, 1914.

DISCHARGE MEASUREMENTS.—Made by wading or from cable.

CHANNEL AND CONTROL.—One channel at all stages; straight for 30 feet above and 120 feet below gage; banks are low and wooded. Control composed of boulders; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 7.2 feet (old gage) at 5.30 p. m. November 24, 1913 (discharge, 110 million gallons per day, or 170 second-feet); minimum stage recorded, 1.6 feet (new gage) March, 1915 (discharge, 7 million gallons per day, or 11 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

UTILIZATION.—After joining North Fork of Wailua River part of the water is diverted for irrigation of sugar cane, but most of it is wasted.

ACCURACY.—Estimates prior to December 31, 1914, at the staff-gage station, poor, owing to effect of backwater from main stream; rating curve poorly defined for this period. Estimates December 31, 1914, to June 30, 1915, based on a rating curve well defined below 40 million gallons per day and a continuous record of gage heights; good below that limit and fair for higher stages.

Discharge measurements of East Branch of North Fork of Wailua River near Lihue, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Jan. 24	W. V. Hardy.....	6.27	25	16
Nov. 23	J. C. Dort.....	a 1.86	27	17
26	.....do.....	2.06	47	31
28	.....do.....	2.40	111	72
30	.....do.....	2.50	131	85
Dec. 3	D. E. Horner.....	3.18	400	258
3	.....do.....	4.60	1,290	834
31	J. C. Dort.....	1.80	30	20
1915—Feb. 16	D. E. Horner.....	1.75	24	16
Mar. 18	W. V. Hardy.....	1.61	11	8.3
May 17	.....do.....	1.79	27	17
June 9	.....do.....	1.90	45	29
25	D. E. Horner.....	1.86	29	19

a New datum used on and after Nov. 23, 1914; old gage read 6.42.

Discharge, in million gallons per day, of East Branch of North Fork of Wailua River near Lihue, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	26	19	27	12	45	86	15	18	26	15	19	60
2.....	30	17	27	12	71	80	15	19	22	14	27	62
3.....	34	14	28	11	19	73	15	17	18	14	26	64
4.....	38	16	28	11	21	66	15	17	14	14	24	58
5.....	36	16	23	10	19	59	19	17	13	19	22	48
6.....	23	16	26	23	21	53	36	17	15	24	22	44
7.....	22	16	28	36	28	53	53	17	15	19	22	42
8.....	21	16	21	32	23	40	44	16	15	15	24	40
9.....	19	21	18	28	17	36	40	15	14	15	26	40
10.....	18	16	16	23	21	34	40	15	14	15	28	40
11.....	21	17	17	22	28	32	27	15	14	14	30	40
12.....	21	16	16	30	28	31	24	15	14	14	32	36
13.....	23	23	16	29	28	26	24	15	14	14	33	33
14.....	20	23	16	28	28	72	23	15	14	14	33	33
15.....	19	25	16	27	28	22	22	15	14	14	33	33
16.....	17	26	15	26	29	21	22	15	14	14	19	33
17.....	16	17	15	23	39	19	22	15	15	14	19	32
18.....	19	21	13	23	49	18	22	15	15	24	19	30
19.....	19	17	13	21	59	17	22	15	13	24	19	33
20.....	17	16	13	21	70	17	19	15	14	24	26	33
21.....	23	23	21	21	80	16	19	15	14	22	33	36
22.....	17	16	17	26	90	17	19	13	14	33	40	39
23.....	16	17	13	26	99	16	17	14	14	27	36	42
24.....	19	19	12	23	110	16	15	14	14	27	34	44
25.....	16	16	12	22	98	16	20	14	14	24	33	40
26.....	34	16	12	21	85	16	25	14	14	24	36	36
27.....	21	16	12	21	74	16	29	14	16	24	40	33
28.....	21	16	20	24	61	13	33	30	19	23	44	33
29.....	21	36	17	23	53	15	28	-----	17	22	51	33
30.....	19	30	14	21	92	13	24	-----	15	19	58	30
31.....	17	26	-----	19	-----	13	22	-----	15	-----	59	-----

Discharge measurements of East Branch of North Fork of Wailua River near Lihue, Kauai, during the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Dec.	Jan.	Feb.	Mar.	May.	June.
1914-15.									
1.....	36	44	36	.....	20	13	10	.....	13
2.....	40	44	44	.....	16	13	10	.....	13
3.....	40	44	42	.....	16	13	7	.....	13
4.....	40	42	40	.....	16	13	7	.....	42
5.....	36	40	42	.....	16	16	10	.....	24
6.....	40	39	45	.....	16	13	10	.....	16
7.....	44	38	48	.....	16	13	10	.....	13
8.....	48	36	44	.....	16	13	10	.....	60
9.....	53	34	36	.....	13	13	10	.....	24
10.....	53	33	48	.....	13	24	10	.....	20
11.....	50	36	49	.....	13	23	9	.....	16
12.....	47	36	50	.....	16	22	8	.....	16
13.....	44	33	51	.....	13	21	7	.....	13
14.....	40	32	52	.....	13	20	7	.....	16
15.....	36	30	53	.....	13	18	7	.....	24
16.....	33	30	53	.....	13	16	7	.....	54
17.....	32	30	53	.....	13	16	7	20	67
18.....	31	30	53	.....	10	13	7	24	82
19.....	30	30	53	.....	10	13	7	20	90
20.....	30	30	56	.....	10	16	.....	16	53
21.....	30	30	58	.....	10	42	.....	16	41
22.....	30	36	53	.....	10	32	.....	16	31
23.....	30	38	53	.....	10	20	.....	16	27
24.....	27	40	54	.....	10	20	.....	16	31
25.....	33	38	55	.....	10	13	.....	13	23
26.....	38	36	56	.....	10	13	.....	16	36
27.....	44	36	57	.....	13	10	.....	16	47
28.....	43	36	58	.....	13	7	.....	16	53
29.....	42	36	58	.....	13	.....	.....	16	36
30.....	40	34	58	.....	13	.....	.....	16	27
31.....	42	33	.....	20	13	.....	.....	16	.....

NOTE.—Discharge determined from rating curves applicable as follows:

Staff-gage record: July 1, 1913, to Sept. 30, 1914, poorly defined.

Water-stage recorder: Dec. 31, 1914, to June 19, 1915, well defined below 40 million gallons per day (62 second-feet); and June 20 to 30, fairly well defined.

Discharge estimated by comparison with record of flow of North Fork of Wailua River for days for which no gage height record was obtained. No records for periods for which discharge is not given.

Monthly discharge of East Branch of North Fork of Wailua River near Lihue, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-1914						
July.....	38	16	22.0	34.0	683	2,090
August.....	36	14	19.3	29.9	599	1,840
September.....	28	12	18.1	28.0	542	1,670
October.....	36	10	22.4	34.7	695	2,130
November.....	110	17	50.4	78.0	1,510	4,640
December.....	86	13	33.0	51.1	1,020	3,140
January.....	53	15	24.8	38.4	770	2,360
February.....	30	13	15.9	24.6	446	1,370
March.....	26	13	15.3	23.7	473	1,460
April.....	33	14	19.3	29.9	579	1,780
May.....	59	19	31.2	48.3	967	2,970
June.....	64	30	40.0	61.9	1,200	3,680
The year.....	110	10	26.0	40.2	9,480	29,100
1914-15.						
July.....	53	27	38.8	60.0	1,200	3,690
August.....	44	30	35.6	55.1	1,100	3,390
September.....	58	36	50.3	77.8	1,510	4,630
January.....	20	10	13.1	20.3	407	1,250
February.....	42	7	17.1	26.5	479	1,470
March 1-18.....	10	7	8.5	13.2	153	470
May 17-31.....	24	13	16.9	26.1	253	778
June.....	90	13	34.0	52.6	1,021	3,130

KAPAA RIVER NEAR KEALIA, KAUAI.

LOCATION.—A quarter of a mile below confluence of two main branches, about 1½ miles above intake of Kapahi ditch and 6 miles northwest of Kealia.

RECORDS AVAILABLE.—June 23 to 30, 1915. July 23, 1910, to May 16, 1915, at old station about a mile downstream.

GAGE.—Friez water-stage recorder; July 23, 1910, to May 16, 1915, vertical staff about a mile below present site.

DISCHARGE MEASUREMENTS.—Made by wading or from cable.

CHANNEL AND CONTROL.—One channel at all stages; straight for 100 feet above and below gage; right bank vertical; left bank high with gentle slope. Controls for both old and new stations fairly permanent between extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record at staff-gage station, 13 feet, estimated from flood marks, December 3, 1914 (discharge, roughly estimated by extension of previous rating curve, 1,200 million gallons per day, or 1,860 second-feet), minimum stage recorded, 1.35 feet February, March, and April, 1914 (discharge, 6.2 million gallons per day, or 9.6 second-feet).

DIVERSIONS.—Very small irrigation ditch diverts water about station.

REGULATION.—Practically none.

UTILIZATION.—Irrigation of sugar cane and for domestic supply.

ACCURACY.—Estimates July 1, 1913, to September 26, 1914, fair below 100 million gallons per day and approximate above that limit, as extension of rating curve is not defined by measurements. Estimates January 1 to May 16, 1915, fair for stages below 12 million gallons per day but poor for higher stages because of lack of measurements.

Discharge measurements of Kapaa River near Kealia, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Dec. 30	D. E. Horner.....	0.97	17	11
1915—Feb. 19	...do.....	.87	16	11
Mar. 19	W. V. Hardy.....	.80	14	9
May 16	...do.....	1.64	16	10
June 23	D. E. Horner.....	1.74	21	14
24	...do.....	1.95	28	18

Discharge, in million gallons per day, of Kapaa River near Kealia, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	15	9.0	21	8.4	9.7	17	7.1	9.0	9.0	7.1	29	39
2.....	35	9.7	13	8.4	22	14	7.1	8.0	7.1	7.1	94	50
3.....	16	9.0	28	8.4	16	142	7.1	7.1	7.1	6.2	.....	14
4.....	21	8.4	12	8.4	12	90	7.1	7.1	7.1	7.1	.....	10
5.....	21	8.4	11	7.8	12	27	10	7.1	9.0	50	.....	16
6.....	12	8.4	21	15	10	39	7.1	7.1	12	25	.....	14
7.....	11	11	13	24	23	25	36	7.1	8.0	10	.....	11
8.....	10	10	11	19	14	19	155	7.1	10	9.0	.....	17
9.....	11	14	10	31	74	14	39	7.1	10	8.0	.....	15
10.....	9.0	10	9.7	11	31	13	16	6.2	8.0	7.1	.....	13
11.....	9.7	9.0	9.0	13	28	12	11	6.2	7.1	7.1	.....	14
12.....	12	11	10	12	41	11	21	6.2	7.1	7.1	.....	15
13.....	21	15	9.0	17	39	11	12	6.2	7.1	6.2	10	13
14.....	16	26	9.0	12	17	10	9.0	6.2	6.2	6.2	9.0	10
15.....	11	12	9.0	13	13	9.7	9.0	6.2	7.1	6.2	14	10
16.....	11	20	9.0	12	14	8.4	9.0	6.2	21	6.2	39	11
17.....	10	12	8.4	10	14	8.4	39	6.2	10	6.2	36	17
18.....	9.0	9.0	8.4	23	20	9.0	11	6.2	8.0	25	10	12
19.....	12	9.0	8.4	11	46	8.4	9.0	6.2	7.1	8.0	19	44
20.....	12	9.0	8.4	9.7	82	8.4	9.0	6.2	6.2	10	27	14
21.....	11	14	9.7	25	408	8.4	9.0	6.2	6.2	11	44	21
22.....	9.0	11	9.0	109	78	8.4	7.1	6.2	6.2	21	23	19
23.....	9.0	10	8.4	19	40	8.4	7.1	6.2	6.2	34	11	25
24.....	10	11	8.4	13	49	7.8	7.1	6.2	6.2	29	12	14
25.....	14	14	7.8	13	82	7.8	7.1	6.2	7.1	11	36	50
26.....	18	14	7.8	12	43	7.8	7.1	6.2	29	9.0	11	25
27.....	17	10	7.8	10	33	7.8	60	6.2	10	9.0	53	21
28.....	10	14	31	26	25	7.8	16	16	25	9.0	70	21
29.....	22	28	8.4	14	17	7.8	10	.....	11	8.0	25	14
30.....	12	22	9.0	11	40	7.8	9.0	.....	8.0	19	34	14
31.....	11	19	.....	10	.....	7.8	10	.....	7.1	.....	29	.....

Date.	July.	Aug.	Sept.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.									
1.....	17	14	17	11	10	10	9.5	48	.....
2.....	14	16	53	10	10	10	9.5	26	.....
3.....	23	17	17	10	10	10	9.5	22	.....
4.....	16	17	16	10	10	10	9.5	15	.....
5.....	70	27	25	10	11	10	15	13	.....
6.....	29	17	47	10	10	10	36	12	.....
7.....	63	14	21	11	10	10	16	11	.....
8.....	44	14	19	10	10	10	12	11	.....
9.....	32	17	17	10	10	11	13	10	.....
10.....	47	12	25	11	17	10	10	10	.....
11.....	19	53	14	18	13	9.5	9.5	20	.....
12.....	11	17	32	12	28	9.5	9.5	11	.....
13.....	16	17	19	11	15	13	16	10	.....
14.....	19	14	25	10	16	10	13	10	.....
15.....	12	11	21	10	11	9.5	62	10	.....
16.....	39	10	16	10	13	9.5	54	10	.....
17.....	42	12	16	10	14	9.5	41	.....	.....
18.....	47	23	32	10	10	9.5	38	.....	.....
19.....	16	16	14	10	10	9.5	32	.....	.....
20.....	14	10	16	10	12	9.5	18	.....	.....
21.....	11	10	25	10	12	9.5	13	.....	.....
22.....	10	44	17	10	12	9.5	12	.....	.....
23.....	10	102	23	10	13	9.5	16	.....	13
24.....	11	29	74	10	12	9.5	26	.....	18
25.....	27	12	119	10	10	9.5	18	.....	13
26.....	14	17	530	10	10	9.5	142	.....	17
27.....	34	10	.....	10	10	9.5	94	.....	23
28.....	14	14	.....	10	10	9.5	26	.....	34
29.....	25	21	.....	10	.....	9.5	26	.....	20
30.....	34	21	.....	10	.....	9.5	16	.....	15
31.....	25	29	.....	10	.....	9.5	.....	.....	.....

NOTE.—Discharge determined from rating curves applicable as follows:
Staff gage record: July 1, 1913, to Sept. 26, 1914, fairly well defined between 5 and 100 million gallons per day (8 and 155 second-feet); and Jan. 1 to May 16, 1915, poorly defined.

Water-stage recorder: June 23 to 30, fairly well defined.

No record for periods for which discharge is not given, except Oct. 13 to Dec. 3, 1914, when temporary gage was read; discharge for this period not computed.

Monthly discharge of Kapaa River near Kealia, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	35	9.0	13.8	21.4	428	1,310
August.....	28	8.4	12.8	19.8	397	1,220
September.....	31	7.8	11.5	17.8	346	1,060
October.....	109	7.8	17.3	26.8	537	1,650
November.....	408	9.7	45.1	69.8	1,350	4,150
December.....	142	7.8	12.8	29.1	584	1,790
January.....	155	7.1	18.7	28.9	580	1,780
February.....	16	6.2	6.94	10.7	194	596
March.....	29	6.2	9.55	14.8	296	909
April.....	50	6.2	12.8	19.8	385	1,180
May 1-2, 13-31.....	94	9.0	30.2	46.7	635	1,950
June.....	50	10	19.4	30.0	583	1,790
1914-15.						
July.....	70	10	26.0	40.2	805	2,470
August.....	102	10	21.2	32.8	657	2,020
September 1-26.....	530	14	48.1	74.4	1,250	3,840
January.....	18	10	10.5	16.2	324	999
February.....	28	10	12.1	18.7	339	1,040
March.....	13	9.5	9.82	15.2	304	934
April.....	142	9.5	27.4	42.4	822	2,520
May 1-16.....	48	10	15.6	24.1	249	766
June 23-30.....	34	13	19.1	29.6	153	469

KAPAHU DITCH NEAR KEALIA, KAUAI.¹

LOCATION.—500 feet below intake and about 4 miles west of Kealia.

RECORDS AVAILABLE.—April 15, 1909, to May 2, 1914, and May 10 to June 30, 1915.

GAGE.—Stevens 8-day water-stage recorder, installed May 10, 1915, to replace original Watson recorder.

DISCHARGE MEASUREMENTS.—There is a 20-foot sharp-crested weir immediately below the gage, but as current-meter measurements give a different rating from the weir formula, the meter rating is used.

CHANNEL AND CONTROL.—Channel straight for 50 feet above the weir, which acts as control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 1.74 feet January 7, 1914 (discharge, computed from extension of rating curve, approximately 130 million gallons per day, or 200 second-feet); minimum discharge recorded, 1.5 million gallons per day, or 2.3 second-feet October 1, 1911.

DIVERSIONS.—Ditch diverts part of flow of Kapaa River.

REGULATION.—Flow regulated by head gates.

UTILIZATION.—Irrigation of sugar cane and domestic supply.

ACCURACY.—Estimates based on a rating curve well defined below 15 million gallons per day and a continuous gage-height record, good for low and medium stages; estimates over 15 million gallons per day, fair.

Discharge measurements of Kapahi ditch near Kealia, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1915—May 16.....	W. V. Hardy.....	0.38	16	10
June 23.....	D. E. Horner.....	.44	21	14

¹ Described in Water-Supply Paper 336 (pp. 85-86) as "at Kapahi, near Kapaa," and in Water-Supply Paper 373 (pp. 61-62) "at Kapahi, near Kealia."

Discharge, in million gallons per day, of Kapahi ditch near Kealia, Kauai, for the year ending June 30, 1914.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
1913-14.											
1.....	17	9.2	13	7.6	8.0	23	8.4	10	10	8.4	16
2.....	46	9.2	12	7.2	12	16	8.4	8.4	8.4	8.4	13
3.....	19	8.0	10	6.8	14	6.8	8.4	8.4	8.4	8.4	.....
4.....	20	7.6	14	6.5	10	6.1	8.4	8.4	8.4	8.4	.....
5.....	17	7.2	22	6.5	10	4.8	10	8.4	10	10	.....
6.....	13	7.6	17	11	9.2	4.8	8.4	8.4	19	10	.....
7.....	11	11	12	16	16	13	67	8.4	23	10	.....
8.....	9.6	9.2	10	20	13	23	13	8.4	16	10	.....
9.....	10	12	8.8	22	11	17	16	8.4	13	8.4	.....
10.....	8.8	9.2	8.0	23	10	14	23	8.4	10	8.4	.....
11.....	8.8	8.4	8.0	12	16	13	.....	8.4	8.4	8.4	.....
12.....	10	11	9.2	11	13	12	.....	8.4	8.4	8.4	.....
13.....	24	14	7.6	14	13	11	.....	8.4	8.4	8.4	.....
14.....	18	11	8.0	12	14	11	.....	8.4	8.4	6.5	.....
15.....	11	10	8.0	13	12	10	.....	8.4	8.4	6.5	.....
16.....	11	9.6	7.6	10	9.6	9.6	.....	8.4	19	6.5	.....
17.....	9.6	8.8	7.2	9.6	12	9.6	.....	8.4	16	8.4	.....
18.....	8.8	8.4	7.2	14	12	10	.....	8.4	8.4	19	.....
19.....	17	9.2	7.2	10	12	9.6	.....	6.5	8.4	3.4	.....
20.....	13	8.8	7.2	8.4	7.6	9.2	.....	8.4	8.4	13	.....
21.....	10	21	6.8	25	9.2	9.6	.....	8.4	6.5	16	.....
22.....	8.8	11	8.0	53	9.6	9.2	.....	8.4	6.5	19	.....
23.....	8.0	19	7.6	20	9.2	8.8	.....	6.5	6.5	8.4	.....
24.....	10	11	7.2	13	8.8	8.8	.....	6.5	6.5	10	.....
25.....	14	25	6.8	12	8.0	8.4	.....	6.5	8.4	10	.....
26.....	15	15	6.8	10	8.4	8.4	8.4	6.5	41	10	.....
27.....	16	28	6.8	8.8	21	8.4	41	13	13	10	.....
28.....	10	11	26	28	34	8.4	23	41	8.4	10	.....
29.....	23	9.6	8.0	15	10	8.4	13	.....	8.4	8.4	.....
30.....	11	15	7.6	10	10	8.4	10	.....	10	16	.....
31.....	10	17	.....	9.2	.....	8.4	13	.....	8.4	.....	.....

NOTE.—Discharge determined from a rating curve well defined below 15 million gallons per day (23 second-feet). No record for periods for which discharge is not given.

Monthly discharge of Kapahi ditch near Kealia, Kauai, for the year ending June 30, 1914.

Month.	Discharge.			Total run-off.	
	Million gallons per day.			Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.		
July.....	46	8.0	14.1	21.8	1,340
August.....	28	7.2	12.0	18.6	1,140
September.....	26	6.8	9.85	15.2	907
October.....	53	6.5	14.3	22.1	1,360
November.....	34	7.6	12.1	18.7	1,110
December.....	23	4.8	10.6	16.4	1,010
January 1-10, 26-31.....	67	8.4	17.5	27.1	859
February.....	41	6.5	9.45	14.6	812
March.....	41	6.5	11.4	17.6	1,080
April.....	19	6.5	10.1	15.6	930
The period (289 days).....	67	4.8	11.9	18.4	10,500

ANAHOLA RIVER NEAR KEALIA,¹ KAUAI.

LOCATION.—About a quarter of a mile above dam at Kiokala and 6 miles northwest of Kealia.

RECORDS AVAILABLE.—August 22 to November 2, 1910; December 28, 1912, to June 30, 1915. Fragmentary record December 15, 1910, to December 28, 1912, at dam a quarter of a mile below present site.

GAGE.—Friez water-stage recorder August 22 to November 2, 1910, and December 28, 1912, to June 30, 1915. From December 15, 1910, to December 28, 1912, an inclined staff.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

CHANNEL AND CONTROL.—One channel at all stages; straight for 75 feet above and below gage; right bank steep and high and covered with underbrush; left bank low for about 40 feet from low-water channel then rises abruptly. Control composed of boulders, shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 12.9 feet at 7.30 p. m. September 26, 1914 (discharge estimated from extension of rating curve, approximately 900 million gallons per day, or 1,390 second-feet); minimum stage recorded, 1.3 feet February 27 to 28, 1915 (discharge, 2 million gallons per day, or 3.1 second-feet).

DIVERSIONS.—Part of flow is diverted 3 miles above station.

REGULATION.—None except by diversions.

UTILIZATION.—Irrigation of sugar cane.

ACCURACY.—Estimates July 1 to December 3, 1913, and January 25 to September 26, 1914, based on a fairly well-defined rating curve and continuous gage-height record; fair below 50 million gallons per day; estimates above 50 million gallons per day are not based on discharge measurements and are only approximate. Estimates September 27, 1914, to June 30, 1915, based on a rating curve fairly well defined below 20 million gallons per day, but are poor owing to doubt as to reliability of gage-height record.

Discharge measurements of Anahola River near Kealia, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—June 22	J. C. Dort.....	1.62	50	32
Aug. 26	D. E. Horner.....	1.05	12.4	8.1
1915—Mar. 19	W. V. Hardy.....	.....	3.4	2.2
May 27	do.....	1.71	10.5	6.8
June 2	do.....	1.64	8.6	5.6
June 5	do.....	1.88	17	11

¹ Described in Water-Supply Paper 318 (pp. 129-130), 336 (pp. 88-89), and 373 (p. 63), as "above dam at Kiokala, near Kealia."

Discharge, in million gallons per day, of Anahola River near Kealia, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Noy.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	11	7.8	11	7.8	6.5	24	.....	8.5	24	10	40	.....
2.....	21	7.8	13	8.4	19	19	.....	8.5	20	8.5	.....	.....
3.....	12	7.1	33	6.5	9.7	136	.....	7.0	20	12	.....	.....
4.....	14	7.1	11	6.2	8.4	.....	.....	10	18	37	.....	.....
5.....	14	6.5	11	6.2	7.1	.....	.....	7.0	30	124	.....	.....
6.....	8.4	6.5	28	7.1	7.1	.....	.....	7.0	40	61	.....	.....
7.....	7.8	7.1	14	11	37	.....	.....	5.5	42	30	.....	.....
8.....	7.8	7.8	9.7	15	15	.....	.....	5.5	14	20	.....	.....
9.....	7.8	11	8.4	18	23	.....	.....	5.5	32	18	.....	.....
10.....	7.1	7.8	8.4	9.7	16	.....	.....	5.5	10	16	.....	.....
11.....	6.5	6.5	7.8	8.4	21	.....	.....	4.0	7.0	12	.....	.....
12.....	7.1	8.4	7.8	8.4	17	.....	.....	4.0	7.0	12	.....	.....
13.....	17	8.4	7.8	13	17	.....	.....	4.0	5.5	10	.....	.....
14.....	13	8.4	8.4	11	11	.....	.....	4.0	5.5	10	.....	.....
15.....	8.4	9.7	12	13	9.7	.....	.....	4.0	7.0	10	.....	.....
16.....	7.8	16	8.4	11	9.7	.....	.....	4.0	44	8.5	.....	.....
17.....	7.1	9.7	7.8	8.4	10	.....	.....	3.0	32	10	.....	.....
18.....	7.1	9.0	7.8	8.4	10	.....	.....	4.0	14	37	.....	.....
19.....	9.0	7.8	9.0	7.1	30	.....	.....	3.0	10	18	.....	.....
20.....	10	7.1	8.4	6.5	89	.....	.....	3.0	8.5	20	.....	.....
21.....	7.8	10	8.4	7.8	114	.....	.....	3.0	7.0	20	.....	.....
22.....	7.1	7.8	8.4	32	39	.....	.....	3.0	7.0	42	.....	.....
23.....	7.1	7.1	7.8	37	34	.....	.....	3.0	7.0	58	.....	.....
24.....	9.0	8.4	7.8	14	37	.....	.....	3.0	10	32	.....	.....
25.....	19	14	7.1	11	58	.....	5.5	3.0	22	22	.....	.....
26.....	12	8.4	7.1	9.7	47	.....	5.5	3.0	40	14	.....	.....
27.....	20	11	7.1	8.4	32	.....	47	7.0	16	12	.....	.....
28.....	9.7	11	15	18	28	.....	16	58	37	24	.....	18
29.....	12	12	7.1	9.0	32	.....	10	.....	18	14	.....	22
30.....	9.7	9.7	6.5	7.8	36	.....	5.5	.....	12	12	.....	22
31.....	8.4	14	.....	7.8	.....	.....	12	.....	10	.....	.....	.....
1914-15.												
1.....	27	8	16	13	9	14	6	3	3	4	24	5
2.....	20	8	30	13	9	16	5	3	3	4	46	5
3.....	20	8	20	10	8	64	5	4	4	4	24	6
4.....	37	22	26	13	8	32	5	4	4	4	18	13
5.....	50	24	32	9	6	19	5	4	4	6	14	8
6.....	32	16	37	9	18	22	4	4	3	13	13	6
7.....	34	8	27	12	20	16	4	4	3	7	12	8
8.....	40	7	18	14	10	12	4	4	3	4	10	14
9.....	30	8	18	8	7	10	4	4	3	5	9	7
10.....	40	7	14	7	6	9	4	6	3	4	9	6
11.....	22	30	10	6	7	8	4	9	3	4	14	6
12.....	20	12	24	6	6	7	4	5	3	4	9	6
13.....	18	8	16	6	5	7	4	4	10	7	8	6
14.....	22	7	27	6	30	6	4	4	4	4	8	6
15.....	22	7	22	6	10	6	4	2	4	10	7	6
16.....	40	7	16	6	7	6	4	4	4	34	6	10
17.....	22	8	16	5	6	6	4	3	4	18	6	8
18.....	37	7	20	4	6	6	4	3	4	14	6	9
19.....	18	7	12	5	6	7	4	4	4	19	6	9
20.....	18	7	30	4	5	7	4	3	4	13	6	8
21.....	12	7	22	5	5	7	4	6	4	8	6	8
22.....	10	14	16	4	5	6	4	4	4	8	6	9
23.....	8	27	50	4	4	5	4	2	4	9	6	7
24.....	8	44	103	4	8	6	4	4	4	18	6	10
25.....	12	14	124	4	5	6	4	2	4	12	6	7
26.....	8	10	282	4	10	6	4	2	4	34	6	8
27.....	8	8	82	4	19	5	4	2	4	46	6	16
28.....	16	8	25	4	8	9	4	2	4	22	6	19
29.....	22	18	20	4	18	6	4	.....	4	18	6	10
30.....	18	18	16	6	30	5	4	.....	4	30	6	8
31.....	16	24	.....	9	.....	4	4	.....	4	.....	5	.....

NOTE.—Discharge determined from rating curves applicable, as follows: July 1 to Dec. 3, 1913, and Jan. 25 to Sept. 26, 1914, fairly well defined below 50 million gallons per day (77 second-feet); Sept. 27, 1914, to June 30, 1915, fairly well defined below 20 million gallons per day (31 second-feet). The high-water extensions are roughly approximate. Discharge interpolated Sept. 4 and 5, 1914. No gage record for days for which discharge is not given. Outside staff gage washed out and weekly recorder charts set from markings on float cable, Sept. 26, 1914, to June 2, 1915; estimates for this period may be considerably in error owing to uncertainty in gage datum (see station description).

Monthly discharge of Anahola River near Kealia, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	21	6.5	10.5	16.2	326	999
August.....	16	6.5	9.06	14.0	281	862
September.....	33	6.5	13.2	20.4	395	1,220
October.....	37	6.2	11.4	17.6	354	1,080
November.....	114	6.5	28.0	43.3	839	2,580
January 25-31.....	47	5.5	14.5	22.4	102	311
February.....	58	3.0	6.79	10.5	190	583
March.....	44	5.5	18.6	28.8	576	1,770
April.....	124	8.5	24.5	37.9	734	2,260
1914-15.						
July.....	50	8	22.8	35.3	707	2,170
August.....	44	7	13.2	20.4	408	1,260
September.....	282	10	39.2	60.7	1,180	3,610
October.....	14	4	6.90	10.7	214	656
November.....	30	4	10.0	15.5	301	921
December.....	64	4	11.1	17.2	345	1,060
January.....	6	4	4.19	6.48	130	399
February.....	9	2	3.75	5.80	105	322
March.....	10	3	4.10	6.34	127	390
April.....	46	4	12.9	20.0	387	1,190
May.....	46	5	10.3	15.9	320	980
June.....	19	5	8.47	13.1	254	780
The year.....	282	2	12.3	19.0	4,480	13,700

ANAHOLA DITCH AT KIOKALA, NEAR KEALIA, KAUAI.

LOCATION.—About a quarter of a mile below intake and 6 miles northwest of Kealia.

RECORDS AVAILABLE.—May 10, 1909, to May 1, 1914.

GAGE.—Watson water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by 10-foot sharp-crested weir with end contractions.

CHANNEL AND CONTROL.—Earth ditch; straight for 50 feet above and below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 0.8 foot, April 5, 1914 (discharge, 16 million gallons per day, or 25 second-feet); ditch occasionally dry.

DIVERSIONS.—Diverts from Anahola River.

REGULATION.—Flow regulated by head gates.

UTILIZATION.—Irrigation of sugar cane.

ACCURACY.—Estimates are good, as the conditions for measurement by weir are favorable. A large amount of water leaks from the ditch between the intake and weir; therefore this record does not show amount diverted from stream.

Discharge, in million gallons per day, of Anahola ditch at Kiokala, near Kealia, Kauai, for the year ending June 30, 1914.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Jan.	Feb.	Mar.	Apr.	May.
1.....	7.2	5.0	7.2	3.7	2.8	-----	-----	7.6	-----	8.8
2.....	8.1	5.0	6.5	4.3	5.0	-----	-----	5.4	1.9	-----
3.....	7.6	4.5	11	2.7	5.8	-----	-----	5.4	6.5	-----
4.....	7.6	4.3	11	2.2	4.8	-----	-----	4.5	11	-----
5.....	7.8	3.9	11	2.2	4.3	-----	-----	7.6	16	-----
6.....	6.7	3.6	11	3.0	3.7	-----	-----	10	3.6	-----
7.....	6.5	3.7	9.0	5.4	6.3	-----	3.6	8.8	-----	-----
8.....	6.1	4.7	6.9	7.8	6.5	-----	3.6	10	-----	-----
9.....	6.3	7.2	5.8	7.8	6.9	-----	3.6	10	-----	-----
10.....	5.4	5.0	5.0	5.6	6.5	5.4	3.6	8.8	3.6	-----
11.....	4.8	3.9	4.7	4.1	6.7	5.4	3.6	7.6	8.8	-----
12.....	4.8	5.0	3.9	4.1	6.5	5.4	3.6	6.5	8.8	-----
13.....	7.6	6.3	3.9	6.3	6.5	4.5	3.6	5.4	8.8	-----
14.....	7.8	5.4	4.8	5.6	5.8	7.6	3.6	5.4	8.8	-----
15.....	6.3	6.7	7.2	6.7	5.4	1.2	3.6	5.4	8.8	-----
16.....	5.2	7.8	4.7	6.1	5.2	-----	3.6	8.8	11	-----
17.....	4.7	6.7	3.9	4.1	5.6	4.5	2.7	10	10	-----
18.....	4.7	6.1	3.7	3.4	5.4	4.5	3.6	8.8	8.8	-----
19.....	5.6	4.5	4.5	3.0	6.5	4.5	2.7	7.6	8.8	-----
20.....	6.9	3.6	3.7	2.7	8.5	4.5	2.7	7.6	8.8	-----
21.....	5.0	5.6	4.1	3.9	-----	4.5	2.7	7.6	7.6	-----
22.....	4.5	3.9	3.7	6.3	-----	4.5	2.7	6.5	7.6	-----
23.....	4.5	3.4	3.6	9.5	-----	4.0	2.7	6.5	7.6	-----
24.....	5.0	4.1	3.0	8.5	-----	3.6	2.7	6.5	7.6	-----
25.....	9.0	8.1	2.8	7.6	-----	3.6	2.7	8.8	8.8	-----
26.....	8.3	5.2	2.5	6.1	-----	3.6	2.7	3.6	7.6	-----
27.....	9.2	5.8	2.7	4.7	-----	3.6	3.6	-----	7.6	-----
28.....	6.9	6.9	6.3	7.6	-----	-----	10	-----	8.8	-----
29.....	8.1	7.8	3.7	5.2	-----	-----	-----	-----	8.8	-----
30.....	6.9	6.1	2.8	3.9	-----	-----	-----	-----	7.6	-----
31.....	6.1	7.6	-----	3.4	-----	-----	-----	-----	-----	-----

NOTE.—Discharge computed by weir formula. Discharge interpolated Sept. 4 and 5, 1913, and Jan. 23, 1914. Ditch dry or no flow Jan. 16, Jan. 28 to Feb. 6, Mar. 27 to Apr. 1, and Apr. 7-9, 1914. No record Nov. 21, 1913, to Jan. 9, 1914.

Monthly discharge of Anahola ditch at Kiokala, near Kealia, Kauai, for the year ending June 30, 1914.

Month.	Discharge.			Total run-off.	
	Million gallons per day.			Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.		
July.....	9.2	4.5	6.49	10.0	617
August.....	7.8	3.4	5.40	8.36	514
September.....	11	2.5	5.49	8.49	505
October.....	9.5	2.2	5.08	7.86	483
November 1-20.....	8.5	2.8	5.74	8.88	352
January 10-27.....	7.6	1.2	4.41	6.82	230
February 7-28.....	10	2.7	3.52	5.45	238
March.....	10	3.6	7.33	11.3	585
April.....	16	1.9	8.22	12.7	656
The period (234 days).....	16	1.2	5.82	9.00	1,360

ANAHOLA DITCH ABOVE KANEHA RESERVOIR, NEAR KEALIA, KAUAI.

LOCATION.—At lower end of third tunnel above Kaneha reservoir, 7 miles from Kealia.

RECORDS AVAILABLE.—May 30 to June 30, 1915.

GAGE.—Eight-day Stevens water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from wooden footbridge at gage.

CHANNEL AND CONTROL.—Channel at gage is short straight stretch of open ditch between two tunnels; cut in firm earth. Control is rock section of ditch; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 3.5 feet at 10.30 a. m., June 4, 1915; discharge, 46 million gallons per day or 71 second-feet; minimum stage recorded, 1.1 feet, May 30 to June 3, 1915 (discharge, 1.5 million gallons per day or 2.3 second-feet).

DIVERSIONS.—Diverts from Anahola River.

REGULATION.—By head gates.

UTILIZATION.—Water is stored in Kaneha reservoir for irrigation of sugar cane and for domestic supply.

ACCURACY.—Estimates based on well-defined rating curve and a continuous gage-height record; good for all stages.

Discharge measurements of Anahola ditch near Kealia, Kauai, above Kaneha reservoir, during the year ending June 30, 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
June 3	W. V. Hardy	1.14	2.6	1.7
4	do	3.14	51	33
4	do	2.60	39	25
4	D. E. Horner	2.29	25	16
5	W. V. Hardy	1.68	10	6.8

Discharge, in million gallons per day, of Anahola ditch above Kaneha reservoir, near Kealia, Kauai, during the year ending June 30, 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	May.	June.	Date.	May.	June.	Date.	May.	June.
1.		1.5	11.		3.4	21.		7.8
2.		1.5	12.		2.6	22.		8.2
3.		1.5	13.		2.2	23.		4.4
4.		11	14.		2.2	24.		4.9
5.		6.4	15.		3.4	25.		4.8
6.		3.9	16.		6.4	26.		4.6
7.		12	17.		6.4	27.		4.5
8.		20	18.		10	28.		4.4
9.		5.4	19.		9.6	29.		6.4
10.		4.4	20.		9.0	30.	1.5	5.9
						31.	1.5	

NOTE.—Discharge determined from a well defined rating curve. Discharge interpolated June 7, 19-21, and 25-27, 1915.

Maximum discharge for June, 20 million gallons per day; minimum, 1.5 million gallons per day; mean, 5.96 million gallons per day (9.22 second-feet). Total run-off, 179 million gallons (549 acre-feet).

KALIHIWAI RIVER NEAR HANAIEI, KAUAI.

LOCATION.—At elevation 700 feet, 1 mile east of Kauai Electric Co.'s power line, about 9 miles southeast of Hanalei.

RECORDS AVAILABLE.—March 13, 1914, to June 30, 1915.

GAGE.—Stevens water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

CHANNEL AND CONTROL.—One channel at all stages; straight for 100 feet above and 50 feet below gage; current sluggish at low stages; right bank low and wooded; left bank a high and nearly vertical cliff. Control composed of large boulders; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 14.4 feet at 6.30 a. m. September 25, 1914 (discharge, computed from extension of rating curve, approximately 4,000 million gallons per day, or 6,200 second-feet); minimum stage recorded, 0.95 foot March 13, 1914 (discharge, 6.5 million gallons per day, or 10 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Part of flow is diverted below station for irrigation of rice and taro.

ACCURACY.—Estimates based on well-defined rating curve and a continuous gage-height record, good for all stages.

Discharge measurements of Kalihiwai River near Hanalei, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Feb. 25	W. V. Hardy	0.96	9.7	6.3
Mar. 13	do	1.07	14	8.8
14	do	1.22	18	12
May 26	J. C. Dort	1.64	43	28
June 27	do	1.86	66	42
Oct. 17	do	1.47	33	21
1915—Apr. 22	W. V. Hardy	1.45	29	19
22	do	1.88	83	54
25	do	2.00	101	65
26	do	3.85	659	426
June 27	D. E. Horner	2.53	211	137
27	do	1.93	88	57
28	do	1.58	39	25

Discharge, in million gallons per day, of Kalihiwai River near Hanalei, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Mar.	Apr.	May.	June.	Date.	Mar.	Apr.	May.	June.
1914.					1914.				
1		8.5		180	16	30	8.5		24
2		8.5		89	17	18	9.5		21
3		8.5		42	18	12	21		30
4		14		30	19	11	21		71
5		190		38	20	9.5	26		96
6		59		33	21	9.5	26		42
7		21		42	22	9.5	71		138
8		16		59	23	8.5	19		53
9		14		42	24	9.5			89
10		13		26	25	11			42
11		12		26	26	14		38	102
12		12		42	27	9.5		108	53
13	6.5	11		30	28	24		89	33
14	11	9.5		21	29	43		42	30
15	9.5	9.5		21	30	9.5		96	33
					31	9.5		53	

Discharge, in million gallons per day, of Kalihikwai River near Hanalei, Kauai, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	53	30	53	53	42	108	33	9.5	12	.....	83	.....
2.....	30	30	59	42	53	59	18	8.5	11	.....	77	.....
3.....	38	38	71	42	33	102	16	8.5	12	.....	53	.....
4.....	77	115	33	33	21	378	16	8.5	13	.....	42	.....
5.....	108	71	42	33	21	65	14	12	12	.....	38	.....
6.....	59	38	65	38	48	38	14	8.5	11	.....	33	.....
7.....	65	26	77	42	26	48	13	9.5	11	.....	26	.....
8.....	65	24	53	30	21	26	13	9.5	14	.....	26	.....
9.....	53	33	33	26	21	24	12	9.5	11	.....	24	.....
10.....	89	24	48	24	18	21	12	21	9.5	.....	53	.....
11.....	38	96	38	21	19	21	12	33	9.5	.....	53	.....
12.....	30	30	30	21	16	18	12	33	9.5	.....	30	.....
13.....	30	30	83	21	16	19	12	19	18	.....	26	.....
14.....	26	21	102	19	71	18	12	16	11	.....	.....	.....
15.....	77	19	130	19	33	16	12	13	9.5	.....	.....	.....
16.....	71	19	102	21	21	14	12	18	9.5	.....	30	.....
17.....	65	19	53	24	18	14	12	18	8.5	.....	24	.....
18.....	59	33	59	18	18	14	13	12	8.5	.....	21	.....
19.....	30	30	48	21	16	14	12	11	8.5	.....	19	.....
20.....	26	19	26	19	14	14	9.5	19	8.5	.....	12	.....
21.....	21	19	30	21	14	21	11	38	8.5	.....	12	.....
22.....	19	59	190	18	14	19	9.5	26	8.5	.....	.....	.....
23.....	24	102	402	16	14	24	9.5	19	8.5	42	.....	.....
24.....	33	138	240	16	30	16	9.5	21	8.5	71	.....	.....
25.....	71	38	625	14	19	14	9.5	16	8.5	102	.....	.....
26.....	26	48	108	14	26	14	8.5	14	9.5	.....	.....	.....
27.....	38	26	65	16	115	18	9.5	13	9.5	190	.....	.....
28.....	53	24	59	16	48	18	9.5	12	9.5	102	.....	38
29.....	96	48	71	14	53	16	8.5	.....	8.5	96	.....	26
30.....	96	71	42	19	122	14	8.5	.....	.....	122	.....	26
31.....	53	122	.....	42	.....	48	9.5	.....	.....	.....	.....	.....

NOTE.—Discharge determined from a rating curve well defined below 600 million gallons per day (928 second-feet). No record for periods for which discharge is not given.

Monthly discharge of Kalihikwai River near Hanalei, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
March 13-31.....	30	6.5	12.4	19.2	235	723
April 1-23.....	190	8.5	26.5	41.0	608	1,870
May 26-31.....	108	38	71.0	110	426	1,310
June.....	180	21	52.6	81.4	1,580	4,840
1914-15.						
July.....	108	19	52.2	80.8	1,620	4,970
August.....	138	19	46.5	71.9	1,440	4,420
September.....	625	26	101	156	3,040	9,300
October.....	53	14	24.9	38.5	773	2,370
November.....	122	14	33.4	51.7	1,000	3,080
December.....	378	14	40.4	62.5	1,250	3,840
January.....	33	8.5	12.3	19.0	382	1,170
February.....	38	8.5	16.3	25.2	456	1,400
March 1-29.....	18	8.5	10.2	15.8	297	908
April 23-25, 27-30.....	190	42	104	161	725	2,230
May 1-13, 16-21.....	83	12	35.9	55.5	682	2,090

HANALEI RIVER AT ELEVATION 625 FEET, NEAR HANALEI, KAUAI.

LOCATION.—Two miles west of Kauai Electric Co. power line and 10 miles south of Hanalei. Trail to station leaves power line at pole No. 485.

RECORDS AVAILABLE.—January 26, 1914, to June 30, 1915.

GAGE.—Stevens water-stage recorder; datum raised 6.0 feet January 15, 1915. Records published to new datum.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

CHANNEL AND CONTROL.—One channel at all stages; straight for 100 feet above and below gage; stream bed rough; right bank steep and high; left bank slopes gently; control composed of boulders; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 9.7 feet (new datum) September 26, 1914 (discharge, computed from extension of the rating curve, approximately 3,800 million gallons per day, or 5,880 second-feet); minimum stage recorded, 0.4 foot (new datum) March, 1914 (discharge, 24 million gallons per day, or 37 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Irrigation, power and domestic supply.

ACCURACY.—Estimates based on well-defined rating curves and a continuous gage-height record, good for all stages.

Discharge measurements of Hanalei River at elevation 625 feet, near Hanalei, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—Dec. 17	W. V. Hardy	0.80	65	42
29	do.	.50	44	28
1914—Jan. 27	do.	.80	67	43
27	do.	2.40	526	340
27	do.	1.85	297	192
May 26	J. C. Dort	.96	97	58
June 27	do.	1.35	149	96
Oct. 17	do.	1.19	108	69
1915—Apr. 23	W. V. Hardy	1.36	128	83
24	do.	1.99	299	193
24	do.	1.66	202	131
25	do.	2.12	360	233
June 26	D. E. Horner	1.52	190	123
27	do.	.99	76	49

Discharge, in million gallons per day, of Hanalei River at elevation 625 feet, near Hanalei, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	Date.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914.							1914.						
1		36	24	33	60	188	16		36	86	33	44	44
2		33	24	28	258	178	17		33	48	30	80	52
3		33	24	30	188	75	18		33	36	44	70	44
4		36	24	41	92	60	19		30	33	36	80	41
5			33	24	92	95	20		30	33	44	56	75
6		36	38	56	65	70	21		28	30	48	56	65
7		33	24	41	52	52	22		28	30	60	92	80
8		36	24	36	70	99	23		28	30	198	178	70
9		36	24	36	510	65	24		28	33	99	70	188
10			36	28	36	390	25		30	36	60	56	114
11		36	24	33	131	60	26		30	30	48	122	258
12			36	28	33	122	27		75	44	33	149	122
13			36	26	33	114	28		41	33	86	75	106
14			36	30	33	99	29		36		41	65	75
15			38	33	38	52	30		36		36	48	86
							31		38		30		80

Discharge, in million gallons per day, of Hanalei River at elevation 625 feet, near Hanalei, Kauai, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	65	140	80	275	40	89	48	37	34	26	135	.....
2.....	75	70	70	325	44	70	48	37	34	26	118	.....
3.....	65	70	80	308	53	245	48	37	34	26	96	.....
4.....	65	70	99	153	89	135	44	37	37	26	76	.....
5.....	60	149	149	110	89	76	48	37	40	26	64	.....
6.....	92	232	149	96	135	76	76	44	37	64	58	.....
7.....	99	232	232	96	126	76	103	37	34	53	53	.....
8.....	80	140	122	96	70	96	64	37	44	31	.....	.....
9.....	75	99	92	126	53	58	53	40	44	40	.....	.....
10.....	86	80	86	103	53	56	48	37	34	34	.....	.....
11.....	86	75	106	96	110	54	48	34	34	28	.....	.....
12.....	70	75	131	89	103	52	48	48	34	28	.....	.....
13.....	114	80	80	144	64	49	48	44	37	37	.....	.....
14.....	65	245	75	76	53	46	44	40	34	37	.....	.....
15.....	60	140	80	172	58	43	34	48	31	37	.....	.....
16.....	56	99	92	96	48	40	34	64	31	135	.....	.....
17.....	60	80	114	70	44	40	37	53	31	144	.....	.....
18.....	56	70	370	53	44	44	37	44	31	64	.....	.....
19.....	92	114	178	53	40	44	34	48	31	53	.....	.....
20.....	158	56	122	53	40	44	37	48	31	48	.....	.....
21.....	86	52	106	53	44	89	37	44	28	53	.....	.....
22.....	75	70	86	58	126	118	37	48	28	64	.....	.....
23.....	80	92	99	48	64	64	37	53	28	76	.....	.....
24.....	60	99	80	48	53	76	37	53	28	162	.....	.....
25.....	60	270	86	44	48	70	37	40	28	182	.....	.....
26.....	56	285	86	44	44	58	34	37	28	480	.....	.....
27.....	52	122	80	44	40	53	37	34	28	380	.....	64
28.....	52	86	158	40	40	48	37	34	28	204	.....	82
29.....	56	122	149	40	37	48	37	.....	26	540	.....	58
30.....	56	92	390	40	48	48	37	.....	26	260	.....	53
31.....	106	86	.....	44	.....	53	37	.....	26	.....	.....	.....

NOTE.—Discharge determined from well-defined rating curves applicable Jan. 26 to Sept. 30, 1914, and Oct. 1, 1914, to June 30, 1915. Discharge Mar. 2-11 and Dec. 10-14, 1914, estimated by comparison with record on Kalihiwai River. No record May 8 to June 26, 1915.

Monthly discharge of Hanalei River at elevation 625 feet, near Hanalei, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
January 26-31.....	75	30	42.7	66.1	256	786
February.....	44	28	33.9	52.5	949	2,910
March.....	86	24	34.0	52.6	1,050	3,230
April.....	198	28	52.9	81.8	1,590	4,870
May.....	510	44	118	183	3,670	11,200
June.....	258	41	84.6	131	2,540	7,790
The period.....					10,100	30,800
1914-15.						
July.....	158	52	74.8	116	2,320	7,120
August.....	285	52	119	184	3,690	11,300
September.....	390	70	128	198	3,830	11,800
October.....	325	40	99.8	154	3,090	9,490
November.....	135	37	63.3	97.9	1,900	5,830
December.....	245	40	79.3	123	2,460	7,540
January.....	103	34	44.7	69.2	1,380	4,250
February.....	64	34	42.6	65.9	1,190	3,660
March.....	44	26	32.2	49.8	999	3,060
April.....	540	26	112	173	3,360	10,300
May 1-7.....	135	53	85.7	133	600	1,840
June.....						
The period.....					24,800	76,200

HANALEI RIVER NEAR HANALEI, KAUAI.

LOCATION.—About 5 miles up the river from Hanalei.

RECORDS AVAILABLE.—December 28, 1911, to June 30, 1915.

GAGE.—Inclined and vertical staff on left bank; read twice daily.

DISCHARGE MEASUREMENTS.—Made by wading or from cable.

CHANNEL AND CONTROL.—One channel at all stages; straight for 500 feet above and below gage; banks are low and wooded but do not overflow. Control composed of boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 17.52 feet at 4 p. m. September 26, 1914 (discharge, computed from extension of rating curve, approximately 14,000 million gallons per day, or 21,700 second-feet), minimum stage recorded, 6.21 feet March 25, 1914 (discharge, 26 million gallons per day, or 40 second-feet).

DIVERSIONS.—China ditch diverts water above station.

REGULATION.—By diversions only.

UTILIZATION.—Most of the water passing the station is wasted, but a small amount is diverted for irrigation of rice and taro.

ACCURACY.—Estimates July 1, 1913, to May 2, 1914, based on a fairly well defined rating curve; fair for all stages. Estimates May 3, 1914, to June 30, 1915, poor because of lack of sufficient measurements to properly define a rating curve.

Discharge measurements of Hanalei River near Hanalei, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—Nov. 12	W. V. Hardy.....	8.50	1,616	1,040
1914—Mar. 17	.....do.....	6.64	196	126
May 25	J. C. Dort.....	7.11	328	212
Dec. 24	.....do.....	6.89	156	101
1915—May 8	W. V. Hardy.....	6.78	145	94
June 29	.....do.....	6.95	222	144

Discharge, in million gallons per day, of Hanalei River near Hanalei, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	80	60	102	80	60	80	58	58	58	40	470	740
2.....	703	60	160	60	160	80	58	58	58	33	1,290	205
3.....	235	60	102	60	102	533	58	58	58	40	205	88
4.....	235	60	80	60	80	80	80	58	58	40	115	66
5.....	235	60	80	60	60	80	58	58	58	330	76	100
6.....	80	80	80	60	60	80	58	58	135	245	56	76
7.....	80	80	102	160	129	80	105	58	58	92	165	56
8.....	80	80	80	129	102	80	170	58	58	80	710	445
9.....	80	80	80	80	102	60	80	58	58	58	680	185
10.....	80	60	60	60	323	60	58	58	80	49	245	100
11.....	80	60	60	60	235	60	58	58	58	40	115	56
12.....	80	80	80	60	617	60	80	58	80	40	76	40
13.....	160	102	80	80	129	60	80	58	80	40	56	56
14.....	129	102	80	80	102	60	58	58	80	40	40	48
15.....	102	80	60	80	80	60	58	58	58	40	130	28
16.....	80	160	60	60	80	60	58	58	470	33	100	76
17.....	80	102	60	60	80	60	80	58	120	40	66	56
18.....	102	80	60	80	102	60	58	58	80	580	76	66
19.....	80	60	80	60	160	60	58	58	69	205	76	100
20.....	60	60	60	60	588	60	80	58	49	170	185	88
21.....	60	80	60	60	129	60	80	58	40	135	225	66
22.....	60	80	60	60	102	60	80	58	33	285	185	2,600
23.....	80	60	60	60	102	60	58	58	40	495	66	165
24.....	80	80	60	60	102	60	58	58	40	495	115	165
25.....	80	80	44	80	129	60	58	58	26	170	185	100
26.....	60	74	44	80	129	60	58	58	49	105	66	100
27.....	102	80	44	80	80	60	135	58	40	308	148	268
28.....	80	235	102	80	60	60	80	80	470	188	165	115
29.....	60	102	80	60	60	60	80	80	80	105	100	76
30.....	60	160	80	60	102	60	58	58	58	92	115	56
31.....	60	129	80	80	80	80	58	58	40	100	100	100
1914-15.												
1.....	130	115	115	268	268	340	115	66	66	40	340	40
2.....	88	76	130	310	365	710	115	66	66	40	390	40
3.....	76	66	88	225	205	5,050	100	66	66	34	245	40
4.....	100	445	115	245	130	880	130	66	76	34	205	530
5.....	185	390	268	165	130	390	100	66	76	40	650	130
6.....	130	185	1,280	315	115	340	100	66	66	268	115	88
7.....	88	115	225	185	148	245	100	66	66	76	148	88
8.....	165	560	130	290	115	225	100	66	88	48	88	245
9.....	100	88	130	445	115	185	88	66	66	115	88	115
10.....	165	76	115	620	115	205	100	115	56	56	88	56
11.....	115	340	100	590	100	165	115	115	56	48	390	66
12.....	66	115	472	148	530	390	115	268	56	48	88	56
13.....	66	66	472	130	165	148	100	115	185	66	66	66
14.....	66	56	560	115	115	130	88	88	100	48	66	56
15.....	66	56	205	130	115	130	88	76	56	390	76	66
16.....	205	48	130	130	88	130	88	100	56	620	66	245
17.....	100	76	130	245	115	115	76	148	48	225	66	245
18.....	185	76	445	165	88	115	76	88	48	115	100	268
19.....	76	66	165	130	100	290	76	76	48	225	56	418
20.....	66	66	115	148	76	185	76	76	48	225	66	418
21.....	48	48	76	115	76	165	76	225	48	130	76	148
22.....	40	100	88	115	76	148	76	185	48	165	66	148
23.....	40	500	1,680	100	76	148	76	115	48	225	66	115
24.....	56	340	3,850	100	290	205	130	100	48	560	66	205
25.....	100	130	1,020	100	100	148	115	76	48	590	66	115
26.....	66	76	6,190	88	205	130	66	76	40	1,600	56	245
27.....	48	66	1,020	115	530	130	66	66	40	590	56	340
28.....	100	315	445	100	472	365	66	66	28	365	56	290
29.....	390	340	365	148	390	165	66	66	40	650	56	148
30.....	445	245	315	290	845	130	66	66	40	590	48	115
31.....	245	245	245	205	205	115	66	66	48	48	48	48

NOTE.—Discharge determined from rating curves applicable as follows: July 1, 1913, to May 2, 1914, fairly well defined; May 3, 1914, to June 30, 1915, poorly defined.

Monthly discharge of Hanalei River near Hanalei, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	763	60	119	184	3,680	11,300
August.....	235	60	87.9	136	2,730	8,360
September.....	160	44	74.7	116	2,240	6,880
October.....	160	60	72.5	112	2,250	6,900
November.....	588	60	145	224	4,350	13,400
December.....	533	60	80.4	124	2,490	7,650
January.....	170	58	72.7	112	2,250	6,920
February.....	80	58	58.8	91.0	1,650	5,050
March.....	470	26	88.4	137	2,740	8,410
April.....	580	33	153	237	4,590	14,100
May.....	1,290	40	207	320	6,400	19,700
June.....	2,600	28	213	330	6,390	19,600
The year.....	2,600	26	114	176	41,800	128,000
1914-15.						
July.....	445	40	123	190	3,820	11,700
August.....	560	48	172	266	5,320	16,400
September.....	6,190	76	681	1,050	20,400	62,700
October.....	620	88	210	325	6,500	20,000
November.....	845	76	209	323	6,260	19,200
December.....	5,050	115	394	610	12,200	37,500
January.....	130	66	90.8	140	2,820	8,640
February.....	268	66	98.9	153	2,770	8,500
March.....	185	28	60.3	93.3	1,870	5,740
April.....	1,600	34	274	424	8,230	25,200
May.....	650	48	131	203	4,060	12,500
June.....	530	40	172	266	5,140	15,800
The year.....	6,190	28	218	337	79,400	244,000

CHINA DITCH NEAR HANAIEI, KAUAI.

LOCATION.—Just below intake, about 5 miles south of Hanalei.

RECORDS AVAILABLE.—March 17, 1914, to June 30, 1915. December 28, 1911, to September 30, 1913, at old station a quarter of a mile below present station.

GAGE.—Vertical staff on left bank; read twice daily; vertical staff also at old station.

DISCHARGE MEASUREMENTS.—Made from plank.

CHANNEL AND CONTROL.—Cut in clay and gravel; discharge relation affected by growth of aquatic plants.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 2.36 feet at noon June 22, 1914 (discharge, 50 million gallons per day, or 77 second-feet); ditch occasionally dry.

DIVERSIONS.—Diverts part of flow of Hanalei River.

REGULATION.—By head gates.

UTILIZATION.—Irrigation of rice and taro.

ACCURACY.—Discharge relation rather unstable owing to growth of vegetation in channel, but fairly well defined rating curves were developed for periods July 1, 1912, to June 30, 1913, and March 17 to September 25, 1914; estimates fair for all stages. Estimates October 11, 1914, to June 30, 1915, poor on account of lack of sufficient measurements to properly define a rating curve.

Discharge measurements of China ditch near Hanalei, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—Aug. 26	W. V. Hardy.....	5.00	20	13
1914—Mar. 17	.....do.....	1.61	41	26
May 25	J. C. Dort.....	1.50	36	23
Aug. 25	D. E. Horner.....	1.25	25	16
1915—May 8	W. V. Hardy.....	1.49	30	20
June 29	.....do.....	1.74	39	25

Discharge, in million gallons per day, of China ditch near Hanalei, Kauai, for the years ending June 30, 1913, 1914, and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1912-13.												
1.....	17	17	17	22	22	26	17	17	20	17	17	19
2.....	17	17	19	22	22	28	17	17	20	17	18	19
3.....	17	17	19	22	22	35	17	17	20	17	17	20
4.....	17	18	18	22	22	23	17	17	20	17	17	19
5.....	17	17	19	22	23	22	17	18	20	17	17	19
6.....	17	17	30	21	23	22	20	18	20	17	17	18
7.....	18	17	19	21	23	23	20	17	20	17	19	18
8.....	18	17	17	35	24	19	20	17	20	17	17	18
9.....	18	17	17	23	24	17	20	17	17	17	17	18
10.....	18	17	17	22	22	17	21	17	17	17	17	18
11.....	18	17	17	22	22	17	20	17	17	17	17	18
12.....	18	17	17	21	22	17	21	17	17	17	18	18
13.....	18	17	17	21	22	17	22	20	17	18	17	18
14.....	18	26	17	21	22	17	21	20	17	17	17	18
15.....	18	18	17	21	24	17	21	20	17	17	17	18
16.....	18	17	19	22	22	17	20	20	17	17	17	18
17.....	18	17	22	22	22	17	20	20	17	17	17	18
18.....	18	17	22	22	23	16	20	22	17	17	17	18
19.....	18	17	22	22	22	16	20	21	17	17	17	18
20.....	18	17	21	28	23	16	21	20	17	17	17	18
21.....	17	17	21	28	24	17	20	20	19	17	17	17
22.....	17	23	21	24	26	18	20	20	19	17	17	17
23.....	17	19	21	22	23	18	20	20	19	17	17	19
24.....	17	18	21	22	22	20	20	20	21	17	17	18
25.....	17	17	20	22	22	17	20	20	20	17	19	19
26.....	17	18	20	25	22	17	20	20	18	17	19	21
27.....	17	28	20	22	22	17	18	20	17	17	19	22
28.....	17	19	22	25	22	17	17	20	17	17	19	19
29.....	17	18	22	24	22	17	17	.....	17	17	19	19
30.....	17	18	22	24	22	17	17	.....	17	18	19	20
31.....	17	18	.....	22	.....	17	17	.....	17	.....	19	.....

Discharge, in million gallons per day, of China ditch near Hanalei, Kauai, for the years ending June 30, 1913, 1914, and 1915—Continued.

Date.	Mar.	Apr.	May.	June.	Date.	Mar.	Apr.	May.	June.
1913-14.					1913-14.				
1.....		24	30	32	16.....		22	22	16
2.....		22	38	23	17.....	26	23	22	17
3.....		22	29	20	18.....	24	32	20	18
4.....		22	26	18	19.....	23	35	18	22
5.....		29	24	22	20.....	23	22	26	17
6.....		23	24	22	21.....	23	30	26	22
7.....		18	35	20	22.....	22	34	23	41
8.....		17	34	26	23.....	22	36	20	22
9.....		14	26	26	24.....	22	34	20	16
10.....		18	23	18	25.....	22	28	24	14
11.....		24	22	17	26.....	22	26	18	11
12.....		23	17	20	27.....	22	32	24	16
13.....		23	16	20	28.....	32	28	23	14
14.....		22	16	17	29.....	22	26	20	10
15.....		22	23	16	30.....	18	23	20	10
					31.....	17		20	

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	11	16	14	.....	6.2	4.8	1.2	8.0	14	18	22	20
2.....	10	14	17	.....	6.2	6.2	.....	8.0	13	18	24	20
3.....	12	13	14	.....	4.8	22	1.5	8.0	14	18	19	20
4.....	12	23	16	.....	4.2	3.6	.....	7.1	15	16	16	28
5.....	12	18	17	.....	4.8	3.1	.....	8.0	14	20	15	25
6.....	12	14	22	.....	4.8	4.2	.....	8.0	14	30	14	22
7.....	11	12	17	.....	3.6	3.6	2.6	9.0	13	22	19	25
8.....	12	12	16	.....	2.6	.....	2.6	8.0	19	19	19	28
9.....	12	12	14	.....	2.2	.....	2.6	9.0	22	24	18	24
10.....	13	13	16	.....	1.8	.....	2.6	10	20	24	18	22
11.....	12	20	16	1.5	2.2	2.2	3.1	11	19	24	28	25
12.....	12	16	18	1.5	2.6	1.8	3.1	11	19	22	20	24
13.....	12	16	18	1.5	10	2.2	2.6	10	28	28	19	22
14.....	11	14	22	1.5	4.2	1.5	2.6	10	20	22	19	24
15.....	11	14	17	1.8	3.6	1.5	2.6	10	19	31	15	26
16.....	20	13	14	1.8	3.1	1.5	2.2	10	19	31	14	26
17.....	13	14	14	1.5	3.1	1.8	2.2	10	22	25	14	26
18.....	16	17	18	2.6	3.1	2.2	2.2	12	20	22	19	24
19.....	12	16	16	1.8	3.6	1.8	2.2	14	22	25	16	28
20.....	11	17	13	2.2	3.6	4.8	2.2	15	22	24	14	25
21.....	10	13	13	1.8	3.1	3.1	2.2	24	22	22	16	24
22.....	10	18	12	1.8	3.1	3.6	2.2	20	22	22	14	24
23.....	9.1	16	29	1.5	3.1	.4	2.2	19	22	25	13	22
24.....	12	16	26	1.5	2.6	.....	4.8	16	22	32	13	25
25.....	18	13	5.8	1.8	7.1	.6	7.1	16	20	37	12	22
26.....	14	12	.....	2.6	3.6	.....	8.0	15	20	38	12	26
27.....	14	11	.....	3.1	4.8	.....	8.0	14	19	31	11	30
28.....	18	11	.....	2.6	11	.....	8.0	14	19	22	11	26
29.....	22	13	.....	4.2	10	.....	7.1	.....	19	31	15	26
30.....	22	14	.....	6.2	8.0	.....	7.1	.....	19	26	20	25
31.....	17	14	.....	4.8	.....	.....	9.0	.....	20	.....	20	.....

NOTE.—Daily discharge determined from rating curves applicable as follows: July 1, 1912, to June 30, 1913, fairly well defined; Mar. 17 to Sept. 25, 1914, fairly well defined between 10 and 30 million gallons per day (15 and 46 second-feet); Oct. 11, 1914, to June 30, 1915, poorly defined.

Hanalei River was over the ditch during the high water of Sept. 26, 1914. No water in ditch or no flow Sept. 26 to Oct. 10, Dec. 8-10, 24, 26-31, 1914, Jan. 2 and 4-6, 1915.

Monthly discharge of China ditch near Hanalei, Kauai, for the years ending June 30, 1913, 1914, and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1912-13.						
July.....	18	17	17.5	27.1	541	1,660
August.....	28	17	18.2	28.2	564	1,730
September.....	30	17	19.8	30.6	593	1,820
October.....	35	21	23.0	35.6	714	2,190
November.....	26	22	22.6	35.0	678	2,080
December.....	35	16	19.1	29.6	591	1,820
January.....	22	17	19.3	29.9	598	1,840
February.....	22	17	18.9	29.2	529	1,620
March.....	21	17	18.2	28.2	565	1,730
April.....	18	17	17.1	26.5	512	1,570
May.....	19	17	17.6	27.2	545	1,670
June.....	22	17	18.6	28.8	557	1,710
The year.....	35	16	19.1	29.6	6,990	21,400
1914.						
March 17-31.....	32	17	22.7	35.1	340	1,040
April.....	36	14	25.1	38.8	754	2,310
May.....	38	16	23.5	36.4	729	2,240
June.....	41	10	19.4	30.0	583	1,790
The period (106 days).....	41	10	22.7	35.1	2,400	7,380
1914-15.						
July.....	22	9.1	13.3	20.6	413	1,270
August.....	23	11	14.7	22.7	455	1,400
September 1-25.....	29	5.8	16.6	25.7	415	1,270
October 11-31.....	6.2	1.5	2.36	3.65	50	152
November.....	11	1.8	4.56	7.06	137	420
December 1-7, 11-23, 25.....	22	.4	3.64	5.63	76	235
January 1, 3, 7-31.....	9.0	1.2	3.84	5.94	104	318
February.....	24	7.1	11.9	18.4	334	1,020
March.....	28	13	19.1	29.6	592	1,820
April.....	38	16	25.0	38.7	749	2,300
May.....	28	11	16.7	25.8	519	1,590
June.....	30	20	24.5	37.9	734	2,260
The period (336 days).....	38	.4	13.6	21.0	4,580	14,100

LUMAHAI RIVER NEAR HANALEI, KAUAI.

LOCATION.—About 6 miles above mouth and 10 miles by road and trail from Hanalei.

RECORDS AVAILABLE.—May 23, 1914, to June 30, 1915.

GAGE.—Stevens water stage recorder.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—One channel at all stages; straight for 50 feet above and 100 feet below gage; stream bed very rough; right bank vertical; slope of left bank gentle. Control composed of boulders, shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 8.0 feet at 3 a. m. September 25, 1914 (discharge, computed from extension of the rating curve, approximately 2,600 million gallons per day, or 4,020 second-feet); minimum stage recorded, 0.6 foot April, 1915 (discharge, 20 million gallons per day, or 31 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Small part of flow is diverted for irrigation of rice and taro.

ACCURACY.—Estimates May 23 to September 26, 1914, and December 4, 1914, to June 30, 1915, based on a continuous record of gage height and rating curves fairly well defined below 200 million gallons per day; fair below that limit. Estimates September 27 to December 3, 1914, poor owing to lack of sufficient measurements to properly define a rating curve.

Discharge measurements of Lumahai River near Hanalei, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—May 23	J. C. Dort.....	1.18	67	43
June 17	do.....	1.02	51	33
July 30	do.....	1.69	203	131
31	do.....	1.51	158	102
Aug. 24	D. E. Horner.....	1.68	223	144
Oct. 19	do.....	.82	67	43
1915—Jan. 23	do.....	.69	41	27
Apr. 29	W. V. Hardy.....	1.32	172	111
June 30	D. E. Horner.....	.85	64	41

Discharge, in million gallons per day, of Lumahai River near Hanalei, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	May.	June.	Date.	May.	June.	Date.	May.	June.				
1913-14.												
1.....		83	11.....		38	21.....		92				
2.....		92	12.....		34	22.....		465				
3.....		38	13.....		38	23.....	44	120				
4.....		29	14.....		34	24.....	50	120				
5.....		74	15.....		21	25.....	74	83				
6.....		58	16.....		25	26.....	38	210				
7.....		38	17.....		21	27.....	110	140				
8.....		58	18.....		29	28.....	83	83				
9.....		83	19.....		92	29.....	58	65				
10.....		65	20.....		140	30.....	65	65				
						31.....	74	.....			
	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	110	50	58	.....	198	248	47	27	32	24	67	118
2.....	110	38	65	.....	198	118	42	27	32	20	108	.....
3.....	92	44	50	.....	174	470	60	24	32	20	67	.....
4.....	120	235	50	.....	108	670	47	24	32	20	54	.....
5.....	198	83	140	.....	66	150	42	47	32	20	42	.....
6.....	130	110	280	.....	60	99	42	42	32	20	36	.....
7.....	101	74	101	.....	74	67	47	32	27	20	36	.....
8.....	110	50	58	.....	108	67	227	54	27	269	36	.....
9.....	101	58	58	.....	60	54	162	36	32	90	32	.....
10.....	101	58	38	.....	47	60	74	32	27	36	32	.....
11.....	101	101	44	.....	41	54	60	60	27	47	67	.....
12.....	74	50	130	.....	41	82	47	60	27	36	42	.....
13.....	58	38	162	.....	41	74	47	329	27	32	32	.....
14.....	58	38	140	.....	151	60	42	162	47	27	32	.....
15.....	50	29	185	.....	140	60	36	150	27	27	32	.....
16.....	185	25	58	.....	66	67	36	90	27	27	27	.....
17.....	74	21	44	.....	47	54	36	90	27	99	27	.....
18.....	130	25	110	.....	41	47	32	139	27	398	27	.....
19.....	83	25	65	41	53	42	54	99	27	255	32	.....
20.....	50	25	44	47	41	42	32	60	27	108	32	.....
21.....	50	21	44	47	41	42	27	47	24	90	27	.....
22.....	38	83	34	41	36	42	27	150	24	67	27	.....
23.....	65	210	92	41	36	36	27	150	24	150	27	.....
24.....	65	235	540	41	330	36	27	67	24	.....	27	.....
25.....	198	74	600	41	98	36	27	42	24	.....	27	.....
26.....	74	74	950	41	140	74	27	36	24	.....	27	.....
27.....	92	50	235	41	272	82	27	36	24	.....	24	.....
28.....	174	50	66	235	108	27	32	24	118	24	24	.....
29.....	395	120	.....	47	210	90	27	.....	24	150	24	.....
30.....	198	185	.....	53	490	60	27	.....	24	99	24	.....
31.....	110	151	.....	108	.....	47	27	.....	24	.....	24	.....

NOTE.—Discharge determined from rating curves applicable as follows: May 23, 1914, to Sept. 26, 1914, fairly well defined below 200 million gallons per day (309 second-feet); Sept. 27 to Dec. 3, 1914, poorly defined; Dec. 4, 1914, to June 30, 1915, fairly well defined below 200 million gallons per day (309 second-feet). No record for periods for which discharge is not given.

Monthly discharge of Lumahai River near Hanalei, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-feet (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
May 23-31.....	110	38	66.2	102	596	1,830
June.....	465	21	84.4	131	2,530	7,770
The period.....					3,126	9,600
1914-15.						
July.....	395	38	113	175	3,500	10,800
August.....	235	21	78.4	121	2,430	7,460
September 1-27.....	950	34	162	251	4,380	13,400
October 19-31.....	108	41	50.4	73.0	655	2,010
November.....	490	36	121	187	3,640	11,100
December.....	670	36	104	161	3,240	9,890
January.....	227	27	48.7	75.4	1,510	4,650
February.....	329	24	76.6	119	2,140	6,580
March.....	47	24	27.7	42.9	858	2,640
April 1-23, 28-30.....	398	20	87.3	155	2,270	6,970
May.....	108	24	36.8	56.9	1,140	3,500
The period.....					25,800	79,000

WAIOLI STREAM NEAR HANALEI, KAUAI.

LOCATION.—Three miles above mouth of stream and 4 miles from Hanalei.

RECORDS AVAILABLE.—June 30, 1914, to June 30, 1915.

GAGE.—Stevens water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from cable at gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for 50 feet above and 20 feet below gage; right bank is steep; left bank slopes gently. Control composed of boulders; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 5.8 feet at 6 a. m. December 5, 1914 (discharge, computed from extension of rating curve, approximately 1,100 million gallons per day, or 1,700 second-feet); minimum stage recorded, 0.6 foot July 22, 1914 (discharge, 2 million gallons per day, or 3.1 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Small part of flow is diverted for irrigation of rice and taro.

ACCURACY.—Estimates July 1 to August 25, 1914, poor owing to lack of sufficient discharge measurements. Estimates October 18, 1914, to April 13, 1915, and April 12 to June 30, 1915, based on fairly well defined rating curves and a continuous gage-height record; fair except for extreme floods.

Discharge measurements of Waioli Stream near Hanalei, Kauai, during the year ending June 30, 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Aug. 10.....	J. C. Dort.....	1.15	29	19
Dec. 20.....	D. E. Horner.....	1.22	28	18
20.....	do.....	1.95	131	85
1915—Jan. 14.....	J. C. Dort.....	1.04	18	11
Apr. 29.....	W. V. Hardy.....	1.58	51	33
June 23.....	D. E. Horner.....	1.40	32	21

Discharge in million gallons per day, of Waioli Stream near Hanalei, Kauai, for the year ending June 30, 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.											
1.....	60	7.5	-----	49	92	11	9.5	9.5	22	24	11
2.....	25	6.0	-----	78	36	11	9.5	9.5	15	82	11
3.....	28	6.0	-----	54	17	9.5	9.5	8.0	11	31	11
4.....	60	91	-----	22	107	9.5	9.5	9.5	9.5	21	39
5.....	54	84	-----	17	405	9.5	15	9.5	9.5	17	24
6.....	32	22	-----	15	85	9.5	9.5	9.5	9.5	15	15
7.....	28	14	-----	15	17	9.5	15	9.5	22	15	19
8.....	28	7.5	-----	20	49	9.5	9.5	11	130	13	31
9.....	22	9.0	-----	22	49	8.0	9.5	9.5	107	13	15
10.....	28	2	-----	17	48	9.5	36	9.5	28	15	11
11.....	16	44	-----	15	48	28	44	8.0	36	39	13
12.....	10	16	-----	15	47	15	32	15	28	19	13
13.....	9.0	14	-----	15	47	13	32	32	20	15	15
14.....	14	12	-----	92	46	11	28	11	-----	13	15
15.....	12	12	-----	60	46	11	20	9.5	-----	13	24
16.....	25	16	-----	15	45	9.5	36	8.0	-----	13	27
17.....	10	14	-----	13	45	9.5	36	8.0	-----	13	21
18.....	25	16	-----	15	13	44	9.5	17	8.0	-----	13
19.....	5.0	16	-----	15	15	44	9.5	13	6.5	-----	15
20.....	5.0	14	-----	13	28	9.5	22	6.5	-----	15	17
21.....	4.0	16	-----	15	13	25	9.5	49	6.5	-----	13
22.....	2.0	65	-----	13	13	15	9.5	36	6.5	-----	13
23.....	4.0	128	-----	13	13	11	9.5	17	6.5	-----	9.5
24.....	3.0	60	-----	13	78	17	9.5	13	6.5	-----	13
25.....	40	28	-----	13	17	15	9.5	11	6.5	-----	18
26.....	7.5	-----	-----	13	20	13	11	9.5	6.5	-----	20
27.....	6.0	-----	-----	13	107	15	9.5	9.5	6.5	-----	22
28.....	16	-----	-----	13	36	60	9.5	9.5	6.5	-----	25
29.....	123	-----	-----	32	114	20	8.0	-----	31	-----	27
30.....	65	-----	-----	15	245	13	11	-----	35	-----	24
31.....	25	-----	-----	20	-----	11	-----	-----	-----	9.5	-----

NOTE.—Discharge determined from rating curves applicable as follows: July 1 to Aug. 25, 1914, poorly defined; Oct. 18, 1914, to Apr. 13, 1915, fairly well defined; Apr. 29 to June 30, 1915, fairly well defined below 50 million gallons per day (77 second-feet). Discharge estimated Dec. 9-18, 1914, and June 24-28, 1915, by comparison with record for Lumahai River.

Monthly discharge of Waioli Stream near Hanalei, Kauai, for the year ending June 30, 1915.

Month.	Discharge.			Total run-off.	
	Million gallons per day.			Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.		
July.....	128	2.0	25.7	39.8	2,440
August 1-25.....	128	6.0	29.6	45.8	2,270
October 18-31.....	32	13	15.6	24.1	670
November.....	245	13	41.0	63.4	2,770
December.....	405	11	50.3	77.8	4,790
January.....	28	8.0	10.6	16.4	1,010
February.....	72	9.5	21.7	33.6	1,860
March.....	144	6.5	15.1	23.4	1,440
April 1-13, 29-30.....	130	9.5	34.2	52.9	1,570
May.....	82	9.5	17.5	27.1	1,660
June.....	39	8.0	19.5	30.2	1,800
The period.....	-----	-----	-----	7,589	23,300

WAINIHA RIVER NEAR HANAIEI, KAUAI.

LOCATION.—One mile above intake of Kauai Electric Co.'s power ditch, 6 miles above power house, and 14 miles from Hanalei.

RECORDS AVAILABLE.—July 28, 1914, to June 30, 1915.

GAGE.—Stevens water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from cable.

CHANNEL AND CONTROL.—One channel at all stages; straight for 75 feet above and 200 feet below gage; right bank steep and high; left bank slopes gently. Control composed of large boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 7.85 feet at 8 p. m., September 24, 1914 (discharge, computed from extension of rating curve, approximately 5,000 million gallons per day, or 7,740 second-feet); minimum stage recorded, 1.4 feet March 26 to April 4, 1915 (discharge, 62 million gallons per day, or 96 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Power development and irrigation of rice and taro.

ACCURACY.—Estimates based on fairly well defined rating curves and a continuous gage-height record; fair for all stages except extreme floods.

Discharge measurements of Wainiha River near Hanalei, Kauai, during the year ending June 30, 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—July 28	J. C. Dort.....	1.69	175	113
Aug. 24	do.....	2.35	375	222
Oct. 19	do.....	1.73	168	109
Nov. 24	do.....	3.07	798	516
Dec. 22	do.....	1.76	146	94
1915—June 27	W. V. Hardy.....	2.85	558	673

Discharge, in million gallons per day, of Wainiha River near Hanalei, Kauai, for the year ending June 30, 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1.....		104	104	240	212		76	65	68	62	113	62
2.....		98	180	180	255		72		65	62	113	62
3.....		110	98	190	125		68		68	62	99	62
4.....		255	104	150	110		68		82	62	87	240
5.....		590	225	190	150		68		87	87	76	113
6.....		190	355	180	140		68		72	168	68	82
7.....		150	140	212	98		68		68	82	68	106
8.....		118	110	170	93		68		76	68	65	130
9.....		132	104	140	88		68		72	82	65	82
10.....		110	140	125	93		68		68	68	65	68
11.....		190	190	118	88		76		65	65	179	65
12.....		93	510	110	84		82		65	65	72	65
13.....		84	395	104	93		76		72	68	68	72
14.....		80	620	104	212		68		68	68	65	
15.....		77	170		110		68		65	309	62	
16.....		77	118		98		65		65	318	62	
17.....		77	160		88		68		65	139	62	
18.....		98	150		88		65		65	106	75	
19.....		93	118	104	93		65		65	130	72	
20.....		98	125	110	88		65		65	122	72	
21.....		93	118	104	84		68		62	168	72	
22.....		200	93	98	84	87	68		65	190	68	
23.....		395	212	93	84	82	65		65	285	68	
24.....		285	1,590	93	285	93	65		65	510	65	
25.....		150	1,020	93	150	87	65		65		62	
26.....		140	1,420	93		87	65	68	62		62	
27.....		104	104	240	93	168	65	68	62		62	
28.....	104	132	212	104		255	65	68	62	240	62	
29.....	355	212	255	93		106	65		62	318	62	
30.....	462	418	338	140		87	65		62	158	62	
31.....	160	225		240		76	65		62		62	

NOTE.—Discharge determined from rating curves applicable as follows: July 28 to Dec. 3, 1914, fairly well defined below 800 million gallons per day (1,240 second-feet); Dec. 4, 1914, to June 30, 1915, fairly well defined below 600 million gallons per day (928 second-feet). Discharge estimated May 15-18 and May 25 to June 3, 1915. No record for periods for which discharge is not given.

Monthly discharge of Wainiha River near Hanalei, Kauai, for the year ending June 30, 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
August.....	590	77	167	258	5, 180	15, 900
September.....	1, 590	93	320	495	9, 610	29, 500
October 1-14, 19-31.....	240	93	136	210	3, 670	11, 300
November 1-25.....	285	84	124	192	3, 090	9, 510
December 22-31.....	255	76	113	175	1, 130	3, 470
January.....	82	65	68.1	105	2, 110	6, 480
March.....	87	62	67.1	104	2, 080	6, 380
April 1-24, 28-30.....	318	62	150	232	4, 050	12, 400
May.....	179	62	74.7	116	2, 320	7, 110
June 1-13.....	240	62	93.0	144	1, 210	3, 710
The period.....					34, 500	106, 000

WAINIHA RIVER (EAST AND WEST CHANNELS) NEAR WAINIHA, KAUAI.

LOCATION.—Just northeast of Kauai Electric Co.'s power house, 2 miles south of Wainiha.

RECORDS AVAILABLE.—East Channel, February 25, 1912, to June 30, 1915; West Channel, December 30, 1911, to June 30, 1915.

GAGE.—Inclined staff in each channel; read twice daily.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge over each channel.

CHANNEL AND CONTROL.—The river divides a short distance above power house and a station is maintained on each channel to obtain total flow. Fish dams built by the natives at the point where the river divides shift the water from one channel to the other. Control for East Channel composed of boulders; fairly permanent; control for West Channel composed of boulders; shifting.

EXTREMES OF DISCHARGE.—East Channel: Maximum stage recorded during period of record, 13.5 feet at 5 p. m., September 26, 1914 (discharge, computed from extension of rating curve, approximately 2,000 million gallons per day, or 3,090 second-foot); minimum stage recorded, 6.5 feet August 3 to 6, 1913 (discharge, 3 million gallons per day, or 4.6 second-foot).

West Channel: Maximum stage recorded, 9.0 feet at 5 p. m., September 26, 1914 (discharge, 1,500 million gallons per day, or 2,320 second-foot); minimum stage recorded, 5.4 feet, frequently (discharge, 53 million gallons per day, or 82 second-foot).

DIVERSIONS.—Water diverted for power development above the stations is returned to the river just above the station on the West Channel.

REGULATION.—None except by diversions.

UTILIZATION.—Part of water passing stations is used for irrigation of rice and taro.

ACCURACY.—Estimates for both channels based on fairly well defined rating curves; fair below 500 million gallons per day; estimates for higher stages approximate.

Discharge measurements of East Channel of Wainiha River near Wainiha, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1913—Aug. 23	W. V. Hardy.....	6.59	5.9	3.8
Nov. 13	do.....	9.30	407	263
14	do.....	8.10	106	69
1914—Aug. 7	J. C. Dort.....	8.10	118	76
1915—May 9	W. V. Hardy.....	7.60	41	26

Discharge, in million gallons, per day, of East Channel of Wainiha River near Wainiha, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	12	5	54	5	12	39	19	21	32	23	63	120
2.....	101	5	20	5	19	34	16	21	25	30	204	48
3.....	37	3	12	5	26	300	19	21	19	19	164	32
4.....	43	3	8	4	26	96	85	21	19	25	55	30
5.....	39	3	8	4	10	87	113	21	19	68	42	30
6.....	15	3	9	6	8	81	27	21	73	113	37	113
7.....	17	5	6	20	61	81	395	18	45	42	55	73
8.....	12	10	5	156	18	72	960	18	23	32	55	37
9.....	7	15	5	15	91	58	320	18	52	19	48	59
10.....	6	5	5	6	39	34	55	18	30	19	30	42
11.....	5	5	5	6	561	37	42	18	19	19	37	42
12.....	5	13	6	6	561	32	92	18	19	19	32	48
13.....	32	13	5	39	313	28	85	19	19	19	25	42
14.....	45	32	5	12	69	28	40	19	27	19	23	32
15.....	13	13	5	6	81	28	27	19	19	19	99	23
16.....	10	32	5	12	81	28	73	21	19	19	68	32
17.....	9	12	5	5	96	26	113	21	79	19	204	32
18.....	6	6	5	5	43	24	30	21	45	48	68	32
19.....	9	6	6	5	1,450	24	30	19	25	55	42	146
20.....	9	6	5	5	215	22	23	19	19	155	120	48
21.....	5	6	5	5	65	23	23	19	19	106	120	55
22.....	5	5	5	5	174	23	21	19	19	236	55	214
23.....	5	5	5	5	120	24	19	19	19	382	37	68
24.....	9	5	5	5	140	24	19	19	19	247	59	146
25.....	15	13	5	5	313	22	18	19	25	73	68	42
26.....	15	6	5	5	149	22	19	16	19	55	37	137
27.....	9	6	4	5	34	22	99	27	19	146	42	79
28.....	9	8	12	5	45	22	59	184	106	37	55	42
29.....	17	43	5	5	401	22	27	.....	23	30	42	42
30.....	5	32	5	5	51	22	19	.....	25	21	37	42
31.....	5	15	.....	5	.....	22	27	.....	19	.....	32	.....
1914-15.												
1.....	48	55	55	90	48	68	58	26	33	26	68	21
2.....	42	42	42	105	33	68	58	21	21	21	68	21
3.....	48	48	42	48	40	792	33	21	21	21	84	21
4.....	73	247	55	73	33	191	33	21	40	21	58	48
5.....	73	295	92	73	26	68	33	33	26	53	58	105
6.....	55	99	320	73	40	68	33	26	21	247	33	40
7.....	42	85	120	68	40	33	33	40	21	58	33	40
8.....	42	55	52	84	21	21	21	26	26	48	33	140
9.....	68	73	55	58	21	33	21	21	33	48	33	33
10.....	106	45	42	48	21	58	21	68	26	33	33	33
11.....	42	73	52	33	33	33	33	53	21	33	84	33
12.....	42	37	128	26	26	68	48	160	21	21	33	33
13.....	32	32	270	21	21	68	33	180	33	21	33	33
14.....	32	32	164	21	105	58	33	68	33	21	33	33
15.....	32	32	120	33	33	48	33	68	26	247	33	40
16.....	345	32	55	43	21	48	33	105	21	395	26	202
17.....	42	23	48	53	21	48	33	140	21	191	33	224
18.....	99	42	113	21	21	48	33	68	21	105	33	170
19.....	42	37	55	21	33	191	26	40	21	150	33	358
20.....	37	42	55	26	21	170	24	48	21	98	33	105
21.....	32	32	68	21	16	78	33	150	21	68	33	48
22.....	32	113	42	12	12	90	26	120	21	105	26	48
23.....	23	236	42	12	12	68	26	48	26	170	21	40
24.....	42	174	308	12	224	160	21	48	26	1,040	21	105
25.....	164	63	652	12	40	78	21	33	26	980	21	48
26.....	48	55	1,510	12	33	73	21	33	21	1,000	21	40
27.....	42	48	510	12	224	68	21	33	21	435	21	33
28.....	42	48	90	21	258	395	21	33	21	180	21	40
29.....	320	137	105	21	130	105	21	.....	21	105	21	33
30.....	270	358	247	33	495	68	21	.....	21	68	21	40
31.....	106	184	.....	105	.....	48	33	.....	33	.....	21	.....

NOTE.—Discharge determined from rating curves applicable as follows: July 1 to Dec. 31, 1913, and Jan. 1 to Sept. 26, 1914, fairly well defined below 500 million gallons per day (774 second-feet); Sept. 27, 1914, to June 30, 1915, fairly well defined between 20 and 500 million gallons per day (31 and 774 second-feet). Discharge interpolated Nov. 1 and 2, 1913.

Monthly discharge of East Channel of Wainiha River near Wainiha, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	101	5	17.1	26.5	531	1,630
August.....	43	3	10.9	16.9	339	1,040
September.....	54	4	8.00	12.4	240	737
October.....	156	4	12.3	19.0	382	1,170
November.....	1,450	8	176	272	5,270	16,200
December.....	300	22	45.4	70.2	1,410	4,320
January.....	960	16	94.0	145	2,910	8,940
February.....	184	16	25.5	39.5	714	2,190
March.....	106	19	30.3	46.9	939	2,880
April.....	382	19	70.5	109	2,110	6,490
May.....	204	23	66.3	103	2,060	6,310
June.....	214	23	64.3	99.5	1,930	5,920
The year.....	1,450	3	51.6	79.8	18,800	57,800
1914-15.						
July.....	345	23	79.5	123	2,460	7,560
August.....	358	23	92.7	143	2,870	8,820
September.....	1,510	42	184	285	5,510	16,900
October.....	105	12	41.6	64.4	1,290	3,960
November.....	495	12	70.1	108	2,100	6,450
December.....	792	21	110	170	3,410	10,500
January.....	58	21	30.3	46.9	938	2,880
February.....	180	21	61.8	95.6	1,730	5,310
March.....	40	21	24.7	38.2	765	2,350
April.....	1,040	21	200	309	6,010	18,400
May.....	295	21	43.5	67.3	1,350	4,140
June.....	358	21	73.2	113	2,200	6,740
The year.....	1,510	12	83.9	130	30,600	94,000

Discharge measurements of West Channel of Wainiha River near Wainiha, Kauai, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1913—Aug. 23	W. V. Hardy.....	5.50	112	72
Nov. 13	do.....	6.19	386	249
14	do.....	5.87	242	156
1914—Aug. 7	J. C. Dort.....	5.90	234	151
Dec. 22	do.....	5.70	185	120
1915—May 9	W. V. Hardy.....	5.50	102	66

Discharge, in million gallons per day, of West Channel of Wainiha River near Wainiha, Kauai, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	102	74	236	74	103	90	61	61	87	78	144	187
2.....	268	74	149	74	133	90	53	69	69	87	234	120
3.....	191	74	113	74	162	336	69	69	69	69	217	87
4.....	206	74	90	66	162	191	157	69	69	78	132	78
5.....	191	66	90	66	102	176	202	69	69	202	108	78
6.....	136	66	113	90	83	162	87	69	144	172	98	172
7.....	136	83	90	149	191	162	490	87	108	108	132	144
8.....	113	113	74	375	149	149	805	61	78	87	132	120
9.....	90	124	83	162	268	113	338	61	120	69	120	120
10.....	83	74	74	90	206	90	132	61	87	69	157	108
11.....	74	74	74	90	472	90	78	61	69	69	98	108
12.....	83	113	90	90	472	74	157	53	69	69	87	120
13.....	191	124	74	191	433	74	157	61	69	69	69	108
14.....	220	176	74	113	149	74	108	61	87	69	69	87
15.....	124	124	74	90	162	74	87	61	69	69	172	69
16.....	102	191	74	113	162	74	144	69	69	69	172	87
17.....	90	113	74	74	176	74	187	69	157	69	250	87
18.....	83	90	74	74	149	74	87	69	108	120	144	87
19.....	90	78	90	74	375	74	87	61	78	144	108	202
20.....	90	83	74	74	284	71	69	61	69	202	250	120
21.....	83	90	74	83	136	74	69	61	69	172	187	132
22.....	74	83	83	74	268	68	69	61	69	268	132	268
23.....	74	74	74	74	284	68	69	61	69	355	98	144
24.....	90	83	74	83	284	66	69	61	69	302	132	202
25.....	124	124	74	74	356	58	69	61	78	144	144	108
26.....	124	90	71	74	236	58	69	53	69	120	98	202
27.....	102	90	66	74	136	58	157	78	69	187	108	157
28.....	90	102	113	71	113	61	132	234	187	98	132	108
29.....	136	206	74	74	317	66	87	-----	98	87	108	108
30.....	74	176	74	74	113	66	69	-----	87	69	98	108
31.....	74	136	-----	74	-----	66	87	-----	69	-----	87	-----
1914-15.												
1.....	120	132	132	172	132	157	87	61	69	61	108	53
2.....	108	108	108	187	108	157	87	53	53	53	250	53
3.....	120	120	108	132	120	590	69	53	53	53	108	53
4.....	157	268	132	157	108	217	69	53	78	53	87	172
5.....	157	302	172	157	98	157	69	69	61	87	87	132
6.....	132	172	285	157	120	157	69	61	53	217	69	78
7.....	108	157	202	157	108	108	69	78	53	98	69	78
8.....	108	132	132	172	87	87	53	61	61	87	69	144
9.....	157	132	132	144	87	108	53	53	69	87	69	69
10.....	202	120	108	132	87	144	53	98	61	69	69	69
11.....	108	157	132	108	108	108	69	78	53	69	187	69
12.....	108	98	217	372	120	87	87	187	53	53	69	69
13.....	87	87	285	98	87	87	69	187	69	53	69	53
14.....	87	87	187	87	234	78	69	108	69	53	69	69
15.....	87	87	187	87	108	69	69	108	61	217	69	78
16.....	355	87	132	108	87	69	69	132	53	320	61	187
17.....	108	69	120	132	87	69	69	157	53	187	69	202
18.....	120	108	187	87	87	69	69	98	53	132	69	172
19.....	120	98	132	87	108	172	61	78	53	144	69	285
20.....	108	108	132	98	87	157	53	87	53	87	69	132
21.....	87	87	144	87	78	132	69	187	53	108	69	87
22.....	87	187	108	69	69	108	61	120	53	132	61	87
23.....	69	250	108	69	69	87	61	87	61	157	53	78
24.....	108	217	320	69	250	157	53	87	61	430	53	132
25.....	217	144	510	69	120	108	53	69	61	410	53	87
26.....	120	132	1,140	69	108	98	53	69	53	650	53	69
27.....	108	120	355	69	250	87	53	69	53	355	53	69
28.....	108	120	172	87	268	320	53	69	53	187	53	78
29.....	302	217	187	87	202	120	53	-----	53	132	53	69
30.....	320	372	268	108	338	87	53	-----	53	108	53	78
31.....	172	217	-----	187	-----	69	69	-----	53	-----	53	-----

NOTE.—Discharge determined from rating curves applicable as follows: July 1 to Dec. 31, 1913, and Jan. 1, 1914, to June 30, 1915, fairly well defined below 500 million gallons per day (774 second-feet). Discharge interpolated Nov. 1 and 2, 1913.

Monthly discharge of West Channel of Wainiha River near Wainiha, Kauai, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	268	74	120	186	3,710	11,400
August.....	206	66	105	162	3,240	9,990
September.....	236	66	88.7	137	2,860	8,170
October.....	375	66	97.8	151	3,030	9,300
November.....	472	83	221	342	6,640	20,300
December.....	336	58	97.5	151	3,020	9,280
January.....	805	53	145	224	4,500	13,800
February.....	234	53	70.4	109	1,970	6,050
March.....	187	69	85.7	133	2,660	8,150
April.....	355	69	126	195	3,770	11,600
May.....	250	69	136	210	4,220	12,900
June.....	268	69	128	198	3,830	11,800
The year.....	805	53	118	183	43,200	133,000
1914-15.						
July.....	355	69	140	217	4,360	13,300
August.....	372	69	151	234	4,690	14,400
September.....	1,140	108	218	337	6,530	20,100
October.....	372	69	123	190	3,800	11,700
November.....	338	69	131	203	3,920	12,100
December.....	590	69	136	210	4,220	12,900
January.....	87	53	64.3	99.5	1,990	6,120
February.....	187	53	93.5	145	2,620	8,030
March.....	78	53	57.7	89.3	1,790	5,490
April.....	650	53	162	251	4,850	14,900
May.....	250	53	77.2	119	2,390	7,340
June.....	285	53	102	158	3,050	9,390
The year.....	1,140	53	121	187	44,200	136,000

MISCELLANEOUS MEASUREMENTS.

Measurements of streams and ditches on the island of Kauai at points other than regular gaging stations are listed below:

Miscellaneous discharge measurements on Kauai for the years ending June 30, 1914 and 1915.

Date.	Stream.	Tributary to—	Locality.	Gage height (feet).	Discharge.	
					Second-foot.	Million gallons per day.
1913.						
Sept. 13	Lumaha'i River		Near Wainiha.		63	41
Oct. 21	do.		do.		55	36
July 6	Mohihi.	Waimea River.	Near Waimea.	3.92	4.7	3.0
Aug. 8	Waiakoali.	do.	do.	2.84	10	6.6
Oct. 9	do.	do.	do.	2.57	3.5	2.3
Oct. 14	Hanapepe River.	do.	Hanapepe Falls near Elele.	.38	30	19
Sept. 11	Halekua.	Makaweli River.	Near Waimea.	3.36	.65	.42
Oct. 12	do.	do.	do.	3.50	1.7	1.1
1914.						
Aug. 8	Lihue Ice and Electric Co.'s ditch.		100 yards above fore bay.		5.5	3.6
20	do.		Above tunnel.		5.5	3.6
20	do.		do.		4.6	3.0
20	do.		do.		5.3	3.4
20	do.		In tailrace.		5.4	3.5
20	do.		do.		5.1	3.3
20	do.		do.		3.5	2.3
20	do.		do.		4.3	2.8
Nov. 10	Aaohaka ditch.		Intake, near Lihue 300 yards above confluence.		1.6	1.0

Miscellaneous discharge measurements on Kauai for the years ending June 30, 1914 and 1915—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height (feet).	Discharge.	
					Second feet.	Million gallons per day.
1914.						
Dec. 30	Makaleha	Kapaa River...	Near Kealia .....	.....	12	7.8
Dec. 30	Mosalepo	do.	do. ....	.....	6.1	3.9
May 30	Mohihi	Waimea River ..	Near Waimea	3.97	6.4	4.2
Sept. 2	do.	do.	do.	3.86	4.5	2.9
May 31	Waiakoali	do.	do.	2.92	7.9	5.1
Sept. 2	do.	do.	do.	2.77	3.6	2.3
Nov. 7	do.	do.	do.	1.34	2.8	1.8
Dec. 12	do.	do.	do.	2.10	9.6	6.2
June 10	Kilauea River	do.	Near Kilauea	8.34	30	19
Jan. 22	Huleia River	do.	Near Lihue	6.53	16	10
Nov. 11	do.	do.	do.	6.89	23	15
Dec. 26	do.	do.	do.	6.56	12	8.7
Sept. 3	Kauaikinana	Waimea River ..	Near Waimea .....	.44	1.0	.65
1915.						
Jan. 2	Waimea ditch	do.	Near Waimea .....	.....	8.1	5.2
Feb. 17	Waikoko	South Wailua ..	Near Lihue .....	.....	6.5	4.2
Mar. 19	Anahola River	do.	At elevation 825 feet ..	.....	1.9	1.2
19	Lower Anahola ditch	do.	50 feet below intake near Kealia .....	.....	3.5	2.2
19	do.	do.	1,800 feet below intake near Kealia .....	.....	.....	.....
Apr. 9	Mohihi	Waimea River ..	Near Waimea	3.77	2.5	1.6
May 14	do.	do.	do.	3.81	3.4	2.2
June 12	do.	do.	do.	3.76	2.7	1.7
Apr. 7	Waiakoali	do.	do.	1.68	4.9	3.2
May 15	do.	do.	do.	1.64	3.7	2.8
June 12	do.	do.	do.	1.54	2.6	1.7
22	East Branch of Hanapepe	do.	Near Elele .....	.04	8.7	5.6
22	Hanapepe River	do.	At Hanapepe Falls near Elele .....	.09	6.5	4.2
Jan. 1	Kilauea River	do.	Near Kilauea	8.50	19	12
May 10	do.	do.	do.	8.13	14	8.8
Apr. 9	Kauaikinana	Waimea River ..	Near Waimea .....	.88	3.3	2.1
May 14	do.	do.	do. ....	.88	3.4	2.2
June 11	do.	do.	do. ....	.60	1.7	1.1

ISLAND OF OAHU.

KALIHI STREAM NEAR HONOLULU,¹ OAHU.

LOCATION.—At Kioi Pool, about three-eighths mile above Catholic Orphanage, 3 miles up Kalihi road from King Street car line, and 5 miles north of Honolulu post office.

RECORDS AVAILABLE.—September 8, 1913, to June 30, 1915.

GAGE.—Gurley weight-driven water-stage recorder installed December 4, 1913. Friez recorder in use September 8 to November 22, 1913.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge 500 feet above gage.

CHANNEL AND CONTROL.—Water drops over a 10-foot fall into pool at gage. Channel in solid rock, with steep, high banks; two channels for gage heights of 6.0 feet and over. The high-water control is solid rock, but gravel sometimes collects in the low-water control and affects the discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 10 feet at 6.15 a. m. September 22, 1914 (discharge, approximately 300 million gallons per day, or 460 second-feet); minimum stage recorded, 2.50 feet November 1, 1913 (discharge, 0.5 million gallons per day, or 0.8 second-foot).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Part of water diverted 400 feet below station for power development; remaining low-water flow is diverted farther downstream for irrigation of taro.

¹ Described in Water-Supply Paper 373, p. 74, as "at Kioi Pool, near Honolulu."

ACCURACY.—Records are good for low and medium stages, as sufficient discharge measurements were made to give well-defined curves covering the periods between the several shifts in control. Control was lowered 0.3 foot by flood of November 20, 1913. High-water records only fair, as high-water extension of rating curve not so well defined by measurements.

Discharge measurements of Kalihi Stream near Honolulu, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—Sept. 8	G. R. White	2.64	2.4	1.6
27	do	2.58	1.7	1.1
Oct. 4	do	2.58	1.3	.85
12	do	2.54	1.1	.7
25	do	2.53	1.0	.65
Nov. 8	do	3.41	19	12
8	do	3.22	13	8.4
12	do	3.76	29	19
22	do	2.88	12	7.8
Dec. 4	G. K. Larrison	5.08	96	62
11	J. C. Dort	2.95	11	7.1
23	do	2.50	5.3	3.4
1914—Feb. 24	Howard Kimble	2.20	1.6	1.0
24	do	2.20	1.8	1.2
Mar. 12	H. A. R. Austin	2.13	1.4	.9
12	do	2.13	1.4	.9
Sept. 23	do	4.50	71	46
Nov. 10	do	2.56	6.8	4.4
1915—May 25	do	2.34	4.7	3.0

Discharge, in million gallons per day, of Kalihi Stream near Honolulu, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1913-14.								
1.		1.0	0.5		2.2	3.8	1.2	2.5
2.		1.0	2.0		2.2	7.9	1.2	2.2
3.		1.0	.9		2.2	4.2	1.2	1.8
4.		1.0	.6	50	2.2	2.5	1.2	1.8
5.		1.1	.6	30	2.2	2.2	1.2	51
6.	1.9	1.2	.6	49	1.8	1.8	1.0	45
7.	1.7	1.6	5.6	41	2.2	1.8	1.0	8.6
8.	1.6	2.5	12	18	22	1.8	1.0	5.2
9.	1.6	1.2	7.8	13	4.7	1.5	1.0	4.7
10.	1.6	1.1	5.4	10	2.9	1.5	1.0	3.8
11.	1.4	1.0	10	8.4	2.5	1.5	1.0	3.8
12.	1.2	.8	12	6.5	2.9	1.5	1.0	3.3
13.	1.4	1.0	7.8	6.2	2.2	1.5	1.0	2.9
14.	2.0	1.4	4.4	6.5	2.2	1.5	1.2	2.9
15.	1.6	1.2	3.4	5.8	1.8	1.5	1.0	2.9
16.	1.4	1.1	2.8	4.5	2.2	1.5	2.5	2.5
17.	1.2	.9	2.8	4.7	5.8	1.2	1.8	2.5
18.	1.7	.8	3.2	4.3	2.9	1.2	1.2	2.9
19.	1.8	.8	8.4	4.2	2.9	1.2	1.0	3.3
20.	1.4	.7	18	4.1	2.5	1.2	1.0	3.3
21.	1.4	.7	12	3.9	2.5	1.2	.8	2.9
22.	2.8	.7	6.3	3.7	3.8	1.2	.8	3.3
23.	1.4	.7		18	2.5	1.2	.8	3.3
24.	2.0	.7		3.3	2.2	1.2	.8	2.9
25.	1.4	.6		3.2	2.2	1.2	1.0	
26.	1.2	.6		3.2	1.8	1.2	2.2	
27.	1.0	.6		3.0	1.8	1.2	1.2	
28.	1.0	.6		2.9	1.8	1.8	8.6	
29.	1.0	.6		2.8	1.8		17	
30.	1.0	.6		2.7	1.8		3.8	
31.		.5		2.7	1.8		2.5	

Discharge, in million gallons per day, of Kalihi Stream near Honolulu, Oahu, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....		6.4	11	11	-----	3.0	2.3	1.4	2.3	1.4	12	2.0
2.....	7.9	5.2	13	12	-----	3.9	2.3	1.4	2.3	1.4	8.5	2.3
3.....	4.7	5.2	7.2	10	-----	8.5	2.3	1.4	2.3	1.2	6.0	2.6
4.....		5.8	5.8	8.5	-----	16	2.0	1.4	2.6	1.2	6.6	2.0
5.....		7.9	5.2	9.2	-----	10	2.3	2.0	2.3	1.4	5.4	2.0
6.....	4.7	4.7	4.7	10	-----	12	2.3	1.4	2.0	1.7	4.8	2.0
7.....	3.8	4.2	5.3	7.2	-----	7.8	2.0	1.7	2.0	1.4	4.8	2.0
8.....		4.2	4.7	6.6	-----	4.8	2.0	1.4	2.0	1.4	4.4	2.0
9.....		3.8	4.2	7.2	-----	4.4	2.3	1.4	2.0	2.0	4.4	1.7
10.....		5.2	4.2	6.0	4.4	4.4	2.6	1.7	2.0	1.4	5.4	1.7
11.....		24	4.2	5.4	3.9	3.9	2.3	1.7	1.7	2.0	4.4	1.7
12.....		5.2	6.4	5.4	3.9	3.9	2.3	3.0	1.7	6.6	3.4	1.7
13.....	2.9	5.2	14	5.4	4.4	3.4	3.0	2.0	2.3	3.9	3.4	1.7
14.....	2.9	4.7	88	4.8	11	3.4	2.3	1.7	2.0	2.3	3.4	1.7
15.....	8.6	4.7	28	4.8	6.0	3.0	2.0	1.7	1.7	2.0	3.0	2.0
16.....	8.6	4.2	15	4.8	4.4	3.0	2.0	2.0	2.0	51	5.4	1.7
17.....	14	5.8	8.6	4.8	3.9	3.0	2.0	1.7	1.7	16	4.8	1.7
18.....	7.2	7.9	7.2	4.4	3.4	3.0	1.7	1.7	1.7	12	4.4	2.0
19.....	4.7	4.7	7.2	4.4	3.4	9.2	1.7	1.4	1.7	7.8	3.4	4.8
20.....	4.2	4.2	8.6	4.8	3.0	4.8	1.7	2.3	1.7	5.4	3.0	3.0
21.....	3.8	5.2	18	4.4	3.0	3.4	1.7	12	1.7	4.4	-----	-----
22.....	3.8	14	88	3.9	3.0	3.0	1.7	4.8	1.7	3.9	-----	-----
23.....	3.8	4.7	86	-----	3.0	3.0	1.7	6.0	1.7	2.9	-----	-----
24.....	3.8	4.2	28	-----	3.0	3.0	1.7	6.6	1.7	2.0	-----	-----
25.....	3.8	4.2	28	-----	2.6	2.6	1.7	3.9	1.7	9.2	2.6	-----
26.....	3.3	3.8	42	-----	3.0	2.6	1.7	3.0	1.7	53	2.3	-----
27.....	4.2	3.8	20	-----	3.9	2.6	1.7	2.6	1.4	40	2.3	-----
28.....	20	5.2	14	-----	4.8	2.6	1.7	2.3	1.4	18	2.3	-----
29.....	25	4.7	12	-----	4.8	2.6	1.7	-----	1.4	18	2.6	-----
30.....	16	8.6	18	-----	3.4	2.3	1.7	-----	1.4	12	2.3	-----
31.....	10	15	-----	-----	-----	2.3	1.7	-----	1.4	-----	2.0	-----

NOTE.—Discharge determined from well-defined rating curves applicable as follows: Sept. 8 to Nov. 20, 1913; Nov. 21, 1913, to Sept. 22, 1914; Sept. 23, 1914, to June 30, 1915. Discharge estimated Sept. 28 to Oct. 3 and Oct. 27-31, 1913. No gage record for other periods for which discharge is not given.

Monthly discharge of Kalihi Stream near Honolulu, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-foot.
	Maximum.	Minimum.	Mean.			
1913-14.						
September 6-30.....	2.8	1.0	1.51	2.34	38	116
October.....	2.5	.5	.95	1.47	29	90
November 1-22.....	18	.5	5.78	8.94	127	390
December 4-31.....	50	2.7	11.3	17.5	316	971
January.....	22	1.8	3.11	4.81	96	296
February.....	7.9	1.2	1.89	2.92	53	162
March.....	17	.8	2.04	3.16	63	194
April 1-24.....	51	1.8	7.05	10.9	169	519
1914-15.						
July 2-3, 6-7, 13-31.....	25	2.9	7.42	11.5	171	524
August.....	24	3.8	6.34	9.81	197	603
September 1-22.....	88	4.2	20.2	31.3	607	1,860
October.....	12	3.0	6.59	10.2	145	445
November 10-30.....	11	2.6	4.10	6.34	86	264
December.....	16	2.3	4.69	7.26	145	446
January.....	3.0	1.7	2.00	3.09	62	190
February.....	12	1.4	2.70	4.18	76	232
March.....	2.6	1.4	1.85	2.86	57	176
April.....	53	1.2	9.73	15.1	292	896
May 1-20, 25-31.....	12	2.0	4.34	6.71	117	360
June.....	4.8	1.7	2.12	3.28	42	130

NUUANU STREAM BELOW RESERVOIR NO. 2 WASTEWAY, NEAR HONOLULU, OAHU.

LOCATION.—On Pali road in upper Nuuanu Valley, 1 mile above end of car line, and 5 miles from Honolulu post office.

RECORDS AVAILABLE.—October 21, 1913, to June 30, 1915.

GAGE.—Inclined staff on right bank.

DISCHARGE MEASUREMENT.—Low water discharge measured by 2.0-foot sharp-crested weir with end contractions; flood discharge measured by 12.0-foot sharp-crested weir with end contractions, which, with small weir, gives total flood discharge. Both weirs set in concrete. Crest of small weir is 1 foot lower than that of large weir. The weirs were reconstructed April 10–27, 1914, but original dimensions were maintained.

CHANNEL AND CONTROL.—Channel in solid rock; straight for about 75 feet above and below weir; banks high and covered with vegetation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record; 6.0 feet at 4 p. m. April 5, 1914 (no estimate of discharge possible as entire weir was overflowed); minimum stage recorded, 0.10 foot in November, 1913 (discharge, 0.15 million gallons per day, or 0.25 second-foot).

DIVERSIONS.—Most of the flow at low and medium stages is diverted above station for domestic supply and for power development. An irrigation ditch diverts low-water discharge at point 300 feet below station.

REGULATION.—Amount diverted above station varies.

UTILIZATION.—Station measures the waste water and seepage from reservoirs Nos. 2, 3, and 4, and the Luakaha weir. This waste water is used for irrigation of taro and rice.

ACCURACY.—Records good below 4 million gallons per day, or 6 second-feet; but only fair above, owing to varying velocity of approach and uncertainties resulting from use of compound weir.

Discharge, in million gallons per day, of Nuuanu Stream below reservoir No. 2 wasteway, near Honolulu, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.									
1.....		0.15	9.6	4.0	2.6	1.4	0.45	8.4	11
2.....		.15	30	4.0	6.8	1.4	.4	9.1	8.4
3.....		.15	36	5.4	4.1	1.4	.4	6.8	7.9
4.....		.15	29	5.4	3.6	1.4	.3	6.3	7.9
5.....		.15	20	4.2	3.5	.9	100	5.6	6.3
6.....		.15	31	3.6	3.0	.45	24	6.3	6.1
7.....		.15	24	3.4	2.4	.45	7.8	16	6.1
8.....		.7	14	23	2.3	.45	7.4	48	6.3
9.....		1.3	12	6.8	1.8	.3	6.4	10	6.5
10.....		1.1	8.5	4.6	1.4	.3	5.6	8.6	6.5
11.....		3.3	7.8	3.5	1.6	.2	6.6	7.0	6.5
12.....		3.5	6.8	4.0	2.3	.2	6.6	7.4	6.7
13.....		4.1	6.2	5.4	1.8	.2	5.6	7.4	6.5
14.....		2.8	9.4	3.7	2.6	.2	.....	7.4	6.3
15.....		2.0	8.1	3.4	2.1	.2	.....	7.1	6.5
16.....		2.2	7.4	4.1	1.9	.3	.....	7.6	6.1
17.....		1.2	6.8	4.1	2.3	.3	.....	7.1	5.4
18.....		1.2	6.8	4.9	1.8	.4	.....	7.6	6.7
19.....		1.9	6.8	4.0	2.4	.5	.....	7.6	14
20.....		18	6.8	3.4	2.3	.3	.....	8.9	21
21.....	0.2	16	6.4	4.9	2.8	.25	.....	9.9	7.6
22.....	.2	11	5.8	4.0	2.8	.2	.....	7.1	5.4
23.....	.2	6.6	5.1	4.9	1.6	.2	.....	6.7	8.1
24.....	.2	7.8	4.9	4.8	2.2	.15	.....	8.9	15
25.....	.15	19	4.8	4.5	2.5	.15	.....	6.5	21
26.....	.15	7.8	4.3	3.3	1.8	.15	7.4	6.1	8.1
27.....	.15	32	4.2	3.0	.45	.25	6.5	6.1	7.4
28.....	.15	16	4.2	2.8	1.6	.2	4.3	8.1	7.1
29.....	.15	11	4.0	2.9	.....	2.0	4.5	6.1	6.7
30.....	.15	9.1	4.0	2.9	.....	1.3	6.7	5.3	6.5
31.....	.15	.....	4.0	3.3	.....	1.1	.....	5.6	.....

Discharge, in million gallons per day, of Nuuanu Stream below reservoir No. 2 wasteway, near Honolulu, Oahu, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	7.4	5.4	6.7	16	8.4	5.4	2.3	0.25	0.4	0.25	8.9	4.3
2.....	6.3	5.1	8.4	16	11	6.8	2.3	.25	.4	.25	5.6	4.3
3.....	5.8	4.4	5.8	15	8.1	11	2.8	.25	1.5	.25	5.6	4.3
4.....	5.8	6.8	5.6	14	7.6	13	2.5	1.1	2.3	.25	4.8	4.3
5.....	5.2	6.5	5.4	13	7.6	11	2.5	.75	1.1	.25	4.8	2.3
6.....	4.0	6.3	4.6	13	9.9	6.8	2.5	.4	.75	.25	4.8	2.3
7.....	3.8	6.1	5.2	13	13	8.9	2.5	1.1	.4	.25	4.8	1.3
8.....	3.7	5.4	4.8	13	7.4	7.4	2.5	1.1	1.1	.25	4.3	.4
9.....	4.5	4.6	4.3	12	7.1	6.0	2.8	1.1	.55	.25	4.3	.4
10.....	4.2	4.8	4.3	12	6.7	5.8	3.4	1.1	.4	.25	4.3	.4
11.....	4.3	12	4.3	12	6.7	7.1	2.5	.75	.4	.25	4.3	.4
12.....	4.2	6.0	5.4	12	6.7	6.5	2.5	1.3	.4	.4	4.0	.4
13.....	3.8	5.8	9.3	11	8.1	5.6	1.8	1.3	.55	.25	4.0	.4
14.....	3.7	5.6	7.4	11	11	5.4	1.8	1.1	.4	.25	4.3	2.8
15.....	3.4	5.1	18	11	9.6	6.0	1.8	.9	.4	.25	3.7	2.0
16.....	13	5.0	13	11	6.3	6.1	1.5	.75	.4	2.4	4.8	2.0
17.....	9.1	6.0	9.6	10	6.1	6.1	2.0	.4	.4	2.8	7.6	2.0
18.....	4.3	9.1	9.1	9.9	6.1	6.1	2.3	.4	.25	3.7	4.3	2.0
19.....	4.2	5.0	9.6	9.1	5.6	36	2.3	.4	.25	1.3	4.0	4.0
20.....	4.2	4.6	9.6	8.6	5.6	8.4	1.8	6.5	.25	1.5	4.0	2.0
21.....	4.2	4.5	16	8.6	5.6	6.3	1.8	4.0	.25	.75	4.3	1.1
22.....	4.0	5.8	86	8.1	5.6	6.0	1.8	2.5	.25	.55	4.3	.4
23.....	4.6	4.6	44	8.1	5.4	6.0	2.3	2.8	.25	1.3	4.3	1.1
24.....	4.4	4.6	23	8.1	5.4	5.6	1.3	2.0	.25	2.8	4.0	1.1
25.....	5.2	4.6	24	7.9	5.2	5.2	1.3	.9	.25	6.5	3.7	1.3
26.....	5.1	4.2	31	7.6	5.2	4.2	1.3	.4	.25	26	2.0	1.1
27.....	5.1	3.7	23	7.9	6.7	5.2	1.1	.4	.25	18	2.0	.55
28.....	10	3.8	17	8.1	6.8	4.8	1.1	.4	.25	15	2.0	1.8
29.....	18	5.1	16	7.6	6.8	3.8	.4	-----	.25	11	2.0	1.1
30.....	8.1	6.8	16	7.6	5.6	3.1	.4	-----	.25	8.9	1.3	3.1
31.....	6.3	7.6	-----	7.6	-----	2.5	.4	-----	.25	-----	3.4	-----

NOTE.—Discharge determined from a weir table based on tables in Trans. Am. Soc. Civil Engineers, vol. 76, December, 1913, page 1,070. No record Apr. 14-25, 1914.

Monthly discharge of Nuuanu Stream below reservoir No. 2 wasteway, near Honolulu, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
October 21-31.....	0.2	0.15	0.17	0.26	2	6
November.....	32	.15	6.02	9.31	181	554
December.....	36	4.0	10.9	16.9	339	1,040
January.....	23	2.8	4.72	7.30	146	449
February.....	6.8	.45	2.44	3.78	68	210
March.....	2.0	.15	.55	.85	17	52
April 1-13, 26-30.....	100	.3	11.2	17.3	201	619
May.....	48	5.6	8.97	13.9	278	853
June.....	21	5.4	8.49	13.1	255	782
1914-15.						
July.....	18	3.4	5.80	8.97	180	552
August.....	12	3.7	5.64	8.73	175	537
September.....	86	4.3	17.1	26.5	513	1,570
October.....	16	7.6	10.6	16.4	330	1,010
November.....	13	5.2	7.23	11.2	217	666
December.....	36	2.5	7.36	11.4	228	700
January.....	3.4	.4	1.92	2.97	60	183
February.....	6.5	.25	1.24	1.92	35	107
March.....	2.3	.25	.50	.77	15	48
April.....	26	.25	4.27	6.61	128	393
May.....	8.9	1.3	4.21	6.51	130	401
June.....	4.3	.4	1.83	2.83	55	168
The year.....	86	.25	5.66	8.76	2,070	6,340

KAHUAUWAI SPRING NEAR HONOLULU,¹ OAHU.

LOCATION.—In upper Pauoa Valley, about $1\frac{1}{4}$ miles above Punchbowl, a quarter of a mile above Pauoa Stream weir station, and about $2\frac{1}{4}$ miles northeast of Honolulu post office.

RECORDS AVAILABLE.—September 23, 1912, to December 31, 1914.

GAGE.—A 2 by 2 inch stake driven into pool of spring, with nail in top, 6 feet above weir, to measure head on weir. Head is read twice daily with stick graduated to hundredths.

DISCHARGE MEASUREMENTS.—Computed by Francis formula for sharp-crested weirs with end contractions. Crest of weir 1.5 foot long.

CHANNEL AND CONTROL.—Spring boils up vertically in pool about 10 feet in diameter. Weir is built between rock abutments on south side of pool about 10 feet from center of pool.

EXTREMES OF DISCHARGE.—Flow is very steady. Maximum discharge, 0.35 million gallons per day, or 0.54 second-feet; minimum discharge, 0.32 million gallons per day, or 0.50 second-feet.

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Irrigation of truck gardens, taro, and rice.

ACCURACY.—No velocity of approach, conditions excellent for good results by weir measurement.

Monthly discharge of Kahuaui Spring near Honolulu, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-feet (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	0.35	0.32	0.32	0.50	9.9	30.7
August.....	.32	.32	.32	.50	9.9	30.7
September.....	.32	.32	.32	.50	9.6	29.8
October.....	.32	.32	.32	.50	9.9	30.7
November.....	.35	.32	.34	.53	10.3	31.5
December.....	.35	.35	.35	.54	10.8	33.2
January.....	.35	.32	.35	.54	10.8	33.2
February.....	.35	.32	.34	.53	9.5	31.5
March.....	.32	.32	.32	.50	9.9	30.7
April.....	.35	.32	.34	.53	10.3	31.5
May.....	.32	.32	.32	.50	9.9	30.7
June.....	.32	.32	.32	.50	9.6	29.8
The year.....	.35	.32	.33	.51	120	374
1914-15.						
July.....	.35	.32	.32	.50	10.0	30.7
August.....	.32	.32	.32	.50	9.9	30.7
September.....	.35	.32	.34	.53	10.3	31.5
October.....	.35	.32	.33	.51	10.3	31.4
November.....	.35	.32	.33	.51	9.9	30.4
December.....	.35	.32	.32	.50	10.0	30.7
The period (184 days).....	.35	.32	.33	.51	60.4	185

¹ Described in Water-Supply Paper 373, p. 79, as "at upper Pauoa Valley, near Honolulu."

MANOA STREAM AT COLLEGE OF HAWAII, NEAR HONOLULU, OAHU.

LOCATION.—In gorge about one-half mile southeast of College of Hawaii and 3 miles east of Honolulu post office.

RECORDS AVAILABLE.—March 23, 1909, to November 24, 1910; November 1, 1912, to April 26, 1913; September 10, 1913, to June 30, 1915.

GAGE.—Vertical staff on left bank; read twice daily. The weir used during 1909 and 1910 was destroyed by flood of November 24, 1910. Several changes in gage datum previous to 1912.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel straight and confined in vicinity of station; stream bed, composed of rock; clean and fairly permanent; left bank composed of rock nearly vertical; right bank has a gentle slope, covered with vegetation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during biennial period, 4.7 feet at 6.40 a. m. April 16, 1915 (discharge, from extension of rating curve; 139 million gallons per day, or 215 second-feet); minimum daily discharge for biennial period, March, 1914, 0.2 million gallons per day, or 0.3 second-feet.

DIVERSIONS.—Nearly all the low-water flow is diverted above and below station for irrigation.

REGULATION.—None.

UTILIZATION.—Records show water available for storage at this reservoir site; the low-water flow of the stream is extensively used for irrigation of rice and taro in upper and lower Manoa Valley.

ACCURACY.—Estimates good for low and medium stages. Discharge measurements are well distributed on rating curve for low and medium stages, and indicate that control is permanent. Determinations of discharge from mean gage height based on morning and afternoon readings of staff gage may be considerably in error during periods of rapidly fluctuating stage.

COOPERATION.—Gage-height record furnished by College of Hawaii.

Discharge measurements of Manoa Stream at College of Hawaii, near Honolulu, Oahu, during the year ending June 30, 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Oct. 17	Prof. Keller and students.....	1.09	3.2	2.1
Nov. 17	H. A. R. Austin.....	1.32	5.5	3.5

Discharge, in million gallons per day, of Manoa Stream at College of Hawaii, near Honolulu, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.										
1.....		0.3	0.4	7.1	0.6	0.8	0.35	1.8	2.2	38
2.....		.3	.95	5.2	.6	17	.3	1.2	4.6	9.2
3.....		.3	1.6	28	.6	6.6	.3	.8	22	4.6
4.....		.3	.65	66	.7	2.2	.3	.7	7.4	2.6
5.....		.3	.5	26	.6	2.2	.25	.7	4.1	2.6
6.....		.3	.6	28	.6	1.2	.25	38	2.6	2.2
7.....		.3	.65	42	.7	1.2	.25	14	9.2	2.2
8.....		.3	9.7	18	56	1.2	.2	9.2	46	2.6
9.....		.3	20	12	10	1.0	.2	6.6	12	2.6
10.....	0.4	.3	21	7.8	4.1	1.0	.2	4.6	10	2.2
11.....	.3	.3	23	6.1	.8	1.0	.2	4.6	8.3	2.2
12.....	.3	.25	20	5.0	6.6	.8	.2	3.6	5.2	2.2
13.....	.4	.25	17	4.5	3.6	.8	.2	2.6	3.1	6.6
14.....	.8	.45	7.8	5.2	1.0	.8	.2	2.6	2.2	3.6
15.....	.65	.4	6.1	4.1	.8	.8	.25	1.5	2.6	5.8
16.....	.45	.4	2.5	3.1	1.0	1.5	.4	1.2	1.5	5.8
17.....	.45	.4	3.0	3.0	15	.8	1.5	1.2	1.2	4.6
18.....	.45	.3	4.3	3.7	2.6	.7	.5	1.2	8.3	58
19.....	3.2	.3	15	2.5	3.6	.5	.4	7.4	4.1	56
20.....	.7	.3	39	2.0	3.1	.4	.35	9.2	3.1	48
21.....	.5	.3	20	2.0	2.6	.4	.35	11	22	5.8
22.....	.5	.3	6.3	1.8	10	.4	.35	7.4	6.6	32
23.....	.5	.3	6.1	1.2	4.6	.4	.3	15	4.6	5.8
24.....	.45	.3	21	.9	5.2	.5	.3	11	4.1	14
25.....	.45	.3	48	.65	3.6	.4	.3	10	3.6	4.6
26.....	.4	.3	91	.6	3.6	.4	.4	17	3.1	12
27.....	.4	.3	32	.6	2.6	.4	.6	9.2	12	5.8
28.....	.3	.4	17	.6	4.6	.4	1.0	3.6	6.6	9.2
29.....	.3	.4	12	.5	1.8	.....	26	2.6	3.6	4.6
30.....	.3	.4	11	.5	.8	.....	5.8	1.8	7.4	15
31.....	.....	.4	.....	.45	.8	.....	1.8	.....	28	.....

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	9.2	14	15	7.4	5.8	5.8	1.8	0.6	1.5	1.2	24	1.0
2.....	5.8	15	13	5.2	30	9.2	1.2	.8	2.6	1.0	34	1.2
3.....	8.3	12	8.3	8.3	5.2	13	1.2	.8	4.6	.8	12	1.2
4.....	5.8	11	4.6	13	4.6	22	.8	1.0	17	.8	9.2	2.2
5.....	2.6	11	3.6	12	5.2	13	1.5	6.6	4.6	.8	9.2	1.8
6.....	2.2	9.2	5.8	20	11	11	1.8	1.8	3.6	3.1	7.4	1.8
7.....	4.6	10	3.6	9.2	14	13	1.8	1.8	3.1	1.8	5.8	1.2
8.....	5.8	10	4.1	9.2	6.6	5.2	1.8	1.2	5.2	1.8	4.6	1.2
9.....	6.6	9.2	4.1	14	7.4	5.8	4.1	2.2	4.1	1.5	3.6	1.2
10.....	6.6	7.4	4.6	9.2	5.2	5.8	6.6	5.8	2.2	1.0	7.4	1.0
11.....	8.3	32	4.1	9.2	4.1	7.4	3.6	4.6	2.6	.5	4.6	.8
12.....	8.3	5.8	5.8	7.4	4.1	5.8	2.6	14	2.2	2.6	3.1	.8
13.....	3.6	12	23	4.6	7.4	5.8	1.8	5.2	4.6	4.1	2.6	.8
14.....	1.5	5.8	85	3.6	5.2	4.1	1.8	3.1	3.1	.8	2.6	.8
15.....	1.5	5.2	36	1.8	5.8	2.6	1.5	2.6	1.8	1.0	1.8	.8
16.....	4.6	3.1	22	1.8	3.6	2.6	1.2	7.4	1.8	116	1.8	1.2
17.....	17	14	11	1.8	4.1	2.6	1.5	3.6	1.5	56	1.8	1.2
18.....	12	40	12	1.8	3.6	2.6	1.8	2.6	1.8	18	1.8	1.2
19.....	4.6	8.3	14	1.8	3.1	13	1.0	3.1	2.6	13	1.0	18
20.....	4.1	5.2	20	1.8	2.2	16	.8	10	1.8	11	.8	8.3
21.....	4.1	13	18	3.1	1.8	4.6	.8	48	1.8	9.2	.8	3.1
22.....	4.6	10	54	1.8	1.2	4.1	1.0	23	1.8	5.8	1.5	2.6
23.....	9.2	8.3	56	1.8	1.8	3.6	.8	8.3	3.6	14	1.2	1.8
24.....	15	3.6	13	1.2	7.4	1.8	.6	17	4.6	16	1.2	1.2
25.....	18	3.6	17	1.2	4.1	4.6	.6	11	3.6	40	.8	1.2
26.....	15	2.6	13	1.2	3.1	2.6	.6	6.6	2.6	70	1.0	2.6
27.....	13	9.2	12	1.0	5.8	2.6	.5	4.1	1.8	65	1.0	4.6
28.....	11	7.4	6.6	3.6	7.4	3.6	.6	2.6	1.8	38	1.0	2.2
29.....	70	10	5.2	2.2	14	4.6	.8	.....	1.8	22	1.2	1.5
30.....	46	11	7.4	3.1	6.6	2.6	1.0	.....	1.2	15	1.2	3.6
31.....	23	28	.....	2.6	.....	1.8	.8	.....	1.2	.....	1.2	.....

NOTE.—Discharge determined from a rating curve well defined between 1 and 30 million gallons per day (1.5 and 46 second-feet).

Monthly discharge of Manoa Stream at College of Hawaii, near Honolulu, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
September 10-30.....	3.2	0.3	0.58	0.90	12	37
October.....	.45	.25	.32	.50	10	30
November.....	91	.4	15.3	23.7	458	1,410
December.....	66	.45	9.33	14.4	289	888
January.....	56	.6	4.93	7.63	153	469
February.....	17	.4	1.64	2.54	46	141
March.....	26	.2	1.42	2.20	44	135
April.....	38	.7	6.71	10.4	201	618
May.....	46	1.2	8.43	13.0	261	802
June.....	58	2.2	12.3	19.0	370	1,130
The period.....					1,840	5,660
1914-15.						
July.....	70	1.5	11.4	17.6	352	1,080
August.....	40	2.6	11.2	17.3	347	1,070
September.....	85	3.6	16.7	25.8	502	1,540
October.....	20	1.0	5.35	8.28	166	509
November.....	30	1.2	6.38	9.87	191	587
December.....	22	1.8	6.72	10.4	208	639
January.....	6.6	.5	1.56	2.41	48	148
February.....	48	.6	7.12	11.0	199	612
March.....	17	1.2	3.16	4.89	98	301
April.....	116	.5	17.7	27.4	532	1,630
May.....	34	.8	4.88	7.55	151	464
June.....	18	.8	2.40	3.71	72	221
The year.....	116	.5	7.86	12.2	287	8,900

WEST BRANCH OF MANOA STREAM NEAR HONOLULU, OAHU.

LOCATION.—At diversion dam at R. W. Shingle's bungalow, 300 feet above highway bridge, about one-eighth mile above confluence with East Branch of Manoa Stream, 4 miles northeast of Honolulu post office. From May 20, 1913, to June 16, 1914, station was 150 feet upstream from bridge.

RECORDS AVAILABLE.—May 29, 1913, to June 30, 1915.

GAGE.—Watson water-stage recorder on left bank June 17 to October 20, 1914; replaced October 20, 1914, by a Friez water-stage recorder which was replaced on May 9, 1915, by an 8-day Stevens water-stage recorder; all at same site and datum. Vertical staff gage (at different datum) 150 feet upstream from highway bridge, about 25 feet above a small irrigation ditch diverting from right bank, read from May 29, 1913, to June 16, 1914.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Staff gage site: Channel boulders and gravel; control fairly permanent while station was in use. Water-stage recorder site: Small masonry diversion dam with wide rounded crest acts as the control and forms a large, quiet pool in the vicinity of the gage for low and medium stages. The lodgement of leaves and small débris on control and growth of grass on sides at times affect the discharge relation slightly. Channel is clean and confined in the vicinity of the gage. A short distance upstream the natural slope is steep and channel is filled with boulders.

EXTREMES OF DISCHARGE.—Maximum stage recorded during biennial period, 2.3 feet on morning of April 16, 1915 (discharge, 57 million gallons per day, or 88 second-feet); minimum daily discharge for biennial period, December, 1913, 0.05 million gallons per day, or 0.08 second-foot.

DIVERSIONS.—None above station.

REGULATION.—At low water pool at gage is lowered slightly for short periods by the operation of a small hydraulic ram used for pumping water for domestic use and also for filling a swimming pool, the intake for the ram being at the diverting dam.

¹ Described in Water-Supply Paper 373, p. 84, as "at upper Manoa Valley, near Honolulu."

UTILIZATION.—Records on west and east branches of Manoa Stream together show amount of surface water available in upper Manoa Valley, above nearly all diversions. Practically the entire low-water flow of Manoa Stream is utilized at lower elevations in Manoa Valley for rice and taro irrigation.

ACCURACY.—Staff-gage record: Estimates July, 1913, to March, 1914, good; no high water occurred to alter condition of channel. Estimates April to June, 1914, fair, as no measurements were made to check the rating curve for staff gage.

Water-stage recorder: Estimates July, 1914, to June 30, 1915, excellent except for extreme low-water periods when regulation at control and lack of sensitiveness of control section prevented refined accuracy; monthly estimate for April, 1915, is low as recorder did not operate properly during high water of April 16, 1915.

Discharge measurements of West Branch of Manoa Stream near Honolulu, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—Sept. 11	G. K. Larrison	1.53	0.7	0.5
Nov. 10	J. C. Dort	2.62	10	6.5
12	do	2.95	19	12
1914—Mar. 11	G. K. Larrison	1.42	4	3
Sept. 14	H. A. R. Austin	1.74	42	27
22	do	1.48	24	16
Nov. 10	do	1.08	3.6	2.3
Dec. 16	C. T. Bailey	1.03	1.7	1.1
1915—Apr. 26	R. C. Rice	1.65	34	22
June 14	do	.99	.7	.45

Discharge, in million gallons per day, of West Branch of Manoa Stream near Honolulu, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.	1.2	0.85	2.6	0.4	0.25	3.0	1.2	1.0	0.45	0.9	1.6	10
2.	1.3	.9	1.7	.15	.5	2.9	1.0	2.2	.45	.7	2.0	2.6
3.	1.3	.95	.9	.3	.65	9.0	.9	1.4	.45	.45	5.0	1.8
4.	1.4	.9	.8	.3	.45	12	.7	1.2	.35	.45	2.6	1.6
5.	1.4	1.2	.85	.4	.4	6.5	.9	1.0	.45	4.5	1.8	1.4
6.	1.4	.85	.65	.4	.4	7.1	.7	1.0	.35	11	1.6	1.4
7.	1.4	.95	.5	.45	.3	5.3	1.0	.9	.35	2.9	3.4	2.0
8.	1.5	.7	.45	2.3	5.3	4.4	7.8	.9	.35	1.8	13	1.4
9.	1.5	.8	.4	.5	8.4	3.0	1.8	.9	.35	1.6	3.8	2.0
10.	1.6	2.3	.4	.4	5.9	3.0	1.8	.9	.35	1.4	2.6	1.8
11.	1.6	.85	.4	.3	7.8	2.8	1.2	.7	.35	1.2	2.2	1.4
12.	1.6	5.2	.45	.3	9.7	5.6	1.2	.7	.25	1.4	2.0	1.6
13.	1.5	1.3	1.0	.5	6.5	2.6	1.0	.7	.35	1.2	2.0	2.4
14.	1.2	1.0	1.0	.25	3.7	2.3	1.0	.7	.6	1.2	1.8	2.0
15.	1.3	.8	.5	.45	3.0	.85	1.0	.7	.6	1.2	1.8	2.2
16.	1.2	.8	.45	1.4	2.6	.05	1.0	.9	.9	1.0	1.6	1.8
17.	.85	1.6	.4	.4	2.8	.9	2.2	.7	.7	1.0	1.4	2.8
18.	1.0	.9	.7	.3	3.5	.05	1.8	.7	.45	1.6	2.6	18
19.	.9	.7	2.2	.3	6.5	.5	1.8	.6	.35	1.4	1.6	11
20.	1.0	.8	1.0	.3	14	2.4	1.3	.6	.35	2.6	3.8	7.2
21.	1.1	.65	.8	.25	6.3	2.6	1.6	.7	.35	1.8	6.0	11
22.	.9	.6	.6	.25	4.1	1.2	1.8	.6	.25	2.2	2.6	7.2
23.	1.2	.6	.6	.25	2.8	2.0	1.4	.6	.25	2.2	2.0	7.2
24.	1.7	.6	.6	.25	6.1	1.6	1.4	.6	.25	2.2	2.0	5.7
25.	1.1	.6	.5	.25	5.5	1.6	1.2	.6	.35	1.8	1.6	4.2
26.	.95	.45	.45	.25	15	1.6	.9	.6	.9	4.1	1.6	11
27.	1.3	.45	.4	.25	11	1.4	1.0	.45	.45	2.2	1.6	4.2
28.	1.1	.8	.3	.9	5.9	1.4	1.2	.7	.45	1.4	2.2	4.2
29.	1.3	1.1	.5	.4	4.7	1.2	1.0		3.8	1.6	1.8	4.2
30.	1.2	.7	.4	.25	3.6	1.2	1.0		1.6	1.4	1.6	2.8
31.	1.2	2.3		.25		1.2	1.0		1.0		1.6	

Discharge, in million gallons per day, of West Branch of Manoa Stream near Honolulu, Oahu, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	7.2	5.7	5.7	5.5	4.2	2.8	0.5	0.5	1.5	0.5	7.2	0.5
2.....	2.8	4.2	5.7	5.2	7.2	2.8	.5	.5	1.5	.5	4.2	1.5
3.....	4.2	4.2	4.2	4.8	5.8	4.2	.5	.5	5.7	.5	4.2	.5
4.....	4.2	4.2	2.8	4.8	5.5	5.7	.5	.05	8.7	.5	4.2	.5
5.....	2.8	2.8	2.8	4.5	4.8	4.2	.5	.5	4.2	.5	2.8	.5
6.....	1.5	2.8	1.5	4.2	4.2	4.2	.5	.05	2.8	.5	2.8	.5
7.....	1.5	1.5	1.5	3.9	3.9	2.8	.5	.5	2.8	.5	2.8	.5
8.....	2.8	1.5	2.8	3.6	3.2	2.8	.5	.5	5.7	.5	1.5	.5
9.....	1.5	1.5	2.8	3.6	2.9	1.5	.5	.5	2.8	.5	1.5	.5
10.....	1.5	1.5	1.5	3.2	2.8	1.5	.5	1.5	1.5	.5	2.8	.5
11.....	1.5	5.7	1.5	2.9	1.5	1.5	.5	.5	.5	2.8	2.8	.5
12.....	.5	4.2	2.8	2.8	1.5	1.5	.5	2.8	.5	1.5	1.5	.5
13.....	.5	4.2	5.7	2.8	1.5	1.5	.5	1.5	1.5	1.0	1.5	.5
14.....	1.5	1.5	20	2.8	2.8	1.5	.5	.5	1.5	.5	1.5	.5
15.....	20	1.5	18	1.5	1.5	1.5	.5	.5	1.5	1.0	1.5	.5
16.....	7.2	1.5	11	1.5	1.5	1.5	.05	2.8	1.5	50.	1.5	.5
17.....	11	4.2	7.2	1.5	1.5	1.5	.05	1.5	1.5	6.0	1.5	.5
18.....	5.7	14	5.7	1.5	1.5	1.5	.05	.5	1.5	5.0	1.5	1.5
19.....	5.7	4.2	7.2	1.5	1.5	1.5	.5	.5	1.5	2.8	1.5	8.7
20.....	2.8	1.5	8.7	2.8	1.5	1.5	.5	4.2	1.5	2.8	1.0	5.7
21.....	2.8	32	25	1.5	1.5	1.5	.5	14	1.5	1.5	1.0	2.8
22.....	1.5	2.8	37	.5	1.5	1.5	.5	7.2	.5	1.5	.5	1.5
23.....	4.2	2.8	16	.5	1.5	1.5	.5	7.2	.5	2.8	.5	1.5
24.....	4.2	2.8	8.7	.5	1.5	1.5	.5	5.7	.5	2.8	.5	1.5
25.....	5.7	2.8	12	.5	1.5	1.5	.5	2.8	.5	8.7	.5	1.5
26.....	4.2	2.8	11	.5	1.5	1.5	.5	1.5	.5	25	.5	8.7
27.....	27	1.5	11	1.5	1.5	1.5	.5	1.5	.5	18	.5	5.7
28.....	12	4.2	7.2	2.8	4.2	1.5	.5	1.5	.5	11	.5	2.8
29.....	12	4.2	7.2	.5	4.2	1.5	.5	.5	.5	11	.5	1.5
30.....	7.2	4.2	5.7	.5	2.8	.5	.5	.5	.5	7.2	.5	4.2
31.....	5.7	12	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5

NOTE.—Record from June 23 to July 26, Aug. 4-10, 14-24, Sept. 1-7, 29, and 30, 1914, from outside staff gage near Watson water-stage recorder. Discharge determined from well-defined rating curves applicable as follows: Original staff gage, July 1, 1913, to June 16, 1914; automatic water-stage recorder, June 17, 1914, to June 30, 1915. Discharge estimated July 1-10, 1913, Oct. 1-11, Nov. 2-9, 1914, Apr. 12-18, May 18-23, and 25-29, 1915, by comparison with record of east branch of Manoa Stream. Discharge Dec. 20 to 31, 1913, revised since published in Water-Supply Paper 373, page 84.

Monthly discharge of West Branch of Manoa Stream near Honolulu, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	1.7	0.85	1.26	1.95	39	120
August.....	5.2	.45	1.07	1.66	33	102
September.....	2.6	.3	.75	1.16	22	69
October.....	2.3	.15	.45	.70	14	43
November.....	15	.25	5.04	7.80	151	464
December.....	12	.05	2.94	4.55	91	280
January.....	7.8	.7	1.46	2.26	45	139
February.....	2.2	.45	.83	1.28	23	71
March.....	3.8	.25	.60	.93	18	57
April.....	11	.45	2.01	3.11	60	185
May.....	13	1.4	2.67	4.13	83	264
June.....	18	1.4	4.60	7.12	138	424
The year.....	18	.05	1.97	3.05	717	2,210
1914-15.						
July.....	27	.5	5.58	8.63	173	531
August.....	32	1.5	4.66	7.21	144	443
September.....	37	1.5	8.66	13.4	260	797
October.....	5.5	.5	2.41	3.73	75	229
November.....	7.2	1.5	2.75	4.25	82	253
December.....	5.7	.5	2.00	3.09	62	190
January.....	.5	.05	.46	.71	14	44
February.....	14	.05	2.21	3.42	62	190
March.....	8.7	.5	1.83	2.83	57	174
April.....	50	.5	5.60	8.66	168	516
May.....	7.2	.5	1.80	2.79	56	171
June.....	8.7	.5	1.90	2.94	57	175
The year.....	50	.05	3.31	5.12	1,210	3,710

EAST BRANCH OF MANOA STREAM NEAR HONOLULU,¹ OAHU.

LOCATION.—At highway bridge, 400 feet above confluence with west branch of Manoa Stream, in upper Manoa Valley, and 4 miles northeast of Honolulu post office.

From May 29, 1913, to May 19, 1914, station was 200 feet upstream from bridge.

RECORDS AVAILABLE.—May 29, 1913, to June 30, 1915.

GAGE.—Watson water-stage recorder on right bank in use from May 29, 1913, to September 28, 1914, when it was replaced by a Stevens water-stage recorder at the same location and datum. Vertical staff gage 200 feet upstream on right bank at different datum was read from May 29, 1913, to May 19, 1914.

DISCHARGE MEASUREMENTS.—Made by wading for low and ordinary high-water stages; flood measurements may be made from highway bridge.

CHANNEL AND CONTROL.—Staff gage station. Channel boulders and gravel; control fairly permanent while station was in use.

Water-stage recorder station. Channel steep just above gage, but slope is reduced for 30 feet past gage to control, which is a riffle of small boulders and gravel. Control shifted considerably during 1914 and 1915. At low and medium stages stream past gage is fairly wide and deep and velocity is well distributed. Intake pipe occasionally becomes clogged with gravel. Both banks fairly steep and covered with some vegetation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during biennial period, 3.55 feet at 9 a. m. April 16, 1915 (discharge, from extension of rating curve, 120 million gallons per day, or 186 second-feet), minimum daily discharge for biennial period, March, 1914, 0.9 million gallons per day, or 1.4 second-feet.

DIVERSIONS.—East Manoa ditch diverts a quarter of a mile above the station for irrigation.

REGULATION.—None.

UTILIZATION.—Records on east and west branches of Manoa Stream together show amount of surface water available in upper Manoa Valley above nearly all diversions. Practically the entire low-water flow of Manoa Stream is utilized at lower elevations in Manoa Valley for irrigation of rice and taro.

ACCURACY.—Estimates from staff gage record good from July, 1913, to March, 1914, as no high water occurred to change conditions in channel; estimates from April, 1914, to April, 1915, fair or approximate owing to frequent changes in the control, especially during September, 1914, and to insufficient number of discharge measurements to define all changes in rating. Channel May and June was stable and estimates are good.

Discharge measurements of East Branch of Manoa Stream near Honolulu, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—Sept. 11	G. K. Larrison.....	2.07	1.6	1.0
Nov. 10	J. C. Dort.....	2.54	4.9	3.2
12	.....do.....	2.84	10	6.6
Dec. 4	G. R. White.....	3.38	24	16
1914—Mar. 11	G. K. Larrison.....	1.98	1.7	1.1
Sept. 14	H. A. R. Rustin.....	1.60	21	13
22	.....do.....	2.06	31	20
Nov. 10	.....do.....	1.58	7.3	4.7
24	.....do.....	1.57	4.1	2.6
Dec. 16	C. T. Bailey.....	1.54	5.7	3.7
1915—Apr. 26	R. C. Rice.....	2.20	30	19
May .3	H. A. R. Austin.....	1.58	5.5	3.6
17	G. K. Larrison.....	1.50	3.5	2.3
June 14	R. C. Rice.....	1.42	2.6	1.7
21	.....do.....	1.48	3.7	2.4

¹ Described in Water-Supply Paper 373, pp. 82-83, as "at upper Manoa Valley, near Honolulu."

Discharge, in million gallons per day, of East Branch of Manoa Stream near Honolulu, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1	1.4	1.2	1.1	1.0	0.95	1.9	1.8	1.8	0.95	1.2	1.5	6.0
2	1.4	1.2	1.3	.95	1.2	2.9	1.8	3.0	.95	.95	4.8	3.3
3	1.4	1.1	1.2	.95	1.0	13	1.8	2.0	.95	.95	20	2.0
4	1.4	1.1	1.1	.95	.95	15	1.2	2.0	.95	.95	3.0	2.0
5	1.4	1.1	1.1	1.0	1.0	9.0	1.2	1.8	.95	18	2.3	1.8
6	1.3	1.2	3.5	1.0	1.0	9.0	1.4	1.8	.95	11	2.0	2.0
7	1.3	1.2	1.1	1.1	9.7	12	1.8	1.8	.95	3.4	5.4	1.8
8	1.3	1.1	1.1	1.4	5.0	3.4	10	1.8	.95	2.6	20	1.7
9	1.3	1.1	1.0	1.0	4.8	4.8	2.0	1.8	.95	2.0	4.3	2.0
10	1.3	1.4	1.0	1.0	2.5	3.7	1.8	1.4	.95	2.0	3.0	2.0
11	1.3	1.2	1.0	.95	2.8	3.7	1.8	.95	.95	1.8	2.3	1.8
12	1.3	3.6	1.1	.95	4.8	3.4	1.8	.95	.95	1.8	2.3	1.8
13	1.4	1.3	1.2	1.2	4.3	3.4	1.8	.95	.95	1.6	2.0	3.3
14	1.5	1.2	1.1	1.2	2.9	3.1	1.8	.95	.95	1.5	2.0	2.0
15	1.3	1.2	1.0	1.0	2.1	3.0	1.8	.95	.95	1.5	2.0	2.2
16	1.2	1.2	1.0	1.3	1.6	2.7	1.8	.95	.95	1.4	2.0	2.2
17	1.2	1.4	.95	1.0	1.6	2.5	3.0	.95	.95	1.5	2.0	2.2
18	1.2	1.2	1.1	.95	3.1	2.3	2.3	.95	.95	1.6	7.5	2.9
19	1.2	1.2	1.4	.95	5.4	1.9	2.6	.95	.95	1.5	2.0	7.0
20	1.2	1.2	1.0	.95	29	2.2	2.3	.95	.95	2.6	3.9	8.0
21	1.2	1.2	1.2	.95	5.7	2.1	2.3	1.1	.95	1.8	3.9	3.3
22	1.2	1.2	1.1	.95	3.6	1.9	2.6	.95	.9	2.6	2.0	5.2
23	1.2	1.3	1.0	.95	2.8	1.8	2.3	.95	.9	2.0	1.8	3.3
24	1.2	1.3	1.0	.95	2.8	1.8	2.0	.95	.9	1.8	1.8	2.9
25	1.2	1.3	1.0	.95	9.0	1.8	2.0	.95	.95	1.8	1.8	6.0
26	1.3	1.3	.95	.95	11	1.8	2.0	1.1	1.2	4.3	1.7	2.9
27	1.2	1.2	.95	1.0	9.7	1.8	2.3	.95	1.1	2.0	2.2	2.5
28	1.3	1.4	1.1	1.0	5.4	1.8	2.0	1.5	.95	2.0	2.5	2.5
29	1.2	1.3	1.0	.95	3.9	1.8	2.0	-----	2.6	1.8	2.0	2.2
30	1.2	1.3	1.0	1.0	3.7	1.8	1.8	-----	1.5	1.6	2.0	2.5
31	1.2	2.3	-----	.95	-----	1.8	1.8	-----	1.4	-----	2.2	-----
1914-15.												
1	5.2	3.3	4.5	9.0	4.0	3.1	2.5	1.5	2.0	1.5	4.4	2.0
2	2.9	2.9	5.2	10	3.8	3.7	2.0	1.5	2.5	1.5	3.7	2.0
3	2.5	6.0	3.9	9.0	3.7	4.4	2.0	1.5	3.1	1.5	3.7	2.0
4	2.9	3.9	2.9	9.0	3.7	5.0	2.5	1.5	3.1	1.5	3.7	2.0
5	3.9	2.9	2.9	9.0	3.6	4.4	2.0	2.5	2.5	1.5	3.1	2.0
6	2.5	2.5	2.9	9.0	3.5	4.4	2.0	1.5	2.0	2.5	3.1	2.0
7	2.5	2.5	3.3	9.0	3.4	3.7	2.0	2.0	2.0	1.5	3.1	2.0
8	2.9	2.5	2.2	9.0	3.3	3.1	2.0	1.5	2.5	1.5	3.1	2.0
9	2.5	2.5	2.2	12	3.2	3.1	2.5	2.0	2.0	2.0	3.1	2.0
10	2.5	2.5	2.2	8.0	3.1	3.1	2.5	3.1	2.0	1.5	3.7	2.0
11	2.2	3.9	2.2	8.0	3.1	3.1	2.0	2.5	2.0	2.5	3.1	1.5
12	2.2	2.9	2.2	8.0	3.1	3.1	2.0	4.4	1.5	5.0	3.1	1.5
13	2.2	3.9	3.3	7.6	3.1	3.1	1.5	3.1	2.0	2.5	3.1	1.5
14	2.0	2.9	12	7.2	3.1	3.1	1.5	2.0	2.0	1.5	2.5	1.5
15	5.2	2.5	14	6.8	3.1	3.1	1.5	2.0	2.0	2.5	2.5	2.0
16	4.5	2.5	13	6.4	3.1	3.1	1.5	3.7	2.0	48	3.1	2.0
17	8.0	3.9	14	6.0	3.1	3.1	1.5	2.5	2.0	9.0	2.5	2.0
18	3.9	8.0	14	5.6	3.1	3.1	1.5	2.0	1.5	8.0	2.5	2.0
19	2.9	2.9	16	5.2	3.1	5.0	1.5	2.0	1.5	4.4	2.5	5.0
20	2.5	2.9	13	6.1	3.1	3.7	1.5	3.7	1.5	3.1	2.0	3.7
21	2.2	3.9	12	6.1	3.1	3.1	1.5	9.0	1.5	3.1	2.0	2.5
22	2.2	3.3	14	5.2	3.1	3.1	1.5	3.7	1.5	2.5	2.5	2.0
23	2.5	2.9	13	5.2	3.1	2.5	1.5	4.4	1.5	3.7	2.0	2.0
24	3.3	2.5	12	5.2	3.1	3.1	1.5	4.4	1.5	3.7	2.5	2.0
25	2.9	2.5	10	5.2	3.1	3.1	1.5	3.1	1.5	6.0	2.5	2.0
26	2.5	2.5	13	5.2	3.1	2.5	1.5	2.5	1.5	21	2.0	5.0
27	2.9	2.5	12	5.0	3.1	2.5	1.5	2.5	1.5	13	2.5	3.1
28	6.0	3.3	10	4.8	3.1	2.5	1.5	2.5	1.5	6.0	2.5	2.0
29	36	2.9	10	4.6	3.1	2.5	1.5	-----	1.5	5.0	3.1	2.0
30	7.0	4.5	10	4.4	3.1	2.5	1.5	-----	1.5	4.4	2.5	3.1
31	4.5	7.0	-----	4.2	-----	2.5	1.5	-----	1.5	-----	2.0	-----

NOTE.—Record July 14-20, July 28 to Aug. 3, 7-10, 19-25, and Sept. 1-7, 1914 from outside staff gage at Watson water-stage recorder. Discharge determined from rating curves applicable as follows:

Original staff gage: July 1, 1913 to May 19, 1914, well defined below 30 million gallons per day (46 second-feet).

Automatic water-stage recorder: May 20 to Sept. 21, 1914, curve developed from simultaneous gage readings at old and new sites and rating curve for original staff gage adjusted in gage-height to pass through measurement made Sept. 14, 1914, poorly defined; Sept. 22 to Nov. 2, 1914, poorly defined; Nov. 3, 1914 to June 30, 1915, poorly defined until Apr. 26, 1915, after which date sufficient measurements were made to develop a fairly well defined curve.

Discharge estimated July 1-10, 1913, Oct. 5, 11, 13-18, 24, 25, Oct. 27 to Nov. 2, Nov. 4-9, 12-16, 18-23, 25-29, and Dec. 15, 1914, by comparison with record of West Branch of Manoa Stream.

Discharge Dec. 20-31, 1913, revised since published in Water-Supply Paper 373, p. 83.

Monthly discharge of East Branch of Manoa Stream near Honolulu, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	1.5	1.2	1.28	1.98	40	122
August.....	3.6	1.1	1.34	2.07	42	127
September.....	3.5	.95	1.16	1.79	35	107
October.....	1.4	.95	1.01	1.56	31	96
November.....	29	.95	4.78	7.40	143	440
December.....	15	1.8	3.97	6.14	123	378
January.....	10	1.2	2.22	3.43	69	211
February.....	3.0	.95	1.33	2.06	37	114
March.....	2.6	.9	1.04	1.61	32	99
April.....	18	.95	2.72	4.21	82	250
May.....	20	1.5	3.81	5.89	118	362
June.....	8.0	1.7	3.04	4.70	91	280
The year.....	29	.9	2.31	3.57	843	2,590
1914-15.						
July.....	36	2.0	4.45	6.89	138	423
August.....	8.0	2.5	3.41	5.28	106	324
September.....	18	2.2	8.56	13.2	257	788
October.....	12	4.2	6.94	10.7	215	660
November.....	4.0	3.1	3.24	5.01	97	298
December.....	5.0	2.5	3.27	5.06	101	311
January.....	2.5	1.5	1.76	2.72	54	167
February.....	9.0	1.5	2.81	4.35	79	241
March.....	3.1	1.5	1.88	2.91	58	179
April.....	48	1.5	5.71	8.83	171	526
May.....	4.4	2.0	2.83	4.38	88	269
June.....	5.0	1.5	2.28	3.53	68	210
The year.....	48	1.5	3.93	6.08	1,430	4,400

EAST MANOA DITCH NEAR HONOLULU, OAHU.

LOCATION.—1,000 feet below intake. Ditch diverts from East Branch of Manoa Stream about 1,000 feet above the gaging station on that stream, 4 miles northeast of Honolulu post office.

RECORDS AVAILABLE.—May 24 to June 30, 1915.

GAGE.—Vertical staff on left bank; read once daily.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel is an earth cut on a side hill; straight for 50 feet above and below gage; banks high and covered with vegetation. Control not well defined; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 1.24 feet June 26, 1915 (discharge, 2.8 million gallons per day, or 4.3 second-feet), minimum stage recorded, 0.9 foot June 21 to 22, 28 to 30, 1915 (discharge, 1.3 million gallons per day, or 2.0 second-feet).

DIVERSIONS.—None above station.

REGULATION.—Flow regulated by head gates.

UTILIZATION.—Irrigation of rice and taro.

ACCURACY.—Estimates fair. Control did not shift during the period and a fairly well defined curve was developed.

Discharge measurements of East Manoa ditch near Honolulu, Oahu, during the year ending June 30, 1915.

[Made by R. C. Rice.]

Date.	Gage height (feet).	Discharge.	
		Second-feet.	Million gallons per day.
May 31.....	0.94	2.2	1.4
June 14.....	.89	1.8	1.2
21.....	.89	1.9	1.3

Discharge, in million gallons per day, of East Manoa ditch near Honolulu, Oahu, for the year ending June 30, 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	May.	June.	Date.	May.	June.	Date.	May.	June.
1.....		1.3	11.....		1.3	21.....		1.3
2.....		1.3	12.....		1.3	22.....		1.3
3.....		1.7	13.....		1.3	23.....		1.3
4.....		1.5	14.....		1.5	24.....	1.5	1.3
5.....		1.3	15.....		1.5	25.....	1.5	1.3
6.....		1.3	16.....		1.3	26.....	1.3	2.8
7.....		1.3	17.....		1.3	27.....	1.3	1.3
8.....		1.3	18.....		1.5	28.....	1.3	1.3
9.....		1.3	19.....		2.6	29.....	1.3	1.3
10.....		1.3	20.....		1.5	30.....	1.3	1.3
						31.....	1.3	1.3

NOTE.—Discharge determined from a fairly well defined rating curve.

Monthly discharge of East Manoa ditch near Honolulu, Oahu, for the year ending June 30, 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
May 24-31.....	1.5	1.3	1.35	2.09	11	33
June.....	2.8	1.3	1.44	2.23	43	133

MAKAWAO DITCH NEAR KAILUA,¹ OAHU.

LOCATION.—At west end of flume crossing Makawao Gulch in Kailua Valley, about 2½ miles south of Kailua.

RECORDS AVAILABLE.—November 1, 1912, to June 30, 1915.

GAGE.—Watson water-stage recorder installed March 2, 1914. Vertical staff November 1, 1912, to March 1, 1914; change in datum November 24, 1913.

DISCHARGE MEASUREMENTS.—Prior to November 24, 1913, made by current meter in open flume; November 24, 1913, to February 11, 1914, by a 2.5-foot sharp-crested weir with end contractions; February 12, 1914, to June 30, 1915, by a 4-foot sharp-crested weir with end contractions.

CHANNEL AND CONTROL.—Earth ditch subject to growth of weeds and grass. Flow from Makawao Spring empties into main ditch at pool back of weir. Control for original staff gage was shifting on account of growth of vegetation in ditch.

¹ Described in Water-Supply Paper 373, p. 88, as "at Makawao flume near Waimanalo."

Discharge, in million gallons per day, of Makawao ditch near Kailua, Oahu, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Feb.	Mar.	Apr.	May.	June.
1914-15.										
1.....	2.6	2.6	2.6	.....	2.6	.....	2.2	2.2	.....	2.6
2.....	2.6	2.6	2.6	.....	2.6	.....	2.2	2.2	.....	2.6
3.....	2.6	2.6	2.6	.....	2.6	.....	2.2	2.2	.....	2.6
4.....	2.6	2.6	2.2	.....	2.6	.....	2.2	2.2	.....	2.6
5.....	2.6	2.6	2.2	1.8	2.6	.....	2.2	2.2	.....	2.6
6.....	2.6	2.6	2.2	1.8	2.6	.....	2.2	2.2	.....	2.6
7.....	2.6	2.2	1.8	1.8	2.6	.....	2.2	2.2	.....	2.6
8.....	2.6	2.2	1.8	1.8	2.2	.....	2.2	2.2	.....	2.6
9.....	2.6	2.2	1.8	2.2	2.2	.....	2.2	2.2	.....	2.6
10.....	2.6	2.2	1.8	2.2	2.6	.....	2.2	2.2	.....	2.6
11.....	2.6	2.6	2.2	2.2	2.6	.....	2.2	2.2	.....	2.6
12.....	2.2	2.6	2.2	2.2	2.6	.....	2.2	2.6	2.6	2.6
13.....	2.2	2.6	2.2	2.2	.5	.....	2.6	2.6	2.6	2.6
14.....	2.2	2.6	2.6	2.2	.....	.....	2.6	2.6	2.6	2.6
15.....	2.2	2.6	2.6	2.2	.....	.....	2.6	3.0	3.0	2.6
16.....	2.6	2.2	2.6	2.2	.....	.....	2.6	3.0	3.0	2.6
17.....	2.6	2.6	2.6	2.2	.....	.....	2.6	3.0	3.0	2.6
18.....	2.6	2.6	2.6	2.2	.....	.....	2.2	4.0	3.0	2.6
19.....	2.6	2.6	2.6	2.2	.....	.75	2.2	1.8	2.6	2.6
20.....	2.6	2.6	2.6	2.2	.....	1.1	2.2	.....	2.6	2.6
21.....	2.2	2.6	3.0	2.2	.....	2.6	2.2	1.8	2.6	2.6
22.....	2.2	2.6	.....	2.2	.....	2.2	2.2	3.0	2.6	2.6
23.....	2.2	2.6	.....	2.2	.....	2.2	2.2	3.0	2.6	2.6
24.....	2.2	2.6	.....	2.2	.....	2.2	2.2	3.0	2.6	2.6
25.....	2.2	2.2	.....	2.2	.....	2.2	2.2	3.5	2.6	2.6
26.....	2.2	2.2	.....	2.2	.....	2.2	2.2	1.4	2.6	2.6
27.....	2.2	2.2	.....	2.2	.....	2.2	2.2	.....	2.6	2.6
28.....	2.2	2.2	.....	1.1	.....	2.2	2.2	.....	2.6	2.6
29.....	2.6	2.2	.....	1.1	.....	.....	2.2	.....	2.6	2.2
30.....	2.6	2.2	.....	2.2	.....	.....	2.2	.....	2.6	2.2
31.....	2.6	2.2	.....	2.6	.....	.....	2.2	.....	2.6	.....

NOTE.—Discharge July 1-Nov. 23, 1913, determined from a poorly defined rating curve. Discharge Nov. 24, 1913-June 30, 1915, computed by Francis's formula for contracted weir with velocity of approach and $Q=3.33 (L-.2H) [(H-h)^{3/2} - (h)^{3/2}]$ gives results that agree closely with results of discharge measurements made during 1914 and 1915. No record Dec. 4, 1913, to Feb. 11, 1914. Discharge estimated Mar. 17-22, 25, 26, Apr. 29, 30, May 13-18, Aug. 3, Sept. 2-7, 9-14, 1914, Mar. 27-31, and Apr. 10-15, 1915, as the Watson water-stage recorder failed to operate. Ditch dry Mar. 27 to Apr. 19, May 31, June 1, Sept. 22 to Oct. 4, Nov. 14, 1914, to Feb. 18, 1915, and Apr. 27 to May 11, 1915.

Monthly discharge of Makawao ditch near Kailua, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	2.1	1.2	1.57	2.43	49	149
August.....	2.1	1.4	1.66	2.57	52	158
September.....	1.7	1.0	1.28	1.98	38	118
October.....	1.4	1.0	1.25	1.93	39	119
November.....	3.9	1.2	2.14	3.31	64	197
February 12-28.....	2.2	1.8	1.82	2.82	31	95
March 1-26.....	2.6	1.0	1.82	2.82	47	145
April 20-30.....	2.6	2.2	2.53	3.31	28	85
May 1-3, 12-30.....	3.0	1.1	2.57	3.98	56	174
June 2-30.....	3.0	1.1	2.56	3.96	75	228
The period (258 days).....	3.0	1.0	1.86	2.88	479	1,470
1914-15.						
July.....	2.6	2.2	2.45	3.79	76	233
August.....	2.6	2.2	2.45	3.79	76	233
September 1-21.....	3.0	1.8	2.35	3.64	49	151
October 5-31.....	2.6	1.1	2.07	3.20	56	172
November 1-13.....	2.6	.....	2.38	3.68	8	95
February 19-28.....	2.6	.75	1.98	3.06	20	61
March.....	2.6	2.2	2.26	3.50	70	215
April 1-19, 21-26.....	4.0	1.4	2.40	3.71	6	191
May 12-31.....	3.0	2.6	2.68	4.15	54	164
June.....	2.6	2.2	2.57	3.98	77	237
The period (240 days).....	4.0	.5	2.03	3.14	487	1,750

NOTE.—Estimates cover periods during which water was flowing. See footnote to daily discharge table.

KAILUA STREAM NEAR KAILUA, OAHU.

LOCATION.—About 200 feet below intake of Wong Leong's ditch, three-quarters of mile east of point where road to Kailua rice mill leaves Waimanalo-Honolulu road, 1 mile southeast of Kailua, and about 11 miles by road from Honolulu.

RECORDS AVAILABLE.—Fragmentary record November 12, 1913, to June 30, 1915.

GAGE.—Inclined staff on left bank installed April 29, 1914, at same site and datum as vertical staff installed January 21, 1913, the datum of the later being different from that of original gage. A vertical staff for high water readings is spiked to a mango tree on right bank about 35 feet above inclined staff.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel straight for 50 feet above and below gage; composed of small boulders and gravel; the gently sloping banks overflow in extreme floods. Control is a boulder riffle which shifts during floods.

EXTREMES OF DISCHARGE.—Collection of debris on banks indicated a stage of approximately 11.0 feet on March 27, 1914 (data insufficient for an estimate of discharge); minimum stage recorded, 0.49 foot, May, 1913 (discharge, 0.1 million gallons per day or 0.15 second-foot).

DIVERSIONS.—Wong Leong's ditch usually diverts all low-water flow at a point 200 feet above station.

REGULATION.—Amount diverted above varies.

UTILIZATION.—Low-water flow is diverted for irrigation of rice fields.

ACCURACY.—Record fragmentary as gage was washed out several times and not replaced at once. Also the discharge relation has been unstable for the period owing to shifts in control. Fairly good ratings curves for the periods April 9, 1913, to March 27, 1914, and September 25, 1914, to February 28, 1915, have, however, been developed and records are fair for these periods for low water and medium stages; records for the rest of period poor.

Discharge measurements of Kailua Stream near Kailua, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Feb. 2	G. R. White.....	0.96	5.0	3.2
Apr. 30	H. A. R. Austin.....	1.18	5.6	3.6
Sept. 17	do.....	.86	5.1	3.3
Oct. 8	do.....	1.45	13	8.3
Nov. 12	do.....	1.23	6.3	4.1
Dec. 4	do.....	1.66	20	13
1915—Mar. 11	do.....	.48	.35	.25
June 30	do.....	.20	.65	.4

Discharge, in million gallons per day, of Kailua Stream near Kailua, Oahu, for the years ending June 30, 1913, 1914, and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Apr.	May.	June.	Date.	Apr.	May.	June.	Date.	Apr.	May.	June.
1913.				1913.				1913.			
1.....		0.55	0.2	11.....	0.8	2.5	2.5	21.....	0.8	0.8	1.2
2.....		1.5	.3	12.....	1.5	.85	2.5	22.....	1.5	.55	1.2
3.....		.2	14	13.....	5.2	22	3.1	23.....	2.0	.55	1.2
4.....		.1	28	14.....	1.2	28	3.1	24.....	2.0	.55	1.2
5.....		.1	6.1	15.....	1.5	32	3.1	25.....	.8	1.2	.8
6.....		.1	6.1	16.....	3.7	7.0	3.1	26.....	1.5	1.2	.8
7.....		.1	3.7	17.....	3.7	5.2	3.1	27.....	2.0	1.5	1.2
8.....		15	2.5	18.....	2.5	3.7	1.2	28.....	1.5	1.5	.8
9.....	20	28	2.5	19.....	2.0	3.7	1.5	29.....	1.2	1.5	.8
10.....	.3	5.2	2.5	20.....	.8	1.5	6.1	30.....	1.2	1.5	.8
								31.....		.2	

Discharge, in million gallons per day, of Kailua Stream near Kailua, Oahu, for the years ending June 30, 1913, 1914, and 1915—Continued.

Date.	July.	Aug.	Jan.	Feb.	Mar.	Date.	July.	Aug.	Jan.	Feb.	Mar.
1913-14.						1913-14.					
1.....	0.8	0.1	.....	3.1	0.2	16.....	0.2	0.2	2.0	0.2	0.6
2.....	.8	.1	.....	12	.1	17.....	.2	.8	12	.1	.3
3.....	.6	.2	.....	5.2	.1	18.....	.2	.3	4.4	.1	.2
4.....	.6	.1	.....	3.1	.1	19.....	.1	.2	3.7	.1	.2
5.....	.6	.1	.....	2.5	.2	20.....	.1	.2	9.3	.1	.2
6.....	.3	.1	.....	2.0	.1	21.....	.1	.2	2.5	.1	.1
7.....	.3	.1	.....	1.5	.1	22.....	.1	.2	7.0	.1	.1
8.....	.3	.2	.....	1.5	.1	23.....	.1	.2	2.5	.1	.1
9.....	.3	.2	.....	1.2	.2	24.....	.1	.2	2.0	.1	.1
10.....	.3	.2	.....	1.2	.2	25.....	.1	.1	2.0	.1	.2
11.....	.3	.1	.....	.8	.2	26.....	.1	.1	1.5	.1	3.7
12.....	.3	.8	.....	.8	.2	27.....	.1	.2	1.2	.1	1.5
13.....	.3	.3	.....	.2	.6	28.....	.1	.2	2.5	.2	.....
14.....	.2	.1	.....	.1	.1	29.....	.1	.2	1.5	.....	.....
15.....	.2	.1	.....	.1	.2	30.....	.1	.2	1.5	.....	.....
						31.....	.1	.2	1.5	.....	.....

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
1914-15.								
1.....	.....	3.8	3.3	15	5.2	7.0	3.8	0.95
2.....	.....	3.8	3.8	13	6.1	7.0	3.8	.95
3.....	.....	3.8	2.8	13	5.2	7.0	3.8	1.5
4.....	.....	3.8	2.4	13	5.2	12	3.8	1.5
5.....	.....	3.8	2.0	12	5.2	9.2	3.8	1.5
6.....	.....	2.8	2.0	10	5.2	15	3.8	1.5
7.....	5.0	2.4	2.0	9.2	5.2	13	3.8	1.5
8.....	5.0	2.0	2.4	9.2	5.2	13	3.8	1.3
9.....	5.0	2.0	2.8	8.1	5.2	9.2	3.8	1.3
10.....	5.0	2.0	2.4	8.1	5.2	8.1	3.8	1.3
11.....	5.0	14	2.8	9.2	7.0	7.0	3.8	1.3
12.....	5.0	11	3.3	8.1	7.0	7.0	3.8	1.1
13.....	2.4	8.8	3.8	7.0	9.2	7.0	3.8	1.3
14.....	2.4	5.9	3.8	6.1	12	7.0	3.4	1.3
15.....	2.4	4.4	3.8	5.2	15	7.0	2.9	1.1
16.....	2.4	3.8	3.3	3.8	9.2	6.1	2.9	1.1
17.....	4.4	5.0	3.3	12	9.2	7.0	2.9	1.3
18.....	3.8	4.4	2.8	13	8.1	8.1	2.1	1.3
19.....	3.8	3.8	2.8	12	9.2	12	1.8	1.3
20.....	3.3	3.8	2.8	12	8.1	9.2	1.8	1.3
21.....	2.8	3.8	122	7.0	7.0	8.1	1.5	1.3
22.....	2.0	3.8	297	4.5	7.0	7.0	1.1	.8
23.....	2.4	3.8	143	3.8	7.0	7.0	1.1	.65
24.....	2.0	3.8	272	3.4	7.0	5.2	1.1	.8
25.....	2.0	3.8	5.2	3.4	7.0	5.2	.95	.8
26.....	2.0	3.3	21	3.4	7.0	4.5	.95	.65
27.....	2.0	3.3	21	2.9	7.0	4.5	.95	.8
28.....	2.0	2.8	18	2.9	7.0	3.8	.95	.65
29.....	14	2.8	15	2.9	7.0	3.8	.95	.....
30.....	6.8	2.8	15	2.9	7.0	3.8	.95	.....
31.....	4.4	3.3	.....	2.9	.....	3.8	.95	.....

NOTE.—Discharge determined from rating curves applicable as follows: Apr. 9, 1913, to Mar. 27, 1914, fairly well defined below 16 million-gallons per day (25 second-feet); July 6 to Sept. 24, 1914, poorly defined; Sept. 25, 1914, to Feb. 28, 1915, fairly well defined. No records July 1, 1913, to Jan. 15, 1914. Gage reported washed out Sept. 9, 1913; estimated discharge due to leakage under dam at intake of Wong Leong's ditch was 0.15 million gallons per day or 0.25 second-feet. No record Mar. 28 to July 5, 1914, as gage was washed out. Observer's readings for March, 1915, discarded as unreliable. Water surface was away from foot of inclined gage from April to June, 1915.

Monthly discharge of Kailua Stream near Kailua, Oahu, for the years ending June 30, 1913, 1914, and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913.						
April 9-30.....	20	0.3	2.62	4.05	58	177
May.....	85	.1	8.15	12.6	252	775
June.....	28	.2	3.51	5.43	105	323
1913-14.						
July.....	.8	.1	.26	.40	8.1	25
August.....	.8	.1	.21	.31	6.5	20
January 16-31.....	12	1.2	3.57	5.52	57	175
February.....	12	.1	1.31	2.03	37	113
March 1-27.....	3.7	.1	.37	.57	10	31
1914-15.						
July 6-31.....	14	2.0	3.93	6.08	102	314
August.....	14	2.0	4.27	6.61	132	406
September.....	297	2.0	32.9	50.9	988	3,030
October.....	15	2.9	7.71	11.9	239	733
November.....	15	5.2	7.23	11.2	217	666
December.....	15	3.8	7.57	11.7	235	720
January.....	3.8	.95	2.54	3.93	79	242
February.....	1.5	.65	1.15	1.78	32	99

WONG LEONG'S DITCH NEAR KAILUA, OAHU.

LOCATION.—100 feet below ditch intake from Kailua Stream, three-fourths of a mile east of point where road to rice mill leaves Waimanalo-Honolulu road, about 1 mile south of Kailua, and 11 miles from Honolulu.

RECORDS AVAILABLE.—November 12, 1912, to June 30, 1915.

GAGE.—Vertical staff.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel straight for 50 feet above and below gage; banks clean and high. Discharge relation changed by growth of weeds and cleaning of ditch.

EXTREMES OF DISCHARGE.—Maximum stage recorded during biennial period, 1.80 feet at 8 a. m. May 3, 1914 (discharge, 7.7 million gallons per day, or 12 second-foot); minimum stage recorded, 0.34 foot at 4 p. m. January 17, 1915 (discharge, 0.7 million gallons per day, or 1.1 second-foot).

DIVERSION.—None above station.

REGULATION.—Flow controlled by head gates.

UTILIZATION.—Irrigation of rice fields.

ACCURACY.—Records poor owing to instability of discharge relation.

Discharge measurements of Wong Leong's ditch near Kailua, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1913—Sept. 9	G. K. Larrison.....	1.49	4.2	2.7
1914—Feb. 2	G. R. White.....	1.76	8.9	5.8
14	.....do.....	1.08	6.4	4.1
Apr. 30	H. A. R. Austin.....	1.43	8.5	5.5
Sept. 17	.....do.....	1.18	4.0	2.6
17	.....do.....	1.08	3.5	2.3
Nov. 12	.....do.....	.69	1.6	1.0
1915—Mar. 11	.....do.....	.84	4.1	2.7
June 30	.....do.....	1.00	5.6	3.6
30	.....do.....	.82	5.0	3.2

Discharge, in million gallons per day, of Wong Leong's ditch near Kailua, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	2.5	2.3	3.7	2.8	2.5	2.3	4.3	4.9	4.3	3.2	4.2	1.4
2.....	2.5	2.3	2.3	2.8	2.5	2.5	4.3	5.7	3.9	3.0	4.2	1.3
3.....	2.8	2.1	1.8	2.8	2.3	2.5	4.6	5.7	3.9	2.7	7.7	1.3
4.....	2.8	2.3	1.8	2.8	2.3	4.4	4.3	5.3	3.9	3.0	2.7	1.2
5.....	2.8	2.3	2.5	2.8	2.3	4.4	4.6	5.3	3.9	6.4	1.1	1.2
6.....	2.8	1.8	2.3	2.8	2.3	4.1	4.6	5.3	3.9	5.2	1.1	1.2
7.....	2.8	2.1	2.5	2.8	2.3	4.7	4.3	5.3	3.9	4.5	1.9	1.1
8.....	2.8	2.5	2.5	2.8	2.3	4.4	5.7	5.3	3.9	4.5	1.6	1.1
9.....	2.8	2.1	2.3	2.8	2.5	3.4	5.7	4.9	3.9	4.2	1.9	1.1
10.....	2.8	2.8	2.8	2.8	2.3	4.4	5.3	4.9	3.9	3.6	1.7	1.1
11.....	2.8	1.8	2.8	2.8	2.1	4.0	5.3	4.9	3.9	3.0	1.9	1.1
12.....	2.8	2.5	2.8	2.8	2.1	4.4	5.3	4.9	3.3	2.1	2.3	1.1
13.....	2.8	2.3	2.8	2.8	2.1	4.0	5.3	4.9	3.0	2.1	2.3	1.4
14.....	2.5	1.6	2.8	2.8	2.1	4.0	5.3	4.3	2.8	1.9	2.3	1.9
15.....	2.8	1.8	2.8	2.8	2.3	4.4	5.3	4.3	2.8	1.9	2.3	1.9
16.....	2.5	2.3	2.8	2.8	2.3	4.4	5.3	4.9	4.9	1.9	2.3	1.9
17.....	2.8	2.8	2.8	2.8	2.3	4.4	4.6	4.3	4.6	3.2	2.3	1.9
18.....	2.5	2.3	2.8	2.8	2.5	4.4	4.6	4.3	4.6	4.2	2.3	1.9
19.....	2.5	2.3	2.8	2.8	2.5	4.4	4.6	4.3	4.3	3.9	2.3	1.9
20.....	2.5	2.3	2.8	2.8	2.3	4.4	4.6	4.3	4.3	4.5	2.3	1.9
21.....	2.5	2.5	2.8	2.8	2.5	4.4	4.6	4.3	3.0	4.5	2.3	1.3
22.....	2.5	2.3	3.1	3.1	2.3	4.4	5.3	4.3	3.0	4.5	2.3	1.3
23.....	2.5	2.3	2.8	3.1	2.3	4.4	4.6	4.3	3.0	4.5	2.3	1.2
24.....	1.3	2.3	2.8	3.1	2.3	4.3	4.6	3.9	3.0	4.2	2.3	1.1
25.....	1.8	2.3	2.8	3.1	2.3	4.3	4.6	3.9	4.3	3.9	2.3	1.1
26.....	1.5	2.3	2.8	2.5	2.5	4.3	4.3	3.9	4.2	3.9	2.3	1.1
27.....	1.5	2.5	2.8	2.5	2.5	4.3	4.3	3.9	4.5	3.2	2.3	1.4
28.....	1.5	2.5	2.8	2.5	2.5	4.2	4.6	4.3	4.5	3.2	1.9	1.3
29.....	1.6	2.5	2.8	2.3	2.3	4.2	4.6	.....	6.0	3.6	2.1	1.1
30.....	1.6	2.5	2.8	2.3	2.5	4.2	4.6	.....	4.5	4.5	1.3	1.1
31.....	1.8	2.3	.....	2.3	.....	4.2	4.6	.....	3.9	.....	1.1	.....
1914-15.												
1.....	1.3	2.1	2.5	1.9	2.7	.9	.85	4.6	2.6	1.9	.8	2.8
2.....	1.3	2.1	2.7	1.7	1.6	.9	.85	4.6	2.6	1.9	4.6	3.0
3.....	1.2	2.1	3.0	1.7	1.6	.9	.85	3.3	2.6	1.9	3.6	3.0
4.....	1.1	2.1	3.2	1.7	1.4	.8	.85	3.0	2.6	2.1	3.3	2.8
5.....	1.2	2.1	3.6	1.7	1.6	.8	.85	3.0	2.6	2.1	1.3	3.9
6.....	1.2	2.1	3.2	1.6	1.6	.8	.8	3.0	2.6	2.1	1.3	3.9
7.....	1.2	2.3	3.2	1.6	1.4	.8	.8	3.0	2.6	2.1	1.3	4.3
8.....	1.2	2.3	3.0	1.4	1.4	.8	.8	3.0	2.6	2.4	1.3	4.3
9.....	1.3	2.3	3.2	1.4	1.4	.8	.8	3.0	2.6	2.6	1.4	4.3
10.....	1.2	2.3	3.6	1.4	1.3	.8	.8	2.6	2.6	2.6	1.3	3.9
11.....	1.3	2.7	3.2	1.3	1.1	.85	.8	2.6	2.6	2.6	1.7	3.9
12.....	1.2	2.3	3.2	1.3	1.1	.8	.8	2.4	2.6	2.6	1.7	3.9
13.....	2.5	2.1	3.6	1.2	1.1	.85	.75	2.4	2.8	2.6	1.7	3.6
14.....	2.5	2.1	3.6	1.2	1.0	.85	.75	2.1	2.8	2.6	1.7	3.3
15.....	2.5	1.9	3.6	1.2	1.0	.85	.7	2.1	2.8	2.6	1.7	1.3
16.....	2.5	1.9	3.0	7.5	1.0	.85	.7	1.9	2.8	2.4	1.7	2.1
17.....	1.7	1.9	2.7	7.7	1.0	.85	.7	1.9	2.8	1.7	3.3	2.6
18.....	1.7	1.9	2.7	7.7	1.0	.85	.85	1.7	2.8	1.7	3.6	2.6
19.....	1.9	1.9	2.7	7.7	1.0	.85	.85	1.7	2.8	1.5	2.6	2.8
20.....	1.9	1.7	2.7	7.7	1.0	.85	1.6	1.7	2.8	1.5	2.6	2.6
21.....	2.3	1.9	4.5	2.7	1.0	.85	3.6	2.6	2.6	1.5	3.6	2.8
22.....	2.7	1.9	5.5	2.7	1.0	.85	3.6	2.6	2.6	1.5	3.6	2.6
23.....	3.0	1.9	2.5	2.7	1.0	.85	3.9	2.6	2.6	1.5	3.6	2.6
24.....	2.7	1.7	5.2	2.7	1.0	.85	4.6	2.6	2.6	1.5	3.6	2.6
25.....	2.7	1.9	2.1	2.7	1.0	.85	4.6	2.6	2.4	1.5	3.6	2.6
26.....	2.7	1.9	2.1	2.5	.9	.85	4.6	2.6	2.4	1.4	3.6	1.5
27.....	2.7	1.9	1.9	2.5	.9	.85	4.6	2.6	2.4	1.2	3.6	1.4
28.....	2.7	1.9	1.9	2.5	.9	.85	4.6	2.6	2.4	1.0	3.3	2.6
29.....	3.6	1.9	1.9	2.5	.9	1.1	4.6	.....	2.4	.8	3.0	2.8
30.....	2.3	2.1	1.9	2.5	.9	1.1	4.6	.....	2.4	.8	2.8	3.3
31.....	2.1	2.5	.....	2.5	.....	1.1	4.6	.....	2.4	.....	2.8	.....

NOTE.—Discharge determined from poorly defined rating curves covering short periods. Discharge estimated Dec. 20-31, 1913, and Feb. 10-12, 1914.

Monthly discharge of Wong Leong's ditch near Kailua, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	2.8	1.3	2.39	3.70	74	227
August.....	2.8	1.6	2.29	3.54	71	218
September.....	3.7	1.8	2.60	4.02	78	239
October.....	3.1	2.3	2.76	4.27	86	263
November.....	2.5	2.1	2.34	3.62	70	215
December.....	4.7	2.3	4.10	6.34	127	390
January.....	5.7	4.3	4.80	7.43	149	457
February.....	5.7	3.9	4.67	7.23	131	401
March.....	6.0	2.8	3.93	6.08	122	374
April.....	6.4	1.9	3.63	5.62	109	334
May.....	7.7	1.1	2.36	3.65	73	225
June.....	1.9	1.1	1.36	2.10	41	125
The year.....	7.7	1.1	3.10	4.80	1,130	3,470
1914-15.						
July.....	3.6	1.1	1.98	3.06	61	188
August.....	2.7	1.7	2.05	3.17	64	195
September.....	5.5	1.9	3.06	4.73	92	282
October.....	7.5	1.2	2.23	3.45	69	212
November.....	2.7	.9	1.19	1.84	36	110
December.....	1.1	.8	.87	1.35	27	83
January.....	4.6	.7	2.09	3.23	65	199
February.....	4.6	1.7	2.66	4.12	74	229
March.....	2.8	2.4	2.61	4.04	81	248
April.....	2.6	.8	1.87	2.89	56	172
May.....	4.6	.8	2.60	4.02	81	247
June.....	4.3	1.3	2.99	4.63	90	275
The year.....	7.5	.7	2.18	3.37	796	2,440

MAKAWAO STREAM NEAR KAILUA,¹ OAHU.

LOCATION.—One-fourth mile above confluence of Makawao and Kaimi streams and 100 feet above intake of irrigation ditch near Waimanalo-Honolulu road, 1 mile south of Kailua, and about $12\frac{1}{2}$ miles east by road from Honolulu.

RECORDS AVAILABLE.—November 12, 1912, to June 30, 1915.

GAGE.—Vertical staff on right bank, installed April 29, 1914, to replace gage washed out March 28, 1914; read twice daily; datum new but location same as old gage.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge 10 feet below gage.

CHANNEL AND CONTROL.—One channel at all stages except extreme flood; straight for 50 feet above and below gage; right bank nearly vertical; left bank overflows in floods. Control probably permanent between extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of records, 5.30 feet at 8 a. m., April 27, 1915 (discharge, approximately 320 million gallons per day, or 500 second-feet); minimum stage recorded, 0.84 foot at 5 p. m., November 9, 1913 (discharge, 0.9 million gallons per day, or 1.4 second-feet).

DIVERSIONS.—Low-water discharge of two main branches is diverted into Makawao ditch about three-fourths of a mile above station. An irrigation ditch diverts most of low flow at a point 100 feet below gage.

Regulation.—Amount diverted above station varies.

UTILIZATION.—Entire low flow is diverted for irrigation of rice fields.

ACCURACY.—Records prior to March 28, 1914, fair for low and medium stages; records after that date good for low and medium stages, as the rating curve is well defined below 4 million gallons per day.

¹ Described in Water-Supply Paper 373, pp. 89-90, as "in Kailua Valley, near Kailua."

Discharge measurements of Makawao Stream near Kailua, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons. per day.
1913—Sept. 9	J. C. Dort.....	0.90	1.8	1.2
Dec. 10	G. R. White.....	1.32	7.1	4.6
1914—Sept. 17	H. A. R. Austin.....	.74	2.9	1.9
Oct. 8	.....do.....	.85	4.4	2.8
Nov. 12	.....do.....	.68	2.0	1.3
Dec. 4	.....do.....	.87	4.6	3.0
1915—Mar. 11	.....do.....	.65	1.8	1.1
June 30	.....do.....	.68	2.4	1.6

Discharge, in million gallons per day, of Makawao Stream near Kailua, Oahu, for the years ending June 30, 1914 and 1915.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	1.7	1.4	1.4	1.1	1.1	1.7	2.1	2.1	1.1	.....	3.2	5.6
2.....	2.1	1.1	2.1	1.1	1.1	1.4	2.1	2.5	1.1	.....	3.2	5.0
3.....	1.7	1.4	1.4	1.1	1.1	1.7	2.1	2.1	1.1	.....	7.2	4.3
4.....	1.7	1.1	1.4	1.1	1.1	18	2.1	1.7	1.1	.....	17	4.3
5.....	1.4	1.1	1.1	1.1	1.1	16	2.1	1.7	1.1	.....	5.0	3.8
6.....	1.4	1.1	1.1	1.1	.9	6.1	1.7	1.7	1.1	.....	3.2	3.8
7.....	1.4	1.1	1.1	1.1	.9	14	1.7	1.7	1.1	.....	6.4	3.2
8.....	1.4	1.4	1.1	1.1	1.1	7.8	2.1	1.7	1.1	.....	4.3	3.2
9.....	1.4	1.4	1.1	1.1	.9	5.4	1.7	1.7	1.1	.....	5.0	3.2
10.....	1.4	1.1	1.1	1.1	1.1	4.1	1.7	1.7	1.1	.....	4.3	3.2
11.....	1.4	1.1	1.1	1.1	1.1	3.5	1.7	1.7	1.1	.....	4.3	3.2
12.....	1.4	2.5	1.1	1.1	.9	3.0	1.7	1.4	1.1	.....	3.8	3.2
13.....	1.4	1.7	1.1	1.1	1.1	3.0	1.7	1.4	1.1	.....	3.2	3.2
14.....	1.7	1.4	1.1	1.1	.9	2.5	1.7	1.4	1.1	.....	3.2	3.2
15.....	1.7	1.1	1.1	1.1	.9	2.5	1.7	1.1	1.1	.....	3.2	3.2
16.....	1.4	1.1	1.1	1.1	1.1	2.1	1.7	1.4	1.7	.....	2.8	3.2
17.....	1.4	1.4	1.1	1.1	1.1	2.5	2.5	1.4	1.4	.....	3.2	3.2
18.....	1.4	1.7	1.1	1.1	1.1	2.5	1.7	1.4	1.4	.....	3.2	3.2
19.....	1.4	1.4	1.1	1.1	1.1	2.5	1.7	1.4	1.4	.....	3.2	3.2
20.....	1.4	1.4	1.1	1.1	1.4	2.5	2.5	1.1	1.4	.....	3.2	3.2
21.....	1.1	1.4	1.1	1.1	1.4	2.5	1.7	1.4	1.4	.....	2.8	2.8
22.....	1.1	1.1	1.1	.9	1.4	2.5	2.5	1.1	1.1	.....	2.8	2.8
23.....	1.1	1.4	1.1	1.1	1.1	2.1	1.7	1.4	1.1	.....	2.8	2.3
24.....	1.1	1.4	1.1	1.1	1.1	2.1	1.7	1.1	1.1	.....	2.8	2.3
25.....	1.1	1.4	1.1	1.1	1.4	2.1	1.7	1.4	1.4	.....	2.3	2.3
26.....	1.1	1.4	1.1	1.1	3.0	1.7	1.7	1.1	2.5	.....	2.3	2.3
27.....	1.1	1.4	1.1	1.1	1.1	2.1	1.4	1.1	2.5	.....	2.3	2.3
28.....	1.4	1.4	1.1	1.1	1.1	2.1	1.7	1.4	3.0	.....	3.2	2.3
29.....	1.4	1.1	1.1	1.1	1.1	2.1	1.7	.....	5.0	3.8	3.8	2.3
30.....	1.1	1.4	1.1	.9	1.1	2.1	1.7	.....	3.0	3.8	7.1	2.3
31.....	1.1	1.4	.....	.9	.....	2.1	1.7	.....	2.0	.....	5.6	.....

Discharge, in million gallons per day, of Makawao Stream near Kailua, Oahu, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	2.8	2.3	2.3	3.2	3.8	2.0	2.3	2.0	1.3	1.3	16	2.0
2.....	2.8	2.0	2.3	3.2	2.8	2.0	2.3	2.0	1.3	1.3	15	2.0
3.....	2.3	2.0	2.0	3.2	2.0	2.0	2.3	2.0	1.3	1.3	12	2.3
4.....	2.3	2.3	1.6	3.2	2.0	3.2	2.3	2.0	1.3	1.3	9.0	2.0
5.....	2.3	2.0	1.6	2.8	2.3	2.3	2.3	2.0	1.3	1.6	5.6	2.0
6.....	2.3	2.0	1.6	2.8	2.0	4.3	2.3	2.0	1.3	1.6	5.6	2.0
7.....	2.3	2.0	1.6	2.8	2.3	3.8	2.3	2.0	1.3	1.3	5.0	2.0
8.....	2.3	2.0	2.0	2.3	2.0	3.8	2.0	2.0	1.3	1.3	5.0	2.0
9.....	2.3	2.0	2.0	2.3	2.0	3.2	2.3	2.0	1.3	1.6	5.0	1.6
10.....	2.3	2.0	1.6	2.3	2.0	3.2	2.3	2.0	1.3	1.6	5.0	1.6
11.....	2.3	2.3	1.6	2.3	1.6	2.8	2.3	2.0	1.3	1.3	4.3	1.6
12.....	2.3	2.0	1.6	2.3	2.0	2.3	2.3	1.6	1.3	1.6	3.2	1.6
13.....	2.0	2.0	1.6	2.3	2.0	2.8	2.3	1.6	1.6	1.6	3.2	1.6
14.....	2.0	2.0	1.6	2.3	3.2	2.3	2.3	1.6	1.6	1.6	2.8	1.6
15.....	2.0	2.0	1.6	2.0	5.0	2.3	2.3	1.6	1.3	1.6	2.8	1.6
16.....	2.0	2.0	1.6	2.0	2.8	2.3	2.3	1.6	1.3	5.6	2.8	1.6
17.....	2.3	2.3	1.6	2.0	2.8	2.3	2.0	1.6	1.3	8.0	2.8	1.6
18.....	2.3	2.0	1.6	2.0	2.3	2.8	2.3	1.6	1.3	11	2.8	1.6
19.....	2.3	2.0	1.6	2.3	2.3	4.3	2.3	1.6	1.3	11	2.8	1.6
20.....	2.0	2.0	1.6	2.3	2.3	3.2	2.0	1.6	1.3	11	2.8	1.6
21.....	2.0	2.0	3.0	2.0	2.0	3.2	2.0	1.6	1.3	11	2.8	1.6
22.....	2.0	2.0	104	2.0	2.0	3.2	2.0	1.6	1.3	10	2.8	1.6
23.....	2.0	2.0	23	2.0	2.0	5.0	2.0	1.6	1.0	10	2.8	1.6
24.....	2.0	2.0	60	2.0	2.0	3.2	2.0	1.6	1.0	9.0	2.3	1.6
25.....	2.0	2.0	18	2.0	2.0	3.2	2.0	1.3	1.3	9.0	2.3	1.6
26.....	2.0	2.0	6.4	2.0	2.0	3.2	2.0	1.3	1.3	11	2.3	1.6
27.....	2.0	2.0	5.0	2.0	2.0	2.8	2.0	1.3	1.3	192	2.3	1.6
28.....	2.0	2.0	4.3	2.0	2.0	2.8	2.0	1.3	1.3	100	2.3	1.6
29.....	2.8	2.0	3.8	2.0	2.0	2.8	2.0	.....	1.3	16	2.0	1.6
30.....	2.8	2.0	3.2	2.0	2.0	2.3	2.0	.....	1.3	10	2.0	1.6
31.....	2.3	2.0	.....	2.0	.....	2.3	2.0	.....	1.0	.....	2.0	.....

NOTE.—Discharge determined from rating curves applicable as follows: July 1, 1913, to Mar. 27, 1914, fairly well defined below 10 million gallons per day (15 second-feet); Apr. 29, 1914, to June 30, 1915, well defined below 4 million gallons per day (6 second-feet) and extended to cover high water by comparison with curve developed from discharge measurements made during 1916. Gage washed out Mar. 28, 1914; discharge estimated Mar. 28-31, 1914, by comparison with record of Kaimi Stream; no estimates for Apr. 28, 1914.

Monthly discharge of Makawao Stream near Kailua, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	2.1	1.1	1.38	2.14	43	131
August.....	2.5	1.1	1.35	2.09	42	128
September.....	2.1	1.1	1.16	1.79	35	107
October.....	1.1	.9	1.08	1.67	34	103
November.....	3.0	.9	1.16	1.79	35	107
December.....	18	1.7	4.07	6.30	126	387
January.....	2.5	1.4	1.85	2.86	57	176
February.....	2.5	1.1	1.51	2.34	42	130
March.....		1.1	1.55	2.40	48	147
April.....			5.00	7.74	150	460
May.....	72	2.3	6.28	9.72	195	597
June.....	5.6	2.3	3.19	4.94	96	294
The year.....			2.47	3.82	900	2,870
1914-15.						
July.....	2.8	2.0	2.24	3.47	69	213
August.....	2.3	2.0	2.04	3.16	63	194
September.....	104	1.6	9.74	15.1	292	897
October.....	3.2	2.0	2.32	3.59	72	221
November.....	5.0	1.6	2.32	3.59	70	214
December.....	5.0	2.0	2.94	4.55	91	280
January.....	2.3	2.0	2.16	3.34	67	205
February.....	2.0	1.3	1.71	2.64	48	147
March.....	1.6	1.0	1.29	2.00	40	123
April.....	192	1.3	14.9	23.0	446	1,370
May.....	16	2.0	4.50	6.96	139	428
June.....	2.3	1.6	1.72	2.66	52	158
The year.....	192	1.0	3.97	6.14	1,450	4,450

MAKAWAO SPRING NEAR KAILUA, OAHU.

LOCATION.—15 feet above flume joining Makawao ditch, three-quarters of a mile south of Maunawili Ranch, and about 3 miles south of Kailua.

RECORDS AVAILABLE.—February 12, 1914, to June 30, 1915.

GAGE.—Vertical staff, read once daily.

DISCHARGE MEASUREMENTS.—Made by a 1-foot sharp-crested weir with end contractions.

CHANNEL AND CONTROL.—Water emerges from the ground directly into pool back of weir.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 0.33 foot April 7-8 and May 4-5, 1914 (discharge, 0.38 million gallons per day, or 0.59 second-foot); minimum stage recorded, 0.29 foot frequently (discharge, 0.32 million gallons per day, or 0.50 second-foot).

DIVERSIONS.—None.

REGULATION.—None.

UTILIZATION.—Irrigation of sugar cane by Waimanalo Sugar Co.

ACCURACY.—Estimates good, flow steady, and conditions at weir good.

Monthly discharge of Makawao Spring near Kailua, Oahu, for the years ending June 30, 1914 and 1915.

Month	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
February 12-28.....	0.32	0.32	0.32	0.50	5	17
March.....	.33	.32	.32	.50	10	30
April.....	.38	.33	.35	.54	10	32
May.....	.38	.33	.36	.56	11	34
June.....	.36	.33	.35	.54	10	32
The period.....					46	145
1914-15.						
July.....	.33	.33	.33	.51	10	31
August.....	.33	.32	.33	.51	10	31
September.....	.33	.32	.32	.50	10	29
October.....	.33	.33	.33	.51	10	31
November.....	.33	.33	.33	.51	10	30
December.....	.33	.33	.33	.51	10	31
January.....	.33	.33	.33	.51	10	31
February.....	.33	.32	.33	.51	9	28
March.....	.32	.32	.32	.50	10	30
April.....	.33	.32	.32	.50	10	29
May.....	.33	.33	.33	.51	10	31
June.....	.33	.32	.33	.51	10	30
The year.....	.33	.32	.33	.51	119	362

NOTE.—Discharge computed by Francis formula.

KAIMI STREAM NEAR KAILUA, OAHU.

LOCATION.—At highway bridge on Waimanalo-Honolulu government road, 1 mile south of Kailua, about 12½ miles east of Honolulu.

RECORDS AVAILABLE.—November 12, 1912, to June 30, 1915.

GAGE.—Vertical staff on right bank; read twice daily. Datum raised 1.00 foot April 10, 1913.

DISCHARGE MEASUREMENTS.—Made by wading or from highway bridge at gage.

CHANNEL AND CONTROL.—One channel at all stages; confined between abutments of bridge at gage. Control composed of small boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during biennial period, 4.25 feet at 8 a. m. April 27, 1915 (discharge, approximately 220 million gallons per day, or 340 second-feet); minimum stage recorded, 0.74 foot March 14, 1914 (discharge, 0.8 million gallons per day, or 1.2 second-feet).

DIVERSIONS.—Headwaters diverted by Makawao ditch.

REGULATION.—None.

UTILIZATION.—Water diverted by Makawao ditch used for irrigation of sugar cane; that flowing past station is later diverted for irrigation of rice fields.

ACCURACY.—Records good. Rating curves well defined for ordinary stages; gage-height record reliable.

Discharge measurements of Kaimi Stream near Kailua, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1913—Sept. 9	J. C. Dort.....	0.82	1.7	1.1
1914—Apr. 25	H. A. R. Austin.....	.96	3.3	2.1
Sept. 17	.....do.....	.94	2.6	1.7
Oct. 8	.....do.....	1.21	6.4	4.1
Nov. 12	.....do.....	1.00	3.3	2.1
Dec. 4	.....do.....	1.26	8.0	5.1
1915—Mar. 11	.....do.....	.88	2.4	1.6
June 30	.....do.....	.94	2.2	1.4

¹ Described in Water-Supply Paper 373, p. 91, as, "in Kailua Valley, near Kailua."

Discharge, in million gallons per day, of Kaimi Stream near Kailua, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	1.3	1.0	2.0	1.0	1.0	1.6	2.3	3.1	1.0	2.3	2.3	4.2
2.....	1.6	1.0	2.3	1.0	1.0	1.6	2.3	3.1	1.0	2.3	2.7	3.1
3.....	1.0	1.0	1.3	1.0	1.0	1.6	2.3	2.7	1.0	2.3	3.2	3.1
4.....	1.3	1.0	1.0	1.0	1.0	18	2.3	2.7	1.0	2.7	12	2.7
5.....	1.3	1.0	1.0	1.0	1.0	20	2.3	2.3	1.0	90	3.6	2.3
6.....	1.0	1.0	1.0	1.0	1.0	9.0	2.3	2.3	1.0	35	2.7	2.3
7.....	1.0	1.0	1.0	1.0	1.0	22	2.3	2.3	1.0	6.2	16	2.3
8.....	1.0	1.0	1.0	1.0	1.6	7.0	3.1	2.3	1.0	4.8	5.4	2.3
9.....	1.0	1.0	1.0	1.0	1.6	4.2	2.3	2.3	1.0	4.2	4.8	2.3
10.....	1.0	1.0	1.0	1.0	1.0	3.1	2.3	2.0	1.0	4.2	4.2	2.3
11.....	1.0	1.0	1.0	1.0	1.0	2.7	2.3	2.0	1.0	4.2	4.2	2.0
12.....	1.0	1.6	1.0	1.0	1.0	2.3	2.3	1.0	.8	4.2	3.1	2.0
13.....	1.0	1.3	1.0	1.0	1.0	2.3	2.3	1.0	.8	3.6	2.7	2.0
14.....	1.0	1.0	1.0	1.0	1.0	2.0	2.3	1.0	.8	3.1	2.3	2.0
15.....	1.0	1.0	1.0	1.0	1.0	2.0	2.3	1.0	.8	3.1	2.3	2.0
16.....	1.0	1.0	1.0	1.0	1.0	2.0	2.0	1.3	1.0	2.7	2.3	2.0
17.....	1.0	1.3	1.0	1.0	1.0	2.3	4.2	1.0	1.0	2.7	2.0	2.0
18.....	1.0	1.3	1.0	1.0	1.0	2.7	2.7	1.0	1.0	2.3	2.0	2.0
19.....	1.0	1.0	1.0	1.0	1.3	2.7	3.1	1.0	1.0	2.3	2.0	2.0
20.....	1.0	1.0	1.0	1.0	2.0	2.7	3.1	1.0	.8	2.7	2.0	2.3
21.....	1.0	1.0	1.0	1.0	2.0	2.7	2.7	1.0	.8	2.3	2.0	2.3
22.....	1.0	.8	1.0	1.0	2.0	2.7	3.1	1.0	.8	2.3	2.0	2.0
23.....	1.0	1.0	1.3	1.0	1.6	2.3	2.7	1.0	.8	2.3	2.0	2.0
24.....	1.0	1.0	1.0	1.0	1.3	2.3	2.3	.8	.8	2.0	2.0	2.0
25.....	1.0	1.0	1.3	1.0	1.6	2.3	2.3	1.0	1.0	2.0	2.0	2.0
26.....	1.0	1.0	1.0	1.0	4.8	2.3	2.3	.8	2.3	2.3	2.0	2.0
27.....	.8	1.0	1.0	1.0	1.6	2.3	2.3	.8	3.1	2.3	1.6	1.6
28.....	1.0	1.0	.8	1.0	1.6	2.3	2.3	1.0	3.6	2.0	2.0	1.6
29.....	1.0	1.0	.8	1.0	1.3	2.3	2.3		6.2	3.1	3.1	1.6
30.....	1.0	1.0	.8	1.0	1.6	2.3	2.0		4.2	2.3	5.4	1.6
31.....	1.0	1.0		1.0		2.3	2.0		2.3		4.2	
1914-15.												
1.....	2.0	2.0	2.0	5.4	3.1	4.2	4.2	3.1	1.6	1.6	6.8	1.2
2.....	2.0	1.6	2.3	4.8	2.3	4.2	4.2	3.1	1.6	1.6	8.8	1.5
3.....	2.0	1.6	2.0	4.8	2.3	4.2	4.2	3.1	1.6	1.6	5.2	1.5
4.....	2.0	2.0	1.6	4.8	2.3	6.2	4.2	3.1	1.6	1.6	4.0	1.5
5.....	1.6	1.6	1.6	4.8	2.3	4.2	4.2	3.1	1.6	1.6	4.0	1.2
6.....	1.6	1.6	1.6	4.2	2.3	4.8	4.2	3.1	1.6	1.6	4.0	1.2
7.....	1.6	1.6	1.6	4.2	2.7	4.2	4.2	3.1	1.6	1.3	4.0	1.2
8.....	1.6	1.3	2.0	4.2	2.3	4.2	3.6	3.1	1.6	1.6	3.5	1.2
9.....	1.6	1.3	2.0	4.2	2.3	4.2	4.2	3.1	1.6	1.6	3.5	1.2
10.....	1.6	1.3	1.6	4.2	2.3	4.2	4.2	3.1	1.6	2.0	4.0	1.2
11.....	1.6	3.1	2.0	3.6	2.3	4.2	4.2	3.1	1.6	2.3	3.0	1.0
12.....	1.6	2.3	2.0	3.1	3.1	4.2	4.2	3.1	1.6	1.6	2.6	1.0
13.....	1.6	2.0	2.3	3.1	4.8	4.2	4.2	2.7	2.0	1.6	2.2	1.0
14.....	1.6	2.0	2.3	3.1	5.4	4.2	3.6	2.7	1.6	1.6	2.2	1.0
15.....	1.6	1.6	2.0	2.7	6.2	3.6	3.6	2.7	1.6	2.0	1.8	1.0
16.....	1.3	1.6	2.0	2.7	4.8	3.6	3.6	2.3	1.6	3.6	1.8	1.0
17.....	3.6	2.0	1.6	2.7	4.2	4.2	3.6	2.0	1.6	4.2	1.8	1.2
18.....	2.7	2.0	1.6	2.7	4.2	4.2	3.6	2.0	1.6	7.0	1.8	1.2
19.....	1.6	2.0	1.6	2.7	4.2	5.4	3.1	2.0	1.6	8.0	1.5	1.2
20.....	1.6	1.6	1.6	2.7	4.2	4.2	3.1	2.0	1.6	7.0	1.5	1.2
21.....	1.6	2.0	16	2.7	4.2	4.2	3.1	1.6	1.6	7.0	1.5	1.2
22.....	1.6	2.0	5.2	2.3	4.2	4.2	3.1	1.6	1.6	6.2	1.5	1.2
23.....	2.0	2.0	22	2.3	4.2	4.2	3.1	1.6	1.3	5.4	1.5	1.2
24.....	1.6	2.0	46	2.3	4.2	4.2	3.1	1.6	1.3	5.4	1.5	1.2
25.....	1.6	1.6	9.0	2.3	4.2	4.2	3.1	1.6	1.3	5.4	1.5	1.2
26.....	1.6	1.6	7.0	2.3	4.2	4.2	3.1	1.6	1.6	8.0	1.5	1.2
27.....	1.6	1.6	7.0	2.3	4.2	4.2	3.1	1.6	1.6	156	1.5	1.5
28.....	1.6	1.6	6.2	4.2	4.2	3.6	3.1	1.6	1.3	68	1.5	1.2
29.....	4.2	1.6	5.4	4.2	4.2	3.6	2.7		1.3	3.5	1.5	1.2
30.....	2.7	1.6	5.4	3.6	4.2	3.6	2.7		1.6	7.6	1.5	1.2
31.....	2.3	1.6		3.1		3.6	3.1		1.3		1.5	

NOTE.—Discharge determined from rating curves applicable as follows: July 1, 1913, to Apr. 27, 1915, well defined below 8 million gallons per day (12 second-feet); Apr. 28 to June 30, 1915, well defined below 20 million gallons per day (31 second-feet).

Monthly discharge of Kaimi Stream near Kailua, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.			Total run-off.		
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	1.6	0.8	1.04	1.61	32	99
August.....	1.6	.8	1.04	1.61	32	99
September.....	2.3	.8	1.09	1.69	33	100
October.....	1.0	1.0	1.00	1.55	31	95
November.....	4.8	1.0	1.90	2.94	57	175
December.....	22	1.6	4.45	6.89	138	423
January.....	4.2	2.0	2.47	3.82	77	235
February.....	3.1	.8	1.56	2.41	44	134
March.....	6.2	.8	1.45	2.24	45	138
April.....	90	2.0	6.93	10.7	208	638
May.....	32	1.6	4.48	6.93	139	426
June.....	3.1	1.6	2.20	3.40	66	203
The year.....	90	.8	2.47	3.82	902	2,760
1914-15.						
July.....	3.6	1.3	1.90	2.94	59	181
August.....	3.1	1.3	1.80	2.78	56	171
September.....	52	1.6	7.11	11.0	213	655
October.....	5.4	2.3	3.43	5.31	106	326
November.....	6.2	2.3	3.65	5.65	110	336
December.....	6.2	3.6	4.21	6.51	130	401
January.....	4.2	2.7	3.60	5.57	112	342
February.....	3.1	1.6	2.44	3.78	68	210
March.....	2.0	1.3	1.55	2.40	48	147
April.....	156	1.3	10.9	18.9	328	1,000
May.....	8.8	1.5	2.73	4.22	84	260
June.....	1.5	1.0	1.20	1.86	36	110
The year.....	156	1.0	3.70	5.72	1,350	4,140

MAIN SPRING NEAR KAILUA, OAHU.

LOCATION.—At the head of Makawao ditch, 1 mile south of Maunawili ranch, and about 3 miles south of Kailua.

RECORDS AVAILABLE.—February 12, 1914, to June 30, 1915.

GAGE.—Vertical staff; read once daily.

DISCHARGE MEASUREMENTS.—Made by a 1-foot sharp-crested weir with end contractions.

CHANNEL AND CONTROL.—Water emerges from ground directly into pool back of weir.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 0.53 foot April 28, to May 21, 1915 (discharge, 0.74 million gallons per day, or 1.1 second-foot); minimum stage recorded, 0.39 foot March 17-28, 1914 (discharge, 0.48 million gallons per day, or 0.74 second-foot).

DIVERSIONS.—None.

REGULATION.—None.

UTILIZATION.—Irrigation of sugar cane by Waimanalo Sugar Co.

ACCURACY.—Estimates fair. There is a small amount of seepage around the weir and a velocity of approach of about 0.4 foot per second.

Monthly discharge of Main Spring near Kailua, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1915.						
February 12-28.....	0.52	0.50	0.50	0.77	9	26
March.....	.50	.48	.49	.76	15	47
April.....	.58	.50	.57	.88	17	52
May.....	.58	.58	.58	.90	18	55
June.....	.61	.58	.59	.91	18	54
The period.....	.61	.48	.55	.85	77	234
1914-15.						
July.....	.59	.59	.59	.91	18	56
August.....	.59	.59	.59	.91	18	56
September.....	.70	.59	.61	.94	18	56
October.....	.68	.68	.68	1.05	21	65
November.....	.68	.68	.68	1.05	20	63
December.....	.68	.68	.68	1.05	21	65
January.....	.68	.68	.68	1.05	21	65
February.....	.68	.63	.66	1.02	19	57
March.....	.63	.61	.62	.96	19	59
April.....	.74	.59	.64	.96	19	59
May.....	.74	.72	.73	1.13	23	69
June.....	.72	.66	.69	1.07	21	64
The year.....	.74	.59	.66	1.02	238	734

NOTE.—Discharge computed by Francis formula with correction for velocity of approach.

KAMAKALEPO STREAM NEAR KAILUA,¹ OAHU.

LOCATION.—At highway bridge on Waimanalo-Honolulu Government road, 1 mile south of Kailua, and about 3½ miles from Waimanalo.

RECORDS AVAILABLE.—November 12 to December 3, 1912; April 9, 1913, to June 30, 1915.

GAGE.—Vertical staff bolted to left abutment of bridge; installed April 10, 1913, to replace original gage washed out December 3, 1912; new datum; read twice daily.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge 30 feet below gage.

CHANNEL AND CONTROL.—One at all stages; confined between bridge abutments at gage. Control composed of small boulders and gravel; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 3.95 feet at 8 a. m., September 24, 1914 (discharge, 220 million gallons per day, or 340 second-feet); minimum stage recorded, 1.15 feet November 5 and 6, 1913 (discharge, 0.3 million gallons per day, or 0.45 second-foot).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Joins Kailua Stream; low flow is diverted for irrigation of rice fields.

ACCURACY.—Although several shifts in control occurred, enough measurements were made to insure fairly good results for all low and minimum stages; rating curve is especially good for period September 25, 1914, to June 30, 1915.

¹ Described in Water-Supply Paper 373, p. 93, as "in Kailua Valley, near Kailua."

Discharge measurements of Kamakalepo Stream near Kailua, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—Sept. 9	J. C. Dort.....	1.30	1.7	1.1
Dec. 10	G. R. White.....	1.60	7.4	4.8
1914—Apr. 25	H. A. R. Austin.....	1.23	3.0	1.9
Sept. 17	.....do.....	1.30	3.8	2.4
Oct. 8	.....do.....	1.39	4.0	2.6
Nov. 12	.....do.....	1.32	2.3	1.5
Dec. 4	.....do.....	1.41	4.8	3.1
1915—Mar. 11	.....do.....	1.19	1.5	1.0
June 30	.....do.....	1.24	1.6	1.0

Discharge, in million gallons per day, of Kamakalepo Stream near Kailua, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	1.6	1.4	1.7	0.6	0.3	2.4	1.0	1.0	0.7	2.6	2.1	4.0
2.....	2.5	1.3	4.1	.5	.4	2.0	1.0	1.9	.7	1.9	2.1	4.0
3.....	1.6	1.2	1.4	.45	.3	2.8	1.0	1.4	.7	1.9	3.4	3.3
4.....	1.2	1.2	1.0	.45	.3	7.8	1.0	1.4	.45	1.9	9.1	3.3
5.....	1.1	1.2	1.0	.45	.3	8.4	1.0	1.0	.7	2.9	3.3	2.6
6.....	1.1	1.0	1.0	.45	.3	12	1.0	1.0	.7	2.3	2.1	2.6
7.....	1.0	1.2	.9	.5	.3	17	.7	1.0	.7	6.7	2.3	2.6
8.....	1.0	1.0	1.0	.45	.9	8.4	1.9	1.0	.7	5.6	1.4	2.6
9.....	1.2	.9	.95	.45	.7	5.0	1.0	1.0	.7	4.8	10	2.6
10.....	1.0	.95	.95	.5	.4	3.5	1.0	1.0	.7	4.0	4.8	2.6
11.....	.95	1.0	.9	.6	.45	2.1	1.0	1.0	.7	4.0	3.3	2.6
12.....	1.0	1.6	.9	.45	.45	1.8	1.0	1.0	.45	3.3	3.3	2.1
13.....	1.0	1.2	.9	.45	.45	1.6	1.0	1.0	.45	3.3	3.3	2.1
14.....	1.2	.85	1.0	.4	.45	1.2	1.0	.7	.45	2.6	2.6	2.1
15.....	1.4	.9	1.0	.4	.5	.85	1.0	.7	.45	2.6	2.6	2.1
16.....	1.1	1.0	.9	.4	.6	.8	1.0	1.4	1.0	2.6	2.6	2.1
17.....	1.1	1.4	.85	.4	.6	1.4	3.2	1.0	1.0	2.6	2.6	2.1
18.....	1.2	1.6	.8	.4	.8	1.9	1.4	1.0	.7	2.6	2.6	2.1
19.....	1.4	1.0	1.0	.4	.8	1.7	1.4	1.0	.7	2.6	2.6	2.1
20.....	1.0	1.0	1.0	.4	1.3	1.6	1.4	1.0	.7	2.6	2.1	2.6
21.....	1.0	1.0	.9	.4	.8	1.6	1.0	1.0	.45	2.6	2.1	2.6
22.....	.95	.95	.95	.4	.8	1.4	1.9	1.0	.45	2.6	2.1	2.6
23.....	.9	.95	1.1	.45	.8	1.4	1.4	1.0	.45	2.6	2.1	2.6
24.....	.85	1.0	.85	.5	1.0	1.4	1.0	1.0	.45	2.1	2.1	2.6
25.....	.9	.9	1.0	.6	2.6	1.2	1.0	.7	.7	2.1	2.1	2.6
26.....	.9	1.0	.95	.4	5.8	1.0	1.0	.7	1.4	2.1	2.1	2.6
27.....	.9	1.0	.9	.4	2.9	1.0	1.0	.7	1.0	2.1	2.1	2.1
28.....	.95	.9	.65	.4	2.4	1.0	1.4	.7	2.6	2.1	2.6	2.1
29.....	.95	1.0	.7	.4	1.6	.95	1.0	.....	5.6	3.3	3.3	2.1
30.....	.95	.9	.7	.4	2.1	.95	1.0	.....	4.7	2.6	5.6	2.1
31.....	1.0	.9	.....	.4	.....	1.0	.7	.....	2.6	.....	3.3	.....

Discharge, in million gallons per day, of Kamakalepo Stream near Kailua, Oahu, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	2.6	2.1	2.1	4.0	2.1	1.6	1.6	0.9	0.9	0.9	9.3	1.2
2.....	2.6	2.1	2.6	3.3	1.6	1.6	1.6	.9	.9	.9	6.9	1.2
3.....	2.6	2.1	2.1	3.3	1.6	1.6	.9	.9	.9	.9	4.0	1.6
4.....	2.1	2.1	1.6	3.3	1.6	4.0	1.6	.9	.9	.7	2.6	1.2
5.....	2.1	2.1	1.6	2.6	1.6	2.1	1.6	.9	.9	.7	4.0	1.2
6.....	1.6	2.1	1.6	2.6	1.6	2.6	1.6	.9	.9	.9	4.0	1.2
7.....	1.6	2.1	1.6	2.6	2.1	2.6	1.6	.9	.9	.9	3.3	.9
8.....	2.1	1.6	2.1	2.6	1.6	2.6	1.2	.9	.9	.9	3.3	.9
9.....	2.1	1.6	2.1	2.6	1.6	2.6	1.6	.9	.9	.9	3.3	.9
10.....	2.1	1.6	2.1	2.6	1.6	2.1	1.6	.9	.9	.9	3.3	.9
11.....	1.6	4.0	1.6	2.6	1.6	2.1	1.2	.9	.9	.9	3.3	.9
12.....	1.6	3.3	1.6	2.1	2.1	2.1	1.6	.9	.9	.9	2.6	.9
13.....	1.6	2.6	1.6	2.1	6.9	2.6	1.2	.9	1.2	.9	2.6	.9
14.....	1.6	2.1	2.6	2.1	2.6	2.1	1.2	.9	.9	.9	2.1	.9
15.....	1.6	2.1	2.1	2.1	2.6	2.1	1.2	.9	.9	.9	2.1	.9
16.....	1.6	1.6	2.1	1.6	2.1	1.6	.9	.9	.9	1.2	2.1	.9
17.....	7.8	2.1	2.6	1.6	2.1	2.1	.9	.9	.9	2.1	2.1	.9
18.....	3.3	2.1	2.6	1.6	2.1	2.1	.9	.9	.9	5.8	2.1	.9
19.....	2.1	2.1	2.6	1.6	1.6	2.1	.9	.9	.9	5.8	2.1	.9
20.....	2.1	2.1	2.1	1.6	1.6	2.6	.9	.9	.9	4.0	1.6	.9
21.....	1.6	2.1	18	1.6	1.6	2.1	.9	.9	.9	4.0	1.6	.9
22.....	1.6	2.1	54	1.6	1.6	2.1	.9	.9	.9	3.3	1.6	.9
23.....	2.1	2.1	40	1.6	1.6	2.1	.9	.9	.9	2.6	1.6	.9
24.....	2.1	2.1	121	1.6	1.6	2.1	.9	.9	.7	2.6	1.6	.9
25.....	2.1	1.6	11	1.6	1.6	1.6	.9	.9	.7	2.6	1.6	.9
26.....	1.6	1.6	6.9	1.2	1.6	1.6	.9	.9	.7	4.0	1.6	.9
27.....	1.6	2.1	5.8	1.2	1.6	1.6	.9	.9	.7	66	1.2	1.2
28.....	1.6	1.6	4.9	1.2	1.6	1.6	.9	.9	.7	29	1.2	.9
29.....	4.0	1.6	4.0	1.2	1.6	1.6	.9	-----	.7	16	1.2	.9
30.....	3.3	1.6	4.0	1.2	1.6	1.6	.9	-----	.9	14	1.2	.9
31.....	2.6	2.1	-----	1.2	-----	1.6	.9	-----	.7	-----	1.2	-----

NOTE.—Discharge determined from rating curves applicable as follows: July 1 to Dec. 31, 1913, and Jan. 1 to Apr. 5, 1914, fairly well defined below 6 million gallons per day (9 second-feet): Apr. 6 to Sept. 24, 1914, fairly well defined below 4 million gallons per day (6 second-feet): Sept. 25, 1914, to June 30, 1915, well defined below 40 million gallons per day (62 second-feet).

Monthly discharge of Kamakalepo Stream near Kailua, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	2.5	0.85	1.13	1.75	35	108
August.....	1.6	.85	1.08	1.67	33	103
September.....	4.1	.7	1.06	1.64	32	98
October.....	.6	.4	.45	.70	14	43
November.....	5.8	.3	1.05	1.62	31	97
December.....	17	.8	3.13	4.84	97	298
January.....	3.2	.7	1.17	1.81	36	111
February.....	1.9	.7	1.01	1.56	28	87
March.....	5.6	.45	1.09	1.69	34	104
April.....	29	1.9	4.48	6.93	134	412
May.....	34	2.1	5.21	8.06	162	496
June.....	4.0	2.1	2.54	3.93	76	234
The year.....	34	.3	1.95	3.02	712	2,190
1914-15.						
July.....	7.8	1.6	2.28	3.53	71	217
August.....	4.0	1.6	2.07	3.20	64	197
September.....	121	1.6	10.3	15.9	311	948
October.....	4.0	1.2	2.05	3.17	64	195
November.....	6.9	1.6	1.94	3.00	58	179
December.....	4.0	1.6	2.08	3.22	64	198
January.....	1.6	.9	1.17	1.81	36	111
February.....	.9	.9	.90	1.39	25	77
March.....	1.2	.7	.86	1.33	27	82
April.....	66	.7	5.87	9.07	176	540
May.....	9.3	1.2	2.65	4.10	82	252
June.....	1.6	.9	.98	1.52	30	90
The year.....	121	.7	2.76	4.27	1,010	3,090

POHAKEA STREAM NEAR KAILUA, OAHU.¹

LOCATION.—Half a mile above highway bridge on Honolulu-Waimanalo road, about 1½ miles south of Kailua.

RECORDS AVAILABLE.—November 12, 1912, to March 27, 1914, when station was discontinued.

GAGE.—Vertical staff; read twice daily; new datum November 24, 1913.

DISCHARGE MEASUREMENTS.—Made by wading, with current meter until November 24, 1913; November 25, 1913, to March 27, 1914, by 1-foot sharp-crested weir with end contractions.

CHANNEL AND CONTROL.—One channel at all stages; straight for 20 feet above and below gage; composed of boulders and gravel. Control or staff gage was boulder riffle; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 1.88 feet June 4, 1913 (discharge, 1.3 million gallons per day, or 2.0 second-feet); minimum stage recorded, 0.1 foot (new datum), February and March, 1914 (discharge 0.05 million gallons per day).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Water diverted below station for irrigation of taro.

ACCURACY.—Monthly estimates fair. A fairly good rating curve was developed for period prior to installation of weir. Conditions for measurement by weir good.

Monthly discharge of Pohakea Stream near Kailua, Oahu, for the year ending June 30, 1914.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
July.....	0.2	0.1	0.14	0.22	4	13
August.....	.2	.1	.12	.19	4	11
September.....	.3	.1	.14	.15	4	13
October.....	.1	.1	.10	.22	3	10
November.....	.45	.1	.15	.23	5	14
December.....	.7	.15	.36	.56	11	34
January.....	.35	.1	.20	.31	6	19
February.....	.25	.05	.13	.20	4	11
March 1-27.....	.35	.05	.11	.17	3	9
The period.....					44	134

NOTE.—Discharge determined from a rating curve fairly well defined for period July 1 to Nov. 24, 1913; Francis formula for contracted weir used, beginning Nov. 25, 1913.

KAHANAIKI STREAM NEAR KAILUA, OAHU.

LOCATION.—75 feet below confluence of north and south branches; 100 feet above highway bridge on main road; 1 mile south of Kailua, 4 miles from Waimanalo, and 12 miles from Honolulu.

RECORDS AVAILABLE.—October 13, 1914, to June 30, 1915.

GAGE.—Vertical staff on left bank; read twice daily.

DISCHARGE MEASUREMENTS.—Made by wading or from highway bridge 100 feet below gage.

CHANNEL AND CONTROL.—One channel at all stages. Straight for 50 feet above and below gage. Banks are high and covered with vegetation. Control is composed of small boulders, and is fairly permanent between extreme floods.

¹ Described in Water-Supply Paper 373, p. 94, as, "Pohakea Stream in Kailua Valley, near Kailua, Oahu."

EXTREMES OF DISCHARGE.—Maximum stage recorded: 3.65 feet at 8 a. m April 27, 1915; discharge, 150 million gallons per day, or 230 second-feet. Minimum stage recorded: 0.66 foot at 4 p. m. May 28, 1915; discharge, 0.4 million gallons per day, or 0.6 second-foot.

DIVERSIONS.—Two small ditches divert water above the station—one from the north branch and one from the south branch. The combined flow of these ditches never exceeds 0.4 million gallons per day.

REGULATION.—Amounts diverted above station vary.

UTILIZATION.—Low flow is all diverted for irrigation of rice and taro.

ACCURACY.—Records fairly good for low stages, although the quantity of water involved is too small for best results; high-water curve not well defined.

Discharge measurements of Kahanaiki Stream near Kailua, Oahu, during the year ending June 30, 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Nov. 12	H. A. R. Austin	0.92	1.0	0.65
Dec. 4	do	1.12	3.3	2.5
1915—Mar. 11	do	.80	.8	.5
June 30	do	.76	.9	.6

Discharge, in million gallons per day, of Kahanaiki Stream near Kailua, Oahu, for the year ending June 30, 1915.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1.		1.0	1.0	0.7	0.6	0.5	0.5	8.0	0.4
2.		1.3	1.0	.7	.6	.5	.5	12	.4
3.		1.3	1.0	.7	.6	.5	.5	6.1	.5
4.		1.0	2.2	.7	.6	.5	.5	1.0	.5
5.		1.0	1.0	.7	.6	.5	.5	1.3	.5
6.		1.0	1.3	.7	.6	.5	.5	1.3	.5
7.		1.3	1.3	.7	.6	.5	.5	1.3	.5
8.		1.0	1.3	.7	.6	.5	.5	1.0	.5
9.		1.0	1.3	.7	.6	.6	.5	1.0	.5
10.		1.0	1.3	.7	.6	.5	.5	1.3	.5
11.		1.0	1.0	.7	.6	.5	.5	1.0	.5
12.		1.0	1.3	.7	.6	.5	.5	1.0	.5
13.	0.7	1.3	1.0	.7	.5	.6	.5	.7	.5
14.	.7	1.3	1.0	.7	.5	.5	.5	.7	.5
15.	.7	1.3	1.0	.7	.5	.5	.5	.7	.5
16.	1.0	1.0	.7	.7	.5	.5	.7	.7	.5
17.	1.0	.7	1.0	.7	.5	.5	.7	.7	.5
18.	1.0	.7	1.0	.6	.5	.5	2.2	.7	.5
19.	1.0	.7	2.2	.6	.5	.5	2.2	.7	.5
20.	1.0	.7	1.0	.6	.5	.5	1.0	.7	.5
21.	1.3	.7	1.0	.6	.5	.5	1.0	.7	.5
22.	1.3	.7	.7	.6	.5	.5	.7	.7	.5
23.	1.3	.7	.7	.6	.5	.5	.7	.7	.5
24.	1.3	.7	.7	.6	.5	.5	.7	.7	.5
25.	1.3	.7	.7	.6	.5	.5	1.8	.5	.5
26.	1.0	1.0	.7	.6	.5	.5	3.6	.4	.5
27.	.7	.7	.7	.6	.5	.5	53	.4	.5
28.	.7	.7	.7	.6	.5	.5	34	.4	.5
29.	.7	1.0	.7	.6		.5	5.2	.4	.5
30.	.7	1.0	.7	.6		.5	6.1	.4	.5
31.	.7		.7	.6		.5		.4	

NOTE.—Discharge determined from rating curve fairly well defined below 3 million gallons per day 5 second-feet); above this limit the curve is an extension based on a high-water measurement made Jan. 18, 1916.

Monthly discharge of Kahanaiki Stream near Kailua, Oahu, for the year ending June 30, 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
October 13-31.....	1.3	0.7	0.95	1.47	18	55
November.....	1.3	.7	.95	1.47	28	87
December.....	2.2	.7	1.03	1.59	32	98
January.....	.7	.6	.65	1.01	20	62
February.....	.6	.5	.54	.84	15	46
March.....	.6	.5	.51	.79	16	49
April.....	53	.5	4.04	6.25	121	372
May.....	12	.4	1.54	2.38	48	147
June.....	.5	.4	.49	.76	15	45
The period.....					313	961

SOUTH BRANCH OF KAHANAIKI STREAM NEAR KAILUA,¹ OAHU.

LOCATION.—About 300 feet above junction of two main branches, 600 feet above bridge on government road and about a mile south of Kailua.

RECORDS AVAILABLE.—April 10, 1913, to October 2, 1914.

GAGE.—Vertical staff on left bank; read twice daily.

DISCHARGE MEASUREMENTS.—Made by wading. A 1-foot weir, to be used in conjunction with this station, was installed February 12, 1914, 60 feet below staff gage, but on account of poor conditions weir record was discarded.

CHANNEL AND CONTROL.—One channel at all stages, composed of boulders and gravel; right bank steep and clean; left bank has gentle slope and is covered with vegetation. Control is composed of small boulders; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.91 feet at 8 a. m. September 24, 1914 (discharge, approximately 23 million gallons per day, or 43 second-feet); minimum stage recorded, 0.30 foot October and November, 1913 (discharge, 0.05 million gallons per day).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Irrigation of taro and rice.

ACCURACY.—Estimates poor on account of poorly defined rating curves and unstable discharge relation.

Discharge measurements of South Branch of Kahanaiki Stream near Kailua, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second- feet.	Million gallons. per day.
1913—Sept. 9	G. K. Larrison.....	0.34	0.20	0.13
1914—Sept. 17	H. A. R. Austm.....	.86	.95	.61

¹ Described in Water-Supply Paper 373, p. 96, as "in Kailua Valley, near Kailua."

Monthly discharge of South Branch of Kahanaiki Stream near Kailua, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	0.3	0.1	0.17	0.26	5	16
August.....	.7	.1	.35	.54	11	33
September.....	1.3	.05	.19	.29	7	17
October.....	.05	.05	.05	.08	2	5
November.....	.8	.05	.20	.31	6	18
December.....	2.8	.1	.57	.88	18	54
January.....	1.1	.2	.37	.57	11	35
February.....	.5	.2	.26	.40	7	22
March.....	2.6	.2	.53	.82	16	50
April.....	5.5	.4	1.02	1.58	31	94
May.....	7.2	.4	.90	1.39	28	86
June.....	1.0	.4	.51	.79	15	47
The year.....	7.2	.05	.43	.67	157	477
1914.						
July.....	1.3	.2	.45	.70	14	43
August.....	1.0	.2	.38	.59	12	36
September.....	14	.3	2.03	3.14	61	187
The period.....					87	266

NOTE.—Owing to instability of control and small number of discharge measurements made, estimates are only approximate.

NORTH BRANCH OF KAHANAIKI STREAM NEAR KAILUA,¹ OAHU.

LOCATION.—About 400 feet above junction of two main branches, 700 feet above bridge on Government road, and about a mile south of Kailua.

RECORDS AVAILABLE.—April 11, 1913, to September 23, 1914, when station was discontinued.

GAGE.—Original vertical staff April 11 to November 25, 1913, when a weir was installed 20 feet above staff-gage station; staff gage read twice daily. Original staff was also read in conjunction with weir gage February 6 to September 23, 1914.

DISCHARGE MEASUREMENTS.—Made by wading with current meter prior to installation of 1-foot sharp-crested weir with end contractions. Weir was in use as follows: November 26, 1913, to February 5, 1914, February 13 to March 26, and April 30 to September 23, 1914.

CHANNEL AND CONTROL.—One at all stages; clean and rough; straight for 25 feet above and below station; right bank vertical and clean; left bank has gentle slope and is covered with brush and grass. Control for staff-gage station was a boulder riffle; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.20 feet at 5 p. m. September 21, 1914 (discharge, approximately 18 million gallons per day, or 28 second-feet); minimum discharge recorded, 0.05 million gallons per day, frequently.

DIVERSIONS.—Ditch diverts about 0.2 million gallons per day at point 400 feet above station.

REGULATION.—Amount diverted above varies.

UTILIZATION.—Low-water flow diverted for irrigation of rice and taro.

ACCURACY.—Monthly estimates fair. The old staff-gage rating curve was used for periods when weir record was missing and for flood estimates when weir was drowned out.

¹ Described in Water-Supply Paper 373, p. 96, as "in Kailua Valley, near Kailua."

Monthly discharge of North Branch of Kahanaiki Stream near Kailua, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-foot.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	0.2	0.05	0.10	0.15	3	10
August.....	.1	.05	.05	.08	2	5
September.....	1.0	.05	.28	.43	8	26
October.....	.1	.05	.05	.08	2	5
November.....	.5	.05	.16	.25	5	15
December.....	1.4	.3	.68	1.05	21	65
January.....	7.0	.3	1.24	1.92	38	118
February.....	7.0	.3	1.13	1.75	32	97
March.....	4.1	.3	.87	1.35	27	83
April.....	11	.6	1.90	2.94	57	175
May.....	10	.3	1.06	1.64	33	101
June.....	.7	.3	.38	.59	11	35
The year.....	11	.05	.65	1.01	239	735
1914.						
July.....	1.9	.05	.26	.40	8	25
August.....	.3	.05	.19	.29	6	18
September 1-23.....	15	.05	1.66	2.57	38	117

NOTE.—Owing to shifting channel and small number of discharge measurements made, estimates for 1913-14 are only approximate.

KANEOHE STREAM NEAR KANEOHE, OAHU.

LOCATION.—100 feet below confluence of two main branches of stream near Heeia Agricultural Co.'s mill, about $3\frac{1}{2}$ miles south of Kaneohe.

RECORDS AVAILABLE.—January 15, 1914, to June 30, 1915.

GAGE.—Vertical staff on right bank; read once daily. Datum raised 1.0 foot March 11, 1915. Records published to new datum.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel straight for 25 feet above and below gage; stream bed is composed of firm earth and gravel; banks low and overflow at a gage height about 3.0 feet. Control is a riffle of gravel and small boulders; shifts during floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 3.80 feet (new datum) at 7.30 a. m. May 30, 1914 (discharge, approximately 145 million gallons per day, or 224 second-feet); minimum stage recorded, 0.56 foot (new datum) at 6.40 a. m. March 16, 1914 (discharge, 2.2 million gallons per day, or 3.4 second-feet).

DIVERSIONS.—None above station; several diversions below station, the first one being about 150 feet below gage.

REGULATION.—None.

UTILIZATION.—Low-water flow diverted for irrigation of rice fields.

ACCURACY.—As only one daily reading of gage was obtained at this station, estimates for high or fluctuating stages are only approximate; estimates of low-water flow, which is quite steady, are fair for September 26, 1914, to June 30, 1915, a fairly good low-water rating having been developed for that period. All estimates for periods prior to September 26, 1914, are approximate only, owing to lack of discharge measurements and instability of control.

Discharge measurements of Kaneohe Stream near Kaneohe, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Jan. 15	G. B. White.....	0.60	4.1	2.7
Feb. 1	.....do.....	.61	3.6	2.3
Sept. 15	H. A. R. Austin.....	.78	6.2	4.0
16	.....do.....	.68	5.6	3.7
Nov. 27	.....do.....	.77	5.0	3.2
1915—Mar. 11	.....do.....	.70	4.3	2.8

Discharge, in million gallons per day, of Kaneohe Stream near Kaneohe, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	Date.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914.							1914.						
1.....		2.5	2.5	2.9	2.9	6.1	16.....	2.5	2.5	2.2	3.3	3.3	3.8
2.....		2.9	2.5	2.9	2.9	3.8	17.....	2.5	2.5	2.5	3.3	3.3	3.8
3.....		2.9	2.5	2.9	3.4	3.8	18.....	2.5	2.5	2.2	3.3	3.8	3.8
4.....		2.9	2.5	2.9	3.8	3.8	19.....	2.5	2.5	2.2	3.3	3.3	5.4
5.....		2.9	2.5	5.4	3.3	3.8	20.....	2.9	2.5	2.2	3.3	3.8	5.4
6.....		2.9	2.5	18	3.3	3.8	21.....	2.9	2.5	2.2	3.3	3.8	4.6
7.....		2.9	2.5	5.4	4.8	3.8	22.....	2.9	2.5	2.2	3.3	3.3	3.8
8.....		2.9	2.5	4.8	3.3	3.8	23.....	2.9	2.5	2.2	3.3	3.3	3.8
9.....		2.9	2.5	4.2	3.3	3.8	24.....	2.9	2.5	2.2	3.3	3.8	6.8
10.....		2.9	2.5	4.2	3.3	3.8	25.....	2.9	2.5	2.2	3.3	3.3	3.8
11.....		2.9	2.5	3.8	3.3	3.8	26.....	2.5	2.5	2.9	4.2	3.3	3.8
12.....		2.9	2.5	3.8	3.3	3.8	27.....	2.5	2.5	2.9	3.3	3.8	3.8
13.....		2.9	2.5	3.8	3.3	3.8	28.....	2.5	2.5	2.5	2.9	4.8	3.8
14.....		2.9	2.5	3.8	3.3	3.8	29.....	2.5	.....	6.1	2.9	3.8	3.8
15.....	2.5	2.9	2.5	3.3	3.3	3.8	30.....	2.5	.....	3.3	2.9	145	3.8
							31.....	2.5	.....	2.9	.....	3.8	.....

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	3.8	3.8	3.8	3.8	2.9	2.9	2.5	2.5	2.5	2.5	4.3	3.8
2.....	3.8	3.8	3.8	4.3	3.8	2.9	2.5	2.5	2.5	2.5	4.9	3.8
3.....	3.8	3.8	3.8	3.8	3.3	2.9	2.5	2.5	2.5	2.5	4.9	3.8
4.....	3.8	3.8	3.3	3.8	2.9	11	2.9	2.5	2.5	2.5	4.3	3.8
5.....	3.8	3.8	3.3	3.8	3.3	3.3	2.9	2.5	2.5	2.5	4.3	3.8
6.....	3.8	3.8	3.3	3.8	3.3	3.3	2.5	2.5	2.5	2.5	4.3	3.8
7.....	3.8	3.8	3.8	3.3	2.9	3.3	2.5	2.5	2.5	2.5	4.3	3.8
8.....	3.8	3.8	3.8	3.3	2.9	2.9	2.5	2.5	2.5	2.5	4.3	3.8
9.....	3.8	3.8	3.8	3.3	3.3	2.9	2.5	2.5	2.5	2.5	3.8	3.8
10.....	3.8	3.8	3.8	3.3	2.9	2.9	2.5	2.5	2.5	2.9	3.8	3.8
11.....	3.8	4.8	3.8	3.3	2.9	2.9	2.5	2.5	2.5	2.5	3.8	3.8
12.....	3.8	3.8	3.8	3.3	2.9	2.9	2.5	2.5	2.5	2.5	3.8	3.8
13.....	3.8	3.3	3.8	3.3	3.1	2.9	2.9	2.5	2.5	2.5	3.8	3.8
14.....	3.8	3.3	6.1	3.3	3.3	2.9	2.5	2.5	2.5	2.5	3.8	3.8
15.....	3.8	3.3	4.2	3.3	3.3	2.9	2.5	2.5	2.5	2.5	3.8	4.3
16.....	3.8	3.8	3.3	3.3	3.3	2.9	2.5	2.5	2.5	2.9	3.8	4.3
17.....	3.8	3.8	2.9	3.3	3.3	2.9	2.5	2.5	2.5	2.9	3.8	4.3
18.....	3.8	3.3	2.9	3.3	3.3	2.9	2.5	2.5	2.5	3.3	3.8	4.3
19.....	3.8	3.3	2.9	3.3	3.3	2.9	2.5	2.5	2.5	7.9	3.8	4.3
20.....	3.8	3.3	3.3	3.3	3.3	3.3	2.5	2.5	2.5	3.3	3.8	4.3
21.....	3.8	3.8	2.9	3.3	3.3	2.9	2.5	2.5	2.5	3.3	3.8	4.3
22.....	3.8	4.2	.....	3.3	3.3	2.9	2.5	2.5	2.5	3.3	3.8	4.3
23.....	4.2	3.8	.....	3.3	3.3	2.9	2.5	2.5	2.5	3.3	3.8	4.3
24.....	3.8	3.8	.....	3.3	3.3	2.9	2.5	3.3	2.5	2.9	3.8	4.3
25.....	3.8	3.3	.....	3.3	2.9	2.9	2.5	2.5	2.5	3.3	3.8	4.3
26.....	3.8	3.3	12	3.3	2.9	2.9	2.5	2.5	2.5	3.3	3.8	4.3
27.....	3.8	3.8	4.3	2.9	2.9	2.9	2.5	2.5	2.5	4.1	3.8	4.3
28.....	3.8	3.3	4.3	3.3	2.9	2.9	2.5	2.5	2.5	4.9	3.8	4.3
29.....	6.1	3.4	3.8	2.9	2.9	2.9	2.5	.....	2.5	4.3	3.8	4.3
30.....	3.8	3.6	3.8	2.9	2.9	2.5	2.5	.....	2.5	5.5	3.8	4.3
31.....	3.8	3.8	.....	2.9	.....	2.5	2.5	.....	2.5	.....	3.8	.....

NOTE.—Discharge determined from rating curves applicable as follows: Jan. 15 to Sept. 21, 1914, poorly defined; Sept. 26, 1914, to June 30, 1915, fairly well defined. High-water measurements made since June 30, 1915, used to develop rating curves above 6 million gallons per day (9 second-feet). No gage-height record obtained for high-water period Sept. 22-25, 1914. Discharge interpolated for other short periods for which gage records were lacking.

Monthly discharge of Kaneohe Stream near Kaneohe, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
January 15-31.....	2.9	2.5	2.64	4.08	45	138
February.....	2.9	2.5	2.70	4.18	76	232
March.....	6.1	2.2	2.58	3.99	80	245
April.....	18	2.9	4.03	6.23	121	371
May.....	145	2.9	9.05	14.0	280	861
June.....	6.8	3.8	4.11	6.36	123	378
The period.....					725	2,220
1914-15.						
July.....	6.1	3.8	3.89	6.02	120	370
August.....	4.8	3.3	3.68	5.69	114	350
September 1-21, 26-30.....	12	2.9	4.02	6.22	105	321
October.....	4.3	2.9	3.36	5.20	104	320
November.....	5.8	2.9	3.30	5.11	99	304
December.....	11	2.5	3.19	4.94	99	303
January.....	2.9	2.5	2.54	3.93	79	242
February.....	3.3	2.5	2.53	3.91	71	217
March.....	2.5	2.5	2.50	3.87	78	238
April.....	7.9	2.5	3.21	4.97	96	296
May.....	4.9	3.8	3.97	6.14	123	378
June.....	4.3	3.8	4.07	6.30	122	375
The period.....					1,210	3,710

YOUNG MAU DITCH NEAR KANEOHE, OAHU.

LOCATION.—100 yards below intake. Ditch diverts from Kaneohe Stream half a mile from main road, 1 mile southeast of Kaneohe, and 10 miles from Honolulu.

RECORDS AVAILABLE.—January 15, 1914, to June 30, 1915.

GAGE.—Vertical staff on left bank read once daily. Datum lowered 2.0 feet March 10, 1915; records published to new datum.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Earth channel with steep banks; straight for 50 feet above and below gage. Control is a 2 by 12 inch plank set on edge across the channel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 3.83 feet (new datum) July 25, 26, and 28, 1914 (discharge, 7.8 million gallons per day, or 12 second-feet); ditch occasionally dry.

DIVERSIONS.—None above station.

REGULATION.—None. No head gates.

UTILIZATION.—Irrigation of rice fields.

ACCURACY.—Rating curve fairly good; estimates fair January 15-18 and February 1, 1914, and February 25, 1914, to June 30, 1915. Estimates January 19-31 and February 2-25, 1914 interpolated on account of unreliable gage record; approximate only.

Discharge measurements of Young Mau ditch near Kaneohe, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
914—Jan. 16	G. R. White.....	3.84	3.5	2.2
Feb. 1	.....do.....	3.60	5.1	3.3
Sept. 17	H. A. R. Austin.....	3.51	4.0	2.6
Nov. 27	.....do.....	3.45	2.4	1.6
1915—Mar. 10	.....do.....	3.52	3.7	2.4

Discharge, in million gallons per day, of Young Mau ditch near Kaneohe, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	Date.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914.							1914.						
1.....		3.3	2.7	2.1	2.1	3.3	16.....	2.2	3.7	2.7	2.1	4.0	4.0
2.....		3.3	2.7	2.7	2.1	2.1	17.....	2.2	3.7	3.3	2.1	4.0	4.0
3.....		3.4	2.7	2.1	3.3	1.5	18.....	2.2	3.8	2.1	2.1	4.0	4.8
4.....		3.4	2.7	1.5	3.3	1.5	19.....	2.3	3.8	2.1	2.1	4.0	4.8
5.....		3.4	2.7	2.1	3.3	1.5	20.....	2.4	3.8	2.7	2.1	4.0	5.8
6.....		3.4	2.7	.....	3.3	1.5	21.....	2.4	3.9	2.7	2.1	4.8	4.9
7.....		3.5	2.7	.7	4.8	4.8	22.....	2.5	3.9	2.1	2.1	3.3	4.8
8.....		3.5	2.7	.4	3.3	5.8	23.....	2.6	3.9	2.1	2.1	3.3	4.0
9.....		3.5	2.7	2.1	1.1	5.8	24.....	2.7	3.9	2.1	1.5	3.3	4.8
10.....		3.6	2.7	2.1	2.1	4.0	25.....	2.8	4.0	2.1	1.5	3.3	4.0
11.....		3.6	2.7	2.1	4.0	4.8	26.....	2.8	4.0	3.3	3.3	3.3	2.7
12.....		3.6	2.7	2.1	4.0	4.8	27.....	2.9	3.3	1.5	.7	3.3	2.7
13.....		3.6	2.7	2.1	4.0	4.8	28.....	3.0	2.7	1.1	.4	3.3	2.7
14.....		3.7	2.7	2.1	4.0	4.0	29.....	3.1	.....	1.5	1.5	3.3	2.7
15.....	2.2	3.7	2.7	2.1	4.0	4.0	30.....	3.2	.....	.4	2.1	2.7	2.7
							31.....	3.2	.....	2.8	.....	2.1	.....

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	2.7	4.8	3.3	0.7	1.5	1.5	2.1	2.1	2.1	2.1	2.1	2.1
2.....	2.7	4.8	3.3	.7	1.5	1.5	2.1	2.4	2.1	2.1	2.7	2.1
3.....	2.1	4.8	3.3	.7	1.1	1.5	2.1	2.7	1.5	2.1	2.1	2.1
4.....	2.1	4.8	3.3	.7	2.1	2.1	2.1	2.7	2.1	2.1	2.1	2.1
5.....	2.1	6.8	3.3	.7	2.1	1.5	2.1	2.7	1.5	2.7	2.1	2.7
6.....	2.1	4.8	3.3	1.5	2.1	2.1	2.1	2.7	1.5	2.7	2.1	2.7
7.....	1.5	4.8	3.3	1.5	.7	1.1	2.1	2.1	2.1	2.7	2.1	2.7
8.....	1.5	4.8	3.3	1.5	.7	1.1	1.5	2.1	2.1	2.7	2.1	2.7
9.....	1.5	4.0	3.3	1.5	.4	1.1	1.5	2.1	1.5	3.3	2.1	2.7
10.....	1.5	4.0	2.7	1.5	1.5	1.1	1.5	2.1	1.5	3.3	2.1	2.7
11.....	1.5	6.8	2.7	1.5	1.5	1.1	1.5	2.1	2.7	3.3	2.1	2.7
12.....	1.5	4.8	2.7	2.1	1.5	1.1	1.5	2.7	2.1	3.3	2.1	3.3
13.....	1.5	4.8	2.7	2.1	1.8	1.1	1.5	2.5	2.1	3.3	1.5	3.3
14.....	1.5	4.8	2.7	2.1	2.1	1.1	1.5	2.3	2.1	3.3	1.5	3.3
15.....	1.5	4.8	1.5	2.1	2.1	.7	1.5	2.1	2.1	2.7	1.5	3.3
16.....	1.5	4.8	1.1	2.1	1.5	.7	1.5	2.1	2.1	3.3	1.5	3.3
17.....	2.7	4.8	2.1	2.1	1.5	.7	1.5	2.1	2.1	4.0	1.5	3.3
18.....	2.1	4.8	2.1	2.1	1.5	.7	1.5	2.1	2.1	4.0	1.5	3.3
19.....	2.1	4.0	2.1	2.1	1.5	.7	1.5	2.1	2.1	4.8	2.1	3.3
20.....	2.1	4.0	2.7	2.1	1.5	.....	1.5	2.1	2.1	4.0	2.1	3.3
21.....	2.1	4.8	2.1	2.1	1.5	2.1	1.5	2.7	2.1	3.3	2.1	3.3
22.....	3.3	5.8	.....	2.1	1.5	2.1	1.5	2.7	2.1	3.3	2.1	3.3
23.....	6.8	4.0	.....	2.1	1.5	2.1	2.7	2.7	2.7	4.0	1.5	3.3
24.....	6.8	4.0	.....	2.1	1.5	2.1	2.7	3.3	2.7	4.0	1.5	3.3
25.....	7.8	4.0	.....	2.1	1.5	2.1	2.7	2.7	2.7	4.0	1.5	3.3
26.....	7.8	4.0	.....	1.5	1.5	2.1	2.1	2.7	2.7	4.8	1.5	4.0
27.....	6.8	4.0	.....	1.5	1.5	2.1	2.1	2.1	2.7	2.4	1.5	4.8
28.....	7.8	4.0	.7	2.1	1.5	2.1	2.1	2.1	2.7	.....	2.1	4.0
29.....	6.8	3.8	.7	1.5	1.5	2.1	2.1	.....	2.1	1.5	2.1	4.0
30.....	4.8	3.5	.7	1.5	1.5	2.1	2.1	.....	2.1	3.3	2.1	4.0
31.....	5.8	3.3	.....	1.5	.....	2.1	2.1	.....	2.1	.....	2.1	.....

NOTE.—Discharge determined from a fairly well defined rating curve applicable Feb. 26, 1914, to June 30, 1915. Discharge Jan. 15-18, and Feb. 1, 1914, estimated from hydrographer's gage readings and measurements made Jan. 16 and Feb. 1, 1914. Gage record prior to Feb. 26, 1914, discarded, as unreliable. Gage datum was lowered 2.00 feet Mar. 10, 1915.

Monthly discharge of Young Mau ditch near Kaneohe, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.			Total run-off.		
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
January 15-31.....			2.63	4.07	45	137
February.....			3.60	5.57	101	309
March.....	3.3	0.4	2.42	3.74	75	230
April 1-5, 7-30.....	3.3	.4	1.87	2.89	54	166
May.....	4.8	1.1	3.38	5.23	105	322
June.....	5.8	1.5	3.79	5.86	114	349
The period (166 days).....	5.8	.4	2.97	4.60	494	1,510
1914-15.						
July.....	7.8	1.5	3.37	5.21	104	321
August.....	6.8	3.3	4.58	7.09	142	436
September 1-21, 28-30.....	3.3	.7	2.46	3.81	59	181
October.....	2.1	.7	1.66	2.57	52	158
November.....	2.1	.4	1.51	2.34	45	139
December 1-19, 21-31.....	2.1	.7	1.52	2.35	46	140
January.....	2.7	1.5	1.87	2.89	58	178
February.....	3.3	2.1	2.29	3.54	64	197
March.....	2.7	1.5	2.14	3.31	66	204
April 1-27, 29-30.....	4.8	1.5	3.19	4.94	92	284
May.....	2.7	1.5	1.91	2.96	59	182
June.....	4.8	2.1	3.14	4.86	94	289
The period (357 days).....	7.8	.4	2.47	3.82	881	2,710

NOTE.—Estimates cover periods in which water was flowing in ditch. See footnote to daily discharge table.

AHLO DITCH NEAR KANEOHE, OAHU.

LOCATION.—50 feet below Honolulu Kaneohe road, 400 feet below intake, and 600 feet south of Kaneohe.

RECORDS AVAILABLE.—January 15, 1914, to June 30, 1915.

GAGE.—Vertical staff on right bank; read once daily. Datum raised 1.0 foot March 10, 1915; records published to new datum.

DISCHARGE MEASUREMENTS.—Made from plank 12 feet below gage.

CHANNEL AND CONTROL.—Earth channel cut on hillside; right bank high and steep; straight for 50 feet above and below gage. No well defined control. Discharge relation affected by growth of grass and weeds in channel and on banks.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 1.32 feet (new datum) at 9.10 a. m. April 26, 1914 (discharge, 14 million gallons per day, or 22 second-feet); ditch occasionally dry.

DIVERSIONS.—None above station. Ditch diverts from Kaneohe Stream.

REGULATION.—Flow regulated by head gates.

UTILIZATION.—Irrigation of rice fields.

ACCURACY.—Estimates are poor on account of unstable conditions caused by growth of grass and weeds which made frequent cleaning of ditch necessary. Rating curves not well defined.

Discharge measurements of Ahlo ditch near Kaneohe, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Jan. 13	G. R. White	0.58	7.3	4.7
31	do	.53	9.0	5.8
Sept. 15	H. A. R. Austin	1.09	10	6.6
16	do	.94	9.6	6.2
Nov. 23	do	.69	12	7.6
1915—Mar. 10	do	.62	8.7	5.6

Discharge, in million gallons per day, of Ahlo ditch near Kaneohe, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	Date.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914.							1914.						
1		6.5	6.0	7.0	6.5	7.0	16	5.1	5.6	6.0	6.5	6.0	6.0
2		7.5	5.6	7.0	6.5	6.0	17	5.1	6.5	7.5	7.0	6.0	6.0
3		7.0	5.6	7.0	11	5.6	18	5.1	6.5	7.0	7.0	6.0	6.0
4		6.5	6.0	6.5	7.0	5.6	19	5.1	6.5	6.0	7.0	6.0	6.5
5		6.5	5.6	7.0	6.0	5.6	20	5.1	6.5	6.0	7.0	6.0	7.0
6		5.6	5.6	7.5	6.5	6.0	21	5.1	6.5	6.5	6.5	6.5	6.5
7		5.6	5.6		8.0	6.0	22	5.1	6.5	6.0	7.0	6.0	6.0
8		5.6	6.0		6.5	5.6	23	5.1	6.5	6.5	6.5	5.6	5.1
9		5.6	5.6		6.5	6.0	24	5.1	6.5	6.0	6.5	6.0	6.5
10		5.6	5.6		6.5	6.6	25	5.1	6.5	7.0	6.5	5.6	6.0
11		5.6	5.6	7.0	6.5	5.6	26	5.2	6.0	8.5	14	5.6	6.0
12		5.6	5.6	7.0	6.5	5.6	27	5.2	4.7	8.0	6.5	5.6	6.0
13		5.6	6.0	7.0	6.5	6.0	28	5.2	7.0	8.0	6.5	7.0	5.6
14		5.6	6.0	7.0	6.0	5.6	29	5.2		8.0	6.5	6.0	5.6
15	5.1	5.6	6.0	6.5	6.0	5.6	30	5.6		7.5	6.5	13	6.0
							31	5.6		7.0		4.3	

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1	6.0	5.6	6.3	6.3	4.9	7.5	7.5	5.6	5.1	5.1	6.5	6.0
2	5.6	5.6	6.3	6.8	8.3	7.5	7.5	5.6	5.1	5.1	2.6	6.0
3	5.6	5.6	6.3	6.3	5.4	7.5	7.5	5.6	5.6	5.1	6.5	6.0
4	5.6	5.6	6.3	6.3	5.4	10	7.5	5.6	5.6	5.1	6.5	6.0
5	5.6	7.0	5.8	5.8	4.4	8.0	7.0	5.6	5.1	5.1	6.5	6.0
6	5.6	5.6	5.8	6.3	4.4	8.0	7.0	5.6	5.1	4.6	6.5	6.0
7	5.6	5.6	6.3	6.3	4.4	8.0	7.0	5.6	5.6	5.1	6.5	6.0
8	5.6	5.6	6.3	6.3	4.0	8.0	7.0	5.6	5.6	5.1	6.5	5.6
9	5.6	5.1	5.8	6.8	4.4	8.0	7.0	5.1	5.6	5.1	6.5	6.0
10	5.6	5.1	5.8	6.3	4.0	8.0	7.5	5.1	5.1	5.1	6.0	6.0
11	5.6	7.0	5.8	6.3	4.0	7.5	7.5	5.1	6.5	5.1	6.0	6.0
12	5.6	5.6	6.3	5.8	4.0	8.0	7.5	5.1	5.6	5.1	6.0	5.6
13	5.6	5.6	6.3	5.8	5.4	8.0	7.0	5.1	5.6	4.6	6.0	6.0
14	5.6	5.6	8.8	5.8	6.8	8.0	7.0	5.1	5.6	4.6	6.0	6.0
15	5.1	5.6	7.8	5.8	6.8	7.5	7.5	5.1	5.1	4.2	6.0	6.0
16	5.6	5.6	6.3	5.8		7.5	7.5	6.0	5.6	4.6	6.0	6.0
17	6.0	5.6	5.8	5.8	7.5	7.5	7.5	5.6	5.1	6.0	6.0	6.0
18	5.6	5.6	5.8	5.4	7.5	7.5	7.5	5.6	5.1	7.0	6.0	6.0
19	5.6	5.6	6.3	5.8	7.5	7.5	7.5	5.1	5.1	7.0	6.0	6.0
20	5.6	5.6	6.8	5.8	7.5	8.0	7.5	5.6	5.1	6.0	6.0	6.0
21	5.6	5.6	6.3	5.8	7.5	7.5	7.5	6.5	5.1	6.0	6.0	6.0
22	5.6	6.5		5.8	7.5	7.5	7.5	6.0	5.1	6.0	6.5	5.6
23	5.6	5.6		5.8	7.5	7.5		6.0	5.1	6.5	6.0	5.6
24	6.0	5.6		5.4	7.5	7.5	5.6	6.5	5.1	6.5	6.0	5.6
25	6.0	5.6		5.4	7.5	7.5	5.6	6.0	5.1	5.6	6.0	6.0
26	6.0	5.6	8.3	5.4	7.5	7.5	5.6	5.6	5.1	6.5	6.0	6.0
27	5.6	5.6	6.8	5.4	7.5	7.5	5.6	5.6	5.1	10	6.0	6.5
28	5.6	5.8	6.8	5.4	7.5	7.5	5.6	5.1	5.1	6.5	6.0	6.0
29	7.0	5.8	6.3	4.9	7.5	7.5	5.6		5.1	6.0	6.5	6.0
30	6.0	6.3	6.3	4.9	7.5	7.5	5.6		5.1	3.4	6.0	6.0
31	6.5	6.3		4.9		7.5	5.6		5.1		6.0	

NOTE.—Discharge determined from rating curves covering short periods and adjusted to account for changes in the discharge relation caused by growth of weeds, cleaning of ditch, and changes in control. No water in the ditch Apr. 7-10, June 17, Nov. 16, 1914, Jan. 23 and June 9, 1915. High water occurred Sept. 22-25, 1914; no gage record. Discharge interpolated Jan. 16, 17, Aug. 29, 30, 1914, and Feb. 13, 14, and June 6, 1915.

Monthly discharge of Ahlo ditch near Kaneohe, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acres- feet.
	Maximum.	Minimum.	Mean.			
1914.						
January 15-31.....	5.6	5.1	5.18	8.01	88	270
February.....	7.5	4.7	6.14	9.50	172	528
March.....	8.5	5.6	6.38	9.87	198	607
April 1-6, 11-30.....	14	6.5	7.08	11.0	184	565
May.....	13	4.3	6.57	10.2	204	625
June 1-16, 18-30.....	7.0	5.1	5.94	9.19	172	529
The period (162 days).....	14	4.3	6.28	9.72	1,020	3,120
1914-15.						
July.....	7.0	5.1	5.74	8.88	178	546
August.....	7.0	5.1	5.75	8.90	178	547
September 1-21, 26-30.....	8.8	5.8	6.46	10.0	168	515
October.....	6.8	4.9	5.83	9.02	181	555
November 1-15, 17-30.....	8.3	4.0	6.26	9.69	182	557
December.....	10	7.5	7.74	12.0	240	736
January 1-22, 24-31.....	7.5	5.6	6.88	10.6	206	633
February.....	6.5	5.1	5.56	8.60	156	478
March.....	6.5	5.1	5.29	8.18	164	503
April.....	10	3.4	5.59	8.65	168	515
May.....	6.5	2.6	6.05	9.36	188	576
June 1-8, 10-30.....	6.5	5.6	5.95	9.21	172	530
The period (358 days).....	10	2.6	6.09	9.42	2,180	6,690

NOTE.—Estimates cover periods in which water was flowing in ditch. See footnote to daily-discharge table.

HOOLEINAIWA STREAM NEAR KANEOHE, OAHU.

LOCATION.—400 yards above junction with Kaneohe Stream, three-quarters of a mile by road from Pali camp, and $3\frac{1}{2}$ miles southwest of Kaneohe.

RECORDS AVAILABLE.—January 15, 1914, to June 30, 1915.

GAGE.—Vertical staff on left bank; read once daily. Datum raised 0.85 foot on March 11, 1915; records published to new datum.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel makes a bend at control 10 feet below gage; both banks steep and high; one channel at all stages; bed of stream is hardpan and gravel. Control is a boulder riffle; shifts during extreme floods, though fairly permanent for ordinary stages.

EXTREMES OF DISCHARGE.—Highest water occurred September 22, to 25, 1914, and April 27, 1915, but no gage readings were obtained; minimum stage recorded, 0.34 foot in April, 1915 (discharge, 0.2 million gallons per day, or 0.3 second-foot).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Low-water flow diverted for irrigation of rice fields.

ACCURACY.—Rating curves fairly well defined for low and medium stages, but the percentage of error in estimates may be large on account of the small amount of water involved.

Discharge measurements of Hooleinaiwa Stream near Kaneohe, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Jan. 14	G. R. White	0.59	0.8	0.5
Feb. 1	do.	.60	.8	.5
Sept. 15	H. A. R. Austin	.63	1.1	.7
16	do.	.58	.75	.5
Nov. 27	do.	.65	1.0	.65
1915—Mar. 11	do.	.42	.45	.3

Discharge, in million gallons per day, of Hooleinaiwa Stream near Kaneohe, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	Date.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914.							1914.						
1.....		0.5	0.3	0.5	0.4	0.9	16.....	0.5	0.5	0.4	0.4	0.5	0.4
2.....		.5	.3	.6	.5	.6	17.....	.5	.5	.3	.4	.6	.4
3.....		.5	.3	.6	2.8	.6	18.....	1.0	.5	.3	.4	.6	.5
4.....		.5	.3	.6	.6	.6	19.....	.5	.5	.3	.4	.5	.6
5.....		.5	.3	.5	.6	.6	20.....	.5	.5	.3	.4	.5	.7
6.....		.5	.3	1.2	.6	.6	21.....	.5	.5	.4	.4	.6	.6
7.....		.5	.3	.7	.8	.6	22.....	.5	.5	.4	.4	.6	.4
8.....		.5	.4	.6	.6	.6	23.....	.5	.5	.4	.4	.6	.4
9.....		.5	.4	.6	.6	.6	24.....	.5	.5	.4	.4	.6	.6
10.....		.5	.4	.5	.6	.6	25.....	.5	.5	.4	.4	.6	.4
11.....		.5	.4	.5	.6	.6	26.....	.5	.4	.3	2.6	.6	.4
12.....		.5	.4	.4	.6	.6	27.....	.5	.3	.3	.5	.6	.4
13.....		.5	.4	.4	.5	.6	28.....	.5	.3	.4	.4	.6	.4
14.....		.5	.4	.4	.5	.6	29.....	.5		.8	.4	.6	.4
15.....	0.5	.5	.4	.4	.5	.6	30.....	.5		.6	.4	4.7	.4
							31.....	.5		.6		.6	

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	0.4	0.5	0.6	1.0	0.6	0.6	0.4	0.3	0.3	0.2	0.5	0.3
2.....	.4	.5	.6	1.0	3.3	.6	.4	.3	.3	.2	.5	.3
3.....	.4	.5	.6	.9	.6	.6	.4	.3	.3	.3	.4	.3
4.....	.5	.5	.6	.7	.6	1.8	.4	.3	.3	.3	.4	.3
5.....	.5	.6	.6	.7	.6	.6	.4	.3	.3	.3	.4	.3
6.....	.5	.6	.6	.6	.6	.8	.4	.3	.3	.3	.4	.3
7.....	.5	.6	.5	.6	.7	.8	.4	.3	.3	.3	.4	.3
8.....	.5	.6	.5	.6	.6	.8	.4	.3	.3	.3	.3	.3
9.....	.5	.7	.5	.6	.8	.8	.4	.3	.3	.3	.3	.3
10.....	.6	.7	.5	.5	.7	.7	.4	.3	.3	.3	.3	.3
11.....	.5	.6	.6	.5	.7	.7	.4	.3	.3	.3	.3	.3
12.....	.5	.4	.6	.5	.7	.7	.4	.3	.3	.2	.3	.3
13.....	.5	.4	.5	.5	.7	.7	.4	.3	.3	.2	.3	.3
14.....	.6	.4	1.0	.5	.7	.7	.4	.3	.3	.2	.3	.3
15.....	.6	.4	.6	.5	.7	.7	.4	.3	.3	.2	.3	.3
16.....	.6	.4	.5	.6	.7	.7	.3	.3	.3	.2	.3	.3
17.....	.6	.4	.5	.6	.7	.7	.3	.3	.3	.3	.3	.3
18.....	.6	.4	.5	.6	.7	.7	.3	.3	.3	.4	.3	.3
19.....	.6	.4	.5	.6	.7	.7	.3	.3	.3	.3	.3	.3
20.....	.6	.4	.8	.6	.6	.4	.3	.3	.3	.3	.3	.3
21.....	.6	.4	.5	.6	.6	.4	.3	.3	.2	.2	.3	.3
22.....	.7	.4		.6	.6	.4	.3	.3	.3	.2	.3	.3
23.....	.7	.4		.6	.6	.4	.3	.3	.3	.2	.3	.3
24.....	.7	.5		.6	.6	.4	.3	.3	.3	.2	.3	.3
25.....	.7	.5		.6	.6	.4	.3	.3	.3	.3	.3	.3
26.....	.7	.5	2.9	.6	.6	.4	.3	.3	.3	.3	.3	.3
27.....	.7	.5	1.1	.6	.6	.4	.3	.3	.3		.3	.4
28.....	.7	.5	1.0	.6	.6	.4	.3	.3		.7	.3	.3
29.....	.8	.5	1.0	.6	.6	.4	.3			.5	.3	.3
30.....	.5	.6	1.0	.6	.6	.4	.3			.6	.3	.3
31.....	.5	.6		.6		.4	.3				.3	

NOTE.—Discharge determined from rating curves applicable as follows: Jan. 15, 1914, to Apr. 26, 1915, fairly well defined below 10 million gallons per day (15 second-feet); Apr. 28 to June 30, 1915, fairly well defined. High water occurred Sept. 22-25, 1914, and Apr. 27, 1915; no records obtained.

Monthly discharge of Hooleinaiwa Stream near Kaneohe, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
January 15-31	1.0	0.5	0.53	0.82	9	28
February .....	.5	.3	.48	.74	14	41
March .....	.8	.3	.38	.59	12	36
April	2.6	.4	.56	.87	17	52
May	4.7	.4	.78	1.21	24	74
June .....	.9	.4	.54	.84	16	50
The period					92	281
1914-15.						
July .....	.8	.4	.57	.88	18	54
August .....	.7	.4	.50	.77	15	48
September 1-21, 26-30	2.9	.5	.74	1.14	19	59
October	1.0	.5	.62	.96	19	59
November	3.3	.6	.73	1.13	22	67
December	1.8	.4	.62	.96	19	59
January .....	.4	.3	.35	.54	11	33
February .....	.3	.3	.30	.46	8	26
March .....	.3	.3	.30	.46	9	28
April 1-26, 28-30 .....	.7	.2	.30	.46	9	27
May .....	.5	.3	.33	.51	10	31
June .....	.4	.3	.30	.46	9	28

PIHO STREAM NEAR KANEOHE, OAHU.

LOCATION.—100 feet above junction with Kaneohe Stream, $3\frac{1}{2}$ miles southwest of Kaneohe and $8\frac{1}{2}$ miles from Honolulu.

RECORDS AVAILABLE.—January 15, 1914, to June 30, 1915.

GAGE.—Vertical staff on left bank; read once daily. Datum raised 0.7 foot March 11, 1915; records published to new datum.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—One channel at all stages; straight 10 feet above and 25 feet below gage; both banks steep and high; stream bed composed of firm earth and gravel. Control is a small-boulder riffle and shifts frequently; discharge tion also affected by growth of grass and weeds on sides of channel.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 1.6 feet (new datum) at 7 a. m. April 26, 1914 (discharge, 9.8 million gallons per day, or 15 second-feet); minimum stage recorded, 0.3 foot (new datum) April, 1914 (discharge, 0.1 million gallons per day, or 0.15 second-foot).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—After joining Kaneohe Stream the water is diverted for irrigation of rice fields.

ACCURACY.—Records only approximate owing to frequent shifts in control; measurements insufficient to define good rating curves.

Discharge measurements of Piho Stream near Kaneohe, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Jan. 14	G. R. White	1.02	0.6	0.4
Feb. 1	do	1.01	.7	.45
Sept. 15	H. A. R. Austin	1.20	1.6	1.0
16	do	1.03	.75	.5
Nov. 27	do	.54	.6	.4
1915—Mar. 11	do	.40	.2	.15

Monthly discharge of Piho Stream near Kaneohe, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-feet (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
January 15-31.....	0.7	0.5	0.61	0.94	10	32
February.....	.7	.2	.48	.74	13	41
March.....	.8	.2	.34	.53	10	32
April.....	9.8	.1	.64	.99	19	59
May.....	1.0	.2	.26	.40	8	25
June 1-20, 22-30.....	.6	.1	.20	.31	6	18
1914-15.						
July.....	.5	.1	.17	.26	5	16
August.....	.5	.2	.25	.39	8	24
September 1-21, 26-30.....	2.0	.4	.62	.96	16	49
October.....	.8	.4	.44	.68	14	42
November.....	2.7	.4	.48	.74	14	44
December.....	.9	.2	.29	.45	9	28
January.....	.3	.2	.24	.37	7	23
February.....	.3	.2	.20	.31	6	17
March.....	.2	.2	.20	.31	6	19
April 1-26, 28-30.....	.8	.1	.27	.42	8	24
May.....	.8	.4	.55	.85	17	52
June.....	.8	.2	.54	.84	16	50

NOTE.—Owing to shifting of channel and limited number of discharge measurements, estimates for 1914 are only approximate.

KUOU STREAM NEAR KANEOHE, OAHU.

LOCATION.—Just below trail crossing, 300 feet above junction with Kaneohe Stream, $3\frac{1}{2}$ miles southwest of Kaneohe and $8\frac{1}{2}$ miles from Honolulu.

RECORDS AVAILABLE.—January 15, 1914, to June 30, 1915.

GAGE.—Vertical staff on right bank; read once daily; datum raised 0.5 feet March 10, 1915; records published to new datum.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—One channel at all stages; straight for 15 feet above gage and for 50 feet below gage; bed of stream composed of boulders and gravel; right bank steep and high; left bank has gentle slope. Control is a boulder rifle; shifts during floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 1.9 feet (new datum) at 7.25 a. m. April 26, 1914 (discharge, 20 million gallons per day, or 31 second-feet); minimum stage recorded, 0.81 foot in June, 1915 (discharge, 1.0 million gallons per day, or 1.5 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Low-water flow diverted below junction with Kaneohe Stream for irrigation of rice fields.

ACCURACY.—Estimates fair for low stages when flow is steady; for high and medium stages, which are fluctuating, estimates are poor, as gage was read only once daily and the extensions of the rating curves are approximate above 4 million gallons per day, or 6 second-feet.

Discharge measurements of Kuou Stream near Kaneohe, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Jan. 13	G. R. White.....	0.94	3.1	2.0
Feb. 1	.....do.....	.90	2.7	1.7
Sept. 15	H. A. R. Austin.....	1.18	3.5	2.3
16	.....do.....	1.03	2.9	1.9
Nov. 27	.....do.....	.82	3.6	2.4
1915—Mar. 10	.....do.....	.83	2.2	1.4
Apr. 30	.....do.....	1.02	5.3	3.4

Monthly discharge of Kuou Stream near Kaneohe, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.			Total run-off.		
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
January 15-31.....	5.0	1.8	3.48	5.38	59	182
February.....	2.4	1.8	2.14	3.31	60	184
March.....	4.3	1.4	1.67	2.58	52	159
April.....	20	1.8	3.04	4.70	91	280
May.....	9.2	1.8	2.52	3.90	78	240
June.....	4.3	2.4	2.77	4.29	83	255
The period.....					423	1,300
1914-15.						
July.....	3.6	1.8	2.44	3.78	76	232
August.....	5.8	1.8	2.67	4.13	83	254
September 1-21, 26-30.....	13	1.7	3.14	4.86	82	251
October.....	2.8	1.7	2.24	3.47	70	213
November.....	8.0	2.2	2.61	4.04	78	240
December.....	5.5	1.4	1.85	2.86	58	176
January.....	1.8	1.4	1.50	2.32	47	143
February.....	1.8	1.4	1.43	2.21	40	123
March.....	1.4	1.0	1.39	2.15	43	132
April 1-26, 28-30.....	3.0	1.4	1.75	2.71	51	156
May.....	3.0	1.8	1.95	3.02	61	186
June.....	1.8	1.0	1.16	1.80	35	107

KUOU DITCH NEAR KANEOHE, OAHU.

LOCATION.—Four feet above highway bridge, 200 yards below intake. Ditch diverts from Kaneohe Stream between inflow of Piho and Kuou streams, $3\frac{1}{2}$ miles southwest of Kaneohe.

RECORDS AVAILABLE.—January 13, 1914, to June 30, 1915.

GAGE.—Vertical staff on left bank; read once daily. New datum May 6, 1914.

DISCHARGE MEASUREMENTS.—Two-foot sharp-crested weir with end contractions. Weir was destroyed April 3, 1914, and was replaced May 6, 1914.

CHANNEL AND CONTROL.—Large pool back of weir.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 0.74 foot, May 13 to 18, 1915 (discharge, 2.6 million gallons per day, or 4.0 second-feet), ditch dry January 3-11, 1915.

DIVERSIONS.—None above station.

REGULATION.—Flow regulated by head gates.

UTILIZATION.—Irrigation of rice fields.

ACCURACY.—Estimates January 13 to April 2, 1914, poor owing to leakage around weir and uncertainty of elevation of weir crest with respect to the gage. Estimates May 6, 1914, to June 30, 1915, fair, as conditions for measurement were improved upon reestablishment of weir. There is no velocity of approach.

Discharge measurements of Kuou ditch near Kaneohe, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons. per day.
1914—Jan. 13	G. R. White	1.68	0.4	0.25
Sept. 16	H. A. R. Austin	a .50	2.3	1.5

a Head on weir.

Monthly discharge of Kuou ditch near Kaneohe, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
January 13-31.....	0.3	0.1	0.19	0.29	4	11
February.....	.45	.2	.37	.57	10	32
March.....	.3	.1	.27	.42	8	26
May 6-31.....	2.1	1.4	1.83	2.83	48	146
June.....	2.1	1.4	1.74	2.69	52	160
The period.....	2.1	.1	.91	1.41	122	375
1914-15.						
July.....	1.9	1.4	1.78	2.75	55	169
August.....	2.3	1.7	2.01	3.11	62	191
September 1-21, 26-30.....	2.1	.1	1.46	2.26	38	116
October.....	.5	.1	.34	.53	10	32
November.....	.5	.1	.14	.22	4	13
December.....	.25	.05	.10	.15	3	10
January 1-2, 12-31.....	2.1	.05	1.82	2.82	40	123
February.....	2.1	1.7	1.99	3.08	56	171
March.....	1.9	1.7	1.80	2.78	56	171
April.....	2.3	1.2	1.85	2.86	55	170
May.....	2.6	1.9	2.10	3.25	65	200
June.....	2.3	1.7	1.91	2.95	57	176
The period (352 days).....	2.6	.05	1.43	2.21	501	1,540

NOTE.—Estimates cover periods in which water was flowing in ditch.

NOTE.—Discharge computed by Francis formula for 2-foot sharp-crested weir with end contractions and without velocity of approach. No record Apr. 3 to May 5, 1914 (weir having been removed by Chinamen), and Sept. 22 to 25, 1914. No water in ditch Jan. 3-11, 1915.

LULUKU STREAM NEAR KANEOHE, OAHU.

LOCATION.—A short distance above junction with Kaneohe Stream, 3 miles southwest of Kaneohe.

RECORDS AVAILABLE.—March 1, 1914, to June 30, 1915.

GAGE.—Vertical staff on right bank; read once daily. Datum raised 1.0 foot March 10, 1915; records published to new datum.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge at gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for 30 feet above and 10 feet below the control; left bank steep; right bank has gentle slope; bed of stream composed of boulders and gravel. Control is a riffle of large boulders; shifts during heavy floods. Discharge relation is also affected by growth of grass and weeds on control.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 1.85 feet (new datum) at 7.40 a. m. April 26, 1914 (discharge, approximately 50 million gallons per day, or 77 second-feet); minimum stage recorded, 0.09 foot (new datum) at 7.40 a. m. March 9, 1914 (discharge, 0.3 million gallons per day, or 0.45 second-feet).

DIVERSIONS.—South Luluku ditch diverts about 0.1 million gallons per day half a mile above station. North Luluku ditch diverts about 1,500 feet above station.

REGULATION.—Amount diverted above station varies.

UTILIZATION.—Water diverted above station is for irrigation of taro. Water flowing past the station joins Kaneohe Stream and is diverted later for irrigation of rice fields.

ACCURACY.—Estimates of daily discharge withheld on account of instability of control and lack of sufficient measurements for a reliable rating curve. A fairly good low-water rating curve was developed for the period March to September, 1914, and monthly estimates for that period are fair. Monthly estimates October, 1914, to June, 1915, are approximate only.

Discharge measurements of Luluku Stream near Kaneohe, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Jan. 14	G. R. White.	0.36	0.7	0.45
Feb. 1	do. ....	.44	.8	.5
Sept. 15	H. A. R. Austin. ....	.57	3.4	2.2
16	do. ....	.49	1.0	.65
1915—Mar. 10	do. ....	.16	1.0	.65

Monthly discharge of Luluku Stream near Kaneohe, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
March.....	1.6	0.3	0.40	0.62	12	38
April.....	50	.3	2.13	3.30	64	196
May.....	8.5	.4	.82	1.27	26	78
June.....	3.5	.4	.69	1.07	21	64
The period.....					123	376
1914-15.						
July.....	.9	.4	.49	.76	15	47
August.....	3.5	.5	.72	1.11	22	68
September 1-21, 26-30.....	12	.4	1.38	2.14	36	110
October.....	.5	.4	.40	.62	12	38
November.....	2.4	.4	.56	.87	17	52
December.....	.7	.5	.51	.79	16	49
January.....	.5	.3	.46	.71	14	44
February.....	.4	.3	.38	.59	11	33
March.....	.5	.3	.36	.56	11	34
April.....	.6	.3	.44	.68	13	41
May.....	.5	.4	.44	.68	14	42
June.....	.5	.3	.40	.62	12	37

NOTE.—Owing to unstability of channel after the high water of September, 1914, and the small number of discharge measurements made, estimates from September, 1914, to June, 1915, are only approximate.

NORTH LULUKU DITCH NEAR KANEHOE, OAHU.

LOCATION.—200 feet below intake. Ditch diverts from Luluku Stream about three-quarters of a mile above confluence with Kaneohe Stream, and about 3 miles southwest of Kaneohe.

RECORDS AVAILABLE.—January 15, 1914, to June 30, 1915.

GAGE.—Vertical staff on right bank, read once daily. Datum raised 0.56 foot February 7, 1914, and 0.5 foot March 10, 1914. Records published to latest datum.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel straight for 20 feet above and below gage; subject to growth of grass and weeds. Control is a 2-foot sharp-crested weir with end contractions. Weir has not been used for measurement of discharge on account of high velocity of approach and tendency of weir to become choked with sediment.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 0.84 foot at 7.50 a. m., March 22, 1915; (discharge, 1.3 million gallons per day, or 2.0 second-feet); ditch dry, September 26 to 29, 1914.

DIVERSIONS.—Small amount of water diverted above station for irrigation of taro.

REGULATION.—No regulation by head gates.

UTILIZATION.—Irrigation of taro and rice fields.

ACCURACY.—Estimates fair. Weir made a good control and a fairly well defined rating curve was developed.

Discharge measurements of North Luluku ditch near Kaneohe, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Jan. 14..	G. R. White.....	0.62	0.55	0.35
Feb. 1....	do.....	.61	.3	.2
1915—Mar. 10..	H. A. R. Austin.....	.78	1.6	1.0

Discharge, in million gallons per day, of North Luluku ditch near Kaneohe, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	Date.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914.							1914.						
1.....		0.3	0.15	0.85	0.65	0.85	16.....	0.5	0.3	0.45	0.85	0.65	0.45
2.....		.65	.3	.85	.65	.65	17.....	.3	.3	.45	.85	.65	.45
3.....		.65	.45	.65	1.1	.45	18.....	.3	.3	.45	.85	.65	.45
4.....			.45	.65	.85	.45	19.....	.45	.3	.45	.85	.65	.45
5.....			.45	1.1	.85	.65	20.....	.45	.3	.45	.85	.65	.65
6.....			.45	1.3	.65	.65	21.....	.45	.3	.45	.65	.65	.65
7.....			.45	1.1	.85	.65	22.....	.45	.3	.45	.85	.65	.65
8.....		.3	.45	.85	.65	.65	23.....	.45	.3	.45	.65	.65	.45
9.....		.3	.45	.85	.65	.65	24.....	.45	.3	.45	.65	.65	.45
10.....		.3	.45	.85	.65	.65	25.....	.45	.3	.45	.65	.65	.65
11.....		.3	.45	.85	.65	.45	26.....	.45	.3	.45	1.1	.65	.45
12.....		.3	.45	.85	.65	.45	27.....	.45	.3	.45	.65	.65	.45
13.....		.3	.45	.85	.65	.65	28.....	.45	.3	.65	.65	.65	.45
14.....		.3	.45	.85	.65	.65	29.....	.45		.65	.65	.65	.45
15.....	0.65	.3	.45	.85	.65	.45	30.....	.45		.85	.65	.45	.45
							31.....	.45		.85		.65	

Discharge, in million gallons per day, of North Luluku ditch near Kaneohe, Oahu, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	0.45	0.65	0.45	0.85	0.3	0.15	0.45	1.1	1.1		0.65	0.85
2.....	.45	.45	.65	.85	.45	.15	.45	1.1	1.1	1.1	.65	1.1
3.....	.45	.45	.65	.45	.3	.45	.45	1.1	1.1	1.1	.85	.85
4.....	.45	.45	.65	.45	.15	.45	.45	1.1	1.1	1.1	.65	.85
5.....	.45	.65	.65	.45	.15	.3	.45	1.1	1.1	1.1	.65	.85
6.....	.45	.45	.65	.45	.15	.3	.45	1.1	1.1	1.1	.65	.85
7.....	.45	.45	.65	.45	.15	.3	.3	1.1	1.1	1.1	.65	.85
8.....	.45	.45	.65	.45	.15	.3	.3	1.1	1.1	1.1	.65	.85
9.....	.45	.45	.45	.45	.3	.3	.45	.85	1.1	.85	.65	1.1
10.....	.45	.45	.45	.45	.15	.3	.45	1.1	1.1	.85	.65	1.1
11.....	.45	.45	.45	.45	.15	.3	.45	1.1	1.1	.85	.45	1.1
12.....	.45	.45	.65	.45	.15	.3	.45	1.1	1.1	1.3	.65	.85
13.....	.45	.45	.65	.45	.3	.3	.85	1.1	1.1	.85	.65	.85
14.....	.45	.45	.65	.3	.3	.3	.45	1.1	1.1	.85	1.1	.85
15.....	.45	.3	.45	.3	.15	.3	.45	1.1	1.1	.85	1.1	.85
16.....	.45	.3	.45	.3	.15	.3	.45	1.1	1.1	.85	1.1	.85
17.....	.65	.3	.45	.3	.15	.3	.45	1.1	1.1	.85	1.1	.85
18.....	.65	.3	.45	.3	.15	.3	.45	1.1	1.1	.85	1.1	.85
19.....	.65	.3	.45	.3	.15	.3	.45	.85	1.1	.85	1.1	.85
20.....	.65	.3	.45	.3	.15	.15	.45	.85	1.1	.65	.85	.85
21.....	.65	.65	.45	.15	.15	.15	.45	1.1	1.1	.65	1.1	.65
22.....	.65	.65		.15	.15	.15	.45	1.1	1.3	.65	.85	.65
23.....	.65	.65		.15	.15	.15	.45	1.1	1.1	.65	.85	.65
24.....	.65	.65		.3	.15	.45	.45	1.1	1.1	.65	.85	.65
25.....	.65	.65		.3	.15	.45	.45	1.1	1.1	.65	.85	.65
26.....	.65	.65		.3	.15	.45	.45	1.1	1.1	.65	.85	.65
27.....	.45	.65		.3	.15	.45	1.1	1.1	1.1	.65	.85	.85
28.....	.45	.65		.3	.15	.45	1.1	1.1	1.1	.65	.85	.65
29.....	.65	.65		.3	.15	.45	1.1			1.1	.65	.85
30.....	.45	.65	.65	.3	.15	.45	1.1			1.1	.65	.85
31.....	.65	.65		.3		.45	1.1		1.1		.85	

NOTE.—Discharge determined from a fairly well defined rating curve. No gage-height record Feb. 4-7 and Sept. 22-25, 1914. Ditch dry Sept. 26-29, 1914.

Monthly discharge of North Luluku ditch near Kaneohe, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
January 15-31.....	0.65	0.3	0.45	0.70	8	23
February 1-3, 8-28.....	.65	.3	.33	.51	8	24
March.....	.85	.15	.47	.73	15	45
April.....	1.3	.65	.82	1.27	25	75
May.....	1.1	.45	.68	1.05	21	65
June.....	.85	.45	.55	.85	16	51
The period (163 days).....	1.3	.15	.57	.88	93	283
1914-15.						
July.....	.65	.45	.53	.83	16	50
August.....	.65	.3	.50	.77	16	48
September 1-21, 31.....	.65	.45	.55	.85	12	37
October.....	.85	.15	.37	.57	12	35
November.....	.45	.15	.18	.28	6	17
December.....	.45	.15	.32	.50	10	30
January.....	1.1	.3	.56	.87	17	53
February.....	1.1	.85	1.07	1.66	30	92
March.....	1.3	1.1	1.11	1.72	34	106
April.....	1.3	.65	.86	1.33	26	79
May.....	1.1	.45	.82	1.27	26	78
June.....	1.1	.65	.83	1.28	25	76
The period (357 days).....	1.3	.15	.64	.99	230	701

NOTE.—Estimates are for periods in which water was flowing in ditch. See footnote to daily discharge table.

KAWA STREAM NEAR KANEOHE, OAHU.

LOCATION.—At highway bridge, half a mile south of Kaneohe ranch buildings, and a mile southeast of Kaneohe.

RECORDS AVAILABLE.—March 1, 1914, to June 30, 1915.

GAGE.—Vertical staff bolted to right abutment of bridge, installed October 19, 1914, to replace original gage washed out September 22, 1914; read once daily. Datum raised 1.02 feet October 19, 1914; records published to new datum.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—One channel at all stages; confined between bridge abutments at gage; straight for 20 feet above and below gage. Control of solid conglomerate; shifts only during extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.50 feet at 8.10 a. m. April 27, 1915 (discharge, approximately 46 million gallons per day, or 71 second-feet); minimum stage recorded, 0.38 foot (new datum) at 8.50 a. m. July 24, 1914 (discharge, 0.3 million gallons per day, or 0.45 second-foot).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Low-water flow diverted below station for irrigation of rice fields.

ACCURACY.—Estimates for low and medium stages fair. Rating curve for period March 1-29 not well defined, but flow was low for greater part of month. Rating curve below 10 million gallons per day for period March 30, 1914, to June 30, 1915, fairly good; estimates for high and fluctuating stages approximate, gage was read only once a day.

Discharge measurements of Kawa Stream near Kaneohe, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Jan. 12	G. R. White.....	0.66	1.4	0.95
31	do.....	.64	1.3	.8
Sept. 15	H. A. R. Austin.....	.72	2.9	2.0
16	do.....	.49	.9	.6
Oct. 19	do.....	.59	2.2	1.4
Nov. 12	do.....	.58	1.6	1.0
27	do.....	.56	1.6	1.1
1915—Mar. 10	do.....	.45	.7	.5
Apr. 30	do.....	.91	8.75	5.6

Discharge, in million gallons per day, of Kawa Stream near Kaneohe, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Mar.	Apr.	May.	June.	Date.	Mar.	Apr.	May.	June.
1914.									
1.....	0.4	6.2	2.0	3.2	16.....	0.4	2.5	1.1	1.5
2.....	.4	5.5	2.0	2.0	17.....	1.3	2.5	1.5	1.5
3.....	.4	6.2	5.5	2.0	18.....	.6	2.5	2.0	1.5
4.....	.4	5.5	2.0	2.0	19.....	.6	2.5	1.5	2.0
5.....	.4	15	2.5	2.0	20.....	.6	2.0	1.5	2.0
6.....	.4	13	2.0	2.0	21.....	.4	2.5	1.5	2.0
7.....	.4	7.0	2.0	2.0	22.....	.4	2.5	1.5	1.5
8.....	.6	5.5	2.5	2.0	23.....	.6	2.0	1.1	1.5
9.....	.4	4.8	1.5	2.0	24.....	.6	2.0	1.1	1.5
10.....	.4	4.8	1.5	2.0	25.....	.6	2.0	1.1	1.5
11.....	.4	4.0	1.5	1.5	26.....	1.8	2.5	1.1	1.5
12.....	.4	4.0	1.5	1.5	27.....	2.8	2.0	1.1	1.1
13.....	.4	4.0	1.5	2.5	28.....	4.2	2.0	3.2	1.1
14.....	.4	3.2	1.5	1.5	29.....	7.4	2.0	2.0	1.1
15.....	.4	2.5	1.5	2.0	30.....	6.2	2.0	16	1.1
					31.....	6.2	.....	2.5	.....

Discharge, in million gallons per day, of Kawa Stream near Kaneohe, Oahu, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	1.5	0.7	1.1	.....	1.1	1.1	1.5	0.7	0.5	0.5	3.2	1.5
2.....	1.1	.5	1.1	.....	5.5	1.1	1.1	1.1	.5	.5	4.8	1.5
3.....	1.1	.5	1.1	.....	1.5	1.1	1.5	.5	.5	.5	4.0	1.5
4.....	1.1	.5	1.1	.....	1.5	3.2	1.5	1.1	.5	.5	4.0	1.5
5.....	1.1	.5	.7	.....	1.5	1.5	1.1	1.1	.5	.5	3.2	1.1
6.....	.7	.5	.7	.....	1.5	1.5	1.1	.7	.5	.5	3.2	1.3
7.....	1.1	.5	1.1	.....	1.5	1.5	1.1	.7	.5	.5	3.2	1.5
8.....	1.1	.5	.7	.....	1.5	1.5	1.1	.7	.7	.5	2.0	1.1
9.....	1.1	.5	.7	.....	1.5	1.5	1.1	.7	.5	.5	2.0	1.1
10.....	1.1	.5	.7	.....	1.5	1.5	1.1	1.1	.5	.5	2.0	1.1
11.....	.7	.5	.7	.....	1.5	1.1	1.1	.7	.5	.5	2.5	1.1
12.....	.7	.5	.7	.....	1.5	1.5	1.1	.7	.5	.7	2.5	1.1
13.....	1.1	.5	.7	.....	1.5	1.5	1.1	.7	.5	.5	2.0	1.1
14.....	1.1	.5	1.1	.....	1.5	1.5	1.1	.7	.5	.5	2.0	1.1
15.....	1.1	.5	3.2	.....	1.5	1.5	1.1	.7	.5	.5	2.0	1.5
16.....	1.1	.5	.7	.....	1.5	1.1	1.5	.7	.7	.7	2.0	1.5
17.....	1.1	.7	.7	.....	1.5	1.1	1.1	.7	.5	.7	1.5	1.1
18.....	.7	.5	.7	.....	1.5	1.1	1.1	.7	.5	.7	2.0	1.1
19.....	.7	.5	.5	1.5	1.1	1.1	.7	.7	.5	4.0	2.0	1.1
20.....	.7	.5	.7	1.5	1.1	2.0	.7	.7	.5	1.5	2.0	1.1
21.....	.7	.5	.7	1.5	1.1	1.5	1.1	.7	.5	1.5	2.0	.7
22.....	.5	1.5	.....	1.5	1.1	1.5	.7	.7	.5	1.5	2.0	1.1
23.....	.3	.5	.....	1.5	1.1	1.5	.7	.7	.7	1.5	1.5	.7
24.....	.3	.7	.....	1.5	1.1	1.5	.7	.7	.5	1.5	1.5	.7
25.....	.5	.7	.....	1.5	1.1	1.5	.7	.5	.5	1.5	1.5	1.1
26.....	.5	.7	.....	1.5	1.1	1.5	.7	.7	.5	2.0	1.5	1.1
27.....	.5	1.1	.....	1.5	1.1	1.5	.7	.5	.5	46	1.5	1.1
28.....	.3	.7	.....	1.5	1.1	1.5	.7	.5	.5	3.2	1.5	1.1
29.....	1.1	.7	.....	1.5	1.1	1.5	.7	.....	.5	3.2	1.5	.7
30.....	1.1	1.1	.....	1.5	1.1	1.5	.7	.....	.5	11	1.1	.7
31.....	1.1	1.1	.....	1.1	.....	1.5	.7	.....	.7	.....	1.1	.....

NOTE.—Discharge determined from rating curves applicable as follows: Mar. 1-29, 1914, poorly defined; Mar. 30, 1914, to June 30, 1915, fairly well defined below 10 million gallons per day (15 second-feet). Gage record unreliable prior to Mar. 1, 1914. No record Sept. 22 to Oct. 18, 1914; gage washed out. Discharge interpolated June 21, Nov. 13, 1914, Feb. 2, 13, 14, and June 6, 1915.

Monthly discharge of Kawa Stream near Kaneohe, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-feet (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
March.....	7.4	0.4	1.32	2.04	41	126
April.....	15	2.0	4.16	6.44	125	383
May.....	16	1.1	2.28	3.53	71	217
June.....	3.2	1.1	1.75	2.71	53	161
The period.....					290	887
1914-15.						
July.....	1.5	.3	.87	1.35	27	83
August.....	1.5	.5	.64	.99	20	61
September 1-21.....	3.2	.5	.92	1.42	19	59
October 19-31.....	1.5	1.1	1.47	2.27	19	59
November.....	5.5	1.1	1.46	2.26	44	134
December.....	3.2	1.1	1.47	2.27	46	140
January.....	1.5	.7	.99	1.53	31	94
February.....	1.5	.5	.76	1.18	21	65
March.....	.7	.5	.53	.82	16	50
April.....	46	.5	2.94	4.55	88	271
May.....	4.8	1.1	2.18	3.37	68	207
June.....	1.5	.7	1.13	1.75	34	104

WING WO TAI DITCH NEAR HEEIA, OAHU.

LOCATION.—100 feet below intake. Ditch diverts from Heeia Stream half a mile west of Heeia.

RECORDS AVAILABLE.—January 19, 1914, to June 30, 1915.

GAGE.—Vertical staff on left bank; read once daily. Datum raised 1.31 feet March 10, 1915; records published to new datum.

DISCHARGE MEASUREMENTS.—Made by wading. A 2.5-foot sharp-crested weir with end contractions was installed, but a rating by current meter has been used, as the conditions for measurement by weir are not good.

CHANNEL AND CONTROL.—Channel is cut in earth and gravel; section about 2 feet wide and 3 feet deep; subject to growth of grass and weeds. Control is a 2.5-foot weir. Weir crest was bent over while ditch was being cleaned, September 10, 1914, and was repaired September 17, 1914.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 0.94 foot (new datum), September 2 and 7, 1914 (discharge, 2.8 million gallons per day, or 4.3 second-feet); ditch occasionally dry.

DIVERSIONS.—None above station.

REGULATION.—Flow regulated by head gates.

UTILIZATION.—Irrigation of rice fields.

ACCURACY.—Estimates are fair for all stages. Dates of change in control are known, and the rating curves are fairly well defined. Flow ordinarily steady.

Discharge measurements of Wing Wo Tai ditch near Heeia, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Jan. 13	G. R. White.....	0.48	0.5	0.3
31	do.....	.73	2.1	1.3
Sept. 16	H. A. R. Austin.....	.61	1.5	.95
1915—Mar. 10	do.....	.72	1.6	1.0

Discharge, in million gallons per day, of Wing Wo Tai ditch near Heeia, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	Date.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914.							1914.						
1.....		1.7	1.1	0.5	0.7	0.7	16.....	1.7	1.4	0.2	0.9	0.9	
2.....		1.7	.9	.7	.7	.7	17.....	1.7	.2	.2	.9	.9	
3.....		1.7	1.1	.7	.5	1.1	18.....	1.7	1.4	.2	1.1	.9	
4.....		1.7	1.1	.3	.3	1.1	19.....	1.7	1.7	1.1	.2	.9	.5
5.....		1.7	1.1	.1	.3	1.1	20.....	1.7	1.7	1.1	.2	1.1	.5
6.....		1.7	1.1		.3	1.1	21.....	1.7	1.7	1.1	.2	1.4	.5
7.....		1.7	1.4	.2	.3	1.1	22.....	1.7	1.7	1.4	.2	.9	.5
8.....		1.7	.9	.3	.3	1.1	23.....	1.7	1.7	1.4	.3	.9	.5
9.....		1.7	1.1	.1	.7	1.1	24.....	1.7	1.7	1.4	.3	.9	.5
10.....		1.7	1.1	.1	.7	.9	25.....	1.7	1.7	1.4	.3	1.1	.5
11.....		1.7	.9	.2	.5	.9	26.....	1.7	1.1	.2	.3	1.1	.5
12.....		1.7	.9	.2	.9	.9	27.....	1.7	1.7	.7	1.1	1.1	.5
13.....		1.7	1.7	.2	1.1	1.1	28.....	1.7	1.4	.7	.7	.7	.5
14.....		1.7	1.4	.2	.9	1.1	29.....	1.7		.9	.9	.7	.3
15.....		1.7	1.4	.2	.9	.9	30.....	1.7		.5	.7	.7	.3
							31.....	1.4		.5		.7	

Discharge, in million gallons per day, of Wing Wo Tai ditch near Heeia, Oahu, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	0.3	1.4	2.0	0.1	1.4	0.1	0.1	2.0	0.9	1.4	0.05	0.9
2.....	.3	1.7	2.8	.1	1.7	.1	.1	2.0	.9	1.4	.05	.9
3.....	.3	1.7	2.4	.2	.9	.1	.1	2.0	.9	1.2	.05	.9
4.....	.3	2.0	2.4	.2	.9	.1	.1	1.7	.9	1.2	.05	1.2
5.....	.3	.9	2.4	.2	1.4	.1	.1	1.2	.9	1.2	.05	.9
6.....	.5	1.7	2.4	.1	1.4	.1	.1	1.2	.9	1.4	.05	.9
7.....	.3	1.4	2.8	.1	1.4	.1	.1	.9	.9	1.4	.05	.9
8.....	.5	1.4	1.7	.1	1.4	.1	.1	.9	1.2	.5	.05	.7
9.....	.3	1.4	.1	.1	.5	.1	.05	.7	1.2	.5	.05	.9
10.....	.3	1.1	.9	.1	.5	.1	.05	.7	.9	.5	.....	.9
11.....	.3	2.4	.3	.1	.5	.1	.2	.9	.9	.5	.....	.9
12.....	.3	1.1	.2	1.2	.9	.1	.2	1.4	.9	.5	.....	.9
13.....	.9	1.7	.2	1.2	.8	.1	.2	1.4	1.4	.5	.1	.9
14.....	.7	1.4	.1	1.2	.7	.1	.3	1.2	.9	.5	.1	.9
15.....	.7	1.1	.3	1.2	.7	.1	.3	1.2	1.2	.5	.7	1.2
16.....	.3	1.4	.5	1.4	.5	.1	.3	1.2	.9	.7	1.7	1.2
17.....	.7	1.1	.3	1.4	.5	.1	.3	1.2	1.4	.7	1.7	1.2
18.....	.7	1.4	.1	1.4	.5	.1	.3	1.2	1.4	.5	.7	1.2
19.....	.7	1.4	.1	1.6	.5	.1	.3	1.2	.9	.2	.2	1.4
20.....	.7	1.4	.1	1.7	.3	.2	.3	1.2	1.2	.7	.2	.5
21.....	1.7	1.7	.1	1.7	.3	.2	.3	.9	1.2	.3	1.2	.5
22.....	1.7	2.4	.....	1.4	.3	.2	.3	.9	2.0	.2	1.4	.5
23.....	1.4	1.7	.....	.9	.3	.2	.3	.9	.9	.05	1.4	.5
24.....	1.4	1.7	.....	1.4	.3	.1	.3	.7	1.2	.05	1.4	.5
25.....	1.4	1.7	.....	1.4	.3	.1	.5	.7	.9	.05	1.2	.5
26.....	1.7	1.4	.1	1.4	.3	.1	.3	.7	.9	.....	1.2	.5
27.....	1.7	1.4	.2	1.4	.3	.1	.3	1.2	.9	.....	1.2	.5
28.....	1.1	1.4	.2	1.4	.2	.1	.3	1.2	.9	.1	1.2	.2
29.....	2.8	1.6	.1	1.4	.2	.1	.3	.....	1.4	.05	1.4	.5
30.....	2.4	1.8	.1	1.2	.1	.1	.3	.....	1.7	.1	1.4	.5
31.....	2.0	2.0	.....	1.4	.....	.1	2.0	.....	1.4	.....	1.2	.....

NOTE.—Discharge determined from rating curves fairly well defined, applicable as follows: Jan. 19 to Sept. 10, 1914, Sept. 11 to 17, 1914, and Sept. 18, 1914, to June 30, 1915. The weir at this station acts only as an artificial control. Changes in rating are due to alteration of crest of weir at known dates. High water occurred Sept. 22-25, 1914; no record obtained. Discharge interpolated June 21, Aug. 29, 30, Nov. 13, 1914, Feb. 13, 14, and June 6, 1915.

Monthly discharge of Wing Wo Tai ditch near Heeia, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1914.						
January 19-31.....	1.7	1.4	1.68	2.60	22	67
February.....	1.7	1.1	1.67	2.58	47	144
March.....	1.7	.2	1.05	1.62	33	100
April 1-5, 7-30.....	1.1	.1	.34	.53	10	30
May.....	1.4	.3	.78	1.21	24	74
June.....	1.1	.3	.77	1.19	23	71
The period (162 days).....	1.7	.1	.98	1.52	159	486
1914-15.						
July.....	2.8	.3	.93	1.44	29	88
August.....	2.4	.9	1.55	2.40	48	147
September 1-21, 26-30.....	2.8	.1	.88	1.36	23	70
October.....	1.7	.1	.93	1.44	29	88
November.....	1.7	.1	.67	1.04	20	62
December.....	.2	.1	.11	.17	4	10
January.....	2.0	.05	.28	.43	9	27
February.....	2.0	.7	1.16	1.80	33	100
March.....	2.0	.9	1.09	1.69	34	104
April 1-25, 28-30.....	1.4	.05	.60	.93	17	52
May 1-9, 13-31.....	1.7	.05	.72	1.11	20	62
June.....	1.4	.2	.80	1.24	24	74
The period (356 days).....	2.8	.05	.81	1.25	290	884

NOTE.—Estimates are for periods in which water was flowing in ditch. See footnote to daily discharge table.

HOP TUCK DITCH NEAR HEEIA, OAHU.

LOCATION.—200 yards below intake, 300 yards above rice mill, and $1\frac{1}{2}$ miles northeast of Heeia.

RECORDS AVAILABLE.—March 1, 1914, to June 30, 1915.

GAGE.—Vertical staff on right bank; read once daily. Datum raised 1.14 feet March 10, 1915; records published to new datum.

DISCHARGE MEASUREMENTS.—Made by wading. A 2.5-foot sharp-crested weir with end contractions was installed when station was established, but a rating by current meter has been used, as conditions for measurement by weir are not good.

CHANNEL AND CONTROL.—Channel is cut in firm earth; section about 5 feet wide and 4 feet deep; straight for 50 feet above and below gage; channel and banks are subject to growth of weeds and grass. Control is 2.5-foot weir; weir sometimes drowned out by closing of gates below.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 1.10 feet at 1.10 p. m. April 16, 1915 (discharge, 4.2 million gallons per day, or 6.5 second-feet); minimum stage recorded, 0.51 foot (new datum) in April and December, 1914, and January, 1915 (discharge, 0.1 million gallons per day, or 0.15 second-feet).

DIVERSIONS.—None above station. Ditch diverts from Heeia Stream.

REGULATION.—Flow regulated by head gates.

UTILIZATION.—Irrigation of rice fields.

ACCURACY.—Estimates between 1 and 2 million gallons per day fair; estimates for extremely low and high stages poor owing to lack of discharge measurements at these stages.

Discharge measurements of Hop Tuck ditch near Heeia, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Jan. 13	G. R. White.....	0.77	1.9	1.2
31	do.....	.89	3.2	2.1
Sept. 15	H. A. R. Austin.....	.79	2.8	1.8

Discharge, in million gallons per day, of Hop Tuck ditch near Heeia, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Mar.	Apr.	May.	June.	Date.	Mar.	Apr.	May.	June.
1913.					1914.				
1.....	1.8	0.1	1.8	2.2	16.....	1.4	0.8	1.4	1.4
2.....	2.2	.8	1.8	1.8	17.....	.8	.8	1.8	1.4
3.....	2.2	.8	.2	1.8	18.....	1.1	.8	1.4	1.4
4.....	2.2	.8	1.4	1.4	19.....	1.4	.8	1.4	1.8
5.....	2.2	.2	1.1	1.4	20.....	1.4	.8	1.4	2.2
6.....	2.2	.6	1.1	1.4	21.....	1.4	.2	1.8	2.0
7.....	2.2	.4	1.1	1.4	22.....	1.1	.2	1.8	1.8
8.....	2.2	.8	.8	1.4	23.....	1.4	.2	1.8	1.8
9.....	2.2	.8	1.8	1.4	24.....	1.4	.2	1.4	1.8
10.....	2.2	.8	1.8	1.4	25.....	1.4	.2	1.4	1.8
11.....	2.2	.8	1.4	1.4	26.....	1.4	.8	1.1	1.8
12.....	2.2	.8	1.4	1.4	27.....	.8	.6	1.4	1.8
13.....	1.8	.8	1.4	1.4	28.....	1.1	1.1	2.2	1.4
14.....	1.8	.1	1.4	1.4	29.....	.4	.6	1.4	1.8
15.....	1.8	.8	1.1	1.4	30.....	.8	1.8	1.4	1.4
					31.....	.8	.....	2.2	.....

Discharge, in million gallons per day, of Hop Tuck ditch near Heeia, Oahu, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	1.4	0.8	1.1	0.6	1.8	0.8	0.1	1.8	2.7	1.4	1.1	1.8
2.....	1.4	.8	1.4	.6	1.1	.6	.1	2.8	2.7	1.8	1.1	1.8
3.....	1.4	.8	1.1	.6	1.4	.6	.1	3.7	3.2	2.2	.8	2.2
4.....	1.4	.8	1.1	.6	1.4	.6	.1	2.2	3.2	1.8	1.1	2.2
5.....	1.4	.4	1.1	.8	1.1	.4	.1	2.7	3.2	1.8	1.1	2.2
6.....	1.4	.8	1.1	.8	1.1	.4	.2	2.7	3.2	2.2	1.1	2.2
7.....	1.4	1.1	1.1	.8	1.4	.4	.2	2.7	3.2	2.2	1.1	2.2
8.....	1.4	1.1	1.1	.8	1.4	.4	.2	3.2	2.7	2.7	1.1	1.8
9.....	1.4	1.1	1.1	.8	1.4	.4	.2	2.2	2.7	3.2	1.1	2.2
10.....	1.4	1.1	1.1	.8	1.4	.4	.2	2.7	2.7	2.7	1.4	2.2
11.....	1.4	.8	1.1	.8	1.4	.4	.2	3.2	2.7	2.7	1.1	2.2
12.....	1.4	1.4	1.1	.8	1.1	.4	.2	3.7	2.7	2.7	1.1	2.2
13.....	1.1	1.1	1.8	1.1	1.6	.4	.2	3.2	3.2	3.2	1.1	2.2
14.....	1.1	1.1	.8	1.1	2.2	.4	.2	2.7	2.7	3.2	1.1	2.2
15.....	1.1	1.4	1.4	1.1	1.4	.2	.2	2.2	2.7	2.7	1.1	2.2
16.....	1.4	1.4	1.1	1.4	1.4	.2	1.4	2.2	3.2	4.2	.8	2.2
17.....	.4	1.1	1.8	1.1	1.4	.2	1.8	2.7	2.7	3.2	.8	1.8
18.....	1.1	1.8	1.4	1.1	1.4	.2	2.2	2.7	2.7	2.2	.8	2.7
19.....	.8	1.4	1.4	1.1	1.4	.2	2.2	3.2	2.7	.8	1.1	3.7
20.....	.8	1.4	1.8	1.1	1.4	.1	2.2	3.7	2.7	.8	1.1	3.2
21.....	.8	1.4	1.8	1.1	1.4	.4	2.2	2.7	2.7	1.4	1.1	2.7
22.....	1.1	2.2		1.1	1.4	.1	2.7	2.7	3.2	1.4	1.4	2.7
23.....	.8	1.8		1.4	1.4	.2	1.8	2.7	2.7	2.2	1.4	2.7
24.....	.8	1.4		1.1	1.4	.2	1.8	2.7	2.7	1.8	1.8	2.7
25.....	.6	1.4		1.1	1.4	.2	1.8	2.7	2.7	2.7	1.8	1.8
26.....	.6	1.4	1.1	1.4	1.4	.2	1.8	2.7	2.7	1.8	1.8	1.8
27.....	.6	1.1	.8	1.8	1.4	.2	1.8	2.2	2.7	1.1	2.2	1.4
28.....	1.1	1.1	1.1	1.8	1.4	.2	1.8	2.2	2.7	1.4	2.2	1.1
29.....	1.1	1.1	1.1	1.8	1.4	.1	3.7		2.2	1.4	2.2	1.1
30.....	.8	1.1	1.1	1.4	.8	.1	3.7		1.8	1.1	1.8	1.1
31.....	.8	1.1		1.4		.1	1.8		1.8		1.8	

NOTE.—Discharge determined from a rating curve fairly well defined between 1 and 2 million gallons per day (1.5 and 3 second-feet). High water occurred September 22-25, 1914; no record. Discharge interpolated June 21, Aug. 29, 30, Nov. 13, 1914; Feb. 2, 13, 14, and June 6, 1915.

Monthly discharge of Hop Tuck ditch near Heeia, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-feet (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
March.....	2.2	0.4	1.60	2.48	50	152
April.....	1.8	.1	.64	.99	19	59
May.....	2.2	.2	1.45	2.24	45	138
June.....	2.2	1.4	1.61	2.49	48	148
The period (122 days).....	2.2	.1	1.33	2.06	162	497
1914-15.						
July.....	1.4	.4	1.09	1.69	34	104
August.....	2.2	.4	1.19	1.84	37	113
September 1-21, 26-30.....	1.8	.8	1.23	1.90	32	98
October.....	1.8	.6	1.06	1.64	33	101
November.....	2.2	.8	1.39	2.15	42	128
December.....	.8	.1	.31	.48	10	29
January.....	3.7	.1	1.20	1.86	37	114
February.....	3.7	1.8	2.74	4.24	77	235
March.....	3.2	1.8	2.75	4.25	85	262
April.....	4.2	.8	2.13	3.30	64	196
May.....	2.2	.8	1.31	2.03	41	125
June.....	3.7	1.1	2.15	3.33	64	198
The period (361 days).....	4.2	.1	1.54	2.38	556	1,700

NOTE.—Estimates cover periods in which water was flowing in ditch. See footnote to daily discharge table.

LEE DITCH NEAR HEEIA, OAHU.

LOCATION.—100 feet below intake. Ditch diverts from Heeia Stream $1\frac{1}{2}$ miles north-west of Heeia.

RECORDS AVAILABLE.—March 1, 1914, to June 30, 1915.

GAGE.—Vertical staff on right bank; read once daily. Datum raised 1.0 foot March 10, 1915; records published to new datum.

DISCHARGE MEASUREMENTS.—Made by wading. A 2.5-foot sharp-crested weir with end contractions was installed when station was established, but a rating by current meter has been used, as conditions for measurement by weir are not good.

CHANNEL AND CONTROL.—Channel is cut in earth and gravel; section about 3 feet wide and 3 feet deep; straight for 50 feet above and below gage. Control is 2.5-foot weir.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 0.56 foot (new datum) at 1.20 p. m. May 16, 1914 (discharge, 1.4 million gallons per day, or 2.2 second-feet); no flow April 27-28, 1914.

DIVERSIONS.—None above station.

REGULATION.—Flow regulated by head gates.

UTILIZATION.—Irrigation of rice fields.

ACCURACY.—Estimates March 1, 1914, to February 11, 1915, fair, as rating curve is fairly well defined and discharge relation remained constant between those dates. Estimates February 12 to June 30, 1915, poor; control seemed to be unstable and rating curves are poorly defined.

Discharge measurements of Lee ditch near Heeia, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Jan. 13	G. R. White	0.40	0.8	0.5
30	do	.14	1.2	.75
31	do	.47	1.3	.8
Sept. 15	H. A. R. Austin	.37	.5	.3
1915—Mar. 10	do	.33	.85	.55

Discharge, in million gallons per day, of Lee ditch near Heeia, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Mar.	Apr.	May.	June.	Date.	Mar.	Apr.	May.	June.
1914.					1914.				
1.....	0.5	0.05	0.3	0.7	16.....	0.7	0.1	1.4	0.7
2.....	.7	.1	.3	.7	17.....	.7	.1	1.0	.7
3.....	.7	.05	.05	.5	18.....	.7	.1	.7	.7
4.....	.7	.1	.3	.7	19.....	.7	.1	1.0	.1
5.....	.7	.5	.5	.7	20.....	.3	.1	1.0	.7
6.....	.7	.5	.3	.7	21.....	.3	.1	1.0	.6
7.....	.7	.05	.5	1.0	22.....	.3	.1	1.0	.5
8.....	1.0	.1	.3	1.0	23.....	.3	.1	.7	.3
9.....	.7	.1	.7	1.0	24.....	.3	.1	.7	.3
10.....	.7	.1	.3	.7	25.....	.3	.1	.7	.3
11.....	.7	.1	.3	.7	26.....	.7	.7	.7	.1
12.....	.7	.1	.3	.7	27.....	.1	.....	.7	.1
13.....	.7	.1	.5	.7	28.....	.05	.....	1.0	.1
14.....	.7	.1	.7	.7	29.....	.5	.05	.7	.1
15.....	.7	.1	.7	.7	30.....	.1	.1	.7	.1
					31.....	.1	.....	.5	.....

Discharge, in million gallons per day, of Lee ditch near Heeia, Oahu, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	0.1	0.5	0.7	0.3	0.5	0.3	0.5	0.7	0.6	0.4	0.5	0.7
2.....	.1	.5	.7	.3	.5	.3	.5	.7	.6	.4	.5	1.0
3.....	.1	.5	.7	.3	.5	.3	.5	.7	.6	.4	.5	.7
4.....	.1	.7	.7	.3	.7	.5	.5	.7	.6	.4	.5	.7
5.....	.3	.3	.7	.3	.7	.5	.5	.7	.6	.4	.5	1.0
6.....	.1	.7	.7	.3	.7	.5	.5	.7	.6	.4	.5	.8
7.....	.3	.7	.7	.3	.5	.5	.5	.7	.6	.4	.5	.7
8.....	.3	.7	.7	.3	.5	.5	.5	.7	.6	.4	.5	.7
9.....	.3	.7	.7	.3	.5	.5	.5	.7	.4	.4	.5	.7
10.....	.3	.7	.7	.3	.5	.5	.5	.7	.6	.4	.3	.7
11.....	.3	.7	.7	.3	.5	.5	.5	.7	.4	.4	.5	.7
12.....	.3	.7	.7	.3	.5	.5	.5	.9	.4	.4	.3	.7
13.....	.3	.5	.5	.1	.7	.5	.5	.9	.6	.4	.3	.7
14.....	.5	.5	.3	.1	1.0	.5	.5	.9	.4	.4	.3	.7
15.....	.5	.5	.3	.1	.7	.5	.5	.9	.4	.2	.3	.7
16.....	.5	.5	.3	.1	.5	.5	.5	.6	.4	.6	.3	.7
17.....	.5	.3	.5	.1	.5	.5	.5	.6	.4	.4	.3	.5
18.....	.5	.7	.5	.3	.5	.5	.5	.6	.4	.4	.3	.5
19.....	.5	.5	.5	.5	.5	.5	.5	.6	.6	.4	.3	1.0
20.....	.5	.5	.5	.7	.5	.5	1.0	.9	.6	.4	.3	.7
21.....	.7	.5	.3	.7	.5	.5	1.0	.6	.6	.4	.7	.5
22.....	.3	.7	.....	.7	.5	.5	1.0	.6	.9	.5	.7	.7
23.....	.7	.5	.....	.7	.5	.5	1.0	.9	.6	.5	.7	.1
24.....	.7	.5	.....	.7	.5	.5	1.0	.6	.6	.5	.7	.3
25.....	.5	.5	.....	.7	.5	.5	1.0	.6	.6	.5	1.0	.3
26.....	.7	.5	.3	.7	.5	.5	1.0	.6	.6	.7	1.0	.3
27.....	.7	.3	.1	.5	.5	.5	1.0	.6	.6	.3	1.0	.5
28.....	1.0	.3	.5	.5	.3	.5	1.0	.6	.6	.5	1.0	.3
29.....	1.0	.4	.3	.5	.3	.5	.7	.....	.6	.5	1.0	.3
30.....	.7	.5	.5	.5	.3	.5	.7	.....	.4	.5	1.0	.3
31.....	.7	.7	.....	.5	.....	.5	.7	.....	.4	.....	1.0	.....

NOTE.—Discharge determined from rating curves applicable as follows: Mar. 1, 1914, to Feb. 11, 1915, fairly well defined; Feb. 12 to Apr. 21, 1915, and Apr. 22 to June 30, 1915, poorly defined. The weir at this station acts only as an artificial control. Staff gage was knocked out by cattle Feb. 11, 1915, and it was replaced by observer at a different datum. High water occurred Sept. 22-25, 1914; no record. Discharge interpolated June 21, Aug. 29, 30, Sept. 13, Nov. 13, 1914, Feb. 13, 14, and June 6, 1915.

Monthly discharge of Lee ditch near Heeia, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
March.....	1.0	0.05	0.54	0.84	17	51
April 1-26, 29-30.....	.7	.05	.14	.22	4	12
May.....	1.4	.05	.63	.97	20	60
June.....	1.0	.1	.55	.85	17	51
The period (120 days).....	1.4	.05	.47	.73	58	174
1914-15.						
July.....	1.0	.1	.45	.70	14	43
August.....	.7	.3	.54	.84	17	51
September 1-21, 26-30.....	.7	.1	.53	.82	14	42
October.....	.7	.1	.40	.62	12	38
November.....	1.0	.3	.53	.82	16	49
December.....	.5	.3	.48	.74	15	46
January.....	1.0	.5	.66	1.02	21	63
February.....	.9	.6	.70	1.08	20	60
March.....	.9	.4	.54	.84	17	51
April.....	.7	.2	.43	.67	13	40
May.....	1.0	.3	.57	.88	18	54
June.....	1.0	.1	.61	.94	18	56
The period (361 days).....	1.0	.1	.54	.84	195	593

NOTE.—Estimates cover periods in which water was flowing in ditch. See foot note to daily-discharge table.

HAIKU STREAM NEAR HEEIA, OAHU.

LOCATION.—60 feet above intake of reservoir ditch, $1\frac{1}{2}$ miles west of Heeia.

RECORDS AVAILABLE.—January 29, 1914, to June 30, 1915.

GAGE.—Stevens water-stage recorder installed April 28, 1914, at same location and datum as staff gage, which was read once daily January 29, to April 27, 1914; original staff gage datum was raised 0.88 foot March 29, 1914; all records published to new datum.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

CHANNEL AND CONTROL.—One channel at all stages; straight for 20 feet above and 40 feet below station; banks steep and high; stream bed of solid rock. Control is smooth, solid-rock ledge; permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 6.45 feet at 8.30 p. m. May 1, 1914 (estimated discharge, 250 million gallons per day, or 390 second-feet); minimum stage recorded, 0.65 foot (discharge, 1.9 million gallons per day, or 2.9 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Low flow diverted below station for domestic supply and for irrigation of taro and rice.

ACCURACY.—Rating curve well defined for low and medium stages; estimates are good; flow was steady during period in which gage was read but once daily—January 29 to April 27, 1914—and estimates are good. High-water extension of rating curve not based on measurements; estimates above 16 million gallons per day may be considerably in error.

Discharge measurements of Haiku Stream near Heeia, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Jan. 31	G. R. White	0.66	2.8	1.8
Mar. 26	H. A. R. Austin	.72	3.8	2.4
26	do	1.08	11	7.2
28	do	1.18	14	8.9
July 16	G. K. Larrison	.76	5.2	3.4
Sept. 15	H. A. R. Austin	.88	6.9	4.5
1915—Apr. 30	do	1.05	11	7.4

Discharge, in million gallons per day, of Haiku Stream near Heeia, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	Date.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914.							1914.						
1.		1.9	1.9	3.0	24	9.4	16.		1.9	1.9	2.4	3.0	1.9
2.		1.9	1.9	3.0	26	3.6	17.		1.9	2.4	1.9	2.4	1.9
3.		1.9	1.9	2.4	5.7	3.0	18.		1.9	1.9	1.9	3.0	2.4
4.		1.9	1.9	2.4	3.6	2.4	19.		1.9	1.9	1.9	3.0	2.4
5.		1.9	2.4	22	3.0	2.4	20.		1.9	1.9	1.9	3.0	5.0
6.		1.9	1.9	8.6	3.6	1.9	21.		1.9	1.9	1.9	6.4	3.6
7.		1.9	1.9	3.6	7.1	2.4	22.		1.9	1.9	1.9	3.6	3.0
8.		1.9	1.9	1.9	3.6	1.9	23.		1.9	1.9	1.9	3.0	3.0
9.		1.9	1.9	2.4	7.8	1.9	24.		1.9	1.9	1.9	2.4	2.4
10.		1.9	1.9	2.4	3.6	1.9	25.		1.9	1.9	1.9	2.4	3.0
11.		1.9	1.9	2.4	3.0	1.9	26.		1.9	2.4	7.8	2.4	2.4
12.		1.9	1.9	1.9	3.0	1.9	27.		1.9	2.4	2.4	5.0	1.9
13.		1.9	1.9	1.9	3.0	1.9	28.		1.9	3.0	1.9	5.7	1.9
14.		1.9	1.9	1.9	3.0	1.9	29.		1.9	6.4	2.4	5.7	1.9
15.		1.9	1.9	1.9	3.0	1.9	30.		1.9	3.6	2.4	5.7	1.9
							31.		1.9	3.0		5.7	

Discharge, in million gallons per day, of Haiku Stream near Heeia, Oahu, for the years ending June 30, 1914 and 1915.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	1.9	2.4	3.6	3.0	2.4	2.4	3.0	2.4	2.4	2.4	4.3	2.4
2.....	1.9	1.9	4.3	3.0	5.7	2.4	3.0	2.4	2.4	2.4	3.6	2.4
3.....	1.9	1.9	3.0	2.4	2.4	3.0	3.0	2.4	2.4	2.4	3.0	2.4
4.....	1.9	2.4	2.4	2.4	2.4	6.4	3.0	2.4	2.4	2.4	3.0	2.4
5.....	2.4	7.1	2.4	2.4	2.4	3.0	3.0	2.4	2.4	1.9	3.0	2.4
6.....	1.9	1.9	3.0	2.4	4.3	3.0	3.0	2.4	2.4	1.9	2.4	2.4
7.....	1.9	1.9	3.0	2.4	4.3	3.0	3.0	2.4	2.4	1.9	2.4	1.9
8.....	1.9	1.9	3.0	2.4	4.3	3.0	3.0	2.4	2.4	2.4	2.4	1.9
9.....	1.9	1.9	3.0	2.4	3.0	3.0	3.0	2.4	2.4	2.4	2.4	1.9
10.....	1.9	1.9	3.0	2.4	2.4	3.0	3.0	2.4	2.4	2.4	3.0	2.4
11.....	1.9	4.3	3.0	2.4	2.4	3.0	3.0	2.4	2.4	2.4	2.4	2.4
12.....	1.9	2.4	3.0	2.4	2.4	3.0	3.0	3.0	2.4	3.0	2.4	2.4
13.....	1.9	1.9	3.0	2.4	3.0	3.0	3.0	2.8	3.0	2.4	2.4	2.4
14.....	1.9	1.9	21	2.4	6.4	3.0	3.0	2.6	3.0	1.9	2.4	2.4
15.....	1.9	1.9	7.8	2.4	3.0	3.0	3.0	2.4	2.4	1.9	2.4	1.9
16.....	3.6	2.4	3.0	2.4	3.0	3.0	3.0	2.4	2.4	6.4	3.0	2.4
17.....	2.4	1.9	2.4	2.4	2.4	3.0	3.0	2.4	2.4	4.3	3.0	1.9
18.....	2.4	2.4	2.4	2.4	2.4	2.4	3.0	2.4	2.4	4.3	2.4	1.9
19.....	1.9	2.4	2.4	2.4	2.4	2.4	3.0	2.4	1.9	3.6	1.9	2.4
20.....	1.9	1.9	2.4	2.4	2.4	3.6	3.0	2.4	1.9	3.0	1.9	1.9
21.....	1.9	2.4	7.8	2.4	2.4	3.0	2.4	3.0	1.9	3.0	2.4	1.9
22.....	1.9	9.4	32	2.4	2.4	3.0	2.4	2.4	2.4	2.4	2.4	1.9
23.....	1.9	2.4	27	1.9	2.4	3.0	2.4	2.4	1.9	2.4	2.4	1.9
24.....	1.9	2.4	4.3	2.4	2.4	3.0	2.4	3.0	1.9	3.0	2.4	2.4
25.....	1.9	2.4	9.4	2.4	2.4	3.0	2.4	3.0	1.9	3.0	2.4	2.4
26.....	1.9	1.9	6.4	2.4	2.4	3.0	2.4	3.0	1.9	7.8	1.9	3.0
27.....	1.9	1.9	3.6	2.4	2.4	3.0	2.4	3.0	1.9	14	1.9	3.6
28.....	1.9	3.0	3.0	2.4	3.0	3.0	2.4	2.4	1.9	4.3	2.4	2.4
29.....	3.6	2.4	2.4	2.4	2.4	3.0	2.4	2.4	1.9	3.6	2.4	2.4
30.....	3.0	3.0	3.0	2.4	2.4	3.0	2.4	2.4	1.9	5.7	2.4	2.4
31.....	2.4	4.3	3.0	2.4	2.4	3.0	2.4	2.4	1.9	2.4	2.4	2.4

NOTE.—Discharge determined from a rating curve well-defined below 16 million gallons per day (26 second-feet). Discharge estimated May 28-17, June 21-26, and Nov. 20-26, 1914.

Monthly discharge of Haiku Stream near Heeia, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.			Second-foot (mean).	Total run-off.	
	Million gallons per day.				Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
February	1.9	1.9	1.90	2.94	53	163
March.....	6.4	1.9	2.24	3.47	69	213
April.....	22	1.9	3.27	5.06	98	301
May.....	26	2.4	5.32	8.23	165	506
June.....	9.4	1.9	2.61	4.04	78	240
The period.....					463	1,420
1914-15.						
July.....	3.6	1.9	2.11	3.26	65	201
August.....	9.4	1.9	2.71	4.19	84	258
September.....	32	2.4	6.00	9.28	180	552
October.....	3.0	1.9	2.42	3.74	75	230
November.....	6.4	2.4	2.93	4.53	88	270
December.....	6.4	2.4	3.05	4.72	95	290
January.....	3.0	2.4	2.79	4.32	86	265
February.....	3.0	2.4	2.55	3.95	71	219
March.....	3.0	1.9	2.25	3.48	70	214
April.....	14	1.9	3.50	5.42	105	322
May.....	4.3	1.9	3.55	3.95	79	243
June.....	3.6	1.9	2.29	3.54	69	211
The year.....	32	1.9	2.92	4.52	1,070	3,280

RESERVOIR DITCH NEAR HEEIA, OAHU.

LOCATION.—200 yards below intake. Ditch diverts from Haiku Stream, $1\frac{1}{2}$ miles by road west of Heeia and 12 miles by road from Honolulu.

RECORDS AVAILABLE.—January 19, 1914, to June 30, 1915.

GAGE.—Vertical staff on left bank; read once daily. Datum raised 1.0 foot March 9, 1915; records published to new datum.

DISCHARGE MEASUREMENTS.—Made by wading. When station was established a 2.5-foot sharp-crested weir with end contractions was installed, but a current-meter rating has been used as the conditions for measurement by weir are not good.

CHANNEL AND CONTROL.—Channel is cut in firm earth and is approximately rectangular in section; subject to growth of weeds and grass which affects flow. Control is 2.5-foot weir. Crest of weir was bent over somewhat June 3, 1915, changing discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 1.32 feet (new datum) at 10 a. m. September 14, 1914 (discharge, approximately 11 million gallons per day, or 17 second-feet); ditch occasionally dry.

DIVERSIONS.—None above station.

REGULATION.—Flow regulated by head gates.

UTILIZATION.—Part of ditch flow is impounded in reservoir for domestic supply of Heeia, and part is diverted for irrigation of taro.

ACCURACY.—Estimates fair for low and medium stages; above 4 million gallons per day approximate only. Very few discharge measurements were made, but the discharge relation is known to have remained constant except for the change on June 3, 1915.

Discharge measurements of Reservoir ditch near Heeia, Oahu, during the years ending June 30 1914, and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Jan. 13	G. R. White.....	0.41	1.9	1.2
31	.....do.....	.54	1.7	1.1
Sept. 15	H. A. R. Austin.....	.28	.65	1.45
1915—Mar. 9	.....do.....	.40	2.0	1.3

Discharge, in million gallons per day, of Reservoir ditch near Heeia, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	Date.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914.							1914.						
1.....		1.5	1.2	1.5	1.2	1.2	16.....	1.5	1.5	1.5	2.2	2.2	
2.....		1.5	1.5	1.2	1.2	3.0	17.....	1.5	1.5	1.5	2.2	2.2	
3.....		1.5	1.5	1.2	1.2	2.5	18.....	1.5	1.5	1.5	2.2	2.2	
4.....		1.5	1.5	1.2	.5	2.5	19.....	1.5	1.5	1.5	1.5	2.5	2.5
5.....		1.5	1.5	9.9	1.2	2.5	20.....	1.5	1.5	1.5	1.5	2.5	4.4
6.....		1.5	1.5	3.0	2.2	2.2	21.....	1.5	1.5	1.5	1.5	4.9	3.9
7.....		1.5	1.5	2.2	4.4	2.5	22.....	1.5	1.5	1.5	1.5	2.5	3.4
8.....		1.5	1.5	1.5	2.2	2.2	23.....	1.5	1.5	1.5	1.5	2.2	2.2
9.....		1.5	1.5	1.5	2.5	2.2	24.....	1.5	1.5	1.5	1.5	2.2	2.5
10.....		1.5	1.5	1.5	2.2	2.2	25.....	1.5	1.5	1.5	1.5	2.2	3.9
11.....		1.5	1.5	1.5	2.2	2.2	26.....	1.5	1.5	1.5	3.4	2.2	2.2
12.....		1.5	1.5	1.5	2.5	2.2	27.....	1.5	1.5	1.5	1.2	2.2	2.2
13.....		1.5	1.5	1.5	2.5	2.2	28.....	1.5	1.5	1.8	1.2	4.9	2.2
14.....		1.5	1.5	1.2	2.2	2.2	29.....	1.5	.....	3.4	1.2	3.9	2.2
15.....		1.5	1.5	1.2	2.2	2.2	30.....	1.5	.....	1.8	1.2	3.4	2.2
							31.....	1.8	.....	1.5	.....	3.0	.....

Discharge, in million gallons per day, of Reservoir ditch near Heela, Oahu, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	2.2	2.2	3.9	4.9	4.9	3.4	3.0	2.5	1.2	1.5	3.4	2.2
2.....	2.2	1.8	3.4	5.4	7.8	3.4	3.4	2.4	1.2	1.5	3.9	2.2
3.....	2.2	1.8	2.2	4.9	4.9	3.4	3.4	2.2	1.2	1.5	3.4	2.2
4.....	2.2	2.2	2.2	4.9	4.9	6.0	3.4	2.2	1.2	1.5	3.4	2.8
5.....	2.2	.1	2.2	5.4	4.4	3.9	3.4	2.2	1.2	1.5	3.4	2.8
6.....	2.2	2.2	2.2	5.4	4.9	3.9	3.4	2.2	1.2	1.8	2.5	2.8
7.....	2.2	2.2	2.5	5.4	.5	1.5	3.4	2.5	1.2	1.8	2.5	2.8
8.....	2.2	2.2	2.2	5.4	.5	1.5	3.4	2.5	1.2	1.8	3.0	2.8
9.....	2.2	2.2	2.2	5.4	.7	1.0	3.0	1.5	1.2	1.8	3.0	2.8
10.....	2.2	2.2	2.2	5.4	.7	1.0	3.0	1.2	1.2	2.2	3.0	2.4
11.....	2.2	4.4	2.2	5.4	1.5	1.0	3.0	1.2	1.2	2.2	3.0	2.4
12.....	2.2	2.5	2.6	5.4	2.5	1.0	3.0	1.2	1.2	2.2	2.5	2.8
13.....	2.2	2.2	3.0	4.9	4.4	1.0	3.4	1.2	1.2	2.5	2.5	2.8
14.....	2.2	2.2	11	4.9	6.0	1.0	3.0	1.2	1.2	2.5	2.5	2.8
15.....	2.2	2.2	.7	4.9	4.4	1.0	3.0	1.2	1.2	2.5	2.5	2.8
16.....	3.4	2.2	1.5	4.9	3.9	1.0	3.0	1.2	1.2	4.9	2.5	2.8
17.....	2.5	2.2	3.4	4.9	3.9	1.0	3.0	1.2	1.2	3.9	2.5	2.8
18.....	2.5	2.2	3.4	4.9	3.4	.7	3.0	1.2	1.2	4.4	2.5	2.8
19.....	2.2	2.2	3.4	4.9	3.4	.7	3.0	1.2	1.2	3.9	2.5	3.7
20.....	2.2	2.2	3.9	5.4	3.4	.5	3.0	1.2	1.0	3.4	2.5	3.2
21.....	2.2	2.2	5.4	4.9	3.4	.5	3.0	1.2	1.0	3.4	2.5	2.8
22.....	2.2	8.5	.....	4.9	3.4	.7	3.0	1.2	1.2	3.0	2.5	2.8
23.....	2.2	2.2	.....	5.4	3.4	1.2	3.0	1.2	1.2	3.0	2.5	2.8
24.....	2.2	2.2	.....	4.9	3.4	1.2	2.5	1.2	1.2	3.0	2.5	2.8
25.....	2.2	2.2	.....	4.9	3.4	2.5	2.5	1.2	1.2	3.4	2.5	3.2
26.....	2.2	2.2	.....	4.9	3.4	2.5	2.5	1.2	1.2	6.0	2.5	3.2
27.....	2.2	2.2	.....	4.9	3.9	3.0	2.5	1.2	1.2	2.5	2.5	1.7
28.....	2.2	2.2	.....	4.9	3.9	3.0	2.5	1.2	1.5	.3	2.5	1.4
29.....	3.4	2.4	4.9	4.9	3.4	3.0	2.5	.....	1.5	3.0	2.5	1.4
30.....	2.5	2.7	5.4	4.9	3.4	3.0	2.5	.....	1.8	5.4	2.2	3.2
31.....	2.2	3.0	.....	4.9	.....	3.0	2.5	.....	1.8	.....	2.2	.....

NOTE.—Discharge determined from rating curves applicable as follows: Jan. 19, 1914, to June 3, 1915, fairly well defined below 2 million gallons per day (3 second-feet); June 4-30, 1915, well defined. On June 3, 1915, the weir crest, which serves as an artificial control for the gage, was found bent over.

Monthly discharge of Reservoir ditch near Heela, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-feet (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
January 19-31.....	1.8	1.5	1.52	2.35	20	61
February.....	1.5	1.5	1.50	2.32	42	129
March.....	3.4	1.2	1.57	2.43	49	149
April.....	9.9	1.2	1.83	2.83	55	168
May.....	4.9	.5	2.44	3.78	76	232
June.....	4.4	1.2	2.48	3.84	74	228
The period (163 days).....	9.9	.5	1.93	2.99	316	967
1914-15.						
July.....	3.4	2.2	2.31	3.57	72	220
August.....	8.5	.1	2.44	3.78	76	232
September 1-21, 29-30.....	11	.7	3.30	5.11	76	233
October.....	5.4	4.9	5.08	7.86	157	483
November.....	7.8	.5	3.53	5.46	106	325
December.....	6.0	.5	1.98	3.06	62	188
January.....	3.4	2.5	2.97	4.60	92	283
February.....	2.5	1.2	1.54	2.38	43	132
March.....	1.8	1.0	1.25	1.93	39	119
April.....	6.0	.3	2.74	4.24	82	252
May.....	3.9	2.2	2.71	4.19	84	258
June.....	3.7	1.4	2.67	4.13	80	246
The period (358 days).....	11	.1	2.70	4.18	969	2,970

NOTE.—Estimates cover periods in which water was flowing in ditch. See footnote to daily discharge table.

IOLEKAA STREAM NEAR HEEIA, OAHU.

LOCATION.—About 50 feet above uppermost diversion, 2 miles west of Heeia.

RECORDS AVAILABLE.—January 19, 1914, to June 30, 1915.

GAGE.—Vertical staff fastened to boulder on right bank 12 feet above footbridge; read once daily.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

CHANNEL AND CONTROL.—One channel at all stages; straight for 10 feet above and 40 feet below gage; composed of boulders and gravel; banks steep and high. Control composed of large boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.68 feet at 11.30 a. m. April 5, 1914 (discharge, 14 million gallons per day, or 23 second-feet); minimum stage recorded, 1.71 feet at 10.20 a. m. March 18, 1914 (discharge, 0.3 million gallons per day, or 0.45 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Low-water flow diverted below station for irrigation of taro and rice.

ACCURACY.—Estimates for low and medium stages are good. Rating curve well defined for ordinary stages and flow is steady. Estimates for high and fluctuating stages only fair, as gage was read only once a day, and the high-water extension of the rating curve is not well defined.

Discharge measurements of Iolekaa Stream near Heeia, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Jan. 13	G. R. White	1.84	1.3	0.8
31	do.	1.83	1.2	.8
Sept. 14	H. A. R. Austin	2.82	26	17
15	do.	2.00	3.8	2.4
1915—Mar. 8	do.	1.95	2.2	1.4

Daily discharge, in million gallons per day, of Iolekaa Stream near Heeia, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	Date.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914.							1914.						
1.....		0.5	0.7	1.0	1.0	1.8	16.....		0.5	0.5	1.3	1.0	0.7
2.....		.5	.7	.7	1.0	1.0	17.....		.5	.7	1.3	.7	.7
3.....		.5	.7	1.0	6.4	1.0	18.....		.5	.3	1.3	.7	1.0
4.....		.5	.7	1.0	2.2	1.0	19.....	1.3	.5	.5	1.3	1.0	1.0
5.....		.5	.7	1.4	1.3	1.0	20.....	.3	.5	.3	1.3	.7	2.2
6.....		.5	.5	5.6	1.3	.7	21.....	.5	.5	.5	1.3	1.8	1.6
7.....		.5	.5	2.8	1.8	1.0	22.....	.5	.5	.5	1.3	1.0	1.0
8.....		.5	.5	1.8	1.3	1.0	23.....	.5	.5	.5	1.3	.7	.7
9.....		.5	.5	1.8	2.8	.7	24.....	.5	.5	.5	1.3	.7	.7
10.....		.5	.5	1.3	1.3	1.0	25.....	.5	.5	.5	1.3	.7	1.8
11.....		.5	.5	1.8	1.3	.7	26.....	.5	.7	1.0	4.8	.7	.7
12.....		.5	.5	1.3	1.3	.7	27.....	.5	.5	.7	1.3	2.2	.7
13.....		.5	.5	1.3	1.0	1.0	28.....	.5	.7	1.3	1.3	2.8	.7
14.....		.5	.5	1.3	1.3	1.0	29.....	.5		3.4	1.3	2.2	.7
15.....		.5	.5	1.3	1.0	1.0	30.....	.5		1.8	1.0	2.8	.7
							31.....	.7		1.3		2.2	

Discharge, in million gallons per day, of Iolekaa Stream near Heeia, Oahu, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	0.7	0.7	1.8	1.8	1.3	1.8	2.2	2.2	1.8	1.8	2.2	1.8
2.....	.7	.7	1.8	2.2	4.1	1.8	2.2	2.2	1.8	1.8	2.8	1.8
3.....	.7	.7	1.0	1.8	1.8	1.8	2.2	2.2	1.8	1.8	2.8	1.8
4.....	.7	1.0	1.0	1.8	1.3	3.4	2.2	2.2	2.2	1.8	2.8	1.8
5.....	.7	2.2	1.0	1.8	1.8	2.2	2.2	2.2	1.8	1.8	2.2	1.8
6.....	.7	1.0	1.0	1.8	1.8	2.2	2.2	2.2	1.8	1.8	2.2	1.8
7.....	.7	1.0	1.3	1.8	1.8	2.2	2.2	2.2	1.8	1.8	2.2	1.8
8.....	.7	1.0	1.0	1.8	1.8	2.2	2.2	2.2	2.2	1.8	2.2	1.8
9.....	.7	1.0	1.0	1.8	1.8	2.2	2.2	2.2	1.8	2.2	2.2	1.8
10.....	.7	.7	1.0	1.8	1.8	2.2	2.2	2.2	2.2	2.2	2.2	1.8
11.....	.7	1.8	1.0	1.8	1.8	2.2	2.2	2.2	2.2	1.8	2.2	1.8
12.....	.7	1.0	1.0	1.8	1.8	2.2	2.2	2.2	2.2	2.8	2.2	1.8
13.....	.7	1.0	1.0	1.8	2.2	2.2	2.8	2.2	2.8	2.2	2.2	1.8
14.....	.7	1.0	8.0	1.3	5.6	2.2	2.2	2.2	2.2	1.8	2.2	1.8
15.....	.7	.7	2.2	1.8	2.2	1.8	2.2	2.2	2.2	1.8	2.2	1.8
16.....	1.0	1.0	1.3	1.8	1.8	2.2	2.2	2.2	2.2	4.1	2.2	1.8
17.....	1.0	1.0	1.3	1.3	1.8	2.2	2.2	2.2	2.2	2.8	2.2	1.8
18.....	1.0	1.0	1.0	1.3	1.8	2.2	2.2	2.2	2.2	3.4	2.2	1.8
19.....	.7	1.0	1.0	1.3	1.8	2.2	2.2	2.2	2.2	3.4	2.2	2.2
20.....	.7	.7	1.3	1.8	1.3	2.8	2.2	2.2	2.2	2.2	1.3	2.2
21.....	.7	1.0	2.8	1.8	1.8	2.2	2.2	2.2	1.8	1.8	1.8	2.2
22.....	.7	1.3	-----	1.3	1.8	2.2	2.2	2.2	2.2	1.8	2.2	1.8
23.....	1.0	1.0	-----	1.3	1.8	2.2	2.2	2.2	2.2	2.2	2.2	1.8
24.....	.7	.7	-----	1.3	1.8	2.2	2.2	2.2	2.2	2.2	2.2	1.3
25.....	.7	.7	-----	1.3	1.8	2.2	2.2	2.2	2.2	2.2	1.8	1.3
26.....	.7	.7	2.8	1.3	1.8	2.2	2.2	1.8	1.8	4.8	1.8	1.8
27.....	.7	.7	2.2	1.3	2.2	2.2	2.2	1.8	1.8	13	1.8	2.2
28.....	.7	.7	1.8	1.3	2.2	2.2	2.2	1.8	1.8	4.1	1.8	1.8
29.....	2.2	.8	2.2	1.3	1.8	2.2	2.2	-----	1.8	2.8	1.8	1.3
30.....	1.0	.9	2.2	1.3	1.8	2.2	2.2	-----	1.8	4.1	1.8	1.3
31.....	1.0	1.0	-----	1.3	-----	2.2	2.2	-----	2.2	-----	1.8	-----

NOTE.—Discharge determined from a rating curve well defined below 4 million gallons per day (6 second-feet) and fairly well defined below 20 million gallons per day (31 second-feet). High water Sept. 22-25, 1914; no record. Discharge interpolated Sept. 12, 1914, Feb. 13, 14, and June 6, 1915, and estimated Nov. 13, 1914.

Monthly discharge of Iolekaa Stream near Heeia, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
January 19-31.....	1.3	0.3	0.56	0.87	7	22
February.....	.7	.5	.51	.79	14	44
March.....	3.4	.3	.74	1.14	23	70
April.....	14	.7	2.02	3.13	61	186
May.....	6.4	.7	1.51	2.34	47	144
June.....	2.2	.7	.98	1.52	30	90
The period.....					182	556
1914-15.						
July.....	2.2	.7	.81	1.25	25	77
August.....	2.2	.7	.96	1.49	30	91
September 1-21, 26-30.....	8.0	1.0	1.73	2.68	45	138
October.....	2.2	1.3	1.59	2.46	49	151
November.....	5.6	1.8	2.01	3.11	60	185
December.....	3.4	1.8	2.21	3.42	68	210
January.....	2.8	2.2	2.22	3.43	69	211
February.....	2.2	1.8	2.16	3.34	60	186
March.....	2.8	1.8	2.05	3.17	64	195
April.....	13	1.8	2.80	4.33	84	258
May.....	2.8	1.3	2.13	3.30	66	203
June.....	2.2	1.3	1.79	2.77	54	165

WAIPIO DITCH NEAR HEEIA, OAHU.

LOCATION.—50 yards below intake. Ditch diverts from Haiku Stream, 1 mile west of Heeia.

RECORDS AVAILABLE.—January 19, 1914, to June 30, 1915.

GAGE.—Vertical staff; read once daily.

DISCHARGE MEASUREMENTS.—Made by wading. A 2.5-foot sharp-crested weir with end contractions was installed when station was established, but conditions for measurement by weir were not good and a rating by current meter has been used.

CHANNEL AND CONTROL.—Channel cut in earth and gravel; section about 4 feet wide and 2 feet deep; straight for 20 feet above and below gage. Control is 2.5-foot weir. Discharge relation is sometimes affected by silt filling in back of weir.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.42 feet at 11.20 a. m. April 5, 1914 (discharge, approximately 15 million gallons per day, or 23 second-feet); minimum stage recorded, 1.43 feet at 10.45 a. m. December 10, 1914 (discharge, 0.6 million gallons per day, or 0.9 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Irrigation of rice fields.

ACCURACY.—Estimates below 3 million gallons per day are fair, as rating curve is fairly well defined for ordinary stages and flow is steady; above 3 million gallons per day estimates are poor.

Discharge measurements of Waipio ditch near Heeia, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Jan. 13	G. R. White	1.54	1.2	0.8
31	.....do.....	1.65	2.0	1.3
Sept. 15	H. A. R. Austin.....	1.75	4.2	2.7
16	.....do.....	1.69	2.8	1.8
16	.....do.....	1.65	2.4	1.6
1915—Mar. 8	.....do.....	.68	2.7	1.8

Discharge, in million gallons per day, of Waipio ditch near Heeia, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	Date.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914.							1914.						
1.....		1.0	1.0	1.6	1.6	4.3	16.....	1.0	1.0	0.8	1.3	1.3	
2.....		1.0	1.0	1.6	1.6	2.0	17.....	1.0	1.3	.8	1.3	1.3	
3.....		1.0	1.0	1.3	7.6	1.6	18.....	1.0	1.0	.8	2.0	1.3	
4.....		1.0	1.0	1.3	2.0	2.0	19.....	1.3	1.0	1.0	.8	2.0	1.6
5.....		1.0	1.3	15	2.0	1.6	20.....	.8	1.0	1.0	1.0	2.0	4.3
6.....		1.0	1.0	4.3	1.6	1.6	21.....	.8	1.0	1.0	.8	4.3	4.0
7.....		1.0	1.0	2.0	3.0	2.0	22.....	1.0	1.0	1.0	.8	1.6	3.6
8.....		1.0	1.0	1.0	1.0	1.6	23.....	1.0	1.0	1.0	1.0	1.6	1.6
9.....		1.0	1.0	1.3	2.0	1.6	24.....	1.0	1.0	1.0	1.0	1.6	3.0
10.....		1.0	1.0	1.3	1.3	1.6	25.....	1.0	1.0	1.3	.8	1.6	3.0
11.....		1.0	1.0	1.3	1.3	1.6	26.....	1.0	1.0	1.6	3.6	1.6	1.3
12.....		1.0	1.0	1.0	1.3	1.6	27.....	1.0	1.0	1.3	.8	1.6	1.3
13.....		1.0	1.0	1.0	1.3	1.3	28.....	1.0	.8	2.0	.8	4.3	1.3
14.....		1.0	1.0	1.0	1.3	1.6	29.....	1.0		4.3	1.6	3.6	1.3
15.....		1.0	1.0	1.0	1.6	1.6	30.....	1.0		1.6	1.6	2.5	1.3
							31.....	1.3		1.6		2.5	

Discharge, in million gallons per day, of Waipio ditch near Heeia, Oahu, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	1.0	1.6	2.0	0.6	1.0	1.0	1.0	2.0	1.6	1.6	2.0	2.0
2.....	1.3	1.3	2.0	1.3	3.0	1.0	1.0	2.0	1.6	2.0	2.0	1.6
3.....	1.3	1.3	1.3	1.6	1.6	1.0	1.0	2.0	1.6	2.0	1.6	2.0
4.....	1.3	1.6	1.3	1.6	1.3	2.0	1.0	2.0	1.6	2.0	1.6	2.0
5.....	1.3	3.6	1.3	1.6	1.3	1.3	1.0	2.0	1.6	2.0	2.0	1.6
6.....	1.3	1.3	1.0	1.3	1.3	1.3	1.0	2.0	1.6	2.0	2.0	1.8
7.....	1.0	1.3	1.6	1.3	1.0	1.3	1.0	2.0	1.6	2.0	2.0	2.0
8.....	1.0	1.3	1.3	1.3	1.0	1.3	1.0	2.0	2.0	2.0	2.0	2.0
9.....	1.3	1.3	1.3	1.3	1.0	.6	.8	1.6	2.0	1.6	2.0	1.6
10.....	1.3	1.6	1.6	1.3	1.0	.6	.8	1.6	2.0	1.6	2.0	1.6
11.....	1.3	2.0	1.6	1.3	1.0	1.0	1.0	1.6	2.0	1.6	2.0	1.6
12.....	1.0	1.3	1.6	1.3	.8	1.0	1.0	1.6	2.0	1.6	1.6	1.6
13.....	1.3	1.0	1.6	1.3	1.4	1.0	1.0	1.6	2.0	2.0	1.6	2.0
14.....	1.3	1.3	1.1	1.3	2.0	1.0	1.0	1.6	2.0	1.6	1.6	2.0
15.....	1.3	1.3	2.5	1.3	1.0	1.0	1.0	1.6	2.0	1.3	2.0	2.0
16.....	2.5	1.3	2.0	1.3	.8	1.0	1.0	1.6	2.0	2.0	2.0	2.0
17.....	1.6	1.3	1.0	1.3	.8	.8	1.0	1.6	2.0	2.5	2.5	2.0
18.....	1.6	1.6	1.0	1.3	.8	1.0	.8	1.6	2.0	2.5	2.5	2.0
19.....	1.3	1.3	1.0	1.3	.8	1.3	.8	1.6	2.0	2.5	2.0	2.5
20.....	1.0	1.3	1.3	1.6	.8	1.6	.8	2.0	2.0	2.0	2.0	2.0
21.....	4.3	2.0	2.0	1.6	.8	1.3	.8	2.0	2.5	1.6	2.0	2.0
22.....	1.0	3.6	.....	1.3	.8	1.3	.8	1.6	2.5	1.3	2.0	2.0
23.....	1.3	1.6	.....	1.3	.8	1.0	.8	2.0	2.0	1.6	2.0	2.0
24.....	1.0	1.6	.....	1.3	.8	1.0	.8	2.0	2.0	1.6	2.0	1.6
25.....	1.3	1.6	.....	1.3	.8	1.0	.8	1.6	2.0	1.6	2.0	2.0
26.....	1.3	1.3	2.5	1.3	.8	1.0	.8	1.6	2.0	5.0	2.0	2.0
27.....	1.3	1.0	1.0	1.0	.8	1.0	.8	1.6	2.0	9.6	2.0	3.0
28.....	1.3	1.3	.8	1.3	.8	1.0	.8	1.6	2.0	3.0	2.0	2.0
29.....	3.0	1.6	.6	1.0	.8	1.0	.8	.....	2.0	1.6	2.0	2.0
30.....	2.0	1.8	.8	1.0	.8	1.0	.8	.....	2.0	4.3	2.0	2.0
31.....	2.0	2.0	.....	1.0	.....	1.0	2.0	.....	2.0	.....	2.0	.....

NOTE.—Discharge determined from a rating curve generally averaging all measurements. Discharge relation affected by filling up and cleaning out of channel of approach back of weir, which serves only as an artificial control for the gage. Weir crest was bent over by some one at an unknown date.

Monthly discharge of Waipio ditch near Heeia, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
January 19-31.....	1.3	0.8	1.02	1.58	13	41
February.....	1.0	.8	.99	1.53	28	85
March.....	4.3	1.0	1.24	1.92	38	118
April.....	15	.8	1.77	2.74	53	163
May.....	7.6	1.0	2.13	3.30	66	203
June.....	4.3	1.3	1.97	3.05	59	181
The period (163 days).....	7.6	.8	1.58	2.44	257	791
1914-15.						
July.....	4.3	1.0	1.49	2.31	46	142
August.....	3.6	1.0	1.59	2.46	49	151
September 1-21, 26-30.....	11	.6	1.81	2.80	47	144
October.....	1.6	.6	1.29	2.00	40	123
November.....	3.0	.8	1.06	1.64	32	98
December.....	2.0	.6	1.09	1.69	34	104
January.....	2.0	.8	.94	1.45	29	89
February.....	2.0	1.6	1.77	2.74	50	152
March.....	2.5	1.6	1.94	3.00	60	185
April.....	9.6	1.3	2.32	3.59	70	214
May.....	2.5	1.6	1.97	3.05	61	187
June.....	3.0	1.6	1.95	3.02	58	180
The period (361 days).....	11	.6	1.59	2.46	576	1,770

NOTE.—Estimates cover periods in which water was flowing in ditch. See footnote to daily discharge table.

WAIAHOLE STREAM BELOW POWER HOUSE, NEAR WAIAHOLE, OAHU.

LOCATION.—About 600 feet below hydroelectric power station, half a mile above gaging station, at lower boundary of Government land, and $2\frac{1}{2}$ miles south of junction of Waiahole Valley and main country road.

RECORDS AVAILABLE.—April 15 to June 30, 1915.

GAGE.—Gurley water-stage recorder on left bank.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—One channel at all stages, except possibly extreme floods; straight for several hundred feet above station and with very high gradient, resulting in a series of rapids and pools; composed of large boulders, and, prior to tunneling operations in the valley above, clean and containing little gravel or silt. Waste from the tunnels has partly filled the pool at the station; right bank perpendicular; left bank has a fairly flat slope, both above and below station; both banks covered with heavy vegetation above ordinary flood stages. Control probably permanent before tunnel operations were begun, but is now affected by tunnel waste.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 1.94 feet at 2.30 a. m., April 26, 1915 (discharge approximately 75,000,000 gallons per day, or 116 second-feet); minimum stage recorded during period, 1.45 feet, May and June, 1915 (discharge, 27,000,000 gallons per day, or 42 second-feet).

DIVERSIONS.—None above station.

REGULATION.—Discharge consists of water obtained by the Waiahole tunnels in the upper valley.

UTILIZATION.—Station was established to measure the water obtained in the main Waiahole tunnel and a water-development tunnel in the upper valley. Tunnel structures prevent direct measurements being made in the tunnels or at the portals. Water is used first to operate a hydroelectric power plant, and is then wasted back into the stream at a point about 600 feet above the station. The discharge at the station includes the flow from several springs in addition to the tunnel water. Miscellaneous measurements of the discharge of these other sources are made at frequent intervals, and coefficients obtained which may be applied to the total discharge at the station to determine the flow from the tunnels.

ACCURACY.—Estimates based on a fairly well-defined rating curve and continuous gage-height record; fair for ordinary stages.

Discharge measurements of Waiahole Stream below power house, near Waiahole, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Apr. 2	Howard Kimble.....	1.10	36	23
May 7	G. K. Larrison.....	1.18	43	28
June 26	H. A. R. Austin.....	1.24	71	46
Nov. 23	.....do.....	.98	57	37
23	Howard Kimble.....	.98	58	38
1915—Jan. 15	.....do.....	.96	56	36
15	H. A. R. Austin.....	.96	58	37
22	C. T. Bailey.....	.97	61	39
Feb. 18	H. A. R. Austin.....	a 1.60	56	36
Mar. 4	.....do.....	a 1.58	55	36
Apr. 1	.....do.....	a 1.58	60	39
May 7	.....do.....	a 1.54	51	33
June 24	.....do.....	a 1.47	44	28

a Water-stage recorder at new site.

Discharge, in million gallons per day, of Waiahole Stream below power house, near Waiahole, Oahu, for the year ending June 30, 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Apr.	May.	June.	Date.	Apr.	May.	June.	Date.	Apr.	May.	June.
1.....		34	30	11.....		30	27	21.....	34	27	27
2.....		34	30	12.....		30	27	22.....	34	27	27
3.....		34	30	13.....		30	27	23.....	34	27	27
4.....		34	30	14.....		30	27	24.....	34	30	27
5.....		34	30	15.....	34	30	27	25.....	34	30	27
6.....		30	30	16.....	42	30	27	26.....	47	30	27
7.....	27	30	17.....	17.....	38	30	27	27.....	42	30	27
8.....	30	30	18.....	18.....	38	30	27	28.....	34	30	30
9.....	30	30	19.....	19.....	38	27	30	29.....	34	27	27
10.....	30	30	20.....	20.....	34	27	27	30.....	34	27	27
								31.....		27	

NOTE.—Discharge determined from a well-defined rating curve.

Monthly discharge of Waiahole Stream below power house, near Waiahole, Oahu, during year ending June 30, 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
April 15-30.....	47	34	36.6	56.6	585	1,800
May.....	34	27	29.8	46.1	923	2,840
June.....	30	27	28.2	43.6	846	2,600

WAI AHOLE STREAM NEAR WAI AHOLE,¹ OAHU.

LOCATION.—About 100 feet south of house of Peleioholani, at lower boundary of Government land, a mile above junction of Waianu and Waiahole streams, and 2 miles south of junction of Waiahole Valley and main country roads.

RECORDS AVAILABLE.—September 25, 1911, to June 30, 1915.

GAGE.—Vertical staff on right bank, about 100 feet south of house of Peleioholani; read twice daily.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—One channel at all stages, except possibly extreme floods; straight for several hundred feet above and below gage; composed of loose boulders and gravel. Right bank nearly vertical and covered with vegetation. Left bank very flat slope and covered with heavy vegetation; cross section the same for several hundred feet above and below station. Control is made up of large loose boulders; shifting. An attempt April 4, 1914, made to establish a permanent control with large boulders, resulted in raising the water surface about 0.3 foot or from a gage reading of 1.40 to 1.70 feet. The flood of May 7, 1915, again shifted this control.

EXTREMES OF DISCHARGE.—Maximum stage recorded 1911–1915: 5.00 feet at 6 a. m. August 5, 1914 (discharge, 210 million gallons per day, or 325 second-feet); minimum stage recorded during biennial period, 0.98 foot July 9–16 and 22–24, 1913 (discharge, 14 million gallons per day, or 21 second-feet); minimum stage recorded 1911–1915, 0.91 foot December 30 and 31, 1912, and January 1–15, 1913 (discharge, 12 million gallons per day, or 18 second-feet).

DIVERSIONS.—None above station.

REGULATION.—Prior to August 1, 1913, the discharge was very steady, the greater part being supplied by a number of large springs about a mile above the station. In August, 1913, additional water was developed in the bore of the Waiahole Tunnel in the upper valley and was spilled into stream above the station. As the bore progressed the quantity of tunnel water which was added to the stream fluctuated considerably and increased the previous low-water discharge proportionately at the station below.

¹ Described in Water-Supply Papers 318 (p. 179), 336 (p. 117) and 373 (p. 97) as "Waiahole Stream at Manianiaula, near Walkane, Oahu."

UTILIZATION.—A small part of the original flow of the stream is used to irrigate taro and rice lands in the lower valley. The Waiahole Tunnel, which is the principal feature of a large irrigation project to deliver the discharge of windward Oahu streams to the sugar-cane lands near Pearl Harbor, on the opposite side of the Koolau Mountain range, will, when completed, divert the greater part of the low-water discharge of the stream.

ACCURACY.—Records fair. Sufficient discharge measurements were made to determine the shift in control and give fairly well defined curves.

Discharge measurements of Waiahole Stream near Waiahole, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—Aug. 8	J. C. Dort.....	1.26	38	25
15	G. K. Larrison.....	1.29	37	24
Sept. 12	G. R. White.....	1.39	43	28
Oct. 1	do.....	1.30	40	26
Dec. 9	J. C. Dort.....	1.30	40	26
1914—Jan. 30	G. R. White.....	1.27	34	22
Apr. 3	Howard Kimble.....	1.70	44	28
May 7	G. K. Larrison.....	1.85	50	32
Oct. 16	H. A. R. Austin.....	2.09	70	45
1915—Jan. 22	C. T. Bailey.....	1.98	65	42
May 7	R. C. Rice.....	1.98	57	37

Discharge, in million gallons per day, of Waiahole Stream near Waiahole, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	14	17	30	28	24	24	25	25	23	29	32	36
2.....	15	21	32	28	24	24	25	25	23	29	32	34
3.....	14	22	32	28	24	25	25	25	23	29	36	34
4.....	14	23	30	28	24	24	25	25	23	30	34	34
5.....	14	23	30	28	24	24	25	25	27	32	34	34
6.....	14	23	30	28	24	24	25	25	29	36	34	34
7.....	14	24	30	28	24	24	25	25	29	32	36	34
8.....	14	24	30	27	25	25	25	25	29	30	40	34
9.....	14	24	30	26	24	25	25	25	29	30	36	36
10.....	14	24	29	26	24	25	25	23	27	30	36	36
11.....	14	25	28	25	24	25	23	23	23	30	34	36
12.....	14	25	28	25	24	25	23	23	23	30	34	36
13.....	14	25	28	25	24	25	23	23	23	30	34	36
14.....	14	25	28	25	24	25	23	23	23	30	34	36
15.....	14	25	28	25	24	25	23	23	23	30	34	36
16.....	14	26	29	25	24	25	23	23	27	30	34	34
17.....	14	59	29	25	24	25	25	23	27	30	34	34
18.....	14	26	29	25	25	25	23	23	23	30	36	34
19.....	14	28	32	25	25	25	23	23	23	30	36	34
20.....	14	28	30	25	25	25	23	23	23	30	34	34
21.....	14	28	30	25	25	25	23	23	23	30	34	34
22.....	14	28	30	25	25	25	23	23	29	30	34	34
23.....	14	29	30	25	24	25	25	23	50	30	34	34
24.....	14	30	29	25	24	25	25	23	29	30	34	36
25.....	14	30	29	25	24	25	23	23	50	30	34	36
26.....	14	30	29	25	24	25	23	23	37	30	34	36
27.....	14	30	29	24	24	25	23	23	29	30	34	36
28.....	14	30	29	24	24	25	25	23	29	30	34	36
29.....	14	30	29	24	24	25	25	23	29	32	24	38
30.....	14	30	29	24	24	25	25	23	29	32	34	40
31.....	14	30		24	25	25			20		34	

Discharge, in million gallons per day, of Waiahole Stream near Waiahole, Oahu, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	40	38	32	44	44	42	38	38	38	38	40	35
2.....	38	38	32	44	44	42	38	38	38	38	42	35
3.....	38	40	32	44	44	42	38	38	38	38	40	35
4.....	38	40	32	44	44	42	38	38	38	38	40	35
5.....	38	168	32	44	44	42	38	38	38	38	40	33
6.....	38	32	32	44	82	42	38	38	38	38	40	33
7.....	38	32	32	44	46	42	38	38	38	38	40	33
8.....	38	32	32	44	44	42	38	38	38	38	39	33
9.....	38	32	32	44	44	42	38	38	38	38	39	33
10.....	38	32	32	44	44	42	38	38	38	38	39	31
11.....	38	38	32	44	44	42	38	38	38	38	39	31
12.....	38	32	32	44	42	42	38	40	38	52	39	31
13.....	38	32	32	44	42	42	38	38	38	42	37	31
14.....	38	32	32	44	44	42	38	38	38	40	37	31
15.....	38	32	32	44	42	42	38	38	38	40	37	31
16.....	38	32	32	44	42	42	40	38	38	44	37	31
17.....	40	38	32	44	42	42	40	40	38	44	37	31
18.....	38	32	32	44	42	40	40	40	38	42	37	31
19.....	38	32	32	44	42	42	40	40	38	42	36	31
20.....	38	32	32	44	42	42	40	40	38	40	36	31
21.....	38	32	54	44	42	42	38	40	38	40	36	30
22.....	38	32	87	44	42	42	38	40	38	40	36	30
23.....	40	32	165	44	42	42	38	40	38	40	36	30
24.....	40	32	42	44	42	42	38	40	38	40	36	30
25.....	40	32	87	44	42	42	38	40	38	40	36	30
26.....	40	32	44	44	42	42	38	38	38	52	26	30
27.....	40	32	40	44	42	42	38	38	38	44	26	30
28.....	40	32	38	44	42	42	38	38	38	40	26	30
29.....	40	32	44	44	42	42	38	.....	38	40	26	30
30.....	40	36	49	44	42	42	38	.....	38	40	25	30
31.....	40	34	.....	44	.....	42	38	.....	38	.....	35	.....

NOTE.—Discharge determined from fairly well defined rating curves applicable July 1, 1913, to Apr. 3, 1914, and Apr. 4, 1914, to May 7, 1915. Indirect method for shifting channels used May 8 to June 30, 1915; during this period flow was very steady, being practically the outflow of the Waiahole tunnel and Wahee tributary.

Monthly discharge of Waiahole Stream near Waiahole, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	15	14	14.0	21.7	435	1,330
August.....	59	17	27.2	42.1	842	2,590
September.....	32	28	29.5	45.6	885	2,720
October.....	28	24	25.6	39.6	795	2,440
November.....	25	24	24.2	37.4	726	2,230
December.....	25	24	24.8	38.4	769	2,360
January.....	25	23	24.1	37.3	747	2,290
February.....	25	23	23.6	36.5	662	2,030
March.....	50	23	27.8	43.0	863	2,640
April.....	36	29	30.4	46.7	911	2,780
May.....	40	32	34.5	53.4	1,070	3,280
June.....	40	34	35.2	54.5	1,060	3,240
The year.....	59	14	26.7	41.3	9,760	29,900
1914-15.						
July.....	40	38	38.7	59.9	1,200	3,680
August.....	168	32	37.9	58.6	1,170	3,610
September.....	165	32	43.0	66.5	1,290	3,960
October.....	44	44	44.0	68.1	1,360	4,190
November.....	82	42	44.1	68.2	1,320	4,080
December.....	49	42	42.2	65.3	1,310	4,010
January.....	40	38	38.3	59.3	1,190	3,640
February.....	40	38	38.7	59.9	1,080	3,330
March.....	38	38	38.0	58.8	1,180	3,620
April.....	52	38	40.7	68.0	1,220	3,750
May.....	42	35	37.6	58.2	1,160	3,580
June.....	35	30	31.5	48.7	946	2,900
The year.....	168	30	39.6	61.3	14,400	44,300

KAHANA STREAM NEAR KAHANA, OAHU.

LOCATION.—Half a mile above confluence with East Branch of Kahana Stream, 1½ miles above mouth of stream and south of Kahana.

RECORDS AVAILABLE.—June 19, 1914, to June 30, 1915.

GAGE.—Stevens water-stage recorder on right bank.

DISCHARGE MEASUREMENTS.—Made by wading or from cable.

CHANNEL AND CONTROL.—One channel at all stages; straight for 50 feet above and 150 feet below gage; stream bed of gravel and boulders; right bank steep and high; left bank has gentle slope. Control composed of large and small boulders; shifts during floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 6.79 feet at 6 a. m. September 23, 1914 (discharge, approximately 1,150 million gallons per day, or 1,780 second-feet). Minimum stage recorded, 0.90 foot February, March, and April, 1915 (discharge, 19 million gallons per day, or 29 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Irrigation of sugar cane, taro, and rice.

ACCURACY.—Estimates June 19, 1914, to April 26, 1915, based on a well-defined rating curve; good, except for short periods when recorder did not work and discharge was interpolated. Estimates April 27 to June 30, 1915, based on a poorly defined rating curve but are fair, since flow was steady and no floods occurred to change discharge relation.

Discharge measurements of Kahana Stream near Kahana, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Mar. 23	H. A. R. Austin.....	1.00	21	14
Apr. 20	Howard Kimble.....	1.66	85	55
Sept. 28	.....do.....	1.75	101	65
1915—Jan. 7	.....do.....	1.00	35	23
Feb. 3	.....do.....	.90	30	20
Mar. 4	H. A. R. Austin.....	1.29	57	37
Apr. 26	.....do.....	2.65	238	154
Apr. 29	.....do.....	2.94	365	236
June 7	.....do.....	1.08	37	24

Discharge, in million gallons per day, of Kahana Stream near Kahana, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	June.	Date.	June.	Date.	June.
1914.		1914.		1914.	
1.....		11.....		21.....	42
2.....		12.....		22.....	48
3.....		13.....		23.....	42
4.....		14.....		24.....	42
5.....		15.....		25.....	48
6.....		16.....		26.....	40
7.....		17.....		27.....	34
8.....		18.....		28.....	34
9.....		19.....	24	29.....	34
10.....		20.....	70	30.....	40

Discharge, in million gallons per day, of Kahana Stream near Kahana, Oahu, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	45	42	51	54	42	30	23	23	23	19	62	27
2.....	34	37	70	54	67	34	23	19	23	21	56	27
3.....	34	34	45	45	37	54	23	19	34	21	56	25
4.....	48	.....	42	45	32	60	25	19	37	21	47	23
5.....	40	.....	40	42	32	45	25	21	27	21	39	23
6.....	40	.....	42	42	64	48	25	19	30	21	36	23
7.....	40	.....	45	42	42	37	23	21	30	21	34	23
8.....	40	.....	37	42	57	34	23	19	25	21	32	23
9.....	40	.....	37	74	48	32	23	19	25	21	32	21
10.....	40	.....	37	48	42	34	25	19	.....	27	39	21
11.....	40	.....	37	42	37	32	23	19	.....	32	36	21
12.....	40	.....	40	42	34	30	23	30	.....	42	32	21
13.....	40	.....	51	42	34	30	32	23	.....	.....	32	21
14.....	40	.....	274	40	40	27	25	21	.....	.....	32	23
15.....	40	.....	78	40	34	27	23	19	.....	.....	32	23
16.....	45	.....	64	40	32	27	23	21	.....	.....	39	21
17.....	42	.....	48	40	32	27	23	21	.....	.....	44	21
18.....	45	.....	45	40	30	27	23	19	.....	.....	42	23
19.....	40	.....	60	37	30	48	23	19	.....	.....	34	34
20.....	40	.....	54	40	30	32	21	23	23	.....	32	32
21.....	37	.....	92	37	30	30	23	67	23	.....	32	.....
22.....	34	.....	226	34	30	27	23	37	25	.....	32	.....
23.....	40	.....	274	34	30	27	23	32	23	27	29	.....
24.....	37	37	78	34	30	27	23	48	21	30	29	.....
25.....	57	37	182	32	30	25	23	30	19	45	29	.....
26.....	37	34	189	32	30	25	23	27	19	154	27	.....
27.....	42	34	108	32	34	25	23	25	19	123	27	.....
28.....	82	42	60	34	37	25	23	25	19	66	27	.....
29.....	64	42	57	32	37	25	23	.....	19	137	27	.....
30.....	57	64	57	30	32	25	23	.....	19	130	25	.....
31.....	48	60	.....	30	.....	23	23	.....	19	.....	25	.....

NOTE.—Discharge determined from rating curves applicable as follows: June 19, 1914, to Apr. 26, 1915, well-defined below 200 million gallons per day (309 second-feet); Apr. 27 to June 30, 1915, poorly defined. High-water extensions of curves not based on discharge measurements. Discharge estimated June 24-27, July 6-13, 1914, Jan. 31 to Feb. 3, and Apr. 5-11, 1915. Discharge interpolated Nov. 18-20, 1914, Jan. 22-29, Mar. 7, 8, 25-27, and Apr. 3, 1915. No records obtained for days for which discharge is not given.

Monthly discharge of Kahana Stream near Kahana, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
June 19-30.....	70	34	42.3	65.4	508	1,560
1914-15.						
July.....	82	34	43.5	67.3	1,350	4,140
August 1-3, 24-31.....	64	34	42.1	65.1	463	1,420
September.....	274	37	84.0	130	2,520	7,730
October.....	74	30	40.4	62.5	1,250	3,840
November.....	67	30	37.2	57.6	1,120	3,420
December.....	60	23	32.2	49.8	999	3,060
January.....	32	21	23.5	36.4	730	2,240
February.....	67	19	25.1	38.8	704	2,160
March 1-9, 20-31.....	37	19	23.9	37.0	502	1,540
April 1-12, 23-30.....	154	19	50.0	77.4	1,000	3,070
May.....	62	25	35.4	54.8	1,100	3,370
June 1-20.....	34	21	23.8	36.8	476	1,460

EAST BRANCH OF KAHANA STREAM NEAR KAHANA, OAHU.

LOCATION.—Just above headquarters of Kahana Agricultural Co.; 500 feet above confluence with main Kahana Stream, and 1 mile south of Kahana.

RECORDS AVAILABLE.—April 30, 1914, to June 30, 1915.

GAGE.—Vertical staff on left bank; read twice daily.

DISCHARGE MEASUREMENTS.—Made by wading or from cable.

CHANNEL AND CONTROL.—Two channels at high stages; straight for 50 feet above and below gage; left bank steep and high; right bank low and overflows at high stages. Control is a riffle of small boulders; not well defined; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.86 feet at 5.15 p. m., September 14, 1914 (discharge, approximately 100 million gallons per day, or 155 second-feet); minimum stage recorded, 1.14 feet June, 1915 (discharge, 0.8 million gallons per day, or 1.2 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Irrigation of taro.

ACCURACY.—Estimates rated as follows: April 30 to September 23, 1914, poor on account of lack of discharge measurements; September 24 to December 4, 1914, fair for low and medium stages; December 5, 1914, to June 30, 1915, based on a well-defined rating curve and good for low and medium stages. Estimates above 14 million gallons per day approximate.

Discharge measurements of East Branch of Kahana Stream near Kahana, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Apr. 30	Howard Kimble	1.52	33	21
Sept. 29	do.	1.62	16	10
Nov. 20	H. A. R. Austin	1.38	4.5	2.9
Dec. 21	do.	1.32	6.9	4.5
1915—Jan. 7	Howard Kimble	1.22	2.6	1.7
Feb. 3	G. K. Larrison	1.22	2.2	1.4
3	do.	1.22	2.2	1.4
Apr. 29	H. A. R. Austin	1.59	20	13
June 7	do.	1.17	2.0	1.3

Discharge, in million gallons per day, of East Branch of Kahana Stream near Kahana, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Apr.	May.	June.	Date.	Apr.	May.	June.	Date.	Apr.	May.	June.
1914.				1914.				1914.			
1.....		12	26	11.....		16	6.0	21.....		12	6.0
2.....		16	24	12.....		12	9.0	22.....		12	4.7
3.....		20	16	13.....		10	6.0	23.....		9.0	7.5
4.....		18	12	14.....		10	4.7	24.....		9.0	7.5
5.....		14	10	15.....		9.0	4.7	25.....		9.0	9.0
6.....		12	9.0	16.....		10	4.7	26.....		6.0	6.0
7.....		34	9.0	17.....		10	4.7	27.....		6.0	4.7
8.....		49	9.0	18.....		14	4.7	28.....		10	4.7
9.....		26	7.5	19.....		10	4.7	29.....		10	4.7
10.....		20	7.5	20.....		10	10	30.....		34	6.0
								31.....		16	.....

Discharge, in million gallons per day, of East Branch of Kahana Stream near Kahana, Oahu, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	4.7	6.0	7.5	9.2	3.4	2.4	2.8	2.8	4.0	1.6	10	1.6
2.....	4.7	4.7	14	4.7	9.2	2.4	2.8	1.6	2.8	1.6	8.4	1.6
3.....	4.7	9.0	10	6.0	4.7	3.4	2.8	1.6	4.0	1.6	8.4	1.6
4.....	4.7	7.5	7.5	4.7	3.4	34	2.8	1.6	4.0	1.6	8.4	1.6
5.....	4.7	7.5	7.5	3.4	3.4	14	2.8	1.6	4.0	1.6	6.8	1.6
6.....	4.7	6.0	12	6.0	22	10	2.8	1.6	4.0	1.6	6.8	1.6
7.....	4.7	4.7	12	4.7	6.0	8.4	2.8	1.6	4.0	1.6	6.8	1.6
8.....	4.7	4.7	7.5	4.7	18	8.4	2.8	1.6	2.8	1.6	6.8	1.6
9.....	4.7	3.4	6.0	4.7	4.7	6.8	2.8	1.6	2.8	1.6	6.8	1.6
10.....	4.7	4.7	6.0	7.6	4.7	5.4	2.8	1.6	2.8	4.0	6.8	1.6
11.....	4.7	12	6.0	4.7	4.7	5.4	2.8	1.6	1.6	5.4	5.4	1.6
12.....	4.7	7.5	6.0	3.4	3.4	5.4	8.4	2.8	1.6	14	5.4	.8
13.....	4.7	6.0	4.7	3.4	3.4	5.4	4.0	2.8	1.6	8.4	5.4	.8
14.....	3.4	4.7	67	2.4	24	5.4	2.8	2.8	2.8	5.4	5.4	.8
15.....	4.7	4.7	26	3.4	11	4.0	2.8	2.8	2.8	5.4	4.0	.8
16.....	9.0	4.7	12	3.4	7.6	4.0	2.8	2.8	2.8	5.4	4.0	.8
17.....	7.5	9.0	10	3.4	4.7	4.0	2.8	2.8	2.8	31	4.0	.8
18.....	9.0	7.5	9.0	3.4	3.4	2.8	2.8	1.6	2.8	21	4.0	.8
19.....	7.5	7.5	7.5	3.4	3.4	8.4	2.8	1.6	2.8	17	4.0	2.8
20.....	6.0	6.0	9.0	3.4	3.4	5.4	2.8	2.8	1.6	10	4.0	2.8
21.....	6.0	7.5	46	2.4	3.4	5.4	2.8	10	1.6	8.4	4.0	2.8
22.....	6.0	7.5	55	2.4	3.4	4.0	2.8	5.4	1.6	6.8	2.8	1.6
23.....	7.5	9.0	61	2.4	3.4	4.0	2.8	10	1.6	6.8	2.8	1.6
24.....	4.7	6.0	18	2.4	3.4	4.0	2.8	10	1.6	8.4	2.8	1.6
25.....	4.7	6.0	61	2.4	3.4	2.8	2.8	5.4	1.6	23	2.8	.8
26.....	4.7	4.7	37	2.4	4.7	2.8	2.8	4.0	1.6	36	2.8	.8
27.....	4.7	4.7	22	2.4	3.4	2.8	2.8	4.0	1.6	43	1.6	23
28.....	7.5	10	4.7	3.4	3.4	2.8	2.8	2.8	1.6	36	1.6	12
29.....	9.0	12	11	2.4	3.4	2.8	2.8	.....	1.6	21	1.6	5.4
30.....	9.0	18	14	2.4	3.4	2.8	2.8	.....	1.6	23	1.6	2.8
31.....	7.5	12	.....	2.4	.....	2.8	2.8	.....	1.6	.....	1.6	.....

NOTE.—Discharge determined from rating curves applicable as follows: Apr. 30 to Sept. 23, 1914, poorly defined; Sept. 24 to Dec. 4, 1914, fairly well defined below 12 million gallons per day (19 second-feet); Dec. 5, 1914, to June 30, 1915, well defined below 14 million gallons per day (22 second-feet). Extensions of rating curve to cover high-water periods not based on discharge measurements.

Monthly discharge of East Branch of Kahana Stream near Kahana, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.			Total run-off.	
	Million gallons per day.			Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.		
1914.					
May.....	49	6.0	14.4	22.3	1,370
June.....	26	4.7	8.33	12.9	767
1914-15.					
July.....	9.0	3.4	5.79	8.96	551
August.....	18	3.4	7.26	11.2	691
September.....	61	4.7	19.2	29.7	1,770
October.....	9.2	2.4	3.79	5.86	361
November.....	24	3.4	6.13	9.48	564
December.....	34	2.4	5.88	9.10	559
January.....	8.4	2.8	3.02	4.67	287
February.....	10	1.6	3.33	5.15	286
March.....	4.0	1.6	2.45	3.79	233
April.....	43	1.6	11.8	18.3	1,090
May.....	10	1.6	4.76	7.36	453
June.....	23	.8	2.71	4.19	250
The year.....	61	.8	6.33	9.79	7,100

PUNALUU STREAM AT ELEVATION 539 FEET, NEAR PUNALUU, OAHU.

LOCATION.—About a quarter of a mile below confluence of Kalena and Pio branches of the stream, and 5 miles by road and foot trail south of Punaluu railroad station.

RECORDS AVAILABLE.—April 27 to June 30, 1915.

GAGE.—Eight-day Stevens water-stage recorder on right bank.

DISCHARGE MEASUREMENTS.—Made by wading or from cable located 150 feet above gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for several hundred feet above and below the station; composed of boulders and gravel; right bank has sharp slope and left bank is vertical; both branches are fairly clean up to extreme flood stages; cross section is the same for several hundred feet above and below the gage. Control composed of large boulders; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 1.52 feet at 4 p. m., April 27, 1915 (discharge, 18 million gallons per day, or 28 second-feet); minimum stage recorded during period, 0.75 foot, June, 1915 (discharge, 2.4 million gallons per day, or 3.7 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Part of low-water flow is diverted at low elevations for rice and taro irrigation. Station was established to determine the feasibility of a project to divert the waters of the upper Punaluu Valley to augment the water diverted from the Kahana Valley by the Waiahole Water Co.

ACCURACY.—Estimates based on a fairly well defined rating curve, fair for period May 4 to June 6, 1915. Estimates June 7-30 poor, owing to broken gage-height record.

Discharge measurements of Punaluu Stream at elevation 539 feet, near Punaluu, Oahu, during the year ending June 30, 1915.

[Made by H. A. R. Austin.]

Date.	Gage height (feet).	Discharge.	
		Second-feet.	Million gallons per day.
Apr. 27.....	1.51	28	18
June 8.....	.77	4.6	2.9

Discharge, in million gallons per day, of Punaluu Stream at elevation 539 feet, near Punaluu, Oahu, for the year ending June 30, 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Apr.	May.	June.	Date.	Apr.	May.	June.	Date.	Apr.	May.	June.
1.....			3.4	11.....		5.3	2.4	21.....		5.3	2.4
2.....			2.8	12.....		5.3	2.4	22.....		5.3	2.4
3.....			2.8	13.....		5.3	2.4	23.....		5.3	2.8
4.....		8.0	2.8	14.....		5.3	2.4	24.....		4.6	5.5
5.....		8.0	2.8	15.....		5.3	2.4	25.....		3.4	5.5
6.....		7.0	2.8	16.....		5.3	2.4	26.....		3.4	4.5
7.....		6.2	2.6	17.....		6.2	2.4	27.....	18	3.4	4.5
8.....		6.2	2.4	18.....		6.2	3.0	28.....		3.4	4.5
9.....		6.2	2.4	19.....		5.3	5.5	29.....		3.4	4.0
10.....		6.2	2.4	20.....		5.3	3.0	30.....		3.4	4.0
								31.....		3.4	

NOTE.—Discharge determined from a fairly well defined rating curve. The water-stage recorder not operating satisfactorily Apr. 27 to May 3 and June 7-28; staff-gage readings used Apr. 27, June 8, 15, and 22. Discharge for periods in June for which gage record was lacking estimated by comparison with record from lower station.

Monthly discharge of Punaluu Stream at elevation 539 feet, near Punaluu, Oahu, for the year ending June 30, 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
May 4-31.....	8.0	3.4	5.25	8.12	147	451
June.....	5.5	2.4	3.19	4.94	96	294

PUNALUU STREAM AT ELEVATION 250 FEET, NEAR PUNALUU, OAHU.

LOCATION.—About $1\frac{1}{2}$ miles by wagon road and horse trail, south of Punaluu railroad station.

RECORDS AVAILABLE.—May 14, 1914, to June 30, 1915.

GAGE.—Stevens water-stage recorder on left bank.

DISCHARGE MEASUREMENTS.—By wading or from cable located about 150 feet below gage.

CHANNEL AND CONTROL.—One channel at all stages, straight for about 200 feet above and below gage; composed of large boulders; right bank has gradual slope and is covered with small trees and vegetation; left bank has sharp slope and is covered with vegetation; cross section the same for several hundred feet above the gage; at a point about 100 feet below the gage left bank becomes vertical and right bank is about the same as at the gage. Control composed of large boulders; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 5.85 feet at 5 a. m., September 23, 1914 (discharge, approximately 700 million gallons per day, or 1,080 second-feet). Minimum stage recorded during period, 1.00 foot, March 28-30, 1915 (discharge, 10 million gallons per day, or 15 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Part of low-water flow is diverted at low elevations for rice and taro irrigation.

ACCURACY.—Estimates good for all stages except extreme floods; discharge relation remained constant and a good rating curve was developed. Water-stage recorder gave good record.

Discharge measurements of Punaluu Stream at elevation 250 feet, near Punaluu, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1914—Mar. 17	H. A. R. Austin.....	1.10	21	14
May 14	Howard Kimble.....	1.22	30	20
Sept. 29	.....do.....	1.48	62	40
1915—Jan. 7	.....do.....	1.16	28	18
Apr. 27	H. A. R. Austin.....	1.95	121	78
28	.....do.....	1.52	55	36

Discharge, in million gallons per day, of Punahuu Stream at elevation 250 feet, near Punahuu, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	May.	June.	Date.	May.	June.	Date.	May.	June.
1914.			1914.			1914.		
1.....		116	11.....			21.....	38	19
2.....		64	12.....			22.....	22	25
3.....		42	13.....			23.....	25	19
4.....		31	14.....	19		24.....	89	25
5.....		25	15.....	19		25.....	28	31
6.....			16.....	16		26.....	22	22
7.....			17.....	14		27.....	31	22
8.....			18.....	28		28.....	50	19
9.....			19.....	25	16	29.....	34	16
10.....			20.....	31	25	30.....	42	19
						31.....	34	.....

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	22	19	25	31	25	22	19	14	14	12	42	16
2.....	16	19	28	28	34	22	19	14	14	12	38	14
3.....	16	19	22	28	22	50	19	14	16	12	34	14
4.....	16	25	22	25	19	38	19	14	16	12	31	14
5.....	16	31	22	25	19	38	19	14	14	12	28	14
6.....	14	22	22	25	55	38	16	14	16	12	22	14
7.....	14	19	22	22	31	28	16	14	14	12	22	14
8.....	14	19	19	22	31	25	16	14	14	12	19	14
9.....	12	16	19	28	28	25	19	14	14	14	19	14
10.....	14	19	19	25	25	25	16	14	14	12	22	14
11.....	12	42	16	22	22	25	16	12	14	14	19	14
12.....	12	25	19	22	22	22	16	14	14	31	19	14
13.....	10	22	25	22	22	22	22	14	16	25	16	14
14.....	10	19	100	22	28	22	16	12	16	16	16	14
15.....	12	19	46	22	22	22	16	12	16	16	16	14
16.....	14	19	38	22	22	22	16	12	14	46	19	14
17.....	16	19	28	22	22	22	16	12	14	42	19	14
18.....	19	19	25	22	22	22	16	12	14	42	22	14
19.....	19	19	28	22	19	42	16	12	14	38	16	14
20.....	16	16	28	22	19	31	16	14	14	28	16	14
21.....	16	19	50	19	19	25	16	22	14	22	16	14
22.....	16	22	110	19	22	22	16	16	14	19	16	14
23.....	16	25	186	22	22	22	16	14	14	19	16	14
24.....	16	19	64	19	22	22	16	25	14	16	16	14
25.....	22	19	134	19	22	22	16	16	12	22	16	16
26.....	16	19	110	19	22	19	16	16	12	74	16	22
27.....	16	19	60	19	22	19	16	14	12	84	16	38
28.....	22	19	42	19	25	19	16	14	10	42	16	22
29.....	31	22	34	19	22	19	14	.....	10	84	14	19
30.....	25	31	34	19	22	19	14	.....	10	79	14	19
31.....	22	28	.....	19	.....	19	14	.....	12	.....	14	.....

NOTE.—Discharge determined from a rating curve well defined below 100 million gallons per day (155 second-feet). Discharge interpolated July 15-18, 1914, and June 6-14, 1915.

Monthly discharge of Punahuu Stream at elevation 250 feet, near Punahuu, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
May 14-31.....	89	14	31.5	48.7	567	1,740
June 1-5, 19-30.....	116	16	31.5	48.7	536	1,640
1914-15.						
July.....	31	10	16.5	25.5	512	1,570
August.....	42	16	21.6	33.4	669	2,050
September.....	186	16	46.6	72.1	1,400	4,290
October.....	31	19	22.3	34.5	691	2,120
November.....	55	19	24.3	37.6	729	2,240
December.....	50	19	25.5	39.5	790	2,430
January.....	22	14	16.6	25.7	514	1,580
February.....	25	12	14.4	22.3	403	1,240
March.....	16	10	13.7	21.2	426	1,300
April.....	84	12	29.4	45.5	881	2,710
May.....	42	14	20.2	31.3	625	1,920
June.....	38	14	15.8	24.4	474	1,450
The year.....	186	10	22.2	34.3	8,110	24,900

KALUANUI STREAM NEAR HAUULA, OAHU.

LOCATION.—At Castle's rest house, 5 miles from Government road and $7\frac{1}{2}$ miles by road and trail south of Hauula.

RECORDS AVAILABLE.—April 28 to June 30, 1915.

GAGE.—Eight-day Stevens water-stage recorder on right bank.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—One channel at all stages; straight for 25 feet above and below gage; composed of boulders and gravel; right bank has gentle slope; left bank steep and high. Control composed of large boulders; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, gage height of discharge measurement April 12, 1915, 2.27 feet discharge, 27 million gallons per day, or 42 second-feet; minimum stage recorded, 0.85 foot June 10 to 14, 1915 (discharge, 0.35 million gallons per day, or 0.55 second-foot).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Irrigation of sugar cane and rice.

ACCURACY.—Estimates April 28, May 5, 12, 18, and 21, each based on one observation of gage height; fair. Estimates June 1-30, based on a continuous record of stage and well-defined rating curve; good.

Discharge measurements of Kaluanui Stream near Hauula, Oahu, during the year ending June 30, 1915.

[Made by H. A. R. Austin.]

Date.	Gage height (feet).	Discharge.		Date.	Gage height (feet).	Discharge.	
		Second-foot.	Million gallons per day.			Second-foot.	Million gallons per day.
1915—Apr. 12.....	2.09	37	24	Apr. 28.....	1.54	8.4	5.4
Do.....	2.27	42	27	June 8.....	.92	.65	.4
Apr. 13.....	1.34	3.6	2.3				

Discharge, in million gallons per day, of Kahuanui Stream near Hauula, Oahu, for the year ending June 30, 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Apr.	May.	June.	Date.	Apr.	May.	June.	Date.	Apr.	May.	June.
1.....			0.4	11.....			0.35	21.....			1.0
2.....			.45	12.....		1.0	.35	22.....			.65
3.....			.45	13.....			.35	23.....			2.1
4.....			.4	14.....			.35	24.....			2.6
5.....		1.7	.4	15.....			.5	25.....		0.5	2.1
6.....			.5	16.....			.8	26.....			2.1
7.....			.5	17.....			1.7	27.....			5.7
8.....			.4	18.....		4.0	4.0	28.....	5.7		2.6
9.....			.4	19.....			3.2	29.....			1.3
10.....			.35	20.....			2.6	30.....			4.0

NOTE.—Daily discharge determined from a well-defined rating curve. Water-stage recorder did not operate satisfactorily April 28 to May 31, staff gage readings used April 28, May 5, 12, 18, and 25. Maximum discharge for June, 5.7 million gallons per day; minimum 0.35 million gallons per day; mean, 1.42 million gallons per day, or 2.20 second-feet; total run-off, 43 million gallons, or 131 acre-feet.

KOLOA STREAM NEAR LAIE, OAHU.

LOCATION.—About 3 miles by horse trail southwest of Laie.

RECORDS AVAILABLE.—July 30, 1914, to June 30, 1915.

GAGE.—Stevens water-stage recorder on left bank.

DISCHARGE MEASUREMENTS.—Made by wading or from cable about 20 feet below gage.

CHANNEL AND CONTROL.—Channel straight for a hundred feet above station; right bank clean and perpendicular; left bank clean with gradual slope to above high water stage; cross section above station about the same; about 50 feet below the channel turns to the left and both banks have gentle slopes. Low-water control formed by boulders just below the intake pipe, for medium and high stages an apparently permanent riffle of large boulders about 50 feet below the gage becomes the control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 5.3 feet at about 9 a. m. September 25, 1914 (discharge, 755 million gallons per day, or 1,170 second-feet). Stream goes nearly dry at times and there is less than 0.1 million gallons per day, or less than 0.15 second-foot, flowing past gage.

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Stream is not perennial in its lower course. A small part of the flood discharge is diverted at low elevations for sugar-cane irrigation. Station was established to determine whether the total discharge of the streams would justify the construction of a large flood-water storage project in the vicinity.

ACCURACY.—Estimates for extreme low stages may be considerably in error owing to percolation through the gravels in the natural control and also to uncertainty in the point of zero flow, estimates for medium stages fairly reliable; estimates for high water periods, based on extension of rating curve, are fairly good.

Discharge measurements of Koloa Stream near Laie, Oahu, during the year ending June 30, 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Oct. 7	Howard Kimble.....	0.31	2.1	1.3
1915—Apr. 16	H. A. R. Austin.....	1.99	145	94
May 27	.....do.....	.11	1.2	.75

Discharge, in million gallons per day, of Koloa Stream near Laie, Oahu, for the year ending June 30, 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1.....		6.5	1.3	6.5	4.7	1.6	1.0	0.3	0.2	0.6	4.4	0.8
2.....		6.5	1.1	5.2	1.6	1.8	.5	.3	.2	.6	15	1.3
3.....		5.2	1.8	2.5	1.3	36	.5	.2	.2	.6	9.4	1.0
4.....		24	2.2	2.5	1.3	12	.5	.1	.4	.6	4.4	.5
5.....		25	2.5	2.2	1.8	1.6	.3	.1	.6	.6	3.0	.3
6.....		7.8	3.0	1.8	24	21	.1	.1	2.1	.9	2.5	.2
7.....		9.4	1.3	1.3	2.5	1.6	.1	.2	.9	.6	2.2	.2
8.....		7.8	2.5	1.3	1.6	1.2	.1	.4	.9	.6	1.8	.2
9.....		6.5	3.0	2.2	1.6	1.6	.1	.4	.6	4.8	1.8	.2
10.....		27	3.5	1.6	1.6	1.6	2.1	.4	.6	5.3	16	.2
11.....		47	3.5	1.3	1.6	1.6	1.6	.4	.6	4.4	4.4	.2
12.....			2.5	1.3	1.6	1.6	.9	3.9	.6	29	2.2	.2
13.....			1.8	1.3	1.6	1.6	2.6	1.2	1.6	3.5	1.8	.2
14.....			3.5	1.3	10	1.6		.9	1.2	1.2	1.6	.2
15.....			1.3	1.3	1.6	1.6		.6	.6	.9		.2
16.....			1.6	1.3	1.6	1.6		.9	.6	46		.8
17.....			1.8	1.3	1.6	1.6		.9	.6	21		.6
18.....			2.2	1.3	1.6	1.6		.6	.6	13		1.8
19.....			1.6	1.3	1.6	26		.6	.6	7.8		3.5
20.....			1.6	1.3	1.6	6.5		.6	.6	2.6		2.5
21.....			18	1.3	1.6	4.4		20	.6	1.6		1.3
22.....			79	1.3	1.6	2.1		2.6	.6	1.2		1.1
23.....			79	1.6	1.6	1.6		6.8	.6	1.6		.9
24.....			55	1.3	1.6	1.6		8.6	.6	2.1		3.7
25.....			165	1.3	1.6	1.6		1.2	.6	19		3.5
26.....			51	1.3	1.6	1.6		.9	.6	72		7.4
27.....			20	1.3	3.9	1.2		.6	.6	56	.6	31
28.....		2.5	5.2	1.3	2.2	1.6		.4	.6	7.8	.9	4.4
29.....		1.6	7.8	1.3	1.8	1.6			.6	11	.9	1.8
30.....	20	1.1	7.8	1.3	1.8	1.8			.6	7.8	.8	4.8
31.....	13	.9		1.3		1.0			.6		.8	

NOTE.—Discharge determined from rating curves fairly well defined below 150 million gallons per day (232 second-feet) applicable as follows: July 30, 1914, to Dec. 3, 1914; Dec. 4, 1914, to Apr. 26, 1915; Apr. 27 to June 30, 1915. Discharge estimated Dec. 31, 1914, to Jan. 3, 1915; Feb. 1-6, Feb. 25 to Mar. 3, and June 3-15, 1915, by comparison with record Waialeale Stream. Discharge for periods during which no gage records were obtained was estimated by comparison with record Waialeale Stream as follows: Aug. 12-27, 1914, 3 million gallons per day; Jan. 14-31, 1915, 0.2 million gallons per day; May 15-26, 1915, 0.9 million gallons per day.

Monthly discharge of Koloa Stream near Laie, Oahu, for the year ending June 30, 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-feet (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
August.....	47	0.9	7.32	11.3	227	696
September.....	165	1.1	17.7	27.4	531	1,630
October.....	6.5	1.3	1.76	2.72	55	167
November.....	24	1.3	2.86	4.43	86	263
December.....	36	1.0	4.08	6.31	126	388
January.....	2.6	.1	.45	.70	14	43
February.....	8.6	.1	1.94	3.00	54	167
March.....	2.1	.2	.67	1.04	21	64
April.....	72	.6	10.8	16.7	325	994
May.....	16	.6	2.75	4.25	85	262
June.....	31	.2	2.50	3.87	75	230
The period.....					1,600	4,900

WAILALE STREAM NEAR LAIE, OAHU.

LOCATION.—About 3 miles by horse trail southwest of Laie, about 525 feet above sea level.

RECORDS AVAILABLE.—July 30, 1914, to June 30, 1915.

GAGE.—Stevens water-stage recorder on right bank.

DISCHARGE MEASUREMENTS.—Made by wading or from cable located about 20 feet above gage.

CHANNEL AND CONTROL.—Channel is straight for about 50 feet above gage and is formed of large semipermanent boulders and gravel; right bank is sloping and clean; left bank is nearly vertical and clean; cross section for several hundred feet above and below the gage is the same. Control consists of an apparently permanent natural dam of large boulders, about 15 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 4.85 feet at 9.30 a. m. September 23, 1914 (discharge, 295 million-gallons per day, or 456 second-feet); channel frequently dry.

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Stream is not perennial. A small part of the flood discharge is at present diverted at low elevations for sugar-cane irrigation. Station was established to determine whether the total flood discharge of the stream at an elevation of about 500 feet above sea level will justify the construction of a large flood-water storage project in the vicinity.

ACCURACY.—Conditions in channel favorable for obtaining fairly reliable estimates for low and medium stages; estimates for high-water periods, based on extension of rating curve, are fairly good. Comparison of records from Wailele and Koloa streams gave consistent run-off ratios for use in estimating monthly discharge for April, May, and June, 1915, for which period a satisfactory gage-height record was not obtained.

Discharge measurements of Wailele Stream near Laie, Oahu, during the year ending June 30, 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Sept. 26	Howard Kimble.....	2.22	58	37
Oct. 6	.....do.....	1.02	2.1	1.3
1915—Apr. 16	H. A. R. Austin.....	2.14	56	36
May 27	.....do.....	.65	.2	.1

Discharge, in million gallons per day, of Wailele Stream near Laie, Oahu, for the year ending June 30, 1915.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1.		0.2	0.4	3.0	3.7	0.2			0.6	0.1		0.2
2.		.2	2.5	2.4	3.2	.4			.3			.3
3.		.2	.3	1.5	.3	23			.1			.2
4.		4.3	.2	1.1	.4	9.4			.3			.1
5.		2.1	.2	.9	.9	1.1			.3			
6.		.2	.1	1.1	16	1.1	0.1		1.5			
7.		.2	.6	.9	1.1	.9	.1	0.1	.4			
8.		.2	.2	.7	.4	.7		.4	.3			
9.		.2	.1	2.4	.3	1.1	.1	.1	.4			
10.		3.9		.9	.3	.9	1.1		.2			
11.		6.9		.6	.2	.6	.7	.2	.1			
12.		.1	.2	.6	.2	.4	.4	3.9				
13.		.1	.6	.4	.2	.4	2.3	1.1	1.1			
14.		.2	19	.4	6.8	.3	.4	.7	.4			
15.		.2	.7	.4	.4	.3		.6	.4			
16.		.2	.9	.4	.2	.2		.7	.2			
17.		.2	.1	.4	.2	.2		.7	.2			
18.		.4	.3	.4	.2	.2		.4				
19.		.2	.3	.3	.2	14		.2				
20.		.2	3.5	.3	.2	1.1						
21.		.8	17	.4	.2	.7		20				
22.		1.1	4.5	.8	.2	.3		3.8				
23.		.2	42	2.4	.3	.2		3.8				
24.		.1	25	.4	.6	.2		10				
25.		.1	80	.3	.3	.2		1.5	.2			
26.		.1	22	.2	.3	.2		1.2	.1			
27.		.2	10	.2	4.2	.2		1.0				
28.		.2	3.8	.6	.7	.2		.8			0.2	
29.		1.0	5.3	.3	.6	.2					.4	
30.	0.9	.7	4.5	.2	.3	.1					.2	
31.	.7	.9		.3		.1					.2	

NOTE.—Discharge determined from a rating curve fairly well defined below 75 million gallons per day (116 second-feet); discharge estimated September 24 and 25, 1914, by comparison with record Koloa Stream, as water-stage recorder was unreliable. No record obtained for periods Jan. 15-31, Apr. 7 to May 27, and June 9-30, 1915. Stream dry or there was practically no flow for other days for which discharge is not given.

Monthly discharge of Wailele Stream near Laie, Oahu, for the year ending June 30, 1915

Month.	Discharge.			Total run-off.	
	Million gallons per day.			Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.		
August.	6.9	0.1	0.83	1.28	79
September.	80	0.1	8.14	12.6	749
October.	3.0	.2	.81	1.25	77
November.	16	.2	1.44	2.17	133
December.	23	.1	1.91	2.94	182
January.	2.3	0	.28	.43	27
February.	20	0	1.83	2.83	157
March.	1.5	0	.23	.36	22
April.			.54	.84	497
May.			.14	.22	133
June.			.12	.19	110
The period.				703	2,170

* Estimated by hydrograph comparison with Koloa stream.

EAST BRANCH OF KAHAWAINUI STREAM NEAR LAIE, OAHU.

LOCATION.—About half a mile above junction with West Branch of Kahawainui Stream, 3 miles by horse trail southwest of Laie, at elevation about 500 feet above sea level.

RECORDS AVAILABLE.—July 29, 1914, to June 30, 1915.

GAGE.—Stevens water-stage recorder on left bank. Original staff gage consisted of inclined and vertical sections inclined section reading from 0.00 to 0.46 foot and the vertical section from 0.46 to 5.00 feet; this gage was destroyed by flood September 24, 1914. On October 6, 1914, a new reference point was established on top of the intake pipe at the left bank at elevation 0.23 foot gage datum. After this date the stage was checked by observing the head on this reference point. No change of datum occurred during the period.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 60 feet below gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for several feet above the station; composed of large bowlders and free from vegetation; right bank clean and nearly perpendicular; left bank sloping and fairly clean; right bank flattens out about 60 feet below the gage, otherwise the cross section is the same for several hundred feet above and below the station. Control consists of a natural dam of large bowlders which may be shifted by extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 5.1 feet at 7 a. m. September 25, 1914 (discharge, 340 million gallons per day or 526 second-feet); channel dry during considerable part of period.

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Part of the flood discharge is diverted at present at low elevations to irrigate sugar cane. Station was established to determine whether total flood discharge at this elevation is sufficient to justify a large flood-water storage project near Kahuku.

ACCURACY.—Estimates approximate. Sufficient measurements were not made to define the high-water extension of rating curve; uncertainty in the permanency of the control and point of zero flow subject the low-water estimates to considerable error.

Discharge measurements of East Branch of Kahawainui Stream near Laie, Oahu, during the year ending June 30, 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons. per day.
1914—Sept. 26	Howard Kimble.....	0.95	15	9.5
Oct. 6	.....do.....	.47	1.7	1.1
1915—Apr. 17	H. A. R. Austin.....	.87	9.7	6.3

Discharge, in million gallons per day, of East Branch of Kahawainui Stream near Laie, Oahu, for the year ending June 30, 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Day.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	June.
1.	0.8	2.0	0.4	0.4				0.4	1.1
2.	8.6	1.5	.6	.8				.4	29
3.	.8	.4	.3	24			0.2	.4	.5
4.	.4	.6	.3	2.0			.4	.6	
5.	.3	.6	.2	.6			.4	.6	
6.	.3	.8	13	.4			1.1	.6	
7.	1.4	.4	1.2	.3			.3	.6	
8.	.4	.4	.4	.3			.2	.6	
9.	.3	.4	.3	.6			.3	1.8	
10.	.2	.4	.2	.3			.2	1.5	
11.	.2	.2	.2	.3			.2	3.5	
12.	.4	.2	.3	.3		0.5	.4	15	
13.	.8	.2	.3	.2	1.9		.9	3.0	
14.	30	.2	3.6	.2			.3	.6	
15.	3.0	.2	.6	.3			.2	.3	
16.	3.1	.3	.3	.2		.2	.2	11	
17.	.8	.3	.3	.4			.2	11	
18.	.4	.3	.3	.6			.4	8.0	
19.	.6	.3	.3	12			.4	6.3	
20.	6.2	.3	.6	2.7		.2	.4	1.2	
21.	4.8	.3	.3	1.9		4.7	.4	.6	
22.	25	1.9	.3	.4		.2	.4	.4	
23.	25	.6	.3	.2		1.4	.4	.4	
24.	12	.3	.3	.2		1.9	.4	.8	
25.	60	.3	.3	.2			.4	8.5	
26.	15	.2	.4	.2			.4	37	4.6
27.	5.5	.6	2.5	.2			.4	17	16
28.	2.0	.4	.8	.2			.4	3.3	.3
29.	3.2	.2	.6	.2			.3	2.3	.1
30.	3.4	.4	.4	.2			.3	2.3	
31.		.3		.1			.4		

NOTE.—Discharge determined from a poorly defined rating curve. Discharge estimated Apr. 28 to May 3, June 28 and 29, 1914, by comparison with record of East Branch of Malaekahana Stream. Stream was dry or there was practically no flow on days for which discharge is not given.

Monthly discharge of East Branch of Kahawainui Stream near Laie, Oahu, for the year ending June 30, 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-feet (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
September.	60	0.2	7.16	11.1	215	659
October.	2.0	.2	.50	.77	16	48
November.	13	.2	1.00	1.55	30	92
December.	24	.1	1.64	2.54	51	156
January.	1.9	0	.06	.09	2	6
February.	4.7	0	.32	.50	9	27
March.	1.1	0	.35	.54	11	33
April.	37	.3	4.67	7.23	140	430
May.	29	0	.99	1.53	31	94
June.	16	0	.70	1.08	21	64
The period.					526	1,610

EAST BRANCH OF MALAEKAHANA STREAM NEAR KAHUKU, OAHU.

LOCATION.—About three-quarters of a mile above junction with Middle Branch of Malaekahana Stream and $3\frac{1}{4}$ miles, by horse trail, south of Kahuku, about 375 feet above sea level.

RECORDS AVAILABLE.—July 31, 1914, to June 30, 1915.

GAGE.—Stevens water-stage recorder on right bank. Original staff gage, established on July 31, 1914, was washed out by flood September 24, 1914. From September 25, 1914, to May 28, 1915, a reference point consisting of a 20-penny nail in kukui tree on left bank 50 feet upstream, at same datum as staff gage, was used to check gage heights. On May 28, 1915, a new staff gage was established at the original datum.

DISCHARGE MEASUREMENTS.—Made by wading or from cable located about 5 feet upstream from staff gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for several hundred feet above gage; composed of loose boulders and gravel; right bank at gage is clean and nearly vertical; left bank has gradual slope and above ordinary flood stages is covered with small trees and vegetation; cross section same for several hundred feet upstream; the right bank flattens at a point about 20 feet below gage and is similar to the left bank, which is about the same as at the gage. Original control consisted of a concrete slab, 2 feet wide, with a small notch for low flow, between large boulders, about 6 feet below the gage; part of this control was destroyed by flood September 24, 1914. Point of zero flow originally about gage height 0.8 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 5.05 feet at 5 a. m. September 25, 1914 (discharge, 378 million gallons daily, or 585 second-feet); channel dry the greater part of the time.

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Stream not perennial. A small part of the flood discharge is at present diverted at low elevations for sugar-cane irrigation. Station was established to determine whether the total flood discharge at an elevation of about 350 feet above sea level will justify the construction of a large flood-water storage project near Kahuku.

ACCURACY.—Estimates for August and September, 1914, approximate, as sufficient data were not obtained prior to failure of artificial control. High-water estimates fair and low-water estimates approximate October, 1914, to June 30, 1915; the few measurements made are well distributed on the rating curve but the point of zero flow was uncertain after the high water of September, 1914.

Discharge measurements of East Branch of Malaekahana Stream near Kahuku, Oahu, during the year ending June 30, 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Sept. 25	Howard Kimble	2.52	129	83
Oct. 2	do	1.17	2.8	1.8
5	do	.98	.7	.45
1915—Apr. 17	H. A. R. Austin	1.54	24	16
May 26	do	.63	.15	.1

Discharge, in million gallons per day, of East Branch of Malaekahana Stream near Kahuku, Oahu, for the year ending June 30, 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....		0.4	0.6	1.2	2.6	0.3			0.1		0.8	0.1
2.....		.3	3.4	1.2	1.2	.2					22	.2
3.....		.3	.7	.8	.4	11					.4	.1
4.....		.6	.4	.5	.3	3.7					.1	.1
5.....		1.4	.3	.5	.3	.4					.1	.1
6.....		.5	.3	.8	12	.3						.1
7.....		.4	.5	.5	.5	.3			.2			.1
8.....		.4	.4	.5	.4	.2			.2			
9.....		.4	.3	.4	.3	.2			.2	0.3		
10.....		.4	.3	.4	.3	.3			.1	.4		
11.....		7.8	.2	.4	.3	.2			.1	1.2		
12.....		.7	.5	.4	.3	.2			.1	3.8		
13.....		.4	.7	.4	.2	.2	0.2	0.2		2.4		
14.....		.4	16	.4	1.4	.2		.2	.2	.1		
15.....		.4	1.8	.4	.4	.2		.1	.2	.1		
16.....		.4	2.7	.4	.3	.2		.1	.2	7.1		
17.....		.4	.8	.4	.3	.2		.2	.1	12		
18.....		1.0	.5	.2	.2	.2		.2	.1	2.5		
19.....		.5	.4	.4	.2	6.8		.1		.4		.1
20.....		.4	2.7	.4	.2	.4				.1		.2
21.....		.4	2.2	.4	.2	.3		6.5				.2
22.....		1.5	13	.4	.2	.2		.3				.1
23.....		.8	16	1.2	.2			.2				
24.....		.5	14	.4	.2			2.7			.1	
25.....		.5	67	.3	.2			.1		.3	.1	
26.....		.5	19	.3	.2			.1		17	.1	
27.....		.5	9.0	.3	.5			.1		28	.1	14
28.....		.5	1.7	.3	.4			.1		2.5	.1	.4
29.....		.5	2.5	.3	.3					1.7	.1	.2
30.....		.5	2.5	.3	.3					1.7	.1	.1
31.....	0.3	.5		.3							.1	

NOTE.—Discharge determined from rating curves applicable as follows: July 31 to Sept. 24, 1914, very poorly defined; Sept. 25, 1914, to June 30, 1915, fairly well defined. Stream was dry or there was practically no flow for days on which discharge is not given.

Monthly discharge of East Branch of Malaekahana Stream near Kahuku, Oahu, for the year ending June 30, 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-feet (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
August.....	7.8	0.3	0.78	1.21	24	74
September.....	67	.2	6.01	9.30	180	553
October.....	1.2	.3	.49	.76	15	47
November.....	12	.2	.83	1.28	25	76
December.....	11	0	.85	1.32	26	81
January.....	.2	0	.01	.02	0	1
February.....	6.5	0	.40	.62	11	34
March.....	.2	0	.06	.09	2	6
April.....	28	0	2.72	4.21	82	250
May.....	22	0	.78	1.21	24	74
June.....	14	0	.54	.84	16	50
The period.....					405	1,250

MIDDLE BRANCH OF MALAEKAHANA STREAM NEAR KAHUKU, OAHU.

LOCATION.—About a mile above junction with East Branch of Malaekahana Stream, $3\frac{1}{2}$ miles, by horse trail, south of Kahuku, about 440 feet above sea level.

RECORDS AVAILABLE.—July 31, 1914, to June 30, 1915.

GAGE.—Stevens water-stage recorder on right bank. Gage datum lowered 1.00 foot on September 25, 1914, to avoid minus readings.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 15 feet downstream from staff gage.

CHANNEL AND CONTROL.—One channel at all stages; composed of loose boulders and gravel, free from vegetation, and straight for several hundred feet above gage; at the gage right bank is clean and nearly vertical; left bank slopes gradually and above ordinary flood stages is covered with trees and vegetation; cross section about the same for several feet above and below the gage. Control constructed July 31, 1914, consisted of a concrete slab 2.0 feet wide, with small notch for low flow between large boulders, about 25 feet below the staff gage. Part of this control was destroyed by flood September 24, 1914, and lowered the point of zero flow 0.8 foot, or to gage height 0.2 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 4.25 feet (new gage datum) at 12.30 a. m., September 25, 1914 (discharge, 147 million gallons per day, or 227 second-feet); channel dry the greater part of the period.

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Stream is perennial. A small part of the flood discharge is at present diverted at low elevations for irrigating sugar cane. Station was established to determine whether the total flood discharge at an elevation of about 400 feet above sea level will justify the construction of a large flood-water storage reservoir near Kahuku.

ACCURACY.—Estimates for August and September, 1914, approximate, as sufficient data were not obtained prior to failure of artificial control; some uncertainty in gage-height record during August. Estimates October, 1914, to June 30, 1915, approximate. Station was visited several times when East Branch of Malaekahana Stream was gaged, but on two visits only was there sufficient water to measure. Point of zero flow was uncertain after the high water of September, 1914.

Discharge measurements of Middle Branch of Malaekahana Stream near Kahuku, Oahu, during the year ending June 30, 1915.

[Made by Howard Kimble.]

Date.	Gage height (feet).	Discharge.	
		Second-feet.	Million gallons per day.
1914—Sept 25.....	2.41	69	44
Oct. 2.....	.99	3.0	2.0

Discharge, in million gallons per day, of Middle Branch of Malaekahana Stream near Kahuku, Oahu, for the year ending June 30, 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	April.	May.	June.
1914-15.											
1.		0.2	0.4	5.0						0.3	
2.		.1	1.5	5.0	0.5					.7	
3.		.5	.5	2.1		0.2				.2	
4.		1.5	.2	1.8		.2					
5.		.4	.2	1.5							
6.		.3	.2	1.5	2.3						
7.		.4	.2	1.2	.2						
8.		1.5	.2	1.0	.2						
9.		.3	.2	.8	.2						
10.		.3	.2	.8	.2						
11.		.3	.2	.8							
12.		.3	.2	.7					4.4		
13.		.3	.2	.7			0.2		1.2		
14.		.2	.4	.6					.2		
15.		.2	.5	.6							
16.		.2	.6	.5					6.5		
17.		.2	.6	.5					5.0		
18.		.2	.7	.4					5.0		
19.		.3	.6	.3		.1			2.6		
20.		.8	.6	.2		.2			1.8		
21.		.5	.6	.2				0.2	1.0		
22.		.3	.5	.1				.2	.4		
23.		.2	.5	.8							
24.		.2	16	.1				.2	.2		
25.		.2	31	.1				.3	2.6		
26.		1.0	10						11		
27.		1.0	7.0						11		3.3
28.		.5	6.0						.8		1.5
29.		.3	5.0						.5		.2
30.		.4	5.0						.4		
31.	0.2	.3									

NOTE.—Discharge determined from poorly defined rating curves applicable July 31 to Sept. 24, 1914, and Sept. 25, 1914, to June 30, 1915. Intake pipe was clogged Aug. 3, 4, 8-10, 21, 26-29, 1914; discharge estimated by comparison with record of East Branch of Malaekahana Stream. Stream flowed only part of day Nov. 6, Dec. 19, 1914, Jan. 13, Feb. 21, 24, Apr. 12, 14, 16, 24, June 27 and 29, 1915. Stream was dry or there was practically no flow on days for which discharge is not given.

Monthly discharge of Middle Branch of Malaekahana Stream near Kahuku, Oahu, for the year ending June 30, 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
August.....	1.5	0.1	0.43	0.67	13	41
September.....	31	.2	3.60	4.64	90	276
October.....	5.0	0	.88	1.36	27	84
November.....	2.3	0	.12	.19	4	11
December.....	.2	0	.02	.03	1	2
January.....	.2	0	.01	.02	0	1
February.....	.3	0	.03	.05	1	3
March.....	0	0	0	0	0	0
April.....	11	0	1.82	2.82	55	168
May.....	.7	0	.04	.06	1	4
June.....	3.3	0	.17	.26	5	16
The period.....					197	606

RIGHT BRANCH OF NORTH FORK OF KAUKONAHUA STREAM NEAR WAHIAWA, OAHU.

LOCATION.—About 200 feet upstream from intake of Wahiawa Water Co.'s tunnel which is at the confluence of the right and left branches, or two main branches, of North Fork, about 8 miles northeast of Wahiawa.

RECORDS AVAILABLE.—May 29, 1913, to June 30, 1915.

GAGE.—Stevens water-stage recorder on left bank.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge 20 feet upstream from gage.

CHANNEL AND CONTROL.—Channel is a straight stretch 200 feet long that has been cleared of boulders, both banks steep, flow well distributed and confined. Natural control of large boulders has been improved somewhat for low-water stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period 6.9 feet at 10 p. m. Nov. 8, 1914 (discharge estimated by extension of rating curve at 560 million gallons per day, or 866 second-feet); minimum daily discharge, Mar. 1914, 0.2 million gallons per day, or 0.3 second-foot.

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Wahiawa Water Co.'s ditch diverts entire low-water flow of both right and left branches of North Fork at their confluence below gaging station on each branch for domestic water supply and irrigation in vicinity of Wahiawa. Discharge from North Fork is impounded in Wahiawa reservoir for sugar-cane irrigation on Waialua plantation.

ACCURACY.—Monthly estimates for low and medium stages good for July to November, 1913, January, April, August, November, 1914, February to June, 1915, and fairly good for other periods when discharge was estimated. The improved natural control developed a fairly stable and sensitive discharge relation between excessive floods, but the water-stage recorder failed to operate satisfactorily at times.

Discharge measurements of right branch of North Fork of Kaukonahua Stream near Wahiawa, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—July 11	J. C. Dort.....	1.57	2.9	1.9
Aug. 21	G. K. Larrison.....	1.55	2.8	1.8
Sept. 1	J. C. Dort.....	3.18	93	60
Oct. 1	G. R. White.....	1.30	.55	.35
31	J. C. Dort.....	1.35	1.0	.65
Nov. 11	do.....	3.44	120	78
20	G. R. White.....	2.49	35	23
26	J. C. Dort.....	3.88	190	123
1914—Feb. 28	do.....	1.51	2.8	1.8
Mar. 6	H. A. R. Austin.....	1.25	.45	.3
6	do.....	1.25	.5	.35
31	do.....	1.33	.8	.5
Apr. 13	do.....	1.34	1.0	.65
13	do.....	1.34	1.0	.65
June 1	do.....	2.40	29	19
Aug. 3	do.....	1.94	12	7.8
Nov. 2	do.....	2.27	28	18
1915—Jan. 6	do.....	1.43	1.5	1.0
26	Howard Kimble.....	1.31	.5	.3
May 5	H. A. R. Austin.....	1.87	11	6.9
June 1	do.....	1.52	2.7	1.7

Discharge, in million gallons per day, of right branch of North Fork of Kaukonahua Stream near Wahiawa, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.	7.1	0.9	4.0	0.5	0.7	5.5	1.2	1.8	0.9	0.4	2.9	14
2.	23	.85	2.5	.5	2.4	4.8	1.2	8.4	.4	.4	7.1	9.0
3.	17	.85	2.1	.5	2.1	26	1.2	2.1	.4	.4	12	5.4
4.	6.5	.8	1.4	.5	1.0	36	1.2	1.3	.4	4.7	4.7	4.0
5.	56	.8	1.4	.5	.9	14	1.2	1.2	.3	27	3.4	4.0
6.	5.9	.8	1.3	.5	.9	28	1.2	1.2	.3	10	2.5	6.2
7.	4.8	.8	1.2	.5	2.9	17	2.5	1.2	.4	4.0	19	17
8.	4.4	.8	1.0	.45	9.7	9.0	21	1.2	.3	1.4	40	8.0
9.	3.5	.9	1.0	.4	22	7.0	3.4	1.2	.25	1.2	9.0	10
10.	2.7	2.5	1.0	.4	29	5.9	2.1	1.2	.25	1.2	5.4	7.1
11.	2.0	1.2	.9	.7	56	5.2	1.8	1.2	.25	.9	4.1	9.7
12.	1.9	43	.9	18	91	4.8	2.9	1.2	.25	.9	3.5	4.4
13.	1.9	1.6	.9	6.2	47	4.4	2.5	1.2	.25	.6	2.9	4.3
14.	1.8	1.4	.95	1.7	13	3.7	1.4	1.1	.4	.4	2.6	3.4
15.	2.0	1.1	1.4	1.1	9.0	3.5	1.4	1.2	1.7	.4	2.7	5.6
16.	1.5	1.8	1.4	.85	6.4	3.2	3.4	1.1	.95	.4	2.9	7.8
17.	1.4	5.4	1.0	.8	5.2	3.4	10	1.1	.4	.4	2.8	4.3
18.	1.5	2.1	1.0	.65	4.7	3.6	2.9	1.0	6.4	2.1	7.1	4.3
19.	1.6	1.4	2.6	.65	10	3.2	2.9	.95	1.4	1.4	.95	4.3
20.	1.3	1.3	1.2	.85	67	2.5	3.4	.95	.8	3.4	18	4.8
21.	1.2	1.9	1.0	1.8	36	2.5	2.1	.95	.45	2.5	18	4.2
22.	1.1	1.6	1.2	2.4	13	2.3	2.1	.85	.3	4.7	26	6.5
23.	1.2	1.4	.45	1.8	9.7	2.0	1.8	.8	.25	8.0	6.2	36
24.	1.2	1.6	.45	1.2	10	1.7	1.4	.5	.2	15	4.4	17
25.	1.3	1.1	.45	2.1	52	1.6	1.4	.5	.25	4.0	9.0	13
26.	1.5	.9	.45	2.3	51	1.6	1.4	.4	.25	25	4.4	8.4
27.	2.6	.9	.5	1.0	30	1.6	1.4	.4	.25	21	3.7	11
28.	1.8	2.1	.5	.85	21	1.5	1.4	1.4	.2	9.0	4.0	7.8
29.	1.7	2.1	.5	.8	13	1.4	1.2		.8	4.7	8.4	5.4
30.	2.1	1.4	.5	.65	10	1.4	1.2		.9	4.7	4.0	5.7
31.	1.2	2.8		.65		1.2	1.2		.6		12	
1914-15.												
1.	12		15	61		6.1	1.0	.4	1.5	.65	21	2.0
2.			32		11		1.0	.4	1.5	.65	14	2.0
3.			14		6.1		1.0	.4	32	.65	12	2.5
4.			11		4.4		1.0	.4	21	.65	9.2	1.5
5.					6.1		1.0	.4	8.1	.65	7.0	1.2
6.					23		1.2	.4	6.1	3.1	5.2	1.2
7.					11		.9	1.2	4.4	1.5	5.2	1.2
8.					23		.9	.65	9.2	.9	4.4	1.2
9.					25		1.2	.4	4.4	.9	3.7	.9
10.		11			14		4.4	.9	3.1	.9	6.1	.9
11.		32			9.2		2.0	.9	2.5	2.0	6.1	1.2
12.		9.2			6.1		.9	12	2.5	12	3.7	.9
13.		11			5.2		.65	2.5	2.0	5.2	3.1	1.2
14.		8.1			9.2		.65	1.2	2.0	1.5	2.5	3.7
15.		6.1			6.1		.65	.65	2.0	2.5	2.5	2.5
16.		5.2			4.4		.65	1.2	1.5	42	4.4	2.0
17.		19					.65	.9	1.5	14	17	2.0
18.		32					.65	.65	1.5	12	17	23
19.		15					.65	.4	1.2	7.0	6.1	12
20.		14					.65	11	1.2	3.7	5.2	9.0
21.		14					.65	37	1.2	2.5	5.2	6.0
22.		19					.65	9.2	2.0	2.5	7.0	3.8
23.		30					.65	7.0	1.5	3.1	4.4	3.0
24.		11					.65	9.0	1.2	4.4	3.7	3.0
25.		11					.4	6.0	1.2	21	3.1	3.0
26.		8.1					.4	4.0	.9	125	2.5	10
27.		7.0					.4	3.0	.9	34	2.5	8.0
28.		11					.4	2.0	.9	42	2.5	3.0
29.		23					.4			51	3.1	2.5
30.		37					.4			34	2.0	8.0
31.		32					.4			.65	2.0	

NOTE.—Discharge determined from rating curves applicable as follows: July 1 1913, to July 1, 1914, well defined; Aug. 10, 1914, to June 13, 1915, fairly well defined below 30 million gallons per day (46 second-feet); June 19-30, 1915, fairly well defined. Discharge estimated July 1-10, Sept. 23-30, Dec. 1-31, 1913, Jan. 2-4, Feb. 2-29, May 11-June 1, June 11-30, 1914, Jan. 1-5, 10-26, and Feb. 23-28, 1915, by comparison with records of other stations in Kaukonahua drainage.

Monthly discharge of right branch of North Fork of Kaukonahua Stream near Wahiawa, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	56	1.1	5.31	8.22	165	505
August.....	43	.8	2.84	4.39	88	270
September.....	4.0	.45	1.17	1.81	35	108
October.....	18	.4	1.67	2.58	52	159
November.....	91	.7	20.9	32.3	627	1,920
December.....	36	1.2	6.76	10.5	210	643
January.....	21	1.2	2.75	4.25	85	262
February.....	8.4	.4	1.34	2.07	38	105
March.....	6.4	.2	.68	1.05	21	65
April.....	27	.4	5.34	8.26	160	492
May.....	40	.95	8.18	12.7	254	778
June.....	36	3.4	8.42	13.0	253	775
The year.....	91	.2	5.44	8.42	1,990	6,080
1914-15.						
August 10-31.....	37	5.2	16.6	25.7	366	1,120
November 2-16.....	25	4.4	10.9	16.9	164	502
January.....	4.4	.4	.87	1.35	27	83
February.....	37	.4	4.08	6.31	114	351
March.....	32	.65	3.90	6.03	121	371
April.....	125	.65	14.4	22.3	432	138
May.....	21	2.0	6.24	9.65	193	594
June.....	23	.9	4.08	6.31	122	376

LEFT BRANCH OF NORTH FORK OF KAUKONAHUA STREAM NEAR WAHIAWA, OAHU.

LOCATION.—100 feet above the intake of the Wahiawa Water Co.'s tunnel, which is at the confluence of the right and left branches, or the two main branches of the North Fork, about 8 miles east by north of Wahiawa.

RECORDS AVAILABLE.—May 25, 1913, to June 30, 1915.

GAGE.—Stevens water-stage recorder on left bank.

DISCHARGE MEASUREMENTS.—Made by wading or from cable at gage.

CHANNEL AND CONTROL.—Channel straight for 100 feet above and below gage, and fairly uniform in cross section, with high, wooded banks; only one at all stages; stream bed composed of boulders and gravel. Control composed of large boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 6.95 feet at 5 p. m. November 8, 1914 (discharge, approximately 750 million gallons per day, or 1,160 second-feet); minimum stage, 0.85 foot February 9 and 19, 1915 (discharge, 0.25 million gallons per day, or 0.37 second-foot).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—The entire low flow of the North Fork is diverted immediately below the confluence of the right and left branches and is impounded in Wahiawa reservoir for sugar-cane irrigation on Waialua Agricultural Co.'s plantation.

ACCURACY.—Records good for all stages. Rating curve is especially well defined for period July 1, 1913, to July 28, 1914. Water-stage recorder failed to operate at times, but the gage record obtained is reliable.

Discharge measurements of left branch of North Fork of Kaukonahua Stream near Wahiawa, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—July 11	J. C. Dort.....	1.39	6.0	3.9
Aug. 31	do.....	1.60	12	7.8
Sept. 1	do.....	1.25	3.0	1.9
1	do.....	2.08	42	27
1	do.....	2.52	95	61
Oct. 1	G. R. White.....	1.08	.95	.6
31	J. C. Dort.....	1.00	1.0	.65
Nov. 20	G. R. White.....	2.70	94	61
20	do.....	2.27	60	39
26	J. C. Dort.....	3.00	167	108
1914—Feb. 28	do.....	.98	.75	.5
Mar. 6	H. A. R. Austin.....	.87	.85	.55
31	do.....	1.13	1.3	.85
Apr. 13	do.....	1.12	1.1	.7
June 1	do.....	2.18	48	31
Aug. 3	do.....	1.68	21	14
Oct. 1	do.....	2.20	51	33
Dec. 1	do.....	1.58	14	9.0
1915—Jan. 26	Howard Kimble.....	.97	.65	.4
May 5	H. A. R. Austin.....	1.51	13	8.5
June 1	do.....	1.18	3.7	2.4

Discharge, in million gallons per day, of left branch of North Fork of Kaukonahua Stream near Wahiawa, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	13	2.3	8.4	0.85	0.6	9.7	2.0	1.4	0.4	0.65	5.2	28
2.....	41	2.1	4.5	.85	9.0	8.4	1.4	17	.4	.55	14	17
3.....	30	2.0	5.0	.7	.9	45	1.4	2.0	.3	.45	23	8.4
4.....	12	1.9	3.3	.7	.9	62	1.4	1.4	.3	.45	8.4	7.2
5.....	9.7	1.8	2.7	.7	.9	24	1.4	1.4	.3	54	5.9	6.1
6.....	10	1.9	2.6	.7	.9	48	1.4	1.4	.3	22	4.2	5.2
7.....	8.4	1.9	2.1	.7	.9	30	4.2	1.4	.3	6.1	39	8.4
8.....	7.8	1.8	1.9	14	.8	16	31	1.4	.3	3.4	85	11
9.....	6.1	2.5	1.8	21	.65	12	6.1	1.4	.3	2.6	16	8.4
10.....	4.8	7.8	1.8	4.7	.65	10	2.6	1.4	.3	2.0	8.4	6.1
11.....	4.1	2.6	1.7	2.6	1.2	9.0	2.6	1.4	.3	1.4	7.2	20
12.....	4.0	2.6	1.8	2.1	32	8.4	5.2	1.4	.3	1.4	6.1	8.4
13.....	3.8	4.7	1.6	1.7	11	7.8	3.4	1.4	.3	1.0	5.2	7.2
14.....	3.7	5.4	1.7	1.5	3.0	6.5	2.0	1.0	.4	.65	4.2	6.1
15.....	3.7	3.7	2.2	1.5	1.9	6.1	2.0	1.4	2.0	.65	4.2	11
16.....	3.6	4.7	1.7	1.8	1.5	5.7	8.4	1.0	.65	.55	5.2	16
17.....	2.8	13	1.5	5.4	1.4	5.9	16	1.0	.4	.65	4.2	7.2
18.....	2.8	5.4	1.4	3.3	1.1	6.3	4.2	1.0	12	7.2	14	8.4
19.....	2.8	4.0	7.1	2.3	1.1	5.7	5.2	1.0	1.4	7.2	20	7.2
20.....	2.7	3.1	2.2	2.5	1.5	4.5	5.2	1.0	.55	11	34	9.7
21.....	2.6	7.1	1.6	6.3	3.2	4.3	2.6	1.0	.45	6.1	34	7.2
22.....	2.2	3.8	1.5	2.5	4.2	4.1	2.6	.65	.4	8.4	54	12
23.....	2.2	3.4	2.5	1.8	3.2	3.6	2.6	.65	.3	16	12	73
24.....	2.3	3.4	.95	1.7	2.1	3.1	2.0	.65	.3	31	8.4	34
25.....	4.5	2.7	.95	4.3	3.6	2.8	2.0	.65	.3	7.8	17	25
26.....	6.3	2.5	.85	1.8	88	2.8	1.4	.45	.3	51	8.4	16
27.....	8.4	2.5	.8	1.5	30	2.7	2.0	.45	.3	45	6.1	22
28.....	11	2.6	.85	1.2	18	2.6	2.0	.45	.3	17	7.2	14
29.....	7.8	2.2	.8	1.2	13	2.5	1.4	.....	.55	8.4	17	11
30.....	4.0	1.8	.85	.95	13	2.5	1.4	.....	2.0	8.4	7.2	11
31.....	2.8	5.4	.....	1.0	.....	2.2	1.4	.....	1.0	.....	22	.....

Discharge, in million gallons per day, of left branch of North Fork of Kaukonahua Stream near Wahiawa, Oahu, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	17	16	49	26	-----	9.0	1.0	0.4	2.5	0.4	18	2.5
2.....	14	13	45	-----	31	14	1.0	.4	2.5	.4	14	2.5
3.....	11	13	18	-----	8.0	31	1.0	.4	28	.6	14	3.2
4.....	25	26	14	-----	7.0	19	1.0	.3	21	1.0	10	2.5
5.....	20	38	13	-----	8.0	18	1.0	.3	7.0	.6	8.0	2.5
6.....	11	13	13	-----	18	13	1.0	.3	6.0	10	7.0	2.0
7.....	9.7	14	18	-----	10	-----	1.5	1.5	4.0	2.5	6.0	1.5
8.....	14	10	13	-----	21	-----	1.5	.3	10	1.0	6.0	1.5
9.....	11	8.0	13	-----	23	-----	1.5	.25	4.0	1.0	6.0	2.0
10.....	11	13	14	-----	14	-----	6.0	.6	4.0	.6	14	1.5
11.....	7.2	73	13	-----	9.0	-----	3.2	.4	3.2	4.0	9.0	1.5
12.....	7.2	14	7.0	-----	8.0	-----	2.5	12	2.5	13	5.0	8.0
13.....	8.4	16	49	-----	7.0	-----	2.5	3.2	2.5	6.0	5.0	8.0
14.....	11	12	178	-----	12	-----	2.5	1.0	2.5	2.0	4.0	6.0
15.....	25	10	109	-----	7.0	-----	1.5	.4	2.5	9.0	3.2	3.2
16.....	28	10	45	-----	6.0	-----	1.5	1.0	2.5	45	8.0	14
17.....	20	23	49	-----	5.0	-----	1.0	.4	2.5	13	13	38
18.....	16	68	-----	-----	5.0	-----	1.0	.3	2.0	13	12	31
19.....	11	31	-----	-----	4.0	-----	.6	.25	2.0	8.0	7.0	28
20.....	8.4	26	-----	-----	4.0	-----	.6	14	2.0	6.0	6.0	12
21.....	7.2	18	-----	-----	4.0	-----	.6	73	1.5	4.0	5.0	9.0
22.....	6.1	26	-----	-----	3.2	-----	.6	18	3.2	3.2	9.0	7.0
23.....	20	45	-----	-----	3.2	-----	.4	14	2.0	5.0	5.0	9.0
24.....	22	31	-----	-----	7.0	-----	.6	18	1.5	8.0	3.2	6.0
25.....	49	19	-----	-----	5.0	-----	.6	12	1.0	63	3.2	16
26.....	14	19	-----	-----	8.0	-----	.4	5.0	1.0	158	3.2	8.0
27.....	25	16	-----	-----	28	-----	.4	4.0	.6	38	3.2	6.0
28.....	133	16	-----	-----	23	-----	.4	3.2	.6	45	7.0	5.0
29.....	63	18	-----	-----	23	-----	.4	-----	.4	41	5.0	4.0
30.....	54	34	-----	-----	18	-----	.4	-----	.4	23	3.2	21
31.....	26	31	-----	-----	-----	-----	.4	-----	.4	-----	3.2	-----

NOTE.—Discharge determined from rating curves applicable as follows: July 1, 1913, to July 28, 1914, well defined; July 29, 1914, to June 30, 1915, fairly well defined. Discharge estimated Nov. 3-25, 1913, Apr. 22 to May 8, 1914, Jan. 1-6, and June 28 and 29, 1915, by comparison with records of other stations in Kaukonahua drainage.

Monthly discharge of left branch of North Fork of Kaukonahua Stream near Wahiawa, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	41	2.2	7.45	11.5	231	709
August.....	13	1.8	3.63	5.62	113	345
September.....	8.4	.8	2.29	3.54	69	211
October.....	21	.7	3.03	4.69	94	288
November.....	88	.6	8.34	12.9	250	768
December.....	62	2.2	11.7	18.1	364	1111
January.....	31	1.4	4.15	6.42	128	395
February.....	17	.45	1.66	2.57	47	143
March.....	12	.3	.89	1.38	28	85
April.....	54	.45	10.8	16.7	323	994
May.....	85	4.2	16.3	25.2	507	1,550
June.....	73	5.2	14.4	22.3	432	1,330
The year.....	88	.3	7.08	11.0	2,590	6,930
1914-15.						
July.....	133	6.1	22.7	35.1	705	2,160
August.....	73	8.0	23.2	35.9	720	2,270
September.....	-----	-----	a 51.1	a 79.1	1,530	4,700
November 2-30.....	31	3.2	11.4	17.6	329	1,010
December 1-6.....	31	9.0	17.3	26.8	104	319
January.....	60	.4	1.25	1.93	39	118
February.....	73	.25	6.60	10.2	185	567
March.....	28	.4	4.06	6.28	126	386
April.....	158	.4	17.5	27.1	525	1,610
May.....	18	3.2	7.27	11.2	225	692
June.....	38	1.5	8.75	13.5	262	806

a Partly estimated.

SOUTH FORK OF KAUKONAHUA STREAM ABOVE UNITED STATES ARMY RESERVOIR, NEAR WAHIAWA,¹ OAHU.

LOCATION.—About one-eighth mile above United States Army ditch intake, 5 miles by trail above United States Army reservoir, and 10 miles east of Wahiawa by road to reservoir and trail along ditch.

RECORDS AVAILABLE.—June 18, 1913, to June 30, 1915.

GAGE.—Stevens water-stage recorder on left bank.

DISCHARGE MEASUREMENTS.—Made by wading or from cable at gage.

CHANNEL AND CONTROL.—Channel in vicinity of gage is straight and has been cleared of boulders; both banks steep; flow is confined past the gages. Natural control at head of long riffle has been improved for low-water stages by the construction of a low rock-fill dam.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 7.05 feet 11 p. m. November 20, 1913; discharge estimated by extension of rating curve, 900 million gallons per day, or 1,390 second-feet. Minimum daily discharge: March, 1915, 0.15 million gallons per day (0.25 second-foot).

DIVERSIONS.—None above gage.

REGULATION.—None.

UTILIZATION.—Low-water flow past this station is diverted one-eighth mile downstream into United States Army ditch and impounded into United States Army storage reservoir of 21 million gallons capacity (64 acre-feet), 5 miles downstream, and carried thence by pipe line for water supply of cantonment at Castner. Records show amount of water available for additional water supply for Castner. Discharge from South Fork is impounded in Wahiawa Reservoir for sugar-cane irrigation on Waialua Plantation.

ACCURACY.—Estimates for low and medium stages good prior to high-water of November 20, 1913, and excellent thereafter. The improved natural control maintained a stable and sensitive discharge relation after the high water of November 20, 1913.

Discharge measurements of South Fork of Kaukonahua Stream above United States Army reservoir, near Wahiawa, Oahu, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—July 9	J. C. Dort.....	1.63	5.4	3.5
Sept. 13	G. R. White.....	1.47	1.4	.9
24	J. C. Dort.....	1.46	1.1	.7
Oct. 9	.....do.....	1.55	3.1	2.0
Nov. 11	G. R. White.....	2.21	39	25
21	.....do.....	2.00	30	19
Dec. 17	.....do.....	1.58	6.7	4.3
1914—Jan. 8	J. C. Dort.....	2.64	97	63
Mar. 4	G. K. Larrison.....	1.25	.3	.2
Apr. 14	H. A. R. Austin.....	1.23	.6	.4
14	.....do.....	1.23	.5	.3
June 29	.....do.....	1.73	13	8.4
Aug. 5	.....do.....	2.16	52	34
Sept. 2	.....do.....	2.96	145	94
Nov. 6	.....do.....	2.10	40	26
1915—Feb. 11	.....do.....	1.32	1.3	.85
June 3	.....do.....	1.27	.6	.4

¹ Called South Fork of Kaukonahua Stream near Wahiawa, Oahu, in Water-Supply Paper 373, p. 102.

Discharge, in million gallons per day, of South Fork of Kaukonahua Stream above United States Army reservoir, near Wahiawa, Oahu, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	17	0.7	1.3	0.8	0.4	41	2.2	3.0	0.5	.....	4.0	20
2.....	28	.6	1.3	.5	.45	37	1.5	3.0	.35	.....	15	9.2
3.....	18	.45	1.3	.5	6.2	33	2.2	4.0	.35	.....	13	5.0
4.....	7.1	.45	1.3	.45	1.4	29	1.5	3.0	.35	.....	6.2	4.0
5.....	9.7	.45	1.3	.45	.7	25	1.5	3.0	.35	.....	4.0	3.0
6.....	7.1	.5	1.3	.6	.65	21	1.5	3.0	.35	.....	3.0	5.0
7.....	5.0	.8	1.3	1.4	.7	19	3.0	2.2	.35	.....	60	5.0
8.....	5.2	.8	1.3	12	8.4	17	45	2.2	.35	.....	22	6.2
9.....	3.7	.6	1.3	4.1	57	14	9.2	3.0	.35	.....	9.2	20
10.....	3.3	1.2	1.4	1.3	24	13	4.0	9.2	.35	.....	6.2	6.2
11.....	3.1	1.4	1.6	.9	18	11	2.2	3.0	.35	.....	5.0	4.0
12.....	3.1	23	1.9	.7	43	10	2.2	.75	.35	.....	4.0	5.0
13.....	3.1	5.0	1.3	1.3	23	8.4	2.2	.5	.35	.....	3.0	18
14.....	3.1	1.9	1.2	2.3	8.4	7.1	7.5	.5	.5	0.35	4.0	6.2
15.....	3.1	2.1	1.7	1.0	5.7	6.1	3.0	.5	.75	.35	6.2	5.0
16.....	3.1	2.4	1.3	.8	5.0	5.0	2.2	.5	.35	.35	5.0	9.2
17.....	2.9	2.4	3.1	.7	4.5	4.3	2.2	.5	9.2	.35	7.5	9.2
18.....	2.8	2.6	10	.8	4.8	3.8	2.2	.5	.75	2.2	34	13
19.....	2.6	2.8	2.9	.7	9.0	3.4	4.0	.5	.35	7.5	9.2	25
20.....	2.4	2.9	2.1	.45	72	3.2	15	.5	.2	20	22	64
21.....	2.1	1.4	1.6	.45	28	3.2	5.0	.35	.2	6.2	15	15
22.....	1.9	1.9	4.8	.45	6.3	2.8	4.0	.35	.2	20	7.5	31
23.....	1.7	7.8	2.4	.45	26	2.6	7.5	.35	.2	38	11	13
24.....	1.6	1.4	1.2	.7	77	2.6	6.2	.35	.2	45	7.5	11
25.....	3.5	1.2	1.4	3.1	19	2.5	4.0	.35	.2	11	5.0	31
26.....	2.8	1.3	.8	.7	59	2.3	4.0	.35	1.5	15	5.0	20
27.....	4.8	1.4	.65	.5	55	2.1	4.0	.35	.5	7.5	11	11
28.....	7.8	.9	.6	.5	52	2.0	4.0	.5	.35	6.2	18	11
29.....	4.1	1.7	.6	.8	48	1.9	4.0	.....	9.2	6.2	7.5	9.2
30.....	1.7	1.4	.65	.45	44	1.7	4.0	.....	3.0	6.2	5.0	13
31.....	1.3	1.3	.....	.45	.....	1.6	4.0	.....	1.0	.....	5.0	.....
1914-15.												
1.....	42	15	43	25	7.5	6.2	.4	.2	.5	.15	.....	.....
2.....	15	13	38	25	15	6.2	.4	.35	.5	.15	.....	.....
3.....	13	13	11	13	3.0	13	.4	.2	9.2	.15	.....	1.0
4.....	31	31	9.2	13	2.2	15	.4	.2	7.5	.15	.....	.5
5.....	18	48	11	13	2.2	6.2	.4	1.0	2.2	.15	.....	.5
6.....	11	13	7.5	15	34	5.0	.4	.35	1.5	2.2	.....	1.5
7.....	11	11	7.5	9.2	7.5	4.0	.4	.2	1.0	.35	.....	1.5
8.....	11	9.2	7.5	9.2	11	.....	.4	.2	1.5	.15	.....	2.2
9.....	9.2	7.5	6.2	18	9.2	.....	.4	.35	1.0	.15	.....	.5
10.....	7.5	9.2	6.2	11	5.0	.....	.4	2.2	1.0	.15	.....	.35
11.....	6.2	48	6.2	7.5	3.0	.....	.4	1.0	.5	1.0	.....	.35
12.....	6.2	9.2	13	6.2	3.0	.....	.5	20	.5	5.0	.....	.2
13.....	6.2	7.5	13	5.0	3.0	.....	.35	5.0	.5	1.5	.....	.2
14.....	7.5	7.5	118	5.0	4.0	.....	.35	2.2	.5	.35	1.5	1.0
15.....	11	6.2	68	5.0	4.0	.....	.35	1.0	.5	11	1.5	2.2
16.....	13	5.0	31	4.0	2.2	.....	.35	2.2	.5	38	.....	2.2
17.....	15	9.2	20	4.0	2.2	.....	.35	1.5	.5	9.2	.....	1.0
18.....	11	25	15	4.0	1.5	.....	.35	.5	.35	6.0	.....	4.0
19.....	7.5	11	22	4.0	1.5	.....	.35	.35	.35	6.0	.....	42
20.....	6.2	7.5	18	3.0	1.5	.....	.2	4.0	.35	2.0	.....	20
21.....	5.0	28	20	3.0	1.5	.....	.35	1.0	.35	1.0	.....	15
22.....	5.0	22	68	3.0	1.5	.....	.35	11	.35	1.0	.....	7.5
23.....	15	15	100	2.2	1.5	.....	.35	4.0	.35	2.0	.....	5.0
24.....	13	9.2	25	2.2	6.2	.....	.2	5.0	.35	5.0	.....	3.0
25.....	22	12	138	2.2	3.0	.....	.2	2.2	.2	52	.....	4.0
26.....	13	13	52	2.2	3.0	.....	.35	1.5	.2	88	.....	2.2
27.....	42	10	45	2.2	28	.....	.2	1.0	.2	30	.....	11
28.....	100	10	20	9.2	34	.....	.2	1.0	.15	8.0	.....	3.0
29.....	83	11	25	2.2	20	.....	.2	.....	.2	9.0	.....	2.2
30.....	38	25	18	2.2	9.2	.....	.2	.....	.15	23	.....	9.2
31.....	25	21	.....	2.2	.....	.....	.2	.....	.15	.....	.....	.....

NOTE.—Discharge determined from rating curves applicable as follows: July 1 to Nov. 20, 1913, fairly well defined; Nov. 21, 1913, to June 30, 1915, well defined. Discharge estimated Nov. 27 to Dec. 5, 1913, Aug. 25 to Sept. 1, 1914, Jan. 1-11, Apr. 18-24 and 27-30, 1915, by comparison with records of Left Branch of North Fork of Kaukonahua Stream.

Monthly discharge of South Fork of Kaukonahua Stream above United States Army reservoir, near Wahiawa, Oahu, for the years ending June 30, 1914 and 1915.

Month.	Discharge.			Second-foot (mean).	Total run-off.	
	Million gallons per day.				Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	28	1.3	5.38	8.32	167	512
August.....	23	.45	2.41	3.73	75	229
September.....	10	.6	1.83	2.83	55	168
October.....	12	.45	1.30	2.01	40	124
November.....	77	.4	23.6	36.5	708	2,170
December.....	41	1.6	10.9	16.9	337	1,010
January.....	45	1.5	5.32	8.23	165	506
February.....	9.2	.35	1.65	2.55	46	112
March.....	9.2	.2	1.08	1.67	33	103
April.....		.35	9.15	14.2	274	842
May.....	60	3.0	11.0	17.0	340	1,050
June.....	64	3.0	13.6	21.0	407	1,250
The year.....	77	.2	7.25	11.2	2,650	8,140
1914-15.						
July.....	100	5.0	20.0	30.9	620	1,900
August.....	48	5.0	15.6	24.1	482	1,480
September.....	138	6.2	32.3	50.0	968	2,970
October.....	25	2.2	7.64	11.8	237	727
November.....	34	1.5	7.68	11.9	230	707
December 1-7.....	15	4.0	7.94	12.3	56	171
January.....	.5	.2	.33	.51	10	31
February.....	20	.2	2.49	3.85	70	215
March.....	9.2	.15	1.07	1.66	33	102
April.....	88	.15	10.1	15.6	303	930
June 3-30.....	42	.2	5.04	7.80	141	433

Partly established by comparison with records of left branch of North Fork of Kaukonahua stream.

SOUTH FORK OF KAUKONAHUA STREAM BELOW UNITED STATES ARMY RESERVOIR, NEAR WAHIAWA, OAHU.

LOCATION.—About 600 feet upstream from highway bridge on road from Castner to United States Army reservoir, about one-quarter mile above gulch entering from northeast, $2\frac{1}{2}$ miles east of Castner and 2 miles southeast of Wahiawa.

RECORDS AVAILABLE.—July 23, 1914, to June 30, 1915.

GAGE.—Stevens water-stage recorder on right bank.

DISCHARGE MEASUREMENTS.—Made by wading or from cable directly over concrete control 50 feet downstream from gage.

CHANNEL AND CONTROL.—Reinforced concrete slab 26 feet long, extending from bank to bank, 4 feet wide, with rectangular low-water section 7.5 feet wide near left bank, to confine extreme low flow. Downstream side of concrete slab protected from undermining by apron of discarded fence posts. Both banks high. Channel, composed of gravel, is straight and fairly smooth in vicinity of gaging station. Point of zero flow, top of low-water section of control, at gage height 0.00 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during biennial period, 8.55 feet at 9.30 a. m. September 25, 1914 (discharge, estimated by extension of rating curve), about 1,300 million gallons per day, or 2,010 second-feet; minimum daily discharge, March and June, 1915, 1.0 million gallons per day, or 1.5 second-feet.

DIVERSIONS.—United States Army ditch diverts water from stream near headwaters.

REGULATION.—Practically none.

UTILIZATION.—Water is diverted at about 1,130 feet above sea level by the United States Army ditch, impounded in United States Army reservoir at an elevation of 1,200 feet, and carried by pipe line to the cantonment of Castner for water supply. An additional supply is pumped into this pipe line from the stream just below

the highway bridge below the gaging station. Wahiawa reservoir, into which this stream empties, supplies water for irrigating sugar cane to Waialua Plantation.

ACCURACY.—Excellent estimates for low and medium stages were obtained by means of a concrete control, a water-stage recorder, and a small number of well-distributed discharge measurements.

Discharge measurements of South Fork of Kaukonahua Stream below United States Army reservoir, near Wahiawa, Oahu, during the year ending June 30, 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—July 28	G. K. Larrison.....	2.07	117	76
Aug. 17	do.....	.90	13	8.4
Sept. 2	H. A. R. Austin.....	1.47	41	26
1915—Jan. 12	do.....	.68	5.4	3.5
June 1	do.....	.41	1.4	.9

Discharge, in million gallons per day, of South Fork of Kaukonahua Stream below United States Army reservoir, near Wahiawa, Oahu, for the year ending June 30, 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1.....		19	21	34	6.8	16	3.3	2.1	2.6	1.3	17	1.0
2.....		14	34	70	31	12	3.3	1.6	2.1	1.3	16	1.0
3.....		12	17	38	10	17	3.3	1.6	2.6	1.3	14	1.3
4.....		28	14	38	7.8	12	3.3	1.6	2.6	1.3	14	1.3
5.....		80	17	28	6.8	14	3.3	2.1	5.8	1.3	8.9	1.0
6.....		21	11	42	16	14	2.6	2.1	3.3	2.6	6.8	1.6
7.....		17	11	23	19	10	2.6	2.6	2.6	4.9	5.8	1.6
8.....		16	10	28	17	8.9	2.6	2.6	3.3	2.1	4.9	3.3
9.....		12	10	28	21	7.8	2.6	2.1	4.0	1.3	4.0	1.6
10.....		11	10	26	11	7.8	4.0	4.9	2.6	1.3	6.8	1.3
11.....		70	8.9	17	8.9	6.8	4.9	4.0	2.6	1.3	12	1.3
12.....		14	28	17	7.8	6.8	3.3	17	2.1	2.6	4.0	1.3
13.....		11	17	16	6.8	6.8	3.3	8.9	2.1	7.8	3.3	1.3
14.....		10	203	14	6.8	5.8	3.3	3.3	2.1	2.6	2.6	2.6
15.....		8.9	126	14	8.9	5.8	2.6	2.6	1.6	1.6	2.1	6.8
16.....		7.8	46	12	5.8	4.9	2.6	2.6	1.6	75	2.1	11
17.....		8.9	34	12	5.8	4.9	2.6	3.3	1.6	14	4.0	4.9
18.....		28	21	11	4.9	4.0	2.6	2.1	1.6	7.8	4.0	3.3
19.....		19	28	11	4.9	23	2.1	2.1	1.6	7.8	3.3	96
20.....		12	21	11	4.9	16	2.1	2.1	1.6	4.0	2.1	34
21.....		42	23	10	4.0	7.8	2.1	70	1.3	2.6	2.1	34
22.....		34	80	10	4.0	5.8	2.1	26	1.6	2.1	1.6	14
23.....		14	26	218	8.9	4.0	5.8	2.1	8.9	2.6	3.3	1.6
24.....	7.8	16	38	8.9	10	4.9	2.1	8.9	2.1	8.9	1.3	6.8
25.....	26	14	266	7.8	8.9	4.9	2.1	4.9	1.6	31	1.3	6.8
26.....	16	14	96	7.8	7.8	4.9	2.1	3.3	1.3	168	1.3	4.0
27.....	31	14	70	8.9	26	4.9	2.1	3.3	1.3	60	1.3	14
28.....	75	17	38	19	85	4.9	2.1	2.6	1.3	16	1.6	6.8
29.....	218	26	75	8.9	65	4.9	2.1	.....	1.3	19	1.3	2.6
30.....	42	19	46	7.8	38	4.0	2.1	.....	1.0	46	1.3	6.8
31.....	42	26	.....	6.8	.....	4.0	2.1	.....	1.3	.....	1.3	.....

NOTE.—Discharge determined from a rating curve well defined below 120 million gallons per day (186 second-feet).

Monthly discharge of South Fork of Kaukonahua Stream below United States Army reservoir, near Wahiawa, Oahu, for the year ending June 30, 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-feet (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914-15.						
July 23-31.....	218	7.8	52.4	81.1	472	1,450
August.....	80	7.8	21.5	33.3	668	2,050
September.....	266	8.9	54.6	84.5	1,640	5,030
October.....	70	6.8	19.2	29.7	595	1,830
November.....	85	4.0	15.5	24.0	465	1,430
December.....	23	4.0	8.42	13.0	261	801
January.....	4.9	2.1	2.69	4.16	83	256
February.....	70	1.6	7.11	11.0	199	611
March.....	23	1.0	2.81	4.35	87	267
April.....	168	1.3	16.7	25.8	500	1,540
May.....	17	1.3	4.96	7.67	154	472
June.....	96	1.0	9.44	14.6	283	869
The period.....					5,410	16,600

UNITED STATES ARMY DITCH AT RESERVOIR, NEAR WAHIAWA, OAHU.

LOCATION.—At United States Army reservoir 3 miles east of Wahiawa.

RECORDS AVAILABLE.—October 1, 1914, to June 30, 1915.

GAGE.—Vertical staff, read twice daily.

DISCHARGE MEASUREMENTS.—Made by 3-foot sharp-crested weir with end contractions.

CHANNEL AND CONTROL.—Cement-lined canal. Water emerges from tunnel directly into pool at weir.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 0.61 foot April 26, 1910 (discharge, 3.0 million gallons per day, or 4.6 second-feet); ditch frequently dry.

DIVERSIONS.—None.

REGULATION.—Flow regulated by head gates.

UTILIZATION.—Water supply of United States Army at Castner Barracks.

ACCURACY.—Estimates fair. Conditions at weir are good but flow is unsteady.

Discharge, in million gallons per day, of United States Army ditch at reservoir, near Wahiawa, Oahu, for the year ending June 30, 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.									
1.....	0.8	0.55	1.3	0.05	1.0			1.9	
2.....	1.0	1.6	1.3	.05	.8			1.3	
3.....	.8	1.0	1.6	.05	.55			1.0	
4.....	1.0	.8	1.6	.05	.35	1.0		1.0	
5.....	1.0	.35	1.6	.05	.55	.55		.55	
6.....	.8	1.3	1.0		.2	.55		.35	
7.....	.8	.8	.8		.05	.05		.2	
8.....	1.0	.8	.8		.2	.2		.2	
9.....	.8	.8	.55		.05	.05		.2	
10.....	.8	.35	.55	.35				.05	
11.....	.8	.35	.55	.2				.55	
12.....	.8	.55	.55		1.0			.35	
13.....	.55	.35	.35		1.6			.2	
14.....	.55	.35	.35		1.0			.2	
15.....	.55	.35	.35		.2				1.3
16.....	.55	.35	.35		.55		2.9		.35
17.....	.55	.2	.55		.8		1.0	.35	
18.....	.35	.2	.55		.55		.55	.05	1.0
19.....	.35	.2	1.6		.05		.55	.05	2.9
20.....	.35	.05	1.6		1.3		.2		1.6
21.....	.35	.05	1.0		1.6				.8
22.....	.55	.05	.55		.8				.2
23.....	.8	.05	.55		.55				
24.....	.55	1.0	.55		.55		.55		
25.....	.35	.35	.55		.55		2.2		
26.....	.35	.35	.2		.55		2.2		
27.....	.55	.8	.2				1.6		.8
28.....	1.6	1.6	.2				.8		.2
29.....	1.0	1.0	.2				1.3		
30.....	.55	1.0	.2	.2			2.2		1.6
31.....	.55		.05	.35					

NOTE.—Discharge determined from weir table. No water in ditch Jan. 6, 9, 12-29; Feb. 8, 10, 11; Feb. 27 to Mar. 3; Mar. 10 to Apr. 15; Apr. 21-23; May 16; May 20 to June 14; June 17, 23-26, and 29, 1915.

Monthly discharge of United States Army ditch at reservoir, near Wahiawa, Oahu, for year ending June 30, 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-feet (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914-15.						
October.....	1.6	0.35	0.69	1.07	21	66
November.....	1.6	.05	.56	.87	17	52
December.....	1.6	.05	.71	1.10	22	68
January 1-6, 10-11, 30-31.....	.35	.05	.15	.23	1	4
February 1-9, 12-26.....	1.6	.05	.66	1.02	15	47
March 4-9.....	1.0	.05	.40	.62	2	7
April 16-20, 24-30.....	2.9	.2	1.34	2.07	16	49
May 1-15, 17-19.....	1.9	.05	.50	.77	8	26
June 15-22, 26-28, 30.....	2.9	.2	1.08	1.67	11	33
The period (170 days).....	2.9	.05	.68	1.05	113	352

NOTE.—Estimates are for periods in which water was flowing. See footnote to daily discharge table.

MISCELLANEOUS MEASUREMENTS.

Measurements of streams and ditches on the island of Oahu at points other than regular gaging stations are listed below:

Miscellaneous discharge measurements on Oahu during the years ending June 30, 1914 and 1915.

Date.	Stream.	Tributary to—	Locality.	Gage height (feet).	Discharge.	
					Second-feet.	Million gallons per day.
1913.						
July 1	East Branch of Kahana.		Weir No. 12, near Kahana.		0.74	0.48
1	Kahana.		Weir No. 5, near Kahana.		5.9	3.8
1	West Branch of Kahana.		Weir No. 2, near Kahana.		.35	.23
2	Waihee.	Waiahole.	Confluence, near Waiahole.		3.7	2.4
2	Waianu.	do.	Weir No. 2, Waianu Valley.		3.7	2.4
2	Uwau.	Waianu.	Weir, Waianu Valley.		.48	.31
2	Walawa.		Above intake, Walawa Valley.		2.8	1.8
Aug. 8	Waiahole.		Near Waikane.		43	28
8	North portal of tunnel.		Near Waiahole.	1.94	25.5	16
15	do.		do.	2.10	26	17
Sept. 12	do.		do.	2.20	32	21
Oct. 22	do.		do.	1.96	26	17
31	do.		do.	2.03	22	14
Sept. 12	Lulumaha.	Nuuanu.	Near Honolulu.	1.49	.60	.39
Nov. 10	do.	do.	do.	1.71	1.8	1.2
Dec. 5	Keaahala Spring.	Kaneohe.	Near Kaneohe.		.48	.31
1914.						
Jan. 10	Waiahole Tunnel.		1,100 feet from north portal.		5.0	3.2
14	South Luluku ditch.		Near Kaneohe.	1.50	.20	.13
Feb. 1	do.		do.	1.45	.20	.13
Jan. 14	Punaluu Spring.		do.		.46	.30
14	Baskerville's Springs.		Near Heela.		4.9	3.2
Jan. 17	Y. Ahin's artesian well No. 1.		Palama, Honolulu.		1.8	1.2
17	Y. Ahin's artesian well No. 2.		do.		1.3	.85
17	Y. Ahin's artesian well No. 3.		do.		.68	.44
17	Y. Ahin's artesian well No. 4.		do.		.65	.42
Feb. 5	Plo.	Punaluu.	Elevation 700 feet, near Punaluu.		1.2	.80
Aug. 26	do.	do.	Elevation 750 feet, near Punaluu.		2.6	1.7
Mar. 4	Schofield supply ditch.		Near Wahiawa.		.26	.17
12	Paoa.		Below pump house springs, Honolulu.		.16	.10
12	do.		Above Kikahi Springs, elevation 275 feet.		.57	.37
12	do.		Below Kikahi Springs.		.72	.47
12	do.		100 feet below Pacific Height intake.		.17	.11
21	Manoa ditch.		Intake, one-half mile above College of Hawaii.		.17	.11
Apr. 3	Waiahole.		Above Waihee tributary.		18	12
3	Waihee.	Waiahole.	Confluence, near Waiahole.		4.8	3.1
Aug. 13	do.	do.	do.		4.6	3.0
Nov. 20	do.	do.	do.		5.6	3.6
Apr. 6	Kipapa ditch.		Government road, near Waipahu.		42	27
6	Waikakalau ditch.		Ditchman's house, above siphon, near Wahiawa.		55	36
May 7	East Branch of Waihee.		Near north portal of Waiahole tunnel.		3.5	2.3

Miscellaneous discharge measurements on Oahu during the years ending June 30, 1914 and 1915—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height (feet).	Discharge.	
					Second-feet.	Million gallons per day.
1914.						
May 7	Waiahole tunnel.	.....	1,350 feet from north portal. ....	.....	20	13
June 26	.....do.....	.....	.....do.....	.....	38	25
July 10	Waiau Spring.	.....	In flume, 60 feet above mill, near Pearl City. ....	.....	7.2	4.7
10	.....do.....	.....	In ditch, east side of pond, near Pearl City. ....	.....	1.6	1.0
10	Ditch B. ....	.....	200 feet below meter at H. S. P. A. experiment station, at Waipio. ....	.....	2.73	1.76
10	.....do.....	.....	700 feet below meter at H. S. P. A. experiment station at Waipio. ....	.....	2.62	1.69
10	Ditch C. ....	.....	200 feet below meter at H. S. P. A. experiment station at Waipio. ....	.....	.72	.46
10	.....do.....	.....	1,200 feet below meter at H. S. P. A. experiment station at Waipio. ....	.....	.60	.39
10	Branch of ditch C. ....	.....	40 feet below road at H. S. P. A. experiment station at Waipio. ....	.....	.64	.41
10	.....do.....	.....	300 feet below road at H. S. P. A. experiment station at Waipio. ....	.....	.65	.42
Sept. 9	Waihee ditch. ....	.....	30 feet below intake, near Kahuluu. ....	.....	11	7.1
9	South Branch of South Fork of Waihee. ....	.....	Near Kahuluu. ....	.....	2.5	1.6
9	North Branch of South Fork of Waihee. ....	.....	Elevation 630 feet near Kahuluu. ....	.....	2.6	1.7
9	Waihee. ....	.....	300 feet above intake near Kahuluu. ....	.....	15	9.7
17	Kahanaiki ditch. ....	.....	Kailua Valley.	27	.64	.41
Aug. 25	Kahuanui. ....	.....	Castle's rest house, near Hauula. ....	.....	2.8	1.8
26	South Branch of Kalena. ....	.....	Elevation 800 feet, near Punaluu. ....	.....	2.5	1.6
26	North Branch of Kalena. ....	.....	Elevation 760 feet, near Punaluu. ....	.....	.74	.48
27	South Branch of Waipuhio.	Punaluu.	Elevation 580 feet, near Punaluu. ....	.....	.37	.24
27	Waihoi. ....do.....	.....do.....	Elevation 470 feet, near Punaluu. ....	.....	6.7	4.3
Oct. 2	Kawaiolena Springs. ....	.....	East outlet, near Honolulu. ....	.....	.47	.30
2	.....do.....	.....	Ditch from upper pond, near Honolulu. ....	.....	.63	.41
15	Kamehameha well. ....	.....	Fort Shafter. ....	.....	1.90	1.23
15	.....do.....	.....	.....do.....	.....	1.76	1.14
16	.....do.....	.....	.....do.....	.....	2.45	1.58
16	.....do.....	.....	.....do.....	.....	2.51	1.62
1915.						
Jan. 22	Waihee.	Waiahole.	Confluence, near Waiahole. ....	.....	5.0	3.2
Feb. 18	.....do.....	.....do.....	.....do.....	.....	6.0	3.9
Mar. 4	.....do.....	.....do.....	.....do.....	.....	5.1	3.3
Apr. 1	.....do.....	.....do.....	.....do.....	.....	3.9	2.5
May 7	.....do.....	.....do.....	.....do.....	.....	3.7	2.4
June 24	.....do.....	.....do.....	.....do.....	.....	4.0	2.6
Jan. 22	Development tunnel A. ....	.....	Portal, near north portal of Waiahole tunnel. ....	.....	4.5	2.9
Feb. 18	.....do.....	.....	.....do.....	.....	4.2	2.7
Mar. 4	.....do.....	.....	.....do.....	.....	3.1	2.0
Apr. 1	.....do.....	.....	.....do.....	.....	3.1	2.0
29	.....do.....	.....	.....do.....	.....	3.1	2.0
May 7	.....do.....	.....	.....do.....	.....	2.9	1.9
June 24	.....do.....	.....	.....do.....	.....	1.1	.7
Apr. 1	Tunnel R. ....	.....	.....do.....	.....	5.0	3.2
15	.....do.....	.....	.....do.....	.....	11	7.2
29	.....do.....	.....	.....do.....	.....	14	9.0
May 7	.....do.....	.....	.....do.....	.....	12	7.6
June 24	.....do.....	.....	.....do.....	.....	1.7	1.1
Apr. 27	Waiahole tunnel. ....	.....	In flume at north portal, near Waiahole. ....	.....	9.7	6.3
May 7	.....do.....	.....	.....do.....	.....	8.0	5.2
June 24	.....do.....	.....	.....do.....	.....	5.1	3.3

Miscellaneous discharge measurements on Oahu during the years ending June 30, 1914 and 1915—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height (feet).	Discharge.	
					Second-feet.	Million gallons per day.
1915.						
May 7	Large siphon..	.....	In north end of Waiahole Tunnel, near Waiahole.	.....	15	10
June 24	.....do.....	.....	.....do.....	.....	14	8.8
24	Small siphon..	.....	North end of Waiahole Tunnel, near Waiahole.	.....	20	13
Apr. 15	Waiahole tunnel.	.....	1,305 feet from north portal.	.....	11	7.3
29	.....do.....	.....	.....do.....	.....	10	6.6
Feb. 4	Kaluanui.....	.....	Elevation 1,900 feet, near Hauula.	.....	.10	.06
Mar. 3	.....do.....	.....	Castle's rest house, near Hauula.	.....	1.8	1.1
Feb. 5	Waihoi.....	Punaluu	Elevation 500 feet.	.....	8.3	5.4
Mar. 3	.....do.....	.....do.....	.....do.....	.....	7.5	4.8
Apr. 28	.....do.....	.....do.....	.....do.....	.....	6.4	4.2
Feb. 5	Kalena.....	.....do.....	Elevation 700 feet, near Punaluu.	.....	2.0	1.3
5	Punaluu.....	.....	Elevation 400 feet, below Waihi tributary, near Punaluu.	.....	7.2	4.7
Mar. 3	.....do.....	.....	Elevation 610 feet, near Punaluu.	.....	6.3	4.1
Feb. 11	Army reservoir ditch.	.....	2,000 feet below intake, near Wahiawa.	.....	1.1	.7
25	Orphanage ditch.	.....	50 feet below intake, in Kalihi Valley, near Honolulu.	.....	5.9	3.8
25	.....do.....	.....	1,000 feet below intake.	.....	6.1	3.9
Apr. 17	Y. M. C. A. artesian well.	.....	Y. M. C. A. Building, Honolulu.	.....	1.5	.97
21	Waiahole tunnel.	.....	South portal, near Wahiawa.	.....	20.4	13.2
21	.....do.....	.....	.....do.....	.....	20.8	13.4
21	Waiahole canal.	.....	Adit No. 8, near Waipahu.	.....	20	13
21	.....do.....	.....	.....do.....	.....	20	13
Apr. 30	Afong's ditch..	.....	150 feet above driveway to Afong house, Nuuanu Valley.	.....	2.0	1.3
May 13	Pump No. 3...	.....	60 feet below sump, at Schofield Barracks.	.....	.55	.36
13	.....do.....	.....	100 feet below sump, at Schofield Barracks.	.....	.60	.39
17	East Manoa ditch.	.....	Footbridge, 300 feet south of gaging station on West Manoa stream.	.....	2.2	1.4

ISLAND OF MAUI.

IAO STREAM NEAR WAILUKU, MAUI.

LOCATION.—A quarter of a mile below main forks of the stream, 3 miles west of Wailuku.

RECORDS AVAILABLE.—May 7, 1910, to June 30, 1915.

GAGE.—Stevens water-stage recorder installed June 10, 1914, to replace original Friez recorder; datum raised 1.75 feet May 22, 1915; records published to original datum.

DISCHARGE MEASUREMENTS.—Made by wading or for cable at gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for 50 feet above and for 100 feet below gage; right bank slopes gently and is wooded; left bank is clean and nearly vertical. Control is composed of large boulders and remains of original plank control and is fairly permanent except at extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 5.50 feet at 4.30 a. m. May 20, 1914 (discharge, 650 million gallons per day, or 1,000 second-feet); minimum stage recorded, 2.27 feet at 1 p. m. October 31, 1913 (discharge, 5.0 million gallons per day, or 7.7 second feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Domestic supply and irrigation of sugar cane and taro.

ACCURACY.—Estimates fair for all stages. Sufficient discharge measurements were made to define changes in control. Owing to faulty working of the recorder there are many gaps in record after June 10, 1914.

Discharge measurements of Iao Stream near Wailuku, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—Aug. 12	E. O. Christiansen	4.08	213	137
Dec. 4	C. T. Bailey	5.25	758	490
1914—Feb. 25	G. R. White	2.80	22	14
Apr. 21	C. T. Bailey	3.82	165	107
June 10	do.	3.40	108	70
13	do.	4.15	309	200
25	do.	4.75	559	361
July 20	do.	3.18	71	46
Sept. 4	do.	3.67	154	99
Oct. 1	do.	3.17	88	57
Nov. 24	do.	4.70	607	392
1915—June 12	H. A. R. Austin	a 2.52	24	16
19	do.	a 3.84	206	133

a Old gage datum.

Discharge, in million gallons per day, of Iao Stream near Wailuku, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	51	8	14	7	6	26	22	26	8	19	22	200
2.....	51	8	26	6.5	51	19	26	22	8	26	19	135
3.....	37	10	16	6.5	84	104	37	19	8	16	46	72
4.....	26	8	10	7	33	375	33	19	8	16	97	56
5.....	66	10	10	16	14	188	37	19	8	14	51	46
6.....	29	10	10	16	10	175	29	19	8	12	42	66
7.....	19	12	12	19	26	90	33	16	8	26	118	78
8.....	12	10	12	14	238	61	212	12	8	19	428	46
9.....	12	22	10	10	358	46	111	12	8	14	118	90
10.....	12	12	12	10	111	33	56	10	10	12	66	.....
11.....	12	145	10	10	97	29	37	10	8	19	46	.....
12.....	26	104	10	6	90	26	145	10	8	29	37	.....
13.....	19	37	10	37	61	22	165	10	19	61	51	.....
14.....	14	33	8	12	33	46	66	10	10	33	46	.....
15.....	14	42	8	7	26	33	51	10	7	22	46	.....
16.....	12	118	10	6	61	26	78	16	22	19	33	.....
17.....	12	51	29	6	56	33	118	10	51	29	66	.....
18.....	12	33	33	6	118	51	46	8	12	22	250	.....
19.....	37	26	14	5.5	84	29	42	8	10	78	310	.....
20.....	42	19	8	5.5	61	26	72	8	10	97	445	.....
21.....	19	29	14	5.5	61	29	51	8	8	135	238	.....
22.....	14	19	12	5.5	33	26	111	8	7	104	90	.....
23.....	22	19	12	5.5	22	29	51	8	7	265	66	.....
24.....	22	14	10	5.5	72	19	42	8	7	97	66	.....
25.....	16	10	10	5.5	97	22	33	8	6.5	61	51	.....
26.....	14	14	10	5.5	84	26	29	8	10	56	78	.....
27.....	8	10	10	5.5	26	22	29	8	10	37	104	.....
28.....	10	19	8	5.5	19	26	26	8	8	29	135	.....
29.....	8	12	7	5	16	26	26	.....	135	26	78	.....
30.....	8	7	7	5	33	26	37	.....	42	22	61	.....
31.....	8	46	.....	5	.....	22	42	.....	22	.....	46	.....

Discharge, in million gallons per day, of Iao Stream near Wailuku, Maui, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....		66	72	73			36	17	33		130	
2.....		56	165	68			51	17	33		159	
3.....		90	111	73			33	17	59		83	
4.....	135		90	59			88	17	94		36	
5.....	97		111	78			68	88	51		33	
6.....	97		250	73			47	40	43	19	30	
7.....	72	46	111	68			47	55	64	17	27	
8.....		51	78	64			43	24	88	17	24	
9.....		118	61	320			43	59	51	22	33	
10.....		310	90	139			47	108	40	27		
11.....		90	61	68			73	115	36	59		
12.....			104	59			36	208	33	68		15
13.....			155	55			33	108	47	30		
14.....			225	55			30	68		24		
15.....			225	55			27	55		36		
16.....			212	59			24	51		220		
17.....			118	55			22	64		94	19	
18.....			200	59			22	73		73		
19.....		135	238	55			19	51		59		
20.....	46	126	97	78			19	130		51		139
21.....	42	135	84	59			24	320		68		115
22.....	56	175	212	55			19	122		94		115
23.....	66	175	139	55		43	19	139		73	22	108
24.....	118	111	78	55		73	19	78		59		100
25.....	111	78	68	55	64	83	19	73		83		122
26.....		97	78	59	59	139	19	68		245		108
27.....		72	73	59	130	73	17	43		220		108
28.....		97	115	59	422	94	17	36		208		108
29.....		72	83	51		59	17			130		108
30.....		126	73	78		43	17			130		108
31.....		104		115		40	17					

NOTE.—Discharge determined from rating curves fairly well defined for periods July 1, 1913, to Sept. 22, 1914, Sept. 23, 1914, to May 22, 1915, and May 23 to June 30, 1915. Gaps in records after June 10, 1914, due to lack of continuity in gage height record.

Record of discharge, July 1 to Dec. 31, 1913, supersedes that published in Water-Supply Paper 373, p. 104.

Monthly discharge of Iao Stream near Wailuku, Maui, for the year ending June 30, 1914.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-foot.
	Maximum.	Minimum.	Mean.			
July.....	66	8	21.4	33.1	664	2,040
August.....	145	7	29.6	45.8	417	2,820
September.....	33	7	12.4	19.2	372	1,140
October.....	37	5	8.77	13.6	272	834
November.....	358	6	69.4	107	2,080	6,390
December.....	375	19	55.2	85.4	1,710	5,250
January.....	212	22	61.1	94.5	1,890	5,810
February.....	26	8	12.1	18.7	338	1,040
March.....	135	6.5	16.2	25.1	502	1,540
April.....	265	12	47.2	73.0	1,420	4,350
May.....	445	19	108	167	3,350	10,300
June 1-9.....	200	46	87.7	136	789	2,420
The period.....					13,800	43,900

SOUTH WAIEHU STREAM NEAR WAILUKU, MAUI.

LOCATION.—300 feet above intake of South Waiehu ditch, about 3 miles west of Wailuku.

RECORDS AVAILABLE.—March 19, 1913, to June 30, 1915.

GAGE.—Vertical staff; read twice daily.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge 100 feet below gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for 100 feet above and below gage; bed of stream very rough and steep; banks high and covered with vegetation. Control composed of boulders and gravel; shifting; discharge relation also affected by growth of weeds on banks at control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 4.12 feet at 6 a. m. May 18, 1914 (discharge, computed from extension of rating curve, approximately 77 million gallons per day, or 119 second-feet); minimum stage recorded, 0.5 foot July, 1913 (discharge, 1.5 million gallons per day, or 2.3 second-feet).

DIVERSIONS.—A small taro ditch diverts about 0.1 second-foot around station.

REGULATION.—None.

UTILIZATION.—Irrigation of sugar cane.

ACCURACY.—Estimates May 14, 1913, to September 22, 1914, fair, as control fairly stable during this period; estimates for other periods poor on account of unstable stage-discharge relation.

Discharge measurements of South Waiehu Stream near Wailuku, Maui, during the years ending June 30, 1914 and 1915.

[Made by C. T. Bailey.]

Date.	Gage height (feet).	Discharge.		Date.	Gage height (feet).	Discharge.	
		Second-foot.	Million gallons per day.			Second-foot.	Million gallons per day.
1913—July 31.....	0.53	2.7	1.8	1914—Aug. 15.....	1.52	19	12
1914—Feb. 25.....	.80	4.5	2.9	Sept. 8.....	.92	18	11
Apr. 6.....	1.22	11	7.0	Oct. 19.....	.63	10	6.5
May 26.....	1.52	20	13	1915—Feb. 13.....	.76	9.5	6.1
Do.....	1.73	25	16				

Discharge, in million gallons per day, of South Waiehu Stream near Wailuku, Maui, for the years ending June 30, 1913, 1914, and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Mar.	Apr.	May.	June.	Date.	Mar.	Apr.	May.	June.
1912-13.					1912-13.				
1.....		3.5	3.5	2.0	16.....		11	2.0	2.0
2.....		3.5	3.5	2.0	17.....		17	2.0	2.0
3.....		3.5	3.5	2.0	18.....		13	2.0	2.0
4.....		3.5	3.5	2.0	19.....	3.5	3.5	2.0	2.0
5.....		3.5	3.5	2.0	20.....	3.5	3.5	2.0	2.0
6.....		3.5	3.5	2.0	21.....	3.5	5.5	2.0	2.0
7.....		3.5	3.5	2.0	22.....	5.5	5.5	2.0	2.0
8.....		3.5	3.5	2.0	23.....	3.5	3.5	2.0	2.0
9.....		3.5	3.5	2.0	24.....	3.5	3.5	2.0	2.0
10.....		3.5	3.5	2.0	25.....	3.5	3.5	2.0	2.0
11.....		12	3.5	2.0	26.....	3.5	3.5	2.0	2.0
12.....		7.8	28	2.0	27.....	3.5	3.5	2.5	12
13.....		15	32	2.0	28.....	4.5	3.5	3.5	2.0
14.....		4.0	18	2.0	29.....	3.5	3.5	2.2	2.0
15.....		8.5	5.0	2.0	30.....	4.0	3.5	2.0	2.0
					31.....	3.5		2.0	

Discharge, in million gallons per day, of South Waiehu Stream near Wailuku, Maui, for the years ending June 30, 1913, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.	1.5	1.8	2.5	2.5	2.2	2.5	2.5	5.5	3.5	3.5	4.5	54
2.	1.8	2.5	18	2.5	3.0	2.8	2.8	5.5	3.5	6.8	6.0	16
3.	1.8	2.8	1.8	2.5	12	14	2.8	4.0	3.5	3.0	8.2	8.2
4.	1.8	1.8	2.0	2.0	2.2	36	11	4.5	3.5	4.0	34	5.5
5.	1.8	2.0	1.8	2.2	2.0	39	5.5	4.0	4.0	34	9.0	5.5
6.	1.8	2.2	2.0	3.0	2.0	29	3.0	3.5	5.0	36	6.0	7.5
7.	1.8	2.2	5.5	2.0	14	9.8	3.0	4.0	3.0	14	72	6.8
8.	1.8	2.0	2.5	2.0	26	2.8	16	4.0	4.0	9.0	66	6.8
9.	1.8	2.2	2.0	2.0	12	2.2	3.0	3.5	9.8	9.0	24	8.2
10.	1.8	2.2	2.0	2.0	3.0	2.2	2.8	3.5	11	4.0	8.2	6.8
11.	2.2	2.8	2.0	2.0	2.2	2.2	28	3.5	5.5	3.5	9.0	6.8
12.	2.0	4.0	2.0	2.0	2.2	2.2	7.5	3.5	4.5	12	9.0	45
13.	2.0	1.8	2.0	2.0	2.2	2.0	5.0	5.0	5.5	14	16	6.8
14.	2.0	2.2	2.0	2.0	2.0	16	4.5	4.5	3.0	6.0	44	6.8
15.	2.0	2.2	2.0	2.0	2.0	3.0	4.5	4.0	3.0	5.0	16	6.8
16.	1.8	4.0	2.2	2.2	2.0	3.0	4.5	5.0	11	4.0	9.8	6.0
17.	1.8	2.2	3.5	2.0	2.2	3.0	22	6.0	24	6.0	41	6.8
18.	1.5	2.0	3.5	2.0	9.0	2.5	4.5	3.5	4.0	6.8	73	12
19.	2.5	2.0	2.2	2.2	10	2.5	2.8	3.5	3.0	12	68	8.2
20.	2.2	2.0	2.0	2.5	2.8	2.5	13	3.5	3.0	6.8	66	6.8
21.	2.0	2.2	2.0	2.5	2.5	2.5	13	3.5	2.8	5.5	56	6.8
22.	2.0	2.0	1.8	2.0	2.2	2.2	18	3.5	3.0	6.0	24	6.8
23.	2.0	2.0	2.0	2.5	2.2	2.0	14	3.5	4.5	6.8	9.8	6.8
24.	2.0	2.0	2.0	2.0	2.5	2.0	6.0	4.0	6.8	7.5	24	6.8
25.	1.8	2.0	2.0	2.0	2.2	2.0	4.5	3.5	4.5	5.0	31	29
26.	1.5	2.0	2.0	2.0	2.5	2.0	3.5	4.5	18	22	40	8.2
27.	1.8	2.2	2.0	2.0	2.0	2.0	3.5	4.5	8.2	6.8	34	6.8
28.	2.5	2.0	2.2	2.0	2.0	2.0	4.0	4.0	8.2	5.0	28	6.8
29.	1.8	2.0	2.2	2.0	2.0	2.0	4.5	-----	34	9.0	9.8	6.8
30.	2.0	2.0	2.2	2.0	2.0	2.0	5.0	-----	3.5	6.0	13	9.8
31.	2.2	3.0	-----	2.0	-----	2.2	16	-----	3.0	-----	22	-----
1914-15.												
1.	9.0	14	18	-----	11	8.2	6.8	6.5	4.5	5.0	5.5	4.5
2.	20	13	32	-----	8.2	7.5	6.8	8.0	4.5	5.5	5.5	5.0
3.	6.8	10	18	-----	7.5	7.5	6.8	6.0	8.8	5.5	5.5	5.0
4.	8.2	26	14	-----	9.0	7.5	16	4.5	8.8	5.5	5.0	4.2
5.	9.0	13	14	-----	6.8	7.5	7.2	6.5	6.0	5.0	5.5	5.0
6.	10	13	72	-----	5.0	7.5	4.5	6.0	7.2	5.0	5.5	5.0
7.	6.8	9.8	13	-----	5.0	7.5	4.5	5.0	6.5	4.5	5.0	5.0
8.	6.8	9.8	13	-----	6.0	7.5	5.0	5.5	7.2	4.5	5.0	5.5
9.	6.8	13	11	-----	6.8	7.5	5.0	5.5	5.5	5.5	5.0	5.5
10.	6.8	22	8.8	-----	6.8	12	5.0	6.0	5.0	9.5	12	5.5
11.	8.2	41	9.8	-----	7.5	11	12	5.5	5.0	10	6.0	5.5
12.	6.8	16	13	-----	7.5	9.8	6.0	13	4.5	6.5	5.5	5.5
13.	18	35	9.8	-----	9.0	9.8	6.0	8.0	6.0	6.0	5.0	5.5
14.	11	39	31	-----	11	9.0	5.0	6.0	6.0	5.5	5.5	5.5
15.	13	20	18	-----	11	7.5	5.0	6.0	7.2	5.5	5.5	5.5
16.	18	20	18	-----	8.2	6.8	5.0	5.0	5.5	14	5.5	6.0
17.	14	30	18	-----	8.2	7.5	5.0	6.0	4.5	13	5.5	5.5
18.	11	18	10	-----	8.2	6.0	5.0	6.5	4.5	7.2	5.0	5.5
19.	6.8	14	2.8	9.8	13	12	4.5	6.0	4.5	6.0	5.5	8.8
20.	6.8	14	3.5	9.0	8.2	14	4.5	7.2	4.5	5.5	5.5	7.2
21.	8.2	22	4.0	8.2	8.2	11	5.0	16	4.5	5.0	5.5	6.0
22.	18	24	4.5	8.2	7.5	8.2	6.5	5.0	4.5	7.2	5.0	6.0
23.	11	20	-----	8.2	7.5	7.5	5.0	5.5	5.0	7.2	5.0	5.5
24.	11	22	-----	7.5	11	12	5.0	5.5	5.5	6.0	4.5	6.0
25.	11	20	-----	7.5	7.5	9.8	5.0	5.0	5.0	5.5	4.5	8.0
26.	13	20	-----	8.2	9.0	9.8	4.5	5.0	4.5	10	4.5	7.2
27.	22	14	-----	7.5	9.8	9.0	5.0	4.2	4.5	12	5.5	6.0
28.	34	13	-----	8.2	16	9.8	5.5	4.2	4.5	6.0	5.0	5.0
29.	36	14	-----	11	11	8.2	5.0	-----	4.5	7.2	4.5	5.0
30.	14	29	-----	9.0	9.0	8.2	5.0	-----	4.5	6.0	4.5	6.0
31.	11	24	-----	10	-----	9.0	5.5	-----	5.0	-----	5.5	-----

NOTE.—Discharge determined from rating curves applicable as follows: Mar. 19 to May 13, 1913, poorly defined; May 14, 1913 to Sept. 22, 1914, well defined below 25 million gallons per day (37 second-feet); Oct. 19, 1914, to Jan. 4, 1915, poorly defined; and Jan. 5 to June 30, 1915, fairly well defined below 8 million gallons per day (12 second-feet). No gage record Sept. 23 to Oct. 18, 1914; gage washed out.

Record of discharge Mar. 19 to Dec. 31, 1913, supersedes that published in Water-Supply Paper No. 373, p. 106.

Monthly discharge of South Waiehu Stream near Wailuku, Maui, for the years ending June 30, 1913, 1914, and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913.	5.5	3.5	3.77	5.83	49	150
March 19-31.....	17	3.5	5.64	8.73	169	519
April.....	32	2.0	5.02	7.77	156	478
May.....	12	2.0	2.33	3.61	70	215
June.....						
The period.....					444	1,360
1913-14.	2.5	1.5	1.91	2.96	59	182
July.....	4.0	1.8	2.27	3.51	70	216
August.....	18	1.8	2.79	4.32	84	257
September.....	3.0	2.0	2.15	3.33	67	205
October.....	26	2.0	4.57	7.07	137	421
November.....	39	2.0	6.42	9.93	199	611
December.....	28	2.5	7.76	12.0	241	738
January.....	6.0	3.5	4.11	6.36	115	353
February.....	34	2.8	6.90	10.7	214	656
March.....	36	3.0	9.30	14.4	279	856
April.....	73	4.5	28.4	43.9	881	2,700
May.....	54	5.5	11.1	17.2	332	1,020
June.....						
The year.....	73	1.5	7.34	11.4	2,680	8,220
1914-15.	36	6.8	12.7	19.6	393	1,210
July.....	41	9.8	19.8	30.6	613	1,880
August.....	72	2.8	16.2	25.1	356	1,090
September 1-22.....	11	7.5	8.64	13.4	112	345
October 19-31.....	16	5.0	8.68	13.4	260	799
November.....	14	6.0	8.91	13.8	276	847
December.....	16	4.5	5.89	9.11	183	560
January.....	16	4.2	6.40	9.90	179	550
February.....	8.8	4.5	5.43	8.40	168	517
March.....	14	4.5	6.89	10.7	207	634
April.....	12	4.5	5.42	8.39	168	516
May.....	8.8	4.2	5.71	8.83	171	526
June.....						

NORTH WAIIEHU STREAM NEAR WAILUKU, MAUI.

LOCATION.—50 feet above uppermost diversion, 1 mile above Waihee canal crossing, and about 2½ miles northwest of Wailuku.

RECORDS AVAILABLE.—July 9, 1912, to June 30, 1915.

GAGE.—Vertical staff on right bank; read twice daily.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—One channel at all stages; stream bed very steep and rough; right bank nearly vertical rock wall; left bank high with gentle slope. Control composed of small boulders; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 4.08 feet morning of September 6, 1914 (discharge, computed from extension of rating curve, approximately 300 million gallons per day, or 460 second-feet); minimum stage recorded, 1.20 feet, March 25 to 31, 1915 (discharge, 1.6 million gallons per day, or 2.5 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Irrigation of sugar cane.

ACCURACY.—Owing to unstable control satisfactory rating curves were not developed and estimates are poor.

Discharge measurements of North Waiehu Stream near Wailuku, Maui, during the years ending June 30, 1914 and 1915.

[Made by C. T. Bailey.]

Date.	Gage height (feet).	Discharge (million gallons per day).	Date.	Gage height (feet).	Discharge (million gallons per day).
1913—July 3.....	0.62	2.5	1914—May 28.....	0.98	11
Aug. 14.....	.60	3.0	Oct. 29.....	1.20	5.8
1914—Feb. 26.....	.71	3.7	1915—Mar. 13.....	1.50	5.1
Apr. 22.....	.79	4.5			

Discharge, in million gallons per day, of North Waiehu Stream near Wailuku, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	3.2	2.6	2.6	2.6	2.6	3.9	3.9	4.8	3.9	3.9	4.8	15
2.....	3.9	2.6	7.0	2.6	2.6	3.9	3.9	3.9	3.9	4.8	4.8	11
3.....	3.2	3.2	3.2	4.8	2.6	3.9	3.9	3.9	3.9	4.8	5.8	8.1
4.....	2.6	2.6	2.6	3.9	2.6	15	5.8	3.9	3.9	4.8	7.0	8.1
5.....	2.6	2.6	2.6	3.9	2.6	7.0	5.8	3.9	4.8	4.8	4.8	8.1
6.....	2.6	2.6	2.6	3.9	2.6	8.1	4.8	3.9	4.8	8.1	4.8	8.1
7.....	2.6	2.6	3.2	3.9	3.2	4.8	4.8	3.9	3.9	5.8	5.8	8.1
8.....	2.6	2.6	2.6	3.2	13	3.9	4.8	3.9	3.9	4.8	9.6	8.1
9.....	2.6	2.6	2.6	3.2	9.6	3.9	4.8	3.9	4.8	4.8	5.8	8.1
10.....	2.6	3.2	2.6	3.2	4.8	3.9	3.9	3.9	4.8	5.8	7.0	8.1
11.....	2.6	2.6	2.6	2.6	3.9	3.9	3.9	3.9	3.9	4.8	5.8	8.1
12.....	2.6	3.9	2.6	2.6	3.9	3.9	7.0	3.9	5.8	5.8	5.8	11
13.....	3.2	2.6	2.6	2.6	3.9	3.9	5.8	3.9	4.8	5.8	8.1	32
14.....	2.6	2.6	2.6	2.6	3.9	8.1	4.8	3.9	4.8	5.8	5.8	9.6
15.....	2.6	2.6	2.6	2.6	3.9	4.8	3.9	3.9	4.8	4.8	5.8	9.6
16.....	2.6	4.8	2.6	2.6	3.9	4.8	3.9	3.9	4.8	4.8	5.8	9.6
17.....	2.6	2.6	2.6	2.6	3.9	4.8	7.0	3.9	4.8	4.8	7.0	9.6
18.....	2.6	2.6	3.2	2.6	7.0	4.8	4.8	3.9	4.8	5.8	11	9.6
19.....	3.9	2.6	2.6	2.6	4.8	4.8	4.8	3.9	4.8	5.8	8.1	9.6
20.....	2.6	2.6	2.6	2.6	4.8	4.8	5.8	3.9	3.9	5.8	11	9.6
21.....	2.6	2.6	2.6	2.6	3.9	4.8	5.8	3.9	3.9	5.8	8.1	9.6
22.....	2.6	2.6	2.6	2.6	3.9	4.8	5.8	3.9	3.9	5.8	5.8	9.6
23.....	2.6	2.6	2.6	2.6	3.9	4.8	4.8	3.9	4.8	5.8	5.8	9.6
24.....	2.6	2.6	2.6	2.6	3.9	3.9	4.8	3.9	4.8	5.8	5.8	9.6
25.....	2.6	2.6	2.6	2.6	3.9	3.9	4.8	3.9	4.8	4.8	5.8	15
26.....	2.6	2.6	2.6	2.6	3.2	3.9	4.8	3.9	4.8	5.8	8.1	11
27.....	2.6	2.6	2.6	2.6	3.9	3.9	4.8	3.9	4.8	5.8	8.1	22
28.....	2.6	2.6	2.6	2.6	3.9	3.9	4.8	3.9	4.8	5.8	9.6	11
29.....	2.6	2.6	2.6	2.6	3.9	3.9	4.8	.....	8.1	4.8	8.1	11
30.....	3.2	2.6	2.6	2.6	3.9	3.9	4.8	.....	3.9	4.8	8.1	11
31.....	3.2	5.8	.....	2.6	.....	3.9	4.8	.....	3.9	.....	11	.....

Discharge, in million gallons per day, of North Waiehu Stream near Wailuku, Maui, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	9.6	9.6	11	9.7	16	9.0	6.1	4.5	2.8	4.7	4.7	4.7
2.....	11	11	13	13	7.1	7.1	6.1	4.5	2.8	4.7	4.7	4.7
3.....	11	11	11	13	5.8	9.5	6.1	4.5	4.1	4.7	4.7	4.7
4.....	11	11	11	12	5.8	9.5	7.4	4.5	4.1	4.7	4.7	4.7
5.....	11	11	11	12	5.8	9.5	10	8.7	4.1	3.1	4.7	4.7
6.....	11	11	245	12	5.8	9.5	10	6.3	4.1	3.1	4.7	6.7
7.....	11	11	11	11	5.8	9.5	10	5.3	4.1	3.1	4.7	4.7
8.....	11	11	11	11	5.8	9.5	10	5.3	4.1	3.1	4.7	4.7
9.....	11	11	11	11	22	5.8	9.5	10	5.3	4.1	5.7	4.7
10.....	11	11	10	16	5.8	17	10	5.3	4.1	8.1	6.7	4.7
11.....	11	11	10	10	5.8	11	10	5.3	4.1	11	8.1	4.7
12.....	11	11	10	10	5.8	9.5	10	10	4.1	8.1	9.5	4.7
13.....	13	11	10	10	5.8	11	10	6.2	2.6	4.7	13	4.7
14.....	11	13	11	10	11	15	10	5.2	3.1	4.7	13	4.7
15.....	11	11	9.6	9.4	14	9.5	5.4	5.2	4.7	4.7	13	5.7
16.....	13	11	11	9.1	9.0	9.5	5.4	5.2	2.1	11	13	4.7
17.....	11	13	11	8.9	7.8	9.5	5.4	5.2	2.1	9.5	13	4.7
18.....	9.6	11	9.2	8.7	7.8	9.5	5.4	5.2	2.1	9.5	13	4.7
19.....	11	11	8.9	8.4	14	8.5	5.4	5.2	2.1	9.5	13	6.7
20.....	9.6	11	8.8	8.1	14	11	5.4	6.2	2.1	5.7	13	9.5
21.....	9.6	11	8.6	11	7.8	11	4.5	21	2.1	4.7	13	4.7
22.....	11	11	8.4	11	5.4	8.5	4.5	6.2	2.1	4.7	6.7	4.7
23.....	11	11	32	7.4	5.4	8.5	4.5	5.2	2.1	4.7	6.7	4.7
24.....	11	11	8.3	7.1	7.8	8.5	4.5	4.1	2.1	4.7	6.7	4.7
25.....	11	11	8.1	6.9	10	11	4.5	4.1	1.6	4.7	6.7	6.7
26.....	11	11	7.9	6.6	29	15	4.5	4.1	1.6	11	6.7	8.1
27.....	11	11	7.7	6.3	7.8	15	4.5	4.1	1.6	13	6.7	6.7
28.....	11	13	7.5	6.1	12	15	4.5	4.1	1.6	13	6.7	4.7
29.....	15	11	7.3	5.8	18	15	4.5	.....	1.6	6.7	6.7	4.7
30.....	11	11	7.1	5.8	10	15	4.5	.....	1.6	4.7	6.7	4.7
31.....	11	11	.....	5.8	.....	15	4.5	.....	1.6	.....	6.7	.....

NOTE.—Discharge July 1, 1913, to Sept. 5, 1914, and Mar. 14 to June 30, 1915, based on poorly defined rating curves; discharge Sept. 6, 1914, to Mar. 13, 1915, computed by method for shifting channels.

Monthly discharge of North Waiehu Stream near Wailuku, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acres.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	3.9	2.6	2.78	4.30	86	264
August.....	5.8	2.6	2.85	4.41	88	271
September.....	7.0	2.6	2.81	4.35	84	259
October.....	4.8	2.6	2.90	4.49	90	276
November.....	13	2.6	4.28	6.62	128	394
December.....	15	3.9	4.92	7.64	152	468
January.....	7.0	3.9	4.93	7.63	153	469
February.....	4.8	3.9	3.93	6.08	110	338
March.....	8.1	3.9	4.59	7.90	142	437
April.....	8.1	3.9	5.38	8.32	161	485
May.....	11	4.8	7.05	10.9	219	671
June.....	32	8.1	11.0	17.0	328	1,010
The year.....	32	2.6	4.78	7.40	1,740	5,350
1914-15.						
July.....	15	9.6	11.1	17.2	343	1,060
August.....	13	9.6	11.1	17.2	346	1,060
September.....	245	7.1	18.2	28.2	547	1,680
October.....	22	5.8	9.81	15.2	304	933
November.....	29	5.4	9.26	14.3	278	853
December.....	17	7.1	11.0	17.8	341	1,050
January.....	10	4.5	6.70	10.4	208	637
February.....	21	4.1	5.93	9.18	166	510
March.....	4.7	1.6	2.81	4.35	87	267
April.....	13	3.1	6.51	10.1	195	599
May.....	13	4.7	8.08	12.5	251	769
June.....	9.5	4.7	5.27	8.15	158	485
The year.....	245	1.6	8.83	13.7	3,220	9,900

WAIHEE STREAM NEAR WAIHEE, MAUI.

LOCATION.—About 300 feet above intake of Waihee Canal, 3 miles west of Waihee, and 7 miles northwest of Wailuku.

RECORDS AVAILABLE.—April 1, 1913, to June 30, 1915.

GAGE.—Barrett and Lawrence water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge 250 feet below gage.

CHANNEL AND CONTROL.—Channel at gage is a pool at foot of low waterfall; banks mostly of solid rock, steep and high. Control is composed of boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 8.35 feet at 4 a. m. September 6, 1914 (discharge, computed from extension of rating curve, approximately 1,400 million gallons per day, or 2,160 second-feet); minimum stage recorded, 2.59 feet August 5, 1913 (discharge, 21 million gallons per day, or 32 second-feet).

DIVERSIONS.—None above station.

REGULATION.—Normal flow of stream is increased by development tunnels near headwaters.

UTILIZATION.—Irrigation of sugar cane and taro.

ACCURACY.—Estimates based on well-defined rating curves and continuous gage-height record; good for all stages.

Discharge measurements of Waihee Stream near Waihee, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—July 31	C. T. Bailey	2.78	46	30
Aug. 13	.....do.....	3.00	66	43
Dec. 4	.....do.....	4.08	359	232
1914—Feb. 28	.....do.....	2.74	44	29
Apr. 23	.....do.....	4.15	366	237
23	.....do.....	3.90	285	184
23	.....do.....	3.55	187	121
June 1	.....do.....	4.60	577	373
July 1	.....do.....	3.34	163	105
20	.....do.....	3.10	102	66
Nov. 24	.....do.....	4.40	519	335
1915—Feb. 15	.....do.....	2.90	73	47
June 12	H. A. R. Austin	2.98	55	36

Discharge, in million gallons per day, of Waihee Stream near Waihee, Maui, for the years ending June 30, 1914 and 1915.

(To convert discharge in million gallons per day to second-feet multiply by 1.55.)

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	52	25	30	27	29	36	28	43	28	26	36	153
2.....	89	36	105	26	82	36	28	33	28	30	40	133
3.....	43	30	40	26	59	105	30	30	28	30	61	83
4.....	48	25	32	26	36	377	36	30	26	30	88	76
5.....	54	24	28	26	26	160	40	30	28	111	67	76
6.....	45	30	28	26	25	63	30	33	28	138	49	90
7.....	44	27	35	27	63	37	36	33	26	55	43	90
8.....	36	25	29	29	302	37	185	33	26	36	95	76
9.....	32	32	28	28	242	32	74	30	30	36	67	133
10.....	31	44	28	26	63	30	33	30	33	43	55	115
11.....	34	63	28	26	74	30	30	30	26	33	49	83
12.....	75	122	28	27	82	28	88	30	26	33	49	153
13.....	41	40	28	32	44	28	67	30	26	36	55	163
14.....	29	36	28	26	25	61	30	30	26	74	74	83
15.....	30	44	28	26	33	30	33	30	26	40	61	83
16.....	30	52	30	26	30	28	40	33	43	33	49	124
17.....	34	32	50	26	30	40	129	30	43	33	74	98
18.....	39	28	45	28	75	52	36	30	26	55	216	106
19.....	92	28	28	27	89	28	36	30	28	129	237	204
20.....	88	28	27	27	52	28	40	30	28	103	283	106
21.....	35	41	28	28	52	28	43	30	26	103	143	90
22.....	28	30	28	29	33	28	95	30	26	103	90	124
23.....	33	30	28	29	30	28	36	30	26	156	76	90
24.....	37	32	28	28	46	27	33	30	28	61	98	106
25.....	48	28	28	27	89	27	33	30	28	49	83	318
26.....	54	31	28	27	56	28	30	30	40	74	90	106
27.....	33	36	28	27	36	28	30	28	33	49	90	143
28.....	50	41	28	25	34	29	36	28	28	55	90	90
29.....	43	29	28	25	34	29	30	.....	81	40	76	90
30.....	48	33	27	25	34	30	33	.....	28	40	76	163
31.....	28	34	.....	25	.....	29	55	.....	26	.....	76	.....
Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.		
1914-15.												
1.....	90	83	90	98	272	76	50	41	56	50		
2.....	76	83	237	106	98	83	62	41	62	68		
3.....	83	90	115	115	83	115	45	41	124	56		
4.....	90	98	133	98	83	83	115	41	106	50		
5.....	83	98	163	106	83	76	68	76	62	45		
6.....	76	83	342	106	83	68	50	45	56	41		
7.....	83	83	143	98	76	68	50	45	83	41		
8.....	90	83	115	90	76	68	45	50	90	41		
9.....	76	83	106	318	76	76	45	83	50	41		
10.....	68	90	133	173	76	115	62	124	45	50		
11.....	68	90	115	98	76	98	50	106	45	83		
12.....	90	83	164	98	76	115	50	133	45	133		
13.....	98	106	204	90	76	106	45	83	76	133		
14.....	90	115	306	90	226	106	45	62	62	50		
15.....	90	124	260	90	153	83	45	226	75	45		
16.....	83	106	283	106	90	76	45	45	56	45		
17.....	83	98	163	98	76	68	45	56	50	248		
18.....	83	98	237	106	115	68	45	62	50	115		
19.....	83	106	294	98	163	163	45	56	50	98		
20.....	76	98	143	153	90	106	45	98	45	.....	
21.....	68	98	153	124	76	76	45	143	50	.....	
22.....	76	98	403	90	76	68	45	98	50	.....	
23.....	83	106	237	90	76	68	45	133	50	.....	
24.....	90	98	134	90	215	124	50	68	50	.....	
25.....	98	98	143	83	83	115	45	56	50	.....	
26.....	90	90	183	98	83	115	45	56	45	.....	
27.....	106	90	133	90	183	56	45	56	45	.....	
28.....	106	90	163	115	306	83	41	56	45	.....	
29.....	106	90	143	98	133	56	41	.....	45	.....	
30.....	106	90	124	133	83	50	41	.....	45	.....	
31.....	98	90	.....	153	.....	50	41	.....	45	.....	

NOTE.—Discharge determined from well-defined rating curves applicable as follows: July 1 to Dec. 31, 1913; Jan. 1 to May 18, 1914; May 19, 1914, to Apr. 19, 1915. Gage-height record Apr. 20 to June 30, 1915, fragmentary and unreliable owing to clogging of well intake and unsatisfactory operation of water-stage recorder.

Monthly discharge of Waihee Stream near Waihee, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	92	28	45.3	70.1	1,400	4,310
August.....	122	24	36.6	56.6	1,140	3,480
September.....	105	26	32.7	50.6	982	3,010
October.....	32	25	26.9	41.6	833	2,560
November.....	302	25	63.8	98.7	1,920	5,870
December.....	377	27	50.9	78.8	1,580	4,840
January.....	185	28	48.5	75.8	1,500	4,610
February.....	43	28	30.9	47.8	864	2,660
March.....	81	26	30.9	47.8	959	2,940
April.....	156	26	61.1	94.5	1,830	5,630
May.....	283	36	88.3	137	2,740	8,400
June.....	318	76	118	183	3,550	10,900
The year.....	377	24	52.8	81.7	19,300	59,200
1914-15.						
July.....	106	68	86.6	134	2,690	8,240
August.....	124	83	94.7	147	2,940	9,010
September.....	403	90	185	286	5,550	17,000
October.....	318	83	113	175	3,500	10,800
November.....	306	76	115	178	3,460	10,600
December.....	163	50	86.4	134	2,680	8,220
January.....	115	41	49.6	76.7	1,540	4,720
February.....	226	41	77.9	127	2,180	6,690
March.....	124	45	58.3	90.2	1,810	5,550
April 1-19.....	248	41	75.4	117	1,430	4,400
The period.....					27,800	85,200

KAHAKULOA STREAM NEAR HONOKAHAU, MAUI.

LOCATION.—Three miles above mouth of stream, about 12 miles by trail southeast of Honokahau.

RECORDS AVAILABLE.—Fragmentary record January 22, 1913, to December 16, 1914. Station discontinued.

GAGE.—Stevens water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge at gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for 100 feet above and below gage; both banks high and nearly vertical to above high water. Control composed of large boulders; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record; 3.25 feet May 18, 1914 (discharge, 92 million gallons per day, or 142 second-feet); minimum stage recorded, 0.99 foot January 30, 1913 (discharge, 0.95 million gallons per day, or 1.5 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Irrigation of taro and domestic supply.

ACCURACY.—Record very fragmentary owing to faulty working of water-stage recorder, but estimates given are based on a well-defined rating curve and continuous gage-height record and are good for all stages.

Discharge measurements of Kahakuloa Stream near Honokahau, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—Oct. 5	C. T. Bailey.....	1.10	2.6	1.7
1914—Mar. 19	G. R. White.....	1.07	2.5	1.6
June 11	C. T. Bailey.....	1.32	6.2	4.0
July 29	H. A. R. Austin.....	2.42	72	46
29	do.....	2.22	46	30
29	do.....	2.18	46	30
Sept. 17	C. T. Bailey.....	1.85	26	17
17	do.....	1.69	20	13

Monthly discharge of Kahakuloa Stream near Honokahau, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-feet (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
March 19-31.....	17	1.7	4.04	6.25	52	161
April 1-4, 29-30.....	35	1.7	8.04	12.4	169	518
May 1-4, 13-30.....	92	2.6	2.79	4.32	335	1,030
June 3-10.....	16	5.4	8.42	13.8	67	207
September 17-30.....	71	9.7	21.8	33.1	306	937
October.....	53	2.6	8.82	13.6	273	839
November 1-17, 30.....	28	1.7	5.42	8.39	98	299
December 1-16.....	17	3.2	6.41	9.92	102	315

NOTE.—Discharge determined from a rating curve well defined below 50 million gallons per day (77 second-feet). Water-stage recorder did not operate satisfactorily; consequently record is fragmentary.

HONOKAHAU STREAM NEAR HONOKAHAU, MAUI.

LOCATION.—1,000 feet above intake of Honokahau ditch, about 6 miles southeast of Honokahau.

RECORDS AVAILABLE.—March 6, 1913, to June 30, 1915.

GAGE.—Stevens water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 400 feet below gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for 100 feet below gage but makes sharp bend 50 feet above gage; right bank slopes gently; left bank is vertical wall of rock. Control is composed of large boulders; shifts infrequent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 5.10 feet at 5.30 a. m., December 4, 1913 (discharge, computed from extension of rating curve, 700 million gallons per day, or 1,080 second-feet); minimum stage recorded, 1.00 foot October 31, 1913 (discharge, 10 million gallons per day, or 15 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Low flow of stream all diverted by Honokahau ditch for irrigation of sugar cane and power development.

ACCURACY.—Estimates are based on well-defined rating curve and continuous gage-height record; good for all stages.

Discharge measurements of Honokahau Stream near Honokahau, Maui, during the years ending June 30, 1914, and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—July 8	C. T. Bailey.....	1.21	20	13
Aug. 22	do.....	1.18	19	12
Oct. 4	do.....	1.11	17	11
1914—Mar. 18	G. R. White.....	1.27	21	14
May 6	C. T. Bailey.....	1.46	27	18
June 12	do.....	2.98	203	131
12	do.....	3.02	215	139
July 28	H. A. R. Austin.....	3.45	305	197
29	C. T. Bailey.....	4.40	678	438
Sept. 16	do.....	3.60	378	244
Dec. 23	do.....	1.68	39	25

Discharge, in million gallons per day, of Honokahau Stream near Honokahau, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	42	12	.....	12	11	14	.....	16	12	14	14	106
2.....	60	14	.....	11	46	14	.....	14	12	16	26	39
3.....	20	16	.....	11	56	24	.....	14	12	14	123	22
4.....	19	12	.....	12	26	308	.....	14	12	14	31	20
5.....	28	12	.....	11	14	111	.....	14	12	22	18	20
6.....	24	18	.....	24	12	106	.....	14	12	90	16	56
7.....	18	16	.....	20	18	31	.....	14	12	28	76	56
8.....	14	14	.....	31	169	22	155	14	12	16	201	48
9.....	12	14	.....	12	282	20	28	14	14	16	31	41
10.....	12	31	.....	11	64	19	16	14	22	22	19	34
11.....	12	20	.....	11	80	19	16	14	14	16	18	26
12.....	24	148	.....	11	90	20	16	14	12	14	18	60
13.....	24	20	.....	28	36	20	111	14	31	12	26	56
14.....	16	20	.....	24	16	36	18	14	16	26	20	26
15.....	14	24	.....	14	16	26	31	14	14	16	20	34
16.....	12	34	.....	14	28	19	34	14	24	12	16	52
17.....	12	14	.....	11	34	26	.....	20	42	14	28	39
18.....	12	12	.....	11	76	49	.....	16	14	28	155	56
19.....	20	12	.....	11	80	18	.....	14	14	106	148	142
20.....	31	12	.....	11	24	16	.....	14	14	76	238	46
21.....	14	14	11	11	56	16	.....	14	12	80	106	26
22.....	14	14	11	11	20	16	.....	14	12	85	24	49
23.....	16	12	11	11	16	16	.....	14	12	142	19	36
24.....	18	16	11	11	60	16	.....	14	12	42	28	52
25.....	16	14	11	16	95	16	.....	14	12	34	20	228
26.....	16	12	11	12	72	16	.....	12	19	31	34	52
27.....	12	22	11	11	20	16	.....	12	18	16	49	56
28.....	14	14	11	12	16	16	20	12	14	16	49	31
29.....	14	.....	11	11	14	14	22	.....	56	18	22	31
30.....	12	.....	11	11	14	14	16	.....	16	14	20	22
31.....	12	.....	.....	10	.....	14	31	.....	14	.....	22	.....

Discharge, in million gallons per day, of Honokahau Stream near Honokahau, Maui, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.											
1.....	68	36	.....	64	162	24	22	20	16	19	14
2.....	56	36	.....	68	46	34	22	20	18	18	14
3.....	42	68	.....	72	36	26	22	20	22	18	14
4.....	85	210	.....	52	36	68	20	19	16	16	16
5.....	36	76	.....	76	36	60	52	100	16	16	19
6.....	39	39	.....	68	36	28	20	31	18	16	16
7.....	46	42	.....	64	34	26	34	42	16	16	20
8.....	72	34	.....	56	31	26	20	28	16	16	16
9.....	36	28	.....	228	31	28	26	20	20	16	19
10.....	31	117	.....	68	31	31	80	20	26	16	20
11.....	26	228	.....	46	31	68	49	19	46	16	16
12.....	72	39	.....	46	31	34	100	19	85	31	16
13.....	64	64	.....	42	31	26	60	36	22	19	16
14.....	64	72	.....	42	85	26	28	26	16	18	20
15.....	106	56	.....	42	68	26	24	36	16	16	26
16.....	46	36	.....	52	36	24	24	24	64	16	28
17.....	56	.....	85	52	31	24	22	22	72	16	22
18.....	36	.....	148	60	36	24	31	20	28	16	28
19.....	26	.....	155	52	76	24	39	20	22	19	100
20.....	22	.....	68	68	42	22	24	18	18	18	76
21.....	22	.....	60	60	31	24	142	16	16	31	39
22.....	31	.....	162	39	31	24	238	16	20	20	34
23.....	60	.....	111	39	28	24	76	16	60	19	20
24.....	129	.....	49	39	117	22	95	16	31	19	20
25.....	90	.....	52	39	.....	22	42	16	22	20	42
26.....	155	.....	68	49	.....	22	24	16	46	16	22
27.....	162	.....	68	49	.....	22	22	16	123	16	22
28.....	210	.....	72	52	.....	22	22	16	100	16	16
29.....	201	.....	85	52	.....	22	.....	16	106	16	16
30.....	155	.....	76	80	.....	22	.....	16	39	14	28
31.....	72	.....	.....	85	.....	24	.....	16	.....	14	.....

NOTE.—Discharge determined from a well-defined rating curve. Discharge interpolated June 8-10, 1914. No gage record for other days for which discharge is not given.

Monthly discharge of Honokahau Stream near Honokahau, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	60	12	18.8	29.1	584	1,790
August 1-28.....	148	12	21.2	32.8	593	1,820
September 21-30.....	11	11	11.0	17.0	110	338
October.....	31	10	13.8	21.4	428	1,310
November.....	282	11	52.0	80.5	1,560	4,790
December.....	308	14	35.1	54.3	1,090	3,340
January 8-16, 28-31.....	155	16	39.5	61.1	514	1,580
February.....	20	12	14.1	21.8	396	1,210
March.....	56	12	16.9	26.1	524	1,610
April.....	142	12	35.0	54.2	1,050	3,220
May.....	238	14	52.7	81.5	1,640	5,010
June.....	228	20	52.1	80.6	1,560	4,800
1914-15.						
July.....	210	22	74.7	116	2,320	7,110
August 1-16.....	228	28	73.8	114	1,180	3,620
September 17-30.....	162	49	89.9	139	1,260	3,860
October.....	228	39	61.3	94.8	1,900	5,830
November 1-24.....	162	28	48.0	74.3	1,150	3,540
January.....	68	22	29.0	44.9	899	2,760
February.....	238	20	49.3	76.3	1,380	4,240
March.....	100	16	23.7	36.7	736	2,250
April.....	123	16	37.9	58.6	1,140	3,490
May.....	31	14	17.8	27.5	553	1,690
June.....	100	14	25.8	39.9	775	2,380

HONOLUA STREAM NEAR HONOKAHAU, MAUI.

LOCATION.—300 feet above Honokahau ditch crossing, about 2 miles south of Honokahau.

RECORDS AVAILABLE.—March 12, 1913, to June 30, 1915.

GAGE.—Vertical staff on right bank; read twice daily.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge at gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for 100 feet above and below gage; stream bed very rough and on steep grade; right bank high and nearly vertical; left bank high with gentle slope. Control is composed of large boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 4.00 feet at 6 a. m. November 28, 1914 (discharge, computed from extension of rating curve, approximately 180 million gallons per day, or 278 second-feet; minimum stage recorded, 0.25 foot October 23 and 24, 1913 (discharge 0.15 million gallons per day, or 0.25 second-foot).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Normal flow diverted by Honokahau ditch for irrigation of sugar cane.

ACCURACY.—Estimates based on a fairly well defined rating curve and a reliable gage-height record of two readings daily; fair for all stages.

Discharge measurements of Honolua Stream near Honokahau, Maui, during the years ending June 30, 1914 and 1915.

[Made by C. T. Bailey.]

Date.	Gage height (feet).	Discharge.		Date.	Gage height (feet).	Discharge.	
		Second-feet.	Million gallons per day.			Second-feet.	Million gallons per day.
1913—July 10.....	0.55	1.4	0.95	1914—June 12.....	1.63	42	27
Aug. 22.....	.46	.8	.5	July 29.....	1.99	67	44
1914—Mar. 18.....	.67	2.5	1.6	Aug. 6.....	1.01	12	7.8

Discharge, in million gallons per day, of Honolua Stream near Honokahau, Maui, for the years ending June 30, 1913, 1914, and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Mar.	Apr.	May.	June.	Date.	Mar.	Apr.	May.	June.
1913.					16.....	12	30	6.8	1.8
1.....		2.3	1.8	1.0	17.....	4.7	22	5.7	1.0
2.....		1.0	3.0	1.0	18.....	1.4	12	9.2	.7
3.....		.7	3.0	1.0	19.....	1.0	11	15	.5
4.....		.5	1.8	1.8	20.....	.5	8.0	3.8	.5
5.....		.4	1.4	1.4	21.....	.7	14	2.3	.5
6.....		.4	1.0	1.8	22.....	22	9.2	1.8	.5
7.....		.4	1.0	1.8	23.....	3.0	12	1.8	.5
8.....		.4	1.0	1.0	24.....	.7	5.7	1.8	.5
9.....		.4	1.0	1.4	25.....	1.8	26	1.8	.5
10.....		.4	1.0	4.7	26.....	1.0	5.7	1.8	.7
11.....		30	1.0	1.4	27.....	.7	8.0	2.3	12
12.....	0.5	18	20	4.7	28.....	1.4	3.8	2.3	20
13.....	.5	44	3.0	12	29.....	1.0	3.8	2.3	14
14.....	.5	24	12	1.8	30.....	.5	3.0	2.3	11
15.....	9.2	42	22	4.7	31.....	2.3	.....	1.0	.....

Discharge, in million gallons per day, of Honolua stream near Honokahau, Maui, for the years ending June 30, 1913, 1914, and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	9.2	0.4	0.7	0.2	0.3	1.0	1.0	5.7	0.4	1.4	4.7	9.2
2.....	11	.4	3.8	.2	.4	.7	12	.4	.4	6.8	3.0	8.0
3.....	4.7	3.0	4.7	.2	20	.7	1.8	4.7	.4	1.4	8.0	3.0
4.....	3.8	.5	.7	.4	3.0	72	6.8	3.8	.4	.7	18	1.8
5.....	3.0	.4	.4	.3	1.8	44	12	3.0	.4	1.8	15	1.8
6.....	4.7	.4	.4	1.8	.7	40	3.0	3.0	.4	24	6.8	1.8
7.....	1.8	.4	.5	3.0	.5	4.7	3.0	2.3	.4	12	15	6.8
8.....	1.4	.4	.4	4.7	32	9.2	50	2.3	.4	4.7	15	1.8
9.....	1.0	.4	.3	.4	14	2.3	26	1.8	.4	2.3	9.2	5.7
10.....	.7	1.4	.4	.4	9.2	1.8	4.7	1.8	6.8	3.8	4.7	3.8
11.....	.7	1.0	.4	.3	6.8	1.8	3.0	1.4	.7	1.8	3.8	3.8
12.....	.7	34	.4	.3	5.7	1.8	34	.7	.5	1.4	3.0	11
13.....	5.7	3.0	.4	.3	4.7	1.8	37	.7	1.8	1.0	3.8	11
14.....	3.0	3.8	.3	3.8	2.3	20	3.8	.7	.4	1.8	3.0	2.3
15.....	1.0	12	.3	.5	2.3	6.8	3.0	.7	.4	5.7	1.8	2.3
16.....	.7	8.0	.3	.5	1.8	3.8	6.8	2.3	.4	1.0	1.0	1.8
17.....	.7	1.4	.3	.4	1.8	30	26	2.3	9.2	1.0	1.8	8.0
18.....	.5	1.0	1.4	.4	30	4.7	5.7	1.4	1.4	1.4	15	2.3
19.....	.5	.7	.7	.25	55	4.7	3.8	.7	.7	8.0	16	9.2
20.....	3.0	.7	.5	.25	2.3	3.8	22	.7	.4	14	16	8.0
21.....	1.4	.5	.4	.2	1.8	3.0	4.7	.5	.4	15	14	1.8
22.....	.7	.4	.3	.2	1.4	3.0	44	.5	.3	12	8.0	4.7
23.....	.7	.4	.25	.15	1.0	2.3	18	.5	.3	15	5.7	2.3
24.....	.7	.4	.25	.15	2.3	1.8	4.7	.4	.3	6.8	3.0	3.0
25.....	1.0	.4	.25	20	24	1.8	3.8	.4	.25	9.2	1.8	44
26.....	.7	.4	.25	1.4	42	1.8	3.0	.4	.25	12	3.0	14
27.....	.7	.5	.2	.3	12	1.4	3.0	.4	3.8	5.7	3.0	9.2
28.....	.5	3.8	.2	.3	2.3	1.4	6.8	.4	1.0	4.7	8.0	2.3
29.....	.4	1.0	.2	.25	1.0	1.4	5.7	1.0	8.0	4.7	4.7	1.8
30.....	.4	.5	.2	.2	.7	1.0	4.7	3.8	8.0	3.8	28	2.3
31.....	.4	4.7	.....	.2	.....	1.0	8.0	.....	1.0	.....	1.8	.....
1914-15.												
1.....	20	8.0	1.8	3.8	26	4.7	3.0	1.0	3.0	1.4	5.7	1.8
2.....	9.2	6.8	15	4.7	8.0	5.7	4.7	1.0	3.0	1.4	3.8	1.8
3.....	3.0	4.7	3.0	4.7	3.0	14	3.8	.7	40	1.8	4.7	1.4
4.....	6.8	12	1.8	6.8	3.0	11	16	.7	15	1.4	3.0	1.4
5.....	6.8	6.8	18	6.8	1.8	6.8	6.8	3.8	6.8	1.0	3.8	2.3
6.....	3.8	4.7	20	4.7	1.8	5.7	3.8	4.7	8.0	1.0	3.0	2.3
7.....	6.8	1.8	22	3.0	1.4	4.7	3.0	4.7	6.8	1.0	3.0	3.0
8.....	9.2	3.0	4.7	3.0	1.0	4.7	3.0	3.8	22	1.0	3.0	3.0
9.....	3.8	1.8	1.8	16	.7	4.7	4.7	1.8	4.7	1.8	3.0	1.8
10.....	1.8	11	4.7	6.8	.7	11	8.0	30	3.8	4.7	8.0	3.8
11.....	1.4	32	3.0	3.0	.7	9.2	5.7	8.0	3.0	14	3.0	1.8
12.....	1.8	6.8	1.8	3.0	.7	14	15	30	3.0	28	3.0	1.8
13.....	18	6.8	4.7	1.8	.5	9.2	2.3	11	4.7	5.7	2.3	1.4
14.....	22	8.0	20	1.4	8.0	11	1.8	5.7	6.8	1.8	1.8	2.3
15.....	22	5.7	4.7	1.8	14	8.0	1.4	3.8	12	1.8	1.8	1.8
16.....	9.2	3.0	6.8	2.3	5.7	5.7	1.4	3.8	6.8	20	3.0	3.8
17.....	5.7	40	4.7	5.7	1.8	4.7	1.4	4.7	3.8	20	2.3	5.7
18.....	4.7	11	6.8	5.7	1.4	3.8	1.4	3.8	3.0	4.7	5.7	3.0
19.....	3.0	5.7	14	4.7	16	3.8	1.4	4.7	2.3	3.0	3.0	22
20.....	2.3	1.8	4.7	11	6.8	9.2	1.4	12	2.3	3.0	2.3	28
21.....	1.8	3.0	3.0	11	1.8	5.7	1.8	40	1.8	3.0	3.0	11
22.....	3.8	9.2	30	3.0	1.0	3.8	1.4	12	1.8	22	6.8	8.0
23.....	9.2	4.7	18	1.8	.7	3.0	1.0	15	2.3	12	2.3	4.7
24.....	9.2	3.0	2.3	1.0	6.8	3.8	1.0	6.8	1.8	6.8	1.8	4.7
25.....	12	2.3	1.8	.7	5.7	11	1.0	3.8	2.3	11	1.8	3.8
26.....	18	1.8	3.0	1.0	4.7	34	1.0	3.0	1.8	34	1.4	5.7
27.....	40	1.8	3.8	6.8	9.2	4.7	1.0	3.0	1.4	44	1.4	8.0
28.....	60	3.0	2.3	4.7	98	11	1.0	3.0	1.4	66	1.4	1.8
29.....	28	3.0	4.7	4.7	15	6.8	1.0	.....	1.0	12	3.0	1.8
30.....	18	1.8	4.7	6.8	6.8	4.7	1.0	.....	1.0	6.8	2.3	3.0
31.....	11	4.7	.....	14	.....	3.0	1.0	.....	1.4	.....	1.8	.....

NOTE.—Discharge determined from a fairly well defined rating curve.

Monthly discharge of Honokua Stream near Honokahau, Maui, for the years ending June 30, 1913, 1914, and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913.						
March 12-31.....	22	0.5	3.27	5.06	65	201
April.....	44	.4	11.3	17.5	339	1,040
May.....	22	1.0	4.39	6.79	136	418
June.....	20	.5	3.54	5.48	106	326
The period.....					646	1,980
1913-14.						
July.....	11	.4	2.11	3.26	65	201
August.....	34	.4	2.78	4.30	86	264
September.....	4.7	.2	.66	1.02	20	61
October.....	20	.15	1.35	2.09	42	128
November.....	55	.3	9.44	14.6	283	869
December.....	72	.7	8.89	13.8	276	846
January.....	50	.7	11.6	17.9	360	1,100
February.....	12	.4	1.98	3.06	56	170
March.....	9.2	.25	1.47	2.27	46	140
April.....	24	.7	6.30	9.75	189	580
May.....	18	1.0	7.14	11.0	221	679
June.....	44	1.8	7.15	11.1	214	658
The year.....	72	.15	5.09	7.88	1,860	5,700
1914-15.						
July.....	60	1.4	12.0	18.6	372	1,140
August.....	40	1.8	7.09	11.0	220	675
September.....	30	1.8	7.92	12.3	238	729
October.....	16	.7	5.04	7.80	156	479
November.....	98	.5	8.42	13.0	253	775
December.....	34	3.0	7.84	12.1	243	746
January.....	16	1.0	3.30	5.11	102	314
February.....	40	.7	8.08	12.5	226	694
March.....	40	1.0	5.77	8.93	179	549
April.....	66	1.0	11.2	17.3	336	1,030
May.....	8.0	1.4	3.10	4.80	96	295
June.....	28	1.4	4.89	7.57	147	450
The year.....	98	.5	7.04	10.9	2,570	7,880

HONOKAWAI STREAM NEAR LAHAINA, MAUI.

LOCATION.—500 feet below confluence with Amalu Stream, about 8 miles northeast of Lahaina.

RECORDS AVAILABLE.—May 13, 1913, to June 30, 1915.

GAGE.—Vertical staff on right bank, read twice daily.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge 150 feet below gage.

CHANNEL AND CONTROL.—One channel at all stages; filled with large boulders and very rough; very narrow at gage. Control a rock ledge; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 5.6 feet at 7 a. m. February 21, 1915 (discharge, computed from extension of rating curve, approximately 120 million gallons per day, or 186 second-foot); channel occasionally dry.

DIVERSIONS.—Most of the normal flow is diverted into Honokawai ditch half a mile above gage.

REGULATION.—Natural flow of stream is increased by a development tunnel a short distance above intake of Honokawai ditch.

UTILIZATION.—Irrigation of sugar cane and taro.

ACCURACY.—Estimates based on a rating curve well defined below 40 million gallons per day and a gage-height record of two readings daily; fair for all stages.

Discharge measurements of Honokawai Stream near Lahaina, Maui, during the years ending June 30, 1914-15.

[Made by C. T. Bailey.]

Date.	Gage height (feet).	Discharge.		Date.	Gage height (feet).	Discharge.	
		Second-feet.	Million gallons per day.			Second-feet.	Million gallons per day.
1914.				1914.			
Aug. 12.....	1.14	0.75	0.5	Sept. 15.....	2.41	19	13
Sept. 15.....	3.05	40	26	15.....	2.28	17	11
15.....	2.70	27	18				

Discharge, in million gallons per day, of Honokawai Stream near Lahaina, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	4.8						0.05	0.05	0.05	0.05	0.3	6.4
2.....	7.8						.05	.05	.05	.2	.2	.4
3.....	3.9		0.4		1.3		.05	.05	.05	.05	.05	.05
4.....	1.4				1.2	14	.05	.05	.05	.05	28	.05
5.....	.4				.05	3.6	.05	.05	.05	.05	.7	.05
6.....	.65			0.15		8.4	3.0	.05	.05	2.6	.2	.05
7.....	.5			.4		.95	.05	.05	.05	.05	2.0	.05
8.....	.05			1.9	9.7	.25	2.6	.05	.05	.2	.44	.4
9.....					12	.85	41	.05	.05	.05	.7	10
10.....		0.25			2.3	.4	2.6	.05	.05	.7	.4	5.3
11.....					1.2	.15	.05	.05	.05	.6	.3	.4
12.....	.15	.15			12	.05	.05	.05	.05	.1	.1	4.8
13.....	1.0	.4		6.5	2.6		20	.05	1.7	.05	.05	5.8
14.....	.65	.65		.7			.3	.05	.05	.3	.05	.2
15.....	.05	.15				.05	.2	.05	.05	1.7	.05	1.0
16.....		4.5			.2		.3	.05	.05	.2	.05	.1
17.....		.4			1.9	.15	14	.05	9.0	.05	.05	1.2
18.....	.05				5.0	4.8	.1	.05	.05	1.7	2.6	.7
19.....	.5		1.4		5.7		.05	.05	.05	2.0	11	68
20.....	.15				.5		2.0	.05	.05	32	56	29
21.....	.05				2.4		.1	.05	.05	52	20	.1
22.....	.05				.15		.05	.05	.05	2.0	.2	6.4
23.....	.05						16	.05	.05	47	.05	.2
24.....					2.6		.05	.05	.05	13	.05	1.2
25.....					3.4		.05	.05	.05	3.0	.05	80
26.....				.15	7.8		.05	.05	.05	1.7	.05	12
27.....					1.7		.05	.05	.05	.7	.05	2.0
28.....		4.3					.4	.05	.05	.05	7.1	.6
29.....		.25					.05		21	.2	.7	.05
30.....							.05		.05	.2	.1	3.4
31.....		2.2					.4		.1		.05	

Discharge, in million gallons per day, of Honokawai Stream near Lahaina, Maui, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	9.7	0.6	0.2	1.7	25	3.4	2.0	0.4	0.3	0.2	0.4	0.2
2.....	4.8	.4	19	22	4.4	3.0	2.0	.4	.3	.2	.3	.2
3.....	.3	9.7	7.1	1.7	1.2	7.1	19	.3	.4	.2	.3	.2
4.....	.7	56	6.4	1.7	1.0	2.6	26	.3	14	.2	.3	.2
5.....	1.0	25	7.8	4.8	.7	2.3	23	29	1.0	.2	.4	.2
6.....	.05	1.2	46	4.4	1.4	2.3	2.0	1.7	.7	.2	.4	.3
7.....	.1	.4	1.4	1.2	1.0	2.3	1.7	5.8	.7	.2	.3	.2
8.....	5.3	.4	.6	3.4	.7	2.0	1.7	1.4	15	.2	.2	.3
9.....	.7	.3	.6	47	.7	1.7	1.7	1.7	1.0	.2	.2	.2
10.....	.7	9.0	14	3.9	1.0	2.3	25	14	.4	.2	1.7	.6
11.....	.2	44	1.2	.7	1.0	20	4.4	2.6	.4	5.3	.4	.2
12.....	.4	.6	11	.6	.7	23	2.0	12	.3	19	.2	.2
13.....	1.7	.4	4.8	.6	1.0	10	1.2	9.7	.3	.7	.2	.2
14.....	.2	26	53	.4	1.7	4.4	1.0	1.7	1.0	.4	.2	.3
15.....	7.8	.7	21	.4	2.6	3.4	1.0	1.0	1.2	.2	.2	.3
16.....	.6	.4	4.4	.6	1.4	2.3	1.0	.2	.6	18	.2	2.0
17.....	.7	30	4.4	1.7	1.2	2.0	1.0	2.3	.4	2.3	.2	.2
18.....	1.0	16	22	1.4	1.4	2.0	1.0	1.2	.2	.6	.2	30
19.....	.2	6.4	23	2.6	2.6	1.2	.7	2.0	.2	.4	1.7	14
20.....	.1	2.0	2.3	.7	3.0	35	.7	22	.2	.2	.6	1.2
21.....	.2	10	1.0	3.4	1.7	4.4	.7	100	.4	.2	.3	2.3
22.....	.4	24	3.4	.4	1.7	1.7	.7	25	.4	12	.2	.3
23.....	7.8	26	8.4	.4	1.7	1.4	.7	41	.3	3.9	.2	.3
24.....	11	1.7	.7	.4	20	1.4	.7	2.6	.2	1.4	.2	1.0
25.....	26	5.8	.4	.3	3.0	12	.6	1.0	.4	18	.2	.2
26.....	35	.7	.3	.4	1.4	20	.6	.6	.05	28	.2	1.0
27.....	18	.6	3.4	2.3	14	2.3	.3	.4	.4	11	.2	.6
28.....	50	8.4	.6	3.0	62	5.8	.3	.4	.4	80	.2	.3
29.....	54	3.0	7.1	1.7	11	3.9	.3	.....	.4	2.3	.4	.2
30.....	40	.3	22	2.3	15	2.0	.3	.....	.2	.4	.2	9.0
31.....	3.9	12	.....	12	.....	2.0	.3	.....	.2	.....	.2	.....

NOTE.—Discharge determined from a rating curve well defined below 40 million gallons per day (62 second-feet). Stream dry or practically no flow on days for which discharge is not given.

Monthly discharge of Honokawai Stream near Lahaina, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	7.8	0	0.72	1.14	22	68
August.....	4.5	0	.43	.67	13	41
September.....	1.4	0	.06	.09	2	6
October.....	6.5	0	.32	.50	10	30
November.....	12	0	2.46	3.81	74	226
December.....	14	0	1.08	1.67	34	103
January.....	41	0.05	3.35	5.78	104	319
February.....	.05	.05	.05	.08	1	4
March.....	21	.05	1.07	1.66	33	102
April.....	52	.05	5.42	8.39	163	499
May.....	56	.05	5.65	8.74	175	538
June.....	80	.05	8.00	12.4	240	737
The year.....	80	0	2.38	3.68	871	2,670
1914-15.						
July.....	54	.05	9.11	14.7	283	867
August.....	56	.3	9.63	14.9	299	916
September.....	53	.2	9.92	15.3	298	913
October.....	47	.3	4.13	6.39	128	393
November.....	62	.7	6.17	9.55	185	568
December.....	35	1.2	6.10	9.44	189	580
January.....	26	.3	3.32	5.14	103	316
February.....	100	.3	10.1	15.6	282	868
March.....	15	.05	1.35	2.09	42	128
April.....	80	.2	6.88	10.6	206	633
May.....	1.7	.2	.36	.56	11	34
June.....	30	.2	2.21	3.42	66	203
The year.....	100	.05	.....	8.87	2,090	6,420

HONOKAWAI DITCH NEAR LAHAINA, MAUI.

LOCATION.—250 feet below junction with Amalu wooden flume, 1,000 feet below intake, 2 miles above Pioneer Mill Co.'s power house, and about 7 miles northeast of Lahaina.

RECORDS AVAILABLE.—July 1, 1912, to June 30, 1915.

GAGE.—A graduated rod, which the observer places in center of flume at each reading; gage read twice daily.

DISCHARGE MEASUREMENTS.—Made in flume near gage.

CHANNEL AND CONTROL.—Semicircular galvanized iron flume 3 feet in diameter; straight for 100 feet above and below gage; flume is clean and uniform in section and grade. Discharge relation stable.

EXTREMES OF DISCHARGE.—Maximum stage recorded during biennial period, 1.67 feet August 12, 1913 (discharge, 15 million gallons per day, or 23 second-feet); minimum stage recorded, 0.80 foot May 15, 1913 (discharge, 2.4 million gallons per day, or 3.8 second-feet); minimum stage recorded during biennial period, 0.88 foot September 25 to 28, 1913 (discharge, 3.1 million gallons per day, or 4.8 second-feet).

DIVERSIONS.—Ditch diverts all low-water flow from Honokawai and Amalu stream.

REGULATION.—Flow controlled by head gates.

UTILIZATION.—Power development and irrigation of sugar cane.

ACCURACY.—Estimates fair for all stages. Great care has to be taken in making measurements on account of shape of flume, but a fairly good rating curve has been developed. Because of the uniform conditions the extension of the rating curve is probably good.

Discharge measurements of Honokawai ditch near Lahaina, Maui, during the years ending June 30, 1914 and 1915.

[Made by C. T. Bailey.]

Date.	Gage height (feet).	Discharge.	
		Second-feet.	Million gallons per day.
1913—Aug. 21.....	0.92	5.2	3.4
1914—Aug. 12.....	1.10	8.6	5.6

Discharge, in million gallons per day, of Honokawai ditch near Lahaina, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	6.1	3.2	3.4	3.4	3.2	3.7	3.2	3.2	3.2	3.8	4.3	4.3
2.....	5.8	3.2	3.2	3.4	3.2	3.4	3.2	3.2	3.2	5.5	3.8	4.3
3.....	5.2	3.2	5.1	3.4	10	3.2	3.2	3.2	3.2	4.3	3.2	3.2
4.....	5.6	3.2	3.6	3.5	9.0	7.1	4.3	3.2	3.2	3.8	5.5	3.8
5.....	5.6	3.4	3.4	3.2	3.8	4.0	8.0	3.2	3.2	3.8	5.5	4.3
6.....	5.3	5.1	3.2	5.1	3.4	5.1	4.3	3.2	3.2	4.3	4.3	4.3
7.....	4.8	3.4	3.2	5.0	3.4	4.2	4.3	3.2	3.2	3.8	5.5	5.5
8.....	4.0	4.4	3.4	9.7	12	3.2	9.3	3.2	3.2	3.8	6.1	5.5
9.....	3.6	3.2	3.6	4.4	12	4.2	8.6	3.2	3.2	3.8	4.3	4.3
10.....	3.4	5.1	3.4	3.2	10	4.4	4.3	3.2	4.3	3.8	4.3	4.3
11.....	3.4	3.4	3.4	3.4	10	3.8	3.2	3.2	3.2	3.8	4.3	4.3
12.....	4.7	15	3.8	3.2	12	3.7	6.1	3.2	3.2	3.8	3.8	5.5
13.....	4.8	4.8	3.4	7.1	8.4	3.6	6.7	3.2	6.1	3.2	4.3	4.3
14.....	4.8	6.5	3.2	6.5	4.2	3.8	3.8	3.2	4.3	3.8	4.3	4.3
15.....	4.0	6.2	3.4	4.1	4.0	4.0	6.7	3.2	3.2	5.5	4.3	5.5
16.....	3.5	7.1	4.0	3.4	5.6	3.4	8.0	3.2	3.2	3.8	3.2	4.3
17.....	3.4	5.3	5.9	3.2	9.0	4.4	8.0	4.3	6.7	3.8	3.2	5.5
18.....	3.7	3.4	7.8	3.2	10	9.0	4.3	3.2	4.3	5.5	6.7	4.9
19.....	5.1	3.2	5.9	3.2	10	5.2	3.8	3.2	3.8	6.1	4.3	7.4
20.....	4.0	3.2	3.4	3.2	5.6	3.8	4.9	3.2	3.2	5.5	5.5	7.4
21.....	4.0	3.2	3.2	3.2	10	3.4	3.8	3.2	3.2	4.3	4.3	4.3
22.....	4.5	3.2	3.2	3.2	4.8	3.4	4.3	3.2	3.2	4.3	4.3	4.3
23.....	4.2	3.2	3.2	3.2	4.0	3.2	8.0	3.2	3.2	4.3	3.8	4.3
24.....	4.0	3.2	3.2	3.4	7.8	3.2	3.2	3.2	3.2	4.3	4.9	4.3
25.....	3.7	3.4	3.1	5.9	10	3.2	3.2	3.2	3.2	4.3	3.8	6.1
26.....	3.4	3.2	3.1	5.4	10	3.4	3.2	3.2	3.2	3.8	3.8	4.3
27.....	3.2	6.5	3.1	3.4	7.8	3.2	3.2	3.2	4.9	4.3	4.3	5.5
28.....	3.6	7.1	3.1	3.2	4.0	3.2	5.5	3.2	3.8	3.2	4.9	4.3
29.....	3.2	4.7	3.4	3.2	3.8	3.2	4.3	.....	8.0	3.8	4.3	3.8
30.....	3.2	3.8	3.4	3.2	3.4	3.2	3.8	.....	4.3	3.8	4.3	5.5
31.....	3.2	8.4	.....	3.2	.....	3.2	5.5	.....	4.3	.....	3.8	.....
1914-15.												
1.....	5.5	5.5	5.5	6.7	8.0	6.7	6.1	6.7	6.1	5.5	5.5	4.3
2.....	5.5	5.5	5.5	6.7	6.7	6.7	6.1	6.1	6.1	4.9	5.5	4.3
3.....	5.5	7.4	5.5	6.7	6.1	7.4	6.1	6.1	6.1	5.5	5.5	4.3
4.....	5.5	8.0	5.5	6.7	5.5	6.7	8.0	6.7	8.0	5.5	4.9	4.3
5.....	5.5	8.0	5.5	6.7	5.5	6.1	8.0	8.0	6.7	4.9	5.5	4.3
6.....	4.9	6.1	7.4	6.7	6.1	6.1	6.7	6.7	6.7	4.9	5.5	5.5
7.....	4.3	5.5	4.9	6.1	5.5	6.7	6.7	7.4	6.7	5.5	4.9	4.3
8.....	5.5	5.5	5.5	6.1	5.5	6.7	6.1	6.7	8.0	4.9	4.9	5.5
9.....	5.5	4.9	4.3	8.0	5.5	6.1	6.1	6.7	6.7	4.9	4.9	4.3
10.....	6.1	6.7	7.4	6.7	5.5	6.7	6.7	8.0	6.7	5.5	6.7	6.1
11.....	4.3	8.0	5.5	5.5	5.5	8.6	8.6	6.7	6.1	7.4	6.1	4.3
12.....	6.1	5.5	6.7	5.5	5.5	7.4	6.7	8.0	6.1	8.0	5.5	4.3
13.....	5.5	5.5	5.5	5.5	5.5	7.4	6.1	8.0	6.1	6.1	4.9	4.3
14.....	5.5	6.1	8.0	4.9	6.1	6.7	6.7	6.7	6.7	5.5	4.9	5.5
15.....	6.7	6.1	8.0	4.9	6.7	6.1	6.1	6.7	6.7	4.9	4.3	5.5
16.....	5.5	5.5	6.7	5.5	6.1	6.1	6.1	6.1	6.1	8.0	4.3	6.7
17.....	5.5	8.0	5.5	6.1	5.5	6.7	6.1	6.7	6.1	6.7	4.9	6.1
18.....	5.5	6.7	6.7	6.7	5.5	6.7	6.1	6.7	6.1	6.1	4.9	4.3
19.....	4.3	6.7	6.7	6.7	6.7	6.7	6.1	6.7	5.5	5.5	6.7	7.4
20.....	4.3	5.5	5.5	5.5	6.1	8.0	6.7	8.6	5.5	4.9	6.7	7.4
21.....	4.3	6.7	6.7	6.7	6.1	6.7	6.7	11	5.5	4.9	6.1	6.7
22.....	4.9	8.0	5.5	5.5	5.5	6.7	6.1	8.0	5.5	8.6	4.9	6.7
23.....	5.5	6.1	6.1	5.5	6.7	6.7	6.1	9.3	5.5	7.4	4.9	5.5
24.....	6.7	5.5	5.5	5.5	8.0	6.7	6.1	6.7	5.5	6.7	4.9	4.9
25.....	7.4	6.7	5.5	4.9	7.4	7.4	6.7	6.7	6.7	8.6	4.3	4.3
26.....	8.0	5.5	5.5	5.5	6.7	8.0	6.7	6.7	5.5	8.6	4.3	5.5
27.....	7.4	5.5	6.7	6.7	9.3	6.7	6.7	6.1	5.5	7.4	4.3	5.5
28.....	8.6	6.7	6.1	6.1	9.3	7.4	6.7	6.1	5.5	9.3	4.3	4.9
29.....	9.3	6.7	6.7	6.1	6.7	6.7	6.7	.....	5.5	6.7	5.5	4.3
30.....	8.0	4.9	7.4	6.7	6.7	6.7	6.7	.....	5.5	6.1	4.3	6.7
31.....	6.7	7.4	.....	6.7	.....	6.1	6.7	.....	5.5	.....	4.3	.....

NOTE.—Discharge determined from rating curves applicable as follows: July 1 to Dec. 31, 1913, and Jan. 1, 1914, to June 30, 1915, fairly well defined between 2 and 10 million gallons per day (3 and 15 second-feet).

Monthly discharge of Honokawai ditch near Lahaina, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	6.1	3.2	4.23	6.54	131	402
August.....	15	3.2	4.69	7.26	145	446
September.....	7.8	3.1	3.72	5.76	112	342
October.....	9.7	3.2	4.04	6.25	125	384
November.....	12	3.2	7.15	11.1	214	658
December.....	9.0	3.2	3.97	6.04	123	378
January.....	9.3	3.2	5.04	7.80	166	479
February.....	4.3	3.2	3.24	5.01	91	278
March.....	8.0	3.2	3.83	5.93	119	364
April.....	6.1	3.2	4.20	6.50	126	387
May.....	6.7	3.8	4.43	6.85	137	421
June.....	7.4	3.2	4.80	7.43	144	442
The year.....	15	3.1	4.45	6.89	1,620	4,980
1914-15.						
July.....	9.3	4.3	5.93	9.18	184	564
August.....	8.0	4.9	6.34	9.81	196	603
September.....	8.0	4.3	6.12	9.47	184	563
October.....	8.0	4.9	6.12	9.47	190	582
November.....	9.3	5.5	6.38	9.87	192	587
December.....	8.6	6.1	6.84	10.6	212	651
January.....	8.6	6.1	6.57	10.2	204	625
February.....	11	6.1	7.16	11.4	201	615
March.....	8.0	5.5	6.15	9.52	190	585
April.....	9.3	4.9	6.31	9.76	189	581
May.....	6.7	4.3	5.13	7.94	159	488
June.....	7.4	4.3	5.27	8.15	158	485
The year.....	11	4.3	6.19	9.58	2,260	6,930

KAHOMA STREAM NEAR LAHAINA, MAUI.

LOCATION.—About 125 feet above intake of Pioneer Mill Co.'s upper ditch, 3½ miles east of Lahaina.

RECORDS AVAILABLE.—August 3, 1911, to June 30, 1915.

GAGE.—Vertical staff on left bank; read twice daily.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge at gage.

CHANNEL AND CONTROL.—Channel at gage is a pool at foot of rapids; right bank high and wooded; left bank a vertical wall of rock. Control composed of large and small boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 6.50 feet at 3 p. m. June 10, 1914 (discharge, estimated from extension of rating curve, 500 million gallons per day, or 770 second-feet); channel frequently dry.

DIVERSIONS.—None above station at present. Before November 24, 1914, the minimum flow of the stream and water from Kahoma development tunnel was diverted above station; since that date all water passes the gage.

REGULATION.—Normal flow of the stream largely increased by development tunnel about 300 feet above station.

UTILIZATION.—Irrigation of sugar cane.

ACCURACY.—Estimates fair for ordinary stages; extension of rating curve not confirmed by measurements; estimates above 30 million gallons per day approximate only.

Discharge measurements of Kahoma Stream near Lahaina, Maui, during the years ending June 30, 1914 and 1915.

[Made by C. T. Bailey.]

Date.	Gage height (feet).	Discharge.	
		Second-feet.	Million gallons per day.
1913—Aug. 19.....	0.62	0.2	0.1
1914—Mar. 24.....	.43	.15	.1
Sept. 12.....	1.50	24	.15

Discharge, in million gallons per day, of Kahoma Stream near Lahaina, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	5.5											0.5
2.....	42									0.95		
3.....	23				4.5							
4.....	7.8				2.5	28					4.5	
5.....	28					9.0						
6.....	2.5			23		4.5						63
7.....	.5			1.4								39
8.....				4.5	7.8		39				17	4.5
9.....					59		10					28
10.....					19		.2			.95		194
11.....					9.0							
12.....		52			28		9.0					
13.....	1.4	.35		45	2.0		4.5		0.1			.95
14.....		.5		1.4			2.5					
15.....	.35	2.0					2.5					2.5
16.....		1.4			2.0		6.5	2.5				
17.....		.1	0.95		7.8		.5	.2	28			3.5
18.....			10		13	4.5					.95	9.0
19.....			.1		30					79	9.0	45
20.....	1.4				.2		4.5			23	23	5.5
21.....		.95			.95					36	19	
22.....							7.8			.35		.95
23.....										39		9.0
24.....				.95	33					4.5		19
25.....	.35			10	13					6.5		56
26.....					10					.5		5.5
27.....					4.5							3.5
28.....		2.5									3.5	2.0
29.....									71			.1
30.....							2.5					19
31.....		1.4					.2					

Discharge, in million gallons per day, of Kahoma Stream near Lahaina, Maui, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	2.5	0.5	0.1	23	6.5	7.8	4.5	3.4	3.0	2.8	2.6	2.5
2.....	.1	13	10	1.4	7.8	4.5	3.4	3.0	2.8	2.6	2.5	2.5
3.....	.1	30	9.0	33	.5	9.0	4.3	3.4	3.0	2.8	2.6	2.5
4.....	.2	67	2.0	1.4	.5	6.5	23	3.4	10	2.8	2.6	2.5
5.....	.2	45	2.0	2.8	.35	6.5	23	42	4.1	2.8	2.6	2.5
6.....	19	108	13	.95	6.5	5.3	5.9	3.7	2.8	2.6	2.9	2.5
7.....	4.5	.95	17	.35	5.5	4.5	5.7	3.3	2.8	2.6	2.5	2.5
8.....	.5	.2	5.5	.35	5.5	4.1	5.7	13	2.8	2.6	2.5	2.5
9.....	.35	9.0	19	.35	5.5	4.1	3.3	3.7	2.8	2.6	2.5	2.5
10.....	2.0	1.4	15	5.5	.35	17	4.1	19	3.3	2.8	2.9	2.5
11.....	23	4.5	3.5	.35	15	30	5.7	3.0	3.7	4.3	2.5	2.5
12.....	.5	52	.95	.35	13	7.0	13	3.0	17	2.5	2.5	2.5
13.....	23	.5	.35	7.8	4.3	5.9	3.0	3.3	2.5	2.5	2.5	2.5
14.....	59	.5	2.0	7.8	4.1	6.1	3.1	2.8	2.5	12	12	12
15.....	19	30	.5	.95	6.5	4.1	3.7	3.7	2.7	2.5	12	12
16.....	.1	7.8	.35	.5	5.5	3.9	3.3	3.0	33	2.5	4.3	4.3
17.....	23	2.5	1.4	.35	5.5	3.8	4.7	2.9	4.5	2.5	3.7	3.7
18.....	15	9.0	1.4	.35	5.5	3.8	4.5	2.9	2.7	2.5	19	19
19.....	36	1.4	7.8	.35	5.5	3.8	6.5	2.9	2.7	6.1	48	48
20.....	7.8	1.4	2.5	.95	19	3.7	39	2.9	2.7	5.9	12	12
21.....	19	2.0	1.4	.5	6.5	3.7	75	2.9	2.7	2.5	4.3	4.3
22.....	19	2.0	1.4	.35	5.5	3.7	19	2.9	12	2.5	4.7	4.7
23.....	.95	4.5	4.5	.5	.35	5.5	3.6	30	2.9	7.2	2.5	2.5
24.....	45	.5	.95	.35	10	5.5	3.6	23	2.9	4.5	2.5	2.5
25.....	91	4.5	.5	.35	5.5	9.0	3.6	4.1	2.9	52	2.5	3.9
26.....	42	.5	.35	.35	4.5	19	3.6	3.3	2.9	28	2.5	2.7
27.....	15	.5	.95	2.0	56	5.5	3.5	3.3	2.9	9.0	2.5	2.7
28.....	75	4.5	23	1.4	59	23	3.5	3.3	2.9	33	2.5	2.5
29.....	56	1.4	10	2.0	12	6.5	3.5	2.9	5.1	2.5	2.5	2.5
30.....	59	4.5	23	.95	15	5.5	3.5	2.9	3.5	2.5	13	13
31.....	9.0	4.5	3.5	-----	4.5	3.5	-----	2.9	-----	2.5	-----	-----

NOTE.—Discharge determined from a rating curve fairly well defined below 30 million gallons per day (46 second-feet); curve extended to cover highwater.

After about Nov. 24, 1914, discharge from Kahoma development tunnel (lower) entered the stream above the gaging station (see description); discharge Jan. 3, 16-19, Jan. 23 to Feb. 4, Mar. 1-3, 11-13, Mar. 16 to Apr. 10, 14, 15, 18 to 21, May 1-9, 12-18, May 21 to June 5, 7-13, 23, and 24, 1915, taken from more reliable and accurate weir records on Kahoma development tunnel (lower). Stream practically dry on days for which discharge is not given.

Monthly discharge of Kahoma Stream near Lahaina, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	42	0	3.67	5.68	114	349
August.....	52	0	1.94	3.00	60	185
September.....	10	0	.37	.57	11	34
October.....	45	0	2.78	4.30	86	264
November.....	59	0	8.21	12.7	246	756
December.....	28	0	1.48	2.29	46	141
January.....	39	0	2.89	4.47	90	275
February.....	2.5	0	.10	.15	3	9
March.....	71	0	3.20	4.95	99	304
April.....	79	0	6.36	9.84	191	586
May.....	23	0	2.48	3.84	77	236
June.....	194	0	17.0	26.3	510	1,570
The year.....	194	0	4.20	6.50	1,530	4,710

Monthly discharge of Kahoma Stream near Lahaina, Maui, for the years ending June 30, 1914 and 1915—Continued.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914-15.						
July.....	91	0	13.5	20.9	418	1,280
August.....	67	0	10.8	16.7	336	1,030
September.....	108	.1	13.9	21.5	417	1,280
October.....	33	.35	5.28	8.17	164	502
November.....	59	.35	6.04	9.35	181	556
December.....	23	4.5	8.54	13.2	265	812
January.....	30	3.5	6.10	9.44	189	580
February.....	75	3.3	12.4	19.3	349	1,070
March.....	13	2.9	3.63	5.62	112	345
April.....	52	2.7	8.67	13.4	260	798
May.....	6.1	2.5	2.83	4.38	88	269
June.....	48	2.5	6.17	9.55	185	568
The year.....	108	0	8.12	12.6	2,960	9,090

KAHOMA DEVELOPMENT TUNNEL¹ NEAR LAHAINE, MAUI.

LOCATION.—At portal of lower of two development tunnels of Pioneer Mill Co., $3\frac{1}{2}$ miles east of Lahaina.

RECORDS AVAILABLE.—August 1, 1911, to June 30, 1915.

GAGE.—Vertical staff; read twice daily.

DISCHARGE MEASUREMENTS.—A 4-foot sharp-crested weir with end contractions measures discharge from development tunnel and amount diverted from stream by small pipe; measurements checked by current meter.

CHANNEL AND CONTROL.—Deep pool at weir confined by rock and concrete walls.

EXTREMES OF DISCHARGE.—Maximum discharge during period of record, 6.5 million gallons per day or 10 second-feet, August, 1911; minimum discharge, 1.7 million gallons per day or 2.6 second-feet.

DIVERSIONS.—Small amount diverted from Kahoma Stream also passes over weir.

REGULATION.—None.

UTILIZATION.—Irrigation of sugar cane.

ACCURACY.—No velocity of approach; weir conditions and estimates good.

The following discharge measurement was made by C. T. Bailey:

August 19, 1913: Gage height, 0.42 foot; discharge, 3.8 second-feet, or 2.4 million gallons per day.

¹ Described in Water-Supply Papers 318 (p. 243), 336 (p. 156), and 373 (p. 121) as "Kahoma ditch at weir."

Discharge, in million gallons per day, of Kahoma development tunnel near Lahaina, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	4.0	2.2	2.4	2.2	2.2	2.4	2.2	2.2	2.2	2.6	2.6	3.0
2.....	5.2	2.2	2.3	2.2	2.2	2.4	2.2	2.2	2.2	3.5	2.6	2.6
3.....	4.9	2.2	2.9	2.2	4.2	2.4	2.6	2.2	2.2	2.6	2.2	2.2
4.....	5.0	2.2	2.3	2.2	4.0	4.8	3.0	2.2	2.2	2.6	3.5	2.2
5.....	4.6	2.2	2.3	2.2	2.9	4.2	3.0	2.2	2.2	2.6	2.6	2.2
6.....	3.8	3.0	2.2	4.4	2.4	4.0	2.6	2.2	2.2	2.6	2.6	3.5
7.....	3.4	3.7	2.2	3.6	2.3	3.0	2.6	2.2	2.2	2.6	2.6	2.2
8.....	3.0	2.7	2.2	4.0	4.4	2.5	4.5	2.2	2.2	2.6	4.0	2.2
9.....	2.3	2.3	2.2	2.9	5.0	2.3	4.0	2.2	2.2	2.2	3.0	2.2
10.....	2.3	2.3	2.2	2.3	4.4	2.3	3.5	2.2	2.2	3.0	2.6	2.2
11.....	2.2	2.3	2.2	2.3	4.2	2.2	2.2	2.2	2.2	3.0	2.6	2.6
12.....	3.2	5.0	2.3	2.3	4.5	2.2	3.5	2.2	2.2	2.6	2.2	2.6
13.....	3.4	3.6	2.4	3.6	3.6	2.2	4.0	2.2	3.5	2.2	2.2	3.0
14.....	3.4	3.6	2.3	3.7	3.0	2.2	2.2	2.2	2.6	2.2	2.2	3.0
15.....	2.9	3.8	2.3	2.4	3.2	2.2	2.2	2.2	2.2	3.0	2.2	3.0
16.....	2.3	3.5	2.7	2.4	3.8	2.2	3.0	3.0	2.2	2.6	2.2	3.0
17.....	2.3	3.1	3.6	2.3	4.2	2.2	3.0	3.0	4.0	2.6	2.2	3.5
18.....	2.3	2.6	5.0	2.3	4.2	4.2	2.6	2.6	2.6	2.6	3.0	3.0
19.....	3.3	2.3	3.3	2.3	4.5	3.0	2.2	2.2	2.6	4.0	4.0	3.5
20.....	3.6	2.4	2.4	2.3	3.3	2.5	3.5	2.2	2.6	4.0	4.0	3.5
21.....	2.5	2.3	2.3	2.3	3.6	2.2	2.6	2.2	2.6	4.0	3.5	3.0
22.....	2.3	2.3	2.2	2.3	3.0	2.2	3.0	2.2	2.6	3.0	2.6	3.0
23.....	2.7	2.3	2.2	2.3	2.9	2.2	2.6	2.2	2.2	4.0	2.6	3.0
24.....	3.0	2.2	2.3	3.0	5.0	2.2	2.2	2.2	2.2	3.5	2.6	3.5
25.....	2.4	2.6	2.2	3.8	4.8	2.2	2.2	2.2	2.2	3.5	2.2	3.5
26.....	2.3	2.3	2.2	2.9	4.6	2.2	2.2	2.2	2.2	3.0	2.2	3.5
27.....	2.3	2.3	2.2	2.3	3.9	2.2	2.2	2.2	3.0	3.0	2.2	3.0
28.....	2.3	3.6	2.2	2.3	2.9	2.1	2.2	2.2	2.2	2.6	3.5	3.0
29.....	2.2	2.9	2.2	2.3	2.5	2.1	2.6	.....	4.0	2.6	2.6	2.6
30.....	2.2	2.9	2.2	2.3	2.5	2.1	3.5	.....	3.0	2.6	2.2	3.5
31.....	2.2	3.8	.....	2.3	.....	2.1	3.0	.....	2.6	.....	2.2	.....
1914-15.												
1.....	3.0	2.6	2.6	2.6	4.0	4.5	4.3	3.4	3.0	2.8	2.6	2.5
2.....	2.6	2.6	2.6	2.6	4.0	4.5	4.3	3.4	3.0	2.8	2.6	2.5
3.....	2.6	3.0	2.6	3.0	4.0	4.5	4.3	3.4	3.0	2.8	2.6	2.5
4.....	2.6	3.0	2.6	3.0	4.0	4.5	4.3	3.4	3.0	2.8	2.6	2.5
5.....	2.6	3.0	2.6	3.0	4.0	4.5	4.2	3.4	3.0	2.8	2.6	2.5
6.....	2.2	3.0	2.2	3.0	4.0	4.5	4.1	3.4	3.0	2.8	2.6	2.5
7.....	2.2	3.0	2.2	3.0	4.0	4.5	4.0	3.4	3.0	2.8	2.6	2.5
8.....	2.6	2.2	2.2	3.0	4.0	4.5	3.9	3.4	3.0	2.8	2.6	2.5
9.....	2.6	2.2	2.6	3.0	4.0	4.5	3.8	3.3	3.0	2.8	2.6	2.5
10.....	3.0	2.6	2.6	3.0	4.0	4.5	3.8	3.3	3.0	2.8	2.6	2.5
11.....	2.6	3.0	2.6	3.0	4.0	4.5	3.8	3.3	3.0	2.8	2.6	2.5
12.....	3.0	2.2	2.6	3.0	4.0	4.5	3.8	3.3	3.0	2.8	2.5	2.5
13.....	2.2	2.2	2.2	3.0	4.5	4.5	3.8	3.3	3.0	2.8	2.5	2.5
14.....	2.2	2.2	2.2	3.5	4.5	4.5	3.8	3.3	3.0	2.8	2.5	2.5
15.....	3.5	2.2	2.2	3.5	4.5	4.5	3.8	3.3	3.0	2.7	2.5	2.5
16.....	2.6	2.2	2.2	3.5	4.5	4.5	3.8	3.3	3.0	2.7	2.5	2.5
17.....	2.2	2.2	2.2	3.5	4.5	4.5	3.8	3.3	2.9	2.7	2.5	2.5
18.....	2.6	2.2	2.2	3.5	4.5	4.5	3.8	3.3	2.9	2.7	2.5	2.5
19.....	2.2	2.2	2.2	3.5	4.5	4.5	3.8	3.3	2.9	2.7	2.5	2.5
20.....	2.2	2.2	2.2	3.5	4.5	4.5	3.7	3.3	2.9	2.7	2.5	2.5
21.....	2.2	2.2	2.6	3.5	4.5	4.5	3.7	3.3	2.9	2.7	2.5	2.5
22.....	2.2	2.2	2.2	3.5	4.5	4.5	3.7	3.3	2.9	2.7	2.5	2.5
23.....	3.0	2.2	2.6	3.5	4.5	4.5	3.6	3.3	2.9	2.7	2.5	2.5
24.....	3.0	2.2	2.6	3.5	4.5	4.5	3.6	3.2	2.9	2.7	2.5	2.5
25.....	3.5	2.2	2.6	4.0	4.5	4.5	3.6	3.2	2.9	2.7	2.5	2.5
26.....	3.0	2.6	2.6	4.0	4.5	4.5	3.6	3.2	2.9	2.7	2.5	2.5
27.....	3.0	2.6	2.6	4.0	4.5	4.5	3.5	3.1	2.9	2.7	2.5	2.5
28.....	3.5	2.6	2.6	4.0	4.5	4.5	3.5	3.1	2.9	2.7	2.5	2.5
29.....	3.0	2.6	2.6	4.0	4.5	4.5	3.5	.....	2.9	2.7	2.5	2.5
30.....	3.0	2.6	2.6	4.0	4.5	4.5	3.5	.....	2.9	2.6	2.5	2.5
31.....	3.0	2.6	.....	4.0	.....	4.5	3.5	.....	2.9	.....	2.5	.....

NOTE.—Discharge determined from weir table.

Monthly discharge of Kahoma development tunnel near Lahaina, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July	5.2	2.2	3.03	4.69	94	288
August.....	5.0	2.2	2.80	4.33	87	266
September.....	5.0	2.2	2.46	3.81	74	226
October.....	4.4	2.2	2.65	4.10	82	252
November.....	5.0	2.2	3.61	5.59	108	332
December.....	4.8	2.1	2.55	3.95	79	243
January.....	4.5	2.2	2.80	4.33	87	266
February.....	3.0	2.2	2.27	3.51	64	195
March.....	4.0	2.2	2.50	3.87	78	238
April.....	4.0	2.2	2.92	4.52	88	269
May.....	4.0	2.2	2.69	4.16	84	256
June.....	3.5	2.2	2.88	4.46	86	265
The year	5.2	2.1	2.77	4.29	1,010	3,100
1914-15.						
July.....	3.5	2.2	2.70	4.18	84	257
August.....	3.0	2.2	2.47	3.82	77	235
September.....	2.6	2.2	2.44	3.77	73	225
October.....	4.0	2.6	3.38	5.23	105	322
November.....	4.5	4.0	4.30	6.65	129	396
December.....	4.5	4.5	4.50	6.96	140	428
January.....	4.3	3.5	3.81	5.89	118	362
February.....	3.4	3.1	3.30	5.11	92	284
March.....	3.0	2.9	2.95	4.56	92	281
April.....	2.8	2.6	2.74	4.24	82	252
May.....	2.6	2.5	2.54	3.93	79	242
June.....	2.5	2.5	2.50	3.87	75	230
The year	4.5	2.2	3.14	4.86	1,150	3,510

LAHAINALUNA STREAM NEAR LAHAINA, MAUI.

LOCATION.—200 feet above Pioneer Mill Co.'s upper ditch intake, a quarter of a mile above Lahainaluna School, and about $1\frac{1}{2}$ miles northeast of Lahaina.

RECORDS AVAILABLE.—August 1, 1911, to June 30, 1915.

GAGE.—Vertical staff on right bank installed May 7, 1913; read twice daily. Prior to May 7, 1913, vertical staff 200 feet below present site.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge 200 feet below gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for 50 feet above and below gage; bed of stream very rough, banks high. Control composed of boulders and gravel; fairly permanent between extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 3.80 feet at 6 a. m. August 12, 1913 (discharge, approximately 140 million gallons per day, or 217 second-foot); minimum stage recorded, 0.10 foot (old datum) August, September, and October, 1912 (discharge, 0.3 million gallons per day, or 0.5 second-foot). Minimum stage recorded during biennial period, 0.70 foot (new datum) March 26-31, 1915 (discharge, 0.4 million gallons per day, or 0.6 second-foot).

DIVERSIONS.—Most of the normal flow of the stream is diverted into Lahainaluna ditch about 1 mile above the station.

REGULATION.—Amount diverted above varies.

UTILIZATION.—Water diverted above station is used for domestic supply, power, and irrigation; water passing gage is diverted for irrigation of sugar cane and taro.

ACCURACY.—Estimates July 1, 1913, to March 29, 1914, fair for low and medium stages; estimates over 6 million gallons per day poor because of lack of measurements above that stage. For period March 30, 1914, to June 30, 1915, rating curve is well defined throughout and estimates are good.

Discharge measurements of Lahainaluna Stream near Lahaina, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—Aug. 19	C. T. Bailey.....	1.18	0.95	0.6
Sept. 30	do.....	1.15	.9	.6
1914—Mar. 17	do.....	1.56	5.4	3.5
May 7	do.....	.86	1.2	.75
8	do.....	1.66	12	8.0
June 26	do.....	3.30	150	97
26	do.....	2.85	94	60
26	do.....	2.50	58	38
26	do.....	1.80	17	11
Sept. 11	do.....	1.42	7.2	4.7

Discharge, in million gallons per day, of Lahainaluna Stream near Lahaina, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	14	0.95	0.5	0.65	0.5	1.6	1.0	1.3	0.65	0.75	0.6	1.8
2.....	32	.95	.5	.5	.5	1.3	1.0	1.0	.65	1.1	.6	1.1
3.....	5.4	.95	.8	.65	25	.8	1.6	.8	.65	.6	.6	1.1
4.....	2.5	.95	.65	.65	23	30	4.7	1.0	.8	.5	2.2	1.1
5.....	30	.95	.5	.5	.8	4.0	2.9	.8	.8	.5	.6	.9
6.....	5.4	2.1	.5	9.5	.8	2.9	1.3	.8	.8	.6	.6	1.3
7.....	2.9	1.3	.5	.8	2.4	2.0	1.3	.8	.8	.6	.6	18
8.....	1.8	1.1	.5	16	4.7	1.6	43	.8	.8	.6	18	3.3
9.....	1.1	.95	.5	.8	91	1.6	9.5	.8	.8	.6	1.3	12
10.....	1.3	1.3	.5	.5	49	1.3	2.0	.8	.8	1.1	.75	3.3
11.....	1.1	1.1	1.0	.5	12	1.0	1.0	.65	.8	.75	.75	1.1
12.....	4.0	113	.65	.65	6.3	1.3	6.3	.8	.5	.6	.6	3.3
13.....	5.4	1.6	1.6	43	4.0	1.3	12	.8	.5	.6	.75	3.3
14.....	1.8	4.0	.65	4.7	1.0	1.3	2.4	.8	.45	.6	.75	1.3
15.....	1.5	2.0	.65	.8	1.0	1.3	2.0	.8	.4	1.3	.75	4.4
16.....	1.1	11	1.3	.5	12	1.3	5.4	7.2	.4	.6	.75	1.3
17.....	1.1	2.0	7.2	.5	19	1.3	9.5	1.3	12	.6	.75	3.8
18.....	1.1	.65	40	.5	76	12	1.6	1.0	1.3	.6	2.2	5.7
19.....	1.3	.65	.8	.5	19	2.0	1.0	1.0	.45	3.3	1.8	8.8
20.....	1.5	.65	.5	.5	2.0	1.3	7.2	1.0	.65	22	20	30
21.....	1.1	.65	.65	.5	1.3	1.3	1.0	.65	.65	20	11	18
22.....	1.3	.65	.65	.5	1.0	1.3	16	.65	.65	.9	1.1	1.3
23.....	3.4	.65	.8	.5	1.0	1.3	1.6	.8	.8	38	.9	5.7
24.....	1.5	1.3	.65	.65	1.1	1.3	1.0	.8	.65	15	.9	1.3
25.....	1.5	.8	.65	25	12	1.3	1.0	.8	.65	12	.75	4.4
26.....	1.3	.65	.5	1.0	27	1.3	.8	.8	.8	1.8	.9	36
27.....	1.3	.65	.5	.5	4.0	1.3	.8	1.0	1.0	.75	1.1	6.4
28.....	.95	.8	.5	.5	1.3	1.0	1.0	.65	.8	.6	5.7	2.5
29.....	.95	.65	.65	.5	1.3	1.0	1.0	.....	37	.75	1.3	2.5
30.....	.95	.65	.65	.5	2.0	1.0	2.0	.....	2.5	.6	1.1	1.3
31.....	.8	2.9	.....	.5	.....	1.0	2.0	.....	.6	.....	.9	.....

Discharge, in million gallons per day, of Lahainaluna Stream near Lahaina, Maui, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	4.4	1.8	3.3	11	4.4	2.9	1.3	1.1	0.9	0.5	0.6	0.75
2.....	2.2	1.8	33	24	2.5	2.2	1.3	1.1	1.1	.5	.6	.75
3.....	1.1	17	22	4.4	1.6	3.8	1.3	1.1	1.3	.5	.6	.75
4.....	2.5	75	7.1	5.7	1.3	2.2	11	1.1	12	.5	.6	.6
5.....	2.5	47	11	11	1.6	1.8	1.4	30	1.3	.5	.75	.6
6.....	1.8	12	5.7	7.1	1.6	1.6	2.2	1.6	1.3	.5	.6	1.8
7.....	1.8	11	3.8	20	1.3	1.6	1.1	2.2	.9	.5	.6	.6
8.....	2.9	11	2.5	5.7	1.3	1.6	.9	1.3	8.0	.5	.5	.6
9.....	2.5	6.4	1.6	14	1.1	1.6	.9	.9	.9	.4	.5	.6
10.....	3.8	14	2.9	5.7	1.1	1.6	.9	8.8	.9	.5	1.8	1.3
11.....	1.8	24	4.4	1.6	1.1	5.0	24	1.6	.6	.6	1.1	.6
12.....	4.4	6.4	26	1.6	1.1	8.8	2.9	2.9	.6	2.9	.6	.6
13.....	1.8	5.7	7.1	1.6	1.3	2.9	1.6	1.6	.6	.75	.6	.6
14.....	1.6	3.8	33	1.3	1.6	2.9	1.6	.9	.6	.5	.5	1.3
15.....	2.2	3.8	22	1.3	1.8	1.6	1.6	.9	.6	.5	.5	4.4
16.....	2.5	3.8	8.8	1.6	1.3	1.6	1.6	.9	.6	3.3	.4	3.3
17.....	1.6	8.0	4.4	2.2	1.6	1.1	1.3	2.9	.6	1.6	.6	1.8
18.....	1.6	20	11	1.8	1.1	1.1	1.3	1.3	.6	.9	.6	.6
19.....	1.3	17	8.8	17	1.1	1.1	1.1	2.5	.6	.5	2.2	41
20.....	1.3	8.8	5.7	1.8	1.3	11	1.1	12	.6	.5	1.8	17
21.....	1.3	33	2.2	1.8	1.1	2.2	1.3	63	.6	.4	.75	1.3
22.....	1.3	36	2.5	1.6	.9	1.8	1.1	22	.6	1.1	.4	1.6
23.....	4.4	20	4.4	1.6	.9	1.8	.9	8.8	.6	1.3	.4	.6
24.....	22	6.4	4.4	1.3	18	.9	.9	1.8	.9	.6	.5	.5
25.....	44	17	1.8	1.3	6.4	3.8	.75	1.3	.9	14	.6	.5
26.....	47	8.0	1.3	1.3	3.3	18	.75	1.3	.4	22	.6	1.3
27.....	15	3.3	4.4	4.4	41	1.8	.75	1.1	.4	1.8	.75	2.9
28.....	33	7.1	7.1	2.2	92	11	.75	.9	.4	1.8	.75	.6
29.....	41	8.0	18	2.9	17	1.8	.75	.....	.4	1.1	.75	.4
30.....	47	2.5	17	2.2	18	1.3	.75	.....	.4	.6	.75	8.8
31.....	6.4	8.8	.....	2.2	.....	1.3	.75	.....	.4	.....	.75	.....

NOTE.—Discharge determined from rating curves applicable as follows:

July 1 to Aug. 12, 1913, and Aug. 13, 1913, to Mar. 29, 1914, fairly well defined below 6 million gallons per day (9 second-feet); Mar. 30, 1914, to June 30, 1915, well defined.

Record of discharges July 1 to Dec. 31, 1913, supersedes that published in Water-Supply Paper 373, p. 123.

Monthly discharge of Lahainaluna Stream near Lahaina, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	32	0.8	4.24	6.56	131	403
August.....	113	.65	5.11	7.91	158	486
September.....	40	.5	2.20	3.40	66	203
October.....	43	.5	3.65	5.65	113	347
November.....	91	.5	13.4	20.7	402	1,230
December.....	30	.8	2.72	4.26	84	259
January.....	43	.8	4.67	7.23	145	444
February.....	7.2	.65	1.09	1.69	30	94
March.....	37	.4	2.29	3.54	71	218
April.....	38	.5	4.28	6.62	128	394
May.....	20	.6	2.60	4.02	81	247
June.....	36	.9	6.21	9.64	186	572
The year.....	113	.4	4.38	6.78	1,600	4,900
1914-15.						
July.....	47	1.1	9.94	15.4	308	946
August.....	75	1.8	14.5	22.4	448	1,380
September.....	33	1.3	9.57	14.8	287	881
October.....	24	1.3	5.26	8.14	163	500
November.....	92	.9	7.66	11.9	230	705
December.....	18	.9	3.35	5.18	104	319
January.....	24	.75	2.25	3.48	70	214
February.....	63	.9	6.32	9.78	177	543
March.....	12	.4	1.31	2.08	41	125
April.....	22	.4	2.06	3.19	62	190
May.....	2.2	.4	.74	1.14	23	70
June.....	41	.4	3.27	5.06	98	301
The year.....	92	.4	5.51	8.53	2,010	6,170

LAHAINALUNA DITCH NEAR LAHAINA, MAUI.

LOCATION.—200 feet above intake for Lahainaluna School power house and Lahaina water supply, $1\frac{1}{2}$ miles east of Lahaina.

RECORDS AVAILABLE.—May 6, 1913, to August 18, 1914, when ditch was replaced by pipe and station discontinued.

GAGE.—Vertical staff on left bank; read twice daily.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Very rough channel cut in lava rock on hillside; control is fairly permanent; discharge relation affected somewhat at times by growth of moss and cleaning of ditch.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 1.30 feet at 4.30 p. m. November 18, 1913 (discharge, approximately 6.5 million gallons per day, or 10 second-feet); minimum stage recorded, 0.65 feet August 4, 1914 (discharge, 0.1 million gallons per day, or 0.15 second-foot).

DIVERSIONS.—Ditch takes all low flow from Lahainaluna Stream.

REGULATION.—Flow regulated by head gates.

UTILIZATION.—Domestic supply for Lahaina; power and domestic supply for Lahainaluna School.

ACCURACY.—Estimates July 1 to November 18, 1913, fair. Estimates November 19, 1913, to August 18, 1914, poor, owing to uncertainty of date of shift in control, probable error of estimated discharge, and to regulation during laying of pipe line.

Discharge measurements of Lahainaluna ditch near Lahaina, Maui, during the year ending June 30, 1914.

[Made by C. T. Bailey.]

Date.	Gage height (feet).	Discharge.		Date.	Gage height (feet).	Discharge.	
		Second-feet.	Million gallons. per day.			Second-feet.	Million gallons. per day.
1913—Aug. 19.....	0.77	2.0	1.3	1914—Mar. 17.....	1.02	2.8	1.8
Sept. 30.....	.72	1.9	1.2	May 7.....	.98	2.1	1.4
Oct. 3.....	.76	2.0	1.3				

Discharge, in million gallons per day, of Lahainaluna ditch near Lahaina, Maui, for the years ending June 30, 1914-1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	3.4	1.7	1.9	1.4	1.2	0.4	0.4	0.9	0.6	0.9	1.6	0.9
2.....	3.5	1.7	1.7	.95	1.3	.4	.4	.6	.6	1.2	1.2	.9
3.....	2.8	1.6	1.9	1.0	4.1	.4	.6	1.2	.6	.9	1.6	.9
4.....	3.0	1.6	1.2	1.4	3.4	3.0	1.2	.9	.6	.6	2.0	.9
5.....	3.6	1.6	1.4	1.0	1.7	2.5	.9	.6	.6	1.6	1.6	.9
6.....	3.2	2.6	1.4	3.2	1.6	1.6	.9	.6	.4	.9	1.6	.9
7.....	2.6	2.8	1.4	2.4	1.2	.6	.6	1.2	.4	.9	1.6	.9
8.....	1.9	2.6	1.3	3.9	3.9	.4	1.6	.9	.4	.6	2.5	.9
9.....	1.7	2.1	1.3	2.3	4.6	.4	.9	.9	.4	.9	2.0	1.6
10.....	1.6	2.6	1.6	2.1	2.6	.4	.6	.6	.6	1.2	1.6	.9
11.....	1.6	1.9	2.1	2.2	2.6	.4	.6	.6	.4	.9	1.6	.9
12.....	2.6	4.8	2.1	1.9	1.7	.4	.9	.6	.4	.9	1.6	.6
13.....	3.0	3.2	2.1	3.1	.9	.4	2.0	.6	1.2	.9	1.2	.6
14.....	2.8	3.4	1.9	2.6	1.6	.4	1.2	.6	1.2	.9	1.2	.....
15.....	2.1	3.2	1.6	1.4	1.4	.4	2.0	.6	.9	1.6	1.2	.....
16.....	1.9	3.7	2.2	1.7	4.8	.4	1.6	2.0	.9	.9	1.2	.....
17.....	1.7	1.9	3.6	1.6	5.4	.4	2.0	.6	2.5	.9	.9	.....
18.....	1.7	1.9	4.4	1.4	6.5	2.0	1.2	.6	.6	.9	1.6	.....
19.....	1.7	1.6	3.0	1.3	4.0	.9	.6	.6	1.2	2.5	2.5	.....
20.....	2.2	1.6	2.4	1.4	2.0	.4	1.2	.9	1.2	3.0	3.0	.....
21.....	1.9	1.4	1.9	.95	2.0	.4	.6	.9	1.2	2.5	2.0	.....
22.....	2.3	1.4	1.2	.9	1.6	.4	1.6	.9	.9	1.6	1.6	.....
23.....	2.4	1.3	1.2	.9	1.2	.4	.6	.9	.6	3.5	1.2	.....
24.....	2.2	1.9	1.4	1.3	2.5	.4	.6	.9	.6	2.5	.9	.....
25.....	1.7	1.4	1.2	2.6	3.0	.4	.6	.9	.6	1.6	.9	.....
16.....	1.4	1.6	1.2	2.2	3.5	.4	.6	.4	.6	1.6	.6	.....
27.....	1.4	1.7	1.3	1.4	2.5	.4	.4	.4	.9	1.6	.6	.....
28.....	1.6	1.7	1.2	1.4	.6	.4	1.6	.9	.6	1.6	1.2	.....
29.....	1.7	1.9	1.4	1.0	.4	.4	.9	.....	2.5	1.2	.9	.....
30.....	1.7	1.4	1.0	1.0	.6	.4	1.2	.....	.9	1.2	.9	.....
31.....	1.7	3.1	.....	1.4	.....	.4	1.6	.....	.9	.....	.9	.....

Date.	July.	Aug.	Date.	July.	Aug.	Date.	July.	Aug.
1914.			1914.			1914.		
1.....	1.0	0.6	11.....	0.6	0.3	21.....	0.6	.....
2.....	1.0	.6	12.....	1.2	.3	22.....	.6	.....
3.....	1.0	.9	13.....	.6	.3	23.....	.6	.....
4.....	1.0	.1	14.....	.6	.3	24.....	1.2	.....
5.....	.9	.3	15.....	.9	.3	25.....	1.2	.....
6.....	.6	.4	16.....	1.2	.3	26.....	1.6	.....
7.....	.4	.4	17.....	.6	.4	27.....	1.6	.....
8.....	.6	.3	18.....	.9	.3	28.....	1.2	.....
9.....	1.2	.2	19.....	.6	.....	29.....	1.2	.....
10.....	.9	.2	20.....	.6	.....	30.....	1.2	.....
						31.....	.6	.....

NOTE.—Discharge determined from rating curves applicable as follows: July 1 to Nov. 18, 1913, fairly well defined; Nov. 19, 1913, to Aug. 13, 1914, poorly defined. As the date when the change in rating took place is uncertain between measurements made on Oct. 3, 1913, and Mar. 17, 1914, estimates for period Nov., 1913, to Feb., 1914, are only approximate. Observer away June 14 to July 4, 1914; no record. Discharge estimated July 1 to 4, 1914; total discharge June 14-30, 1914, estimated at 22 million gallons.

Monthly discharge of Lahainaluna ditch near Lahaina Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	3.6	1.4	2.21	3.42	69	210
August.....	4.8	1.3	2.16	3.34	67	205
September.....	4.4	1.0	1.78	2.75	54	164
October.....	3.9	.9	1.72	2.66	53	164
November.....	6.5	.4	2.48	3.84	74	228
December.....	3.0	.4	.66	1.02	21	63
January.....	2.0	.4	1.02	1.58	32	97
February.....	2.0	.4	.81	1.25	23	70
March.....	2.5	.4	.84	1.30	26	80
April.....	3.5	.6	1.37	2.12	41	126
May.....	3.0	.6	1.45	2.24	45	138
June.....			1.13	1.75	34	104
The year.....			1.47	2.27	539	1,650
1914.						
July.....	1.6	.4	.90	1.39	28	86
August 1-18.....	.9	.1	.36	.56	6	20

KAUAULA STREAM NEAR LAHAINA, MAUI.

LOCATION.—600 feet above Kauaula ditch intake, about 3 miles east of Lahaina.

RECORDS AVAILABLE.—March 7, 1912, to June 30, 1915.

GAGE.—Vertical staff installed April 29, 1913, but not used until May 15, 1913; prior to May 15, 1913, vertical staff about 400 feet below present site.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge at gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for 100 feet above and below station; stream bed composed of boulders and coarse gravel; right bank slopes gently; left bank is of rock and nearly vertical. Control composed of large boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 3.00 feet March 29, 1914 (discharge, computed from extension of rating curve, approximately 300 million gallons per day, or 460 second-feet); minimum stage recorded, 0.89 foot April, 1914 (discharge, 4.2 million gallons per day, or 6.5 second-feet).

DIVERSIONS.—None above station.

REGULATION.—Natural flow of stream is increased by a development tunnel in mountains above station.

UTILIZATION.—Power development and irrigation of sugar cane.

ACCURACY.—Estimates based on rating curve fairly well defined below 40 million gallons per day but, owing to doubtful reliability of gage-height record, are poor; gage-height record May 15 to December 31, 1913, discarded as unreliable; flow for that period not determined.

Discharge measurements of Kauaula Stream near Lahaina, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1913—Aug. 19	E. O. Christiansen.....	1.04	8.8	5.7
1914—Mar. 24	G. R. White.....	.93	6.1	3.9
June 26	C. T. Bailey.....	1.36	38	25
Oct. 16	do.....	1.08	14	9.2

Discharge, in million gallons, of Kauaula Stream near Lahaina, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day into second-feet multiply by 1.55.]

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	Date.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914.							1914.						
1.....	5.2	6.2	4.2	5.2	4.2	8.1	16.....	10	8.1	5.2	4.2	5.2	6.2
2.....	5.2	5.2	4.2	5.2	5.2	8.1	17.....	21	6.2	15	4.2	5.2	15
3.....	8.1	5.2	4.2	5.2	5.2	5.2	18.....	12	5.2	6.2	4.2	10	8.1
4.....	10	5.2	4.2	4.2	6.2	5.2	19.....	8.1	5.2	5.2	10	10	41
5.....	6.2	5.2	4.2	4.2	5.2	5.2	20.....	10	5.2	5.2	12	21	21
6.....	6.2	5.2	4.2	4.2	4.2	5.2	21.....	8.1	5.2	4.2	12	18	8.1
7.....	6.2	5.2	4.2	4.2	4.2	8.1	22.....	21	5.2	4.2	10	8.1	15
8.....	24	5.2	4.2	4.2	24	8.1	23.....	10	5.2	4.2	46	6.2	12
9.....	10	5.2	4.2	4.2	8.1	12	24.....	8.1	5.2	4.2	15	6.2	15
10.....	10	5.2	4.2	5.2	5.2	12	25.....	6.2	5.2	4.2	10	6.2	46
11.....	10	5.2	4.2	4.2	5.2	6.2	26.....	6.2	5.2	4.2	6.2	5.2	21
12.....	8.1	5.2	4.2	4.2	5.2	6.2	27.....	6.2	4.2	4.2	5.2	5.2	21
13.....	24	5.2	4.2	4.2	5.2	8.1	28.....	6.2	4.2	4.2	5.2	12	15
14.....	10	5.2	4.2	4.2	5.2	6.2	29.....	6.2	144	5.2	4.2	6.2	10
15.....	8.1	5.2	4.2	5.2	5.2	10	30.....	6.2	10	5.2	5.2	21
							31.....	6.2	5.2	5.2	5.2	5.2
Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	
1914-15.													
1.....	12	21	12	21	21	15	6.2	6.2	6.2	6.2	6.2	5.2	
2.....	10	15	32	18	15	10	6.2	6.2	6.2	6.2	6.2	5.2	
3.....	10	12	10	12	10	12	6.2	6.2	6.2	6.2	6.2	5.2	
4.....	10	107	18	18	8.1	10	8.1	6.2	15	5.2	6.2	5.2	
5.....	8.1	36	15	18	8.1	10	12	90	8.1	5.2	6.2	5.2	
6.....	8.1	24	15	15	8.1	10	12	8.1	6.2	5.2	6.2	6.2	
7.....	6.2	21	18	12	8.1	8.1	10	8.1	6.2	5.2	6.2	6.2	
8.....	6.2	10	18	12	8.1	8.1	8.1	6.2	18	5.2	6.2	6.2	
9.....	8.1	10	10	21	6.2	8.1	8.1	6.2	8.1	5.2	6.2	6.2	
10.....	10	15	10	21	6.2	8.1	6.2	12	8.1	5.2	6.2	6.2	
11.....	6.2	21	12	12	6.2	8.1	12	8.1	6.2	5.2	6.2	6.2	
12.....	8.1	10	15	10	6.2	18	8.1	12	6.2	6.2	6.2	5.2	
13.....	8.1	10	15	10	6.2	8.1	8.1	10	6.2	6.2	5.2	5.2	
14.....	8.1	10	28	8.1	10	8.1	8.1	8.1	6.2	6.2	5.2	6.2	
15.....	10	10	41	8.1	8.1	8.1	6.2	8.1	6.2	5.2	5.2	6.2	
16.....	10	8.1	32	8.1	8.1	8.1	6.2	8.1	6.2	18	5.2	8.1	
17.....	6.2	12	18	10	8.1	6.2	6.2	8.1	6.2	8.1	5.2	8.1	
18.....	8.1	28	15	15	6.2	6.2	6.2	8.1	6.2	6.2	5.2	6.2	
19.....	6.2	15	21	18	6.2	6.2	6.2	8.1	6.2	6.2	8.1	21	
20.....	6.2	15	12	8.1	8.1	18	6.2	10	6.2	5.2	6.2	21	
21.....	5.2	18	12	12	6.2	12	8.1	82	6.2	5.2	6.2	10	
22.....	5.2	18	12	8.1	6.2	10	6.2	75	6.2	6.2	6.2	10	
23.....	6.2	21	12	6.2	6.2	8.1	6.2	18	6.2	8.1	5.2	8.1	
24.....	8.1	15	12	6.2	21	8.1	6.2	10	6.2	6.2	5.2	6.2	
25.....	21	12	12	6.2	12	18	6.2	10	6.2	8.1	5.2	6.2	
26.....	24	10	10	6.2	15	18	6.2	8.1	6.2	21	5.2	10	
27.....	36	10	10	10	28	10	6.2	8.1	6.2	15	5.2	10	
28.....	41	10	10	8.1	125	10	6.2	6.2	6.2	15	5.2	10	
29.....	46	10	28	6.2	28	8.1	6.2	6.2	6.2	8.1	5.2	6.2	
30.....	46	10	12	8.1	18	8.1	6.2	6.2	6.2	8.1	5.2	10	
31.....	21	18	15	15	6.2	6.2	6.2	6.2	6.2	5.2	5.2	.....

NOTE.—Discharge determined from a rating curve fairly well defined below 40 million gallons per day.

Monthly discharge of Kauaula Stream near Lahaina, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
January.....	24	5.2	9.77	15.1	303	929
February.....	8.1	4.2	5.30	8.20	148	455
March.....	144	4.2	9.44	14.6	293	898
April.....	46	4.2	7.39	11.4	222	680
May.....	24	4.2	7.51	11.6	233	714
June.....	46	5.2	13.0	20.1	389	1,200
1914-15.						
July.....	46	5.2	13.7	21.2	426	1,300
August.....	107	8.1	18.1	28.0	562	1,720
September.....	41	10	16.6	25.7	497	1,530
October.....	21	6.2	11.9	18.4	368	1,130
November.....	125	6.2	14.6	22.6	438	1,340
December.....	18	6.2	10.0	15.5	311	951
January.....	12	6.2	7.31	11.3	227	695
February.....	90	6.2	16.5	25.5	462	1,420
March.....	18	6.2	7.05	10.9	218	671
April.....	21	5.2	7.62	11.8	229	702
May.....	8.1	5.2	5.78	8.94	179	550
June.....	21	5.2	7.90	12.2	237	727
The year.....	125	5.2	11.4	17.6	4,150	12,700

KAUAULA DITCH NEAR LAHAINA, MAUI.

LOCATION.—About 100 feet below intake which is uppermost on the stream, about 3 miles east of Lahaina.

RECORDS AVAILABLE.—October 16, 1911, to June 30, 1915.

GAGE.—Vertical staff; read twice daily.

DISCHARGE MEASUREMENTS.—Made in flume at gage.

CHANNEL AND CONTROL.—Straight wooden flume 3 feet wide and on even grade; discharge relation probably constant.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 1.70 feet April 7, 1912 (discharge, 16 million gallons per day, or 24 second-feet); water is occasionally turned off.

DIVERSIONS.—Diverts all low flow from Kauaula Stream.

REGULATION.—Flow regulated by head gates.

UTILIZATION.—Power development and irrigation of sugar cane.

ACCURACY.—Estimates based on fairly well defined curves and a reliable gage-height record; fair for all stages.

Discharge measurements of Kauaula ditch near Lahaina, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by.	Gage height (feet).	Discharge.	
			Second foot.	Million gallons per day.
1913—Aug. 19	C. T. Bailey.....	0.84	8.0	5.2
1914—Mar. 24	G. R. White.....	.68	6.5	4.2
24	C. T. Bailey.....	.68	6.5	4.2
Oct. 16	.....do.....	1.16	12	7.5

Discharge, in million gallons per day, of Kauaula ditch near Lahaina, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.	9.7	4.4	5.0	3.8	3.5	7.0	4.4	5.8	4.0	5.3	5.3	5.8
2.	8.3	4.4	5.0	3.7	3.5	6.8	4.4	5.3	4.0	6.2	4.8	6.2
3.	7.8	4.4	5.0	3.7	9.7	6.4	7.1	5.3	4.0	4.8	4.8	5.3
4.	7.4	4.4	4.8	3.7	8.3	11	7.1	4.8	4.0	4.4	6.6	4.8
5.	10	4.4	4.7	3.7	5.2	10	5.8	4.8	4.0	4.4	5.8	4.8
6.	5.9	4.5	4.5	8.8	5.2	9.4	6.2	4.8	4.0	4.4	4.8	4.8
7.	7.1	4.4	4.3	5.2	4.1	8.5	4.8	4.4	4.0	4.4	4.8	7.1
8.	5.9	4.4	4.3	8.3	10	7.8	7.6	4.4	3.6	4.4	7.6	7.1
9.	5.5	4.4	4.3	5.0	11	7.4	8.5	4.4	3.6	4.4	7.6	6.6
10.	5.3	4.4	4.3	4.7	9.4	6.5	7.6	4.4	3.6	5.8	6.2	7.6
11.	5.0	4.4	4.3	4.5	9.4	5.8	5.8	4.4	3.6	4.4	5.8	6.2
12.	5.0	10	4.3	4.1	8.9	5.4	6.6	4.4	3.6	4.4	5.3	6.2
13.	6.4	8.3	4.1	7.1	8.3	5.2	8.5	4.4	4.0	4.4	4.8	6.6
14.	5.0	5.8	4.1	9.2	8.0	5.4	7.1	4.0	4.0	4.4	4.8	6.2
15.	4.8	6.2	4.1	5.0	8.0	5.0	6.6	4.0	3.6	4.4	5.3	7.6
16.	4.8	8.5	4.3	5.2	8.5	5.0	7.1	6.2	4.8	4.4	4.8	5.8
17.	4.5	7.1	5.3	4.4	9.7	5.0	8.0	5.3	7.6	4.0	4.8	8.0
18.	4.5	5.8	8.0	4.3	9.7	8.9	8.0	4.8	5.3	4.0	7.1	7.1
19.	4.5	5.6	5.8	4.1	-----	7.4	6.6	4.4	4.8	7.1	7.6	9.5
20.	4.5	5.4	4.8	3.8	3.0	5.2	7.6	4.0	4.0	7.6	7.6	8.5
21.	4.5	5.4	4.7	3.7	7.7	5.0	6.6	4.0	4.0	7.6	7.6	7.6
22.	4.5	5.3	4.5	3.6	7.4	4.8	3.2	4.0	4.0	7.6	7.1	8.5
23.	4.5	5.3	4.8	3.6	7.1	4.7	5.3	4.0	3.6	8.0	6.2	8.5
24.	4.7	5.0	4.8	3.6	8.5	4.7	6.6	4.0	3.6	8.0	5.8	8.5
25.	4.7	4.8	4.5	6.4	10	4.5	6.2	4.0	3.6	7.6	5.8	9.0
26.	4.5	4.8	4.5	3.8	10	4.5	5.8	4.0	3.6	6.6	5.3	8.0
27.	4.5	4.8	4.5	3.8	8.9	4.5	6.2	4.0	4.0	6.2	5.3	8.0
28.	4.5	4.7	4.4	3.8	8.6	4.4	6.2	4.0	4.0	5.8	7.6	7.6
29.	4.5	4.7	4.3	3.7	8.3	4.3	5.8	-----	3.2	5.8	7.1	9.0
30.	4.5	4.7	4.1	3.7	7.7	4.1	5.8	-----	4.0	5.8	5.8	9.5
31.	4.4	5.6	-----	3.7	-----	4.1	5.8	-----	4.4	-----	5.3	-----
1914-15.												
1.	8.5	10	9.5	10	9.5	10	7.1	4.8	5.8	4.4	5.3	4.0
2.	8.0	9.0	9.5	10	9.0	9.5	6.6	4.8	5.8	4.4	5.3	4.0
3.	7.6	9.5	9.0	9.5	7.6	10	6.6	4.8	5.8	4.4	4.8	4.0
4.	7.6	8.0	9.0	10	7.1	8.5	8.0	4.8	8.5	4.4	4.8	4.0
5.	8.0	8.5	9.0	10	6.6	8.0	9.5	10	6.2	4.4	4.8	4.0
6.	7.1	7.6	9.0	10	6.6	7.1	6.6	8.0	5.8	4.4	4.8	4.8
7.	7.1	9.0	8.0	10	6.6	7.1	6.2	9.5	5.8	4.0	4.8	4.4
8.	6.6	9.5	8.0	10	6.6	6.6	5.8	6.2	9.0	4.0	4.8	4.8
9.	7.6	9.0	9.0	10	6.6	6.6	5.8	4.8	6.6	4.0	4.8	4.4
10.	7.6	9.0	9.5	10	6.6	6.6	5.8	9.0	5.8	4.0	4.8	4.4
11.	7.1	9.5	9.5	10	6.2	8.5	7.1	6.2	5.3	4.0	4.8	4.4
12.	7.6	9.5	8.5	10	6.2	10	7.1	9.5	5.3	5.8	4.8	4.4
13.	7.6	9.5	9.5	8.5	6.2	9.5	6.2	9.0	5.3	4.4	4.4	4.0
14.	7.6	9.5	9.5	8.5	7.1	8.5	5.8	6.2	5.3	4.4	4.4	4.4
15.	2.8	9.0	9.5	8.0	6.6	8.0	5.8	8.5	4.0	5.3	4.4	4.4
16.	7.6	7.6	9.5	8.0	6.2	7.1	5.3	5.8	4.8	9.0	4.4	6.6
17.	6.6	9.5	10	8.0	6.2	6.6	5.3	6.6	4.8	7.1	4.4	7.6
18.	7.1	9.5	10	9.5	6.2	6.2	5.3	5.8	4.8	5.8	4.4	4.8
19.	6.2	9.5	10	9.5	5.8	6.2	5.3	6.2	4.8	4.8	6.6	9.5
20.	5.8	12	10	8.0	6.6	10	5.3	8.0	4.8	4.4	5.3	9.5
21.	5.8	12	10	9.0	6.2	9.0	5.8	9.0	4.8	4.4	4.8	8.5
22.	5.8	11	7.6	8.0	5.8	7.6	5.3	9.0	4.8	5.3	4.8	8.5
23.	6.6	9.0	7.6	7.6	5.8	7.1	4.8	9.0	4.8	5.8	4.4	6.6
24.	7.6	9.5	7.6	7.6	7.6	6.6	4.8	8.5	4.8	5.3	4.4	5.8
25.	7.6	9.5	9.5	7.1	9.5	8.5	4.8	7.6	4.4	7.1	4.4	5.8
26.	7.6	9.0	9.5	6.6	8.5	8.5	4.8	7.1	4.4	9.5	440	6.6
27.	9.5	9.0	10	8.0	10	8.0	4.8	6.2	4.4	9.0	4.0	7.1
28.	10	9.0	10	7.6	10	7.6	4.8	6.2	4.4	9.0	4.0	6.6
29.	10	9.5	9.5	7.1	10	8.0	4.8	-----	4.4	6.6	4.0	5.8
30.	10	9.0	10	8.5	10	7.6	4.8	-----	4.4	5.8	4.0	7.6
31.	8.5	10	-----	9.5	-----	7.1	4.8	-----	4.4	-----	4.0	-----

NOTE.—Discharge determined from rating curves applicable as follows: July 1 to Dec. 31, 1913, fairly well defined below 6 million gallons per day (9 second-feet); Jan. 1, 1914, to June 30, 1915, fairly well defined. No water in ditch Nov. 19, 1913.

Monthly discharge of Kauaula ditch near Lahaina, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	10	4.4	5.54	8.57	172	527
August.....	10	4.4	5.36	8.29	166	510
September.....	8.0	4.1	4.68	7.24	140	431
October.....	9.2	3.6	4.70	7.27	146	447
November 1-18, 20-30.....	11	3.0	7.85	12.1	228	699
December.....	11	4.1	6.09	9.42	189	579
January.....	8.5	3.2	6.42	9.93	199	611
February.....	6.2	4.0	4.51	6.98	126	388
March.....	7.6	3.2	4.07	6.30	126	387
April.....	8.0	4.0	5.55	8.59	167	511
May.....	7.6	4.8	5.97	9.24	185	568
June.....	9.5	4.8	7.20	11.1	216	663
Total period (364 days).....	11	3.0	5.66	8.76	2,060	6,320
1914-15.						
July.....	10	2.8	7.44	11.5	231	708
August.....	12	7.6	9.38	14.5	291	892
September.....	10	7.6	9.23	14.3	277	850
October.....	10	6.6	8.84	13.7	274	841
November.....	10	5.8	7.32	11.3	220	674
December.....	10	6.2	7.94	12.3	246	755
January.....	9.5	4.8	5.83	9.02	181	555
February.....	10	4.8	7.09	11.9	198	609
March.....	9.0	4.4	5.34	8.26	166	508
April.....	9.5	4.0	5.46	8.45	164	503
May.....	6.6	4.0	4.65	7.99	144	442
June.....	9.5	4.0	5.71	8.83	171	526
The year.....	12	2.8	7.02	10.9	2,560	7,860

LAUNIUPOKO STREAM NEAR LAHAINA, MAUI.

LOCATION.—About 175 feet above Pioneer Mill Co.'s ditch intake, 1 mile above storage reservoir, and about $5\frac{1}{2}$ miles southeast of Lahaina.

RECORDS AVAILABLE.—July 25, 1911, to June 30, 1915.

GAGE.—Vertical staff on right bank; read once daily.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—One channel at all stages; straight for 50 feet above and below gage; stream bed rough and steep. Control composed of small boulders, shifts during floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 2.00 feet at 6 a. m. March 1, 1914 (discharge, approximately 50 million gallons per day, or 77 second-feet); minimum stage recorded 0.4 foot frequently during 1913-14 (discharge, 0.5 million gallons per day, or 0.75 second-foot).

DIVERSIONS.—None above station.

REGULATION.—Nearly all normal flow of stream is derived from a development tunnel above station.

UTILIZATION.—Irrigation of sugar cane.

ACCURACY.—Owing to unreliable gage-height record estimates July 1, 1913, to October 15, 1914, are poor, gage-height record is more reliable and estimates are fair for low stages October 16, 1914, to June 30, 1915.

Discharge measurements of Launiupoko Stream near Lahaina, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1913—Aug. 20	C. T. Bailey	0.45	0.95	0.6
1914—Mar. 26	.....do. ....	.46	1.2	.8
Oct. 16	.....do. ....	.28	3.0	1.9

Discharge, in million gallons per day, of Launiupoko Stream near Lahaina, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	0.95	0.5	0.5	0.5	0.5	0.5	0.5	0.5	20	0.5	0.5	0.5
2.....	1.1	.5	.5	.5	1.9	.5	.5	.5	.95	.5	.5	.5
3.....	.95	.5	.5	.5	1.6	.8	.5	.5	.5	.5	.5	.5
4.....	1.3	.5	.5	.5	.6	4.3	.5	.5	.5	.5	.5	.5
5.....	.65	.5	.5	.5	.5	1.2	.5	.5	.5	.5	.5	.5
6.....	.5	.5	.5	.5	.5	.95	.5	.5	.5	.5	.5	.5
7.....	.5	.5	.5	.5	.7	.5	.5	.5	.5	.5	.5	.5
8.....	.5	.5	.5	.5	4.5	.5	2.3	.5	.5	.5	4.8	.5
9.....	.5	.5	.5	.5	4.1	.5	1.6	.5	.5	.5	.95	.5
10.....	.5	.5	.5	.5	2.4	.5	.5	.5	.5	.5	.5	.5
11.....	.5	.6	.5	.5	2.2	.5	.5	.5	.5	.5	.5	.5
12.....	.5	2.5	.5	.5	.95	.5	2.3	.5	.5	.5	.5	.7
13.....	.5	.8	.5	2.3	.8	.5	1.6	.5	.5	.5	.5	.5
14.....	.5	.5	.5	.6	.8	.5	.95	.5	.5	.5	.5	.5
15.....	.5	.5	.5	.5	.85	.5	.5	.5	.5	.5	.5	.5
16.....	.5	3.6	.5	.5	.8	.5	.5	.95	.5	.5	.5	.5
17.....	.5	1.4	.5	.5	2.8	.5	.5	.5	.5	.5	.5	.5
18.....	.5	.9	.95	.5	1.4	.95	.5	.5	.5	.5	.7	1.3
19.....	.5	.7	.5	.5	.65	.5	.5	.5	.5	.5	.7	4.1
20.....	.5	.5	.5	.5	.5	.5	.7	.5	2.8	1.6	4.8	2.3
21.....	.5	.5	.5	.5	.5	.5	.5	.5	.5	.7	.95	.7
22.....	.5	.5	.5	.5	.5	.5	.95	.5	.5	.95	.5	.5
23.....	.5	.5	.5	2.2	.5	.5	2.8	.5	.5	4.1	.5	.5
24.....	.5	.5	.5	.8	.95	.5	.5	.5	.5	2.0	.5	.5
25.....	.5	.5	.5	1.9	2.2	.5	.5	.5	.5	.7	.5	5.6
26.....	.5	.5	.5	.6	3.9	.5	.5	.5	.5	.5	.5	2.3
27.....	.5	.5	.5	.5	1.3	.5	.5	.5	.5	.5	.5	.95
28.....	.5	.5	.5	.5	.95	.5	1.3	.5	.5	.5	.5	.95
29.....	.5	.5	.5	.5	.8	.5	.5	.....	.5	.5	.5	.7
30.....	.5	.5	.5	.5	.5	.5	.5	.....	.5	.5	.5	.7
31.....	.5	.5	.....	.5	.....	.5	.5	.....	.5	.....	.5	.....

Discharge, in million gallons per day, of Launiupoko Stream near Lahaina, Maui, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	0.5	0.95	0.95	0.95	1.8	1.1	2.2	1.8	1.4	1.4	1.4	1.1
2.....	.5	.95	.95	.95	1.1	4.5	2.6	1.8	1.4	1.4	1.4	1.1
3.....	.5	1.3	.95	.95	1.1	3.8	2.6	1.8	1.8	1.4	1.4	1.1
4.....	.5	7.4	.95	.95	1.1	3.2	3.2	1.8	1.8	1.1	1.4	1.1
5.....	.5	3.4	1.3	.95	1.1	2.6	2.6	11	1.8	1.1	1.4	1.1
6.....	.5	1.3	2.0	1.3	1.1	2.6	1.8	3.8	2.6	1.1	1.4	1.1
7.....	.5	.95	.95	.95	.9	1.8	1.8	2.2	5.2	1.1	1.4	1.1
8.....	.5	.7	.95	.95	1.1	2.2	1.8	2.6	10	1.1	1.4	1.1
9.....	.5	.5	.95	.95	1.1	1.8	1.8	1.1	2.6	1.1	1.4	1.1
10.....	.5	.7	.95	.95	1.1	2.6	2.2	1.8	2.6	1.4	1.4	1.1
11.....	.5	3.4	1.3	.95	.9	1.8	2.6	1.1	1.8	1.1	1.4	1.1
12.....	.5	.95	1.3	.95	1.1	3.8	1.8	1.8	2.2	1.1	1.4	1.1
13.....	.5	.95	.95	.95	1.1	2.6	1.8	1.8	1.1	1.1	1.4	1.1
14.....	.5	.95	.95	.95	1.1	2.6	2.6	1.8	1.8	1.1	1.4	1.1
15.....	.5	.95	1.3	.95	1.1	2.2	2.2	1.1	1.4	1.4	1.4	1.1
16.....	.5	.95	1.6	1.8	1.1	1.8	1.1	1.8	1.4	1.4	1.4	1.1
17.....	.5	2.0	1.6	1.4	1.1	1.8	1.8	1.4	1.4	2.2	1.4	1.1
18.....	.5	2.3	1.6	1.1	1.1	1.4	1.8	1.4	1.4	1.8	1.4	1.1
19.....	.5	2.8	1.6	.9	1.1	9.0	1.8	1.4	1.4	1.4	1.4	2.6
20.....	.5	2.8	1.6	1.1	14	6.1	1.8	1.8	1.4	1.4	1.4	1.4
21.....	.5	4.1	2.0	1.1	9.0	3.2	2.2	14	1.4	1.4	1.4	1.1
22.....	.5	2.3	1.6	.9	2.6	1.8	1.8	9.0	1.4	1.8	1.4	1.1
23.....	1.3	2.3	1.6	1.1	1.8	1.8	1.8	7.0	1.4	1.8	1.4	1.1
24.....	.95	2.0	1.6	1.4	1.1	12	1.8	2.6	1.4	1.8	1.4	1.1
25.....	.95	2.0	1.3	1.1	1.1	6.1	1.8	2.2	1.4	14	1.1	1.1
26.....	1.3	1.6	.95	1.1	1.1	3.8	1.1	1.8	1.4	3.8	1.1	1.8
27.....	2.0	1.6	.95	1.1	14	3.2	1.8	1.8	1.4	1.8	1.1	1.8
28.....	1.3	1.6	.95	1.4	12	2.6	1.8	1.4	1.4	1.8	1.1	1.4
29.....	5.6	1.6	.95	1.1	3.2	2.2	1.8	.....	1.4	1.8	1.1	1.4
30.....	2.8	2.0	.95	1.4	1.8	2.6	1.8	.....	1.8	1.8	1.1	2.6
31.....	.95	1.6	.....	1.1	.....	1.8	1.8	.....	1.4	.....	1.1	.....

NOTE.—Daily discharge determined from rating curves applicable as follows: Jan. 1 to Oct. 15, 1914, fairly well defined below 6 million gallons per day (9 second-feet); Oct. 16, 1914, to June 30, 1915, poorly defined. Observer was found to be reading gage 0.2 foot too high Oct. 15, 1914; gage readings since then probably more reliable.

Monthly discharge of Launiupoko Stream near Lahaina, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-feet (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	1.3	0.5	0.58	0.90	18	55
August.....	3.6	.5	.73	1.18	22	69
September.....	.95	.5	.52	.80	15	48
October.....	2.3	.5	.67	1.04	21	64
November.....	4.5	.5	1.37	2.12	41	126
December.....	4.3	.5	.68	1.05	21	65
January.....	2.8	.5	.82	1.27	26	78
February.....	.95	.5	.52	.80	14	45
March.....	20	.5	1.22	1.89	38	116
April.....	4.1	.5	.74	1.14	22	68
May.....	4.8	.5	.82	1.27	25	78
June.....	5.6	.5	1.00	1.55	30	92
The year.....	20	.5	.82	1.25	293	904
1914-15.						
July.....	5.6	0.5	0.91	1.41	28	87
August.....	7.4	.5	1.90	2.94	59	181
September.....	2.0	.95	1.25	1.93	38	115
October.....	1.8	.95	1.09	1.69	34	104
November.....	14	.9	2.76	4.27	83	254
December.....	12	1.1	3.24	5.01	100	308
January.....	4.3	1.1	1.98	3.06	61	188
February.....	14	1.1	3.03	4.69	85	260
March.....	10	1.1	2.01	3.11	62	191
April.....	14	1.1	2.35	3.64	71	216
May.....	1.4	1.1	1.33	2.06	41	127
June.....	2.6	1.1	1.28	1.98	38	118
The year.....	14	.5	1.92	2.97	700	2,150

OLOWALU STREAM NEAR OLOWALU, MAUI.

LOCATION.—About 600 feet above power house of Olowalu Sugar Co., 1 mile north of Olowalu.

RECORDS AVAILABLE.—April 26, 1913, to June 30, 1915.

GAGE.—Vertical staff on right bank, read twice daily.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

CHANNEL AND CONTROL.—One channel at all stages; straight for 100 feet above and below gage; right bank nearly vertical to above high water; left bank is low with gentle slope. Control composed of boulders and gravel; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 2.70 feet, gage height of discharge measurement May 8, 1914 (discharge, 187 million gallons per day, or 289 second-feet); channel frequently dry.

DIVERSIONS.—Water for power house and irrigation diverted $1\frac{1}{2}$ miles above gage; partly measured in tailrace called Olowalu ditch.

REGULATION.—Diversion above station.

UTILIZATION.—Low and medium flow past gage is diverted for irrigation of sugar cane.

ACCURACY.—Estimates poor, control shifts greatly and insufficient measurements were made to develop good rating curves.

Discharge measurements of Olowalu Stream near Olowalu, Maui, during the years ending June 30, 1914 and 1915.

[Made by C. T. Bailey.

Date.	Gage height (feet).	Discharge.		Date.	Gage height (feet).	Discharge.	
		Second-feet.	Million gallons per day.			Second-feet.	Million gallons per day.
1913—Aug. 20.....	0.50	a 0.10	0.05	1914—Aug. 13.....	1.18	46	30
1914—May 8.....	2.70	290	187	Oct. 15.....	.73	9.4	6.1
June 27.....	1.23	28	18				

a Estimated.

Discharge, in million gallons per day, of Olowalu Stream near Olowalu, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	14		0.1			0.8		9.0	4.0	2.5	6.0	12
2.....	7.1		.2			.3		9.0	4.0	2.5	5.0	15
3.....	16				21	.2		7.5	3.5	1.5	9.0	14
4.....	7.1				12	54		3.5	3.5	1.0	12	12
5.....	1.2				4.1	22		3.0	3.5	1.0	7.5	6.0
6.....	4.9				.1	19		2.5		1.5	6.0	6.0
7.....	1.9					12		2.0		1.0	5.0	7.5
8.....	1.6				27	7.8	63	2.5		.8	116	7.5
9.....	1.2				65	6.5	35	2.5		1.0	26	9.0
10.....	1.2				39	4.9	14	2.0		2.5	15	12
11.....	.2				23	4.3	10	2.5		1.0	10	9.0
12.....		18			19	3.6	7.5	2.5		1.0	4.0	19
13.....	12	.3			18	3.2	50	2.5		1.0	3.0	19
14.....		1.7			10	3.6	42	2.5		1.0	3.0	14
15.....		4.7			1.7	.6	15	2.5		1.0	3.0	9.0
16.....		7.1		1.0	.2	.1	17	6.0		1.0	2.5	10
17.....		12		.1	3.4	.1	42	4.0	22	1.0	2.0	19
18.....		2.9	2.6		10	7.8	19	4.0	5.0	.8	12	17
19.....		3.6			26	.2	15	4.0	4.0	2.0	35	63
20.....		50			25	.1	24	4.0	4.0	19	160	35
21.....		8.4			4.9	.1	15	4.0	4.0	26	78	19
22.....		25		4.5	1.6		54	4.0	3.5	19	32	17
23.....		.7		.7	.3		26	4.0	3.5	109	19	14
24.....		.1		.1	1.2		17	4.0	3.5	32	14	14
25.....		.1			18		14	4.0	3.5	19	9.0	58
26.....		.1			32		12	4.0	2.5	14	9.0	54
27.....		.1			12		10	4.0	1.5	10	7.5	29
28.....		.1			4.5		12	4.0	1.5	7.5	32	24
29.....		.1			1.5		9.0		138	6.0	15	19
30.....		.1			2.9		9.0		35	9.0	10	24
31.....		.6							7.5		7.5	
1914-15.												
1.....	38	38	17	10	35	32	7.5	2.5	3.0		2.5	
2.....	35	19	26	17	14	9.0	9.0	2.5	2.5		1.5	
3.....	22	17	24	15	7.5	7.5	7.5	2.5	2.0		1.5	
4.....	24	90	19	24	6.0	7.5	14	2.5	7.5		.8	
5.....	29	35	19	17	5.0	6.0	19	22	3.0		.4	
6.....	19	24	78	15	4.0	5.0	7.5	3.0	2.0		.4	
7.....	15	15	24	14	3.5	4.0	6.0	2.5	2.0		.1	
8.....	19	12	15	14	3.5	3.5	5.0	2.5	14		.1	
9.....	17	10	14	19	3.0	3.5	5.0	2.5	5.0			
10.....	12	38	12	29	3.0	4.0	3.5	15	3.0		.5	
11.....	12	138	12	15	3.0	7.5	17	6.0	2.0		.8	
12.....	14	29	19	12	3.0	10	6.0	14	1.5	.5		
13.....	24	22	32	9.0	3.5	7.5	5.0	10	1.5			
14.....	19	22	73	7.5	4.0	5.0	4.0	4.0	1.5			
15.....	26	17	58	6.0	3.5	4.0	3.5	2.5	1.5			
16.....	26	12	38	7.5	3.0	3.5	3.5	2.5	.8	29		
17.....	17	46	24	6.0	3.0	3.5	3.0	2.0	.8	7.5		
18.....	19	38	29	6.0	3.0	3.0	3.0	1.5	.5	2.5		
19.....	14	26	50	6.0	3.5	3.5	3.0	3.5	.5	1.5		3.0
20.....	10	35	29	5.0	3.5	32	3.0	12	.5	.8		12
21.....	9.0	50	19	5.0	3.0	14	3.0	96	.8	.2		9.0
22.....	22	24	17	5.0	3.0	6.0	3.0	38	.8	1.5		5.0
23.....	12	26	26	5.0	14	5.0	3.0	29	.5	1.5		2.5
24.....	14	26	17	5.0	12	7.5	2.5	15	.8	.8		.5
25.....	78	19	14	4.0	6.0	15	2.5	7.5	.8	5.0		1.5
26.....	123	17	12	4.0	17	58	2.5	5.0	.5	14		2.0
27.....	152	17	10	5.0	130	22	2.5	4.0	.5	26		.8
28.....	116	19	9.0	5.0	68	17	2.5	3.5	.5	19		.8
29.....	96	17	24	5.0	42	12	2.5		.5	7.5		.4
30.....	102	14	17	6.0	17	10	2.5		.5	3.5		.4
31.....	84	24		22		9.0	2.5		.5			

NOTE.—Daily discharge determined from poorly defined rating curves applicable as follows: July 1 to Dec. 31, 1913, and Jan. 1, 1914, to June 30, 1915. Owing to the small number of measurements made, to frequent periods of highwater between measurements and to shifting of the control, estimates are only approximate. Channel dry or practically no flow on days for which discharge is not given.

Monthly discharge of Olowalu Stream near Olowalu, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July	16	0	2.21	3.42	68	210
August	50	0	4.38	6.78	136	417
September	2.6	0	.10	.15	3	9
October	4.5	0	.21	.32	6	20
November	65	0	12.8	19.8	383	1,180
December	54	0	4.88	7.55	151	464
January	63	0	17.4	26.9	540	1,660
February	9.0	2.0	3.93	6.08	110	338
March	138	0	8.31	12.9	258	791
April	109	.8	9.85	15.2	296	907
May	160	2.0	21.8	33.7	675	2,070
June	63	6.0	19.6	30.3	587	1,800
The year	160	0	8.80	13.6	3,210	9,870
1914-15.						
July	152	9.0	39.3	60.8	1,219	3,740
August	138	10	30.2	46.7	936	2,870
September	78	9.0	25.9	40.1	777	2,380
October	29	4.0	10.5	16.2	325	999
November	130	3.0	14.3	22.1	430	1,320
December	58	3.0	10.9	16.9	337	1,040
January	19	2.5	5.29	8.18	164	503
February	96	1.5	11.2	17.3	314	962
March	14	.5	1.99	3.08	62	189
April	29	0	4.03	6.23	121	371
May	2.5	0	.28	.43	9	27
June	12	0	1.26	1.95	38	116
The year	152	0	13.0	20.1	4,730	14,500

LOWALU DITCH¹ NEAR LOWALU, MAUI.

LOCATION.—In flume crossing Olowalu Stream near power house, 1 mile above Olowalu.

RECORDS AVAILABLE.—August 12, 1911, to June 30, 1915.

GAGE.—Vertical staff; read twice daily.

DISCHARGE MEASUREMENTS.—Made in flume.

CHANNEL AND CONTROL.—Straight wooden flume 3 feet wide. Control is earth section at end of flume and fairly permanent. Discharge relation sometimes affected by cleaning of ditch.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 0.85 foot March 10, 1912 (discharge, 13 million gallons per day, or 20 second-feet).

DIVERSIONS.—Diverts from Olowalu Stream.

REGULATION.—Station is in tailrace from power house.

UTILIZATION.—After passing through power house water is used to irrigate sugar cane.

ACCURACY.—Estimates based on fairly well defined rating curves and a reliable gage-height record; fair for all stages.

Discharge measurements of Olowalu ditch near Olowalu, Maui, during the years ending June 30, 1914 and 1915.

[Made by C. T. Bailey.]

Date.	Gage height (feet).	Discharge.	
		Second-feet.	Million gallons per day.
1913—Aug. 20.....	0.49	8.0	5.2
1914—Mar. 16.....	.32	5.0	3.2

¹ Described in Water-Supply Papers 318 (p. 235), 336 (p. 147), and 373 (p. 129) as Olowalu ditch No. 1.

Discharge, in million gallons per day, of Olowalu ditch near Olowalu, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	6.5	3.2	2.9	2.5	2.5	7.1	3.8	3.2	2.6	5.3	3.2	4.5
2.....	6.5	2.9	2.9	2.6	2.6	7.1	3.8	3.8	2.6	5.3	3.2	5.3
3.....	6.5	2.9	2.9	2.6	3.1	7.1	4.5	4.5	2.6	4.5	3.8	5.3
4.....	5.5	2.9	2.9	2.6	3.6	9.7	4.5	4.5	2.6	3.8	3.8	3.8
5.....	5.2	2.9	2.9	2.6	3.1	8.4	3.8	3.8	2.6	3.8	3.2	3.8
6.....	4.8	2.9	2.9	3.2	3.1	7.1	3.8	3.8	3.2	3.8	3.2	3.8
7.....	3.6	2.9	2.9	2.6	3.1	7.1	3.8	3.8	3.2	3.8	3.2	3.8
8.....	3.6	2.9	2.6	3.6	5.2	6.1	6.2	3.8	3.2	3.8	5.3	3.8
9.....	3.6	2.9	2.6	2.8	3.1	4.8	7.2	3.8	3.2	3.2	4.5	3.8
10.....	3.6	3.2	2.6	2.6	3.5	4.4	5.3	3.2	3.2	4.5	3.8	5.3
11.....	3.6	2.9	2.6	2.5	2.5	3.6	4.5	3.8	3.2	3.8	3.8	3.8
12.....	4.5	2.9	2.6	2.5	1.9	3.6	3.8	3.2	2.6	3.2	5.3	4.5
13.....	5.2	2.9	2.6	4.2	2.6	3.2	6.2	3.2	3.8	3.2	5.3	5.3
14.....	5.2	5.2	2.6	5.2	2.6	3.4	5.3	3.8	2.6	3.8	5.3	5.3
15.....	4.5	5.2	2.6	3.4	3.9	3.7	3.8	4.5	2.6	3.2	5.3	3.8
16.....	4.5	5.2	2.6	2.8	6.1	4.8	3.8	3.8	4.5	3.8	5.3	4.5
17.....	3.6	4.8	3.2	2.6	7.1	5.2	6.2	3.8	4.5	3.8	4.5	5.3
18.....	3.6	5.2	5.2	2.6	7.1	7.1	5.3	3.2	3.2	3.8	6.2	5.3
19.....	3.9	5.2	3.9	2.6	7.1	5.2	3.8	3.2	3.2	5.3	7.2	6.2
20.....	4.8	4.8	3.2	2.5	6.1	5.2	6.2	2.6	2.6	6.2	6.2	6.2
21.....	4.5	4.5	2.9	2.5	7.1	5.2	5.3	2.6	2.6	6.2	5.3	5.3
22.....	3.6	4.5	2.9	2.6	7.1	4.4	3.8	2.6	2.6	5.3	3.8	4.5
23.....	3.9	3.9	2.9	4.4	7.1	4.4	3.8	2.6	2.6	7.2	3.8	3.8
24.....	3.9	3.6	2.6	4.8	7.1	3.9	4.5	2.6	2.1	6.2	5.3	3.8
25.....	3.6	3.6	2.6	3.9	8.4	3.6	3.8	2.6	2.1	6.2	4.5	4.5
26.....	3.6	3.2	2.6	3.6	8.4	3.6	3.8	2.6	2.6	5.3	5.3	3.8
27.....	3.6	3.2	2.6	3.4	7.8	3.6	3.8	2.6	3.8	5.3	4.5	3.8
28.....	3.6	2.9	2.6	3.4	7.1	3.6	3.8	2.6	3.8	3.8	6.2	3.2
29.....	3.2	2.9	2.6	3.4	7.1	3.6	3.2	-----	6.2	3.2	5.3	2.6
0.....	2.9	2.9	2.6	3.1	7.1	3.5	3.2	-----	4.5	3.8	4.5	3.2
31.....	2.9	4.5	-----	3.6	-----	3.4	3.2	-----	4.5	-----	3.8	-----
1914-15.												
1.....	4.5	3.2	2.6	3.8	3.8	2.1	1.9	1.9	1.9	2.8	4.2	2.3
2.....	3.8	3.2	3.8	3.8	3.8	2.6	1.5	1.9	2.8	2.8	4.2	2.8
3.....	3.8	2.6	3.2	3.8	3.8	3.2	1.5	1.9	2.8	2.8	4.2	2.8
4.....	5.3	3.8	3.2	3.8	3.2	3.2	2.3	1.9	4.2	2.8	4.2	2.3
5.....	5.3	1.3	3.2	3.8	3.2	3.2	3.5	4.2	4.2	2.8	4.2	2.3
6.....	5.3	2.6	3.2	3.2	2.6	3.2	2.8	2.8	2.8	2.8	4.2	2.3
7.....	4.5	3.8	3.2	3.2	2.6	3.8	2.8	2.8	2.8	2.8	3.5	2.3
8.....	5.3	3.8	2.6	2.6	2.6	3.8	2.8	2.8	4.2	2.8	3.5	2.3
9.....	4.5	3.8	2.1	2.6	2.6	3.8	2.8	2.3	4.2	2.3	3.5	2.3
10.....	3.8	3.8	2.1	3.8	2.6	3.8	2.8	2.8	4.2	2.8	4.2	2.8
11.....	3.8	3.8	2.1	3.2	2.6	3.8	2.8	2.8	4.2	4.2	4.2	2.3
12.....	3.8	3.2	2.6	2.6	2.6	3.8	2.8	3.5	4.2	4.2	2.8	2.3
13.....	5.3	2.6	2.6	3.2	3.8	3.8	2.8	3.5	4.2	4.2	2.8	2.3
14.....	5.3	2.6	3.8	2.6	3.8	3.8	2.8	3.5	4.2	2.8	2.8	4.2
15.....	5.3	2.6	3.8	2.6	3.8	3.8	2.8	3.5	4.2	2.8	2.8	4.2
16.....	5.3	3.8	3.2	3.2	3.8	3.8	2.8	3.5	4.2	4.2	2.3	3.5
17.....	5.3	3.8	3.2	2.6	3.8	3.8	2.8	4.2	3.5	3.5	2.3	3.5
18.....	5.3	3.2	3.2	2.6	3.8	3.8	2.8	3.5	3.5	3.5	2.3	3.5
19.....	5.3	2.6	3.2	2.6	3.8	3.2	2.8	4.2	3.5	3.5	2.8	3.5
20.....	3.8	3.2	3.2	2.1	3.8	4.5	2.8	4.2	2.8	3.5	2.8	3.5
21.....	3.8	3.2	3.2	3.2	3.8	4.5	4.2	3.5	2.8	3.5	2.3	3.5
22.....	3.8	3.2	2.6	3.2	3.8	4.5	4.2	2.8	2.8	4.2	2.3	3.5
23.....	3.8	2.6	3.2	3.2	3.8	4.5	4.2	2.8	2.8	5.0	2.3	4.2
24.....	4.5	2.1	2.1	3.2	3.8	4.5	4.2	4.2	3.5	4.2	2.3	4.2
25.....	4.5	2.6	2.1	3.2	3.8	4.5	4.2	3.5	3.5	5.0	2.3	5.0
26.....	4.5	2.6	3.8	3.2	3.8	2.1	4.2	2.8	2.8	5.0	2.3	5.0
27.....	3.8	2.6	4.5	3.2	3.2	4.5	4.2	2.8	2.8	5.0	2.3	5.0
28.....	3.8	2.6	3.8	3.2	3.8	3.8	2.3	2.3	2.8	5.8	2.3	4.2
29.....	3.8	2.6	3.8	3.8	3.8	3.8	2.3	-----	2.8	5.8	2.3	4.2
30.....	3.8	3.2	3.8	4.5	2.1	3.8	2.3	-----	3.5	5.0	2.3	4.2
31.....	3.8	3.8	-----	4.5	-----	3.2	2.3	-----	3.5	-----	2.3	-----

NOTE.—Discharge determined from rating curves fairly well defined from July 1 to Dec. 31, 1913, Jan. 1 to Dec. 31, 1914, and Jan. 1 to June 30, 1915.

Monthly discharge of Olowalu ditch near Olowalu, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.			Total run-off.		
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	6.5	2.9	4.26	6.59	132	405
August.....	5.2	2.9	3.70	5.72	115	352
September.....	5.2	2.6	2.87	4.44	86	264
October.....	5.2	2.5	3.14	4.86	97	299
November.....	8.4	1.9	5.11	7.91	153	470
December.....	9.7	3.2	5.05	7.81	157	480
January.....	7.2	3.2	4.45	6.89	138	423
February.....	4.5	2.6	3.36	5.20	94	289
March.....	6.2	2.1	3.20	4.95	99	304
April.....	7.2	3.2	4.48	6.98	134	412
May.....	7.2	3.2	4.64	7.18	144	441
June.....	6.2	2.6	4.40	6.81	132	405
The year.....	9.7	1.9	4.06	6.28	1,480	4,540
1914-15.						
July.....	5.3	3.8	4.47	6.92	138	425
August.....	3.8	1.3	3.05	4.72	94	290
September.....	4.5	2.1	3.10	4.80	93	285
October.....	4.5	2.1	3.23	5.00	100	307
November.....	3.8	2.1	3.40	5.26	102	313
December.....	4.5	2.1	3.69	5.77	114	351
January.....	4.2	1.5	2.95	4.56	91	289
February.....	4.2	1.9	3.09	4.78	86	265
March.....	4.2	1.9	3.43	5.31	106	326
April.....	5.8	2.3	3.75	5.80	112	345
May.....	4.2	2.3	3.00	4.64	93	285
June.....	5.0	2.3	3.34	5.17	100	308
The year.....	5.8	1.3	3.88	6.08	1,230	3,790

UKUMEHAME STREAM NEAR OLOWALU, MAUI.

LOCATION.—Half a mile above upper ditch intake, 2 miles above Government road at the 14-mile post, and 4 miles by road and trail east of Olowalu.

RECORDS AVAILABLE.—August 14, 1911, to June 30, 1915.

GAGE.—Vertical staff installed April 23, 1913, half a mile above original inclined staff; read twice daily.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge at gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for 50 feet above and below gage; banks steep and high; very rough stream bed composed of boulders and gravel. Control is of same material but is fairly stable.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 3.40 feet at 3 p. m. August 4, 1914 (discharge, approximately 270 million gallons per day, or 418 second-feet); minimum stage recorded, 0.60 foot October 4-5, 1913 (discharge 2.3 million gallons per day, or 3.6 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Irrigation of sugar cane.

ACCURACY.—Estimates are fair for all stages.

Discharge measurements of Ukumehame Stream near Olowalu, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—Aug. 20	E. O. Christiansen	0.84	6.4	4.1
1914—Mar. 16	C. T. Bailey .....	.80	5.5	3.6
May 5	do.	1.07	7.3	4.7
8	do.	2.10	88	57
8	do.	1.85	61	39
Aug. 11	do.	2.18	95	62
Sept. 11	do.	1.30	18	11
Oct. 15	do.	1.16	14	9.2

Discharge, in million gallons per day, of Ukumehame Stream near Olowalu, Maui, for the years ending June 30, 1913, 1914, and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Apr.	May.	June.	Date.	Apr.	May.	June.	Date.	Apr.	May.	June.
1913.				1913.				1913.			
1.....		5.2	4.8	11.....		4.3	4.8	21.....		6.0	4.3
2.....		5.2	4.8	12.....		6.9	5.2	22.....	8.0	5.2	4.3
3.....		5.2	5.2	13.....		6.0	6.0	23.....	8.0	5.2	4.3
4.....		5.2	5.2	14.....		34	5.2	24.....	8.0	5.2	4.3
5.....		5.2	5.2	15.....		16	4.8	25.....	8.0	5.2	4.3
6.....		5.2	5.2	16.....		11	4.8	26.....	6.9	5.2	4.3
7.....		4.8	5.2	17.....		9.1	4.8	27.....	6.0	5.2	8.0
8.....		4.8	4.8	18.....		8.0	4.8	28.....	6.0	5.2	9.1
9.....		4.8	4.8	19.....		8.0	4.3	29.....	6.0	4.8	8.0
10.....		4.3	4.8	20.....		6.9	4.3	30.....	6.0	4.8	12
								31.....		4.8	

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	11	3.5	3.5	2.9	3.2	3.9	2.6	4.3	2.9	4.8		14
2.....	11	3.5	3.2	2.6	3.2	3.9	2.6	4.3	2.9	3.9	4.8	16
3.....	6.9	3.5	3.2	2.6	6.0	3.2	3.5	4.3	2.9	3.9	4.8	31
4.....	5.2	3.5	3.2	2.3	5.2	43	3.5	3.9	2.9	3.5	5.2	16
5.....	5.2	3.5	3.2	2.3	5.2	9.1	3.2	3.9	2.9	3.5	6.9	6.9
6.....	6.0	3.2	2.9	3.5	3.9	8.0	3.2	3.5	2.9	4.3	12	5.2
7.....	6.0	3.2	2.9	3.2	3.5	14	3.2	3.5	2.9	3.9	14	5.2
8.....	5.2	3.2	2.9	3.2	21	5.2	12	3.5	2.9	3.5	46	4.8
9.....	5.2	3.2	2.9	3.2	37	4.8	16	3.2	2.9	3.2	12	4.8
10.....	5.2	3.2	2.9	2.9	11	4.3	18	3.2	2.9	3.9	8.0	11
11.....	4.8	3.2	2.9	2.9	18	4.3	18	2.9	2.9	3.2	18	5.2
12.....	4.8	24	2.6	2.6	5.2	3.9	28	2.9	2.9	3.2	11	21
13.....	4.8	5.2	2.6	52	4.8	3.5	37	2.9	3.5	3.2	6.9	11
14.....	4.8	4.8	2.3	3.2	4.3	3.5	9.1	2.9	2.9	3.2	5.2	11
15.....	4.3	4.8	2.3	3.2	3.9	3.5	21	2.9	2.9	2.9	5.2	5.2
16.....	4.3	5.2	2.9	2.9	3.5	3.2	9.1	4.3	3.5	2.9	4.8	5.2
17.....	4.3	6.9	2.9	2.9	4.8	3.2	21	3.5	3.2	2.9	4.8	12
18.....	4.3	6.0	4.3	2.9	12	3.2	8.0	3.2	2.9	2.9	12	8.0
19.....	3.9	4.8	3.9	2.9	11	3.2	6.9	2.9	2.9	2.9	16	34
20.....	3.9	4.3	3.5	2.9	5.2	2.9	11	2.9	2.9	8.0	60	26
21.....	3.5	3.9	3.5	2.9	4.8	2.9	6.9	2.9	2.9	40	40	26
22.....	3.5	3.5	3.2	2.9	3.9	2.9	34	2.9	2.9	11	8.0	12
23.....	3.5	3.5	3.2	2.9	3.5	2.9	6.9	2.9	2.9	8.0	16	6.9
24.....	3.5	3.5	3.2	3.2	8.0	2.9	6.0	2.9	2.9	60	24	40
25.....	3.5	3.5	2.9	2.9	28	2.9	8.0	2.9	2.9	8.0	24	40
26.....	3.5	3.5	2.9	2.9	14	2.9	18	2.9	2.9	5.2	26	21
27.....	3.5	3.9	2.9	2.9	6.9	2.9	5.2	2.9	3.5	5.2	31	8.0
28.....	3.5	3.5	2.9	2.9	4.8	2.9	5.2	2.9	3.2	5.2	11	16
29.....	3.5	3.2	2.9	3.2	4.3	2.9	5.2		60	5.2	16	24
30.....	3.5	3.2	2.9	2.9	4.3	2.9	4.8		18	5.2	24	18
31.....	3.5	3.9		2.9		2.9	4.8		21		18	

Discharge, in million gallons per day, of Ukumehame Stream near Olowalu, Maui, for the years ending June 30, 1913, 1914, and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	21	21	24	9.1	6.0	9.1	34	6.0	6.9	5.2	16	4.3
2.....	18	16	28	6.0	12	6.9	21	6.0	6.9	5.2	11	4.3
3.....	12	16	28	6.0	5.2	6.0	12	5.2	6.0	5.2	12	6.9
4.....	14	101	18	11	6.0	5.2	24	5.2	12	5.2	24	5.2
5.....	12	31	12	6.0	5.2	5.2	24	6.0	14	5.2	16	5.2
6.....	11	16	31	11	5.2	5.2	6.9	6.9	12	5.2	12	5.2
7.....	6.9	12	18	11	5.2	5.2	6.0	8.0	24	5.2	6.9	5.2
8.....	9.1	46	11	6.0	5.2	5.2	5.2	6.9	8.0	5.2	5.2	4.8
9.....	12	11	11	6.0	5.2	5.2	5.2	6.0	6.9	5.2	16	4.8
10.....	12	21	12	16	5.2	5.2	5.2	6.0	6.9	5.2	12	4.3
11.....	9.1	63	14	6.0	4.8	4.8	6.0	8.0	6.0	6.9	16	4.3
12.....	12	24	14	6.0	4.8	26	8.0	28	6.0	24	16	4.3
13.....	12	18	70	8.0	5.2	5.2	6.9	9.1	6.0	18	8.0	4.3
14.....	11	12	37	11	5.2	5.2	6.9	6.9	6.0	6.9	5.2	4.3
15.....	16	11	60	9.1	5.2	5.2	6.9	6.9	5.2	5.2	5.2	4.3
16.....	12	11	40	6.9	5.2	4.8	6.9	6.9	5.2	21	5.2	3.9
17.....	9.1	28	28	8.0	4.8	4.3	6.9	26	5.2	11	5.2	3.9
18.....	12	34	31	6.9	4.3	4.3	6.0	8.0	5.2	8.0	5.2	3.5
19.....	9.1	31	37	6.0	4.3	4.3	6.0	8.0	5.2	6.9	5.2	12
20.....	8.0	26	28	6.0	4.3	34	6.0	6.0	5.2	6.9	4.8	16
21.....	6.9	26	21	5.2	3.9	11	6.0	60	5.2	5.2	4.8	6.9
22.....	8.0	31	18	5.2	3.9	6.9	6.0	24	5.2	5.2	5.2	8.0
23.....	16	31	24	5.2	3.5	6.0	6.0	31	6.9	21	16	37
24.....	21	26	16	5.2	18	6.0	6.0	21	11	8.0	5.2	26
25.....	16	14	12	5.2	6.0	28	5.2	12	9.1	6.9		8.0
26.....	49	16	11	5.2	6.9	31	5.2	8.0	6.9	18	4.8	14
27.....	43	14	12	21	14	18	5.2	8.0	6.0	11	4.3	18
28.....	101	16	24	52	49	11	5.2	6.9	5.2	12	4.3	8.0
29.....	101	14	28	26	31	6.9	5.2	.....	5.2	8.0	4.3	5.2
30.....	77	16	18	26	11	6.0	5.2	.....	5.2	24	4.3	6.9
31.....	37	28	.....	16	.....	6.0	6.0	.....	5.2	.....	4.3	.....

NOTE.—Discharge determined from a fairly well defined rating curve.

Monthly discharge of Ukumehame Stream near Olowalu, Maui, for the years ending June 30, 1913, 1914, and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913.						
April 22-30.....	8.0	6.0	6.99	10.8	63	193
May.....	34	4.3	7.00	10.8	217	666
June.....	12	4.3	5.40	8.36	162	497
1913-14.						
July.....	11	3.5	4.83	7.47	150	460
August.....	24	3.2	4.57	7.07	142	435
September.....	4.3	2.3	3.05	4.72	92	281
October.....	5.2	2.3	2.99	4.63	93	284
November.....	37	3.2	8.48	13.1	254	781
December.....	43	2.9	5.35	8.28	166	509
January.....	37	2.6	11.0	17.0	342	1,050
February.....	4.3	2.9	3.29	5.09	92	283
March.....	60	2.9	5.89	9.11	183	560
April.....	60	2.9	7.56	11.7	227	696
May.....	60	4.8	16.2	25.1	501	1,540
June.....	40	4.8	15.5	24.0	465	1,430
The year.....	60	2.3	7.41	11.5	2,710	8,310
1914-15.						
July.....	101	6.9	23.0	36.5	714	2,190
August.....	101	11	25.2	39.0	781	2,400
September.....	70	11	24.5	37.9	736	2,260
October.....	52	5.2	10.8	16.7	334	1,030
November.....	49	3.5	8.52	13.2	266	784
December.....	34	4.3	9.46	14.6	293	900
January.....	34	5.2	8.75	13.5	271	832
February.....	60	5.2	12.4	19.2	347	1,070
March.....	24	5.2	7.42	11.5	230	706
April.....	24	5.2	9.54	14.8	286	878
May.....	24	4.3	8.71	13.5	270	829
June.....	37	3.5	8.30	12.8	249	764
The year.....	101	3.5	13.1	20.3	4,770	14,600

WAIKAPU STREAM NEAR WAIKAPU, MAUI.

LOCATION.—500 feet below intake of Palolo ditch, $1\frac{1}{2}$ miles west of Waikapu, and 5 miles by road southwest of Wailuku.

RECORDS AVAILABLE.—December 1, 1910, to June 30, 1915.

GAGE.—Vertical staff on right bank installed May 10, 1914, at new datum to replace original inclined staff; read twice daily.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—One channel at all stages; straight for 20 feet above and for 100 feet below gage; right bank high and nearly vertical; left bank slopes gently.

Control composed of large boulders; fairly permanent between extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 3.76 feet (old datum) at 9 a. m. May 8, 1914 (discharge, computed from extension of rating curve, approximately 230 million gallons per day, or 360 second-feet); minimum stage recorded, 0.25 foot (old datum) February 26 to March 4, 1914 (discharge, 0.1 million gallons per day, or 0.15 second-foot).

DIVERSIONS.—Nearly all low-water flow is diverted above station by South Side Waikapu ditch and Palolo ditch.

REGULATION.—Natural flow has been increased by development tunnels near the headwaters.

UTILIZATION.—Flow at low and medium stages is diverted for irrigation of sugar cane.

ACCURACY.—Estimates July 1, 1913, to May 10, 1914, fair for low stages but approximate only for medium and high stages owing to lack of discharge measurements; estimates May 11, 1914, to June 30, 1915, fair for all stages.

Discharge measurements of Waikapu Stream near Waikapu, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Feb. 27	G. R. White.....	^a 0.38	0.3	0.2
Apr. 21	C. T. Bailey.....	^b 1.80	8.8	5.7
Apr. 27	do.....	^b 2.05	26	17
May 11	do.....	^b 1.30	.55	.35
May 28	do.....	1.33	1.8	1.2
June 13	do.....	2.14	28	18
June 13	do.....	1.68	7.9	5.1
July 2	do.....	2.58	64	41
July 2	do.....	2.25	31	20
Sept. 3	do.....	2.07	24	15
Oct. 8	do.....	1.90	16	10
Oct. 8	do.....	1.78	9.2	6.0
1915—Feb. 11	do.....	1.56	5.2	3.3

^a Old gage datum.

^b Referred to gage installed May 11, 1914.

Discharge, in million gallons per day, of Waikapu Stream near Waikapu, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	3.9	0.2	0.1	0.2	0.1	0.1	0.2	0.6	0.1	0.5	0.2	26
2.....	1.9	.2	.1	.2	.1	.1	.2	.5	.1	.6	.3	13
3.....	.2	.2	.1	.2	1.0	.1	.3	.5	.1	.5	.3	7.1
4.....	.1	.2	.1	.2	.1	115	.3	.5	.1	.2	5.8	4.4
5.....	.1	.2	.1	.2	.1	44	.3	.3	.2	.2	.5	3.6
6.....	.2	.2	.1	.2	.1	34	.2	.2	.2	40	.3	3.6
7.....	.2	.2	.2	.2	.1	26	.2	.1	.2	13	2.6	4.4
8.....	.1	.2	.1	.2	95	16	16	.1	.2	1.3	220	2.9
9.....	.1	.2	.1	.1	55	5.8	11	.3	.2	1.0	18	2.3
10.....	.1	.6	.1	.1	5.8	3.2	1.3	.2	.2	2.6	4.8	7.1
11.....	.1	.1	.1	.1	.5	1.3	1.0	.2	.2	.6	.3	2.9
12.....	.3	16	.1	.1	.2	9.7	23	.1	.2	.3	1.0	24
13.....	.2	.6	.2	.1	.2	3.9	13	.1	.2	.6	1.8	21
14.....	.2	.1	.1	.1	.1	3.9	1.3	.1	.2	1.3	.6	7.1
15.....	.1	.2	.1	.1	.1	2.6	.6	.1	.2	.5	.5	2.9
16.....	.2	34	.1	.1	.1	1.3	.6	.2	.2	.3	.3	2.9
17.....	.2	1.0	.1	.1	.2	1.3	47	.2	.3	.3	.6	7.1
18.....	.2	.2	.5	.1	3.2	1.9	1.9	.1	.2	.2	52	2.9
19.....	.2	.1	.2	.1	11	1.0	1.0	.1	.2	1.0	31	21
20.....	.2	.1	.1	.1	.1	.6	11	.1	.2	13	94	9.7
21.....	.2	.1	.1	.1	.1	.5	1.3	.1	.2	13	37	5.2
22.....	.2	.2	.1	.1	.1	.3	40	.1	.2	3.9	11	3.6
23.....	.2	.1	.1	.1	.2	.3	3.2	.1	.2	68	4.4	2.3
24.....	.2	.1	.1	.1	.1	.3	.6	.1	.2	9.7	2.9	1.3
25.....	.2	.2	.1	.1	.2	.3	.5	.1	.2	1.3	2.9	49
26.....	.2	.2	.1	.1	5.8	.2	.5	.1	.2	.6	15	9.7
27.....	.2	.2	.1	.1	.2	.2	.5	.1	.3	.5	6.2	8.4
28.....	.2	.2	.1	.3	.1	.2	.6	.1	.2	.3	19	6.2
29.....	.2	.2	.1	.6	.1	.2	.6	140	.2	.2	8.4	3.6
30.....	.2	.2	.1	.1	.2	.2	.6	3.9	.2	.2	5.2	3.6
31.....	.2	3.9	.....	.1	.....	.2	.6	.....	.5	.....	2.3	.....
1914-15.												
1.....	15	7.1	9.7	6.2	94	6.2	3.6	1.0	1.8	1.0	1.8	1.0
2.....	21	4.4	28	13	8.4	5.2	5.2	1.0	1.3	1.0	1.3	1.0
3.....	5.2	4.4	15	9.7	6.2	3.6	3.6	1.0	1.8	1.0	1.3	1.0
4.....	8.4	94	11	9.7	4.4	2.9	17	1.0	5.2	1.0	1.3	1.0
5.....	17	13	26	13	3.6	2.9	13	13	2.3	1.0	1.3	1.0
6.....	19	7.1	26	8.4	3.6	2.3	5.2	1.8	1.8	1.0	1.3	1.0
7.....	8.4	6.2	13	8.4	2.9	2.9	3.6	8.4	2.3	1.0	1.0	1.0
8.....	19	3.6	9.7	7.1	2.9	2.9	3.6	2.3	7.1	1.0	1.0	1.0
9.....	8.4	1.8	6.2	63	2.9	3.6	3.6	1.3	4.4	1.0	1.0	.65
10.....	4.4	19	7.1	15	2.3	3.6	3.6	21	2.3	2.3	3.6	1.0
11.....	1.8	70	5.2	7.1	2.3	5.2	9.7	5.2	2.3	9.7	1.3	.65
12.....	21	9.7	7.1	7.1	1.8	6.2	4.4	34	1.8	2.9	1.0	1.0
13.....	26	21	6.2	7.1	2.3	5.2	3.6	19	2.9	1.8	1.0	1.0
14.....	8.4	24	40	6.2	3.6	8.4	2.9	4.4	2.3	1.0	1.0	1.0
15.....	24	15	43	6.2	8.4	3.6	2.9	2.3	3.6	1.3	1.0	1.0
16.....	8.4	9.7	26	13	3.6	2.9	2.9	1.8	2.9	66	1.0	1.0
17.....	3.6	40	11	3.6	3.6	2.3	2.3	2.3	2.3	13	1.0	1.0
18.....	13	26	37	4.4	2.3	2.3	1.8	1.8	1.8	8.4	1.0	1.0
19.....	5.2	8.4	56	3.6	3.6	3.6	1.8	2.9	1.8	8.4	1.0	9.7
20.....	5.2	7.1	11	3.6	7.1	31	1.8	3.6	1.8	3.6	1.0	15
21.....	1.3	17	9.7	6.2	9.7	8.4	3.6	98	1.8	1.3	1.0	1.8
22.....	6.2	6.2	9.7	4.4	7.1	6.2	1.8	9.7	1.8	3.6	1.8	2.3
23.....	7.1	13	21	3.6	8.4	5.2	1.8	15	2.3	2.3	1.0	1.8
24.....	7.1	17	8.4	3.6	34	3.6	1.3	6.2	4.4	1.8	1.0	1.3
25.....	9.7	8.4	9.7	3.6	9.7	8.4	1.3	4.4	2.3	1.8	1.0	1.8
26.....	40	7.1	9.7	3.6	6.2	21	1.3	2.9	1.8	40	1.0	3.6
27.....	37	7.1	8.4	3.6	13	6.2	1.0	2.3	1.8	24	1.0	2.3
28.....	34	17	8.4	11	31	17	1.0	1.8	1.8	9.7	.65	1.0
29.....	26	9.7	13	11	17	6.2	1.0	.....	1.0	5.2	1.0	1.0
30.....	19	7.1	9.7	9.7	8.4	5.2	1.0	.....	1.0	2.3	1.0	1.3
31.....	11	19	.....	26	.....	4.4	1.0	.....	1.0	.....	1.0	.....

NOTE.—Discharge determined from rating curves applicable as follows: July 1, 1913, to May 10, 1914, fairly well defined below 1 million gallons per day (1.5 second-feet); May 11, 1914, to June 30, 1915, fairly well defined below 60 million gallons per day (93 second-feet).

Monthly discharge of Waikapu Stream near Waikapu, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	3.9	0.1	0.36	0.56	11	34
August.....	34	.1	1.95	3.02	60	186
September.....	.5	.1	.12	.19	4	11
October.....	.6	.1	.15	.23	5	14
November.....	95	.1	6.01	9.30	180	553
December.....	115	.1	8.86	13.7	275	843
January.....	47	.2	5.95	9.21	184	566
February.....	.6	.1	.19	.29	5	16
March.....	140	.1	4.83	7.47	150	460
April.....	68	.2	5.86	9.07	176	540
May.....	220	.2	17.7	27.4	549	1,680
June.....	49	1.3	8.96	13.9	269	825
The year.....	220	.1	5.12	7.92	1,870	5,730
1914-15.						
July.....	40	1.3	14.2	22.0	441	1,350
August.....	94	1.8	16.8	26.0	520	1,600
September.....	56	5.2	16.7	25.8	502	1,540
October.....	63	3.6	9.73	15.1	302	926
November.....	94	1.8	10.5	16.2	314	967
December.....	31	2.3	6.41	9.92	199	610
January.....	17	1.0	3.62	5.60	112	344
February.....	98	1.0	9.62	14.9	269	827
March.....	7.1	1.0	2.41	3.73	75	229
April.....	66	1.0	7.31	11.3	219	673
May.....	3.6	.65	1.18	1.83	37	112
June.....	15	.65	2.01	3.11	60	185
The year.....	98	.65	8.36	12.9	3,050	9,360

PALOLO DITCH NEAR WAIKAPU, MAUI.

LOCATION.—200 feet below intake, $1\frac{1}{2}$ miles west of Waikapu, and $5\frac{1}{2}$ miles by road southwest of Wailuku.

RECORDS AVAILABLE.—November 21, 1910, to June 30, 1915.

GAGE.—Vertical staff on left bank; read twice daily.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel is cut in earth and soft rock; straight for 50 feet above and below gage; clean and usually free from vegetation. Control, a small wooden culvert 1 foot below gage; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 1.33 feet at 2 p. m. December 7, 1913 (discharge, 4.7 million gallons per day, or 7.3 second-feet); ditch occasionally dry.

DIVERSIONS.—None above station.

REGULATION.—Water may be turned out of ditch by gates.

UTILIZATION.—Irrigation of sugar cane and taro.

ACCURACY.—Estimates based on well-defined rating curve and reliable gage heights; good for all stages.

Discharge measurements of Palolo ditch near Waikapu, Maui, during the years ending June 30, 1914 and 1915.

[Made by C. T. Bailey.]

Date.	Gage height (feet).	Discharge.		Date.	Gage height (feet).	Discharge.	
		Second-foot.	Million gallons per day.			Second-foot.	Million gallons per day.
1913—July 29.....	0.80	2.2	1.4	1914—Oct. 8.....	0.93	3.6	2.3
1914—Feb. 27.....	.84	2.6	1.7	1915—Feb. 11.....	1.15	5.5	3.5
Apr. 21.....	.92	3.6	2.3				

Discharge, in million gallons per day, of Palolo ditch near Waikapu, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	2.1	1.6	1.6	1.3	1.6	1.6	1.6	2.7	1.8	1.8	1.8	1.6
2.....	2.4	1.6	1.6	1.3	1.6	1.6	1.6	3.0	1.8	2.1	1.8	1.6
3.....	2.1	1.6	1.6	1.3	2.4	1.6	1.8	2.7	1.8	1.8	2.1	1.6
4.....	1.8	1.6	1.6	1.6	1.8	2.4	1.8	3.0	1.8	.7	2.4	1.6
5.....	1.6	1.6	1.6	1.3	1.6	1.8	1.8	3.0	1.6	1.0	2.1	1.6
6.....	1.8	1.6	1.6	1.6	1.6	1.8	1.8	2.4	1.6	2.7	2.1	1.3
7.....	2.1	1.6	1.8	1.6	1.6	4.5	1.6	1.8	1.6	1.8	2.7	1.6
8.....	1.6	1.3	1.6	1.6	3.9	4.5	2.1	1.8	1.6	1.6	3.0	1.6
9.....	1.6	1.6	1.6	1.3	2.7	1.8	2.1	3.6	1.0	1.6	2.1	1.6
10.....	1.6	2.7	1.6	1.6	1.8	2.4	3.6	3.0	1.0	1.8	2.1	1.6
11.....	1.6	1.6	1.6	1.6	1.8	.5	3.6	3.0	1.0	1.6	2.1	1.6
12.....	2.4	2.7	1.6	1.6	1.8	1.3	3.6	3.0	1.0	1.6	2.1	1.8
13.....	2.1	2.4	1.6	1.6	1.8	1.0	3.6	2.4	1.3	1.8	2.4	1.8
14.....	1.8	1.6	1.6	1.6	1.6	1.3	3.0	1.8	1.0	1.8	2.1	1.8
15.....	1.6	1.8	1.6	1.6	1.6	1.0	2.7	1.8	1.0	1.6	2.1	1.8
16.....	1.6	3.0	1.6	1.6	1.6	1.0	3.0	2.1	1.3	1.6	2.1	1.8
17.....	1.6	2.4	1.6	1.6	1.8	1.0	3.3	1.8	1.0	1.8	2.1	1.8
18.....	1.6	1.8	1.8	1.6	2.1	1.0	2.7	1.8	1.0	1.6	2.7	1.8
19.....	1.6	1.6	1.6	1.6	2.1	1.3	2.1	1.8	1.0	1.8	1.8	1.8
20.....	1.8	1.6	1.6	1.6	1.8	1.6	2.4	1.6	1.0	1.8	.7	1.8
21.....	1.6	1.6	1.6	1.6	1.6	1.6	2.4	1.6	.7	2.1	1.3	2.1
22.....	1.6	1.6	1.6	1.3	1.6	1.6	2.4	1.6	.7	1.8	1.6	2.1
23.....	1.6	1.6	1.6	1.3	1.6	1.6	2.4	1.8	.7	2.7	1.6	2.1
24.....	1.6	1.6	1.6	1.3	1.6	1.6	2.4	1.8	1.0	2.1	1.6	2.1
25.....	1.6	1.6	1.6	1.6	1.8	1.6	2.4	1.8	.7	1.8	1.3	2.4
26.....	1.6	1.6	1.3	1.6	2.4	1.6	2.4	1.8	.7	1.8	1.6	2.4
27.....	1.6	1.8	1.3	1.6	1.8	1.6	2.7	1.8	1.0	1.8	1.6	2.4
28.....	1.6	1.6	1.3	1.8	1.6	1.6	3.0	1.8	.7	1.6	1.6	2.4
29.....	1.6	1.6	1.3	2.1	1.6	1.6	2.7	-----	.1	1.8	1.6	2.4
30.....	1.6	1.6	1.3	1.6	1.8	1.6	2.7	-----	.7	1.8	1.6	2.7
31.....	1.6	3.0	-----	1.6	-----	1.6	3.0	-----	1.8	-----	1.6	-----
1914-15.												
1.....	2.4	2.4	2.1	2.7	2.7	1.8	1.3	3.0	2.1	3.0	2.7	3.0
2.....	2.4	2.4	2.1	2.7	2.4	1.8	1.8	3.0	2.1	3.0	2.7	3.0
3.....	2.4	2.4	2.1	2.7	2.4	1.8	1.8	3.0	2.1	3.0	2.7	3.0
4.....	2.4	2.7	-----	2.7	2.1	1.8	1.8	3.0	2.1	3.0	3.0	3.0
5.....	2.4	2.1	-----	2.4	2.1	1.8	1.8	3.3	2.1	3.0	3.0	2.7
6.....	2.4	1.6	2.1	2.4	2.1	1.8	1.8	3.0	2.1	3.0	3.0	3.0
7.....	2.4	1.6	2.4	2.4	2.1	2.1	1.8	3.0	2.1	3.0	3.0	2.7
8.....	2.4	1.6	1.6	2.7	2.1	2.1	1.8	3.0	2.1	3.0	3.0	3.0
9.....	2.4	1.6	1.8	2.7	2.1	2.1	1.8	3.0	2.1	3.0	3.0	3.0
10.....	2.4	2.1	2.1	2.4	2.1	2.1	1.8	3.3	2.1	3.0	3.0	3.0
11.....	2.4	1.8	2.1	2.4	2.1	2.1	1.8	3.3	2.1	3.0	3.0	3.0
12.....	2.4	2.1	2.1	2.4	2.1	2.4	1.8	3.3	2.1	3.0	3.0	3.0
13.....	2.4	2.4	2.1	2.1	2.4	2.4	1.8	3.3	2.1	3.0	3.0	3.0
14.....	2.4	2.4	2.1	2.1	2.4	2.1	1.8	3.3	2.1	3.0	3.0	2.7
15.....	2.4	2.4	1.8	2.4	2.4	2.1	1.8	3.0	2.1	3.3	3.0	2.7
16.....	2.4	2.4	2.4	2.1	2.4	2.1	1.8	3.0	2.1	2.7	3.0	2.7
17.....	2.7	2.4	2.4	2.1	2.4	2.1	1.8	3.0	2.1	3.0	3.0	3.0
18.....	2.7	2.4	2.4	2.1	2.4	2.1	1.8	3.0	2.1	3.0	3.0	3.0
19.....	2.7	2.4	2.4	2.1	2.4	2.1	1.8	3.0	2.1	3.0	3.0	3.0
20.....	2.7	2.4	2.7	2.1	2.4	2.1	1.8	3.0	2.1	2.7	3.0	3.0
21.....	2.4	2.4	2.7	2.1	2.4	2.1	1.8	3.6	2.1	2.7	3.0	3.0
22.....	2.4	2.4	2.7	2.1	2.7	1.6	1.8	2.4	2.1	2.7	3.0	3.0
23.....	2.4	2.4	2.1	2.1	2.7	1.0	1.8	2.1	2.1	2.7	3.0	3.0
24.....	2.4	2.4	2.7	2.1	3.0	1.0	1.8	2.1	2.1	2.7	3.0	3.0
25.....	2.4	2.1	2.4	2.1	2.1	1.3	1.8	2.1	2.1	2.7	3.0	3.0
26.....	2.7	2.1	2.4	2.1	1.6	1.8	2.1	2.1	2.1	2.7	2.7	3.0
27.....	2.4	2.1	2.4	2.1	1.8	2.4	2.4	2.4	2.1	2.7	3.0	3.0
28.....	2.4	2.1	2.4	2.1	2.4	2.4	2.4	2.1	2.1	2.7	3.0	2.4
29.....	2.4	2.1	2.7	2.1	2.1	1.6	3.0	-----	3.0	2.7	3.0	2.1
30.....	2.4	2.1	2.7	2.1	2.1	1.3	3.0	-----	3.0	2.7	3.0	2.4
31.....	2.4	2.1	-----	2.4	-----	1.3	3.0	-----	3.0	-----	3.0	-----

NOTE.—Discharge determined from a well-defined rating curve. Ditch dry Sept. 4-5, 1914.

Monthly discharge of Palolo ditch near Waikapu, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	2.4	1.6	1.74	2.69	54	166
August.....	3.0	1.3	1.82	2.82	56	173
September.....	1.8	1.3	1.56	2.41	47	144
October.....	2.1	1.3	1.55	2.40	48	147
November.....	3.9	1.6	1.87	2.89	56	172
December.....	4.5	.5	1.70	2.63	53	162
January.....	3.6	1.6	2.53	3.91	78	241
February.....	3.6	1.6	2.22	3.43	62	191
March.....	1.8	.1	1.13	1.75	35	108
April.....	2.7	.7	1.77	2.74	53	163
May.....	3.0	.7	1.92	2.97	59	183
June.....	2.7	1.3	1.89	2.92	57	174
The year.....	4.5	.1	1.80	2.78	658	2,020
1914-15.						
July.....	2.7	2.4	2.45	3.79	76	233
August.....	2.7	1.6	2.19	3.39	68	208
September 1-3, 6-30.....	2.7	1.6	2.29	3.54	64	197
October.....	2.7	2.1	2.29	3.54	71	218
November.....	3.0	1.6	2.28	3.53	68	210
December.....	2.4	1.0	1.89	2.92	59	180
January.....	3.0	1.3	1.95	3.02	60	186
February.....	3.6	2.1	2.88	4.46	81	247
March.....	3.0	2.1	2.19	3.39	68	208
April.....	3.3	2.7	2.89	4.47	87	266
May.....	3.0	2.7	2.96	4.58	92	282
June.....	3.0	2.1	2.88	4.46	86	265
The period (363 days).....	3.6	1.0	2.42	3.74	880	2,700

SOUTH SIDE WAIKAPU DITCH NEAR WAIKAPU, MAUI.

LOCATION.—One mile below intake, $1\frac{1}{2}$ miles west of Waikapu, and about $5\frac{1}{2}$ miles by road southwest of Wailuku.

RECORDS AVAILABLE.—November 21, 1910, to June 30, 1915.

GAGE.—Vertical staff on right bank; read twice daily.

DISCHARGE MEASUREMENTS.—Made from plank over ditch 400 feet below gage.

CHANNEL AND CONTROL.—Channel is cut in earth and soft rock; section fairly uniform; banks vertical. Control not well defined but fairly permanent between times of cleaning ditch.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 1.25 feet at 9 a. m. May 8, 1914 (discharge, 16 million gallons per day, or 25 second-feet); ditch occasionally dry.

DIVERSIONS.—None above station.

REGULATION.—Practically none.

UTILIZATION.—Irrigation of sugar cane.

ACCURACY.—Estimates based on two well-defined rating curves and reliable gage-height record, good for all stages.

Discharge measurements of South Side Waikapu ditch near Waikapu, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1913—July 29	C. T. Bailey.....	0.60	3.8	2.4
Nov. 5	.....do.....	.66	4.9	3.1
1914—Feb. 27	G. R. White.....	.36	4.3	2.8
Apr. 21	C. T. Bailey.....	.93	15	9.6
27	.....do.....	.53	7.7	5.0
May 11	.....do.....	.62	9.6	6.2
June 13	.....do.....	1.18	24	15
Oct. 28	.....do.....	.71	11	7.2
Dec. 22	.....do.....	.63	11	7.0

Discharge, in million gallons per day, of South Side Waikapu ditch near Waikapu, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	5.8	2.7	3.7	2.3	1.8	3.7	1.8	1.8	3.2	5.8	3.2	9.7
2.....	5.8	3.2	3.7	2.3	1.8	3.7	1.8	1.4	3.2	6.4	3.9	9.0
3.....	4.7	2.7	3.7	1.8	7.0	3.7	2.7	1.0	3.2	4.5	4.5	7.1
4.....	4.2	2.7	3.7	2.3	5.8	9.4	3.2	1.8	2.7	4.5	7.1	7.1
5.....	3.7	2.7	3.7	1.8	3.7	5.3	2.3	1.8	2.7	3.9	5.2	7.1
6.....	3.7	2.7	3.2	2.3	2.7	3.7	2.3	1.8	2.7	9.0	4.5	7.1
7.....	4.2	2.7	3.7	2.3	2.3	2.7	2.3	1.8	3.2	7.8	6.4	7.1
8.....	3.7	2.3	2.7	2.7	11	2.7	7.0	1.4	2.7	6.4	16	7.1
9.....	3.2	2.7	2.7	2.3	10	1.0	6.4	2.3	2.7	3.2	9.0	7.1
10.....	2.7	4.7	2.7	1.8	7.0	4.7	2.3	2.3	3.2	5.8	7.8	8.4
11.....	2.7	2.7	2.7	1.8	5.3	4.2	2.3	2.3	2.7	3.2	5.8	7.1
12.....	4.7	7.0	2.7	1.8	4.7	4.0	5.3	2.7	2.7	3.2	5.2	13
13.....	4.2	5.8	3.2	2.7	4.7	3.8	5.3	3.9	4.5	3.2	6.4	12
14.....	3.7	3.7	2.7	1.8	3.7	3.7	2.7	3.2	3.2	4.5	5.2	9.0
15.....	3.7	4.2	2.3	1.8	3.2	2.7	2.7	3.2	2.7	4.5	5.2	8.4
16.....	3.2	6.4	2.7	1.8	4.2	2.7	2.7	4.5	3.9	3.2	4.5	7.8
17.....	3.2	5.3	2.7	1.8	4.7	3.2	6.4	3.9	7.1	3.2	5.8	9.0
18.....	3.2	4.2	4.7	1.8	7.0	3.2	3.2	3.2	3.2	3.2	12	8.4
19.....	3.2	3.2	3.2	1.8	8.8	2.7	2.3	3.2	3.2	5.8	11	13
20.....	3.7	3.7	2.7	1.8	5.3	2.7	4.7	3.2	3.2	8.4	14	9.0
21.....	3.2	3.7	2.7	1.8	4.7	2.3	2.7	3.2	3.2	9.0	11	8.4
22.....	2.7	3.2	2.7	1.8	3.7	1.8	7.0	3.2	3.2	7.1	8.4	7.8
23.....	3.2	3.2	2.7	1.8	4.2	1.8	3.7	3.2	3.2	14	7.8	7.1
24.....	3.2	3.2	2.3	1.8	5.3	1.8	2.7	3.2	3.2	9.0	7.1	6.4
25.....	3.7	3.7	2.3	1.8	5.8	1.8	2.3	3.2	3.2	7.1	7.1	14
26.....	3.2	3.2	2.3	1.8	8.2	1.8	1.8	3.2	3.2	5.8	8.4	9.0
27.....	2.7	4.2	2.3	1.8	5.3	1.8	1.8	3.2	4.5	5.2	7.1	9.0
28.....	2.7	3.7	2.3	1.8	4.2	1.8	1.8	3.2	3.2	4.5	8.4	9.0
29.....	2.7	3.7	2.3	1.8	3.7	1.8	1.8	.....	12	3.9	7.1	7.8
30.....	2.7	3.7	2.3	1.8	5.3	1.8	1.8	.....	7.1	3.9	6.4	7.8
31.....	2.7	6.4	.....	1.8	.....	1.8	2.3	.....	5.2	.....	6.4	.....

Discharge, in million gallons per day, of South Side Waikapu ditch near Waikapu, Maui, for the years ending June 30, 1914 and 1915—Continued.

Date.	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.	12	8.4	9.0	7.1	15	5.8	6.4	4.5	5.8	5.2	7.1	3.9
2.	12	7.8	12	8.4	8.4	5.8	6.4	4.5	5.8	5.2	6.4	4.5
3.	9.0	8.4	8.4	7.8	7.8	6.4	5.8	4.5	5.8	5.8	6.4	5.2
4.	9.7	15	8.4	7.8	7.1	6.4	8.4	3.9	7.1	5.2	6.4	4.5
5.	9.7	7.8	8.4	8.4	7.1	6.4	8.4	7.1	5.8	5.2	6.4	4.5
6.	12	7.8	13	7.8	7.1	5.8	6.4	4.5	5.8	6.4	5.8	3.9
7.	9.7	7.8	8.4	7.8	7.1	5.8	5.8	7.1	5.8	5.8	5.8	3.9
8.	11	7.1	7.8	7.1	6.4	5.8	5.8	4.5	7.8	5.2	5.8	4.5
9.	8.4	7.1	7.1	13	6.4	5.8	5.8	5.2	6.4	5.8	5.8	4.5
10.	8.4	9.7	7.1	9.7	6.4	5.8	5.8	8.4	6.4	6.4	7.8	4.5
11.	7.8	15	6.4	7.8	5.8	7.1	7.8	7.1	5.8	8.4	5.8	4.5
12.	9.7	9.0	7.1	7.8	5.8	7.8	6.4	9.0	5.8	8.4	5.2	3.9
13.	12	11	7.1	6.4	6.4	7.1	5.8	8.4	5.8	7.8	5.8	3.9
14.	9.7	11	11	6.4	7.8	7.1	5.8	6.4	5.8	5.8	5.2	4.5
15.	9.7	9.7	12	6.4	7.8	6.4	5.2	6.4	7.1	6.4	5.2	4.5
16.	12	9.0	9.7	7.8	7.1	6.4	5.2	6.4	6.4	14	5.2	4.5
17.	9.7	13	8.4	7.8	7.1	5.8	5.2	6.4	5.8	9.0	5.2	5.8
18.	8.4	11	12	8.4	5.8	5.2	5.2	5.8	5.8	9.0	5.2	5.2
19.	9.0	8.4	14	7.8	7.1	6.4	5.2	6.4	5.8	9.0	5.2	8.4
20.	7.8	8.4	8.4	7.8	6.4	7.8	5.2	7.1	5.2	7.8	4.5	8.4
21.	8.4	9.7	7.8	8.4	-----	6.4	6.4	11	5.2	7.1	4.5	7.1
22.	9.0	9.0	7.8	7.8	-----	6.4	5.8	7.8	5.2	8.4	6.4	7.1
23.	9.0	9.0	8.4	7.8	-----	6.4	5.2	8.4	5.2	7.8	4.5	5.8
24.	9.7	9.7	7.1	7.8	9.7	6.4	4.5	7.1	7.1	7.8	4.5	6.4
25.	9.7	8.4	7.1	7.1	6.4	7.1	4.5	7.1	5.8	7.1	4.5	6.4
26.	14	8.4	7.1	7.1	5.8	9.0	4.5	6.4	5.8	11	4.5	7.1
27.	14	8.4	6.4	7.1	6.4	7.1	4.5	5.8	5.8	9.7	4.5	6.4
28.	14	11	7.8	7.8	8.4	7.8	4.5	5.8	5.2	8.4	4.5	5.4
29.	13	8.4	8.4	8.4	7.1	7.1	4.5	-----	5.2	8.4	4.5	5.8
30.	12	8.4	7.8	8.4	5.8	6.4	4.5	-----	5.2	7.8	3.9	5.8
31.	9.7	9.7	-----	9.7	-----	6.4	4.5	-----	5.8	-----	4.5	-----

NOTE.—Discharge determined from well-defined rating curves applicable July 1, 1913, to Feb. 8, 1914, and Feb. 9, 1914, to June 30, 1915. Ditch dry Nov. 21-23, 1914.

Monthly discharge of South Side Waikapu ditch near Waikapu, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.			Total run-off.	
	Million gallons per day.			Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.		
1913-14.					
July.	5.8	2.7	3.55	5.49	110
August.	7.0	2.3	3.78	5.85	117
September.	4.7	2.3	2.91	4.50	87
October.	2.7	1.8	1.95	3.02	61
November.	11	1.8	5.17	8.00	155
December.	9.4	1.0	3.03	4.69	94
January.	7.0	1.8	3.21	4.97	99
February.	4.5	1.0	2.72	4.21	76
March.	12	2.7	3.78	5.85	117
April.	14	3.2	5.64	8.73	169
May.	16	3.2	7.35	11.4	228
June.	14	6.4	8.66	13.4	260
The year.	16	1.0	4.31	6.67	1,570
1914-15.					
July.	14	7.8	10.3	15.9	320
August.	15	7.1	9.44	14.6	292
September.	14	6.4	8.71	13.5	261
October.	13	6.4	7.99	12.3	247
November 1-20, 24-30.	15	5.8	7.24	11.2	196
December.	9.0	5.2	6.66	10.2	203
January.	8.4	4.5	5.96	8.76	175
February.	11	3.9	6.54	10.1	183
March.	7.8	5.2	5.91	9.14	183
April.	14	5.2	7.51	11.6	225
May.	7.1	3.9	5.39	8.34	167
June.	8.4	3.9	5.33	8.25	160
The period (362 days).	15	3.9	7.22	11.2	2,610
					8,020

HANAWI STREAM NEAR NAHIKU, MAUI.

LOCATION.—200 feet above Koolau ditch crossing and trail bridge, 2 miles southwest of Nahiku post office and 6½ miles east of Upper Keanae.

RECORDS AVAILABLE.—January 9, 1914, to June 30, 1915.

GAGE.—Stevens water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge 100 feet above gage.

CHANNEL AND CONTROL.—Channel at gage is a pool with nearly vertical rock walls.

Control is rock ledge; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded: 7.5 feet at 7 p. m. December 4, 1914 (discharge, computed from extension of the rating curve, approximately 1,100 million gallons per day, or 1,700 second-feet); minimum stage recorded, 0.8 foot February 3 to March 12, 1914 (discharge, 1.8 million gallons per day, or 2.8 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Normal flow is diverted into Koolau ditch for irrigation of sugar cane.

ACCURACY.—Estimates based on a well-defined rating curve and a continuous gage-height record; good for all stages, with the possible exception of period February 4 to March 12, 1914, for which accuracy of gage heights is somewhat doubtful.

Discharge measurements of Hanawi Stream near Nahiku, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Mar. 12	G. R. White.....	0.78	2.7	1.7
Apr. 16	C. T. Bailey.....	1.08	6.4	4.2
June 17	.....do.....	1.56	18	12
July 25	.....do.....	2.81	78	50
26	.....do.....	3.65	212	137
Aug. 23	.....do.....	2.19	45	29
Sept. 28	.....do.....	2.20	39	25
1915—June 17	H. A. R. Austin.....	1.54	20	13

Discharge, in million gallons per day, of Hanawi Stream near Nahiku, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	Date.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914.													
1.....		12	1.8	3.8	8.9	39	16.....	12	1.8	1.8	4.4	16	11
2.....		2.8	1.8	3.3	11	22	17.....	20	1.8	3.3	4.4	39	16
3.....		1.8	1.8	3.8	20	16	18.....	7.2	1.8	1.8	3.8	216	17
4.....		1.8	1.8	2.8	85	13	19.....	5.8	1.8	1.8	22	26	35
5.....		1.8	1.8	5.8	35	11	20.....	5.8	1.8	1.8	29	45	18
6.....		1.8	1.8	18	26	12	21.....	5.8	1.8	1.8	43	14	13
7.....		1.8	1.8	12	37	11	22.....	24	1.8	1.8	25	19	19
8.....		1.8	1.8	5.8	144	9.8	23.....	7.2	1.8	3.3	136	16	13
9.....	76	1.8	1.8	3.3	30	18	24.....	6.5	1.8	14	29	14	15
10.....	8.9	1.8	1.8	2.3	20	16	25.....	5.8	1.8	7.2	25	14	39
11.....	6.5	1.8	1.8	1.8	21	9.8	26.....	5.0	1.8	80	25	18	8.0
12.....	21	1.8	1.8	19	16	15	27.....	5.0	1.8	22	14	29	20
13.....	90	1.8	3.3	16	19	14	28.....	5.0	1.8	8.0	8.9	22	15
14.....	11	1.8	3.3	8.0	16	9.8	29.....	9.8	.....	22	8.9	19	14
15.....	8.0	1.8	2.3	5.0	15	8.0	30.....	9.8	.....	5.8	8.9	18	21
							31.....	9.8	.....	4.4	.....	17	.....

Discharge, in million gallons per day, of Hanawi Stream near Nahiku, Maui, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	20	17	17	34	34	17	6.5	2.8	5.8	3.3	.....	3.8
2.....	19	17	24	26	11	15	6.5	2.8	5.8	2.8	.....	3.8
3.....	18	32	24	24	8.0	19	5.8	2.8	7.2	2.8	.....	3.8
4.....	24	256	71	17	7.2	50	18	2.8	9.8	2.3	.....	3.8
5.....	19	76	102	37	7.2	37	22	22	8.0	2.3	.....	3.8
6.....	16	30	90	34	6.5	22	8.0	3.8	6.5	2.3	.....	6.5
7.....	14	29	20	29	5.8	19	6.5	2.8	7.2	2.3	.....	3.8
8.....	13	25	16	24	5.0	18	5.8	2.8	8.9	2.3	.....	3.3
9.....	12	22	14	53	5.0	16	5.8	2.8	6.5	.....	.....	5.8
10.....	13	48	18	22	5.0	16	5.0	11	6.5	.....	.....	4.4
11.....	11	43	22	17	4.4	14	18	6.5	6.5	.....	.....	2.8
12.....	20	24	35	15	4.4	16	8.0	56	6.5	.....	.....	2.8
13.....	18	32	28	14	4.4	24	5.8	26	15	.....	.....	2.3
14.....	14	39	50	14	43	41	5.0	8.9	18	.....	6.5	2.3
15.....	24	32	48	14	22	20	5.0	5.8	17	.....	5.8	2.8
16.....	16	20	35	15	12	14	5.0	5.0	8.9	.....	5.0	7.2
17.....	12	32	26	14	8.0	12	4.4	6.5	7.2	.....	5.0	14
18.....	11	25	60	14	28	9.8	4.4	11	7.2	.....	5.0	22
19.....	8.9	29	45	15	45	12	4.4	9.8	6.5	.....	5.0	9.8
20.....	8.0	32	22	12	16	14	3.8	22	5.8	.....	5.0	16
21.....	7.2	41	17	12	8.0	8.0	3.8	96	5.8	.....	5.0	8.0
22.....	8.9	48	29	9.8	7.2	7.2	3.8	32	5.0	.....	5.0	5.0
23.....	8.9	39	32	8.0	6.5	7.2	3.8	20	5.0	.....	4.4	3.8
24.....	19	26	18	8.0	71	15	3.8	11	4.4	.....	4.4	.....
25.....	85	25	17	7.2	18	17	3.3	8.0	4.4	.....	4.4	.....
26.....	180	32	16	8.9	12	12	3.3	6.5	4.4	.....	4.4	.....
27.....	121	24	16	12	67	7.2	3.3	6.5	3.8	.....	4.4	.....
28.....	136	29	34	7.2	276	17	3.3	5.8	3.8	.....	4.4	.....
29.....	60	37	39	8.0	90	9.8	3.3	.....	3.8	.....	4.4	.....
30.....	96	25	29	12	35	7.2	2.8	.....	3.3	.....	3.8	.....
31.....	30	21	.....	19	.....	6.5	2.8	.....	3.3	.....	3.8	.....

NOTE.—Discharge determined from a rating curve well defined below 200 million gallons per day (309 second-feet). Gaps due to lack of gage record; accuracy of estimate Feb. 4 to Mar. 12, 1914, somewhat doubtful, as water-stage recorder was not operating properly.

Monthly discharge of Hanawi Stream near Nahiku, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
January 9-31.....	90	5.0	15.9	24.6	366	1,120
February.....	12	1.8	2.20	3.40	62	189
March.....	80	1.8	6.82	10.6	211	649
April.....	136	1.8	16.6	25.7	498	1,530
May.....	216	8.9	33.7	52.1	1,050	3,210
June.....	39	8.0	16.6	25.7	498	1,530
The period.....					2,680	8,230
1914-15.						
July.....	180	7.2	34.3	53.1	1,060	3,260
August.....	256	17	38.9	60.2	1,210	3,700
September.....	102	14	33.8	52.3	1,010	3,110
October.....	53	7.2	17.9	27.7	556	1,700
November.....	276	4.4	29.1	45.0	873	2,680
December.....	50	6.5	16.8	26.0	520	1,600
January.....	22	2.8	6.16	9.53	191	586
February.....	96	2.8	14.3	22.1	400	1,230
March.....	18	3.3	7.03	10.9	215	669
April 1-8.....	3.3	2.3	2.55	3.95	20	63
May 14-31.....	6.5	3.8	4.76	7.36	86	263
June 1-23.....	22	2.3	6.16	9.53	142	435

WEST BRANCH OF KOPILIULA STREAM NEAR KEANAE, MAUI.

LOCATION.—600 feet above Koolau ditch crossing and highway bridge, $4\frac{1}{2}$ miles by trail east of Upper Keanae, and 6 miles east of Keanae post office.

RECORDS AVAILABLE.—January 3, 1914, to June 30, 1915.

GAGE.—Friez water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge 300 feet below gage.

CHANNEL AND CONTROL.—Channel at gage is a large pool at foot of falls; banks are of rock and nearly vertical. Control at outlet of pool composed of large boulders; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 7.26 feet at 7 a. m. April 27, 1915 (discharge, computed from extension of rating curve, approximately 1,300 million gallons per day, or 2,010 second-feet); minimum stage recorded, 0.55 foot March 21, 1914 (discharge, 1.8 million gallons per day, or 2.8 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Normal flow is diverted into Koolau ditch and used to irrigate sugar cane.

ACCURACY.—Rating curve well defined up to 20 million gallons per day; conditions for accurate measurements above that stage are not very good and upper section of rating curve is only fairly well defined; estimates good below and fair above 20 million gallons per day.

Discharge measurements of West Branch of Kopiliula Stream near Keanae, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Mar. 12	C. T. Bailey.....	0.60	3.3	2.1
Apr. 16	.....do.....	1.06	11	7.0
June 17	.....do.....	1.53	23	15
July 14	.....do.....	2.55	88	57
26	.....do.....	3.40	268	173
1915—June 17	H. A. R. Austin.....	2.38	91	59
17	.....do.....	1.64	28	18

Discharge, in million gallons per day, of West Branch of Kopiliula stream near Keanae, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	Date.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914.							1914.						
1.....		20	2.6	4.5	8.2	46	16.....	17	4.0	2.6	6.8	14	10
2.....		9.8	2.6	4.0	8.2	21	17.....	28	4.0	5.0	6.0	50	14
3.....	4.5	7.5	2.6	4.0	16	14	18.....	12	4.0	2.6	5.5	260	16
4.....	4.0	6.0	2.6	4.0	123	12	19.....	9.0	3.5	2.1	32	116	43
5.....	4.5	5.5	2.6	7.5	57	10	20.....	8.2	3.5	2.1	57	173	18
6.....	4.5	5.0	2.6	20	32	10	21.....	8.2	3.5	1.8	85	57	12
7.....	5.5	5.0	2.6	16	50	9.8	22.....	53	3.5	2.6	46	21	20
8.....	8.5	4.5	2.6	9.8	158	9.0	23.....	18	3.0	3.0	196	16	12
9.....	4.5	4.5	3.0	6.8	35	18	24.....	20	3.0	16	61	12	14
10.....	4.5	4.5	4.5	5.5	24	14	25.....	19	3.0	7.5	46	12	158
11.....	8.2	4.5	2.1	5.5	26	9.0	26.....	19	3.0	85	35	16	35
12.....	32	5.0	2.1	24	17	14	27.....	18	3.0	18	17	28	21
13.....	151	5.0	4.5	35	21	12	28.....	17	3.0	7.5	12	22	16
14.....	21	4.5	3.5	16	14	9.0	29.....	17		24	9.8	17	14
15.....	14	4.0	2.6	9.8	12	7.5	30.....	16		9.0	9.0	17	22
							31.....	9.0		5.5		16	

Discharge, in million gallons per day, of West Branch of Kopiliula Stream near Keanae, Maui, for the years ending June 30, 1914 and 1915—Continued.

Date.	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June.
1914-15.												
1.....	20	18	16	46	46	21	6.8	3.5	6.8	3.5	9.8	3.0
2.....	20	14	24	35	14	18	9.0	3.0	6.0	3.0	12	3.0
3.....	17	32	26	28	9.8	16	6.8	3.0	6.8	3.0	9.8	3.0
4.....	24	330	123	24	8.2	61	20	3.0	8.2	3.0	8.2	3.0
5.....	17	75	166	61	7.5	30	24	28	6.0	2.6	9.0	3.0
6.....	14	28	116	75	6.8	16	9.8	6.0	5.5	3.0	10	5.0
7.....	12	22	21	53	6.0	14	6.8	5.0	6.0	2.6	9.0	4.0
8.....	10	18	16	35	5.5	14	6.0	4.0	6.8	2.6	7.5	3.5
9.....	9.8	16	14	75	5.0	14	6.0	4.5	5.0	9.8	8.2	6.0
10.....	9.8	46	17	26	5.5	12	6.0	12	4.5	12	12	5.0
11.....	8.2	43	21	17	5.0	9.8	30	17	4.5	28	9.0	3.5
12.....	18	18	38	14	4.5	14	18	110	4.5	14	6.8	3.5
13.....	16	35	24	12	4.5	17	10	50	12	5.0	6.0	3.0
14.....	10	43	57	10	24	50	6.8	14	18	4.5	6.0	3.0
15.....	21	38	70	9.8	53	22	6.0	9.0	12	4.0	5.5	3.5
16.....	10	24	46	12	16	12	5.5	7.5	6.8	66	5.5	5.5
17.....	9.0	38	26	9.8	9.8	9.8	5.5	12	5.5	50	5.0	30
18.....	9.0	26	96	9.0	7.5	9.0	5.0	20	5.0	17	5.0	24
19.....	7.5	32	61	9.0	130	7.5	5.0	-----	5.0	16	4.5	123
20.....	6.8	40	21	8.2	28	-----	4.5	14	4.0	12	5.0	35
21.....	6.0	80	16	6.8	12	-----	4.5	158	4.0	8.2	4.5	16
22.....	8.2	70	28	6.0	9.0	-----	4.5	151	3.5	9.0	4.0	12
23.....	8.2	57	53	6.8	8.2	-----	4.5	-----	3.5	7.5	4.0	7.5
24.....	21	30	20	6.0	85	-----	4.0	-----	3.5	6.8	4.0	6.8
25.....	130	32	16	6.0	43	-----	4.0	-----	3.5	24	4.0	12
26.....	205	50	14	7.5	17	17	3.5	-----	3.5	75	3.5	6.8
27.....	151	28	12	12	96	12	3.5	7.5	3.5	378	4.0	6.0
28.....	166	38	38	6.8	340	22	3.5	6.8	3.0	38	3.5	5.5
29.....	85	53	66	6.8	151	14	3.5	-----	3.0	18	3.5	5.0
30.....	123	32	40	9.0	50	9.0	3.5	-----	3.0	14	3.5	12
31.....	40	21	-----	24	-----	7.5	3.5	-----	3.5	-----	3.5	-----

NOTE.—Discharge determined from a rating curve well defined below 20 million gallons per day, and fairly well defined between 20 and 300 million gallons per day. Discharge interpolated Jan. 25-29, 1914. Gaps due to lack of gage record.

Monthly discharge of West Branch of Kopiliula Stream near Keanae, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
January 3-31.....	151	4.0	21.8	33.7	632	1,940
February.....	20	3.0	4.98	7.71	139	428
March.....	85	1.8	7.66	11.9	237	729
April.....	196	4.0	26.6	41.2	796	2,450
May.....	260	8.2	46.7	72.3	1,450	4,440
June.....	158	7.5	21.3	33.0	640	1,960
The period.....					3,890	11,900
1914-15.						
July.....	205	6.0	39.1	60.5	1,210	3,720
August.....	330	14	46.0	71.2	1,430	4,380
September.....	166	12	43.4	67.1	1,300	4,000
October.....	75	6.0	21.5	33.8	666	2,050
November.....	340	4.5	40.3	62.4	1,210	3,710
December 1-19, 26-31.....	61	7.5	17.9	27.7	449	1,370
January.....	30	3.5	7.74	12.0	240	736
February 1-18, 20-22, 27-28.....	158	3.0	28.2	43.6	649	1,990
March.....	18	3.0	5.69	8.80	176	541
April.....	378	2.6	28.0	43.3	840	2,580
May.....	12	3.5	6.32	9.78	196	601
June.....	123	3.0	12.1	18.7	362	1,110

EAST WAILUAIKI STREAM NEAR KEANAE, MAUI.

LOCATION.—1,000 feet above Koolau ditch crossing and trail, $3\frac{1}{4}$ miles east of Upper Keanae, and about $6\frac{1}{4}$ miles east of Keanae post office.

RECORDS AVAILABLE.—December 21, 1913, to June 30, 1915.

GAGE.—Stevens water-stage recorder, installed April 17, 1914, to replace original Friez recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge 800 feet below gage.

CHANNEL AND CONTROL.—Channel at gage is a large pool at foot of falls; banks, nearly vertical walls of rock. Control composed of large boulders and rock ledge; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 7.2 feet at 6.30 a. m. April 27, 1915 (discharge, computed from extension of rating curve, approximately 1,500 million gallons per day, or 2,320 second-feet); minimum stage recorded, 0.60 foot March 5 to 8, 1914 (discharge, 2.5 million gallons per day, or 3.9 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Normal flow is diverted into Koolau ditch and used to irrigate sugar cane.

ACCURACY.—Owing to unsatisfactory working of recorder for several periods records are missing, but estimates given are based on a well-defined rating curve and a continuous gage-height record and are good for all stages.

Discharge measurements of East Wailuaiki Stream near Keanae, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1914—Mar. 12	C. R. White	0.61	3.8	2.5
Apr. 17	C. T. Bailey .....	.90	9.1	5.9
June 17	.....do	1.30	29	19
July 25	.....do	2.02	109	70
Aug. 26	.....do	3.02	363	235
Aug. 24	.....do	1.59	50	32
1915—June 16	H. A. R. Austin	1.17	19	13

Discharge, in million gallons per day, of East Wailuaiki Stream near Keanae, Maui, for the years ending June 30, 1914-15.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.							
1.		4.5	30	2.9	5.3		48
2.		4.5	14	2.9	4.5		22
3.		4.5	9.6	2.9	4.5		16
4.		4.5	7.2	2.9	3.9		13
5.		4.5	5.3	2.5	9.6		13
6.		5.3	3.9	2.5	25		13
7.		6.1	3.9	2.5	20		11
8.		125	3.9	2.5	9.6		11
9.		140	3.9	3.3	7.2		22
10.		16	3.3	5.3	6.1		16
11.		8.2	3.3	2.5	5.3		11
12.		48	3.9	2.5	36		18
13.		148	3.9	6.1	28		16
14.		22	4.5	4.5	16		11
15.		14	3.9	2.9	8.2		9.6
16.		20	3.3	2.9	7.2		14
17.		28	3.3	4.5	6.1		20
18.		5.3	3.3	3.3	6.1		20
19.		4.5	3.3	2.9	44	190	57
20.		3.9	3.3	2.9	57	200	25
21.	8.2	33	3.3	2.5	88	62	16
22.	7.2	16	2.9	2.9	44	22	25
23.	7.2	30	2.9	3.3	210	16	16
24.	6.1	28	2.9	20	57	13	16
25.	6.1	27	2.9	9.6	44	11	16
26.	6.1	26	2.9	118	36	16	30
27.	6.1	24	2.9	22	18	30	22
28.	5.3	23	2.9	7.2	13	28	33
29.	5.3	21		25	9.6	20	25
30.	5.3	20		9.6	8.2	18	30
31.	5.3	13		6.1		16	

Date.	July.	Aug.	Sept.	Oct.	Dec.	Feb.	Mar.	Apr.	May.	June.
1914-15.										
1.			20	40	18		6.1	3.9	10	4.5
2.			33	40	16		6.1	3.9	15	4.5
3.			30	30	18		6.1	3.3	15	4.5
4.			140	25			9.6	3.3	10	4.5
5.			162	52		40	6.1	3.3	10	4.5
6.			148	68		7.2	6.1	3.9	15	7.2
7.			28	48		5.3	6.1	3.9	12	5.3
8.			20	33		4.5	8.2	4.5	10	5.3
9.			18	81		4.5	6.1	14	10	8.2
10.			22	30		16	5.3	20	15	11
11.			25	18		18	5.3	40	11	5.3
12.				16		132	5.3	20	12	5.3
13.				13		52	18	7.2	7.0	4.5
14.				13		16	22	6.1	7.2	4.5
15.						9.6	22	6.1	7.2	5.3
16.						7.2	9.6	88	7.2	16
17.						9.6	7.2	62	6.1	44
18.						20	6.1	20	5.3	25
19.						20	6.1	20	5.3	140
20.						33	5.3	16	5.3	48
21.						132	5.3	11	5.3	22
22.						48	4.5	13	4.5	18
23.				9.6		25	4.5	11	6.1	13
24.	25	57		9.6		13	4.5	9.6	7.2	9.6
25.	140	36	18	8.2		9.6	4.5	36	13	16
26.	220	52	16	9.6		8.2	4.5	88	6.1	11
27.		33	16	18		8.2	3.9	392	4.5	8.2
28.		40	40			7.2	3.9	44	4.5	7.2
29.		52	74		13		3.9	25	4.5	6.1
30.		44	40				3.9	15	3.9	11
31.		28					3.9		4.5	

NOTE.—Discharge determined from a well-defined rating curve. Discharge estimated Jan. 24-29, June 30, 1914, and Apr. 29 to May 8, 1915, by comparison with record for West Wailuaiki Stream. Gaps due to lack of gage records.

Monthly discharge of East Wailuaiki Stream near Keanae, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
December 21-31.....	8.2	5.3	6.20	9.59	68	209
January.....	148	3.9	28.3	43.8	878	2,690
February.....	30	2.9	5.16	7.98	145	443
March.....	118	2.5	9.40	14.5	291	894
April.....	210	3.9	27.9	43.2	837	2,570
May 19-31.....	200	11	49.4	76.4	642	1,970
June.....	57	9.6	20.5	31.7	616	1,890
1914-15.						
August 23-31.....	57	28	42.0	65.0	378	1,160
September 1-11, 25-30.....	162	16	50.0	77.4	850	2,610
October 1-14, 23-27.....	81	8.2	29.6	45.8	562	1,730
February 5-28.....	132	4.5	26.9	41.6	646	1,980
March.....	22	3.9	7.10	11.0	220	675
April.....	392	3.3	33.1	51.2	994	3,050
May.....	15	3.9	8.38	13.0	260	797
June.....	140	4.5	16.0	24.8	480	1,470

WEST WAILUAIKI STREAM NEAR KEANAE, MAUI.

LOCATION.—500 feet above Koolau ditch crossing and trail bridge, 3 miles east of Upper Keanae, and 5½ miles east of Keanae post office.

RECORDS AVAILABLE.—January 1, 1914, to June 30, 1915.

GAGE.—Stevens water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge 100 feet below gage.

CHANNEL AND CONTROL.—Channel at gage is a large deep pool at foot of low waterfall; banks are nearly vertical walls of rock to above high water. Control at outlet of pool composed of rock ledge and large boulders; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 9.6 feet at 8 a. m., April 27, 1915 (discharge computed from extension of rating curve, approximately 2,200 million gallons per day, or 3,400 second-feet); minimum stage recorded, 0.8 foot March 7 to 12, 1914 (discharge, 1.6 million gallons per day, or 2.5 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Normal flow is diverted into Koolau ditch for irrigation of sugar cane.

ACCURACY.—Estimates based on a well-defined rating curve and continuous gage-height record; good for all stages.

Discharge measurements of West Wailuaiki Stream near Keanae, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1914—Mar. 12	C. T. Bailey.....	0.81	2.6	1.7
Apr. 16	.....do.....	1.27	12	7.6
May 13	.....do.....	4.80	642	415
18	.....do.....	4.35	509	329
19	.....do.....	3.14	165	107
20	.....do.....	4.70	643	416
Aug. 24	.....do.....	2.23	68	44
1915—June 16	H. A. R. Austin.....	1.73	31	20

Discharge, in million gallons per day, of West Wailuauiki Stream near Keanae, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	Date.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914.							1914.						
1.....	3.5	15	3.0	.....	.....	65	16.....	25	5.0	2.5	8.5	.....	15
2.....	4.2	38	3.0	.....	.....	29	17.....	31	4.2	4.2	7.5	.....	21
3.....	3.5	31	3.0	.....	.....	20	18.....	12	4.2	3.5	6.5	268	20
4.....	3.5	18	2.5	.....	.....	14	19.....	8.5	4.2	2.5	55	175	68
5.....	3.5	14	2.5	.....	.....	12	20.....	7.5	3.5	2.5	84	278	31
6.....	4.2	11	2.0	.....	.....	12	21.....	9.8	3.5	2.0	117	92	16
7.....	5.8	9.8	1.6	.....	.....	11	22.....	20	3.5	2.5	65	31	27
8.....	129	8.5	1.6	.....	9.8	23	23.....	30	3.0	3.0	228	20	16
9.....	167	8.5	1.6	.....	25	24	24.....	29	3.5	27	38	15	16
10.....	21	7.5	1.6	.....	16	25	25.....	29	3.5	16	23	12	228
11.....	11	6.5	1.6	.....	.....	11	26.....	28	3.0	.....	14	16	50
12.....	58	6.5	1.6	.....	.....	20	27.....	28	3.0	.....	6.5	41	30
13.....	159	5.8	7.5	.....	.....	18	28.....	27	3.0	.....	3.5	44	25
14.....	34	5.0	5.0	.....	.....	12	29.....	27	.....	.....	.....	25	20
15.....	20	5.0	3.0	.....	.....	9.8	30.....	27	.....	.....	.....	25	30
							31.....	23	.....	.....	.....	21	.....
Date.	July.	Aug.	Sept.	Oct.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.		
1914-15.													
1.....	.....	27	34	62	23	7.5	2.5	6.5	3.5	12	2.5		
2.....	.....	20	52	52	20	12	2.5	5.8	3.0	16	2.0		
3.....	.....	49	49	44	20	8.5	27.5	6.5	2.5	16	2.0		
4.....	.....	500	175	34	65	31	2.5	9.8	2.5	11	2.0		
5.....	.....	80	258	92	41	34	58	6.5	2.5	9.8	2.0		
6.....	.....	38	143	97	21	7.5	9.8	5.8	2.5	16	5.0		
7.....	.....	34	36	76	16	6.5	5.8	6.5	2.0	12	3.5		
8.....	.....	36	34	49	15	5.0	5.0	8.5	2.5	9.8	5.0		
9.....	.....	34	34	102	14	4.2	5.0	5.8	16	9.8	7.5		
10.....	.....	68	34	36	14	4.2	18	5.0	23	15	15		
11.....	.....	62	36	21	14	55	41	5.0	52	11	4.2		
12.....	.....	34	52	16	23	8.5	159	4.2	29	12	4.2		
13.....	.....	49	36	14	41	6.5	72	21	8.5	7.5	3.5		
14.....	.....	84	72	12	76	5.8	23	36	6.5	6.5	4.2		
15.....	.....	55	107	11	31	5.8	14	29	5.0	6.5	5.8		
16.....	.....	36	55	12	18	5.0	12	11	92	5.8	23		
17.....	.....	62	38	9.8	15	5.0	23	7.5	84	5.0	58		
18.....	.....	36	143	11	14	4.2	41	6.5	27	5.0	38		
19.....	.....	49	92	11	12	4.2	27	5.8	27	5.0	192		
20.....	.....	62	5.0	9.8	16	3.5	72	5.8	20	5.8	58		
21.....	.....	102	5.0	9.8	12	3.0	175	5.0	11	3.5	27		
22.....	.....	102	72	7.5	11	3.0	72	4.2	14	3.5	21		
23.....	.....	84	84	6.5	11	3.0	31	3.5	11	3.5	12		
24.....	.....	52	36	6.5	11	3.5	16	3.5	8.5	3.5	9.8		
25.....	.....	159	52	34	72	3.5	14	3.5	36	3.5	20		
26.....	.....	321	76	15	8.5	27	3.0	9.8	3.0	92	14		
27.....	.....	268	46	15	20	3.0	8.5	3.0	470	2.5	9.8		
28.....	.....	299	62	55	8.5	21	3.5	7.5	3.0	58	8.5		
29.....	.....	151	88	97	8.5	27	3.0	.....	2.5	27	6.5		
30.....	.....	192	52	55	8.5	12	3.0	.....	2.5	16	16		
31.....	.....	65	36	.....	11	8.5	2.5	.....	3.0	.....	.....

NOTE.—Discharge determined from a well-defined rating curve. Discharge interpolated Jan. 22-29, 1914. Gage record lacking for periods for which discharge is not given.

Monthly discharge of West Wailuaiki Stream near Keanae, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1914.						
January.....	167	3.5	31.9	49.4	989	3,080
February.....	38	3.0	8.47	13.1	237	728
March 1-25.....	27	1.6	4.27	6.61	107	328
April 16-28.....	228	3.5	50.5	78.1	656	2,010
May 18-31.....	278	12	75.9	117	1,060	3,260
June.....	228	9.8	29.9	46.3	898	2,750
1914-15.						
July 25-31.....	321	65	208	322	1,460	4,470
August.....	560	20	71.8	111	2,230	6,830
September.....	258	5.0	65.1	101	1,950	5,990
October.....	102	5.8	28.2	43.6	873	2,680
December.....	76	8.5	23.9	37.0	742	2,270
January.....	55	2.5	8.32	12.9	258	792
February.....	175	2.5	33.2	51.4	929	2,850
March.....	36	2.5	7.59	11.7	235	722
April.....	470	2.0	38.5	59.6	1,150	3,540
May.....	16	2.5	7.45	11.5	231	709
June.....	192	2.0	19.4	30.0	582	1,790

EAST WAILUANUI STREAM NEAR KEANAE, MAUI.

LOCATION.—1,000 feet above Koolau ditch crossing, $2\frac{1}{2}$ miles east of Upper Keanae, and 5 miles east of Keanae post office.

RECORDS AVAILABLE.—January 1, 1914, to June 30, 1915.

GAGE.—Stevens water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge at gage.

CHANNEL AND CONTROL.—Channel at gage is a small deep pool at foot of rapids; right bank is vertical wall of rock; left bank steep and high. Control is ledge of rock at outlet of pool; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 5.0 feet at 5 a. m. September 7, 1914 (discharge, computed from extension of rating curve, approximately 400 million gallons per day, or 620 second-feet); minimum stage recorded, 0.75 foot April 7, 1915 (discharge, 0.25 million gallons per day, or 0.4 second-foot).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Normal flow is diverted into Koolau ditch for irrigation of sugar cane.

ACCURACY.—Estimates based on a well-defined rating curve and a continuous record of gage height; good for all stages.

Discharge measurements of East Wailuanui Stream near Keanae, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1914—Mar. 12	G. R. White.....	0.83	0.7	0.45
Apr. 16	C. T. Bailey.....	1.15	4.8	3.1
May 18	.....do.....	3.22	157	101
18	.....do.....	2.85	120	78
19	.....do.....	2.14	43	28
20	.....do.....	2.52	68	44
June 17	.....do.....	1.49	13	8.3
1915—June 16	H. A. R. Austin.....	1.18	5.9	3.8

Discharge, in million gallons per day, of East Wailuanui Stream near Keanae, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Jan.	Apr.	May.	June.	Date.	Jan.	Apr.	May.	June.
1914.					1914.				
1.....	1.5			22	16.....	6.0	3.1	38	7.7
2.....	1.5			9.6	17.....	14	3.1	6.0	8.6
3.....	1.1			6.0	18.....	3.7	2.5	53	9.6
4.....	1.1			5.1	19.....	3.7	18	40	24
5.....	1.5			4.4	20.....	3.7	16	50	10
6.....	1.5			5.1	21.....	3.7	22	20	6.8
7.....	2.5			4.4	22.....	3.7	12	8.6	9.6
8.....	30			4.4	23.....	3.7	22	6.8	6.8
9.....	16			13	24.....	3.7	10	5.1	6.8
10.....	3.7			6.0	25.....	3.7	9.6	4.4	56
11.....	3.1			5.1	26.....	3.7	13	6.8	14
12.....	10			7.7	27.....	3.7	5.1	16	9.6
13.....	6.8		43	7.7	28.....	3.7	3.1	10	6.8
14.....	3.7		18	5.1	29.....	3.7	2.0	7.7	6.0
15.....	3.7		7.7	4.4	30.....	3.7		7.7	13
					31.....	8.0		6.8	.....

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	12	8.6	8.6	12	22	6.0	2.0	0.7	2.0	0.7	3.7	1.1
2.....	10	6.8	6.8	13	6.8	6.0	2.5	.7	1.5	.5	3.1	1.1
3.....	8.6	13	13	8.6	4.4	6.8	2.0	.7	2.0	.3	2.5	1.1
4.....	14	46	10	8.6	3.7	13	9.6	.7	3.1	.3	4.4	.7
5.....	9.6	24	13	13	3.7	7.7	8.6	8.6	1.5	.3	3.1	1.1
6.....	8.6	13	20	10	3.1	5.1	3.1	1.5	1.1	.3	1.5	2.0
7.....	6.8	13	43	10	2.5	3.7	2.0	1.1	2.0	.25	4.4	1.5
8.....	6.0	9.6	8.6	9.6	2.5	3.1	1.5	.7	3.1	.3	3.1	1.5
9.....	6.0	7.7	6.8	35	2.5	3.1	1.1	1.1	1.5	7.7	2.5	3.7
10.....	6.0	28	5.1	10	2.0	3.1	1.1	7.7	2.0	9.6	2.5	5.1
11.....	5.1	22	6.0	6.0	.....	3.1	7.7	6.8	1.5	14	6.0	2.0
12.....	12	9.6	9.6	4.4	.....	3.7	2.5	28	1.5	10	3.7	2.0
13.....	10	26	13	3.7	.....	6.0	2.0	10	7.7	3.7	3.7	1.5
14.....	7.7	24	10	3.1	.....	.....	1.5	3.7	9.6	2.5	2.5	1.5
15.....	14	16	16	2.5	.....	.....	1.1	2.5	7.7	2.5	2.5	2.0
16.....	7.7	9.6	22	3.7	.....	.....	1.1	2.0	3.1	13	2.0	3.7
17.....	6.0	22	22	3.1	.....	.....	1.1	3.7	2.5	22	2.0	6.8
18.....	5.1	13	12	3.1	.....	.....	1.1	5.1	2.5	8.6	1.5	8.6
19.....	4.4	18	12	3.7	.....	.....	1.1	3.7	2.0	6.0	1.5	26
20.....	3.7	18	26	2.5	.....	.....	.7	17	2.0	6.8	1.5	14
21.....	3.7	18	30	3.1	.....	.....	.7	40	1.5	3.7	1.5	9.6
22.....	4.4	26	9.6	2.5	.....	.....	.7	16	1.5	3.7	1.5	8.6
23.....	4.4	18	7.7	2.5	.....	.....	.7	9.6	1.1	3.7	1.5	4.4
24.....	17	14	14	2.5	.....	.....	.7	5.1	1.1	3.1	1.5	3.7
25.....	22	13	17	2.5	.....	.....	.7	3.7	1.1	3.1	1.1	8.6
26.....	43	16	7.7	3.7	.....	.....	.7	2.5	.7	13	1.1	4.4
27.....	40	14	5.1	5.1	.....	.....	.7	2.5	.7	40	1.5	3.1
28.....	53	10	10	3.1	.....	.....	.7	2.0	.7	18	1.1	2.5
29.....	30	17	14	3.7	.....	3.1	.7	.....	.5	9.6	1.1	2.5
30.....	35	13	10	4.4	.....	3.1	.7	.....	.5	6.0	1.1	5.1
31.....	16	10	.....	12	.....	2.5	.7	.....	.7	.....	1.1	.....

NOTE.—Discharge determined from a well-defined rating curve. Discharge interpolated Jan. 28, 30, 1914, and Jan. 27 to Feb. 3, 1915, and estimated Jan. 31, 1914. No gage record for periods for which discharge is not given.

Monthly discharge of East Wailuanui Stream near Keanae, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1914.						
January.....	30	1.1	5.28	8.17	164	502
April 16-29.....	22	2.0	10.1	15.6	142	434
May 23-31.....	53	4.4	18.7	28.9	356	1,090
June.....	56	4.4	10.2	15.8	305	939
1914-15.						
July.....	53	3.7	13.9	21.5	432	1,320
August.....	46	6.8	16.7	25.8	517	1,590
September.....	43	5.1	13.6	21.0	409	1,250
October.....	35	2.5	6.80	10.5	211	647
November 1-10.....	22	2.0	5.32	8.23	53	163
December 1-13, 29-31.....	13	2.5	4.94	7.64	79	243
January.....	9.6	.7	1.97	3.05	61	187
February.....	40	.7	6.69	10.4	187	575
March.....	9.6	.5	2.26	3.50	70	215
April.....	40	.25	7.11	11.0	213	655
May.....	6.0	1.1	2.32	3.59	72	221
June.....	26	.7	4.65	7.69	140	428

WEST WAILUANUI STREAM NEAR KEANAE, MAUI.

LOCATION.—50 feet above Koolau ditch crossing and intake, 2 miles east of upper Keanae, and $4\frac{1}{2}$ miles east of Keanae post office.

RECORDS AVAILABLE.—December 19, 1913, to June 30, 1915.

GAGE.—Stevens water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge at gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for 100 feet above gage; waterfall 50 feet below gage; banks steep and high; control is low concrete dam, 30 feet long.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 6.6 feet at 7 a. m. April 27, 1915 (discharge, computed from extension of rating curve, approximately 700 million gallons per day, or 1,080 second-feet); minimum stage recorded, 0.95 foot February 11 to 28, 1914 (discharge, 0.7 million gallons per day, or 1.1 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Irrigation of sugar cane, rice, and taro.

ACCURACY.—Estimates based on a well-defined rating curve and a continuous gage-height record; good for all stages.

Discharge measurements of West Wailuanui Stream near Keanae, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1914—Mar. 11	C. T. Bailey.....	0.97	1.7	1.1
May 18	do.....	3.50	432	279
18	do.....	2.39	213	138
19	do.....	1.65	69	45
20	do.....	2.17	174	112
June 17	do.....	1.26	20	13
1915—June 16	H. A. R Austin.....	1.10	6.9	4.5

*Discharge, in million gallons per day, of West Wailuanui Stream, near Keanae, Maui,
for the years ending June 30, 1914 and 1915.*

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.					Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.											
1.						0.7	7.0	0.7	4.8	7.0	34
2.						.7	15	1.8	3.2	7.0	18
3.						1.8	9.3	1.8	3.2	29	12
4.						1.8	7.0	1.8	3.2	82	9.3
5.						1.8	4.8	1.8	15	39	7.0
6.						1.8	1.8	1.8	21	25	7.0
7.						3.2	1.8	1.8	15	39	7.0
8.						63	1.8	4.8	7.0	127	4.8
9.						82	1.8	3.2	4.8	29	15
10.						9.3	1.8	1.8	3.2	18	9.3
11.						3.2	.7	.7		15	7.0
12.						20	.7	.7		9.3	12
13.						15	.7	3.2		21	9.3
14.						21	.7	1.8		12	7.0
15.						9.3	.7	1.8		12	4.8
16.						9.3	.7	1.8	7.0	9.3	9.3
17.						15	.7	1.8	4.8	57	9.3
18.						4.8	.7	1.8	4.8	179	12
19.					12	4.8	.7	1.8	29	82	29
20.					9.3	3.2	.7	1.8	29	140	15
21.					7.0	3.2	.7	1.8	45	45	9.3
22.					7.0	29	.7	1.8	29	18	15
23.					4.8	4.8	.7	1.8	140	12	12
24.					1.8	4.8	.7	12	45	9.3	15
25.					.7	3.2	.7	7.0	29	7.0	108
26.					1.8	1.8	.7	94	29	9.3	29
27.					3.2	1.8	.7	18	15	25	21
28.					1.8	4.8	.7	7.0	12	21	15
29.					1.8	9.3		29	9.3	15	15
30.					1.8	9.3		7.0	7.0	12	25
31.					.7	12		4.8		12	

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.	21	12	12	21	29		4.8	1.8	4.8	3.2	7.0	1.8
2.	18	9.3	18	18	9.3		7.0	1.8	4.8	3.2	9.3	1.8
3.	21	18	18	15	7.0		4.8	1.8	4.8	1.8	12	1.8
4.	25	218	82	15	7.0		15	1.8	7.0	1.8	7.0	.7
5.	18	45	94	29	7.0		15	21	4.8	1.8	4.8	1.8
6.	18	21	82	34	4.8		7.0	3.2	3.2	3.2	7.0	1.8
7.	12	15	15	25	4.8		4.8	3.2	3.2	3.2	7.0	1.8
8.	9.3	12	9.3	18	4.8		4.8	3.2	4.8	3.2	4.8	1.8
9.	7.0	9.3	9.3	51			4.8	1.8	3.2	12	4.8	7.0
10.	7.0	39	12	15			4.8	9.3	3.2	15	9.3	3.2
11.	9.3	25	12	9.3			15	9.3	3.2	25	7.0	1.8
12.	12	15	21	7.0			7.0	82	3.2	12	7.0	1.8
13.	7.0	34	18	7.0			4.8	34	15	4.8	7.0	1.8
14.	15	34	29	4.8			4.8	12	18	4.8	3.2	1.8
15.	7.0	25	39	4.8			3.2	7.0	15	4.8	4.8	3.2
16.	7.0	15	21	4.8			3.2	4.8	7.0	39	3.2	7.0
17.	4.8	29	15	4.8			3.2	7.0	4.8	39	3.2	18
18.	4.8	18	51	4.8			3.2	9.3	4.8	15	3.2	15
19.	4.8	21	39	4.8			3.2	9.3	4.8	15	3.2	69
20.	4.8	29	15	4.8			3.2	25	4.8	12	3.2	29
21.	4.8	34	12	4.8			3.2	75	4.8	9.3	3.2	15
22.	4.8	29	25	4.8			1.8	29	3.2	9.3	3.2	15
23.	34	29	45	4.8			1.8	18	3.2	9.3	3.2	9.3
24.	34	18	15	4.8			1.8	9.3	3.2	7.0	1.8	7.0
25.	45	18	9.3	4.8			1.8	7.0	3.2	18	1.8	12
26.	108	25	9.3	7.0			1.8	7.0	3.2	51	1.8	9.3
27.	94	18	7.0	9.3			1.8	4.8	3.2	250	1.8	7.0
28.	120	21	21	4.8			1.8	4.8	3.2	29	1.8	4.8
29.	75	34	45	4.8		7.0	1.8		3.2	18	1.8	4.8
30.	82	21	21	7.0		7.0	1.8		3.2	12	1.8	9.3
31.	34	15		18		4.8	1.8		3.2		1.8	

NOTE.—Discharge determined from a well-defined rating curve. Discharge estimated Jan. 12 and 13, 1914, by comparison with record of East Wailuanui Stream. Nogage record for period for which discharge is not given.

Monthly discharge of West Wailuanui Stream near Keanae, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
December 19-31.....	12	0.7	4.13	6.39	54	165
January.....	82	.7	11.5	17.8	356	1,090
February.....	15	.7	2.31	3.57	65	198
March.....	94	.7	7.18	11.1	223	683
April 1-10, 16-30.....	140	3.2	20.6	31.9	515	1,580
May.....	179	7.0	36.3	56.2	1,120	3,450
June.....	108	4.8	16.7	25.8	502	1,540
1914-15.						
July.....	120	4.8	28.0	43.3	868	2,660
August.....	218	9.3	29.5	45.6	916	2,810
September.....	94	7.0	27.4	42.4	821	2,520
October.....	51	4.8	12.0	18.6	373	1,140
November 1-8.....	29	4.8	9.21	14.2	74	226
January.....	15	1.8	4.67	7.23	145	444
February.....	82	1.8	14.4	22.3	404	1,240
March.....	18	3.2	5.20	8.05	161	495
April.....	250	1.8	21.1	32.6	633	1,940
May.....	12	1.8	4.58	7.09	142	436
June.....	69	.7	8.85	13.7	265	815

HONOMANU STREAM NEAR KEANAE, MAUI.

LOCATION.—500 feet above Spreckels ditch intake and trail bridge, about 6 miles south of Keanae post office.

RECORDS AVAILABLE.—November 15, 1913, to June 30, 1915.

GAGE.—Stevens water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge at gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for 200 feet above and below gage; stream bed filled with large boulders and very rough; right bank vertical wall of rock; left bank steep and high. Control composed of large boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 8.65 feet at 10.30 a. m. August 4, 1914 (discharge computed from extension of rating curve, approximately 950 million gallons per day, or 1,470 second-feet); minimum stage recorded, 2.20 feet April 7 and 8, 1915 (discharge, 0.25 million gallons per day, or 0.4 second-foot).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Normal flow is diverted by Spreckels ditch for irrigation of sugar cane.

ACCURACY.—Estimates based on a fairly well-defined rating curve and a continuous gage-height record; fair for all stages.

Discharge measurements of Honomanu Stream near Keanae, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons per day.
1913—Nov. 18	C. T. Bailey.....	6.02	554	358
20	do.....	3.61	32	21
1914—Mar. 13	G. R. White.....	3.15	16	10
Apr. 15	C. T. Bailey.....	2.83	6.6	4.3
18	do.....	2.65	2.8	1.8
May 17	do.....	4.88	247	160
21	do.....	4.70	195	126
Sept. 29	do.....	4.17	102	66
1915—May 13	H. A. R. Austin.....	2.50	3.7	2.4

Discharge, in million gallons per day, of Honomanu Stream near Keanae, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.			
1913-14.											
1.....		4.6	1.7	23	1.2	2.8	3.9	49			
2.....		3.9	1.7	9.5	1.2	2.4	3.9	19			
3.....		79	1.7	5.2	1.0	2.4	12	9.5			
4.....		175	2.8	4.6	1.0	2.4	137	6.7			
5.....		68	10	3.9	1.0	5.2	58	6.0			
6.....		41	12	3.9	1.2	33	23	6.0			
7.....		12	9.5	3.4	1.2	23	45	5.2			
8.....		12	97	3.4	1.0	10	200	6.0			
9.....		7.6	175	3.4	1.2	6.0	27	25			
10.....		6.0	14	2.8	6.7	5.2	13	8.5			
11.....		5.2	6.7	2.8	1.7	3.9	13	10			
12.....		5.2	21	2.4	1.2	9.5	8.5	14			
13.....		4.6	183	2.4	6.0	18	25	14			
14.....		68	30	2.4	2.8	8.5	12	11			
15.....	9.5	16	16	2.0	1.7	4.6	7.6	8			
16.....	103	8.5	19	2.0	1.2	3.9	6.7	4.6			
17.....	144	30	33	2.0	6.7	3.4	16	16			
18.....	251	12	10	1.7	2.0	2.8	250	10			
19.....	58	6.0	6.7	1.7	1.4	68	140	63			
20.....	30	5.2	5.2	1.4	1.2	79	200	21			
21.....	13	4.6	5.2	1.4	1.0	91	90	8.5			
22.....	9.5	3.9	33	1.4	1.2	45	16	19			
23.....	8.5	3.4	9.5	1.4	1.4	242	9.5	9.5			
24.....	91	3.4	5.2	1.2	5.2	84	7.6	7.6			
25.....	33	2.8	3.9	1.2	5.2	41	6.7	200			
26.....	25	2.8	3.9	1.2	116	30	19	33			
27.....	12	2.4	3.4	1.2	19	16	27	18			
28.....	8.5	2.4	7.6	1.2	5.2	8.5	37	13			
29.....	6.7	2.0	27	.....	27	6.7	14	8.5			
30.....	5.2	2.0	18	.....	7.6	5.2	10	16			
31.....	.....	1.7	16	.....	3.9	.....	10	.....		
Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.
1914-15.											
1.....	16	14	13	14	45	10	.....	2.0	1.2	6.0	0.7
2.....	14	9.5	27	27	10	7.6	.....	2.0	1.0	14	7
3.....	12	21	25	23	4.6	6.7	.....	2.8	.85	12	1.2
4.....	19	344	110	79	3.9	16	.....	13	7	6.0	.85
5.....	14	37	137	68	3.4	16	.....	4.6	7	3.9	7
6.....	12	16	85	58	2.8	7.6	2.4	4.6	.4	3.4	6.0
7.....	8.5	13	16	25	2.4	5.2	1.7	2.8	.25	2.8	3.9
8.....	8.5	13	9.5	79	2.0	3.9	2.0	5.2	.25	2.4	3.4
9.....	6.0	7.6	6.7	21	2.0	3.9	1.4	3.4	6.7	2.8	2.4
10.....	6.0	33	9.5	10	1.7	7.6	9.5	1.7	10	8.5	9.5
11.....	5.2	45	13	8.5	.....	6.7	8.5	1.4	27	3.9	1.7
12.....	16	10	30	5.2	.....	10	110	1.4	16	2.8	1.4
13.....	13	18	12	5.2	.....	23	58	6.7	3.9	2.0	1.4
14.....	8.5	49	41	3.9	.....	33	13	25	2.0	2.0	3.4
15.....	16	25	74	4.6	.....	16	5.2	13	1.7	1.7	3.4
16.....	9.5	12	49	4.6	.....	5.2	5.2	3.9	110	1.7	14
17.....	6.7	58	23	4.6	.....	3.4	9.5	2.4	54	1.4	27
18.....	9.5	23	91	5.2	.....	2.4	16	2.0	12	1.4	21
19.....	6.7	27	58	5.2	.....	2.0	19	1.7	6.0	1.4	144
20.....	6.0	41	14	3.9	.....	4.6	14	1.7	4.6	1.4	83
21.....	4.6	68	9.5	3.9	.....	5.2	116	1.4	2.8	1.2	19
22.....	6.7	68	18	2.8	.....	2.8	54	1.4	6.0	1.2	12
23.....	6.0	45	63	2.4	.....	2.0	16	1.4	9.5	1.2	6.7
24.....	21	21	14	1.7	.....	23	8.5	1.4	3.9	1.2	4.6
25.....	137	25	8.5	1.7	.....	.....	5.2	1.2	30	1.0	14
26.....	216	49	7.6	3.9	.....	.....	3.4	1.2	58	1.0	13
27.....	208	19	6.0	12	.....	.....	2.8	1.0	183	1.0	6.7
28.....	251	37	33	3.4	.....	97	2.4	1.0	37	1.0	5.2
29.....	110	41	79	3.4	.....	.....	.....	.85	27	1.0	2.8
30.....	137	19	41	5.2	21	.....	.....	.85	12	.85	9.5
31.....	37	25	.....	33	.....	.....	.....	.85	.....	.7	.....

NOTE.—Discharge determined from a fairly well-defined rating curve. Discharge estimated May 18-21, June 14 and 15, 1914, by comparison with record of Haipuaena Stream. Discharge for May 17, June 16, Nov. 30, Dec. 24 and 28, 1914, computed from water-stage recorder graph for part of day.

Monthly discharge of Honomanu Stream near Keanae, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
November 15-30.....	251	5.2	50.5	78.1	808	2,480
December.....	175	1.7	19.4	30.0	601	1,850
January.....	183	1.7	25.4	39.3	789	2,420
February.....	23	1.2	3.36	5.20	94	289
March.....	116	1.0	7.59	11.7	235	722
April.....	242	2.4	27.8	43.0	833	2,560
May.....	250	3.9	46.7	72.3	1,450	4,440
June.....	200	4.6	21.5	33.3	646	1,980
The period.....					5,460	16,700
1914-15.						
July.....	251	4.6	43.5	67.3	1,350	4,140
August.....	344	7.6	39.8	61.6	1,230	3,790
September.....	137	6.0	37.4	57.9	1,123	3,440
October.....	79	1.7	17.0	26.3	528	1,620
November 1-10, 30.....	45	1.7	8.98	13.9	99	303
December 1-24, 28.....	97	2.0	12.8	19.8	321	982
February 6-28.....	116	1.4	21.0	32.5	484	1,480
March.....	25	.85	3.67	5.68	114	349
April.....	183	.25	20.9	32.3	628	1,920
May.....	14	.7	3.00	4.64	93	285
June.....	144	.7	12.4	19.2	373	1,140

HAIPUAENA STREAM NEAR HUELO, MAUI.

LOCATION.—200 feet above inflow of Spreckels ditch, about 7 miles by trail east of Huelo.

RECORDS AVAILABLE.—October 19, 1913, to June 30, 1915; also records of combined flow of stream and Spreckels ditch at staff gage station 600 feet below present site from December 18, 1910, to September 30, 1913.

GAGE.—Stevens water-stage recorder installed June 16, 1914, to replace original Friez recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

CHANNEL AND CONTROL.—One channel at all stages; straight for 200 feet above and below gage; right bank high with steep slope; left bank nearly vertical. Control composed of large boulders, fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 4.1 feet at 9 a. m. August 4, 1914 (discharge, computed from extension of rating curve, 230 million gallons per day, or 356 second-feet); minimum stage recorded, 0.2 foot March 8, 1914 (discharge, 1.0 million gallons per day, or 1.5 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Normal flow is diverted by ditches of East Maui Irrigation Co. for irrigation of sugar cane.

ACCURACY.—Estimates based on a well-defined rating curve; good for all stages.

Discharge measurements of Haipuaena Stream near Huelo, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—Oct. 27	E. O. Christiansen	0.42	2.8	1.8
Nov. 4	do.	1.38	34	22
8	do.	2.46	141	91
12	C. T. Bailey	2.10	81	52
13	do.	1.01	15	9.6
18	do.	2.72	161	104
1914—May 21	do.	2.12	107	69
Aug. 25	do.	1.31	27	18
1915—Mar. 9	do.	.67	5.6	3.7
June 15	H. A. R. Austin	.62	6.3	4.1

Discharge in million gallons per day, of Haipuaena Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.									
1.....		2.5	4.5	2.5	15	1.2	4.0	3.4	27
2.....		9.5	4.5	2.5	5.9	1.2	4.0	3.4	12
3.....		50	6.8	3.0	4.5	1.2	4.0	12	9.5
4.....		20	114	3.0	4.0	1.2	3.0	66	8.6
5.....		5.9	60	7.6	4.0	1.2	5.9	24	8.6
6.....		4.5	44	5.9	3.4	1.2	22	9.5	6.8
7.....		8.6	11	7.6	3.0	1.2	11	32	6.8
8.....		70	12	60	2.5	1.0	4.5	91	4.5
9.....		102	8.6	56	2.5	1.6	3.4	16	7.6
10.....		44	5.9	7.6	2.2	4.5	3.0	11	5.2
11.....		18	5.2	4.5	2.2	1.8	3.0	11	4.5
12.....		41	5.2	27	2.2	1.6	4.5	9.5	6.8
13.....		12	8.6	56	2.2	4.5	9.5	27	6.8
14.....		6.8	24	11	2.5	3.0	5.9	12	6.8
15.....		8.6	15	7.6	2.5	2.2	4.0	9.5	5.2
16.....		18	7.6	15	2.2	1.8	4.0	8.6	7.6
17.....		27	12	30	2.2	5.9	3.4	32	8.6
18.....		94	22	6.8	2.2	2.5	3.4	110	7.6
19.....	2.5	94	6.8	5.2	2.2	2.2	35	66	30
20.....	2.5	35	5.2	4.5	1.8	1.8	32	91	11
21.....	2.5	27	4.5	4.5	1.6	1.8	41	41	6.8
22.....	2.2	18	4.0	24	1.6	1.8	18	11	11
23.....	2.2	9.5	4.0	5.9	1.6	2.2	84	8.6	6.8
24.....	1.8	60	3.4	4.5	1.3	5.9	20	6.8	8.6
25.....	1.8	20	3.4	4.0	1.3	4.0	20	6.8	77
26.....	1.8	30	3.0	3.4	1.3	60	16	11	15
27.....	1.8	14	3.0	3.4	1.3	11	6.8	15	9.5
28.....	1.8	7.6	2.5	8.6	1.2	4.5	4.5	16	8.6
29.....	1.8	5.9	2.5	14	-----	15	4.0	9.5	7.6
30.....	1.6	5.2	2.5	11	-----	5.2	4.0	8.6	11
31.....	1.8	-----	2.5	9.5	-----	4.0	-----	8.6	-----

Discharge, in million gallons per day, of Hai-puaena Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	9.5	7.6	15	24	38	14	2.4	1.8	4.5	1.6	8.0	2.2
2.....	9.5	7.6	22	17	11	15	5.2	1.8	5.2	1.3	6.0	2.2
3.....	8.6	11	20	18	7.6	14	3.4	1.6	8.6	1.3	13	3.0
4.....	12	80	38	15	5.2	22	15	1.6	24	1.2	9.0	3.0
5.....	9.5	18	53	38	5.2	22	16	20	12	1.2	6.0	4.0
6.....	8.6	12	41	38	4.5	20	5.9	4.0	10	1.2	6.0	8.6
7.....	7.6	11	16	32	4.0	22	4.5	2.5	8.0	1.3	5.0	4.0
8.....	8.6	9.5	15	18	4.0	20	4.0	3.0	10	1.3	5.0	4.5
9.....	7.6	7.6	12	60	4.5	12	3.4	2.5	4.0	7.6	6.0	3.4
10.....	7.6	20	15	18	2.5	22	3.0	11	3.4	14	10	7.0
11.....	7.6	22	18	9.5	2.5	27	18	11	3.0	30	7.0	3.4
12.....	12	9.5	22	6.8	3.0	35	5.9	56	3.0	15	5.0	3.4
13.....	11	16	22	5.9	3.0	41	4.0	32	8.6	6.8	3.4	3.0
14.....	9.5	20	32	5.2	24	41	3.4	11	20	4.0	3.4	3.0
15.....	14	14	41	5.2	27	20	3.4	5.9	14	4.0	3.0	4.5
16.....	9.5	11	27	5.9	12	18	3.0	5.2	5.9	63	2.5	11
17.....	7.6	30	18	5.2	7.6	24	2.5	8.6	4.5	27	3.0	18
18.....	8.6	15	38	5.9	9.5	30	2.5	14	3.4	9.5	2.5	18
19.....	7.6	20	38	6.8	56	32	2.5	14	3.4	5.9	2.5	77
20.....	7.6	22	18	5.2	32	15	2.2	20	3.0	5.9	2.2	30
21.....	7.6	27	16	6.8	7.6	8.6	2.5	80	3.0	5.9	2.2	18
22.....	6.8	32	27	5.2	7.6	9.5	2.5	38	2.5	8.6	2.2	12
23.....	5.9	20	32	4.5	7.6	12	2.2	18	2.5	12	2.2	8.6
24.....	14	15	11	3.4	56	20	2.2	9.5	2.5	7.6	2.2	6.8
25.....	44	18	11	3.4	18	15	2.2	6.8	2.5	30	2.2	14
26.....	66	24	11	4.5	8.6	11	2.2	5.9	2.5	50	2.2	9.5
27.....	66	18	11	9.5	53	14	1.8	5.2	2.4	91	2.2	6.8
28.....	80	20	20	4.5	122	22	1.8	4.5	2.2	38	2.2	6.0
29.....	38	20	24	4.5	47	13	1.8	.....	2.0	24	2.2	6.0
30.....	50	18	22	5.9	24	4.0	1.8	.....	1.9	13	2.2	10
31.....	12	18	.....	24	.....	4.0	1.8	.....	1.8	.....	2.2	.....

NOTE.—Discharge determined from a well-defined rating curve. Discharge estimated Nov. 16, 22, 1913, Jan. 1-3, 1914, Mar. 5-8, 27-31, April 30 to May 12, June 10, 11, 28-30, 1915, by comparison with record of Puohakamoa Stream. Record of discharge Oct. 19 to Dec. 31, 1913, supersedes that published in Water-Supply Paper 373, p. 135.

Monthly discharge of Hai-puaena Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
October 19-31.....	2.5	1.6	2.01	3.11	26	80
November.....	102	2.5	29.0	44.9	869	2,670
December.....	114	2.5	13.5	20.9	418	1,280
January.....	60	2.5	13.4	20.7	416	1,270
February.....	15	1.2	2.87	4.44	80	247
March.....	60	1.0	5.10	7.89	158	485
April.....	84	3.0	12.9	20.0	388	1,190
May.....	110	3.4	25.4	39.3	788	2,420
June.....	77	4.5	11.7	18.1	352	1,080
The period.....					3,495	10,700
1914-15.						
July.....	80	5.9	18.5	28.6	574	1,760
August.....	80	7.6	19.2	29.7	594	1,830
September.....	53	11	23.5	36.4	706	2,160
October.....	60	3.4	13.7	21.2	426	1,300
November.....	122	2.5	20.5	31.7	614	1,890
December.....	41	4.0	19.3	29.9	599	1,840
January.....	18	1.8	4.32	6.68	134	411
February.....	80	1.6	14.1	21.8	395	1,210
March.....	24	1.8	5.95	9.21	184	566
April.....	91	1.2	16.1	24.9	483	1,480
May.....	13	2.2	4.28	6.62	133	407
June.....	77	2.2	10.4	16.1	311	958
The year.....	122	1.2	14.1	21.8	5,150	15,800

PUOHAKAMOA STREAM NEAR HUELO, MAUI.

LOCATION.—150 feet above Spreckels ditch inflow and trail crossing, about 7 miles east of Huelo.

RECORDS AVAILABLE.—June 13, 1913, to June 30, 1915 (new station); December 18, 1910, to June 13, 1913 (old station).

GAGE.—Barrett and Lawrence water-stage recorder installed June 13, 1913. Old staff gage station was 150 feet downstream at trail bridge below inflow from Spreckels ditch.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge 200 feet below gage. Inflow of Spreckels ditch has to be deducted from measurements made at footbridge.

CHANNEL AND CONTROL.—One channel at all stages; curves 100 feet above and below gage; banks steep and high; stream bed is very rough and steep. Control composed of large boulders; shifts not frequent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 6.10 feet at 2.30 p. m. May 8, 1914 (discharge computed from extension of rating curve, approximately 600 million gallons per day or 930 second-feet); minimum stage recorded, 0.21 foot (old station) February 7, 1912; discharge, 2.1 million gallons per day, or 3.2 second-feet. Minimum stage recorded during biennial period, 0.75 foot January 13, 1915 (discharge, 3.6 million gallons per day, or 5.6 second-feet).

DIVERSIONS.—Kula pipe line diverts small amount of water above station at elevation 4,300 feet.

REGULATION.—None.

UTILIZATION.—Normal flow of stream is diverted by ditches of East Maui Irrigation Co. for irrigation of sugar cane.

ACCURACY.—Estimates based on a fairly well defined rating curve and continuous gage-height record; fair for all stages.

Discharge measurements of Puohakamoa Stream near Huelo, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—Oct. 27	E. O. Christiansen	0.94	6.5	^a 4.2
Nov. 12	C. T. Bailey	3.18	130	84
13	.....do.....	2.40	38	24
1914—May 21	.....do.....	3.62	237	^a 153
July 27	.....do.....	4.50	458	^a 296
Aug. 22	.....do.....	2.93	91	^a 59
1915—June 15	H. A. R. Austin	1.19	5.4	^a 3.5

^a Measured below inflow of Spreckels ditch, which was measured and subtracted.

Discharge, in million gallons per day, of Puohakamoa Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.	7.1	4.0	-----	4.2	4.3	9.0	5.4	35	4.0	8.1	9.5	84
2.	28	4.0	-----	3.9	9.7	7.8	5.7	15	3.8	8.1	9.5	72
3.	14	3.9	-----	3.7	83	10	5.4	10	3.8	7.3	16	38
4.	13	3.7	-----	4.0	44	237	7.3	9.5	3.8	7.3	229	16
5.	23	3.7	-----	4.0	10	115	15	8.6	3.8	10	103	15
6.	34	4.6	-----	9.7	7.1	95	12	7.7	4.0	78	46	17
7.	14	26	-----	17	8.4	36	10	7.3	4.0	42	84	15
8.	10	5.4	-----	24	146	39	133	7.0	3.8	17	330	13
9.	7.8	4.8	-----	7.8	197	22	141	7.0	5.2	11	78	32
10.	6.5	4.8	-----	5.5	99	14	20	6.3	9.5	10	42	24
11.	6.5	48	-----	5.3	51	11	11	6.0	4.6	9.0	42	14
12.	7.1	49	-----	4.9	83	10	29	6.0	4.0	13	26	29
13.	7.1	11	-----	11	30	9.7	173	5.4	9.5	29	67	24
14.	7.1	9.7	-----	7.1	14	51	29	110	6.3	22	42	17
15.	6.5	9.7	-----	5.9	13	40	18	5.4	4.4	12	24	13
16.	5.8	7.8	-----	5.2	43	17	29	5.4	4.2	9.5	20	17
17.	5.6	6.3	8.4	4.8	65	24	67	5.2	14	8.6	57	32
18.	5.2	5.6	16	4.7	173	59	20	5.2	5.4	8.1	330	32
19.	4.9	5.2	14	4.5	151	15	13	4.9	4.6	103	173	110
20.	5.0	5.0	6.5	4.4	59	11	11	4.6	4.2	117	304	46
21.	5.2	4.9	5.6	4.5	44	9.0	10	4.6	4.0	141	133	22
22.	4.8	4.7	5.0	4.3	18	8.4	53	4.6	4.2	67	42	38
23.	4.7	4.5	4.8	4.1	20	7.8	15	4.6	4.4	245	26	22
24.	4.7	4.5	4.5	4.1	112	7.1	10	4.4	8.6	78	20	26
25.	4.7	4.4	4.3	4.0	59	6.5	9.5	4.4	8.6	78	18	262
26.	4.7	4.4	4.2	4.0	74	6.3	8.6	4.4	130	67	38	62
27.	4.7	4.5	4.2	4.0	37	6.0	7.7	4.2	40	32	53	38
28.	4.4	4.7	4.2	4.0	17	5.8	14	4.2	10	18	57	24
29.	4.4	4.5	4.1	3.9	14	5.6	26	-----	60	14	32	20
30.	4.3	10	3.9	3.9	10	5.2	20	-----	20	11	22	42
31.	4.2	5.7	-----	3.9	-----	5.0	20	-----	8.1	-----	20	-----
1914-15.												
1.	38	38	32	67	103	26	8.1	4.9	7.0	5.4	15	4.2
2.	38	26	62	67	38	24	11	4.9	7.3	4.6	14	4.2
3.	32	46	53	62	20	24	8.1	4.6	9.5	4.4	20	4.2
4.	53	296	117	46	16	35	32	4.4	26	4.4	13	3.7
5.	35	103	173	110	13	26	42	46	10	4.0	10	3.7
6.	32	53	157	90	10	16	13	8.6	9.0	4.0	9.0	7.3
7.	24	46	42	78	9.5	13	9.0	7.3	9.0	3.8	8.6	4.4
8.	-----	42	26	53	8.6	12	8.1	7.0	14	3.8	8.1	5.7
9.	-----	26	18	157	8.1	12	7.3	6.0	9.0	13	9.5	5.4
10.	-----	78	26	42	7.7	15	7.0	20	7.7	26	24	10
11.	-----	110	38	22	7.0	14	35	17	7.0	62	11	4.9
12.	-----	38	72	17	6.6	22	11	103	6.3	85	9.0	4.9
13.	-----	62	-----	14	6.3	42	8.6	62	15	11	7.7	5.2
14.	-----	96	-----	11	57	67	7.3	17	42	8.1	7.3	5.2
15.	-----	67	-----	11	57	32	6.6	10	26	7.3	7.0	6.3
16.	-----	35	-----	14	22	15	6.3	13	6.6	141	6.6	17
17.	-----	117	-----	11	16	12	5.7	22	4.9	72	6.3	49
18.	-----	62	-----	14	20	11	5.4	18	4.9	26	6.0	24
19.	-----	62	-----	14	133	10	5.2	18	4.9	15	5.7	173
20.	-----	78	-----	11	46	13	4.9	29	5.4	13	5.7	67
21.	-----	110	-----	12	15	14	4.9	157	5.4	11	5.4	42
22.	-----	117	-----	10	12	9.0	5.2	62	4.9	20	5.4	26
23.	-----	110	-----	9.5	11	8.1	4.6	35	4.9	26	5.2	16
24.	-----	38	35	9.0	110	13	4.4	15	4.6	13	4.9	13
25.	-----	157	26	8.6	46	20	4.2	10	4.4	62	4.9	29
26.	-----	213	22	12	20	10	4.0	8.6	4.4	117	4.6	16
27.	-----	262	53	20	103	9.0	3.8	7.7	4.4	229	4.9	11
28.	-----	279	49	57	10	296	3.7	6.6	4.4	57	4.6	9.0
29.	-----	197	57	96	11	117	20	3.7	4.2	38	4.4	8.1
30.	-----	173	62	13	53	9.5	3.6	-----	4.4	22	4.4	22
31.	-----	90	49	62	-----	8.1	3.8	-----	5.4	-----	4.2	-----

NOTE.—Discharge determined from a fairly well-defined rating curve. Discharge estimated Mar. 25-31, 1914, by comparison with record of Waikamoi Stream. No gage record for periods for which discharge is not given.

Monthly discharge of Puohakamoa Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	34	4.2	8.68	13.4	269	826
August.....	49	3.7	9.00	13.9	279	856
September 17-30.....	16	3.9	6.41	9.92	90	275
October.....	24	3.7	6.01	9.30	186	572
November.....	197	4.3	56.5	87.4	1,700	5,200
December.....	237	5.0	29.2	45.2	905	2,780
January.....	173	5.4	30.6	47.3	949	2,910
February.....	110	4.2	11.0	17.0	307	945
March.....	130	3.8	13.1	20.3	405	1,250
April.....	245	7.3	42.7	66.1	1,280	3,930
May.....	330	9.5	80.4	124	2,490	7,650
June.....	262	13	40.5	62.7	1,220	3,730
1914-15.						
July 1-7, 23-31.....	279	13	105	162	1,670	5,160
August.....	296	26	72.4	112	2,240	6,890
September 1-12, 24-30.....	173	18	59.7	92.4	1,130	3,480
October.....	157	8.6	35.1	54.3	1,090	3,340
November.....	296	6.3	46.3	71.6	1,390	4,260
December.....	67	8.1	18.8	29.1	582	1,790
January.....	42	3.6	9.27	14.3	288	882
February.....	157	4.4	25.9	40.1	725	2,230
March.....	42	4.2	9.13	14.1	283	869
April.....	229	3.8	35.4	54.8	1,060	3,260
May.....	24	4.2	8.27	12.8	256	787
June.....	173	3.7	20.0	30.9	601	1,840

ALO STREAM NEAR HUELO, MAUI.

LOCATION.—300 feet above Spreckels ditch inflow and trail crossing, about 5 miles east of Huelo.

RECORDS AVAILABLE.—December 18, 1910, to June 30, 1915.

GAGE.—Friez water-stage recorder installed June 18, 1914. Prior to June 18, 1914, vertical staff at trail bridge 300 feet down stream from present location.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge at gage.

CHANNEL AND CONTROL.—Channel at gage is a fairly large pool at foot of rapids; banks steep and high. Control at outlet of pool is composed of rock ledge and large boulders; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 3.40 feet at 7.30 a. m. April 27, 1915 (discharge, computed from extension of rating curve, approximately 350 million gallons per day, or 540 second-feet); minimum stage recorded, 1.34 feet (old datum) November 4, 1911 (discharge, 0.06 million gallons per day, or 0.1 second-foot); minimum stage recorded during biennial period, 1.07 feet (old datum) at 5.40 a. m. March 9, 1914 (discharge, 0.1 million gallons per day, or 0.15 second-foot).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Normal flow of stream is diverted by ditches of East Maui Irrigation Co., for irrigation of sugar cane.

ACCURACY.—Estimates July 1, 1913, to June 18, 1914, for old location poor, as discharge relation was affected by backwater from inflow of Spreckels ditch; estimates June 19, 1914, to June 30, 1915, based on well-defined rating curve and continuous gage-height record; good for all stages.

Discharge measurements of Alo Stream near Huelo, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-foot.	Million gallons. per day.
1913—July 24	C. T. Bailey.....	1.48	1.4	0.95
Nov. 18	.....do.....	2.58	32	21
20	.....do.....	2.11	18	12
1914—May 21	.....do.....	1.32	26	17
June 18	.....do.....	.92	10	6.7
Aug. 25	.....do.....	1.08	13	8.7
Sept. 23	.....do.....	1.66	60	39
Oct. 24	.....do.....	.64	3.1	2.0
1915—June 18	H. A. R. Austin.....	.60	2.5	1.6

Daily discharge, in million gallons per day, of Alo Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	5.8	0.4	1.6	0.5	0.45	2.8	0.65	4.8	0.1	1.1	1.9	52
2.....	14	.4	1.0	.4	1.2	2.5	.55	3.9	.2	.95	1.9	10
3.....	4.7	.65	1.0	.4	6.3	2.3	.45	2.6	.1	.8	1.9	5.8
4.....	4.7	.4	.7	.6	7.1	71	.95	2.2	.1	.65	58	4.8
5.....	4.7	.3	.6	.5	2.8	34	2.6	1.6	.1	16	25	3.9
6.....	4.7	.65	.5	3.1	2.2	21	3.2	1.3	.1	2.6	8.4	5.8
7.....	3.6	3.0	.8	4.7	1.7	5.6	2.6	1.3	.1	5.8	35	5.8
8.....	3.0	3.1	.6	7.8	41	7.8	38	1.1	.1	3.9	70	3.9
9.....	2.3	1.0	.6	2.8	63	3.1	14	.95	.95	2.6	18	5.8
10.....	1.9	2.6	.5	2.2	15	2.5	5.8	.95	1.9	1.9	7.1	5.8
11.....	1.9	1.2	.5	3.4	17	2.3	2.6	.8	.45	1.6	7.1	3.9
12.....	2.2	28	1.0	2.2	61	3.0	35	.65	.25	8.4	4.8	5.8
13.....	3.0	5.2	.7	9.7	8.4	3.0	14	.65	1.9	14	25	7.1
14.....	2.5	3.5	.7	5.0	4.8	9.0	5.8	.8	1.3	7.1	12	4.8
15.....	1.9	7.8	.8	2.3	3.9	4.8	3.9	.65	.65	3.2	5.8	3.9
16.....	1.6	3.6	1.1	1.8	16	3.6	5.8	.55	.45	2.6	5.8	3.9
17.....	1.2	2.5	3.6	1.0	5.0	4.5	20	.45	.58	1.9	20	10
18.....	1.1	2.1	7.1	.85	36	7.8	4.8	.45	.65	1.3	61	10
19.....	1.0	1.8	5.8	.7	44	3.7	3.2	.45	.45	16	18	27
20.....	1.0	1.6	2.7	.6	11	3.6	2.6	.35	.45	18	25	10
21.....	1.0	1.6	1.4	.5	12	2.8	2.6	.35	.35	18	25	7.7
22.....	.85	1.4	1.1	.45	4.3	2.5	12	.35	.25	7.1	7.1	12
23.....	.8	.9	1.2	.45	4.1	2.2	3.9	.35	.45	30	4.8	8.8
24.....	.9	.9	.7	.4	18	1.9	2.6	.25	2.2	10	3.9	12
25.....	.8	.7	.6	.4	11	1.5	1.9	.25	1.9	7.1	4.8	52
26.....	1.4	.85	.6	.4	27	1.3	1.6	.25	30	.95	12	14
27.....	.85	1.6	.5	.4	7.1	1.1	1.3	.25	4.8	7.1	.55	14
28.....	.65	1.2	.6	.4	4.8	.95	2.6	.2	2.2	4.8	10	10
29.....	.6	.7	.5	.3	3.7	.9	3.2		2.6	3.9	5.8	8.8
30.....	.5	.6	.45	.25	3.1	.8	3.9		1.9	2.6	5.8	16
31.....	.45	6.3		.3		.8	3.2		1.6		5.8	

Daily discharge, in million gallons per day, of Alo Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	13	7.7	6.7	13	24	5.7	1.6	1.0	4.0	1.0	3.3	0.65
2.....	16	6.7	14	10	6.7	6.7	1.6	.8	3.3	.8	2.6	.65
3.....	13	8.8	8.8	12	4.0	6.7	1.3	.8	7.7	.65	4.8	.65
4.....	24	34	10	16	3.3	10	8.8	.8	12	.65	2.6	.65
5.....	10	27	16	18	2.6	5.7	6.7	4.8	4.8	.65	2.1	.65
6.....	10	14	52	18	2.1	4.0	2.6	.8	3.3	.65	2.1	2.1
7.....	8.8	10	8.8	18	2.1	2.6	2.1	1.0	3.3	.65	1.6	.8
8.....	7.7	7.7	5.7	18	1.6	2.1	1.6	.8	4.8	.65	1.6	.8
9.....	7.7	7.7	4.8	27	1.6	2.6	1.6	1.3	2.1	4.8	4.0	1.6
10.....	5.7	38	5.7	16	1.6	3.3	1.6	6.7	1.6	13	7.7	2.1
11.....	4.8	24	7.7	6.7	1.3	2.6	5.7	5.7	1.6	18	3.3	1.0
12.....	16	6.7	18	4.8	1.3	3.3	2.6	18	1.3	7.7	2.1	1.6
13.....	16	14	13	4.0	1.0	4.8	1.6	10	5.7	2.6	2.1	.8
14.....	10	20	34	3.3	14	16	1.6	3.3	12	2.1	1.6	1.6
15.....	16	14	27	3.3	18	6.7	1.3	2.1	8.8	2.1	1.6	1.6
16.....	7.7	10	16	5.7	5.7	3.3	1.3	2.1	4.0	27	1.3	2.1
17.....	6.7	34	10	3.3	4.8	2.6	1.3	2.6	2.6	13	1.3	4.8
18.....	4.8	18	14	2.6	5.7	2.1	1.3	3.3	2.1	5.7	1.3	4.8
19.....	4.0	27	34	2.6	13	1.6	1.0	2.6	1.6	4.0	1.3	27
20.....	3.3	16	10	2.1	5.7	2.1	1.0	27	1.6	4.0	1.3	18
21.....	2.6	16	6.7	5.7	3.3	2.6	1.3	62	1.6	2.6	1.0	10
22.....	4.0	16	24	2.6	3.3	1.6	1.0	18	1.3	4.8	1.0	10
23.....	4.8	21	30	2.6	2.6	1.3	1.0	18	1.3	4.8	1.0	4.8
24.....	14	12	7.7	2.1	16	4.8	1.0	7.7	1.3	2.6	.8	5.7
25.....	16	7.7	5.7	2.1	6.7	2.6	.8	6.7	1.0	6.7	.8	7.7
26.....	27	13	4.8	2.1	4.8	1.6	.8	5.7	1.0	30	.8	4.0
27.....	24	8.8	5.7	2.6	38	1.6	.8	3.3	.8	80	.8	3.3
28.....	57	7.7	8.8	2.1	62	6.7	.8	4.0	.8	12	.8	2.6
29.....	38	12	14	4.0	18	3.3	.8	.....	.8	6.7	.8	2.1
30.....	34	8.8	13	10	8.8	2.1	.8	.....	.8	4.0	.8	6.7
31.....	14	8.8	.....	16	.....	1.6	1.0	.....	.8	.....	.8	.....

NOTE.—Discharge determined from rating curves applicable as follows: July 1, 1913, to June 18, 1914, poorly defined; June 19, 1914, to June 30, 1915, well defined. Discharge estimated May 31, Aug. 13, 14, and Oct. 30, 1914, by comparison with records of Waikamoi and Puohakamoa streams.

Monthly discharge of Alo Stream near Huelo, Maui, for the years ending June 30 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	14	0.45	2.44	3.78	76	232
August.....	28	.3	2.79	4.32	87	265
September.....	7.1	.45	1.32	2.04	40	122
October.....	9.7	.25	1.77	2.74	55	168
November.....	63	.45	14.8	22.9	443	1,360
December.....	71	.8	6.92	10.7	215	658
January.....	38	.45	6.62	10.2	205	630
February.....	4.8	.2	1.03	1.59	29	89
March.....	30	.1	2.08	3.22	64	198
April.....	30	.65	6.73	10.4	202	620
May.....	70	.55	16.0	24.8	497	1,520
June.....	52	3.9	11.5	17.8	345	1,060
The year.....	71	.1	6.18	9.56	2,260	6,920
1914-15.						
July.....	57	2.6	14.2	22.0	441	1,350
August.....	38	6.7	15.4	23.8	477	1,470
September.....	52	4.8	14.6	22.6	437	1,340
October.....	27	2.1	8.27	12.8	256	787
November.....	62	1.0	9.45	14.6	284	870
December.....	16	1.3	4.01	6.20	124	381
January.....	8.8	.8	1.88	2.97	58	179
February.....	62	.8	7.89	12.2	221	678
March.....	12	.8	3.22	4.98	100	306
April.....	80	.65	8.80	13.6	264	810
May.....	7.7	.8	1.91	2.96	59	182
June.....	27	.65	4.36	6.75	131	401
The year.....	80	.65	7.81	12.9	2,850	8,760

WAIKAMOI STREAM NEAR HUELO, MAUI.

LOCATION.—500 feet above Spreckels ditch intake, and 5 miles by trail east of Huelo post office.

RECORDS AVAILABLE.—December 18, 1910, to June 30, 1915.

GAGE.—Friez water-stage recorder installed October 14, 1913, at new datum, to replace original staff.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge at gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for 100 feet above and below gage; banks high and covered with vegetation. Water drops over a fall at control, which is a rock ledge and probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 5.05 feet at 9.30 a. m. August 4, 1914 (discharge, computed from extension of rating curve, approximately 900 million gallons per day or 1,390 second-feet), minimum stage recorded, 1.08 feet September 28, 1912 (discharge, 0.3 million gallons per day or 0.5 second-foot).

DIVERSIONS.—A small amount of water is diverted by Kula pipe line above station at elevation 4,300 feet.

REGULATION.—None.

UTILIZATION.—Low-water flow is all diverted by ditches of East Maui Irrigation Co. for irrigation of sugar cane.

ACCURACY.—Estimates July 1 to October 13, 1913, while staff gage was in use, fair for low and medium stages; gage-height record reliable and rating curve fairly well defined below 6 million gallons per day; estimates October 14, 1913, to June 30, 1915, based on a well-defined rating curve and continuous gage-height record, are good for all stages.

Discharge measurements of Waikamoi Stream near Huelo, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—July 24	C. T. Bailey.....	^a 1.40	2.9	1.9
Oct. 27	E. O. Christiansen.....	.35	2.2	1.4
Nov. 4	.....do.....	1.49	84	54
8	.....do.....	1.80	163	105
13	C. T. Bailey.....	1.03	26	17
20	.....do.....	1.21	53	35
1914—Apr. 15	.....do.....	.76	9.4	6.9
Aug. 25	.....do.....	1.95	177	114
Sept. 23	.....do.....	2.50	343	222
1915—June 18	H. A. R. Austin.....	.78	9.8	6.3

^a Old gage datum.

Discharge, in million gallons per day, of Waikamoi Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	16	1.4	3.7	-----	1.8	7.1	3.5	27	0.95	4.8	6.0	44
2.....	26	1.2	3.0	-----	7.8	6.1	3.5	3.2	.8	4.0	4.8	23
3.....	9.0	1.3	2.8	-----	105	7.8	4.0	6.0	.8	3.2	12	12
4.....	9.7	1.0	2.1	-----	43	251	4.0	4.8	.8	2.8	123	9.6
5.....	12	.9	1.8	-----	10	110	23	4.0	.8	4.0	58	7.1
6.....	14	1.7	1.6	-----	7.8	92	14	4.0	.8	44	23	7.1
7.....	6.5	3.0	1.7	-----	12	16	12	3.2	.8	23	58	7.1
8.....	5.9	6.2	1.7	-----	120	19	100	3.2	.65	9.6	180	6.0
9.....	4.8	3.5	1.7	-----	162	12	100	2.8	1.6	6.0	39	20
10.....	4.1	4.9	1.6	-----	69	8.4	14	2.8	7.1	6.0	20	14
11.....	3.9	3.7	1.3	-----	23	7.1	7.1	2.8	2.3	4.0	17	7.1
12.....	4.5	27	2.1	-----	67	6.5	44	2.3	1.6	6.0	9.6	14
13.....	7.1	10	1.9	-----	19	6.1	107	2.3	4.8	12	31	20
14.....	5.7	9.0	2.1	-----	12	34	27	2.3	3.2	9.6	14	20
15.....	4.4	20	1.9	4.9	12	23	14	2.0	2.0	6.0	9.6	14
16.....	3.7	7.1	2.3	4.0	92	12	23	2.0	1.3	4.0	9.6	17
17.....	3.2	5.9	5.0	3.4	70	16	35	2.0	17	4.0	35	27
18.....	2.8	4.9	24	2.6	121	34	9.6	1.6	4.0	3.2	212	27
19.....	2.5	3.7	11	2.7	105	10	6.0	1.6	2.3	68	107	100
20.....	2.3	4.0	6.5	2.5	37	9.0	4.8	1.3	2.0	76	201	35
21.....	3.7	3.7	4.7	2.6	23	7.8	6.0	1.3	1.3	92	74	12
22.....	2.3	3.0	3.5	2.1	13	6.5	53	1.3	1.6	80	14	27
23.....	2.1	2.5	2.6	1.8	14	6.1	9.6	1.3	1.6	201	9.6	14
24.....	2.3	2.5	1.5	1.7	120	5.5	4.8	1.3	4.0	53	9.6	14
25.....	2.1	2.0	.9	1.6	36	5.1	4.0	.95	4.8	48	7.1	141
26.....	2.3	2.1	.8	1.7	41	4.7	4.0	.95	86	39	17	80
27.....	2.1	4.1	.8	1.7	23	4.4	3.2	.95	23	20	23	58
28.....	1.9	3.6	.9	1.7	14	4.8	20	.95	7.1	14	39	20
29.....	1.7	2.5	.8	1.5	11	3.9	27	-----	39	9.6	17	12
30.....	1.6	1.9	.6	1.3	7.8	3.6	17	-----	12	7.1	12	23
31.....	1.6	4.4	-----	1.4	-----	3.5	17	-----	4.8	-----	9.6	-----
1914-15.												
1.....	23	17	-----	39	63	17	3.2	3.2	4.0	2.8	12	1.3
2.....	20	14	-----	39	17	14	7.1	2.8	4.0	2.0	9.6	1.6
3.....	17	27	-----	39	9.6	14	4.8	2.3	6.0	2.3	12	2.3
4.....	31	366	-----	31	7.1	27	27	2.0	20	2.0	7.1	1.3
5.....	23	53	-----	74	7.1	23	44	68	7.1	1.6	4.8	.95
6.....	17	27	-----	86	6.0	14	12	9.6	7.1	1.6	4.0	7.1
7.....	14	23	-----	71	4.0	9.6	4.8	4.8	7.1	1.3	3.2	4.0
8.....	14	23	-----	56	3.2	6.0	4.0	4.8	12	1.6	3.2	4.8
9.....	9.6	14	-----	42	2.8	9.6	4.0	4.0	7.1	14	4.8	3.2
10.....	7.1	58	-----	27	3.2	20	3.2	20	4.8	31	12	12
11.....	6.0	68	-----	17	2.8	17	39	80	4.0	58	6.0	2.8
12.....	23	23	-----	14	2.3	20	48	150	3.2	35	4.0	3.2
13.....	20	44	-----	12	2.0	35	23	86	12	17	4.0	2.0
14.....	14	58	-----	7.1	39	63	12	23	35	9.6	3.2	4.0
15.....	14	44	-----	9.6	48	31	4.0	14	23	12	3.2	4.8
16.....	12	23	-----	7.1	14	12	2.8	20	9.6	132	2.8	23
17.....	11	93	-----	6.0	12	9.6	2.3	31	6.0	53	2.8	31
18.....	9.0	48	-----	6.0	9.6	6.0	2.3	31	4.8	17	2.3	35
19.....	7.1	48	-----	7.1	123	4.8	2.3	31	4.0	14	2.3	150
20.....	6.0	63	-----	7.1	39	14	2.0	39	3.2	9.6	2.3	48
21.....	4.8	86	-----	9.6	12	14	2.8	160	3.2	17	2.0	27
22.....	7.1	-----	-----	4.8	9.6	6.0	3.2	68	2.8	27	2.3	17
23.....	8.0	-----	-----	4.0	7.1	3.2	2.3	35	2.3	12	2.0	12
24.....	28	-----	20	4.0	115	17	2.0	20	2.3	12	1.6	8.0
25.....	100	-----	12	3.2	48	31	2.0	14	2.3	53	1.6	17
26.....	160	-----	12	4.8	20	7.1	1.6	12	2.3	80	1.3	12
27.....	141	-----	12	17	100	6.0	1.6	7.1	2.0	170	1.3	9.6
28.....	190	-----	48	4.8	353	23	1.3	4.8	2.0	58	1.3	6.0
29.....	86	-----	68	6.0	123	14	1.3	-----	1.6	53	1.3	4.0
30.....	115	-----	44	9.6	44	6.0	1.3	-----	1.3	20	1.3	14
31.....	35	-----	-----	48	-----	4.0	2.3	-----	1.6	-----	1.3	-----

NOTE.—Discharge determined from rating curves applicable as follows: July 1 to Oct. 13, 1913, fairly well defined below 6 million gallons per day (9 second-feet); Oct. 14, 1913, to June 30, 1915, well defined below 300 million-gallons per day (464 second-feet). Discharge estimated Nov. 7, 8, 1913, Jan. 1-3, Apr. 20, 21, July 16-18, 23-25, Oct. 2, 7-9, 1914, and June 23-25, 1915, by comparison with record of Puohakamoa and Alo streams. No records Oct. 1-14, 1913, and Aug. 22 to Sept. 23, 1914.

Monthly discharge of Waikamoi Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	26	1.6	5.54	8.57	172	527
August.....	27	.9	4.93	7.63	153	469
September.....	24	.6	3.23	5.00	97	297
October 15-31.....	4.9	1.3	2.31	3.57	39	121
November.....	162	1.8	46.6	72.1	1,400	4,290
December.....	251	3.5	24.0	37.1	743	2,280
January.....	107	3.2	23.3	36.1	721	2,220
February.....	27	.95	3.22	4.98	90	277
March.....	86	.65	7.77	12.0	241	739
April.....	201	2.8	28.8	44.6	864	2,650
May.....	212	4.8	45.2	69.9	1,400	4,300
June.....	141	6.0	27.7	42.9	832	2,550
1914-15.						
July.....	190	4.8	37.8	58.5	1,170	3,600
August 1-21.....	366	14	58.1	89.9	1,220	3,740
September 24-30.....	68	12	30.9	47.8	216	664
October.....	86	3.2	23.0	35.6	713	2,190
November.....	353	2.0	41.5	64.2	1,250	3,820
December.....	63	3.2	16.1	24.9	498	1,530
January.....	48	1.3	8.82	13.6	274	839
February.....	160	2.0	33.8	52.3	947	2,900
March.....	35	1.3	6.70	10.4	208	637
April.....	170	1.3	30.6	47.3	919	2,820
May.....	12	1.3	3.96	6.13	123	377
June.....	150	1.3	15.6	24.1	469	1,440

OOPUOLA STREAM NEAR HUELO, MAUI.

LOCATION.—About 400 feet above Spreckels ditch crossing, 2 miles by trail east of Huelo.

RECORDS AVAILABLE.—December 16, 1910, to June 30, 1915.

GAGE.—Vertical staff on right bank; read once daily.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel at gage is a small pool in solid rock at foot of rapids; banks nearly vertical and clean to above high water. Control is rock ledge and large boulders; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 4.50 feet at 7 a. m. April 27, 1915 (approximate discharge, 134 million gallons per day, or 207 second-feet); minimum stage recorded, 0.72 foot at 1 p. m. April 8, 1915 (discharge, 0.2 million gallons per day, or 0.3 second-foot). Discharge of 0.1 second-foot November 25, 1912, published in Water-Supply Paper 336 (p. 172) is in error owing to unreliable gage height; correct discharge for that date is 2.6 second-feet.

DIVERSIONS.—Part of flow is diverted by New Hamakua ditch above station.

REGULATION.—Practically none.

UTILIZATION.—Normal flow of stream is diverted by ditches of East Maui Irrigation Co. for irrigation of sugar cane.

ACCURACY.—Estimates for periods of low, steady flow are fair, but are poor for medium and high stages, which are fluctuating, as the gage was read only once daily.

Discharge measurements of Oopuola Stream near Huelo, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—Nov. 12	C. T. Bailey	2.29	24	16
1914—Aug. 27	.....do.....	2.30	27	17
.....Oct. 26	.....do.....	1.71	9.6	6.2
1915—June 18	H. A. R. Austin	1.18	1.6	1.1

Discharge, in million gallons per day, of Oopuola Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	11	0.4	0.45	0.45	0.45	3.1	0.5	12	0.35	1.0	1.6	24
2.....	14	.4	.45	.45	1.2	1.3	.4	7.6	.35	.5	1.3	18
3.....	7.8	.4	.45	.45	2.1	7.8	.4	6.2	.35	.5	33	16
4.....	1.4	.4	.45	.45	7.1	9.7	1.8	1.0	.4	.5	65	6.2
5.....	1.3	.4	.45	.9	2.2	21	1.2	1.0	.35	33	24	10
6.....	1.2	.45	.45	1.4	1.6	39	.65	.8	.4	65	12	11
7.....	1.3	2.5	.45	1.9	.5	21	.65	.8	.35	4.3	65	11
8.....	1.2	.8	.45	17	43	2.8	46	.65	.35	2.5	104	11
9.....	1.0	.65	.45	1.3	27	2.6	7.6	.5	.35	1.0	16	14
10.....	.8	.6	.45	.5	12	2.3	3.0	.5	1.0	1.0	14	12
11.....	.7	.5	.45	.5	16	1.7	5.3	.5	.5	1.0	12	10
12.....	.6	4.1	.45	1.0	17	2.5	7.6	.5	.5	5.5	4.9	16
13.....	.65	4.1	.45	1.6	9.7	1.7	12	.5	2.2	18	24	18
14.....	.8	4.3	.45	9.7	6.5	6.0	6.2	.5	.4	16	22	13
15.....	.7	22	.45	1.0	5.5	10	5.5	.45	.4	10	12	7.6
16.....	.65	3.4	.8	.7	5.9	12	6.8	.4	.4	6.2	12	6.8
17.....	.5	2.2	.8	.65	6.5	12	11	.35	3.4	1.0	33	11
18.....	.5	.9	7.1	.5	43	14	7.6	.35	.65	.8	54	14
19.....	.5	.8	2.8	.45	7.8	2.8	4.3	.3	.5	11	28	28
20.....	.5	.6	.8	.45	5.8	2.2	1.3	.3	.5	22	44	16
21.....	.6	.6	.65	.45	12	1.7	1.3	.35	.5	24	25	15
22.....	.45	.5	.5	.45	7.1	1.2	28	.35	45	16	11	18
23.....	.45	.5	.45	.45	9.0	1.2	3.4	.35	.4	49	8.4	7.6
24.....	.45	.5	.45	.45	10	1.2	1.3	.35	1.6	16	10	16
25.....	.45	.45	.45	.45	7.8	.95	1.2	.35	1.3	9.2	10	74
26.....	.45	.45	.45	.45	7.8	.8	1.0	.35	65	8.8	13	30
27.....	.45	1.9	.45	.45	9.0	.8	.8	.35	7.6	8.4	12	28
28.....	.45	.5	.45	.45	9.0	.7	3.0	.35	3.4	10	22	18
29.....	.45	.5	.45	.45	7.1	.65	8.4	.....	54	9.2	15	8.4
30.....	.45	.45	.45	.45	5.1	.6	8.4	.....	1.3	1.8	16	14
31.....	.45	.5	.....	.45	.....	.6	8.4	.....	1.3	.....	20	.....

Discharge, in million gallons per day, of Oopuola Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	20	19	14	16	16	10	6.0	0.35	0.8	0.3	30	0.5
2.....	16	12	44	15	10	11	7.6	.35	.5	.25	28	.5
3.....	18	16	14	14	7.6	12	7.6	.35	.5	.3	25	.5
4.....	19	54	13	15	5.5	10	7.6	.3	6.2	.3	26	.5
5.....	20	19	15	16	5.5	11	10	6.8	3.0	.25	3.4	.5
6.....	22	12	14	16	1.0	6.2	6.8	.4	1.3	.3	28	.6
7.....	20	18	14	15	.8	1.3	.5	.4	1.3	.2	9.2	.65
8.....	19	13	14	14	.65	9.2	.5	.35	1.3	.2	29	.65
9.....	16	10	13	42	.5	13	.5	.35	.65	10	49	.65
10.....	16	15	13	16	.5	11	5.8	4.3	.5	36	14	.8
11.....	10	28	14	13	.4	8.4	11	1.3	.5	25	1.8	.5
12.....	14	44	15	10	.4	10	.65	12	.5	14	1.8	.65
13.....	19	40	20	10	.35	10	.8	12	.5	8.4	1.8	1.0
14.....	19	24	25	10	.65	10	.5	7.1	8.2	1.8	1.8	1.3
15.....	34	26	24	10	8.8	11	.4	2.2	16	1.8	1.3	1.0
16.....	14	22	24	11	11	10	.4	.8	1.3	44	1.3	12
17.....	11	19	14	10	46	7.6	.4	.8	1.3	49	1.3	16
18.....	10	16	24	10	1.6	6.8	.35	6.8	.8	30	.8	1.8
19.....	7.4	19	25	11	12	6.2	.35	6.8	.5	11	.8	54
20.....	4.8	19	20	10	10	6.2	.35	10	.5	10	.8	32
21.....	2.2	22	14	12	10	.5	.3	6.9	.45	12	.8	10
22.....	10	12	15	10	5.6	.5	.4	3.8	.4	11	1.0	12
23.....	16	13	40	6.7	1.3	.65	.4	3.8	.4	12	.8	11
24.....	20	14	16	3.4	16	.5	.4	6.2	.4	36	.65	4.3
25.....	22	15	14	3.8	10	.75	.35	3.4	.4	50	.5	8.4
26.....	32	25	14	4.3	10	1.0	.35	1.8	.4	65	.5	4.3
27.....	27	13	14	6.8	16	1.8	.35	2.2	.4	134	.5	5.4
28.....	22	15	14	4.3	19	2.5	.35	.8	.35	22	.5	.65
29.....	28	16	18	5.5	19	6.8	.35	.....	.35	19	.5	.65
30.....	26	16	19	4.3	19	5.5	.3	.....	.25	28	.5	12
31.....	25	16	.....	22	.....	4.3	.3	.....	.3	.....	.5	.....

NOTE.—Discharge determined from a rating curve fairly well defined below 30 million gallons per day (46 second-feet). Gage was not read on Sundays; discharge interpolated. Highwater measurements above 30 million gallons per day have not been made to confirm extension of rating curve.

Monthly discharge of Oopuola Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	14	0.45	1.68	2.60	52	160
August.....	22	.4	1.83	2.83	57	174
September.....	7.1	.45	.79	1.22	24	73
October.....	17	.45	1.49	2.31	46	142
November.....	43	.45	10.2	15.8	305	939
December.....	39	.6	6.00	9.28	186	571
January.....	46	.4	6.29	9.73	195	598
February.....	12	.3	1.36	2.10	38	117
March.....	65	.35	4.86	7.52	151	462
April.....	65	.5	11.9	18.4	357	1,100
May.....	104	1.3	24.0	37.1	744	2,280
June.....	74	6.2	16.8	26.0	503	1,550
The year.....	104	.3	7.28	11.3	2,660	8,170
1914-15.						
July.....	34	2.2	18.0	27.9	559	1,710
August.....	34	10	20.1	31.1	622	1,910
September.....	44	13	18.4	28.5	551	1,690
October.....	42	3.4	11.8	18.3	367	1,120
November.....	46	.35	8.84	13.7	265	814
December.....	13	.5	6.64	10.3	206	632
January.....	11	.3	2.42	3.74	75	230
February.....	12	.3	3.66	5.66	103	314
March.....	16	.25	1.62	2.51	50	154
April.....	134	.2	21.1	32.6	632	1,940
May.....	49	.5	8.45	13.1	262	804
June.....	54	.5	6.49	10.0	195	598
The year.....	134	.2	10.6	16.4	3,890	11,900

NAILILIIHAELE STREAM NEAR HUELO, MAUI.

LOCATION.—300 feet above New Hamakua ditch, about 3 miles south of Huelo.

RECORDS AVAILABLE.—October 8, 1913, to June 30, 1915; also at old staff-gage station below New Hamakua from December 9, 1910, to December 31, 1912.

GAGE.—Barrett and Lawrence water-stage recorder installed October 8, 1913.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge 150 feet below gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for 100 feet above and below gage; stream bed is very rough and steep; banks steep and high and covered with dense vegetation. Control composed of large boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 5.5 feet at 6.30 a. m. May 8, 1914 (discharge, computed from extension of rating curve, approximately 1,400 million gallons per day, or 2,170 second-feet); minimum stage recorded, 0.73 foot October 29 to November 1, 1913 (discharge, 2.3 million gallons per day, or 3.6 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Normal flow is diverted by ditches of East Maui Irrigation Co. for irrigation of sugar cane.

ACCURACY.—Estimates October 8, 1913, to November 28, 1914, based on a well-defined rating curve and continuous gage-height record; good for all stages. Rating curve after shift of November 28, 1914, not so well defined; estimates November 29, 1914, to June 30, 1915, fair for all stages.

Discharge measurements of Naililiihaele Stream near Huelo, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons. per day.
1913—Oct. 2	E. O. Christiansen	0.86	6.9	4.5
9	do	1.17	27	17
Nov. 3	do	1.58	53	34
13	C. T. Bailey.....	1.70	68	44
18	do	2.38	174	112
19	do	3.30	514	332
1914—Mar. 13	do	1.30	24	15
May 22	do	1.85	62	40
1915—June 14	H. A. R. Austin	1.17	14	9.1

Discharge, in million gallons per day, of Nailikihale Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.					2.3	21	8.4	50	6.5	13	34	102
2.					8.4	24	9.7	31	6.5	19	24	68
3.					102	42	9.7	28	6.5	20	50	50
4.					67	436	9.7	24	6.5	20	421	37
5.					23	158	28	24	8.1	30	150	31
6.					18	103	21	19	8.1	115	73	40
7.					17	46	24	17	11	60	150	37
8.					101	187	59	204	15	9.7	31	650
9.					21	236	40	96	13	11	31	116
10.					9.7	162	31	37	13	13	21	68
11.					9.0	72	26	26	13	8.1	21	68
12.					7.8	103	24	84	9.7	6.5	31	50
13.					32	59	21	124	13	21	50	124
14.					27	28	93	37	9.7	13	46	63
15.					12	24	46	31	9.7	5.2	31	46
16.					9.0	29	30	43	9.7	3.9	26	43
17.					7.8	43	41	132	9.7	43	24	124
18.					5.5	145	71	40	8.1	11	19	560
19.					5.2	178	32	31	8.1	8.1	181	256
20.					5.2	79	26	28	8.1	6.5	132	366
21.					5.2	59	22	28	8.1	5.2	170	170
22.					5.2	31	20	90	6.5	5.2	90	58
23.					4.8	25	17	40	5.2	5.2	384	43
24.					4.4	67	16	28	6.5	6.5	102	37
25.					4.2	69	15	28	6.5	11	102	34
26.					3.4	90	12	26	5.2	170	124	43
27.					3.2	56	8.4	28	6.5	50	63	63
28.					3.2	34	8.4	58	6.5	26	46	68
29.					2.3	28	7.8	40	.....	58	40	50
30.					2.3	23	7.8	43	.....	21	34	40
31.					2.3	.....	7.1	46	.....	15	.....	37
1914-15.												
1.		50	58	96	160	35	14	8.0	14	8.0	18	4.5
2.		46	54	96	46	35	16	8.0	14	6.8	18	4.5
3.		73	90	78	37	35	16	6.8	27	6.8	18	4.5
4.		300	90	63	31	53	58	6.8	42	6.8	16	4.5
5.		150	102	116	31	38	45	49	20	6.8	14	4.5
6.		90	332	124	28	27	22	14	18	6.8	14	5.5
7.		63	78	96	24	24	18	11	18	5.5	12	5.5
8.		54	154	78	21	22	18	11	24	5.5	11	6.2
9.		43	43	270	21	20	16	9.5	18	14	11	6.9
10.		141	37	96	21	30	14	30	14	38	35	7.6
11.		192	54	54	19	22	42	32	14	80	18	8.3
12.		54	78	43	19	20	22	140	12	53	14	9.0
13.		116	90	37	17	38	16	73	27	18	11	9.6
14.		141	115	34	84	94	14	32	49	16	11	10
15.		96	190	31	102	49	11	20	58	11	11	11
16.		54	240	31	40	24	11	20	24	102	9.5	18
17.		160	100	31	31	20	9.5	18	18	68	9.5	30
18.		84	225	31	28	18	9.5	24	16	30	8.0	27
19.		102	181	34	102	18	9.5	32	14	20	8.0	130
20.		102	242	31	58	16	9.5	42	14	18	6.8	68
21.		102	73	40	31	16	9.5	348	12	16	6.8	45
22.		46	109	68	28	16	11	130	11	18	6.8	30
23.		31	132	84	26	14	9.5	73	11	32	6.8	22
24.		73	96	50	24	109	11	8.0	42	9.5	22	6.8
25.		141	58	43	24	68	45	8.0	24	9.5	32	5.5
26.		181	102	37	24	40	18	8.0	20	9.5	130	5.5
27.		242	78	34	37	132	16	6.8	18	8.0	265	5.5
28.		366	78	54	24	384	14	5.5	16	8.0	86	5.5
29.		229	73	109	28	160	53	5.5	.....	6.8	45	5.5
30.		216	58	84	24	68	16	5.5	.....	6.8	27	4.5
31.		124	84	.....	84	.....	14	5.5	.....	5.5	.....	4.5

NOTE.—Discharge determined from rating curves applicable as follows: Oct. 8, 1913, to Nov. 28, 1914, well defined; Nov. 29, 1914, to June 30, 1915, fairly well defined below 50 million gallons per day (77 second-feet). Discharge estimated Apr. 3-7, June 14-18, 29, 30, and Sept. 14-18, 1914, and June 8-14, 1915, by comparison with record of Kailua Stream. No record July 1 to 21, 1914.

Monthly discharge of Nailiilihaele Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
October 8-31.....	101	2.3	12.2	18.9	293	899
November.....	236	2.3	68.8	106	2,060	6,330
December.....	436	7.1	48.8	75.5	1,510	4,640
January.....	204	8.4	47.7	73.8	1,480	4,540
February.....	50	5.2	13.7	21.2	384	1,180
March.....	170	3.9	18.9	29.2	586	1,800
April.....	384	13	69.2	107	2,080	6,370
May.....	650	24	132	204	4,080	12,600
June.....	440	30	71.6	111	2,150	6,590
The period.....					14,620	44,900
1914-15.						
July 22-31.....	366	31	165	255	1,650	5,060
August.....	300	43	99.4	154	3,080	9,460
September.....	332	34	106	164	3,190	9,760
October.....	270	24	59.1	91.4	1,830	5,620
November.....	384	17	65.5	101	1,970	6,030
December.....	94	14	28.2	43.6	874	2,680
January.....	58	5.5	15.3	23.7	471	1,460
February.....	348	6.8	44.9	69.5	1,260	3,860
March.....	58	5.5	17.8	27.5	553	1,690
April.....	265	5.5	39.8	61.6	1,190	3,660
May.....	35	4.5	10.9	16.9	338	1,040
June.....	130	4.5	20.4	31.6	613	1,880
The period.....					17,000	52,200

KAILUA STREAM NEAR HUELO, MAUI.

LOCATION.—About 800 feet above New Hamakua ditch crossing, 1 mile south of Huelo.

RECORDS AVAILABLE.—June 17, 1913, to June 30, 1915.

GAGE.—Barrett and Lawrence water-stage recorder installed October 1, 1913, at same location and datum as original staff gage, which was read twice daily.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge at gage.

CHANNEL AND CONTROL.—Channel at gage is a large, deep pool with high, sloping banks, at foot of low waterfall. Control at outlet of pool is solid rock ledge and large boulders; will seldom shift.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 5.85 feet at 1.30 p. m. December 4, 1913 (discharge, computed from extension of the rating curve, approximately 450 million gallons per day, or 696 second-feet); minimum stage recorded, 1.0 foot March 5 and 6, 1914 (discharge, 0.6 million gallons per day, or 0.9 second-foot).

DIVERSIONS.—A small amount of water is diverted by Old Hamakua ditch above station and is dropped into Oanui Stream.

REGULATION.—None.

UTILIZATION.—Normal flow of stream is diverted by ditches of East Maui Irrigation Co. for irrigation of sugar cane.

ACCURACY.—Estimates fair for all stages; measuring conditions are not of the best, but fairly good rating curves have been developed.

Discharge measurements of Kailua Stream near Huelo, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—Aug. 26	E. O. Christiansen	1.23	44	2.8
Oct. 2	do	1.14	3.0	1.9
9	do	1.53	19	13
Nov. 3	do	2.60	74	48
13	C. T. Bailey	2.03	37	24
18	do	3.42	188	122
19	do	3.90	270	174
1914—Apr. 10	do	1.40	9.8	6.4
May 22	do	2.11	48	31
1915—June 14	H. A. R. Austin	1.35	11	7.1

Discharge, in million gallons per day, of Kailua Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1	29	7.1	4.0	-----	2.6	14	3.3	21	1.4	8.2	7.1	53
2	96	2.1	3.4	-----	19	13	4.1	23	1.4	4.1	7.1	25
3	18	1.9	3.4	-----	88	14	3.3	18	1.0	5.0	20	18
4	30	1.9	3.2	-----	42	286	4.1	12	1.0	4.1	180	16
5	21	1.9	2.6	-----	14	169	18	9.4	.6	7.1	79	14
6	27	2.6	2.3	-----	10	67	13	6.0	.6	56	29	14
7	13	27	4.0	-----	20	36	8.2	5.0	1.0	27	36	14
8	7.1	7.8	2.3	39	140	29	83	5.0	1.4	12	234	13
9	4.8	4.0	2.3	8.4	248	17	129	4.1	1.4	8.2	67	21
10	5.7	4.0	2.3	4.0	120	11	27	5.0	4.1	5.0	27	23
11	5.7	3.2	2.1	3.6	45	8.4	11	5.0	3.3	4.1	25	14
12	6.1	137	2.1	3.4	72	7.8	20	5.0	2.5	5.0	15	23
13	11	17	2.3	7.8	26	7.1	174	4.1	6.0	9.4	29	19
14	9.0	12	2.3	5.7	14	39	29	4.1	6.0	11	27	16
15	5.7	59	2.3	5.2	12	45	18	4.1	2.5	6.0	13	14
16	4.8	12	3.2	5.0	30	18	20	4.1	2.5	4.1	12	13
17	4.0	6.5	6.5	4.7	68	18	47	4.1	31	4.1	15	31
18	3.7	4.8	72	2.6	203	52	18	4.1	8.2	4.1	253	21
19	3.7	4.7	16	2.6	187	18	11	3.3	4.1	41	119	94
20	3.7	4.3	6.1	2.6	51	13	9.4	3.3	3.3	96	253	67
21	3.4	4.3	4.3	2.1	36	12	8.2	3.3	3.3	96	133	27
22	3.2	4.0	3.4	1.9	19	10	50	2.5	3.3	41	38	29
23	3.0	3.7	3.0	1.9	16	9.0	21	2.0	3.3	210	19	25
24	3.0	3.9	2.8	1.9	112	8.4	11	2.0	2.5	87	16	25
25	2.8	3.4	2.8	1.9	57	7.8	9.4	2.5	2.5	71	13	128
26	3.2	3.4	2.5	1.7	65	7.1	8.2	2.5	12	36	16	138
27	2.8	5.4	2.3	1.7	27	7.1	8.2	2.0	119	29	27	41
28	2.6	4.3	2.3	2.1	21	6.5	11	2.0	60	15	47	36
29	2.6	3.3	2.3	2.3	18	7.8	36	29	29	11	25	21
30	2.3	2.8	2.3	2.5	16	7.1	27	27	27	9.4	19	31
31	2.3	16	2.6	2.6	-----	7.1	23	9.4	-----	18	-----	-----

Discharge, in million gallons per day, of Kailua Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.	31	18	31	56	82	25	7.2	3.5	7.2	5.0	13	3.5
2.	27	14	38	56	19	19	10	4.2	6.5	4.2	13	3.5
3.	25	27	47	36	12	13	8.0	4.2	8.0	4.2	13	3.5
4.	38		108	31	10	29	31	3.5	23	4.2	13	3.5
5.	31		86	74	9.2	25	44	64	12	5.0	12	3.5
6.	25		171	90	8.0	16	13	13	9.2	4.2	10	3.5
7.	21		47	74	8.0	13	10	8.0	9.2	3.0	9.2	3.5
8.	19		25	44	7.2	12	9.2	7.2	13	3.5	9.2	3.0
9.	18		19	90	7.2	10	8.0	5.8	9.2	7.2	9.2	3.0
10.	21		18	38	7.2	21	6.5	13	7.2	18	21	5.8
11.			27	19	7.2	14	29	13	6.5	41	10	4.2
12.			47	14	6.5	18	14	118	6.5	38	7.2	3.5
13.			41	13	6.5	38	9.2	78	16	12	7.2	3.5
14.			56	12	41	56	8.0	29	38	8.0	7.2	5.0
15.			94	10	74	50	7.2	14	34	7.2	7.2	5.8
16.			118	10	19	18	6.5	12	13	29	6.5	14
17.			50	12	12	13	5.8	10	10	53	6.5	25
18.		60	113	10	10	12	5.8	19	9.2	18	6.5	21
19.		64	128	13	90	10	5.0	31	8.0	12	5.8	154
20.		74	90	10	50	12	5.0	21	7.2	10	5.8	64
21.	9.2	104	25	12	16	18	4.2	144	7.2	9.2	5.8	29
22.	14	108	20	10	12	13	5.0	94	6.5	14	5.8	13
23.	31	82	34	9.2	10	9.2	4.2	47	5.8	34	5.0	12
24.	128	50	25	8.0	70	8.0	4.2	23	5.0	27	5.0	12
25.	160	47	16	8.0	82	64	4.2	16	5.0	31	5.0	13
26.	128	67	14	8.0	23	16	4.2	12	5.0	90	5.0	19
27.	128	50	13	25	70	12	4.2	10	5.0	133	4.2	14
28.	242	50	23	12	254	10	4.2	9.2	5.0	53	4.2	12
29.	160	53	118	10	128	47	3.5		5.0	44	4.2	10
30.	160	34	56	12	53	13	3.5		5.0	27	3.5	10
31.		53		53		10	3.5		5.0		3.5	

NOTE.—Discharge determined from fairly well defined rating curves applicable as follows: July 1, 1913, to May 20, 1914; May 21, 1914, to June 30, 1915. Discharge estimated Sept. 21 and 22, 1914, by comparison with record of Nailihilahe Stream. No gage record for periods for which discharge is not given.

Monthly discharge of Kailua Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July	96	2.3	11.0	17.0	340	1,050
August	137	1.9	12.1	18.7	375	1,150
September	72	2.1	5.76	8.99	173	530
October 8-31	39	1.7	4.88	7.55	117	359
November	248	2.6	60.0	92.8	1,800	5,520
December	286	6.5	31.4	48.6	972	2,990
January	174	3.3	27.9	43.2	863	2,650
February	23	2.0	6.02	9.31	168	517
March	119	.0	11.4	17.6	355	1,080
April	210	4.1	30.9	47.8	927	2,840
May	253	7.1	58.7	90.8	1,820	5,580
June	138	13	34.1	52.8	1,020	3,140
1914-15.						
July 1-10, 21-30	242	9.2	70.8	110	1,420	4,350
August 1-3, 18-31	108	14	56.2	87.0	955	2,930
September	171	13	56.6	87.6	1,700	5,210
October	90	8.0	28.4	43.9	879	2,700
November	254	6.5	40.1	62.8	1,200	3,690
December	64	8.0	20.9	32.3	649	1,990
January	44	3.5	9.27	14.3	287	882
February	144	3.5	29.5	45.6	827	2,530
March	38	5.0	10.1	15.6	312	961
April	133	3.0	25.0	38.9	749	2,300
May	21	3.5	7.86	12.2	244	748
June	154	3.0	16.0	24.8	480	1,470

HOOLAWALILII STREAM NEAR HUELO, MAUI.

LOCATION.—400 feet above New Hamakua ditch crossing, about 4 miles by trail west of Huelo.

RECORDS AVAILABLE.—April 5, 1911, to June 30, 1915.

GAGE.—Stevens water-stage recorder installed June 19, 1914, at same location and datum as original staff gage.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge at gage.

CHANNEL AND CONTROL.—Channel at gage is a pool about 100 feet long and 10 feet wide formed by concrete control 12 feet long over which water makes a drop of about 50 feet; banks slope gently and are covered with dense vegetation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 2.30 feet at 8.30 p. m November 27, 1914 (discharge computed from extension of rating curve, approximately 370 million gallons per day, or 570 second-feet); minimum stage recorded, 0.07 foot June 2 and 3, 1913 (discharge 0.85 million gallons per day, or 1.3 second-feet); minimum stage recorded during biennial period, 0.10 foot at 7.30 a. m. March 8, 1914 (discharge, 1.3 million gallons per day, or 2.0 second-feet).

DIVERSION.—None above station.

REGULATION.—None.

ACCURACY.—Estimates good below and fair above 30 million gallons per day.

Discharge measurements of Hoolawalilii Stream near Huelo, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—Aug. 27	E. O. Christiansen	0.16	3.7	2.4
Oct. 2	do .....	.11	2.3	1.5
Nov. 19	C. T. Bailey .....	.51	31	20
1914—Apr. 8	do .....	.29	9.1	5.9
May 22	do .....	.41	19	12
Sept. 22	do .....	.32	11	7.2
1915—June 14	H. A. R. Austin .....	.15	3.5	2.3

Discharge, in million gallons per day, of Hoolawakili Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	5.3	1.7	1.9	1.4	1.4	5.3	2.2	4.8	1.3	3.2	3.2	6.5
2.....	10	1.7	1.9	1.4	1.4	4.9	2.2	3.2	1.3	3.2	3.2	6.5
3.....	5.3	1.7	2.2	2.9	3.2	5.3	2.2	3.2	1.3	3.2	3.2	6.5
4.....	5.3	1.7	1.9	1.7	3.7	26	2.2	3.2	1.3	2.2	28	4.8
5.....	5.3	1.4	1.7	1.7	2.6	25	3.2	3.2	1.3	2.2	23	4.8
6.....	6.1	1.7	1.7	1.9	2.2	23	2.2	3.2	1.3	34	12	4.8
7.....	4.5	2.9	1.9	2.2	1.9	17	2.2	2.2	1.3	9.0	15	4.8
8.....	3.7	1.7	1.9	6.1	14	16	40	2.2	1.3	6.5	38	3.2
9.....	3.7	1.7	2.2	2.6	19	10	6.5	2.2	1.3	4.8	40	4.8
10.....	3.2	1.9	1.7	2.2	15	7.1	4.8	2.2	2.2	3.2	19	4.8
11.....	3.2	1.7	1.7	1.7	14	5.7	3.2	2.2	1.3	3.2	16	4.8
12.....	2.6	15	1.7	1.7	24	5.7	12	2.2	1.3	3.2	6.5	4.8
13.....	3.2	3.7	1.9	4.5	12	5.3	12	2.2	2.2	4.8	28	4.8
14.....	2.9	3.2	1.7	2.6	9.0	10	6.5	2.2	1.3	6.5	12	4.8
15.....	2.6	7.1	1.7	2.2	7.1	7.1	4.8	2.2	1.3	3.2	9.0	3.2
16.....	2.6	4.5	1.7	2.2	7.1	5.3	4.8	2.2	1.3	3.2	6.5	4.8
17.....	2.5	3.2	2.2	2.2	6.1	5.7	13	2.2	9.0	3.2	9.0	6.5
18.....	2.2	3.2	3.7	1.9	15	10	6.5	2.2	2.2	3.2	82	6.5
19.....	2.2	2.9	2.5	1.9	21	5.3	4.8	2.2	2.2	15	34	28
20.....	2.2	2.6	2.2	1.9	14	5.3	4.8	2.2	2.2	19	59	15
21.....	2.2	2.9	1.9	1.9	10	4.9	4.8	1.3	2.2	28	28	9.0
22.....	2.2	2.6	1.9	1.7	8.4	4.5	15	1.3	1.3	12	15	9.0
23.....	2.2	2.6	1.9	1.7	7.1	3.7	6.5	1.3	1.3	82	9.0	6.5
24.....	2.2	2.2	1.7	1.7	10	3.4	3.2	1.3	1.3	19	6.5	9.0
25.....	2.2	2.2	1.7	1.7	9.7	3.2	4.8	1.3	2.2	15	4.8	15
26.....	1.9	2.2	1.7	1.7	14	2.9	3.2	1.3	12	23	6.5	23
27.....	1.9	2.5	1.7	1.7	11	2.9	3.2	1.3	9.0	12	6.5	15
28.....	1.7	2.2	1.7	1.4	8.4	2.6	6.5	1.3	4.8	6.5	9.0	12
29.....	1.7	2.2	1.7	1.4	7.1	2.6	3.2	-----	19	6.5	6.5	9.0
30.....	1.7	2.2	1.7	1.4	6.1	2.5	4.8	-----	4.8	4.8	6.5	9.0
31.....	1.7	2.6	-----	1.4	-----	2.5	4.8	-----	3.2	-----	4.8	-----
1914-15.												
1.....	9.0	12	6.5	15	34	12	3.2	2.2	4.8	2.2	6.5	2.2
2.....	9.0	9.0	15	12	9.0	9.0	3.2	2.2	4.8	2.2	6.5	2.2
3.....	9.0	9.0	12	12	6.5	9.0	3.2	2.2	6.5	2.2	6.5	2.2
4.....	15	40	12	12	6.5	12	6.5	2.2	9.0	2.2	4.8	2.2
5.....	12	34	23	19	4.8	9.0	9.0	3.2	4.8	2.2	4.8	2.2
6.....	12	19	46	19	4.8	6.5	4.8	2.2	4.8	2.2	4.8	2.2
7.....	9.0	12	15	15	4.8	6.5	3.2	2.2	4.8	2.2	4.8	2.2
8.....	6.5	9.0	9.0	12	4.8	4.8	3.2	2.2	6.5	2.2	3.2	2.2
9.....	6.5	9.0	6.5	52	3.2	6.5	3.2	2.2	4.8	2.2	3.2	2.2
10.....	6.5	28	9.0	19	3.2	9.0	3.2	3.2	3.2	6.5	6.5	2.2
11.....	4.8	28	9.0	12	3.2	6.5	4.8	4.8	3.2	19	4.8	2.2
12.....	12	19	15	6.5	3.2	6.5	3.2	15	3.2	12	3.2	2.2
13.....	12	52	19	4.8	3.2	12	3.2	12	4.8	4.8	3.2	2.2
14.....	9.0	40	46	4.8	23	34	3.2	6.5	9.0	4.8	3.2	2.2
15.....	12	23	34	4.8	15	15	3.2	4.8	23	4.8	3.2	2.2
16.....	9.0	19	23	4.8	6.5	9.0	3.2	4.8	6.5	23	3.2	2.2
17.....	6.5	34	12	4.8	6.5	6.5	2.2	4.8	6.5	15	3.2	3.2
18.....	4.8	23	28	4.8	4.8	6.5	2.2	4.8	4.8	9.0	3.2	3.2
19.....	4.8	34	28	4.8	6.5	4.8	2.2	4.8	4.8	6.5	3.2	15
20.....	3.2	28	12	4.8	4.8	6.5	2.2	19	3.2	4.8	3.2	12
21.....	3.2	23	9.0	4.8	4.8	4.8	3.2	91	3.2	4.8	3.2	6.5
22.....	4.8	23	19	4.8	3.2	4.8	3.2	34	3.2	4.8	2.2	6.5
23.....	4.8	28	12	3.2	3.2	4.8	2.2	28	3.2	4.8	2.2	4.8
24.....	12	15	9.0	3.2	19	6.5	2.2	15	3.2	4.8	2.2	4.8
25.....	15	12	6.5	3.2	6.5	6.5	2.2	9.0	3.2	9.0	2.2	4.8
26.....	19	15	6.5	3.2	6.5	4.8	2.2	9.0	3.2	34	2.2	4.8
27.....	28	12	6.5	3.2	59	3.2	2.2	6.5	2.2	59	2.2	4.8
28.....	59	9.0	12	3.2	66	6.5	2.2	6.5	2.2	23	2.2	4.8
29.....	40	9.0	15	4.8	28	4.8	2.2	-----	2.2	12	2.2	4.8
30.....	34	9.0	15	4.8	19	3.2	2.2	-----	2.2	9.0	2.2	6.5
31.....	19	9.0	-----	9.0	-----	3.2	2.2	-----	2.2	-----	2.2	-----

NOTE.—Discharge determined from a rating curve well defined below 30 million gallons per day (46 second-feet). No high-water measurements have been made to confirm the extension of the curve above 30 million gallons per day.

Monthly discharge of Hoolawalili Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-feet (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.....	10	1.7	3.23	5.00	100	307
August.....	15	1.4	2.95	4.56	92	281
September.....	3.7	1.7	1.92	2.97	58	177
October.....	6.1	1.4	2.08	3.22	64	198
November.....	24	1.4	9.52	14.7	286	876
December.....	26	2.5	7.76	12.0	241	738
January.....	40	2.2	6.52	10.7	202	620
February.....	4.8	1.3	2.21	3.42	62	190
March.....	19	1.3	3.20	4.95	99	304
April.....	82	2.2	11.5	17.8	345	1,060
May.....	138	3.2	21.0	32.5	650	2,000
June.....	59	3.2	9.84	15.2	295	906
The year.....	138	1.3	6.83	10.6	2,490	7,660
1914-15.						
July.....	59	3.2	13.3	20.6	411	1,270
August.....	52	9.0	20.8	32.2	645	1,980
September.....	46	6.5	16.4	25.4	490	1,510
October.....	52	3.2	9.40	14.5	291	894
November.....	66	3.2	12.4	19.2	374	1,140
December.....	34	3.2	7.89	12.2	245	751
January.....	9.0	2.2	3.18	4.92	98	303
February.....	91	2.2	10.9	16.9	304	937
March.....	23	2.2	4.94	7.64	153	470
April.....	59	2.2	9.84	15.2	295	906
May.....	6.5	2.2	3.56	5.51	110	339
June.....	15	2.2	4.06	6.28	122	374
The year.....	91	2.2	9.70	15.0	3,540	10,900

HOOLAWANUI STREAM NEAR HUELO, MAUI.

LOCATION.—500 feet above crossing of New Mamakua ditch, about 5 miles by trail west of Huelo.

RECORDS AVAILABLE.—December 12, 1910, to June 30, 1915.

GAGE.—Stevens water-stage recorder installed June 20, 1914, 200 feet upstream from original staff which it replaced, and which was read twice daily; datum of old staff gage was lowered 0.20 foot June 6, 1913.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge at gage.

CHANNEL AND CONTROL.—Stream drops over a low waterfall into a large circular pool with gently sloping banks. Control at outlet of the pool composed of boulders; probably permanent; control at staff gage site an old iron weir set in concrete; also probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 3.90 feet at 3 a. m. November 28, 1914 (discharge, computed from extension of rating curve, approximately 300 million gallons per day, or 465 second-feet); minimum stage recorded, 0.04 foot September and October, 1912 (discharge, 1.0 million gallons per day, or 1.6 second-feet; minimum stage recorded during biennial period, 0.05 foot May and June, 1915 (discharge, 1.1 million gallons per day, or 1.7 second-feet).

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Estimates July 1, 1913, to June 19, 1914, based on a well-defined rating curve and reliable gage-height record of two readings daily; good for low and medium stages and fair for high stages. Estimates June 20, 1914, to June 30, 1915, based on a well-defined rating curve and continuous gage-height record; good for all stages except extreme floods.

Discharge measurements of Hoolawanui Stream near Huelo, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons per day.
1913—Aug. 27	C. T. Bailey.....	a 0.34	4.7	3.0
Oct. 2	E. O. Christiansen.....	a .24	1.8	1.2
Nov. 19	C. T. Bailey.....	a 1.02	63	41
1914—May 22	do.....	1.08	39	25
June 19	do.....	1.30	46	30
Aug. 26	do.....	1.48	64	41
Sept. 22	do.....	.78	22	14
Oct. 25	do.....	.36	6.3	4.1
1915—Feb. 3	do.....	.14	2.3	1.5
June 14	H. A. R. Austin.....	.13	3.0	1.9

a Old staff gage.

Discharge, in million gallons per day, of Hoolawanui Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	8.4	1.5	1.7	1.2	1.2	7.1	3.5	7.2	1.4	3.5	5.0	12
2.....	21	1.5	1.7	1.2	1.4	5.9	2.0	7.2	1.4	3.5	5.0	9.5
3.....	6.5	1.6	1.7	2.6	9.7	8.4	2.0	5.0	1.4	3.5	5.0	7.2
4.....	7.1	1.5	1.6	1.5	11	72	2.0	5.0	1.4	3.5	54	5.0
5.....	5.9	1.5	1.5	1.2	3.2	53	7.2	5.0	1.4	3.5	33	5.0
6.....	7.8	1.7	1.5	1.6	3.2	40	3.5	5.0	1.4	33	18	7.2
7.....	5.9	3.2	1.7	1.7	2.6	23	3.5	3.5	1.4	12	27	5.0
8.....	5.2	1.7	1.5	12	30	23	58	3.5	1.4	7.2	125	5.0
9.....	4.5	1.5	1.5	2.6	61	16	15	3.5	2.0	5.0	44	9.5
10.....	4.2	1.6	1.5	1.9	40	10	9.5	3.5	2.0	5.0	24	7.2
11.....	3.9	1.5	1.5	1.7	31	9.7	7.2	3.5	1.4	5.0	15	5.0
12.....	3.9	21	1.5	1.6	36	9.0	27	2.0	1.4	5.0	12	9.5
13.....	4.2	4.8	1.5	4.5	16	8.4	40	2.0	3.5	5.0	40	5.0
14.....	4.2	3.6	1.5	3.3	11	26	15	3.5	2.0	9.5	21	7.2
15.....	3.9	19	1.4	1.7	9.7	14	9.5	2.0	1.4	5.0	12	5.0
16.....	3.2	5.9	1.5	1.7	10	11	12	2.0	1.4	3.5	9.5	7.2
17.....	2.9	5.6	2.3	1.7	10	12	33	2.0	27	3.5	24	9.5
18.....	2.6	4.2	5.9	1.6	43	25	12	2.0	2.0	5.0	145	12
19.....	2.6	3.2	3.2	1.5	53	11	9.5	2.0	2.0	27	47	33
20.....	2.3	3.2	1.7	1.5	25	8.4	9.5	2.0	2.0	21	92	19
21.....	1.9	3.2	1.7	1.5	19	7.8	5.0	2.0	2.0	40	47	13
22.....	1.9	2.6	1.5	1.5	15	6.5	40	2.0	1.4	21	27	14
23.....	1.9	2.3	1.5	1.4	11	5.9	12	2.0	1.4	110	21	12
24.....	1.8	1.9	1.5	1.4	28	5.2	9.5	2.0	2.0	30	15	13
25.....	1.7	1.9	1.4	1.4	21	5.2	7.2	1.4	2.0	27	9.5	74
26.....	1.7	1.9	1.4	1.4	23	4.5	7.2	1.4	24	27	12	32
27.....	1.7	2.3	1.4	1.4	18	4.2	5.0	1.4	9.5	18	12	23
28.....	1.7	1.9	1.4	1.4	13	3.9	12	1.4	5.0	12	18	18
29.....	1.6	1.8	1.4	1.4	11	3.9	7.2	.....	30	9.5	12	13
30.....	1.6	1.7	1.4	1.2	8.4	3.2	7.2	.....	7.2	7.2	9.5	16
31.....	1.6	1.9	.....	1.2	.....	3.2	7.2	.....	5.0	.....	9.5	.....

Discharge, in million gallons per day, of Hoolawamui Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.	16	23	12	26	37	19	5.0	2.2	5.9	2.8	10	1.1
2.	16	16	21	28	13	14	5.9	1.8	5.9	2.2	9.0	1.1
3.	13	18	14	23	9.0	13	4.2	1.8	6.8	2.2	9.0	1.1
4.	19	55	21	19	7.9	16	13	1.8	10	1.8	7.9	1.1
5.	16	47	30	30	6.8	13	16	12	5.9	1.8	6.8	1.1
6.	16	26	47	35	5.9	10	7.9	2.8	5.0	1.4	5.9	1.1
7.	13	23	19	30	5.0	9.0	6.8	2.8	5.9	1.4	5.0	1.1
8.	13	18	14	24	5.0	7.9	5.9	2.2	6.8	1.4	5.0	1.1
9.	12	13	12	47	4.2	9.0	5.0	2.2	5.0	2.8	5.0	1.1
10.	12	30	12	26	4.2	10	5.0	6.8	5.0	6.8	10	1.4
11.	10	37	12	16	3.4	7.9	12	6.8	4.2	19	6.8	1.4
12.	19	19	24	13	3.4	9.0	5.9	30	4.2	18	4.2	1.1
13.	18	37	21	10	2.8	16	5.0	19	7.9	5.9	4.2	1.1
14.	14	44	44	9.0	21	28	5.0	10	14	4.2	3.4	1.4
15.	18	32	37	7.9	26	18	4.2	7.9	18	4.2	3.4	1.1
16.	13	23	35	7.9	10	13	4.2	6.8	7.9	26	3.4	2.2
17.	10	47	21	6.8	7.9	10	3.4	6.8	6.8	18	3.4	3.4
18.	9.0	35	37	7.9	6.8	7.9	3.4	7.9	5.9	9.0	2.8	5.0
19.	7.9	40	58	7.9	21	6.8	3.4	7.9	5.0	6.8	2.8	28
20.	6.8	37	24	6.8	18	7.9	2.8	16	5.0	5.9	2.8	16
21.	5.9	44	18	7.9	9.0	7.9	3.4	67	4.2	5.0	2.2	10
22.	7.9	44	21	5.9	7.9	5.9	3.4	40	4.2	7.9	2.2	6.8
23.	6.8	37	19	5.0	6.8	5.9	2.8	28	3.4	12	2.2	5.9
24.	14	28	13	5.0	32	10	2.8	16	3.4	6.8	1.8	5.0
25.	35	21	10	4.2	21	12	2.2	12	3.4	14	1.8	6.8
26.	44	26	10	4.2	13	6.8	2.2	10	2.8	40	1.8	5.9
27.	55	19	9.0	6.8	37	5.9	2.2	7.9	2.8	47	1.4	4.2
28.	77	18	13	4.2	103	13	2.2	6.8	2.8	28	1.4	4.2
29.	61	16	28	5.0	58	9.0	2.2	2.2	2.2	19	1.4	3.4
30.	58	14	23	5.0	32	6.8	1.8	2.2	2.2	13	1.4	6.8
31.	40	18	-----	18	-----	5.9	2.8	-----	2.8	-----	1.1	-----

NOTE.—Discharge determined from rating curves applicable as follows: July 1, 1913, to June 19, 1914, and June 20, 1914, to June 30, 1915; both well defined below 60 million gallons per day (93 second-feet).

Monthly discharge of Hoolawamui Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915.

Month	Discharge.				Total run-off.	
	Million gallons per day.			Second-feet (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913-14.						
July.	21	1.6	4.17	6.45	129	397
August.	21	1.5	3.64	5.63	113	346
September.	5.9	1.4	1.75	2.71	52	161
October.	12	1.2	2.02	3.12	62	192
November.	61	1.2	19.2	29.7	575	1,770
December.	72	3.2	14.4	22.3	446	1,370
January.	58	2.0	12.9	20.0	400	1,230
February.	7.2	1.4	3.04	4.70	85	261
March.	30	1.4	4.80	7.43	149	457
April.	110	3.5	15.7	24.3	471	1,450
May.	145	5.0	30.6	47.3	950	2,910
June.	74	5.0	13.8	21.3	423	1,270
The year.	145	1.2	10.5	16.2	3,840	11,800
1914-15.						
July.	77	5.9	21.8	33.7	676	2,070
August.	55	13	29.2	45.2	905	2,780
September.	58	9.0	22.6	35.0	679	2,080
October.	47	4.2	14.6	22.6	452	1,390
November.	103	2.8	17.9	27.7	538	1,650
December.	28	5.9	10.8	16.7	334	1,030
January.	16	1.8	4.90	7.58	152	466
February.	67	1.8	12.3	19.0	343	1,060
March.	18	2.2	5.65	8.74	175	538
April.	47	1.4	11.1	17.2	334	1,020
May.	10	1.1	4.18	6.47	130	398
June.	28	1.1	4.37	6.76	131	402
The year.	103	1.1	13.3	20.6	4,850	14,900

HONOPOU STREAM NEAR HUELO, MAUI.

LOCATION.—200 feet above New Hamakua ditch crossing, about 6 miles west of Huelo.

RECORDS AVAILABLE.—December 10, 1910, to June 30, 1915.

GAGE.—Stevens water-stage recorder, installed June 19, 1914, at same location and datum as original staff, which was read twice daily.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge at gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for 50 feet above and below gage; right bank overflows in floods; left bank steep and high. Control is an old iron weir set in concrete; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 2.30 feet at 6.30 a. m. May 8, 1914 (discharge, computed from extension of rating curve, approximately 60 million gallons per day or 93 second-feet); minimum stage recorded, 0.4 foot September and October, 1912 (discharge, 0.4 million gallons per day or 0.6 second-foot). Minimum stage recorded during biennial period, 0.6 foot September, October, and November, 1913 (discharge 0.6 million gallons per day, or 0.9 second-foot).

DIVERSIONS.—None above station.

REGULATION.—None.

UTILIZATION.—Ordinary flow is diverted by ditches of East Maui Irrigation Co. for irrigation of sugar cane.

ACCURACY.—Estimates below 20 million gallons per day based on a well-defined rating curve and are good; flood estimates are fair; gage-height record reliable until June 18, 1914. The water-stage recorder failed to operate and only a few days' record was obtained from it.

Discharge measurements of Honopou Stream near Huelo, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Gage height (feet).	Discharge.	
			Second-feet.	Million gallons. per day.
1913—Aug. 27	E. O. Christiansen	0.20	3.0	1.9
Nov. 19	C. T. Bailey .....	.79	20	13
1914—May 22	.....do.....	.75	20	13
June 19	.....do.....	.72	21	14
July 21	.....do.....	.31	5.9	3.9
Aug. 26	.....do.....	.72	18	11
1915—June 14	H. A. R. Austin .....	.12	2.6	1.7

Discharge, in million gallons per day, of Honopou Stream near Huelo, Maui, for the years ending June 30, 1914 and 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	2.4	0.8	0.95	0.6	0.6	4.5	2.2	3.6	1.0	2.9	5.2	5.2
2.....	5.6	.8	.95	.6	.6	4.2	1.6	3.6	1.0	2.9	4.4	5.2
3.....	3.0	.8	.95	.6	1.9	4.5	1.6	2.9	1.0	2.9	4.4	3.6
4.....	3.0	.8	.9	.6	2.3	23	1.6	2.9	1.0	2.2	16	3.6
5.....	2.7	.65	.8	.6	1.4	19	2.2	2.9	1.0	2.2	12	3.6
6.....	3.1	.8	.8	.8	1.4	14	2.2	2.9	1.0	11	9.0	3.6
7.....	2.6	.4	.8	.9	1.2	10	1.6	2.9	1.0	6.2	9.0	3.6
8.....	2.4	.95	.8	3.4	11	11	21	2.2	1.0	4.4	43	2.9
9.....	2.3	.8	.8	1.2	14	8.4	6.2	2.2	1.0	3.6	18	4.4
10.....	2.1	.8	.9	.95	13	7.1	3.6	2.2	1.6	3.6	9.0	3.6
11.....	2.0	.65	.8	.8	10	5.9	2.9	2.2	1.0	3.6	9.0	3.6
12.....	1.9	6.5	.8	.8	16	5.8	8.0	1.6	1.0	3.6	7.1	6.2
13.....	1.9	2.1	.8	2.4	7.1	4.8	9.0	1.6	1.6	3.6	16	3.6
14.....	1.9	1.9	.65	1.4	7.1	10	6.2	2.2	1.0	4.4	10	3.6
15.....	1.8	4.4	.6	.95	6.3	6.5	5.2	1.6	1.0	3.6	7.1	3.6
16.....	1.7	2.3	.8	.9	5.4	5.6	5.2	1.6	1.0	2.9	7.1	3.6
17.....	1.4	2.0	1.2	.8	4.8	5.9	11	1.6	6.2	2.9	10	4.4
18.....	1.4	1.8	2.1	.8	9.0	7.8	7.1	1.6	1.6	2.9	40	6.2
19.....	1.3	1.7	1.3	.8	14	5.4	5.2	1.6	1.6	11	18	16
20.....	1.3	1.7	.8	.65	9.7	4.7	5.2	1.6	1.0	9.0	18	9.0
21.....	1.2	1.7	.8	.65	9.7	4.2	4.4	1.0	1.0	14	18	6.2
22.....	1.2	1.4	.65	.65	6.5	3.9	15	1.0	1.0	9.0	12	6.2
23.....	1.1	1.3	.6	.65	5.9	3.6	6.2	1.0	1.0	30	10	4.4
24.....	1.1	1.2	.6	.6	7.8	3.3	5.2	1.0	1.0	11	8.0	6.2
25.....	.95	1.2	.6	.6	9.0	3.3	5.2	1.0	1.0	11	7.1	26
26.....	.95	1.2	.6	.6	9.7	3.0	4.4	1.0	9.0	11	7.1	14
27.....	.95	1.3	.6	.6	8.4	2.7	3.6	1.0	5.2	9.0	6.2	10
28.....	.95	1.2	.6	.6	7.1	2.4	5.2	1.0	3.6	7.1	8.0	8.0
29.....	.9	1.2	.6	.6	5.6	2.1	3.6	-----	11	7.1	6.2	6.2
30.....	.9	.95	.6	.6	5.2	2.0	4.4	-----	3.6	6.2	5.2	7.1
31.....	.8	1.2	-----	.6	-----	2.0	3.6	-----	3.6	-----	4.4	-----
Date.	July.	Aug.	Sept.	Oct.	Nov.	Date.	July.	Aug.	Sept.	Oct.	Nov.	
1914.						1914.						
1.....	6.2	-----	-----	-----	20	16.....	-----	-----	-----	-----	-----	-----
2.....	7.1	-----	-----	-----	-----	17.....	-----	-----	-----	-----	-----	-----
3.....	6.2	-----	-----	-----	-----	18.....	-----	-----	-----	-----	-----	-----
4.....	9.0	-----	-----	-----	-----	19.....	-----	-----	-----	-----	-----	-----
5.....	7.1	-----	-----	-----	-----	20.....	-----	-----	-----	-----	-----	-----
6.....	8.0	-----	-----	-----	-----	21.....	-----	-----	-----	-----	-----	-----
7.....	6.2	-----	-----	-----	-----	22.....	-----	-----	-----	-----	-----	-----
8.....	6.2	-----	-----	-----	-----	23.....	-----	-----	-----	-----	-----	-----
9.....	6.2	-----	-----	-----	-----	24.....	-----	-----	-----	-----	-----	-----
10.....	5.2	-----	-----	-----	-----	25.....	-----	-----	-----	-----	-----	-----
11.....	-----	-----	-----	-----	-----	26.....	-----	-----	-----	3.6	-----	-----
12.....	-----	-----	-----	-----	-----	27.....	-----	8.0	-----	3.6	-----	-----
13.....	-----	-----	-----	-----	-----	28.....	-----	-----	-----	2.9	-----	-----
14.....	-----	-----	-----	-----	-----	29.....	-----	-----	-----	3.6	-----	-----
15.....	-----	-----	-----	-----	-----	30.....	-----	-----	-----	3.6	-----	-----
						31.....	-----	-----	-----	7.1	-----	-----

NOTE.—Discharge determined from a rating curve well defined below 20 million gallons per day (31 second-feet); except for a few days, the water-stage recorder did not operate satisfactorily after July 22, 1914.

Monthly discharge of Honopou Stream near Huelo, Maui, for the year ending June 30, 1914.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
July.....	5.6	0.8	1.83	2.83	57	174
August.....	6.5	.65	1.56	2.41	48	148
September.....	2.1	.6	.82	1.27	25	75
October.....	3.4	.6	.88	1.36	27	84
November.....	16	.6	7.06	10.9	212	650
December.....	23	2.0	6.47	10.0	201	616
January.....	21	1.6	5.47	8.46	170	520
February.....	3.6	1.0	1.91	2.96	54	164
March.....	11	1.0	2.21	3.42	69	210
April.....	30	2.2	6.83	10.6	205	629
May.....	43	4.4	11.8	18.3	364	1,120
June.....	26	2.9	6.45	9.98	193	594
The year.....	43	.6	4.45	6.88	1,620	4,980

NEW HAMAKUA DITCH AT HALEHAKU WEIR, NEAR HUELO, MAUI.

LOCATION.—Just above crossing of Halehaku stream, about 7 miles by trail west of Huelo post office.

RECORDS AVAILABLE.—January 1, 1910, to June 30, 1915.

GAGE.—Friez water-stage recorder.

DISCHARGE MEASUREMENTS.—By 25-foot Cippoletti weir.

CHANNEL AND CONTROL.—Large pool at weir.

EXTREMES OF DISCHARGE.—See monthly discharge table.

DIVERSIONS.—None above station.

REGULATION.—By gates at frequent intervals.

UTILIZATION.—Irrigation of sugar cane.

ACCURACY.—Records good.

COOPERATION.—Daily discharge record copied from records of East Maui Irrigation Co.

Discharge, in million gallons per day, of New Hamakua ditch at Halehaku weir, near Huelo, Maui, Jan. 1, 1913, to June 30, 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	Date.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913.							1913.						
1.....	57.2	41.9	32.5	55.9	61.1	31.4	16.....	56.7	43.8	39.9	52.5	48.0	53.5
2.....	59.4	38.9	30.1	51.5	60.9	30.2	17.....	56.5	37.6	58.4	53.5	19.2	46.3
3.....	56.7	36.0	29.4	49.2	60.1	33.1	18.....	59.3	58.1	54.1	52.1	14.0	42.4
4.....	54.7	33.8	27.8	43.5	58.3	50.0	19.....	58.5	58.7	48.4	54.2	2.8	35.7
5.....	52.8	38.3	26.9	44.3	53.3	32.7	20.....	57.6	58.8	38.3	57.6	10.5	31.9
6.....	51.1	57.7	28.2	48.6	49.6	30.7	21.....	58.1	58.4	56.4	60.1	46.3	30.2
7.....	52.4	57.2	29.6	43.1	49.0	30.2	22.....	57.5	55.5	56.8	57.9	38.1	29.1
8.....	60.3	52.2	26.1	38.2	48.7	29.1	23.....	56.8	48.1	50.1	59.2	36.8	27.6
9.....	60.0	46.0	35.1	40.8	43.1	32.1	24.....	56.0	43.2	42.2	59.0	42.2	27.0
10.....	58.6	41.8	26.3	37.2	40.2	49.4	25.....	54.1	41.1	51.6	59.8	36.8	30.9
11.....	51.4	39.0	22.9	55.1	37.7	37.1	26.....	51.6	37.6	37.8	59.1	50.7	32.9
12.....	53.9	35.8	21.4	50.8	39.9	51.0	27.....	49.5	35.5	36.5	58.5	51.3	39.6
13.....	58.7	33.3	20.0	50.9	43.9	61.7	28.....	46.2	33.5	49.9	57.0	42.6	61.9
14.....	58.6	32.0	19.8	53.8	41.4	59.4	29.....	43.1	.....	40.8	59.4	38.4	54.7
15.....	53.3	32.4	23.6	55.1	54.1	60.4	30.....	41.2	.....	45.0	58.5	35.5	54.2
							31.....	42.9	.....	55.7	.....	33.3	.....

Discharge, in million gallons per day, of New Hamakua ditch at Halehaku weir, near Huelo, Maui, Jan. 1, 1913, to June 30, 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	64.8	19.2	38.8	21.2	20.7	68.7	32.6	63.5	16.7	50.4	66.1	66.0
2.....	71.3	18.9	31.3	18.9	27.9	68.2	30.7	63.9	16.1	50.6	66.2	66.8
3.....	71.8	20.7	27.5	18.5	61.5	71.4	28.7	64.0	16.0	48.4	69.3	65.6
4.....	70.1	19.3	25.9	21.0	65.2	64.8	29.5	59.5	16.0	42.4	68.0	64.2
5.....	69.2	17.0	23.8	19.7	62.2	62.0	47.7	58.5	15.2	37.4	65.5	64.2
6.....	71.0	20.8	22.3	30.0	58.5	63.2	50.2	56.3	14.7	67.2	65.7	63.6
7.....	69.7	36.9	26.0	63.8	54.9	32.7	45.5	57.7	14.8	56.2	66.2	63.6
8.....	68.5	49.5	25.1	64.8	66.6	65.4	70.6	48.0	14.0	59.7	66.4	66.6
9.....	67.2	33.8	22.5	55.0	57.8	1.6	68.2	43.3	20.8	67.0	68.7	68.7
10.....	63.6	38.2	22.5	52.5	55.9	.4	67.5	44.5	51.3	61.1	65.5	67.7
11.....	54.1	35.9	21.5	45.3	64.3	18.6	63.7	42.0	29.7	54.8	65.6	65.2
12.....	47.9	71.1	21.7	46.9	67.0	70.1	58.5	38.0	22.6	30.9	67.2	62.2
13.....	61.6	64.4	23.3	54.6	66.6	66.4	56.3	32.2	29.9	62.6	68.3	62.5
14.....	59.7	66.8	22.1	65.0	67.9	64.1	49.4	30.6	38.9	66.3	66.4	60.9
15.....	50.9	67.4	23.7	62.5	67.2	35.1	52.0	30.7	25.1	65.0	68.1	60.6
16.....	43.0	66.2	25.4	55.0	68.1	41.9	63.8	27.7	21.1	59.3	68.5	62.1
17.....	38.6	59.7	36.3	50.4	67.9	67.2	67.7	25.7	40.3	58.7	65.2	63.0
18.....	31.9	53.6	64.8	40.5	62.9	68.8	68.5	25.3	36.4	58.8	58.4	62.6
19.....	32.4	52.2	65.1	32.4	56.9	67.5	68.4	23.1	24.8	58.1	57.7	67.2
20.....	30.8	45.9	53.9	29.9	62.7	66.7	66.5	21.9	25.9	60.1	57.9	65.8
21.....	32.8	37.0	36.7	29.3	65.7	67.1	60.7	21.8	25.3	60.9	57.9	60.3
22.....	30.7	34.8	35.8	27.2	67.8	67.7	58.5	21.8	23.7	59.5	57.9	62.1
23.....	27.3	30.7	33.2	24.8	67.8	67.0	32.6	20.0	21.7	60.2	23.9	53.6
24.....	27.2	28.9	27.7	23.6	67.2	65.8	36.6	19.7	26.3	61.7	25.1	57.1
25.....	27.0	27.3	23.7	22.2	64.1	63.4	38.5	18.7	52.6	61.2	62.2	63.8
26.....	27.2	27.0	21.8	21.2	64.4	51.3	41.9	18.0	55.2	61.8	64.9	62.8
27.....	27.7	39.4	20.7	20.5	64.7	41.3	56.4	17.4	52.1	59.8	64.7	65.6
28.....	23.8	38.7	21.0	20.4	66.7	40.6	52.3	16.7	53.2	59.4	65.4	65.3
29.....	22.0	29.6	21.5	18.7	67.0	38.7	54.8	.....	63.3	61.2	66.2	66.0
30.....	20.9	26.6	20.0	18.1	68.1	36.0	56.1	.....	56.0	63.6	67.5	66.4
31.....	20.8	46.6	.....	17.5	.....	34.0	63.6	.....	50.8	.....	63.2	.....
1914-15.												
1.....	66.0	64.1	65.7	65.5	67.0	60.3	61.1	24.7	64.3	24.9	67.7	21.3
2.....	66.8	65.3	66.8	65.8	66.5	65.9	62.3	22.5	54.2	23.4	27.2	19.8
3.....	66.2	66.4	65.7	65.3	67.2	65.2	60.7	20.9	55.7	21.4	64.9	20.9
4.....	66.2	58.9	66.3	63.7	66.1	64.8	63.7	19.8	66.3	20.5	68.4	20.0
5.....	65.3	68.4	66.3	61.6	64.6	62.0	64.7	43.9	64.3	18.9	68.3	19.0
6.....	65.9	67.3	53.0	60.0	63.5	62.1	63.5	47.9	55.9	18.2	68.4	35.3
7.....	66.0	67.4	66.7	58.9	63.5	63.4	62.9	35.3	59.3	17.6	68.5	33.7
8.....	66.3	67.2	65.8	61.3	62.7	64.0	63.1	38.9	63.6	17.7	62.4	30.0
9.....	65.6	67.2	65.4	63.8	61.0	63.8	62.1	35.5	54.4	26.1	58.0	29.2
10.....	67.4	66.9	65.8	63.5	53.6	63.5	60.6	51.5	51.1	56.4	64.3	58.9
11.....	65.8	66.2	66.3	65.9	47.4	63.0	64.4	62.7	51.4	64.1	66.6	38.4
12.....	67.1	66.2	68.9	66.0	44.4	63.2	61.7	66.2	50.1	66.7	66.7	28.1
13.....	68.1	66.4	66.4	66.0	42.3	64.0	61.3	66.2	49.3	63.6	60.0	28.4
14.....	70.1	66.4	65.8	66.7	54.7	61.9	40.7	64.9	65.5	53.6	60.6	28.6
15.....	69.8	66.3	65.9	67.0	21.5	57.8	41.6	63.5	66.7	53.2	60.8	32.2
16.....	68.4	65.9	65.6	66.7	.....	61.4	44.3	64.2	64.6	59.9	52.5	49.5
17.....	68.3	66.1	64.9	66.4	.....	63.1	43.2	63.9	56.6	54.6	53.9	64.4
18.....	65.0	66.0	65.6	66.4	28.5	63.6	43.5	64.9	54.2	62.1	41.0	65.9
19.....	57.3	65.8	65.2	66.3	68.3	63.6	38.1	67.5	54.3	66.0	38.6	68.9
20.....	57.1	65.7	65.2	65.3	64.4	64.2	34.1	66.9	56.1	65.2	37.0	67.6
21.....	57.0	65.6	64.7	66.7	62.3	63.5	31.3	66.2	49.9	64.8	35.1	69.5
22.....	57.6	65.9	66.1	64.2	65.6	61.8	38.6	66.1	45.5	64.2	32.2	70.7
23.....	57.6	66.0	66.1	63.0	65.9	61.0	30.6	65.9	40.9	60.3	31.5	66.9
24.....	61.4	66.6	65.3	62.6	66.6	61.7	28.5	66.5	33.3	66.0	28.5	66.4
25.....	64.9	64.9	64.6	61.3	64.6	63.7	26.5	67.4	32.3	65.9	27.1	67.2
26.....	65.2	64.1	64.1	61.8	64.6	61.0	25.0	69.3	28.9	64.6	26.3	65.9
27.....	62.1	64.4	62.6	65.9	65.9	61.7	24.0	70.2	26.3	60.7	24.7	66.7
28.....	61.7	64.2	65.6	61.2	63.5	63.5	23.3	68.0	24.7	61.8	25.5	65.8
29.....	61.3	64.4	65.1	62.9	62.6	64.8	22.1	.....	23.5	64.0	24.4	64.7
30.....	60.5	65.3	65.4	64.2	61.4	67.6	21.6	.....	22.5	66.2	22.9	68.0
31.....	59.8	66.6	.....	65.2	.....	61.9	21.5	.....	21.7	.....	21.6	.....

NOTE.—No record Nov. 16 and 17, 1914.

Monthly discharge of New Hamakua ditch at Halehaku weir, near Huelo, Maui, Jan. 1, 1913, to June 30, 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-feet (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913.						
January.....	60.3	41.2	54.3	84.0	1,680	5,170
February.....	58.8	32.0	43.8	67.8	1,230	3,760
March.....	58.4	19.8	37.5	58.0	1,160	3,570
April.....	60.1	37.2	52.5	87.2	1,580	4,830
May.....	61.1	2.8	41.5	64.2	1,290	3,950
June.....	61.9	27.0	40.5	62.7	1,220	3,730
The period (181 days).....	61.9	2.8	45.0	69.6	8,160	25,000
1913-14.						
July.....	71.8	20.8	46.1	71.3	1,430	4,390
August.....	71.1	17.0	39.5	61.1	1,220	3,760
September.....	65.1	20.0	29.5	45.6	886	2,720
October.....	65.0	17.5	35.2	54.5	1,090	3,350
November.....	68.1	20.7	61.5	95.2	1,850	5,660
December.....	71.4	4	52.8	81.7	1,640	5,020
January.....	70.6	28.7	52.7	81.5	1,630	5,010
February.....	64.0	16.7	36.1	55.9	1,010	3,100
March.....	63.3	14.0	31.3	48.4	970	2,980
April.....	67.2	30.9	57.5	89.0	1,720	5,290
May.....	69.3	23.9	62.1	96.1	1,930	5,910
June.....	68.7	53.6	63.7	98.6	1,916	5,860
The year.....	71.8	.4	47.4	73.8	17,300	53,000
1914-15.						
July.....	70.1	57.0	64.1	99.2	1,990	6,100
August.....	68.4	58.9	65.7	102	2,040	6,250
September.....	68.9	53.0	65.2	101	1,960	6,000
October.....	67.0	58.9	64.2	99.3	1,990	6,110
November 1-15, 18-30.....	68.3	21.5	58.9	91.4	1,650	5,060
December.....	67.6	57.8	63.0	97.5	1,950	5,990
January.....	64.7	21.5	44.9	69.8	1,390	4,270
February.....	70.2	19.8	54.7	84.6	1,530	4,700
March.....	66.7	21.7	48.6	75.2	1,510	4,620
April.....	66.7	17.6	49.8	77.1	1,490	4,580
May.....	68.5	21.6	47.0	72.7	1,460	4,470
June.....	70.7	19.0	47.7	73.8	1,430	4,390
The period (363 days).....	70.7	17.6	56.2	87.0	20,400	62,500

OLD HAMAKUA DITCH AT OPANA WEIR, NEAR HUELO, MAUI.

LOCATION.—A short distance below crossing of Opana Stream, about 8 miles by road west of Huelo post office.

RECORDS AVAILABLE.—January 1, 1910, to June 30, 1915.

GAGE.—Friez water-stage recorder.

DISCHARGE MEASUREMENTS.—By 20-foot Cippoletti weir.

CHANNEL AND CONTROL.—Large pool at weir.

EXTREMES OF DISCHARGE.—See monthly discharge table.

DIVERSIONS.—None above station.

REGULATION.—By gates at frequent intervals.

UTILIZATION.—Irrigation of sugar cane.

ACCURACY.—Records good.

COOPERATION.—Daily discharge record copied from records of East Maui Irrigation Co.

Discharge, in million gallons per day, of Old Hamakua ditch at Opana weir. near Huelo, Maui, Jan. 1, 1913, to June 30, 1915.

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	Date.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913.													
1.....	14.5	0.4	0.3	9.9	8.5	0.4	16.....	24.6	0.3	2.5	27.5	5.0	0.8
2.....	13.2	.4	.3	5.5	7.0	.4	17.....	20.1	.3	2.5	28.0	1.0	.4
3.....	12.2	.4	.3	2.2	4.7	1.1	18.....	13.1	7.0	2.3	27.8	.6	.3
4.....	12.1	.4	.3	.6	1.9	4.0	19.....	11.6	5.9	.7	25.7	2.2	.4
5.....	9.6	.4	.3	.4	1.2	.6	20.....	10.4	6.8	.3	20.3	11.1	.4
6.....	6.5	17.9	.3	.3	.6	.5	21.....	8.7	5.0	2.4	26.3	.7	.4
7.....	1.4	7.2	.3	.3	.6	.4	22.....	8.3	1.9	9.3	14.9	.5	.4
8.....	8.6	1.6	.3	.3	.6	.3	23.....	7.0	.4	.2	14.8	.4	.4
9.....	10.6	.6	.3	.3	.5	.3	24.....	4.5	.4	.3	15.0	.4	.3
10.....	15.2	.5	.3	.3	.5	.4	25.....	2.0	.4	1.4	23.8	.4	.2
11.....	17.4	.4	.3	17.9	.4	.4	26.....	.9	.4	.3	16.7	2.2	.3
12.....	12.8	.4	.3	27.8	.4	2.8	27.....	.7	.3	.2	20.2	.8	1.4
13.....	22.9	.4	.3	24.3	.5	7.0	28.....	.6	.3	1.7	15.9	.5	1.2
14.....	27.2	.4	.3	26.2	1.0	2.8	29.....	.5	.....	.3	13.6	.4	.7
15.....	27.9	.4	.3	26.3	8.2	3.8	30.....	.4	.....	1.0	11.6	.4	5.8
							31.....	.4	.....	12.6	.....	.4	.....

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	12.6	.....	0.2	.....	.....	9.6	0.6	8.7	0.5	2.4	7.9	22.3
2.....	11.3	.....	.....	.....	.....	8.8	.6	9.2	.5	1.1	7.7	20.5
3.....	4.9	.....	.....	.....	17.3	16.2	.6	4.1	.4	.9	13.4	16.4
4.....	7.0	.....	.....	.....	12.9	24.8	.6	2.1	.4	.8	28.2	14.0
5.....	6.3	.....	.....	.....	.7	27.3	1.7	1.4	.4	3.4	27.5	13.7
6.....	12.0	0.3	.....	.....	.8	27.7	1.4	1.2	.4	27.2	28.0	13.8
7.....	6.3	.4	.....	0.7	2.5	25.3	.8	1.2	.4	19.1	28.1	13.0
8.....	5.0	.6	.....	17.9	26.3	27.5	13.0	1.0	.4	5.2	28.7	7.2
9.....	1.8	.....	.....	10.7	27.7	27.7	14.7	.9	1.2	2.9	27.9	14.3
10.....	.4	.....	.....	2.0	27.8	27.8	16.8	.8	1.8	1.5	28.1	14.9
11.....	1.0	2.2	.....	1.1	27.7	21.7	6.9	.7	.7	1.2	28.0	10.3
12.....	.4	25.5	.....	2.1	28.4	18.2	13.5	.7	.5	13.5	27.0	21.7
13.....	.9	10.8	.....	13.5	18.3	15.4	26.4	.7	.5	11.4	27.9	21.6
14.....	.6	5.5	.....	3.0	26.7	16.4	20.3	1.2	.4	18.7	27.7	17.4
15.....	.4	16.3	.....	.8	18.2	9.6	14.7	.9	.2	10.2	26.8	15.7
16.....	.3	11.6	.....	.3	17.4	10.6	2.5	.7	.2	6.6	22.6	26.4
17.....	.3	4.6	.3	.2	27.2	21.3	2.4	.7	16.0	4.6	23.6	23.1
18.....	.3	2.3	7.3	.2	27.9	26.6	2.0	.7	1.6	3.6	25.3	23.6
19.....	.3	.5	3.7	.2	27.8	20.6	1.8	.6	.8	24.9	25.4	25.3
20.....	.2	.6	1.0	.....	27.8	14.4	1.5	.6	.6	27.4	25.4	23.7
21.....	.1	.6	.4	.....	27.9	10.7	1.2	.6	.6	27.8	25.3	12.0
22.....	.1	.5	.2	.....	27.2	7.2	1.5	.6	.6	27.6	25.3	15.4
23.....	.....	.4	.2	.....	22.1	4.8	1.3	.6	.5	27.3	25.4	9.4
24.....	.....	.4	.2	.....	25.7	3.4	1.2	.6	.5	27.9	24.4	10.1
25.....	.....	.3	.1	.....	28.2	2.4	1.2	.6	.5	27.5	24.1	25.8
26.....	.....	.4	.1	.....	27.9	1.2	1.2	.6	11.1	28.1	24.3	25.2
27.....	.....	.6	.....	.....	28.7	.8	.9	.6	22.2	27.4	24.6	25.2
28.....	.....	.4	.....	.....	28.4	.8	14.0	.6	8.9	20.2	25.3	25.3
29.....	.....	.4	.....	.....	21.3	.7	9.7	.....	19.5	13.7	23.5	25.3
30.....	.....	.3	.....	.....	13.4	.7	9.1	.....	7.6	10.4	18.2	25.4
31.....	.....	1.3	.....	.....	.....	.7	9.6	.....	4.3	.....	15.2	.....

Discharge, in million gallons per day, of Old Hamakua ditch at Opana weir, near Huelo, Maui, Jan. 1, 1913, to June 30, 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	25.2	25.2	23.5	25.4	24.7	21.7	16.6	0.5	8.4	0.5	21.1	0.7
2.....	25.4	25.2	22.4	25.3	23.0	25.3	15.4	.4	6.3	.5	18.7	.1
3.....	25.4	25.4	25.3	25.3	15.2	25.2	15.4	.4	7.4	.4	19.4	.7
4.....	25.1	25.2	25.3	25.3	12.4	25.2	21.7	.4	13.5	.4	15.5	1.0
5.....	25.3	25.4	25.3	25.5	10.5	25.2	25.3	15.4	9.4	.4	10.0	1.0
6.....	25.3	25.3	12.7	25.3	8.7	25.3	23.2	5.2	5.5	.3	6.8	1.1
7.....	25.4	25.3	25.3	25.2	6.8	24.9	19.5	.7	7.8	.3	8.2	1.0
8.....	25.2	25.2	25.3	25.2	5.8	25.0	17.5	.5	11.5	.2	2.2	.5
9.....	23.2	25.3	23.3	25.3	4.9	24.9	16.3	.5	6.0	1.6	.9	.4
10.....	22.8	25.3	20.6	25.2	1.2	25.3	10.6	.4	2.4	.....	14.2	.5
11.....	18.0	25.3	22.4	25.2	1.1	25.3	20.2	.3	1.0	.....	9.4	.4
12.....	26.6	25.3	25.3	25.2	1.0	25.3	11.4	.2	1.0	.7	2.7	.4
13.....	25.8	25.2	25.3	24.8	.9	25.3	8.4	3.2	4.9	11.4	.6	.4
14.....	24.6	25.2	25.3	21.2	10.0	25.0	4.6	13.3	20.1	2.9	.7	.4
15.....	24.9	25.2	25.3	16.6	25.1	25.1	1.6	13.5	21.3	1.1	.7	.4
16.....	23.1	20.1	25.3	16.2	21.0	25.2	1.2	13.5	11.2	18.4	.7	1.4
17.....	19.3	.5	25.0	15.1	25.3	25.2	.9	10.5	8.6	24.3	.7	1.2
18.....	17.3	.....	25.3	14.4	19.2	24.3	.2	11.8	5.8	17.9	.7	3.0
19.....	21.1	.....	25.3	15.9	23.4	22.6	.2	13.0	5.0	14.4	.7	24.8
20.....	18.8	.....	25.3	11.8	25.0	25.5	.7	12.9	4.2	6.9	.7	21.8
21.....	14.5	16.6	25.3	14.9	21.3	24.8	.9	13.5	1.1	8.1	.8	8.8
22.....	14.6	25.3	25.1	8.9	18.0	20.6	1.9	13.5	.9	4.2	1.1	5.7
23.....	13.4	25.3	25.3	4.2	16.7	18.7	.7	13.5	.9	19.9	1.0	2.2
24.....	17.5	25.3	24.9	1.7	21.5	19.7	.7	13.5	.7	12.6	1.0	4.2
25.....	25.2	25.2	20.5	1.6	25.3	25.2	.5	13.5	.7	14.0	1.0	6.7
26.....	25.3	25.3	14.6	1.6	25.2	19.3	.5	13.5	.6	25.3	.9	6.1
27.....	25.4	25.2	14.6	5.9	25.3	20.0	.4	13.5	.6	25.3	.9	2.7
28.....	25.5	25.3	16.5	1.5	25.3	22.6	.4	12.8	.6	25.3	.9	2.5
29.....	25.2	25.3	25.3	2.1	25.3	21.0	.5	.....	.6	25.3	.9	1.8
30.....	25.2	24.9	25.3	2.0	25.2	19.8	.4	.....	.5	23.7	1.0	2.6
31.....	25.2	25.3	.....	21.4	.....	18.1	.5	.....	.5	.....	.9	.....

NOTE.—No gage record for days for which discharge is not given.

Monthly discharge of Old Hamakua ditch at Opana weir, near Huelo, Maui, Jan. 1, 1913, to June 30, 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre-feet.
	Maximum.	Minimum.	Mean.			
1913.						
January.....	27.9	0.4	10.5	16.2	326	999
February.....	17.9	.3	2.19	3.39	61	188
March.....	12.6	.3	1.37	2.12	42	130
April.....	28.0	.3	14.8	22.9	445	1,360
May.....	11.1	.4	2.05	3.17	64	195
June.....	7.0	.2	1.29	2.00	39	119
The period (181 days).....	28.0	.2	5.39	8.34	977	2,990
1913-14.						
July 1-22.....	12.6	.1	3.30	5.11	72	223
August 6-8, 11-31.....	25.5	.3	3.62	5.60	87	267
September 1, 17-26.....	7.3	.1	1.23	1.90	14	42
October 7-19.....	17.9	.2	4.05	6.27	53	162
November 3-30.....	28.7	.7	21.9	33.9	614	1,880
December.....	27.8	.7	13.9	21.5	431	1,320
January.....	26.4	.6	6.25	9.67	194	595
February.....	9.2	.6	1.53	2.37	43	131
March.....	22.2	.2	3.36	5.20	104	320
April.....	28.1	.8	14.2	22.0	425	1,310
May.....	28.7	7.7	23.9	37.0	741	2,270
June.....	26.4	7.2	18.6	28.8	558	1,710
The period (310 days).....	28.7	.1	10.8	16.7	3,320	10,200

Monthly discharge of Old Hamakua ditch at Opana weir, near Huelo, Maui, Jan. 1, 1913, to June 30, 1915—Continued.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1914-15.						
July.....	26.6	13.4	22.7	35.1	705	2,160
August 1-17, 21-31.....	25.4	.5	23.9	37.0	669	2,050
September.....	25.3	12.7	23.2	35.9	696	2,140
October.....	25.5	1.5	16.3	25.2	505	1,550
November.....	25.3	.9	16.5	25.5	494	1,520
December.....	25.5	18.1	23.4	36.2	727	2,230
January.....	25.3	.2	7.69	11.9	238	732
February.....	15.4	.2	8.00	12.4	224	687
March.....	21.3	.5	5.45	8.43	169	518
April 1-9, 12-30.....	25.3	.2	10.2	15.8	286	876
May.....	21.1	.6	4.68	7.24	145	445
June.....	24.8	.1	3.48	5.38	104	320
The period.....	26.6	.1	13.8	21.4	4,960	15,200

LOWRIE DITCH AT OPANA WEIR, NEAR HUELO, MAUI.

LOCATION.—A short distance west of Halehaku Gulch, about 7 miles by road northwest of Huelo post office.

RECORDS AVAILABLE.—January 1, 1910, to June 30, 1915.

GAGE.—Friez water-stage recorder.

DISCHARGE MEASUREMENTS.—By sharp-crested weir 16½ feet long, with bottom and end contractions.

CHANNEL AND CONTROL.—Large pool back of weir.

EXTREMES OF DISCHARGE.—See monthly discharge table.

DIVERSIONS.—None above station.

REGULATION.—By gates at frequent intervals.

UTILIZATION.—Irrigation of sugar cane.

ACCURACY.—Records good.

COOPERATION.—Daily discharge record copied from records of East Maui Irrigation Co.

Discharge, in million gallons, per day, of Lowrie ditch at Opana Weir, near Huelo, Maui, Jan. 1, 1913, to June 30, 1915.

[To convert discharge in million gallons per day to second-feet, multiply by 1.55.]

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	Date.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913.													
1.....	57.1	40.3	29.7	51.2	53.9	37.8	16.....	55.9	41.9	29.2	58.8	45.6	52.0
2.....	56.7	37.9	28.1	51.6	52.2	35.9	17.....	56.4	38.1	46.4	59.4	9.2	52.0
3.....	54.3	33.0	27.2	45.6	53.8	39.6	18.....	55.6	52.9	44.9	58.6	3.3	42.9
4.....	53.4	30.1	25.6	45.0	49.6	33.0	19.....	55.2	55.8	43.3	59.2	.....	38.5
5.....	48.7	30.3	24.3	43.8	48.0	35.9	20.....	55.2	49.2	37.5	58.4	.....	35.4
6.....	47.3	47.0	26.7	41.1	44.2	33.5	21.....	53.9	48.4	49.5	58.7	6.9	36.5
7.....	51.8	42.7	29.8	41.2	47.4	33.7	22.....	51.1	47.6	54.7	58.3	40.7	34.1
8.....	55.3	32.1	27.5	37.3	48.8	33.3	23.....	49.4	47.7	45.9	58.4	37.2	31.6
9.....	52.4	41.2	32.7	41.2	43.7	35.6	24.....	49.8	44.6	41.3	57.9	40.7	33.0
10.....	56.3	38.6	26.2	37.4	41.2	52.7	25.....	48.3	29.2	45.8	59.0	28.7	40.9
11.....	55.2	35.0	22.6	49.4	37.6	43.4	26.....	46.2	35.9	39.7	58.4	56.3	43.8
12.....	53.8	30.4	20.7	53.0	39.9	46.5	27.....	45.7	32.9	36.8	58.3	54.1	43.5
13.....	56.5	28.8	19.2	58.6	42.9	58.3	28.....	40.0	31.1	43.1	58.3	53.8	53.3
14.....	55.0	27.5	17.9	58.9	46.8	54.7	29.....	40.2	.....	42.2	58.1	49.3	54.1
15.....	55.5	30.1	19.2	59.1	53.1	53.3	30.....	37.8	.....	41.2	55.5	43.4	54.4
							31.....	36.3	.....	48.1	.....	44.6	.....

Discharge, in million gallons per day, of Lowrie ditch at Opana weir, near Huelo, Maui, Jan. 1, 1913, to June 30, 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913-14.												
1.....	56.6	22.5	46.2	23.3	27.1	58.1	41.6	31.3	20.1	50.7	54.3	2.2
2.....	56.9	23.9	31.9	19.1	32.3	58.0	38.1	56.9	20.5	44.3	55.7	2.2
3.....	53.5	26.1	34.0	19.7	53.8	58.3	36.2	56.3	19.2	38.5	56.0	2.2
4.....	56.8	20.8	29.4	25.5	53.4	61.2	43.7	53.5	19.1	38.8	58.0	2.2
5.....	56.9	20.1	27.7	20.4	34.9	59.9	55.3	50.4	17.9	45.7	57.5	2.2
6.....	56.8	27.2	25.5	44.7	36.8	58.8	51.8	42.0	19.6	44.8	56.4	2.2
7.....	56.4	41.0	32.9	53.3	49.4	58.3	52.1	8.5	17.1	48.2	57.3	2.4
8.....	56.0	53.4	25.6	55.2	54.7	57.2	49.4	13.4	16.5	48.2	58.1	25.4
9.....	55.3	39.1	28.5	53.4	57.1	58.3	53.2	47.1	21.9	52.1	57.2	57.3
10.....	49.8	43.9	25.6	48.4	58.6	58.3	54.3	41.1	48.9	31.9	56.5	57.9
11.....	48.9	39.6	25.1	43.8	58.4	58.2	53.6	35.3	31.7	52.9	55.4	57.1
12.....	57.6	55.2	28.8	47.2	58.6	58.5	55.0	32.9	23.4	52.7	56.4	57.9
13.....	57.1	54.1	27.2	53.5	58.4	57.5	58.7	33.9	36.0	53.0	56.9	57.6
14.....	52.2	55.3	25.7	54.2	58.0	57.0	58.2	7.4	42.9	56.4	56.3	56.7
15.....	50.7	56.7	27.5	47.5	57.0	57.8	57.4	14.6	25.2	54.5	55.6	56.6
16.....	50.0	56.0	34.6	54.0	56.9	58.0	58.0	27.6	20.0	55.0	55.5	57.7
17.....	44.9	50.8	43.6	44.0	58.5	57.6	58.7	29.2	53.1	47.2	56.8	57.5
18.....	41.9	50.0	54.6	33.9	59.0	57.8	58.0	27.8	38.8	47.3	58.8	57.9
19.....	39.4	42.6	55.7	25.7	60.2	57.3	55.4	25.6	27.7	55.1	57.2	59.2
20.....	38.6	37.2	46.2	34.0	58.7	12.2	34.3	24.0	21.3	57.1	57.3	59.0
21.....	40.4	44.2	35.5	33.7	58.3	13.5	39.2	9.4	26.4	57.2	56.5	57.5
22.....	35.4	39.4	49.6	29.7	57.9	54.5	53.0	15.4	26.1	56.8	56.5	58.0
23.....	34.1	35.3	34.3	28.5	57.8	54.4	34.3	24.8	25.1	57.2	56.8	57.7
24.....	33.3	36.3	24.4	26.9	57.8	51.9	58.5	23.4	40.9	57.0	55.1	57.8
25.....	33.6	32.7	25.7	25.2	57.9	52.3	57.8	22.4	48.5	56.8	55.0	58.9
26.....	35.5	34.4	24.3	24.7	58.2	51.9	53.6	21.8	54.8	58.8	54.5	47.8
27.....	29.9	41.1	24.7	24.6	57.9	53.1	38.8	21.1	30.9	56.5	51.9	58.8
28.....	26.9	42.2	24.6	23.5	57.3	52.5	53.0	21.1	39.8	57.1	22.8	58.7
29.....	25.9	32.2	24.7	22.0	57.6	48.3	48.5	.....	49.7	54.9	2.8	58.3
30.....	25.6	30.0	22.0	20.9	58.0	46.0	32.2	.....	42.4	55.7	2.0	58.3
31.....	23.4	46.2	.....	21.4	.....	42.6	13.9	.....	56.6	.....	2.0	.....
1914-15.												
1.....	58.1	57.6	56.4	57.7	58.4	52.5	37.1	34.3	48.2	35.8	56.4	23.6
2.....	58.7	57.5	58.9	57.8	51.5	58.0	45.5	25.7	52.7	26.6	56.1	23.9
3.....	44.5	57.4	57.4	57.7	54.8	57.9	39.0	24.7	53.3	28.1	55.5	25.6
4.....	58.6	57.9	57.3	57.8	56.0	32.2	44.8	23.4	55.6	24.2	56.1	22.6
5.....	58.4	57.9	57.2	57.9	54.8	56.3	56.8	44.2	48.6	22.7	55.6	21.2
6.....	58.5	56.9	58.0	58.0	54.9	57.6	51.3	41.4	54.1	22.6	55.9	44.1
7.....	58.3	56.9	58.8	58.3	48.4	57.0	44.2	39.5	54.9	21.3	52.5	29.8
8.....	58.1	57.0	56.6	57.0	47.2	57.2	41.9	44.3	54.5	20.1	54.3	35.3
9.....	58.2	57.1	56.8	57.4	42.2	57.0	38.3	35.3	52.4	43.0	56.6	30.2
10.....	13.6	57.6	56.9	56.8	49.1	57.7	37.5	54.4	49.0	31.8	56.4	50.4
11.....	1.9	57.7	57.0	55.2	43.8	56.9	51.6	50.2	47.0	31.2	55.9	34.5
12.....	22.4	56.6	57.6	54.8	40.4	56.7	53.0	55.2	39.5	30.3	54.1	39.4
13.....	57.3	56.8	55.0	56.0	37.8	58.1	47.7	56.8	35.4	36.0	55.8	25.3
14.....	57.2	57.8	60.8	56.6	45.8	54.1	52.7	57.2	53.0	54.9	54.3	45.4
15.....	58.7	57.7	58.9	57.0	24.8	44.7	48.8	57.1	55.7	51.9	48.7	31.6
16.....	57.7	57.1	58.8	56.9	56.7	49.2	47.7	56.9	54.2	57.2	49.7	54.6
17.....	58.0	57.6	58.6	57.0	54.1	52.2	42.6	49.7	55.7	56.8	46.8	55.7
18.....	57.9	57.4	58.1	56.9	56.2	56.3	38.4	55.9	51.2	56.5	42.8	55.0
19.....	57.1	57.2	58.3	56.9	56.7	55.2	30.9	56.0	45.7	56.4	43.4	57.1
20.....	56.9	57.2	58.3	55.7	57.3	58.9	29.0	56.1	36.4	57.0	43.8	53.1
21.....	55.3	57.4	58.1	56.4	55.9	57.6	28.9	59.4	38.7	57.2	37.7	55.9
22.....	55.2	57.4	58.2	55.7	55.0	50.7	40.5	56.1	35.7	57.0	38.9	55.5
23.....	55.9	56.6	57.6	54.1	53.4	46.2	28.0	56.6	36.3	57.0	35.2	55.1
24.....	57.7	56.1	57.2	51.9	56.9	49.1	29.6	56.6	40.8	56.4	34.1	53.9
25.....	58.0	55.6	56.1	51.7	58.5	50.9	31.2	56.7	38.5	55.9	32.5	54.5
26.....	58.4	56.4	57.3	52.4	58.3	40.4	30.0	57.0	34.1	59.3	30.7	55.1
27.....	58.5	56.9	57.4	55.8	51.7	39.2	29.4	56.4	33.1	58.7	31.6	55.6
28.....	56.7	56.8	57.1	53.3	59.8	45.0	28.3	50.5	31.5	53.4	29.9	55.1
29.....	30.2	56.6	57.8	55.2	55.9	54.4	27.6	.....	29.9	57.0	28.6	49.2
30.....	57.6	56.4	57.7	54.7	56.9	49.8	26.4	.....	28.5	56.7	26.0	51.7
31.....	58.1	55.8	.....	56.6	.....	46.1	31.1	.....	29.8	.....	26.2	.....

NOTE.—No record May 19 and 20, 1913.

Monthly discharge of Lowrie ditch at Opana weir, near Huelo, Maui, Jan. 1, 1913, to June 30, 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-feet (mean).	Million gallons.	Acro-feet.
	Maximum.	Minimum.	Mean.			
1913.						
January.....	57.1	36.3	51.3	79.4	1,590	4,880
February.....	55.8	27.5	38.6	59.7	1,080	3,320
March.....	54.7	17.9	34.4	53.2	1,070	3,270
April.....	59.4	37.3	53.0	82.0	1,590	4,880
May 1-18, 21-31.....	56.3	3.3	42.0	65.0	1,220	3,740
June.....	58.3	31.6	42.4	65.6	1,270	3,900
The period (179 days).....	59.4	3.3	43.7	67.6	7,820	24,000
1913-14.						
July.....	57.6	23.4	44.5	68.9	1,380	4,230
August.....	56.7	20.1	39.7	64.4	1,230	3,780
September.....	55.7	22.0	32.2	49.8	966	2,960
October.....	55.2	19.1	35.2	54.5	1,090	3,350
November.....	60.2	27.1	54.0	88.6	1,620	4,970
December.....	61.2	12.2	52.9	81.8	1,640	5,030
January.....	58.7	13.9	48.6	75.2	1,510	4,620
February.....	56.9	7.4	29.2	45.2	818	2,510
March.....	56.6	16.5	31.7	49.0	982	3,020
April.....	58.8	31.9	50.7	78.4	1,520	4,670
May.....	58.8	2.0	50.0	77.4	1,550	4,760
June.....	59.2	2.2	43.5	67.3	1,310	4,000
The year.....	61.2	2.0	42.8	66.2	15,600	47,900
1914-15.						
July.....	58.7	1.9	52.0	80.5	1,610	4,950
August.....	57.9	55.6	57.1	88.3	1,770	5,430
September.....	60.8	55.0	57.5	89.0	1,730	5,290
October.....	58.3	51.7	56.0	86.6	1,740	5,330
November.....	59.8	24.8	51.8	80.7	1,550	4,770
December.....	58.9	32.2	52.1	80.6	1,620	4,960
January.....	56.8	26.4	39.0	60.3	1,210	3,710
February.....	59.4	23.4	48.8	75.5	1,376	4,190
March.....	55.7	28.5	44.3	68.5	1,370	4,210
April.....	59.3	20.1	44.4	68.7	1,330	4,090
May.....	56.6	26.0	45.2	69.9	1,400	4,300
June.....	57.1	21.2	43.3	67.0	1,300	3,990
The year.....	60.8	1.9	49.3	76.3	18,000	55,200

HAIKU DITCH AT PEAHI WEIR, NEAR HUELO, MAUI.

LOCATION.—In Peahi, about 8 miles by road northwest of Huelo post office.

RECORDS AVAILABLE.—January 1, 1910 to June 30, 1915.

GAGE.—Friez water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by sharp-crested weir $16\frac{1}{2}$ feet long, with bottom and end contractions.

CHANNEL AND CONTROL.—Large pool at weir.

EXTREMES OF DISCHARGE.—See monthly discharge table.

DIVERSIONS.—None above station.

REGULATION.—By gates at frequent intervals.

UTILIZATION.—Irrigation of sugar cane.

ACCURACY.—Records good.

COOPERATION.—Daily discharge record copied from records of East Maui Irrigation Co.

*Discharge, in million gallons per day, of Haiku ditch at Peahi weir, near Huelo, Maui,
Jan. 1, 1913, to June 30, 1915.*

[To convert discharge in million gallons per day to second-feet multiply by 1.55.]

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	Date.	Jan.	Feb.	Mar.	Apr.	May.	June.
1913.							1913.						
1.....	50.3	5.5	2.9	50.8	43.6	3.6	16.....	53.7	14.4	3.0	53.6	49.5	30.3
2.....	46.3	5.3	2.7	50.7	41.3	3.4	17.....	53.3	4.3	27.3	53.6	43.2	15.2
3.....	39.5	4.8	2.7	46.9	44.2	3.9	18.....	52.9	42.4	33.1	53.6	44.3	6.8
4.....	36.0	3.7	2.6	40.1	34.8	25.8	19.....	50.9	53.3	30.3	53.6	51.0	6.0
5.....	33.5	5.1	2.6	39.7	32.5	4.9	20.....	53.2	43.3	7.2	53.6	44.2	5.4
6.....	35.6	40.3	2.9	23.0	27.5	4.4	21.....	49.5	32.4	30.9	53.6	30.1	3.4
7.....	29.1	50.8	2.8	5.4	5.8	4.3	22.....	37.9	25.1	48.1	53.6	31.0	2.9
8.....	36.8	33.6	2.8	3.0	17.4	3.9	23.....	35.9	6.1	29.8	53.4	33.8	3.6
9.....	45.7	38.8	2.9	6.2	5.7	3.8	24.....	38.9	24.9	24.3	53.1	35.3	3.6
10.....	50.7	16.0	2.5	2.9	5.1	28.0	25.....	28.6	13.3	25.9	54.0	27.0	4.2
11.....	48.1	4.0	2.2	33.7	4.9	9.1	26.....	24.7	5.4	8.4	53.8	41.1	4.8
12.....	44.0	3.7	2.0	53.2	10.2	25.5	27.....	19.6	14.1	3.2	53.5	33.3	24.4
13.....	50.3	2.8	1.9	54.0	25.1	52.1	28.....	5.7	6.8	22.8	53.4	30.1	40.1
14.....	54.0	2.8	1.9	53.9	5.4	43.9	29.....	5.1	.....	13.3	53.1	28.5	17.9
15.....	47.0	3.6	2.1	53.9	30.8	47.1	30.....	4.8	.....	12.0	43.8	9.2	37.1
							31.....	4.8	.....	46.9	.....	3.8	.....
Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	
1913-14.													
1.....	51.8	1.5	13.9	2.0	1.2	53.3	3.2	53.1	2.0	14.2	47.1	53.3	
2.....	51.4	1.6	3.0	2.0	1.7	51.7	3.0	52.9	2.0	24.8	39.6	53.3	
3.....	51.7	1.5	2.4	1.8	49.0	53.4	2.8	33.6	2.0	21.8	45.3	53.3	
4.....	51.7	1.3	2.3	1.5	52.8	53.9	3.0	29.4	2.0	12.7	57.5	53.3	
5.....	52.7	1.2	2.2	1.4	41.9	53.3	25.5	22.5	2.0	7.4	54.8	53.3	
6.....	53.3	1.5	2.0	8.3	22.6	53.3	16.9	27.6	1.8	30.7	53.2	52.5	
7.....	52.6	9.8	2.2	45.9	19.4	53.3	11.1	40.1	1.8	12.2	53.8	52.5	
8.....	44.1	23.8	2.0	53.2	50.8	50.4	48.2	30.7	1.8	51.8	53.4	52.3	
9.....	37.0	3.8	1.9	42.7	53.3	58.3	52.5	23.8	6.0	51.4	53.0	50.2	
10.....	34.8	3.2	1.8	20.3	53.3	58.5	53.4	21.1	22.0	40.8	53.1	53.3	
11.....	18.0	3.5	1.8	6.1	53.3	55.7	41.5	19.6	5.7	14.6	53.1	52.4	
12.....	8.9	49.5	1.8	13.8	53.3	49.3	37.6	16.5	2.0	24.6	53.1	52.6	
13.....	36.7	52.9	2.0	40.4	53.3	49.7	56.5	5.2	8.2	49.6	53.1	53.3	
14.....	15.5	45.6	1.8	51.2	53.3	43.9	56.4	44.2	4.2	52.0	53.1	53.3	
15.....	8.8	53.0	1.9	33.3	53.3	59.9	55.2	26.7	4.8	43.2	53.1	53.3	
16.....	3.5	50.8	3.0	13.5	53.3	59.0	59.0	5.8	6.0	24.9	53.1	27.1	
17.....	3.0	19.2	12.3	12.6	53.3	54.3	60.6	4.0	39.3	30.9	53.1	2.8	
18.....	2.6	30.8	51.3	5.9	53.3	57.8	58.6	3.9	6.1	26.2	54.1	52.4	
19.....	2.5	35.2	53.2	2.5	53.3	54.2	53.1	3.3	5.1	50.0	53.1	53.3	
20.....	2.5	13.0	16.2	2.5	53.3	53.8	54.0	3.0	19.4	59.5	53.8	53.3	
21.....	2.6	6.2	6.5	2.4	53.3	53.1	46.4	21.7	9.0	57.0	53.2	53.2	
22.....	2.6	3.5	5.2	2.2	53.3	33.8	45.1	12.1	2.6	55.8	53.2	53.2	
23.....	2.4	3.1	3.0	1.8	53.3	36.2	45.7	2.8	2.3	60.2	53.2	53.6	
24.....	2.4	3.0	2.4	1.6	53.3	32.8	48.3	2.7	12.0	64.6	53.2	53.4	
25.....	2.2	2.8	2.0	1.7	53.3	22.9	58.4	2.4	22.4	62.1	53.2	53.8	
26.....	2.2	2.7	2.0	1.7	53.3	7.2	49.3	2.5	29.3	52.6	53.2	53.4	
27.....	2.0	22.9	2.2	1.6	53.3	4.3	29.9	2.4	24.6	52.4	53.2	54.1	
28.....	1.9	11.1	2.3	1.5	53.3	4.1	44.8	2.3	27.3	52.4	53.2	58.3	
29.....	1.8	2.7	2.0	1.5	53.3	3.7	53.5	.....	13.3	52.5	53.2	56.6	
30.....	1.7	2.4	1.9	1.5	53.3	3.2	53.6	.....	5.2	52.6	53.2	58.5	
31.....	1.6	24.4	.....	1.4	.....	3.3	52.9	.....	10.9	.....	53.2	.....

Discharge, in million gallons per day, of Haiku ditch at Peahi weir, near Huelo, Maui, Jan. 1, 1913, to June 30, 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.....	58.6	59.3	53.7	54.3	61.1	72.1	2.9	2.8	15.9	2.4	77.8	2.8
2.....	56.7	56.8	55.3	23.8	50.1	72.8	3.7	2.3	25.9	2.2	77.7	2.8
3.....	54.5	60.7	53.2	49.8	58.9	74.1	6.9	2.3	26.1	2.4	71.6	2.6
4.....	58.1	65.2	53.2	66.1	58.0	71.7	38.3	2.3	75.3	2.4	60.5	2.5
5.....	57.5	57.3	53.3	25.0	52.0	75.9	64.1	44.8	28.9	2.3	37.8	2.5
6.....	58.3	52.7	45.1	2.1	49.3	67.7	21.6	24.6	24.2	2.2	44.7	6.8
7.....	56.6	53.0	30.6	65.2	38.6	63.8	6.0	5.8	32.9	2.0	22.9	2.8
8.....	56.0	52.8	52.5	53.7	27.8	63.9	4.8	15.2	57.0	2.0	12.4	2.5
9.....	53.1	52.7	50.7	58.2	21.1	61.3	4.4	6.7	21.5	17.9	23.5	2.6
10.....	54.0	53.7	51.5	43.3	8.0	72.2	5.2	50.6	22.0	54.2	81.4	23.7
11.....	53.3	54.7	53.0	42.3	6.8	68.8	32.4	37.4	26.1	69.0	51.4	3.2
12.....	53.9	53.3	53.1	51.9	1.8	65.3	26.8	81.5	26.9	52.1	23.8	2.9
13.....	53.1	53.6	52.8	54.7	.....	75.4	15.8	79.7	30.3	39.1	22.7	2.6
14.....	53.0	55.5	54.5	50.6	.....	67.8	11.5	70.5	60.4	12.4	27.9	9.3
15.....	53.3	54.4	51.5	54.0	13.9	28.3	13.1	46.2	77.8	23.8	26.4	3.8
16.....	53.3	53.2	53.5	54.7	70.9	27.7	17.9	31.1	43.9	64.0	6.8	41.8
17.....	53.2	53.5	52.7	58.6	72.5	28.3	18.1	24.3	26.3	75.4	6.9	50.9
18.....	53.1	53.4	53.3	53.6	57.0	39.9	19.6	51.5	22.5	64.8	5.3	29.8
19.....	42.5	53.3	53.8	53.8	74.6	38.7	17.0	54.2	32.7	49.0	5.1	87.8
20.....	47.7	44.3	53.3	54.7	84.0	59.7	15.1	59.3	28.3	57.6	4.8	73.8
21.....	34.8	3.9	53.4	58.6	52.5	60.0	14.6	65.1	18.8	31.7	4.4	60.9
22.....	42.3	29.6	54.8	46.7	50.0	32.5	14.2	48.3	27.9	59.3	4.5	62.0
23.....	45.9	53.1	54.4	37.2	26.2	16.1	13.5	80.1	9.9	68.4	3.9	54.2
24.....	52.7	53.3	53.3	37.4	66.1	30.2	8.0	51.6	3.8	36.8	3.7	32.5
25.....	59.9	53.2	52.5	41.4	81.9	40.0	3.7	47.9	3.2	68.2	3.5	56.8
26.....	59.8	52.2	53.1	43.2	64.3	15.7	3.4	37.5	2.5	86.8	3.3	49.9
27.....	60.0	53.2	53.1	51.9	79.1	19.6	2.8	38.7	2.4	64.1	3.3	28.5
28.....	61.0	53.4	53.1	50.2	67.3	29.8	2.9	23.5	2.2	75.0	3.1	25.5
29.....	55.4	53.2	55.2	52.1	42.7	37.3	2.6	.....	2.2	87.7	3.0	24.8
30.....	55.3	53.2	54.4	56.2	48.5	13.6	2.4	.....	2.2	84.2	2.9	41.2
31.....	61.1	48.9	.....	61.7	.....	8.7	2.4	.....	2.3	.....	2.9	.....

NOTE.—No record Nov. 13 and 14, 1914.

Monthly discharge of Haiku ditch at Peahi weir, near Huelo, Maui, Jan. 1, 1913, to June 30, 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-feet (mean).	Million gallons.	Acres-feet.
	Maximum.	Minimum.	Mean.			
1913.						
January.....	54.0	4.8	37.6	58.2	1,170	3,580
February.....	53.3	2.8	18.1	28.0	507	1,560
March.....	48.1	1.9	13.0	20.1	404	1,240
April.....	54.0	2.9	43.7	67.6	1,310	4,020
May.....	51.0	3.8	28.1	43.5	870	2,670
June.....	52.1	2.9	15.6	24.1	469	1,440
The period (181 days).....	54.0	1.9	26.1	40.4	4,730	14,500
1913-14.						
July.....	53.3	1.6	19.6	30.3	606	1,860
August.....	53.0	1.2	15.7	24.3	488	1,490
September.....	53.2	1.8	6.95	10.8	208	640
October.....	53.2	1.4	12.3	19.0	380	1,170
November.....	53.3	1.2	47.4	73.3	1,420	4,360
December.....	59.9	3.2	41.3	63.9	1,280	3,930
January.....	60.6	2.8	41.3	63.9	1,280	3,930
February.....	53.1	2.3	18.4	28.5	516	1,580
March.....	39.3	1.8	9.78	15.1	303	930
April.....	64.6	7.4	40.2	62.2	1,210	3,700
May.....	57.5	39.6	52.5	81.2	1,630	4,990
June.....	58.5	2.8	51.0	78.9	1,530	4,700
The year.....	64.6	1.2	29.7	46.0	10,900	33,300

Monthly discharge of Haiku ditch at Peahi weir, near Huelo, Maui, Jan. 1, 1913, to June 30, 1915—Continued.

Month.	Discharge.				Total run-off.	
	Million gallons per day.			Second-foot (mean).	Million gallons.	Acre- feet.
	Maximum.	Minimum.	Mean.			
1914-15.						
July.....	61.1	34.8	53.8	83.2	1,670	5,120
August.....	65.2	3.9	51.6	79.8	1,600	4,910
September.....	55.3	30.6	52.3	80.9	1,570	4,820
October.....	66.1	2.1	48.5	75.0	1,500	4,610
November 1-12, 15-30.....	84.0	1.8	49.5	76.6	1,380	4,250
December.....	75.9	8.7	48.4	74.9	1,500	4,600
January.....	64.1	2.4	13.4	20.7	416	1,270
February.....	81.5	2.3	38.8	60.0	1,090	3,330
March.....	77.8	2.2	25.2	39.0	782	2,400
April.....	86.8	2.0	42.0	65.0	1,260	3,870
May.....	81.4	2.9	23.5	36.4	730	2,240
June.....	87.8	2.5	26.5	41.0	794	2,440
The period (363 days).....	87.8	1.8	39.4	61.0	14,300	43,900

MISCELLANEOUS MEASUREMENTS.

Measurements of streams and ditches on the island of Maui at points other than regular gaging stations are listed below:

Miscellaneous discharge measurements on Maui during the years ending June 30, 1914-15.

Date.	Stream.	Locality.	Gage height (feet).	Discharge.	
				Second-foot.	Million gallons per day.
1913.					
July 21	Lower springs	Kalepo Gulch, near Kaupo.....		0.44	0.28
21	Upper springs	do.....		.22	.14
21	Manawainui.....	Above large springs, near Kaupo.....		1.22	.79
21	do.....	Below large springs, near Kaupo.....		2.03	1.31
22	Alelele.....	Near Kipahulu.....		.36	.23
22	Oheo.....	Trail bridge near Kipahulu.....		1.17	.76
22	Puaaluu.....	do.....		2.24	1.45
22	Halalawe.....	do.....		1.86	1.20
22	Honolewa.....	do.....		1.29	.83
22	Kaili.....	do.....		1.88	1.22
23	Makapipi.....	Koolau ditch intake, near Nahiku.....		1.71	1.10
23	East Wailuaiki.....	Koolau ditch intake, near Keanae.....		7.0	4.5
Sept. 30	Lahainaluna ditch.....	At intake, near Lahaina.....		2.8	1.8
30	Lahainaluna.....	Above intakes, near Lahaina.....		4.5	2.9
1914.					
Feb. 25	Tributary to Iao.....	Confluence 75 feet below gaging station on Iao Stream.....		1.29	.83
Aug. 6	Honokahau ditch.....	100 feet below intake from Honolua stream.....	0.88	17.3	11.2
6	do.....	do.....	.85	16.8	10.9
6	do.....	do.....	1.36	29.6	19.1
6	do.....	do.....	1.58	39.0	25.2
6	do.....	do.....	2.02	53.8	34.8
6	do.....	do.....	2.27	64.0	41.4
22	Spreckels ditch.....	Old gage No. 4 above confluence with Puohakamoa Stream.....	.38	4.65	3.0
1915.					
May 17	Small stream	40 feet above main spring just below Potter's lot, Haiku homesteads.....		.69	.45
17	do.....	100 feet below main spring just below Potter's lot, Haiku homesteads.....		1.43	.92
June 13	Tributary to Iao.....	Confluence, 75 feet below gaging station on Iao Stream.....		3.4	2.2
15	Spreckels ditch.....	Old gage No. 4 above confluence with Puohakamoa Stream.....	1.10	18.7	12.1

MISCELLANEOUS MEASUREMENTS ON THE ISLAND OF MOLOKAI.

The results of a few measurements of discharge of streams on the island of Molokai are listed in the following table:

Miscellaneous discharge measurements on Molokai in 1914.

Date.	Stream.	Locality.	Gage height (feet).	Discharge.	
				Second-feet.	Million gallons per day.
Feb. 12	East Branch of Pele-kunu.	Elevation 400 feet, 600 feet above confluence with west branch.	.....	6.2	4.0
12	West Branch of Pele-kunu.	Elevation 370 feet, 200 feet above confluence with east branch.	.....	12.4	8.0
13	East Branch of Wailau.	Elevation 500 feet, 300 feet above confluence with west branch.	.....	5.8	3.7
13	West Branch of Wailau.	Elevation 500 feet, 500 feet above confluence with east branch.	.....	13.7	8.8
14	South Branch of Halawa.	Elevation 800 feet, above falls, about 3 miles above Halawa.	.....	5.0	3.2
14	North Branch of Halawa.	Elevation 400 feet, 2,000 feet above confluence with south branch.	.....	2.3	1.5
15	Keopukaloa.....	Elevation 1,000 feet, 300 feet above intake of pipe to Brown's ranch.	.....	.19	.12
15	Honoluiwai.....	Elevation 1,100 feet, 1,000 feet below ditch intake and just below spring feeder.	.....	.58	.37
15	.....do.....	Elevation 1,150 feet, 50 feet above ditch intake, 3 miles above Tollefson's house.	.....	.59	.28
16	Puniuohua.....	Elevation 1,900 feet, 3 miles above H. Bowen's house.	.....	.13	.08

EVAPORATION RECORDS.**METHODS OF MEASUREMENT.**

Records of evaporation from water surfaces obtained thus far in the Hawaiian Islands have been very unsatisfactory, and the accuracy of those heretofore printed is considered low.

In 1910 and 1911 records were obtained from nine stations on the islands of Kauai, Oahu, and Hawaii. Records of evaporation under roof were also obtained at two stations. In 1912 and 1913 the records obtained were so inconsistent and unreliable that they were not published. A careful study of the records obtained at Hoaeae, or Robinson station, Oahu, has eliminated several sources of error and these records are now considered worthy of publication.

The gage used in measuring evaporation consists of a circular galvanized-iron pan, 10 inches deep and about 18 inches in diameter. Readings are made from the surface of the water to the top of a sharp point extending about 2 inches above the bottom in the center of the pan. The pan is filled with water to about 3 inches from the top, water being added or taken out from time to time, according to the amount of evaporation and the rainfall. Rainfall records are obtained at the station, and the amount of rainfall is

taken into account in measuring the evaporation. Owing to the small size of the pan and the necessity of keeping the water some distance below the top, the effect of the wind in aiding evaporation is probably modified to a large extent. Despite the precaution of keeping the water low, the pan is likely to overflow at times of heavy rainfall. At such times, even if no overflow occurs, there are often considerable losses of water by spattering out over the sides of the pan, which probably accounts for the extremely large evaporation shown at times of heavy rainfall.

Owing to the difficulties in obtaining evaporation records, the data here presented are not considered highly accurate throughout. They give, however, some general information on a subject not heretofore investigated in the Territory of Hawaii.

EVAPORATION AT HOAEAE, OR ROBINSON STATION, NEAR WAIPAHU, OAHU.

RECORDS AVAILABLE.—September 1, 1911, to June 30, 1915.

ELEVATION.—705 feet above sea level.

OBSERVER.—Wm. Weinrich.

TEMPERATURE RECORDS.—Nearest temperature records available are those obtained by the United States Weather Bureau at Schofield Barracks; about 900 feet above sea level, and about 4 miles northwest of the evaporation gage; it is estimated that these records are between one and two degrees lower than those at Hoaeae.

Evaporation, in inches, at Hoaeae, or Robinson station, near Waipahu, Oahu, 1911-1915.

Month.	Total evapora- tion.	Maxi- mum daily evapora- tion.	Mean daily evapora- tion.	Total rainfall in inches.	Maxi- mum daily rainfall.	Num- ber of rainy days.	Mean temper- ature.	Maxi- mum temper- ature.	Mini- mum temper- ature.
1911-12.									
September.....	9.5	0.6	0.32	2.39	0.68	17	73.2	85	62
October.....	7.3	.3	.24	1.12	.52	19	71.2	87	57
November.....	6.8	.3	.23	1.07	.26	12	66.4	81	56
December.....	5.5	.4	.17	2.91	.62	21	68.1	79	54
January.....	6.0	.3	.19	1.03	.27	13	67.6	87	53
February.....	5.5	.4	.19	3.75	1.11	14	66.2	78	51
March.....	6.4	.4	.21	.69	.18	15	65.2	79	52
April.....	6.8	.5	.23	1.54	.72	21	68.4	79	55
May.....	8.8	.5	.28	.76	.14	13	70.4	83	57
June.....	10.0	.6	.33	.58	.14	12	72.4	86	59
The period.....	72.6	.6	.24	15.84	1.11	157	68.9	87	51
1912-13.									
July.....	9.5	.5	.31	1.38	.58	11	74.8	90	61
August.....	9.0	.6	.29	1.58	.57	14	75.0	88	60
September.....	9.1	.5	.30	.68	.17	9	74.6	85	62
October.....	7.9	.4	.25	1.91	.54	18	73.8	88	62
November.....	6.3	.4	.21	2.04	.98	12	70.0	84	59
December.....	6.3	.4	.20	4.68	2.20	13	70.8	84	59
January.....	5.8	.5	.19	1.06	.27	13	68.8	81	52
February.....	5.2	.4	.19	1.05	.43	9	69.5	85	55
March.....	7.1	.3	.23	1.12	.26	16	68.0	81	48
April.....	7.8	.5	.26	2.21	.40	20	68.9	80	58
May.....	7.7	.4	.25	4.61	2.16	16	71.0	84	58
June.....	9.4	.4	.31	5.02	1.62	20	72.2	82	61
The year.....	91.1	.6	.25	27.34	2.20	171	71.6	90	48

Evaporation, in inches, at Hoaeae, or Robinson station, near Waipahu, Oahu, 1911-1915—Continued.

Month.	Total evaporation.	Maximum daily evaporation.	Mean daily evaporation.	Total rainfall in inches.	Maximum daily rainfall.	Number of rainy days.	Mean temperature.	Maximum temperature.	Minimum temperature.
1913-14.									
July.....	8.9	0.5	0.29	0.67	0.19	12	74.4	89	63
August.....	7.8	.4	.25	3.80	2.18	16	75.6	89	63
September.....	6.6	.4	.22	3.15	.82	18	74.6	87	62
October.....	5.9	.5	.19	5.56	2.18	16	74.6	89	61
November.....	4.0	.4	.13	3.31	1.22	17	72.2	86	62
December.....	3.4	.4	.11	.79	.25	11	68.2	83	55
January.....	4.9	.4	.16	3.81	.84	16	64.0	80	50
February.....	(a)	(a)	(a)	2.09	.80	13	67.2	83	50
March.....	5.9	.5	.19	7.22	4.08	13	(b)	(b)	(b)
April.....	7.1	.5	.24	2.23	.65	15	68.6	84	52
May.....	7.2	.4	.23	1.46	.46	8	69.2	84	55
June.....	7.9	.5	.26	.63	.14	14	70.6	81	60
The period.....	69.6	.5	.21	.....	.....	.....	70.8	89	50
The year.....	.....	.....	.....	34.73	4.08	169	.....	.....	.....
1914-15.									
July.....	9.3	.5	.30	.50	.12	15	73.2	84	61
August.....	8.2	.5	.26	.80	.15	15	73.8	86	58
September.....	6.8	.4	.23	5.28	1.82	15	73.4	88	61
October.....	6.7	.4	.22	.64	.18	12	70.8	82	55
November.....	5.0	.3	.17	1.82	.37	15	65.7	81	50
December.....	5.0	.4	.16	6.08	2.68	18	61.8	78	41
January.....	5.9	.4	.19	.98	.25	8	62.8	79	40
February.....	6.0	.3	.21	.69	.15	12	64.0	86	42
March.....	6.7	.4	.22	1.33	.54	9	65.0	85	41
April.....	6.3	.3	.21	3.24	.73	15	69.2	84	54
May.....	7.2	.4	.23	1.30	.51	8	73.0	88	57
June.....	8.6	.4	.29	1.19	.64	10	70.1	82	60
The year.....	81.7	.5	.22	23.85	2.68	152	68.5	88	40

^a Record lost.

^b No record.

RAIN GAGING.

The rainfall of the Hawaiian Islands is extremely variable, ranging from a few inches at several low-level, leeward localities to more than 600 inches per annum, usually at elevations above 2,000 feet and on the windward sides of the islands. Valleys on the same sides of the islands and within a few miles of each other may have a variation in mean annual precipitation of several hundred per cent. The rainfall may also vary greatly in the same valley for different elevations. As a rule the zones of heaviest precipitation are on the windward sides of the islands, 2,000 to 3,000 feet above sea level.

Generally the daily rain gages maintained by the United States Weather Bureau are located at low levels. Lack of funds and the absence of inhabitants at high-level localities have prevented the maintenance of Weather Bureau stations at high levels, although a number of daily records are furnished that bureau by occupants and caretakers of mountain houses and ranches. The data furnished by the Weather Bureau are therefore generally of little value in their relation to stream run-off.

When high levels have been accessible and funds available high-level rain gages, which are read monthly and bimonthly, have been established by this office and some valuable records obtained. To

determine the precipitation of the Territory accurately would require the installation of thousands of gages and the construction of hundreds of miles of trails. For this reason and because of the extreme and variable porosity of the soil it is impossible to determine any consistent relation between rainfall and stream run-off.

Acknowledgment for cooperation in furnishing rainfall data is due the following companies and individuals:

Kauai: Kekaha Sugar Co., Hawaiian Sugar Co., Grove Farm Plantation, W. F. Sanborn, of Princeville Ranch, Kauai Electric Co., and J. McClellan.

Oahu: F. Meyer, the United States Army, Koolau Agricultural Co., and Hawaii Preserving Co.

Maui: Wailuku Sugar Co., Honolua Ranch, Hawaiian Commercial & Sugar Co., Maui Board of Supervisors, Pioneer Mill Co., and Olowalu Sugar Co.

Hawaii: Hawaii Mill Co., W. S. May, C. F. Clark, C. R. Willard, Alex. Valentine, Honokaa Sugar Co., Pacific Sugar Mill, Hawaiian Irrigation Co., Kukaiau Ranch Co., and Waiakea Sugar Co.

The tables on pages 317-322 show the precipitation at stations maintained by the Geological Survey and precipitation data obtained from private sources which, with one exception, are not included in United States Weather Bureau records, to which those interested in further data are referred. The stations are listed below.

Rainfall stations in Hawaii.

KAUAI.

1. Waialeale, on summit of ridge at headwaters of Hanapepe, Wainiha, Hanalei, and Olokele streams, and North and South forks of Wailua River; about 25 miles by road and trail northeast of Waimea; 5,075 feet above sea level.

2. Intake of Wainiha Power Co.'s canal, 6 miles back of Hanalei; 700 feet above sea level; records furnished by Kauai Electric Co.

3. About 50 feet below Kauai Electric Co.'s power house, at tailrace, 7 miles west of Hanalei; 125 feet above sea level; records furnished by Kauai Electric Co.

4. Summit Camp (Wainiha ridge), Hanalei; about 30 feet southwest of house at Summit Camp on power line; 6 miles from Kapaka; 1,900 feet above sea level; gage read by employee of Kauai Electric Co.

5. Kapaka, at Lineman's camp, about 50 feet north of house and 5 miles south of Hanalei; 635 feet above sea level; gage read by employee of Kauai Electric Co.

6. At stream gaging station in upper Hanalei Valley; about 2 miles north by foot trail of Summit Camp on power-line trail; about 700 feet above sea level.

7. About 40 feet north of Sanborn's residence, 2 miles from Hanalei; 105 feet above sea level; records furnished by Princeville ranch.

8. At stream gaging station in upper Kalihiwai Valley; about 10 miles southwest of Hanalei by power line and foot trail; about 700 feet above sea level.

9. Residence of W. S. Newlun, about $4\frac{1}{2}$ miles west of Kapaa; 375 feet above sea level.

10. Waiahi, on South Wailua River, near Lihue Electric Co.'s power plant, 7 miles from Lihue; 600 feet above sea level.

11. Aakukui, near plantation camp, about 5 miles southwest of Lihue; 350 feet above sea level; records furnished by Grove farm.

12. Hiloa-Manawaiopuna divide, on ridge between east and west branches of Hanapepe stream, about 10 miles northeast of Eleele; 2,080 feet above sea level.

13. Hanapepe Valley, on left bank of Hanapepe ditch, 3 miles above Koula, and about 8 miles north of Eleele; 530 feet above sea level; records furnished by Hawaiian Sugar Co.

14. Camp No. 2, about 2 miles northwest of Hanapepe and 7 miles southeast of Waimea; 250 feet above sea level; records furnished by Hawaiian Sugar Co.

15. Olokele mauka, on ridge on left side of Olokele stream above intake of Olokele ditch, and about 18 miles by road and trail from Waimea; 2,100 feet above sea level; records furnished by Hawaiian Sugar Co.

16. Keanakua, near Halekua camp, on ridge about 16 miles by road and trail north-northeast of Waimea; 4,450 feet above sea level.

17. Kahana, near Halekua camp, on ridge about 16 miles by road and trail via Kaholuamanu from Waimea; 3,750 feet above sea level.

18. Kaholuamanu, about 12 miles by road and trail northeast of Waimea; 3,650 feet above sea level.

19. Waimea, in Mr. J. McClellan's yard; 10 feet above sea level; Mr. McClellan aids in obtaining record.

20. Camp No. 7, about 2 miles northeast of Waimea; 150 feet above sea level; records furnished by Hawaiian Sugar Co.

21. Pali trail, one-half mile mauka of Kekaha ditch where trail crosses and about 2 miles mauka from Waimea; 850 feet above sea level; records furnished by Kekaha Sugar Co.

22. Hukipo, 3 miles northwest of Waimea; 400 feet above sea level; records furnished by Kekaha Sugar Co.

23. Waialae, near Kaholuamanu, 14 miles by road and trail north of Waimea, near Waialae gaging station; 3,600 feet above sea level.

24. Mohihi-Koaie divide, on ridge about 24 miles by road and trail north of Waimea; 3,950 feet above sea level.

25. Mohihi, on ridge at head of Mohihi Valley and about 23 miles by road and trail northeast of Waimea; 3,500 feet above sea level.

26. Waiahoali, about 22 miles by road, via Halemanu, north of Waimea; 3,450 feet above sea level.

27. Paukahana, about 21 miles north of Waimea by road and trail; 3,723 feet above sea level.

28. Lehuamakanoi, about 22 miles by road and trail north of Waimea; 3,932 feet above sea level.

29. Puu Lua, near wagon road from Kekaha to Halemanu, about 12 miles north of Waimea; 3,500 feet above sea level.

30. Kokee, on mesa one-half mile above Knudsen's camp, near head of Kokee Stream and about 19 miles north of Waimea; 3,550 feet above sea level.

OAHU.

1. Kaaun crater, on trail from Mount Olympus, a short distance before it leads down the ridge into Palolo Valley and about $3\frac{1}{2}$ miles north of Kainauki car line; 1,700 feet above sea level.

2. Near summit of Mount Olympus, back of Manoa Valley, about $6\frac{1}{2}$ miles in air line northeast of Honolulu; 2,400 feet above sea level.

3. Nuuanu Pali, on the water reservation, near the Pali road, about 200 yards toward Honolulu from top of Pali; 1,200 feet above sea level.

4. Residence of J. K. Maui in upper Kalibi Valley; 520 feet above sea level.
5. Ditch tender's house at United States Army reservoir in upper valley of the South Kaukonahua Stream; 1,200 feet above sea level.
6. About 150 yards downstream on left bank of North Fork of Kaukonahua Stream from Waialua Agricultural Co.'s ditch intake, on trail, 8 miles north of Wahiawa; 1,200 feet above sea level.
7. Near the office of the Hawaiian Preserving Co., Wahiawa; 940 feet above sea level; records are furnished by Hawaiian Preserving Co.
8. Makaha near Waianae, on property of Waianae plantation; 1,300 feet above sea level; records furnished by F. Meyer, manager Waianae plantation.
9. Ditch and trail tender's house in upper Punaluu Valley, about 2 miles from Punaluu railroad station; 300 feet above sea level.
10. On the ridge between the Waiahole and Waiawa portals of the Waiahole Water Co.'s tunnel, near Waiahole, Waikane, Oahu; 2,150 feet above sea level.
11. North portal of Waiahole tunnel; 750 feet above sea level.

MAUI.

1. In H. B. Penhallow's yard, Wailuku; 390 feet above sea level; records furnished by Wailuku Sugar Co.
2. Yard at Wailuku Sugar Co.'s office, Wailuku; 175 feet above sea level; records furnished by Wailuku Sugar Co.
3. Waiehu, at T. Burlem's house on old Spreckels ditch just south of South Waiehu Gulch.
4. Waikamoi Gulch, on Kula pipe line at reservoir; 3 miles from Olinda and 7 miles from Makawao; 4,200 feet above sea level; records furnished by board of supervisors, county of Maui.
5. Puohakamoa, on Kula pipe line, about 1,000 feet below intake at Puohakamoa Gulch, 4 miles east of Olinda and 8 miles from Makawao; 4,300 feet above sea level; records furnished by board of supervisors, county of Maui.
6. Residence of George Groves, upper Keanae Valley; 1,000 feet above sea level.
7. Olowalu Sugar Co.'s mill in Olowalu; 10 feet above sea level; records furnished by Olowalu Sugar Co.
8. West slope of Puu Kukui, about one-half mile south of Honokawai Gulch, about $4\frac{1}{2}$ miles east of Kaanapali and $8\frac{1}{2}$ miles from Lahaina; 2,500 feet above sea level; records furnished by Pioneer Mill Co.
9. West slope of Puu Kukui at top of left bank of Honokawai Gulch, about 6 miles east of Kaanapali and 10 miles from Lahaina; 5,000 feet above sea level; records furnished by the Pioneer Mill Co.
10. Honokawai Gulch at junction with Amalu Stream; on trestle supporting Honokawai flume about 1,000 feet below intake; about $3\frac{1}{2}$ miles from Kaanapali and $7\frac{1}{2}$ miles from Lahaina; 1,500 feet above sea level; records furnished by Pioneer Mill Co.
11. Camp on ridge between Honokahau and Kahakuloa gulches beside trail leading to top of Mount Eke; about 12 miles from Honokahau; 2,300 feet above sea level.
12. Honokahau Gulch at ditchman's house on left bank of stream, 150 feet below ditch intake; about 8 miles from Honokahau; 800 feet above sea level; records furnished by Honolua Ranch Co.
13. Rim of extinct crater of Mount Eke; 14 miles by trail from Honokahau; 4,500 feet above sea level.
14. Waihee Gulch, on right bank of the stream, about 100 feet below lower development tunnel; about $5\frac{1}{2}$ miles from mouth of gulch and 3 miles above intake of Waihee Canal and the Waihee gaging station; 1,500 feet above sea level.
15. Waihee, on roof of building formerly used as plantation office; $3\frac{1}{2}$ miles from Wailuku; 125 feet above sea level; records furnished by Wailuku Sugar Co.

16. Waikapu Gulch, on left bank of the South Branch of Waikapu Stream, about 4 miles by trail from Waikapu and 6 miles from Wailuku; 1,535 feet above sea level.

17. About 1,000 feet below small cave in Iao Valley, on ridge between north and south branches of Iao Stream; about 5½ miles west of Wailuku; 1,720 feet above sea level.

18. Iao Valley on small plateau or table-land between north and south branches of Iao Stream, about 1 mile above the junction; about 4 miles west of Wailuku; 1,500 feet above sea level.

19. Right bank of Iao Stream at the gaging station, 20 feet from the north anchorage of the cable; 3 miles west of Wailuku; 830 feet above sea level.

HAWAII.

1. Kemole House, 12 miles southeast of Waimea; 5,500 feet above sea level; records furnished by Parker Ranch.

2. Pohakuloa, 20 miles southeast of Waimea; 5,700 feet above sea level; records furnished by Parker Ranch.

3. Puuhinei Paddock, 14 miles south of Waimea; 1,500 feet above sea level; records furnished by Parker Ranch.

4. Puuanuanu Paddock, 14 miles south-southeast of Waimea; 7,500 feet above sea level; records furnished by Parker Ranch.

5. Punohu Paddock, 10 miles east of Waimea; 4,200 feet above sea level; records furnished by Parker Ranch.

6. Kohala Mountain pipe line, 3 miles north of Waimea; 3,700 feet above sea level records furnished by Parker Ranch.

7. Upper Kawainui, in the Kohala Mountains, near the line of the upper Hamakua ditch, near Kukuihaele; 4,080 feet above sea level; records furnished by Hawaiian Irrigation Co.

8. Lower Kawainui, in Waipio Valley, near the line of the lower Hamakua ditch, near Kukuihaele; 1,040 feet above sea level; records furnished by Hawaiian Irrigation Co.

9. Alakahi-Waipio Valley, Kohala Mountains, near the line of the upper Hamakua ditch; 3,870 feet above sea level; records furnished by Hawaiian Irrigation Co.

10. Alakahi-Waipio, in Waipio Valley, Kohala Mountains, along the line of the lower Hamakua ditch, near Kukuihaele; 1,030 feet above sea level; records furnished by Hawaiian Irrigation Co.

11. Upper Koiawe, along the line of the upper Hamakua ditch, Waipio Valley, near Kukuihaele; 3,350 feet above sea level; records furnished by Hawaiian Irrigation Co.

12. Lower Koiawe, near the line of the lower Hamakua ditch, in Waipio Valley, near Kukuihaele; 1,000 feet above sea level; records furnished by Hawaiian Irrigation Co.

13. Waima, in Waipio Valley, along the line of the lower Hamakua ditch, near Kukuihaele; 980 feet above sea level; records furnished by Hawaiian Irrigation Co.

14. Ahualoa homesteads, at ditch tender's house, near the Parker Ranch, Honokaa 2,551 feet above sea level; records furnished by civil engineer's office of Honokaa Sugar Co. and Pacific Sugar Mill.

15. Upper Hapea, on lands of Kukaiau Ranch Co.; 5,000 feet above sea level.

16. Lower Hapea, on lands of Kukaiau Ranch Co.; 4,000 feet above sea level.

17. Kaala, on lands of Kukaiau Ranch Co.; 5,500 feet above sea level.

18. Puu Kea, on lands of Kukaiau Ranch Co.; 8,565 feet above sea level.

19. Halepuila, on lands of Kukaiau Ranch Co.; 6,000 feet above sea level.

20. Puuhala, on lands of Kukaiau Ranch Co.; 6,500 feet above sea level.

21. Puukihe, on top of Kihe Hill on the side of Mauna Kea, about 10 miles south of Kukaiau; 7,822 feet above sea level; records furnished by Kukaiau Ranch Co. (Ltd.).

22. Umikoa, on property of Kukaiau Ranch Co. (Ltd.). near ranch house; 3,400 feet above sea level; records furnished by Kukaiau Ranch Co. (Ltd.).

23. Near flume at Camp No. 8 of Waiakea plantation, near Waiakea; 1,500 feet above sea level; records furnished by Waiakea Plantation Co.

24. Camp No. 6, at plantation camp back of Waiakea; 800 feet above sea level; records furnished by Waiakea plantation.

25. Piihonua, at office and store of Hawaii Mill Co., near Hilo; 915 feet above sea level; records furnished by Hawaii Mill Co.

26. United States Engineer's office at Hilo Breakwater, Hilo; 15 feet above sea level; records furnished by United States Engineer's office.

27. Kaauhuhu, on property of W. S. May, about 3 miles northwest of Hilo; 1,400 feet above sea level; records furnished by W. S. May.

Precipitation and estimated evaporation (in inches) at rainfall stations maintained during the period July 1, 1913, to June 30, 1915.

Kauai.

No.	Station.	Records available.	Gage.	Readings.	Year ending June 30.	Precipitation.												Estimated evaporation.		
						July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.		Year.	
1	Waialeale a.	Sept. 9, 1910, to June 30, 1915 (broken record)	1.9-inch, 10 : 1.	Irregular..	1915														600	
2	Intake of Wainiha Canal.	Feb. 1, 1907, to June 30, 1915.	Records furnished by Kauai Electric Co.	Daily.....	1914	11.83	9.54	5.20	9.18	28.03	8.81	15.30	5.20	9.96	22.03	23.01	18.08	166.17		
3	Power house, Wainiha.	do.....	do.....	do.....	1915	15.04	21.10	37.16	13.91	19.38	22.66	2.80	14.57	1.75	36.51	4.79	22.69	212.36		
4	Summit Camp, Hanalei.	Sept. 18, 1910, to June 30, 1915.	do.....	do.....	1914	6.92	7.21	3.15	5.22	17.34	8.65	15.23	6.80	13.96	14.63	18.67	13.32	131.10		
5	Kapaka.	do.....	do.....	do.....	1915	19.46	16.92	34.31	6.36	13.34	12.87	4.17	5.06	3.51	22.82	3.50	17.63	159.95		
6	Hanalei.	do.....	do.....	do.....	1914	12.27	11.91	8.95	13.90	31.16	7.81	21.17	2.44	8.12	14.17	26.34	15.28	176.43		
7	Hanalei.	do.....	do.....	do.....	1915	19.52	18.00	41.31	9.55	21.00	24.36	1.92	9.60	2.57	27.33	26.70	15.96	193.62		
8	Hanalei.	do.....	do.....	do.....	1914	9.03	7.67	5.08	6.93	19.10	9.49	12.25	4.33	3.38	17.80	5.74	11.93	133.86		
9	Hanalei.	June 27, 1914, to June 30, 1915.	8-inch, 2 : 1.	Irregular..	1915	17.07	17.78	37.24	5.57	13.67	14.12	2.13	4.53	3.38	17.80	5.74	11.93	189.0	3	
10	Sanborn's residence, Hanalei.	Mar. 1, 1910, to June 30, 1915.	Records furnished by W. F. Sanborn.	Daily.....	1914	5.13	5.00	2.54	6.18	12.12	6.63	6.95	2.22	6.63	8.85	13.41	6.16	81.82		
11	Kalihiwai.	May 26, 1914, to June 30, 1915.	8-inch, 2 : 1.	Irregular..	1915	9.42	7.46	27.44	4.08	7.07	8.03	.75	3.08	1.90	9.92	3.44	7.53	90.12		
12	Newlun's residence, Kealia.	Jan. 1, 1914, to June 30, 1915.	8-inch, 1 : 10.	Daily.....	1915	6.70	5.70	31.50	3.70	8.10	9.30	.6		2.0	1.3	17.6	3.3	6.6	96.40	3
13	Aakui.	Aug. 8, 1910, to June 30, 1915.	8-inch, 2 : 1.	Monthly.....	1914	2.06	2.10	(b)	(b)	22.06	2.04	8.4	1.8	4.6	8.4	2.1	11.0	68.56	4	
14	Hiloa-Manowaiopuna divide.	June 1, 1909, to June 30, 1915.	Records furnished by Grove farm.	Daily.....	1915	12.0	11.8	28.0	7.2	11.8	1.2	4.4	.2	1.6	2	10.6	13.8	102.8	4	
15	Hanapepe Valley.	Jan. 1, 1905, to June 30, 1915.	Records furnished by Hawaiian Sugar Co.	Monthly.....	1914	4.63	3.14	20.12	2.68	5.31	6.23	8.7	2.65	1.04	6.92	1.61	6.00	61.20		
16	Camp No. 2.	do.....	do.....	do.....	1915	16.2	15.4	6.6	18.4	43.4	8.4	9.1	2.2	2.0	13.0	22.9	27.2	194.8	3	
17	Olokele, mauka.	Apr. 1, 1911, to June 30, 1915.	do.....	Daily.....	1914	26.0	32.4	51.6	15.6	26.0	24.2	2.7	8.2	4.6	27.2	6.5	17.0	245.2	3	
18	Keanakua.	Sept. 6, 1910, to June 30, 1915.	8-inch, 2 : 1.	Daily.....	1915	7.73	10.44	3.66	14.18	25.61	.69	5.32	1.04	5.46	7.37	12.70	11.70	105.90		
19				do.....	1915	11.29	14.02	30.45	7.89	15.22	14.43	.98	3.33	2.19	14.37	2.17	8.99	125.33		
20				do.....	1914	.42	1.17	.63	5.37	4.23	0	2.38	.65	3.69	1.26	3.10	.58	23.48		
21				do.....	1915	14	45	9.40	0	86	5.14	3.38		9.96	3.03	.07	.79	21.22		
22				Monthly.....	1914	7.91	10.25	4.76	13.44	27.35	10.28	2.01	7.84	2.42	10.31	12.65	119.70	3		
23				do.....	1915	7.79	14.80	22.05	9.83	14.15	21.70	.92	4.35	2.42	11.41	2.78	10.70	125.92	3	
24				Irregular..	1914													96.6	3	
25				do.....	1915													108.1	3	

b No record.

a Partly estimated by comparison with near-by stations.

Oahu.

		Jan. 1, 1913, to Apr. 30, 1914.	8-inch 2.1.....	Monthly.....	1914.....	3.4.....	6.8.....	3.0.....	5.2.....	18.0.....	16.8.....	4.8.....	4.2.....	10.7.....	17.7.....	.....	.....	93.6.....	3.....
1	Kaau crater.....	do.....	do.....	do.....	1914.....	2.4.....	5.0.....	3.0.....	4.8.....	9.0.....	4.4.....	3.7.....	3.4.....	9.1.....	11.3.....	.....	.....	59.1.....	3.....
2	Mount Olympus.....	do.....	do.....	do.....	1914.....	3.0.....	8.6.....	5.8.....	3.1.....	15.2.....	14.6.....	9.0.....	3.7.....	12.7.....	13.1.....	15.5.....	9.9.....	122.2.....	6.....
3	Nuanu Pali.....	Sept. 23, 1910, to June 30, 1915.	do.....	do.....	1915.....	8.6.....	9.6.....	28.6.....	10.6.....	10.2.....	5.6.....	4.9.....	6.8.....	3.1.....	25.1.....	6.0.....	7.2.....	130.3.....	6.....
4	Upper Kalihi Valley.....	Sept. 1, 1914, to June 30, 1915.	8-inch 1:10.....	Daily.....	1915.....	.....	.....	17.05.....	6.06.....	11.40.....	7.73.....	1.94.....	9.65.....	2.60.....	18.90.....	2.97.....	7.52.....	85.82.....	.....
5	Army reservoir on S. Kaunohua stream.....	Aug. 1, 1914, to June 30, 1915.	Records furnished by U. S. Army.	do.....	1915.....	.....	9.47.....	12.70.....	7.91.....	7.65.....	6.04.....	2.09.....	4.69.....	2.28.....	8.95.....	2.67.....	10.38.....	74.83.....	.....
6	Waialua Agricultural Co.'s intake.....	May 30, 1913, to June 30, 1915.	8-inch 2.1.....	Approximately monthly.....	1914.....	8.5.....	11.9.....	8.6.....	12.8.....	41.2.....	12.4.....	11.6.....	4.5.....	10.2.....	18.1.....	14.9.....	25.0.....	181.7.....	2.....
7	Hawaiian Preserving Co. take.....	Mar. 1, 1913, to June 30, 1915.	Records furnished by Hawaiian Preserving Co.	Daily.....	1914.....	2.26.....	3.57.....	3.51.....	4.76.....	5.78.....	8.2.....	4.15.....	1.63.....	7.53.....	3.65.....	2.52.....	2.02.....	42.30.....	.....
8	Makaha near Waianae.....	Aug. 1, 1912, to June 30, 1915.	Records furnished by Waianae Plantation.	do.....	1914.....	1.39.....	4.02.....	4.22.....	8.80.....	7.78.....	12.41.....	13.30.....	2.80.....	7.34.....	8.22.....	12.26.....	4.22.....	86.76.....	.....
9	Upper Punahoa Valley.....	Apr. 28 to June 30, 1915.	Record furnished by Koolau Agricultural Co.	do.....	1915.....	1.70.....	2.36.....	6.52.....	2.14.....	4.61.....	8.87.....	2.09.....	4.40.....	4.97.....	11.42.....	4.62.....	4.32.....	58.02.....	.....
10	Waialua-Waiahole Ridge.....	Dec. 5, 1910, to May 31, 1914.	do.....	Monthly.....	1914.....	5.3.....	11.3.....	7.5.....	12.2.....	23.5.....	16.1.....	9.1.....	3.6.....	20.5.....	16.7.....	35.8.....	.....	164.6.....	3.....
11	North Portal Waiahole tunnel.....	Sept. 1, 1913, to June 30, 1914.	8-inch 2.1.....	do.....	1914.....	.....	.....	6.35.....	8.68.....	19.28.....	24.37.....	4.55.....	14.36.....	14.32.....	21.08.....	11.38.....	15.00.....	141.35.....	2.....

Maui.

		Nov. 1, 1896, to June 30, 1915.	Records furnished by Wailuku Sugar Co.	Daily.....	1914.....	0.22.....	2.01.....	0.58.....	1.25.....	3.82.....	4.20.....	5.92.....	0.36.....	7.72.....	7.04.....	8.95.....	0.68.....	42.75.....	.....
1	Petthallow's residence, Wailuku.....	do.....	do.....	do.....	1915.....	1.02.....	3.97.....	2.72.....	.69.....	3.71.....	8.62.....	.60.....	2.11.....	1.03.....	5.61.....	.59.....	.60.....	31.27.....	.....
2	Wailuku.....	May 1, 1887, to June 30, 1915.	do.....	do.....	1914.....	.11.....	1.42.....	.46.....	1.06.....	3.31.....	3.00.....	5.80.....	.34.....	8.04.....	5.26.....	6.53.....	.45.....	35.30.....	.....
3	Waiehu.....	Jan. 1, 1910, to June 30, 1915.	Records furnished by Hawaiian Commercial & Sugar Co.	do.....	1915.....	.90.....	3.07.....	2.22.....	.64.....	3.12.....	8.60.....	.51.....	1.73.....	3.80.....	3.80.....	.65.....	.21.....	26.22.....	.....
4	Waikamoi Gulch.....	Oct. 12, 1910, to July 31, 1914; and Oct. 1, 1914, to June 30, 1915.	Records furnished by Maui County.	do.....	1914.....	.48.....	1.40.....	.91.....	1.00.....	2.97.....	4.93.....	6.28.....	.43.....	8.77.....	9.08.....	8.34.....	.91.....	45.50.....	.....
5	Puohakamoa.....	May 1, 1911, to July 31, 1914; and Oct. 1, 1914, to June 30, 1915.	do.....	do.....	1915.....	1.25.....	5.11.....	6.51.....	.99.....	4.51.....	10.70.....	.55.....	2.47.....	.65.....	5.29.....	.72.....	.53.....	39.28.....	.....
					1914.....	8.09.....	15.47.....	7.27.....	10.63.....	40.66.....	27.82.....	31.58.....	.43.....	13.98.....	31.92.....	55.46.....	18.14.....	261.45.....	.....
					1915.....	32.83.....	(a).....	(a).....	20.19.....	26.81.....	30.12.....	7.94.....	32.85.....	11.86.....	36.69.....	6.29.....	34.00.....	245.58.....	.....
					1914.....	7.78.....	13.11.....	18.18.....	14.61.....	41.69.....	16.14.....	30.03.....	.44.....	14.13.....	31.91.....	54.93.....	18.50.....	261.45.....	.....
					1915.....	32.71.....	(a).....	(a).....	25.77.....	26.31.....	28.73.....	6.84.....	32.66.....	11.92.....	32.75.....	5.92.....	33.40.....	237.01.....	.....

a No record.

Precipitation and estimated evaporation (in inches) at rainfall stations maintained during the period July 1, 1913, to June 30, 1915—Continued.

Maui—Continued.

No.	Station.	Records available.	Gage.	Readings.	Year ending June 30.	Precipitation.												Estimated evaporation.
						July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	
6	Keanae ^a	Jan. 1, 1904, to June 30, 1915.	Records furnished by East Maui Ditch Co.	Daily	1914	8.18	14.73	7.02	12.85	42.32	20.38	27.16	1.18	16.75	35.14	59.76	35.71	281.19
					1915	44.73	52.68	45.80	24.18	35.28	18.41	6.46	26.78	10.37	31.63	8.26	20.95	325.53
7	Olowalu.	Jan. 1, 1907, to June 30, 1915.	Records furnished by Olowalu Sugar Co.	do.	1914	0	1.17	0	-72	50	27	8.77	1.30	13.70	70	3.80	0	30.93
					1915	0	0	1.30	0	1.48	11.85	0	1.38	1.13	.45	.13	16.72	16.72
8	Puu-Kukui near Lahaina.	Oct. 13, 1911, to June 30, 1915.	Records furnished by Pioneer Mill Co.	Monthly	1914	9.0	6.5	3.2	6.0	21.5	7.5	13.5	1.0	13.8	15.8	9.4	13.4	123.6
					1915	10.4	15.2	16.8	9.4	19.2	15.2	2.6	14.8	3.8	10.4	2.4	11.0	134.2
9	Puu-Kukui near Kaaunali.	do.	do.	do.	1914	18.0	20.0	7.0	13.5	55.0	26.5	33.0	3.5	20.4	32.6	30.4	59.6	322.5
					1915	52.6	51.6	54.0	35.8	30.6	24.6	9.2	35.2	12.6	31.8	8.6	19.0	368.6
10	Honokawai Gulch.	Oct. 17, 1911, to June 30, 1915.	do.	do.	1914	4.95	6.68	3.10	6.00	20.98	9.36	17.14	2.10	9.09	10.88	10.32	12.20	115.80
					1915	13.14	15.84	16.49	9.94	18.23	18.31	3.81	16.90	5.87	12.19	2.79	6.73	143.24
11	Honokahau Ridge.	Mar. 10, 1913, to June 30, 1915.	8-inch 2:1	Approximately monthly.	1914	6.0	5.5	4.4	9.9	13.7	19.6	13.1	4.6	10.5	22.0	34.9	14.9	163.0
					1915	22.6	24.8	31.8	8.8	20.4	13.6	4.6	21.0	8.4	24.6	4.8	8.6	197.0
12	Honokahau Gulch.	Feb. 1, 1907, to June 30, 1915.	Records furnished by Honolulu Ranch.	Daily	1914	5.06	7.77	3.00	5.57	26.03	15.18	19.18	3.67	11.43	24.31	39.12	19.88	180.20
					1915	26.36	30.11	38.07	11.21	16.68	14.53	5.16	24.15	8.93	27.44	5.29	9.58	217.51
13	Mount Eke.	Mar. 10, 1913, to June 30, 1915.	8-inch 2:1	Monthly	1914	16.8	13.3	13.8	25.6	31.4	33.3	21.1	7.8	12.6	29.9	39.9	20.6	269.1
					1915	32.8	29.6	36.4	12.4	42.8	17.0	7.2	32.8	14.8	34.8	7.6	13.8	285.0
14	Wahee Gulch.	Nov. 4, 1910, to June 30, 1915.	19-inch 10:1	Irregular	1914													316.0
					1915													438.0
15	Wahee.	Jan. 1, 1899, to Oct. 31, 1907, Jan. 1, 1910, to June 30, 1915.	Records furnished by Waialuku Sugar Co.	Daily	1914	27	1.43	61	60	3.03	4.37	4.92	0	7.94	5.30	9.10	.93	38.50
					1915	1.18	4.46	5.12	.97	2.96	11.01	.81	1.89	1.10	5.16	.82	1.66	37.14
16	Waikapu Gulch.	Nov. 3, 1910, to June 30, 1915.	8-inch 2:1	Irregular	1914													152.8
					1915													176.4
17	Cave in Iao Valley.	Nov. 5, 1910, to Dec. 24, 1914.	do.	do.	1914													165.0
18	Iao Valley Tableland.	Apr. 12, 1911, to Dec. 24, 1914.	do.	do.	1914													151.2
19	Iao Valley near Waialuku.	Nov. 5, 1910, to Dec. 24, 1914.	do.	do.	1914													117.7

^a Also published by U. S. Weather Bureau.

Hawaii.

	Kemole House.....	Sep't. 1, 1914, to June 30, 1915.	Records furnished by Parker Ranch.	Monthly ..	1915	5.0	1.6	8.0	0	0.2	C.4	2.6	0	1.6	19.4
1	Pohakuloa.....	do.....	do.....	do.....	1915	3.8	.2	2.8	7.4	.	.8	1.0	0	0	16.4
2	Puuhiwai Paddock.....	do.....	do.....	do.....	1915	1.0	0	1.2	7.0	0	.6	1.4	0	0	12.0
3	Puananui Paddock.....	do.....	do.....	do.....	1915	8.0	.2	5.8	13.0	.4	0	3.6	2.4	5.4	38.8
4	Punohu Paddock.....	Nov. 1, 1914, to June 30, 1915.	do.....	do.....	1915			12.4	8.4	1.5	7.0	6.0	2.0	3.0	41.3
5	Kohala Mountain Pipe Line.....	Sep't. 1, 1914, to June 30, 1915.	do.....	do.....	1915	18.0	15.6	16.4	12.0	6.0	4.8	11.2	5.2	10.0	111.2
6	Upper Kawaiuni.....	July 1, 1907, to June 30, 1915.	Hawaiian Irriga- tion Co.	Daily.....	1914	18.46	6.17	56.62	18.86	35.34	1.52	18.60	28.11	36.98	307.13
7	Lower Kawaiuni.....	Sep't. 1, 1910, to June 30, 1915.	do.....	do.....	1915	82.32	54.25	43.93	19.75	17.09	35.61	12.52	8.35	17.74	445.26
8	Alakahai-Waipia Upper.....	Jan. 1, 1913, to June 30, 1915.	do.....	do.....	1914	6.32	9.20	5.68	2.21	34.44	27.22	13.54	14.91	32.47	197.57
9	Alakahai-Waipio Lower.....	Sep't. 1, 1910, to June 30, 1915.	do.....	do.....	1914	48.62	56.16	29.55	17.46	29.35	14.15	7.43	11.63	6.90	280.42
10	Upper Koialewe.....	Jan. 1, 1912, to June 30, 1915.	do.....	do.....	1914	13.30	11.72	7.28	4.27	41.30	14.85	26.34	2.00	10.43	216.34
11	Lower Koialewe.....	Sep't. 1, 1910, to June 30, 1915.	do.....	do.....	1914	54.47	62.93	35.32	26.47	30.60	16.57	9.39	24.81	8.88	317.27
12	Waimea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1915	8.45	9.58	9.62	2.97	33.83	25.29	32.19	1.47	7.78	181.71
13	Ahualoa Home- steads.....	Mar. 1, 1902, to June 30, 1915.	Records furnished by Kukuaiau Ranch Co.	Irregular periods until June 30, 1914; af- ter that approx- imately weekly.	1913	27.19	37.83	21.23	14.91	17.54	13.12	6.14	15.47	7.78	204.80
14	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1914	5.08	9.00	3.38	2.63	22.76	8.93	15.46	1.14	8.00	181.71
15	Lower Hapea.....	Jan. 1, 1912, to June 30, 1915.	do.....	do.....	1914	4.37	4.86	3.96	1.49	18.13	14.04	8.93	21.54	16.56	203.07
16	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1913	36.24	36.34	20.11	11.14	19.95	12.13	4.65	11.82	5.48	185.09
17	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1912	3.62	4.06	2.96	6.77	10.82	11.23	14.79	6.3	6.80	102.03
18	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1913	35.46	39.29	16.12	9.92	20.76	11.14	3.10	5.54	17.00	179.68
19	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1914	2.66	1.85	2.23	3.73	15.09	3.36	1.27	10.90	14.98	130.81
20	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1915	4.42	2.81	.59	25.78	16.95	19.37	1.93	5.68	3.29	51.54
21	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1914	37.03	40.87	19.43	13.41	37.41	8.75	5.51	9.94	21.76	120.81
22	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1915	8.1	10.5	4.1	3.0	11.4	16.28	6.55	11.28	2.96	127.45
23	Lower Hapea.....	Apr. 1, 1909, to June 30, 1915.	do.....	do.....	1912	1.85	2.23	3.73	15.09	3.36	1.27	10.90	14.98	130.81	25.2
24	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1913	4.42	2.81	.59	25.78	16.95	19.37	1.93	5.68	3.29	51.54
25	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1914	37.03	40.87	19.43	13.41	37.41	8.75	5.51	9.94	21.76	120.81
26	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1915	8.1	10.5	4.1	3.0	11.4	16.28	6.55	11.28	2.96	127.45
27	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1912	1.85	2.23	3.73	15.09	3.36	1.27	10.90	14.98	130.81	25.2
28	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1913	4.42	2.81	.59	25.78	16.95	19.37	1.93	5.68	3.29	51.54
29	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1914	37.03	40.87	19.43	13.41	37.41	8.75	5.51	9.94	21.76	120.81
30	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1915	8.1	10.5	4.1	3.0	11.4	16.28	6.55	11.28	2.96	127.45
31	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1912	1.85	2.23	3.73	15.09	3.36	1.27	10.90	14.98	130.81	25.2
32	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1913	4.42	2.81	.59	25.78	16.95	19.37	1.93	5.68	3.29	51.54
33	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1914	37.03	40.87	19.43	13.41	37.41	8.75	5.51	9.94	21.76	120.81
34	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1915	8.1	10.5	4.1	3.0	11.4	16.28	6.55	11.28	2.96	127.45
35	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1912	1.85	2.23	3.73	15.09	3.36	1.27	10.90	14.98	130.81	25.2
36	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1913	4.42	2.81	.59	25.78	16.95	19.37	1.93	5.68	3.29	51.54
37	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1914	37.03	40.87	19.43	13.41	37.41	8.75	5.51	9.94	21.76	120.81
38	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1915	8.1	10.5	4.1	3.0	11.4	16.28	6.55	11.28	2.96	127.45
39	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1912	1.85	2.23	3.73	15.09	3.36	1.27	10.90	14.98	130.81	25.2
40	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1913	4.42	2.81	.59	25.78	16.95	19.37	1.93	5.68	3.29	51.54
41	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1914	37.03	40.87	19.43	13.41	37.41	8.75	5.51	9.94	21.76	120.81
42	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1915	8.1	10.5	4.1	3.0	11.4	16.28	6.55	11.28	2.96	127.45
43	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1912	1.85	2.23	3.73	15.09	3.36	1.27	10.90	14.98	130.81	25.2
44	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1913	4.42	2.81	.59	25.78	16.95	19.37	1.93	5.68	3.29	51.54
45	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1914	37.03	40.87	19.43	13.41	37.41	8.75	5.51	9.94	21.76	120.81
46	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1915	8.1	10.5	4.1	3.0	11.4	16.28	6.55	11.28	2.96	127.45
47	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1912	1.85	2.23	3.73	15.09	3.36	1.27	10.90	14.98	130.81	25.2
48	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1913	4.42	2.81	.59	25.78	16.95	19.37	1.93	5.68	3.29	51.54
49	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1914	37.03	40.87	19.43	13.41	37.41	8.75	5.51	9.94	21.76	120.81
50	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1915	8.1	10.5	4.1	3.0	11.4	16.28	6.55	11.28	2.96	127.45
51	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1912	1.85	2.23	3.73	15.09	3.36	1.27	10.90	14.98	130.81	25.2
52	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1913	4.42	2.81	.59	25.78	16.95	19.37	1.93	5.68	3.29	51.54
53	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1914	37.03	40.87	19.43	13.41	37.41	8.75	5.51	9.94	21.76	120.81
54	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1915	8.1	10.5	4.1	3.0	11.4	16.28	6.55	11.28	2.96	127.45
55	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1912	1.85	2.23	3.73	15.09	3.36	1.27	10.90	14.98	130.81	25.2
56	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1913	4.42	2.81	.59	25.78	16.95	19.37	1.93	5.68	3.29	51.54
57	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1914	37.03	40.87	19.43	13.41	37.41	8.75	5.51	9.94	21.76	120.81
58	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1915	8.1	10.5	4.1	3.0	11.4	16.28	6.55	11.28	2.96	127.45
59	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1912	1.85	2.23	3.73	15.09	3.36	1.27	10.90	14.98	130.81	25.2
60	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1913	4.42	2.81	.59	25.78	16.95	19.37	1.93	5.68	3.29	51.54
61	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1914	37.03	40.87	19.43	13.41	37.41	8.75	5.51	9.94	21.76	120.81
62	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1915	8.1	10.5	4.1	3.0	11.4	16.28	6.55	11.28	2.96	127.45
63	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1912	1.85	2.23	3.73	15.09	3.36	1.27	10.90	14.98	130.81	25.2
64	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1913	4.42	2.81	.59	25.78	16.95	19.37	1.93	5.68	3.29	51.54
65	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1914	37.03	40.87	19.43	13.41	37.41	8.75	5.51	9.94	21.76	120.81
66	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1915	8.1	10.5	4.1	3.0	11.4	16.28	6.55	11.28	2.96	127.45
67	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1912	1.85	2.23	3.73	15.09	3.36	1.27	10.90	14.98	130.81	25.2
68	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1913	4.42	2.81	.59	25.78	16.95	19.37	1.93	5.68	3.29	51.54
69	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1914	37.03	40.87	19.43	13.41	37.41	8.75	5.51	9.94	21.76	120.81
70	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1915	8.1	10.5	4.1	3.0	11.4	16.28	6.55	11.28	2.96	127.45
71	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1912	1.85	2.23	3.73	15.09	3.36	1.27	10.90	14.98	130.81	25.2
72	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1913	4.42	2.81	.59	25.78	16.95	19.37	1.93	5.68	3.29	51.54
73	Lower Hapea.....	Apr. 1, 1913, to June 30, 1915.	do.....	do.....	1914	37.03	40.87	19.43	13.41	37.41	8.75	5.51	9.94	21.76	120.81
74	Upper Hapea.....	Mar. 1, 1902, to June 30, 1915.	do.....	do.....	1915	8.1	10.5	4.1	3.0	11.4	16.28	6.55	11.28	2.9	

Precipitation and estimated evaporation (in inches) at rainfall stations maintained during the period July 1, 1913, to June 30, 1915—Continued.

Hawaii—Continued.

No.	Station.	Records available.	Gage.	Readings.	Year end- ing June 30.	Precipitation.												Esti- mated eva- ora- tion.	
						July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.		Year.
18	Puu Kea.....	June 1, 1914, to June 30, 1915.	Records furnished by Kukaia Ranch Co.	Monthly.	1914 1915	6.4 19.5	9.6 12.8	6.0 12.8	1.8 7.06	6.4 26.61	4.2 9.12	.2 3.40	.8 12.84	.4 3.80	2.9 6.29	0 2.58	4.08 5.21	42.7 134.22	4
19	Halipula.....	Dec. 1, 1914, to June 30, 1915.	do.	Weekly.	1915						5.50	1.27	3.89	1.25	4.92	0	0	16.83	
20	Puuhala.....	Feb. 1, 1914, to June 30, 1915.	do.	Monthly.	1914 1915	39.6 16.0	29.4 15.6	23.6 7.2	9.6 7.2	23.0 13.8	7.6 5.6	1.8 4.0	2.8 1.6	3.4 1.6	7.2 4.0	11.8 2.8	13.6 8.2	41.0 80.2	4
21	Puukihue.....	Mar. 1, 1903, to June 30, 1915. (broken.)	do.	do.	1915														4
22	Umikoa.....	Jan. 1, 1895, to June 30, 1915.	do.	do.	1914 1915	0 20.51	2.35 24.03	1.36 12.81	.30 7.06	22.03 26.61	17.20 9.12	20.56 3.40	.05 12.84	4.67 3.80	7.41 6.29	16.29 2.58	6.23 5.21	98.45 134.22	4
23	Camp No. 8, Waialeale.	June 1, 1913, to Mar. 31, 1914.	Records furnished by Waialeale Plantation.	Monthly.	1914	9.75	10.75	5.75	6.75	44.50	11.75	13.90	2.50	6.50				112.15	
24	Camp No. 6, Waialeale.	July 1, 1913, to Mar. 31, 1914.	do.	do.	1914	11.03	12.60	6.12	6.60	39.01	9.45	14.10	1.65	6.41				106.97	
25	Pihonua.....	Jan. 1, 1912, to Aug. 31, 1914.	Records furnished by Hawaii Mill Co.	Daily.	1914 1915	12.50 40.96	12.95 47.15	6.16 6.50	6.16 6.00	43.14 30.00	9.16 8.40	9.30 6.56	4.46 3.92	4.85 6.35	15.96 6.63	29.73 18.88	26.46 19.60	181.21 128.24	
26	Hilo Breakwater.	July 20, 1911, to June 30, 1915.	Record furnished by U. S. Engineers Office.	Monthly.	1914 1915	5.80 16.65	6.50 31.55	6.00 20.49	6.00 8.37	30.00 13.18	8.40 11.70	6.56 3.20	3.92 9.40	6.35 2.10	6.63 21.90	18.88 3.36	19.60 6.54	128.24 152.44	4
27	Kaauhulu.....	Mar. 18, 1912, to June 30, 1915.	Records furnished by W. S. May, Hawaii.	Daily.	1914 1915	4.00 15.01	3.34 26.89	2.51 8.01	2.01 5.99	11.53 13.46	10.10 8.44	9.51 4.36	1.37 5.25	8.50 2.62	5.45 8.94	10.81 4.78	9.72 3.28	78.85 107.03	

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