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GEOLOGICAL SURVEY  
GEORGE OTIS SMITH, Director

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Water-Supply Paper 635

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# SURFACE WATER SUPPLY *of* HAWAII

JULY 1, 1925, *to* JUNE 30, 1926

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Prepared in cooperation with the  
TERRITORY OF HAWAII



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# SURFACE WATER SUPPLY OF HAWAII, JULY 1, 1925, TO JUNE 30, 1926

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## AUTHORITY FOR INVESTIGATIONS

This volume contains records of measurements of flow made on certain streams and ditches in the Territory of Hawaii during the year ending June 30, 1926. The data presented in this report were collected by the United States Geological Survey in cooperation with the Territory of Hawaii, under the general sanction of the organic law of the Geological Survey, (20 Stat. L., 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. Since the fiscal year ending June 30, 1895, successive appropriation bills passed by Congress have carried 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.

The Legislature of the Territory of Hawaii approved on March 22, 1909, "An act to promote the conservation and development of the natural resources of the Territory," which provided in substance as follows: A special tax of 2 per cent shall be levied, assessed, and collected annually on all incomes in excess of \$4,000; and all amounts so collected shall constitute a special fund to be expended only for the encouragement of immigration and the conservation of natural resources in the proportion of three-fourths for immigration and one-fourth for conservation. The conservation fund shall be used for the development, conservation, improvement, and utilization of the natural resources, and shall be available for expenditure at such times and in such manner as a board of three persons appointed in accordance with section 80 of the organic act shall, with the approval of the governor, determine.

An act of April 26, 1911, amended the original act so as to extend it until December 31, 1913.

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 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 July 1, 1913.

Since June 30, 1915, the funds for the use of the division of hydrography have been supplied by successive appropriations from the general revenues of the Territory.

On March 23, 1917, the following act by the Legislature of the Territory of Hawaii was approved:

#### ACT 27

SECTION 1. The division of hydrography, authorized by and created pursuant to section 483 of the Revised Laws of Hawaii, 1915, is hereby transferred, together with all the materials, equipment, and supplies now under the control of the division or of the board of commissioners of agriculture and forestry for the division to the commissioner of public lands.

SEC. 2. The commissioner of public lands shall have and exercise the same powers, duties, and jurisdiction with respect to said division as are now exercised by the board of commissioners of agriculture and forestry.

SEC. 3. All unexpended balances of appropriations heretofore made for said division, the expenditure of which is now by law vested in the board of commissioners of agriculture and forestry, are hereby transferred to the commissioner of public lands and the expenditure thereof vested in said commissioner.

SEC. 4. This act shall take effect upon its approval.

## COOPERATION

### COOPERATION WITH THE 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."<sup>1</sup>

The principal features of this agreement are:

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

2. During the progress of the work all notes, maps, and data gathered as a result of field studies are at all times open to inspection by the representative of the Territory, and if they are not 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.

Unless otherwise stated, all data have been collected and are published under this cooperative agreement with the Territory of Hawaii, which has borne from 60 to 90 per cent of the cost thereof.

Until June 30, 1913, the Territory of Hawaii was represented in the cooperation by the board of conservation; from July 1, 1913, to March 23, 1917, by the board of commissioners of agriculture and forestry; and since this date by the commissioner of public lands.

### OTHER COOPERATION

Some of the data in this paper have been obtained in cooperation with the City and County of Honolulu, the counties of Maui and Hawaii and private persons and corporations, under one of the plans indicated in the following paragraphs:

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 Geological Survey.

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

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<sup>1</sup> The United States Geological Survey also cooperated with the Territory of Hawaii in mapping the islands. All of the eight larger islands, except small parts of Hawaii and Maui, have been mapped.

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

Cooperation in the collection of records for whose accuracy responsibility has not rested with the Geological Survey has been acknowledged in the descriptions of the stations. Special acknowledgment is due to the following individuals and companies cooperating under plans 1, 2, and 3: Island of Kauai—Makee Sugar Co., Kilauea Plantation Co., East Kauai Water Co., Princeville Plantation, McBryde Sugar Co., and Lihue Plantation Co.; Island of Oahu—Wahiawa Water Co., Honolulu Sewer and Water Commission, and B. P. Bishop Estate. Island of Maui—Kipahulu Plantation, Wailuku Sugar Co., Pioneer Mill Co., and East Maui Irrigation Co.

### SCOPE OF WORK

The investigations of the surface waters of 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 five larger islands as the available appropriations would allow. It is essential that records of stream flow should be kept during a period of years 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 data which are sufficiently accurate, although many of those presented in this report are for periods too short to yield definite conclusions.

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

### 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 that represent a rate of flow, as “second-feet,” “gallons a minute,” “gallons a day,” “miner’s inches,” and “run-off in second-feet a square mile,” and (2) those that represent the actual quantity of water, as “run-off in inches,” “million gallons,” and “acre-feet.” Those used in this report may be defined as follows:

"Second-foot" is an abbreviation for cubic foot a 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 a 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.

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 measuring 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 a 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 a day, and acre-feet: 1 second-foot flowing 24 hours equals 2 acre-feet; 1,000,000 gallons equals 3 acre-feet; and 1 second-foot equals two-thirds of 1,000,000 gallons a 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.

The following terms not in common use are here defined:

"Stage-discharge relation," an abbreviation for the term "relation of gage height to discharge."

"Control," a term used to designate the section or sections of the stream channel below the gage which determine the stage-discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.

The "point of zero flow" for a gaging station is that point on the gage—the gage height—at which water ceases to flow over the control.

#### EXPLANATION OF DATA

The base data collected at gaging stations consist of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow. The records of stage used in computing discharges in this paper are obtained from water-stage recorders that give continuous records of the fluctuations. Measurements of discharge are made with a current meter by the general methods out-

lined in standard textbooks on the measurement of river discharge. Occasionally discharge is determined from weirs using weir formulas.

From the discharge measurements rating tables are prepared that give the discharge for any stage. The application of the daily gage heights to these rating tables gives the discharge from which the daily, monthly, and yearly discharges are determined.

The data presented in this report for each gaging station comprise a description of the station, a table showing the daily discharge of the stream, and a table of monthly and yearly discharge and run-off. If the base data are insufficient to determine the daily discharge records of discharge measurements are published.

The description of the station gives—in addition to statements regarding location, records available, and equipment—information in regard to any condition that may affect the permanence of the stage-discharge relation, covering such subjects as shifting of control and backwater. It gives also information as to diversions that decrease the flow at the gage, artificial regulation, discharge corresponding to maximum and minimum recorded stages, object of station, utilization of water below station, and the accuracy of the records.

The table of daily discharge gives, in general, the discharge in million gallons a day corresponding to the mean daily gage heights. At stations on streams subject to sudden or rapid diurnal fluctuation the discharge obtained from the rating table and the mean daily gage height may not be the true mean discharge for the day. At such stations the mean daily discharge may be obtained by averaging discharge at intervals during the day or by use of the discharge integrator, an instrument operating on the principle of the planimeter and containing as an essential element the rating curve of the station.

In the table of monthly discharge the column headed "Maximum" gives the flow for the day when the total discharge was greatest. This does not correspond to the rate of flow at the crest of the flood. The highest crest is given under the heading "Extremes of discharge." Likewise, in the column headed "Minimum" the quantity given is the flow for the day when the total discharge was lowest. The columns headed "Mean" give the average flow in million gallons a day and in cubic feet a second during the month. The "Total in million gallons" is the sum of the daily flows and "Total in acre-feet" is computed from the mean monthly discharge in million gallons a day.

Owing to the volcanic formation of the Hawaiian Islands there is so wide a diversity in the character and porosity of the rocks of the drainage basins that a general relation between rainfall and run-off can not be determined. For this reason information concerning drainage areas has been omitted in the station descriptions.

## ACCURACY OF FIELD DATA AND COMPUTED RESULTS

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

The accuracy paragraph in the description of the station gives information regarding the (1) permanence of the stage-discharge relation, (2) precision with which the discharge rating curve is defined, supplemented by a statement giving the number and distribution of discharge measurements made during year and range which they cover, (3) accuracy of gage-height record, (4) methods of applying daily gage height to rating table to obtain the daily discharge, and (5) general statement in regard to accuracy of record.

For the rating tables "very well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "well defined," within 10 per cent; "fairly well defined," within 15 per cent; "poorly defined," within 25 per cent; and "uncertain" may be more than 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

In the general statement of accuracy "excellent," "good," "fair," and "poor" indicate that the errors are probably within 5, 10, 15, and 25 per cent, respectively. When extensions of rating curves are "uncertain" the error may be greater than 25 per cent.

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

## DIVISION OF WORK

The data were collected and prepared for publication under the direction of M. H. Carson, district engineer, Honolulu, Hawaii, by B. L. Bigwood and J. L. Lamson, office engineers, John McCombs, P. P. Livingston, K. N. Vaksvik, J. H. Hofmann, K. M. Kelley, Sam Wong, John Kaheaku, P. P. T. Goo, and Miss M. A. Davison. The manuscript was prepared by J. L. Lamson and was reviewed by M. H. Carson.

## PUBLICATIONS

The following table gives, by years, the numbers of the papers on the surface-water supply of Hawaii containing data from 1903 to 1926 and used in conjunction with the list of stations maintained (see Water-Supply Paper 595), provides a convenient index for finding the data for any station. The data for any particular station will be found in the reports covering the years during which the station was maintained except when publication is delayed owing to undeveloped rating curves. Occasionally data is revised and repub-

lished in later papers. Miscellaneous measurements made during any year at points other than regular gaging stations are published in the paper containing that year's data.

*Numbers of water-supply papers containing data on surface-water supply of Hawaii, 1903-1926*

Year	Water-Supply Paper	Year	Water-Supply Paper	Year	Water-Supply Paper
1903.....	<sup>a</sup> 77	1916-17.....	465	1922-23.....	575
1909-1911 <sup>b</sup> .....	318	1917-18.....	485	1923-24.....	595
1912 <sup>b</sup> .....	336	1918-19.....	515	1924-25.....	615
1913 <sup>b</sup> .....	373	1919-20.....	516	1925-26.....	635
1913-1915.....	430	1920-21.....	535		
1915-16.....	445	1921-22.....	555		

<sup>a</sup> Water resources of Molokai, by Waldemar Lindgren.

<sup>b</sup> Calendar years; reports subsequent to Water-Supply Paper 373 cover the year beginning July 1 and ending June 30.

## GAGING-STATION RECORDS

### ISLAND OF KAUAI

#### WAIMEA RIVER BELOW KEKAHA DITCH INTAKE, NEAR WAIMEA, KAUAI

**LOCATION.**—In Waimea Canyon at camp No. 1, 500 feet below Kekaha ditch intake and 8 miles by trail north of Waimea.

**RECORDS AVAILABLE.**—July 24, 1921, to June 30, 1926.

**EQUIPMENT.**—A continuous water-stage recorder on right bank. Discharge measurements made by wading or from cable 40 feet below gage. Datum lowered 3.85 feet on May 7, 1926.

**CHANNEL AND CONTROL.**—Bed composed of boulders. Right bank vertical rock wall 1,100 feet high. Left bank sloping and boulder strewn; not subject to overflow. Control composed of boulders; subject to shifts.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 814 million gallons a day, or 1,260 second-feet, from 5 to 7 p. m. December 30 (gage height, from water-stage recorder, 6.27 feet); minimum discharge, unknown owing to obstructed intake to stilling well but was frequently nearly zero flow.

1921-1926: Maximum discharge probably greater than 2,500 million gallons a day, or 3,870 second-feet, on January 12, 1923 (gage height, 14.62 feet; at this stage the recorder went out of adjustment); minimum discharge unknown owing to obstructed intake to stilling well but was frequently nearly zero flow.

**DIVERSIONS AND REGULATION.**—Entire low flow, except leakage through dam, is diverted by Kekaha ditch about 500 feet above station. During April, 1925, Kokee ditch began diverting water from some of the tributaries. Diversions regulated by head gates.

**OBJECT OF STATION.**—To determine amount of flow not diverted into Kekaha ditch.

**UTILIZATION.**—Low-water flow used for irrigation of rice and taro.

**ACCURACY.**—Stage-discharge relation permanent during year. Rating curve fairly well defined below 100 million gallons a day; extended above on basis of one discharge measurement at 192 million gallons a day. This curve checked roughly below 1 million gallons a day by six discharge measurements fairly well distributed during year; checked very closely between 22 and 84 million gallons a day by three later measurements. Operation of water-stage

recorder unsatisfactory as indicated in footnote to daily discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for medium stages; poor for low and high stages.

*Discharge, in million gallons a day, of Waimea River below Kekaha ditch intake, near Waimea, Kauai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	46	0.9	0.9	0.6	0.6	1.5		60	0.2	0.2		23
2	.9	.9	.8	.7	.6		60	8.7	.3	.4		6.0
3	.9	1.0	.8	.6				4.8	.2	.3		.2
4	1.0	3.8	.8	9.1				1.4	.2	.3	0.1	.1
5	1.0	234	.8	8.3				80	.2	.3		.1
6	1.0	16.5	.8	.6		.1	1.0	64	.2	.3		2.0
7	12.3	1.1	.8	.6				22	.2	.3	.05	.2
8	5.0	1.0	.8	.6				8.7	.2	.3	.07	287
9	.8	1.0	.8	.6	12.7			4.4	.2	.3	.1	90
10	.8	1.0	.8	.9	.5		10	107	.2	.3	.1	5.1
11	.9	1.0	.8	.8	.5	.06		36	.2	87	.1	.1
12	.9	1.7	.7	.6	10.0	.06		4.9	.2	38	.1	1.1
13	.9	2.2	34	.6	17.4	.04		.7	.2	.2	.2	3.1
14	2.2		39	.6	16.6	.06	.5	.2	.2	.1	.2	.04
15	21		.8	.5	35	.1		.2	.2	.1	.2	15.7
16	1.2		.7	.5	68	.06		.2	.4	.1	.2	118
17	.9		.6	.5		.06	24	68	.3	.1	.2	42
18	.9		.6	.5		218		16.5	.3	.1	.2	2.8
19	.9		.6	.5		177		.7	.3	.1	.2	.1
20	.9	.8	.7	.5		90		.2	.3	.1	.2	.06
21	15.3		.7	.6		239		.2	.4	.1	.3	.05
22	2.5		.7	.6		262		.2	.4	.2	60	.04
23	1.0		.7	.6		126		.2	.4	.1	6.2	.04
24	.9		.7	.7		61	.5	.2	.4	.1	.2	.04
25	1.0		.7	.6	5.4	38	.2	.2	.4	.1	.2	.04
26	40		1.8	.6	2.2		.4	3.4	.4	.1	.2	.03
27	80	82	3.9	.6		1.0	2.7	.3	4.0	.1	.2	.03
28	19.0	38	1.8	4.3		.5	1.4	.3	.2	.2	.2	.03
29	23	13.3	.6	120		52	.4		.2	.1	.2	.03
30	2.6	9.8	.6	77		576	.3		.2	.1	.2	.03
31	.9	1.0		.8		312	129		.2		.2	

NOTE.—Discharge estimated Nov. 10, 11, Jan. 24, 25, and Apr. 30. Braced figures give estimated mean discharge for periods indicated. Estimates made by comparison with records of flow for Kekaha ditch at camp No. 1, near Waimea, Kauai, and tributary streams and study of faulty gage-height record; recorder not operating properly owing to obstructed intake and silt in stilling well.

*Monthly discharge of Waimea River below Kekaha ditch intake, near Waimea, Kauai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	80	0.8	9.28	14.4	288	883
August	234		13.6	21.0	421	1,290
September	39	.6	3.29	5.09	98.8	303
October	120	.5	7.57	11.7	235	720
November	68		5.95	9.21	178	548
December	576	.04	69.6	108	2,160	6,620
January	129	.2	12.5	19.3	388	1,190
February	107	.2	17.6	27.2	494	1,510
March	4.0	.2	.38	.59	11.9	36
April	87		4.34	6.71	130	400
May	60	.05	2.28	3.53	70.8	217
June	287	.03	19.9	30.8	597	1,830
The year	576	.03	13.9	21.5	5,070	15,500

## KAWAIKOI STREAM NEAR WAIMEA, KAUAI

LOCATION.—3 miles northeast of Knudsen's mountain house, Halemanu, and 21 miles by road and trail north of Waimea.

RECORDS AVAILABLE.—April 13, 1909, to July 11, 1917, and July 1, 1919, to June 30, 1926. No record of value December 17, 1916, to July 3, 1919.

EQUIPMENT.—Stevens continuous water-stage recorder on left bank, about 400 feet above old trail crossing. Discharge measurements made by wading or from cable about 300 feet downstream.

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 boulders; subject to shifts.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 396 million gallons a day, or 613 second-feet, at 2.15 p. m. January 31 (gage height, from water-stage recorder, 5.56 feet); minimum discharge, 1.6 million gallons a day, or 2.5 second-feet, several hours May 7, 8, 15-18, and 29 (gage height, 1.27 feet).

1909-1926: Maximum stage recorded, from water-stage recorder, 15.2 feet December 18, 1916 (discharge not determined). Minimum discharge recorded, 1.3 million gallons a day, or 2.0 second-feet, for several hours September 15, 1921 (gage height, 1.28 feet).

DIVERSIONS AND REGULATION.—None.

OBJECT OF STATION.—To determine feasibility of diverting flood water into high-level (3,100 feet) ditch to serve Territorial lands now uncultivated on account of lack of irrigation.

UTILIZATION.—After it reaches Waimea River, low-water flow is used for power and irrigation.

ACCURACY.—Stage-discharge relation changed at times of floods October 29, November 13, and December 18. The two rating curves used are well defined between 2 and 200 million gallons a day; extensions beyond, uncertain. These curves checked very closely by nine discharge measurements well distributed during year and covering a range from 2.5 to 48 million gallons a day. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages except those estimated, which are fair; poor for extremely high and low stages.

*Discharge, in million gallons a day, of Kawaiikoi Stream near Waimea, Kauai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1-----	13.7	7.9	4.5	2.0	5.9	5.8	20	18.7	5.2	4.9	1.9	2.1
2-----	4.5	8.4	3.7	2.1	4.7	4.4	12.9	10.0	4.7	17.5	1.9	5.7
3-----	3.2	4.8	3.0	19.7	4.0	3.7	10.5	8.6	4.3	4.7	1.7	3.2
4-----	2.7	31	2.8	30	4.3	3.7	9.3	8.6	4.2	3.4	1.7	8.0
5-----	2.3	54	2.8	9.4	5.4	5.1	8.4	16.7	3.9	3.7	1.7	3.0
6-----	2.6	10.8	3.5	4.4	4.8	4.4	7.9	17.2	3.7	10.8	1.7	30
7-----	11.1	6.0	3.0	3.7	8.1	6.9	31	9.1	3.6	8.5	1.6	5.0
8-----	7.2	4.7	2.6	4.8	23	6.3	11.2	7.3	3.4	3.9	1.6	91
9-----	3.7	4.1	12.3	9.0	32	4.1	7.9	6.5	3.3	2.7	1.6	24
10-----	2.9	3.7	10.0	8.1	7.7	3.4	6.9	76	3.3	2.3	1.6	6.9
11-----	3.0	3.4	6.2	7.6	9.4	3.0	6.5	14.5	3.2	60	1.6	6.1
12-----	4.9	3.2	3.7	4.2	18.7	2.8	5.9	8.8	3.2	18.2	1.7	26
13-----	3.7	2.9	25	3.2	41	2.7	5.5	7.3	3.2	5.5	1.7	9.9
14-----	36	2.8	14.4	2.8	15.4	6.3	5.4	6.7	3.4	3.9	1.7	5.4
15-----	28	2.7	7.3	2.4	47	10.6	5.2	6.1	3.7	3.3	1.6	4.7

*Discharge, in million gallons a day, of Kawaikoi Stream near Waimea, Kauai, for the year ending June 30, 1926—Continued*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
16-----	11.3	2.6	4.4	2.3	20	4.2	11.7	7.0	4.2	3.4	1.6	26
17-----	5.0	2.4	3.4	2.1	7.3	3.2	8.6	72	3.3	6.5	1.6	8.4
18-----	3.7	2.4	2.8	2.0	5.8	67	28	14.0	2.9	5.4	1.6	4.8
19-----	3.2	2.4	3.2	2.0	6.0	53	9.7	8.4	2.7	3.6	10.6	3.9
20-----	3.3	2.2	4.8	2.0	5.0	22	8.8	7.1	2.7	2.9	5.1	3.2
21-----	18.9	2.0	5.6	1.9	4.2	69	32	6.5	2.5	2.5	24	2.9
22-----	6.3	4.2	3.4	1.9	3.8	96	35	6.1	2.4	2.4	49	2.6
23-----	12.3	4.4	2.8	9.2	3.7	25	11.4	5.5	2.5	16.0	7.5	2.5
24-----	5.0	2.9	2.4	7.8	21	14.9	7.3	5.2	2.7	6.9	3.2	2.4
25-----	14.8	2.4	2.4	3.4	22	14.3	8.2	11.0	2.5	3.6	2.3	2.4
26-----	* 52	40	3.4	* 2.4	8.2	9.8	11.3	27	2.6	2.7	2.1	12.6
27-----	* 42	47	3.0	* 2.1	5.8	8.4	14.6	7.7	23	2.4	1.8	10.5
28-----	* 24	23	2.6	* 44	4.5	7.7	9.1	5.9	5.0	2.2	1.7	5.5
29-----	* 16.0	22	2.3	104	9.1	13.9	7.5	-----	2.9	2.2	1.6	3.3
30-----	6.7	14.9	2.1	29	6.7	115	6.3	-----	2.3	2.1	1.8	2.6
31-----	4.7	5.8	-----	8.6	-----	56	98	-----	2.2	-----	1.9	-----

\* Estimated by comparison with records for near-by streams and study of faulty or fragmentary gage-height record.

*Monthly discharge of Kawaikoi Stream near Waimea, Kauai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July-----	52	2.3	11.6	17.9	359	1,100
August-----	54	2.0	10.7	16.6	331	1,020
September-----	25	2.1	5.11	7.9	153	470
October-----	104	1.9	10.9	16.9	338	1,040
November-----	47	3.7	12.2	18.9	364	1,120
December-----	115	2.7	21.1	32.6	653	2,010
January-----	98	5.2	14.9	23.1	462	1,420
February-----	76	5.2	14.5	22.4	406	1,250
March-----	23	2.2	3.96	6.13	123	377
April-----	60	2.1	7.27	11.2	218	669
May-----	49	1.6	4.60	7.12	143	438
June-----	91	2.1	10.8	16.7	325	994
The year-----	115	1.6	10.6	16.4	3,880	11,900

#### MOHIHI STREAM AT ELEVATION 3,500 FEET, NEAR WAIMEA, KAUAI

**LOCATION.**—At upper trail crossing, at elevation 3,500 feet, 4 miles west of Kokee, (6 miles by trail), and 24 miles by road and trail from Waimea.

**RECORDS AVAILABLE.**—August 12, 1919, to June 30, 1926. Fragmentary records at old station 2 miles downstream from April 13, 1909, to December 31, 1912. Records valueless August 12, 1919, to June 12, 1920.

**EQUIPMENT.**—Stevens continuous water-stage recorder. Discharge measurements made by wading or from cable 260 feet below gage.

**CHANNEL AND CONTROL.**—One channel at all stages; straight for 300 feet above and 100 feet below station. Bed composed of mud and silt. Right bank sloping and covered with ferns and brush; subject to overflow for about 30 feet during extremely high stages. Left bank steep and fern covered; not subject to overflow. Control at boulder rapids 60 feet below gage; subject to shift owing to collection of debris.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 123 million gallons a day, or 190 second-feet, at 2.30 a. m. June 8 (gage height from water-stage recorder, 3.68 feet). A greater discharge may have occurred on December 30 when recorder was not operating. Minimum discharge recorded during year, 0.2 million gallon a day, or 0.3 second-foot, at 6 p. m. May 16 (gage height, 0.72 foot).

1919-1926: Maximum discharge recorded, about 520 million gallons a day, or 805 second-feet, at 1.35 p. m. January 16, 1921 (gage height from water-stage recorder, 6.91 feet); minimum discharge, 0.2 million gallon a day, or 0.3 second-foot, from 4 to 6 p. m. July 16, 1921, 2 to 5 p. m. September 14, and 12 m. to 3 p. m. September 15, 1921, 8 p. m. August 7 to 2 a. m. August 8, 1922, and 6 p. m. May 16, 1926.

**DIVERSIONS AND REGULATION.**—No artificial regulation. Mohihi Stream, which rises in the Alakai swamps, is a series of long pools and short rapids.

**OBJECT OF STATION.**—To determine feasibility of diverting flood water into high-level (3,100 feet) ditch to serve Territorial lands now uncultivated on account of lack of irrigation.

**UTILIZATION.**—After it reaches Waimea River low-water flow is used for power and irrigation.

**ACCURACY.**—Stage-discharge relation changed at times of floods August 27 and February 10 and affected by backwater June 8-16. The two rating curves used are fairly well defined below 30 million gallons a day; extensions above uncertain. These curves checked closely by nine of the ten discharge measurements well distributed during year and covering a range from 0.3 to 13 million gallons a day. Operation of water-stage recorder satisfactory during year except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages except those estimated, which are poor; high-stage records poor.

*Discharge, in million gallons a day, of Mohihi Stream at elevation 3,500 feet, near Waimea, Kauai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	6.2	1.2	0.8	0.3	1.1	1.9	2.8	3.7	0.8	0.4	0.3	0.3
2.....	2.0	1.2	.6	.3	.8	1.2		1.5	.8	3.5	.3	1.3
3.....	1.0	.9	.5	.3	.6	1.0		1.3	.6	1.4	.3	.7
4.....	.7	.8	.4	4.8	.6	1.0		1.6	.6	.8	.3	.5
5.....	.5	15.9	.4	3.3	.6			7.4	.6	.6	.3	.4
6.....	.5	4.0	.4	1.2	.6	1.1		5.3	.5	.6	.3	1.6
7.....	1.4	2.0	.4	.8	.6			2.3	.5	2.4	.3	1.0
8.....	2.0	1.2	.4	1.0	1.6			1.6	.5	1.1	.2	28
9.....	1.0	.9	.4	1.2	3.4			1.3	.5	.7	.2	6.2
10.....	.8	.7	.6	1.7	1.6	.7		12.2	.4	.5	.2	2.1
11.....	.7	.6	1.0	2.9	1.0	.6	1.1	4.8	.4	8.9	.2	1.1
12.....	.8	.5	.8	1.1	1.3	.5		2.6	.4	4.8	.2	2.2
13.....	.8	.5	2.7	.7	3.4	.5		2.0	.4	1.7	.2	2.3
14.....	3.1	.5	5.3	.6	3.8	.6		1.6	.4	1.0	.2	1.1
15.....	6.1	.5	1.6	.5	6.5	1.5		1.3	.4	.7	.2	1.0
16.....	3.2	.4	.8	.4	6.6	.9	3.9	1.1	.4	.6	.2	8.1
17.....	1.7	.4	.6	.3	2.1	.7		7.5	.4	.5	.2	3.8
18.....	1.0	.5	.4	.3	1.3	20		4.2	.4	.6	.2	1.9
19.....	.8	.5	.4	.3	1.1	15.4		2.2	.4	.6	.3	1.2
20.....	.8	.6	.6	.2	.9	8.0		1.6	.5	.5	.4	.8
21.....	3.3	.5	.5	.2	.8	13.4	9.0	1.3	.5	.4	1.0	.6
22.....	2.4	.6	.4	.2	.7			1.1	.4	.4	10.8	.5
23.....	1.4	.8	.4	.2	.6			1.0	.4	.9	2.5	.4
24.....	1.0	.8	.3	1.5	3.2			.9	.5	1.6	.9	.4
25.....	2.4	.6	.4	.6	5.2			1.2	.9	.6	.7	.4
26.....	14.0	4.1	1.2	.4	2.7	1.8	1.1	1.7	.5	.5	.4	.4
27.....	10.2	11.3	.9	.4	1.8		1.1	1.4	.6	.4	.3	.6
28.....	6.1	5.0	.7	1.9	1.1		1.0	1.0	.8	.3	.3	.6
29.....	6.2	2.9	.5	15.2	1.6		.9		.5	.3	.3	.5
30.....	2.6	2.9	.4	7.6	2.2	13	.8		.4	.3	.3	.4
31.....	1.5	1.3		2.0			4.4		.4		.3	

NOTE.—Braced figures give mean discharge for periods indicated, estimated by comparison with record of flow for Kawaikoi Stream near Waimea, Kauai; recorder not operating properly. Discharge June 8-16 from gage heights corrected for backwater determined from one discharge measurement and study of recorder graph.

*Monthly discharge of Mohihi Stream at elevation 3,500 feet, near Waimea, Kauai, for the year ending June 30, 1926*

Month	Discharge			Total run-off		
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	14.0	0.5	2.20	3.40	68.2	209
August.....	15.9	.4	2.08	3.22	64.6	198
September.....	5.3	.3	.83	1.28	24.8	76
October.....	15.2	.2	1.69	2.61	52.4	161
November.....	6.6	.6	1.98	3.06	59.4	182
December.....		.5	4.73	7.32	147	450
January.....			2.34	3.62	72.5	223
February.....	12.2	.9	2.73	4.22	76.4	235
March.....	.8	.4	.50	.77	15.5	48
April.....	8.9	.3	1.26	1.95	37.7	116
May.....	10.9	.2	.73	1.13	22.6	69
June.....	28	.3	2.35	3.64	70.4	216
The year.....	28	.2	1.95	3.02	711	2,180

#### WAIAHULU STREAM NEAR WAIMEA, KAUAI

**LOCATION.**—In Waimea Canyon, half a mile above confluence with Koaie Stream,  $8\frac{3}{4}$  miles north of Waimea.

**RECORDS AVAILABLE.**—February 25 to October 21, 1916; October 25, 1917, to June 30, 1918; and May 25, 1925, when station was reestablished, to June 30, 1926. (Record not published July 1, 1918, to November 8, 1920, when station was discontinued.)

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank. Discharge measurements made by wading or from cable near gage.

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

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during period, 639 million gallons a day, or 989 second-feet, at 2.30 p. m. January 31 (gage height, from water-stage recorder, 4.63 feet); minimum discharge, 6.8 million gallons a day, or 10.5 second-feet, several hours July 19–21 and December 12–13 (gage height, 0.58 foot).

1915–1918; 1925–26: Maximum stage recorded from floodmarks, about 15 feet December 18, 1916 (discharge not determined). Minimum discharge recorded, that of July 19–21 and December 12–13, 1925.

**DIVERSIONS AND REGULATION.**—Kokee ditch began diverting water from some of the tributaries during April, 1925.

**OBJECT OF STATION.**—To determine feasibility of further development.

**UTILIZATION.**—Ordinary flow used for irrigation, power, and domestic supply.

**ACCURACY.**—Stage-discharge relation permanent during period. Rating curve well defined between 8 and 45 million gallons a day; extensions beyond somewhat uncertain. This curve checked closely by 14 discharge measurements well distributed during period and covering a range from 7 to 40 million gallons a day. Operation of water-stage recorder satisfactory except for short period in January. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages except those estimated, which are fair; records poor for extremely low stages and for high stages.

*Discharge, in million gallons a day, of Waiahulu Stream near Waimea, Kauai, for the period May 25, 1925, to June 30, 1926*

Day	May	June	Day	May	June	Day	May	June
1925			1925			1925		
1-----		9.8	11-----		9.5	21-----		11.1
2-----		9.5	12-----		9.5	22-----		10.6
3-----		9.5	13-----		9.5	23-----		10.3
4-----		9.5	14-----		9.8	24-----		10.0
5-----		10.0	15-----		10.8	25-----	10.3	9.8
6-----		9.8	16-----		11.4	26-----	10.3	9.8
7-----		9.8	17-----		10.6	27-----	10.0	9.5
8-----		9.8	18-----		10.3	28-----	10.0	10.6
9-----		9.8	19-----		13.5	29-----	10.0	10.8
10-----		9.5	20-----		13.5	30-----	10.0	13.8
						31-----	9.8	

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1925-26												
1-----	25	9.0	8.8	7.9	9.0	9.5	77	52	10.6	8.8	8.4	8.8
2-----	12.2	8.8	8.1	7.9	8.1	9.0	47	20	9.8	16.0	8.4	8.8
3-----	9.8	8.6	7.9	7.7	7.7	8.4	26	16.8	9.5	11.7	8.1	9.3
4-----	9.0	13.7	7.7	19.7	7.9	8.1	16.8	16.5	9.5	10.0	8.1	9.0
5-----	8.6	75	7.2	44	8.1	10.0	14.4	41	9.4	9.5	8.1	9.0
6-----	8.1	16.8	7.2	11.9	7.4	9.0	14.1	39	9.3	9.7	8.1	21
7-----	8.1	10.6	7.2	9.0	7.4	8.4	27	22	9.3	12.5	8.1	11.4
8-----	9.0	9.3	7.2	8.5	9.2	8.1	15.8	16.5	9.0	10.8	8.1	170
9-----	8.6	8.4	7.5	8.4	29	7.9	11.9	14.1	9.0	10.0	8.1	64
10-----	7.7	8.1	9.2	9.0	11.4	7.4	11.1	101	9.0	9.5	8.1	18.6
11-----	7.2	7.9	8.1	13.3	9.0	7.2	10.6	28	8.8	84	8.1	13.2
12-----	7.0	7.7	8.4	11.9	10.7	7.0	10.0	15.8	8.8	36	8.1	16.7
13-----	13.0	7.4	21	9.3	34	7.0	10.0	13.5	8.8	13.0	8.1	15.1
14-----	17.0	7.4	31	8.8	20	7.2	10.0	12.2	8.8	10.6	8.1	11.7
15-----	30	7.4	14.4	8.1	37	9.3	9.8	11.7	8.8	9.8	8.1	11.4
16-----	11.4	7.9	10.8	7.7	32	8.6	10.3	11.1	8.8	9.3	8.1	43
17-----	8.6	7.4	9.5	7.4	11.9	7.7		84	8.8	8.8	8.4	29
18-----	7.2	7.4	8.4	7.4	9.5	144		23	8.8	8.8	8.4	16.5
19-----	7.0	7.4	8.1	7.4	8.6	101		14.1	8.8	8.8	8.6	13.8
20-----	6.8	7.2	7.9	7.2	8.4	46	19	12.2	8.8	8.8	8.6	11.8
21-----	8.8	7.2	7.9	7.2	7.9	188		11.7	8.8	8.6	9.5	10.8
22-----	10.3	7.2	7.9	7.2	7.7	195		11.1	8.8	8.6	50	10.0
23-----	9.0	7.4	7.9	7.2	7.4	70		10.8	9.8	8.8	15.6	9.8
24-----	7.9	7.7	7.9	11.0	15.7	36		10.6	9.5	10.6	10.3	9.8
25-----	7.9	7.4	7.7	8.7	22	24	12.2	10.8	9.3	9.8	9.3	9.5
26-----	52	14.9	7.9	7.7	13.5	17.2	12.7	26	9.3	9.0	8.8	9.3
27-----	43	54	8.8	7.2	9.8	12.8	17.4	12.5	26	8.6	8.6	9.3
28-----	17.5	24	9.0	32	9.0	11.9	12.8	10.6	10.0	8.6	8.6	9.3
29-----	19.0	13.8	8.5	128	8.4	29	11.4		9.3	8.4	8.4	9.4
30-----	11.7	16.2	8.1	49	10.2	339	10.8		9.0	8.4	8.4	9.0
31-----	9.8	10.3		12.2		174	165		8.8		8.4	

NOTE.—Braced figure gives mean discharge for period indicated, estimated by comparison with record of Kawaikoi Stream near Waimea, Kauai; recorder not operating.

*Monthly discharge of Waiahulu Stream near Waimea, Kauai, for the period May 25, 1925, to June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
1925						
May 25-31.....	10.3	9.8	10.1	15.6	70.4	215
June.....	13.8	9.5	10.4	16.1	312	957
1925-26						
July.....	52	6.8	13.3	20.6	412	1,270
August.....	75	7.2	13.3	20.6	414	1,270
September.....	31	7.2	9.57	14.8	287	881
October.....	128	7.2	16.1	24.9	500	1,530
November.....	37	7.4	13.3	20.6	398	1,220
December.....	339	7.0	49.3	76.3	1,530	4,690
January.....	165	9.8	23.1	35.7	716	2,200
February.....	101	10.6	23.9	37.0	669	2,050
March.....	26	8.8	9.71	15.0	301	924
April.....	84	8.4	13.2	20.4	396	1,220
May.....	50	8.1	10.0	15.5	310	951
June.....	170	8.8	20.3	31.4	608	1,870
The year.....	339	6.8	17.9	27.7	6,540	20,100

#### KOAIE STREAM AT ELEVATION 3,700 FEET, NEAR WAIMEA, KAUAI

**LOCATION.**—At elevation 3,700 feet, 4 miles east of Mohihi station, 1 mile below swamps, and 13 miles northeast of Waimea (27 miles by trail from Waimea by way of Kokee).

**RECORDS AVAILABLE.**—July 1, 1919, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage or from cable 200 feet upstream.

**CHANNEL AND CONTROL.**—Channel covered with boulders and cobblestones and flanked by high banks; straight for 100 feet above and 400 feet below gage. Control is bedrock across stream, forming low falls; right end is low and blocked by cobblestones and boulders, which may shift. Control too wide to be very sensitive at low stages.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 214 million gallons a day, or 331 second-feet, at 2.15 a. m. August 5 and 3.45 p. m. September 13 (gage height from water-stage recorder, 1.56 feet); minimum discharge, 1.0 million gallons a day, or 1.6 second-feet, from 2 to 7 p. m. March 14 (gage height, 0.41 foot). Minimum discharge somewhat questionable owing to intake trouble.

1919-1926: Maximum discharge recorded about 3,750 million gallons a day, or 5,800 second-feet, January 16, 1921 (gage height from water-stage recorder, 6.70 feet); minimum discharge, that of March 14, 1926.

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine amount of flood water available for storage for use in irrigating high-level lands above Waimea and Kekaha.

**UTILIZATION.**—After it reaches Waimea River low-water flow is used for power and irrigation.

**ACCURACY.**—Stage-discharge relation permanent during year. Rating curve well defined below 50 million gallons a day and fairly well defined between 50 and 300 million gallons a day. This curve checked very closely by six discharge measurements well distributed during year and covering a range from 1 to 24 million gallons a day. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily

discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good except those estimated and those for low and extremely high stages, which are fair to poor.

*Discharge, in million gallons a day, of Koaie Stream at elevation 3,700 feet, near Waimea, Kauai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	21	6.1	5.3	2.4	3.0	8.5	12.2	9.7	1.8	1.6	1.2	41
1.....	5.7	5.7	4.2	2.2			8.6	6.1	1.6	2.2	1.2	10.2
3.....	3.9	4.5	3.3	4.4			6.1	4.9	1.5	1.8		4.2
4.....	3.0	23	2.8	8.6			4.9	5.3	1.3	1.6		2.6
5.....	2.6	95	2.6	6.5			4.2	15.6	1.3	1.6		2.0
6.....	3.0	11.0	2.4	6.1	4.5	2.4	4.5	12.9	1.2	2.4	1.2	3.6
7.....	19.6	7.0	2.4	6.5			7.0	8.1	1.2	3.3		2.7
8.....	9.1	4.9	2.0	8.1			5.3	6.1	1.2	2.8		85
9.....	4.9	4.2	2.6	7.0			4.2	5.3	1.1	2.2		12.5
10.....	4.2	3.3	3.9	9.1			2.4	3.3	30	1.1	2.0	5.3
11.....	7.4	3.0	6.1	7.5	10.3	2.4	2.8	10.9	4.2	23	1.2	4.2
12.....	5.7	8.9	3.6	4.9	22	2.0	2.6	7.5	1.1	6.7		11.7
13.....	3.9	6.9	32	3.9	18.0	1.8	2.4	6.1	1.1	2.8		8.0
14.....	7.8	4.2	12.3	3.0	13.7	2.6	2.4	4.9	1.1	2.0		4.5
15.....	12.2	3.3	5.7	2.6	43	3.9	2.6	4.2	1.2	1.8		12.8
16.....	8.6	2.8	3.9	2.2	23	2.8	5.3	4.2	1.8	1.8	1.2	24
17.....	5.7	2.6	2.8	2.0	15.3	3.6	8.6	15.3	2.0	1.8		7.4
18.....	4.2	2.6	2.6	2.0	8.6	53	12.9	5.7	1.6	1.8		4.2
19.....	3.9	3.3	2.4	1.8	7.0	30	9.1	3.9	1.8	2.4		3.6
20.....	4.9	3.3	2.4	1.6		12.9	9.7	3.0	2.6	2.4		2.6
21.....	19.9	3.0	2.6	1.5	8	34	12.2	2.6	2.8	3.6	8.6	2.0
22.....	8.4	5.8	2.4	1.5		60	16.1	2.6	2.0	5.2	29	1.6
23.....	5.3	7.0	2.0	3.4		12.2	12.2	2.6	1.8	4.2	6.3	1.3
24.....	6.1	3.9	2.0	3.6		8.6	8.6	2.2	2.8	3.3	3.3	1.3
25.....	9.8	3.0	7.4	2.6		7.0	6.5	2.4	3.6	2.4	2.4	1.2
26.....	25	34	7.6	2.0	13	5.3	5.7	4.5	2.2	1.8	1.8	2.0
27.....	40	36	7.8	1.6		4.5	5.3	3.3	2.6	1.5	1.6	2.4
28.....	25	24	6.4			3.9	4.9	2.4	2.0	1.3	1.5	2.8
29.....	17.2	20	3.3			16.9	4.2		1.8	1.2	1.3	2.0
30.....	9.1	13.8	2.8			91	3.6		1.6	1.2	2.4	1.6
31.....	6.1	7.5				24	9.7		1.6		3.3	

NOTE.—Braced figures give mean discharge for periods indicated, estimated by comparison with record of flow for Waialae River at elevation 3,700 feet, near Waimea, Kauai; recorder not operating.

*Monthly discharge of Koaie Stream at elevation 3,700 feet, near Waimea, Kauai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	40	2.6	10.1	15.6	313	961
August.....	95	2.6	11.7	18.1	364	1,110
September.....	32	2.0	4.99	7.72	150	459
October.....		1.5	5.18	8.01	161	493
November.....	43		10.2	15.8	307	939
December.....	91	1.8	14.9	23.1	461	1,420
January.....	16.1	2.4	6.70	10.4	208	637
February.....	30	2.2	6.87	10.6	192	590
March.....	3.6	1.1	1.73	2.68	53.5	165
April.....	23	1.2	3.16	4.89	94.7	291
May.....	29		2.82	4.36	87.5	268
June.....	85	1.2	9.01	13.9	270	830
The year.....	95	1.1	7.29	11.3	2,660	8,160

## WAIALAE RIVER AT ELEVATION 3,700 FEET, NEAR WAIMEA, KAUAI

**LOCATION.**—At elevation 3,700 feet, 2 miles below swamps and 15 miles by trail northeast of Waimea by way of Kaholuamano.

**RECORDS AVAILABLE.**—January 26, 1920, to June 30, 1926, August 1, 1910, to January 25, 1916, at site 2 miles downstream.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage.

**CHANNEL AND CONTROL.**—Channel rocky, boulder-strewn bed with steep, high banks; straight for 300 feet above and 100 feet below station. Control solid rock about 15 feet below well intake.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 376 million gallons a day or 582 second-feet at 10 a. m. December 18 and 3.30 a. m. June 8 (gage height, from water-stage recorder, 2.97 feet); minimum discharge, 0.9 million gallons a day, or 1.4 second-feet, several hours April 1–6 (gage height, 0.82 foot).

1920–1926: Maximum discharge recorded, estimated 4,500 million gallons a day, or 6,960 second-feet, January 16, 1921 (gage height from water-stage recorder, 8.44 feet); minimum discharge, 0.7 million gallons a day, or 1.1 second-feet, several hours March 18–20, 1925 (gage height, 0.80 foot).

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine amount of flood water available for storage for use in irrigating high-level lands above Waimea and Kekaha.

**UTILIZATION.**—After it reaches Waimea River low-water flow is used for irrigation.

**ACCURACY.**—Stage-discharge relation changed, presumably, during flood of November 15. The two rating curves used are fairly well defined between 1 and 150 million gallons a day; extensions beyond uncertain. These curves checked closely by eight discharge measurements well distributed during year and covering a range from 1 to 23 million gallons a day. Operation of water-stage recorder satisfactory during year. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good except for extremely high stages, for which they are poor.

*Discharge, in million gallons a day, of Waialae River at elevation 3,700 feet, near Waimea, Kauai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1-----	11.6	2.8	2.8	2.0	2.4	6.4	9.9	5.7	1.6	1.1	1.2	22
2-----	3.5	2.5	2.4	1.8	1.9	4.8	6.2	2.9	1.5	1.1	1.2	8.6
3-----	2.2	2.2	1.9	2.3	1.6	4.6	4.8	2.9	1.4	1.1	1.1	3.5
4-----	1.8	33	1.6	4.8	1.6	10.2	4.3	6.2	1.4	1.2	1.2	2.0
5-----	1.4	105	1.6	4.6	1.9	8.9	3.5	29	1.2	1.2	1.1	1.5
6-----	1.9	6.9	1.6	3.5	1.9	5.7	3.8	10.4	1.2	1.2	1.2	1.5
7-----	19.3	3.9	1.4	3.5	2.5	4.0	5.1	4.8	1.2	1.2	1.2	1.4
8-----	5.9	2.8	1.3	4.1	5.9	3.3	3.8	3.5	1.2	1.3	1.1	86
9-----	3.0	2.5	1.4	4.8	10.9	2.9	2.7	2.9	1.2	1.2	1.2	15.1
10-----	2.4	2.2	1.8	7.7	5.3	2.6	2.4	17.6	1.2	1.2	1.2	5.7
11-----	4.4	2.0	2.2	5.2	4.9	2.4	2.2	5.7	1.1	28	1.2	4.0
12-----	3.2	17.7	1.9	3.2	16.7	1.7	1.8	3.5	1.1	6.9	1.2	4.6
13-----	2.0	5.8	30	2.5	17.8	1.6	1.6	2.7	1.1	2.6	1.2	4.6
14-----	4.6	3.2	10.6	2.2	8.4	3.1	1.4	2.4	1.1	1.6	1.1	2.9
15-----	7.4	2.5	3.2	1.9	38	4.3	1.5	2.2	1.1	1.3	1.1	7.9
16-----	5.0	2.2	2.2	1.8	17.9	2.7	3.8	2.0	1.1	1.3	1.1	34
17-----	2.8	2.0	1.8	1.6	5.7	5.7	5.9	7.6	1.1	1.4	1.1	8.0
18-----	2.2	2.2	1.4	1.4	4.0	92	14.0	4.6	1.1	1.6	1.2	5.9
19-----	1.9	2.6	1.8	1.3	3.8	40	8.2	2.9	1.5	1.6	1.3	4.6
20-----	1.6	2.5	1.8	1.3	3.8	14.9	10.4	2.4	2.0	1.4	1.2	2.7

*Discharge, in million gallons a day, of Waialae River at elevation 3,700 feet, near Waimea, Kauai, for the year ending June 30, 1926—Continued*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
21.....	17.2	2.4	1.6	1.3	3.8	46	7.7	2.2	2.0	3.3	4.7	2.2
22.....	3.9	3.2	1.4	1.3	2.9	53	11.8	2.0	1.5	6.2	24	1.8
23.....	3.5	3.9	1.4	4.2	2.7	11.5	6.4	2.0	1.2	3.5	5.7	1.5
24.....	5.9	2.5	1.6	4.0	4.5	6.2	3.5	1.8	1.8	2.7	2.6	1.5
25.....	7.7	3.2	7.9	2.2	9.6	5.1	2.7	2.0	2.2	1.6	1.6	1.4
26.....	16.9	43	5.7	1.6	5.7	3.8	2.4	2.9	1.5	1.4	1.4	1.4
27.....	27	25	25	1.3	4.0	3.1	2.4	2.2	2.2	1.4	1.3	1.4
28.....	17.6	15.8	6.0	2.6	3.1	2.9	2.4	2.0	1.4	1.3	1.2	1.5
29.....	10.6	14.0	2.8	30	3.8	41	2.2	-----	1.2	1.2	1.2	1.4
30.....	3.9	8.0	2.2	14.6	11.5	163	1.8	-----	1.2	1.2	1.4	1.3
31.....	2.6	4.1	-----	3.7	-----	27	12.1	-----	1.1	-----	2.0	-----

*Monthly discharge of Waialae River at elevation 3,700 feet, near Waimea, Kauai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-foot (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	27	1.4	6.61	10.2	205	629
August.....	105	2.0	10.7	16.6	332	1,020
September.....	30	1.3	4.34	6.71	130	400
October.....	30	1.3	4.14	6.41	128	394
November.....	38	1.6	6.95	10.8	208	640
December.....	163	1.6	18.9	29.2	584	1,800
January.....	14.0	1.4	4.93	7.63	153	469
February.....	29	1.8	4.96	7.67	139	426
March.....	2.2	1.1	1.38	2.14	42.7	131
April.....	28	1.1	2.78	4.30	83.3	256
May.....	24	1.1	2.27	3.51	70.5	216
June.....	86	1.3	8.06	12.5	242	742
The year.....	163	1.1	6.35	9.82	2,320	7,120

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

**LOCATION.**—In Waimea Canyon, half a mile below intake, 1,000 feet below Kekaha Sugar Co.'s weir, and 8 miles by trail north of Waimea.

**RECORDS AVAILABLE.**—October 26, 1917, to June 30, 1926. Staff at flume No. 4 a mile below intake March 18, 1916, to August 2, 1917; weir 1,000 feet above present site November 8, 1907, to June 30, 1915.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank. Discharge measurements made from plank across ditch about 500 feet above gage.

**CHANNEL AND CONTROL.**—Ditch about 9 feet wide cut in soft lava rock and lined with concrete; straight for 1,000 feet above gage and for 300 feet below. Control is concrete-lined section of ditch in tunnel; subject to shifts.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 60 million gallons a day, or 93 second-feet, from 11 a. m. to 12 m. July 14 (gage height, from water-stage recorder, 3.90 feet); minimum discharge, 0.2 million gallons a day, or 0.3 second-foot, from 9 a. m. to 12 m. January 17, (gage height, 0.79 foot).

1907-1926: Maximum discharge recorded, 67 million gallons a day, or 104 second-feet, January 4, 1921, and March 6, 1922; minimum discharge, no flow, occasionally, when water is shut out of ditch.

**DIVERSIONS AND REGULATION.**—Flow regulated by head gates.

**OBJECT OF STATION.**—To measure water diverted from river by ditch. Land and water owned by Territory and leased to Kekaha Sugar Co.

ACCURACY.—Stage-discharge relation changed, presumably, on October 3, January 17, February 26, and March 27. Shifting-control method used September 13 to October 3 and January 31 to February 26. The two rating curves used are well defined between 20 and 60 million gallons a day; extensions beyond somewhat uncertain. These curves checked very closely by seven discharge measurements well distributed during year and covering a range from 20 to 39 million gallons a day. Operation of water-stage recorder satisfactory except as indicated in footnote to daily discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection and corrected when necessary for shifting-control method or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages; low-stage records fair to poor.

Kekaha ditch diverts water from Waimea River at a point 8 miles by trail north of Waimea, 500 feet above gaging station on Waimea River at camp No. 1, and at an elevation of about 550 feet. The course of the ditch is roughly parallel to the river for a distance downstream of about  $4\frac{1}{2}$  miles, then the ditch crosses the river and then continues roughly parallel to it for about  $2\frac{1}{2}$  miles more to a point about half a mile north of Waimea at an elevation of about 400 feet. Here, at the lower end of the river valley, the ditch swings eastward and continues roughly parallel to the coast line for a distance of about 10 miles.

*Discharge, in million gallons a day, of Kekaha ditch at camp No. 1, near Waimea, Kauai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	55	29	26	23	28	42	27	32	27	26	25	32
2.....	40	29		23	25	30	26	33	26	31	24	46
3.....	31	28		22	24	29	26	33	26	29	24	32
4.....	28	28		46	23	30	30	41	25	27	24	27
5.....	27	53		44	25	44	33	36	24	26	24	25
6.....	27	52	40	32	25	35	33	34	24	26	23	40
7.....	37	37		28	24	29	34	32	24	30	23	
8.....	48	31		30	30	28	33	33	24	29	23	
9.....	33	28		29	46	27	34	33	24	27	23	
10.....	30	27		40	35	25	25	34	24	27	23	
11.....	31	26	30	42	32	24	32	34	24	41	23	39
12.....	36	30	28	30	46	23	30	38	24	51	23	39
13.....	29	42	33	26	46	23	29	36	24	38	23	44
14.....	35	30	51	24	49	23	28	34	24	31	23	36
15.....	55	27	38	23	46	30	28	32	24	28	22	37
16.....	46	27	31	23	52	27	29	31	24	27	22	31
17.....	33	25	27	22	41	26	11.4	37	25	26	22	38
18.....	29	25	25	22	30	34	37	37	24	28	23	46
19.....	28	25	25	21	28	39	36	36	24	28	25	46
20.....	27	26	25	21	27	38	31	32	26	27	25	37
21.....	39	25	25	21	27	36	32	30	27	28	25	32
22.....	44	25	25	21	26	30	32	29	25	36	45	30
23.....		33	24	24	25	26		28	26	31	44	28
24.....		28	25	34	33	24		27	25	32	31	28
25.....		26	25	26	52	24		28	28	29	26	28
26.....		46	41	23	41	35	36	43	26	27	25	28
27.....	53	53	36	22	32	36	34	33	38	26	24	28
28.....		53	41	34	26	35	33	29	31	25	24	28
29.....		55	53	27	49	26	29	33	28	25	23	28
30.....		39	51	24	49	32	12.3	32	27	25	23	27
31.....		40	-----	39	-----	11.5	36	-----	26	-----	25	-----

NOTE.—Discharge estimated Aug. 31, Sept. 11, Mar. 10, 11, and June 5 and 11. Braced figures give estimated mean discharge for periods indicated. Estimates made by comparison with record of flow for this ditch below tunnel No. 12 and for tributary streams; gage-height record either faulty or missing.

*Monthly discharge of Kekaha ditch at camp No. 1, near Waimea, Kauai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	55	27	38.3	59.3	1,190	3,640
August	53	25	34.1	52.8	1,060	3,240
September	51	24	28.9	44.7	866	2,660
October	49	21	29.5	45.6	913	2,810
November	52	23	33.4	51.7	1,000	3,080
December	44	11.5	29.2	45.2	905	2,780
January	37	11.4	30.9	47.8	958	2,940
February	43	27	33.4	51.7	935	2,870
March	38	24	25.7	39.8	798	2,440
April	51	25	29.6	45.8	887	2,730
May	45	22	25.2	39.0	782	2,400
June	46	25	34.7	53.7	1,040	3,190
The year	55	11.4	31.0	48.0	11,300	34,800

#### KEKAHA DITCH BELOW TUNNEL NO. 12, NEAR WAIMEA, KAUAI

**LOCATION.**—7 miles below intake, 2½ miles by trail from Waimea, and just above diversion for Waimea domestic supply.

**RECORDS AVAILABLE.**—July 15, 1921, to June 30, 1926. April 7, 1908, to November 30, 1914, and July 20, 1916, to July 15, 1921, at site half a mile downstream.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank. Discharge measurements made from plank across ditch at gage.

**CHANNEL AND CONTROL.**—Channel cut in lava rock; fairly straight near gage. Control is section of ditch; not well defined; shifts occasionally.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 57 million gallons a day, or 88 second-feet, from 7 to 8 a. m. August 27 (gage height, from water-stage recorder, 4.36 feet); minimum discharge, 4.2 million gallons a day, or 6.5 second-feet, from 4 to 8 p. m. December 31 and 8 p. m. to noon January 17 (gage height, 1.35 feet).

1916-1926: Maximum discharge recorded, 64 million gallons a day, or 99 second-feet, at 8.30 a. m. December 22, 1921 (gage height, from water-stage recorder, 4.40 feet); minimum discharge, no flow, occasionally, when water was shut out of ditch.

**DIVERSIONS AND REGULATION.**—Flow regulated by head gates.

**OBJECT OF STATION.**—To determine discharge above first important lateral, also to determine ditch losses between intake and station. Territorial land and water.

**UTILIZATION.**—Water used for irrigation of sugarcane, rice, and taro and for domestic supply.

**ACCURACY.**—Stage-discharge relation changed, presumably, at time of flood December 5. The two rating curves used are fairly well defined above 10 million gallons a day. Nine discharge measurements covering a range from 17 to 43 million gallons a day were made during year; three of these check the rating curves closely and six help define backwater indicated in footnote to daily-discharge table. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair.

For description of ditch see "Kekaha ditch at camp No. 1, near Waimea, Kauai."

*Discharge, in million gallons a day, of Kekaha ditch below tunnel No. 12, near Waimea, Kauai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	52	27	27		29	37	25	28	24	21	22	27
2.....	39	27	22		24	27	23	27	23	23	22	43
3.....	29	26	21		22	25	22	27	22	25	22	32
4.....	23	24	19.2		21	27	27	30	22	22	22	27
5.....	23	52	19.2		22	40	29	32	22	22	21	24
6.....	22	52	18.3		23	30	29	29	22	21	21	32
7.....	30	37			22	25	30	27	22	24	21	27
8.....	46	30			27	24	29	29	21		21	38
9.....	30	27			42	22	30	29	21		21	43
10.....	26	26			36	22	21	29	21		21	43
11.....	26	25		24	30	20	29	30	21		21	37
12.....	32	26			38	20	27	30	22		22	33
13.....	26	45			43	18.3	26	30	21		22	39
14.....	28	30			46	19.2	25	29	22		22	32
15.....	52	27			41	26	25	27	22	28	21	33
16.....	46	27			46	26	26	26	22		21	33
17.....	32	25			39	23	12.9	30	22		21	34
18.....	27	24			29	34	31	32	22		21	41
19.....	25	25		26	24	41	32	30	22		22	41
20.....	24	27			22	37	28	29	22		23	34
21.....	32	26			22	38	29	27	23		22	30
22.....	44	25		18.3	20	31	29	26	23		39	27
23.....	34	34		18.3	19.2	25	30	25	22	27	43	26
24.....	32	29		31	22	22	27	25	22	29	30	25
25.....	36	25		26	44	22	30	24	23	26	25	25
26.....	48	45		22	39	30	30	33	22	23	23	25
27.....		56		20	29	34	30	29	28	22	22	25
28.....	52	54		27	23	32	29	26	29	22	22	26
29.....		52		48	21	27	30		22	22	22	26
30.....	40	50		48	24	17.7	29		21	22	22	24
31.....	30	36		41		7.5	30		21		22	

NOTE.—Braced figures give mean discharge for periods indicated, estimated by comparison with record of this ditch at camp No. 1; gage-height record either faulty or missing. Discharge Aug. 5 to Sept. 6, Oct. 22 to Nov. 24, Feb. 1 to Apr. 8, and Apr. 23 to June 30 from gage heights corrected for backwater determined from six discharge measurements made during year and two made subsequent to June 30 and study of recorder graph and engineer's notes.

*Monthly discharge of Kekaha ditch below tunnel No. 12, near Waimea, Kauai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....		22	35.2	54.5	1,090	3,350
August.....	56	24	33.6	52.0	1,040	3,200
September.....		18.3	25.0	38.7	751	2,300
October.....		18.3	25.9	40.1	804	2,460
November.....	46	19.2	29.6	45.8	889	2,730
December.....	41	7.5	26.8	41.5	830	2,550
January.....	32	12.9	27.4	42.4	850	2,610
February.....	33	24	28.4	43.9	795	2,440
March.....	29	21	22.4	34.7	694	2,130
April.....		21	25.7	39.8	771	2,370
May.....	43	21	23.3	36.1	722	2,220
June.....	43	24	31.7	49.0	952	2,920
The year.....	56	7.5	27.9	43.2	10,200	31,300

## SOUTH FORK OF WAILUA RIVER NEAR LIHUE, KAUAI

**LOCATION.**—One-third of a mile above Wailua Falls and 5 miles (previously published 7 miles) northeast of Lihue. Prior to November 18, 1918, station was one-third of a mile farther upstream.

**RECORDS AVAILABLE.**—December 10, 1911, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank. Discharge measurements made from cable or by wading near gage.

**CHANNEL AND CONTROL.**—One channel at all stages; straight for 600 feet above and 300 feet below gage. Right bank steep and high, left bank slopes gently. Control composed of solid rock ledge; somewhat shifting owing to boulders lodging in water-worn grooves at left end of control. On April 24, 1926, some boulders were placed in the stream at left end of control to raise the stage so that the intake pipe to stilling well would be under water at low stage.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 7,400 million gallons a day, or 11,400 second-feet, at 4 p. m. September 13 (gage height, from water-stage recorder, 7.20 feet); minimum discharge, 1.2 million gallons a day, or 1.9 second-feet, from 5 to 8 p. m. May 3 (gage height, 1.17 feet). A smaller discharge may have occurred during the period March 21 to April 24 when intake pipe was not functioning.

1911-1926: Maximum discharge recorded, 29,000 million gallons a day, or 44,900 second-feet, at 7.25 a. m. January 16, 1920 (gage height from water-stage recorder, 11.25 feet); minimum discharge that of May 3, 1926.

**DIVERSIONS AND REGULATION.**—Several diversions for irrigation and power development.

**OBJECT OF STATION.**—To determine feasibility of diversion for homesteads after stream enters Territorial lands.

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

**ACCURACY.**—Stage-discharge relation changed by building up the low parts of the control with boulders on April 24 and again by flood of June 14. Rating curve used prior to April 24 well defined between 5 and 200 million gallons a day and fairly well defined between 200 and 1,500 million gallons a day. The two rating curves used subsequent to April 24 are poorly defined. Rating curves checked fairly well by 11 discharge measurements, well distributed during year and covering a range from 2 to 31 million gallons a day. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection, or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good prior to March 28 and fair thereafter except for estimated period, for which they are poor.

*Discharge, in million gallons a day, of South Fork of Wailua River near Lihue, Kauai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	152	23	21	12.7	23	35	14.3	25	9.4		1.6	4.7
2	38	16.6	16.6	13.3	19.2	34	15.0	23	7.3		1.4	5.3
3	22	12.2	10.9	16.6	15.2	19.6	16.8	17.9	6.8		1.4	3.1
4	16.2	29	8.6	33	64	23	15.4	12.6	6.5		1.5	4.4
5	14.3	227	8.6	26	95	31	15.1	30	6.8		1.6	3.4
6	14.7	46	11.6	14.8	52	26	15.4	35	6.4		1.6	2.7
7	85	26	8.6	19.6	63	20	15.4	16.8	6.1		1.6	2.4
8	44	17.3	7.8	18.5	68	27	14.1	14.6	6.0		1.8	73
9	27	13.0	7.7	17.5	92	16.5	13.8	13.5	6.1		1.7	4.7
10	25	10.9	130	76	101	15.4	20	15.2	6.2		1.9	3.1
11	59	10.2	36	82	70	15.4	12.3	14.1	6.2		2.2	2.9
12	24	31	21	36	137	13.9	13.1	10.9	6.4	3.0	2.7	8.6
13	15.6	21	407	27	98	13.1	12.6	11.0	6.4		2.7	5.4
14	45	13.6	166	15.9	77	13.4	13.4	10.2	10.0		2.7	109
15	32	14.6	89	11.7	109	19.6	13.5	10.7	39		2.4	510
16	22	72	54	8.9	216	17.0	17.4	9.1	22		2.2	148
17	15.6	32	25	8.4	87	21	37	8.6	23		2.2	28
18	17.3	13.0	14.6	11.4	74	68	76	9.4	10.6		2.6	5.7
19	15.9	13.6	15.9	9.3	59	64	81	8.1	7.9		2.8	4.4
20	16.0	11.4	16.8	8.9	27	28	74	7.5	10.4		2.7	3.8
21	83	11.4	10.7	8.6	27	37	57	13.0	13.7		2.9	3.5
22	22	52	9.5	9.7	25	114	72	12.1	7.7		3.6	3.3
23	13.6	35	9.3	8.6	13.3	45	64	7.0	6.9		3.2	2.9
24	10.1	12.5	9.5	12.0	19.6	23	52	6.7	111		2.0	2.9
25	22	9.7	58	10.0	17.4	32	46	6.8	110	1.8	1.8	3.2
26	66	95	23	15.7	33	21	43	12.3	26	1.7	1.7	3.9
27	108	82	181	14.0	26	27	34	10.6	10.8	1.6	1.9	3.9
28	168	114	43	20	22	15.9	10.8	7.8		1.4	1.9	3.5
29	45	120	19.2	206	39	21	20			1.5	1.7	3.2
30	42	87	13.6	122	40	139	23			1.6	1.9	2.8
31	25	34		46		38	29				2.0	

NOTE.—Braced figure gives mean discharge for period indicated; estimated from fragmentary gage-height record, three discharge measurements, and by comparison with records of near-by streams.

*Monthly discharge of South Fork of Wailua River near Lihue, Kauai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	168	10.1	42.1	65.1	1,310	4,010
August	227	9.7	42.1	65.1	1,310	4,010
September	407	7.7	48.4	74.9	1,450	4,460
October	206	8.4	30.3	46.9	940	2,890
November	216	13.3	60.3	98.3	1,810	5,550
December	139	13.1	33.3	51.5	1,080	3,170
January	81	10.8	30.9	47.8	956	2,940
February	35	6.7	13.6	21.0	380	1,160
March	111		16.4	25.4	508	1,560
April			2.72	4.21	81.6	250
May	3.6	1.4	2.13	3.30	65.9	202
June	510	2.4	32.2	49.8	966	2,960
The year	510		29.6	45.8	10,800	33,200

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

LOCATION.—1½ miles above intake of Kanaha ditch and 7¼ miles (10 miles by road and trail) northwest of Lihue.

RECORDS AVAILABLE.—September 1, 1914, to June 30, 1926. August 1 to October 28, 1910, and December 28, 1910, to September 25 1914, at old site at elevation 500 feet.

EQUIPMENT.—Stevens continuous water-stage recorder on right bank. Discharge measurements made by wading or from cable at gage.

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 slopes gently. Control composed of boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 1,430 million gallons a day, or 2,210 second-feet, at 2.45 p. m. September 13 (gage height, from water-stage recorder, 7.04 feet); minimum discharge, about 7.7 million gallons a day, or 11.9 second-feet, from 4 to 5 p. m. April 27, (gage height, 0.06 foot).

1914-1926: Maximum discharge recorded, 2,370 million gallons a day, or 3,670 second-feet, at 3.15 a. m. February 11, 1925 (gage height, from water-stage recorder, 9.10 feet); minimum discharge, that of April 27, 1926.

DIVERSIONS AND REGULATION.—Water is diverted from Hanalei River into this basin by Hanalei Tunnel to compensate for water diverted out of this basin by North Wailua ditch.

OBJECT OF STATION.—To determine feasibility of further diversion above or near this elevation. Territorial land and water. Important in relation to water supply for homesteads.

UTILIZATION.—Normal flow used for irrigation of sugarcane.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve used well defined between 10 and 100 million gallons a day; extension above uncertain. This curve checked very closely by seven discharge measurements well distributed during year and covering a range from 10 to 42 million gallons a day. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of the day. Records good for ordinary stages except those estimated, which are fair; high-stage records poor.

*Discharge, in million gallons a day, of North Fork of Wailua River at elevation 650 feet, near Lihue, Kauai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	46	35	34	38	30	30	25	14.0	12.5	13.8	12.3	51
2.....	28	30	32	37	26		23	14.3	12.2	14.5	12.4	34
3.....	24	23	30	44	28		15.8	20	14.0	10.5	13.8	23
4.....	20	59	27	48	70	21	15.9	13.5	13.6	14.2	14.0	21
5.....	21	128	28	48	48	18.1	18.1	14.5	12.7	14.0	12.4	16.3
6.....	24	39	26	40	37	16.4	15.6	16.3	13.6	16.3	10.4	18.6
7.....	55	32	25	50	34	11.7	17.6	13.3	14.2	15.3	12.4	14.9
8.....	34	30	25	40	37	16.2	15.0	13.3	12.1	14.0	11.9	93
9.....	26	26	34	52	44	14.8	16.6	14.5	12.0	13.8	13.1	22
10.....	24	22	78	83	62	13.4	14.8	23	13.8	12.2	11.9	22
11.....	60	22	41	72	43	13.1	13.8	16.6	13.2	21	13.8	27
12.....	27	44	44	60	61	12.6	14.4	14.5	12.7	14.1	12.7	64
13.....	23	31	147	43	39	13.0	14.8	15.6	16.6	12.9	13.6	29
14.....	49	26	116	43	37	14.7	15.4	13.9	22	13.1	12.4	139
15.....	36	30	58	37	79	15.1	15.7	13.4	30	13.4	12.0	159
16.....	28	53	45	34	100	16.1	27	14.1	13.6	13.8	11.9	69
17.....	30	32	40	34	50	16.8	34	18.8	20.4	22	11.9	33
18.....	26	27	39	32	39	48	30	15.2	13.2	16.2	14.2	32
19.....	26	25	37	30	32	23	28	13.2	15.3	14.7	33	25
20.....	23	30	34	30	45	21	20	13.0	28	28	15.1	23

*Discharge, in million gallons a day, of North Fork of Wailua River at elevation 650 feet, near Lihue, Kauai, for the year ending June 30, 1926—Continued*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
21.....	54	25	30	30	36	33	16.7	30	15.3	30	22	21
22.....	26	64	30	28	34	115	23	15.0	14.5	18.7	31	19.8
23.....	25	34	27	31	31	25	11.8	13.0	27	22	16.8	18.4
24.....	30	24	33	29	27	17.6	11.2	12.6	40	14.9	14.2	19.4
25.....	35	32	98	26	35	19.0	13.8	18.9	20	13.6	15.0	22
26.....	55	78	52	22		16.2	14.0	27	16.0	13.3	13.1	24
27.....		64	160	25		14.2	11.4	14.1	15.2	12.2	13.2	21
28.....	65	95	52	57		14.5	12.8	19.3	12.9	12.5	13.3	17.8
29.....		87	43	103		26	14.5		12.9	12.9	13.4	16.3
30.....		58	40	44		58	15.8		13.6	12.7	18.4	15.8
31.....		39		32		32	17.7		13.6		17.4	

NOTE.—Braced figures give mean discharge for periods indicated, estimated by comparison with records of near-by streams and from fragmentary gage-height record; gage-height record either faulty or missing.

*Monthly discharge of North Fork of Wailua River at elevation 650 feet, near Lihue, Kauai, for the year ending June 30, 1926*

Month	Discharge			Total run-off	
	Million gallons a day			Second-feet (mean)	Acre-feet
	Maximum	Minimum	Mean		
July.....		20	38.1	58.9	3,620
August.....	128	22	45.4	67.1	4,120
September.....	160	25	50.2	77.7	4,620
October.....	103	22	42.6	65.9	4,060
November.....	100	26	42.6	65.9	3,930
December.....	115	11.7	24.2	37.4	2,310
January.....	34	11.2	18.0	27.9	1,710
February.....	30	12.6	16.1	24.9	1,380
March.....	40	10.4	16.2	25.1	1,540
April.....	30	12.2	15.8	24.4	1,450
May.....	33	10.4	14.9	23.1	1,420
June.....	159	14.9	37.0	57.2	3,410
The year .....	160	10.4	30.0	46.4	33,600

#### KANAHA DITCH NEAR LIHUE, KAUAI

**LOCATION.**—300 feet (about a quarter of a mile after March 5, 1926) below point where Kauai Electric Co.'s power line crosses ditch and  $6\frac{3}{4}$  miles (9 miles by road) northwest of Lihue.

**RECORDS AVAILABLE.**—March 5 to June 30, 1926. August 6, 1910, to July 25, 1921, at site about a third of a mile upstream and July 26, 1921, to March 3, 1926, at site about 1,000 feet upstream.

**EQUIPMENT.**—Stevens continuous water-stage recorder. Discharge measurements made near gage.

**CHANNEL AND CONTROL.**—Prior to March 3, 1926, ditch cut in conglomerate and clay; straight for 300 feet above and 10 feet below gage where ditch turns sharply into a long tunnel; shifting-channel control in tunnel. Subsequent to March 4, 1926, ditch emerges from tunnel just above gage and turns slightly to left just below gage; control is upstream end of semi-circular iron flume about 15 feet below gage.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 29 million gallons a day, or 45 second-feet, at 3.30 p. m. May 19 (gage height from water-stage recorder, 2.66 feet); minimum discharge, 0.3 million gallons a day, or 0.5 second-foot, at 11 a. m. May 20 (gage height, 0.31 foot).

1910–1926: Maximum discharge recorded, that of May 19, 1926; minimum discharge, no flow, occasionally, when water is shut out of ditch.

**DIVERSION AND REGULATION.**—Flow regulated by head gates.

**OBJECT OF STATION.**—This ditch station measures water diverted from river and delivered to fee-simple and Territorial lands leased to Lihue Plantation.

**Territorial water.** Important station relative to North Wailua homesteads.

**UTILIZATION.**—Water used for irrigation of sugarcane and for domestic supply.

**ACCURACY.**—Stage-discharge relation changed at old location August 19; permanent at new location. Rating curves used prior to August 19 and subsequent to March 5 fairly well defined. Rating curve used for intervening period poorly defined. The curve used prior to August 19 checked very closely at 18 million gallons a day by one discharge measurement; curves used subsequently based on 20 discharge measurements made during year and 9 made later. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair except those estimated, which are poor.

Kanaha ditch diverts from North Fork of Wailua River at a point about  $8\frac{1}{2}$  miles above mouth of river, 9 miles north of Lihue, and at an elevation of about 600 feet. The ditch runs due east, almost parallel to the river, for a distance of a third of a mile, and then turns sharply to the south. About 3 miles farther on it crosses South Fork of Wailua River and within a short distance joins Lihue ditch at an elevation of about 550 feet. Through Lihue ditch the water is carried around the base of Kilohana Crater and south for a distance of about 5 miles to a point near Lihue.

*Discharge, in million gallons a day, of Kanaha ditch near Lihue, Kauai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	19.0	14.4	19.4	18.9	18.9	14.3	-----	12.2	4.2	1.5	1.2	9.3
2.....	17.5	16.8	18.9	18.9	18.0	14.3	-----	11.5	3.2	1.6	1.2	13.9
3.....	17.5	16.8	18.9	18.9	18.1	12.2	-----	11.5	-----	1.4	1.1	3.1
4.....	16.8	19.0	18.9	18.9	19.4	14.3	-----	11.5	2.3	1.2	1.1	1.3
5.....	17.5	19.0	20	19.4	19.4	13.6	-----	11.5	-----	1.7	1.0	1.3
6.....	17.5	18.3	20	18.9	18.9	12.9	-----	14.3	2.6	1.9	.8	1.3
7.....	18.3	19.0	18.9	19.4	18.9	7.7	-----	10.2	2.6	1.8	1.6	1.3
8.....	17.5	18.3	19.4	20	18.9	12.9	-----	8.9	2.1	1.8	1.4	11.5
9.....	16.8	13.8	18.9	20	18.9	12.9	-----	10.2	2.0	1.8	1.3	5.6
10.....	16.8	16.8	22	21	18.9	10.8	-----	12.2	2.5	1.3	1.3	2.3
11.....	18.3	18.3	20	20	18.1	10.2	-----	10.8	1.4	1.2	1.3	6.7
12.....	16.8	18.3	20	20	18.9	9.6	-----	9.6	1.3	1.1	1.3	18.1
13.....	16.8	18.3	18.1	20	18.1	10.2	-----	10.2	1.4	1.4	1.2	15.8
14.....	16.8	19.0	16.6	-----	18.1	11.5	-----	4.4	1.5	2.2	1.2	14.5
15.....	16.8	19.0	18.9	-----	18.1	12.9	-----	4.5	8.1	1.6	1.1	14.3
16.....	16.0	14.0	18.9	-----	18.9	11.5	-----	5.4	15.4	1.8	1.0	4.1
17.....	17.5	17.5	19.4	18	16.8	13.6	-----	4.9	3.1	6.7	1.0	6.2
18.....	17.5	18.3	20	-----	18.1	15.8	18.9	4.5	2.3	3.8	2.1	6.6
19.....	17.5	18.2	19.4	-----	17.3	15.0	18.9	4.6	1.9	2.5	4.8	10.1
20.....	17.5	19.4	18.9	-----	18.1	14.3	17.3	7.2	8.3	10.2	2.7	18.1
21.....	18.3	19.4	18.1	20	18.1	15.8	15.0	14.8	4.8	8.8	4.2	5.6
22.....	17.5	19.4	18.9	20	18.1	18.1	17.3	7.6	1.9	8.4	4.5	1.0
23.....	17.5	17.3	17.3	20	17.3	15.8	10.8	1.6	5.6	9.9	3.7	.9
24.....	18.3	15.5	19.4	20	16.6	14.3	8.9	1.7	14.4	4.2	3.5	1.0
25.....	18.3	17.2	19.4	18.9	17.3	14.3	10.2	4.9	7.4	1.0	3.5	.8
26.....	19.8	21	18.9	17.3	16.6	13.6	10.2	10.8	2.1	.9	1.6	.7
27.....	19.0	20	19.4	19.4	17.3	11.5	8.9	4.8	1.9	.7	.7	10.5
28.....	18.3	21	18.1	20	15.8	11.5	10.2	7.7	1.5	.8	.8	1.2
29.....	19.0	20	18.1	19.4	8.3	13.6	12.2	-----	1.4	1.2	.7	.8
30.....	18.3	18.9	18.9	19.4	17.3	19.4	13.6	-----	1.5	1.2	.7	.8
31.....	18.3	19.4	-----	18.9	-----	20	13.6	-----	1.7	-----	.7	-----

NOTE.—Discharge estimated Dec. 31. Braced figures give estimated mean discharge for periods indicated. Estimates made by comparison with record of flow of East Branch of North Fork of Wailua River near Lihue, Kauai, and study of faulty or fragmentary gage-height record. Data insufficient for making estimate Jan. 1-17 when recorder was not operating.

*Monthly discharge of Kanaha ditch near Lihue, Kauai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	19.8	16.0	17.7	27.4	549	1,680
August.....	21	13.8	18.1	28.0	562	1,720
September.....	22	16.6	19.1	29.6	572	1,760
October.....	21	-----	19.1	29.6	594	1,820
November.....	19.4	8.3	17.7	27.4	532	1,630
December.....	20	7.7	13.5	20.9	418	1,280
February.....	14.8	1.6	8.36	12.9	234	718
March.....	15.4	1.3	3.71	5.74	115	353
April.....	10.2	.7	2.85	4.41	85.6	262
May.....	4.8	.7	1.75	2.71	54.3	166
June.....	18.1	.7	6.29	9.73	189	579

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

**LOCATION.**—1,200 feet above confluence with North Fork and 7¼ miles (9½ miles by road and trail) northwest of Lihue.

**RECORDS AVAILABLE.**—July 31, 1912, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank. Discharge measurements made by wading or from cable at gage.

**CHANNEL AND CONTROL.**—One channel at all stages; straight for 60 feet above and 400 feet below gage. Banks low and wooded. Control composed of boulders; subject to shifts.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 1,060 million gallons a day, or 1,640 second-feet, at 4 p. m. September 14 (gage height from water-stage recorder, 5.78 feet); minimum discharge, 4.5 million gallons a day, or 7.0 second-feet, at 6.30 p. m. May 26 (gage height, 1.70 feet; stage-discharge relation affected by moss on control) and from 5 to 7 p. m. May 29 (gage height, 1.71 feet; stage-discharge relation affected by moss on control).

1912-1926: Maximum discharge recorded, 3,000 million gallons a day, or 4,640 second-feet, at 8 a. m. March 3, 1916 (gage height from water-stage recorder, 8.9 feet); minimum discharge, that of May 26 and 29, 1926.

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine feasibility of diversion above this point. Territorial land and water.

**UTILIZATION.**—After joining North Fork of Wailua River ordinary flow is diverted for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation changed slightly at time of floods September 14 and November 4 and affected by moss on control from March to June. Two rating curves used are fairly well defined between 9 and 600 million gallons a day. These curves checked very closely by six of the seven discharge measurements well distributed during year and covering a range from 8 to 142 million gallons a day. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of the day. Records good.

*Discharge, in million gallons a day, of East Branch of North Fork of Wailua River near Lihue, Kauai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	40	22	24	18.9	20	18.9	12.5	10.6	9.2	6.9	5.9	12.7
2	24	19.6	22	20	18.4	16.1	12.1	10.2	8.8	6.9	5.9	19.0
3	18.9	17.7	19.6	25	17.8	15.1	12.1	9.7	8.8	6.8	5.9	13.5
4	17.2	25	18.2	26	94	15.1	11.6	10.2	9.2	6.3	6.3	10.2
5	16.1	78	17.7	24	62	15.1	11.6	11.1	9.0	6.3	5.9	7.3
6	17.2	29	17.7	21	34	14.6	10.6	11.6	8.3	6.3	5.6	9.2
7	28	24	17.7	24	28	14.0	12.5	10.6	8.1	6.6	5.2	6.9
8	20	20	15.6	22	31	13.5	10.6	9.7	8.3	6.6	5.4	40
9	19.6	17.7	19.6	25	31	13.0	10.2	9.7	8.3	6.3	5.6	9.2
10	18.2	16.6	46	83	31	12.5	10.2	25	8.0	6.3	5.6	7.3
11	25	15.6	22	68	26	12.1	10.2	12.5	7.6	6.3	6.3	11.5
12	17.7	25	20	86	37	11.6	9.7	10.6	7.6	6.3	5.9	33
13	16.1	18.9	73	52	29	11.6	9.7	10.2	8.6	5.9	5.9	16.1
14	26	16.6	106	37	24	13.0	8.8	9.7	11.6	6.3	5.9	15.9
15	22	15.6	39	29	40	14.0	9.2	9.7	21	5.9	5.2	193
16	19.6	21	28	26	54	13.0	14.6	9.2	13.3	6.3	5.2	40
17	16.6	17.7	23	23	31	13.0	23	14.6	10.6	7.3	4.9	23
18	15.6	15.1	22	21	27	24	27	10.6	8.3	7.8	5.9	16.6
19	20	14.6	21	19.4	24	13.5	24	9.7	8.0	6.6	9.0	13.0
20	16.6	15.1	18.9	18.9	23	13.5	19.6	9.7	11.1	9.4	7.2	11.1
21	28	14.0	17.2	17.8	20	13.0	16.6	10.2	8.8	9.2	9.3	10.2
22	17.7	33	16.2	17.2	18.9	49	27	9.7	8.0	8.8	15.9	8.8
23	17.7	20	15.0	17.8	18.9	18.2	17.2	9.7	9.2	8.8	7.6	8.0
24	17.2	15.6	15.0	16.7	24	14.6	14.6	8.8	14.6	7.6	5.6	8.0
25	21	21	17.2	15.6	19.6	13.5	13.0	9.7	14.6	6.6	5.5	9.2
26	37	46	15.6	15.6	16.6	12.5	12.1	16.1	9.2	6.3	5.0	12.1
27	60	41	96	18.2	15.6	12.5	11.6	10.2	8.0	6.3	4.9	9.2
28	111	68	28	31	14.6	12.1	11.1	10.2	7.3	5.9	4.9	7.6
29	43	50	21	84	14.6	13.0	10.6	-----	6.9	5.6	4.9	6.9
30	29	39	18.9	38	30	16.1	10.2	-----	6.9	5.9	6.8	6.6
31	24	28	-----	24	-----	14.6	10.6	-----	6.6	-----	7.1	-----

NOTE.—Discharge Mar. 21 to June 14 from gage heights corrected for effect of moss on control determined from one discharge measurement and study of gage-height graph.

*Monthly discharge of East Branch of North Fork of Wailua River near Lihue, Kauai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	111	15.6	26.5	41.0	820	2,520
August	78	14.0	26.5	41.0	820	2,520
September	106	15.0	28.4	43.9	851	2,610
October	86	15.6	31.1	48.1	965	2,960
November	94	14.6	29.2	45.2	875	2,680
December	49	11.6	15.4	23.8	476	1,460
January	27	8.8	13.7	21.2	424	1,300
February	25	8.8	11.1	17.2	310	950
March	21	6.6	9.48	14.7	294	902
April	9.4	5.6	6.81	10.5	204	627
May	15.9	4.9	6.33	9.79	196	602
June	193	6.6	19.8	30.6	595	1,830
The year	193	4.9	18.7	28.9	6,830	21,000

#### KAPAHU DITCH NEAR KEALIA, KAUAI

LOCATION.—500 feet below intake and 5 miles (by road) west of Kealia.

RECORDS AVAILABLE.—April 15, 1909, to May 2, 1914; May 10, 1915, to June 30, 1926.

EQUIPMENT.—Stevens continuous water-stage recorder on right bank. Discharge measurements made by wading about 50 feet below gage.

CHANNEL AND CONTROL.—The ditch cut in earth is straight for about 50 feet above gage. Control is 20-foot sharp-crested rectangular weir with complete end contractions; about 5 feet below gage.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 199 million gallons a day, or 308 second-feet, at 10.15 p. m. November 4 (gage height, from water-stage recorder, 2.84 feet); minimum discharge, no flow 7.30 a. m. November 2 to 4.15 p. m. November 4, several hours November 7–11, and 6.15 a. m. November 12 to 3 p. m. December 7; water shut out of ditch.

1915–1926: Maximum discharge recorded, 233 million gallons a day, or 361 second-feet, at 3 and 4 a. m. March 31, 1923 (gage height, from water-stage recorder, about 3.15 feet); minimum discharge, no flow, occasionally, when water is shut out of ditch.

**DIVERSIONS AND REGULATION.**—Flow regulated by head gates.

**OBJECT OF STATION.**—To determine amount of water diverted by ditch. Water used by Territory and part is leased to Makee Sugar Co. Homesteads entitled to part of water.

**UTILIZATION.**—Water used for irrigation of sugarcane and for domestic supply.

**ACCURACY.**—Stage-discharge relation permanent during year. Weir rating curve well defined and checked very closely by eight of nine discharge measurements made during year. Operation of water-stage recorder satisfactory except for short period in July. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for medium stages except estimated record, which is poor; extreme low-stage records poor.

Kapahi ditch diverts from Kapaa River at a point about 4 miles east of Kealia and mouth of the river and at an elevation of about 400 feet. The general course of the ditch is eastward toward Kealia. It comprises about 6 miles of main ditch.

*Discharge, in million gallons a day, of Kapahi ditch near Kealia, Kauai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	12.1	5.2	5.7	3.4	1.1	0.0	0.9	5.6	4.4	2.3	3.4	13.3
2	10.3	1.9	4.8	4.0	.4	.0	.7	4.9	3.8	2.4	3.3	5.4
3	6.1	4.0	3.9	15.6	.0	.0	.7	4.9	3.7	2.4	3.2	10.2
4	2.4	3.4	3.7	13.7	22	.0	.7	4.9	4.0	.7	4.3	4.7
5	2.6	7.8	3.4	8.3	55	.0	1.7	5.2	4.2	1.8	3.6	3.3
6	6.2	11.9	2.6	7.6	10.9	.0	2.4	4.8	3.7	1.9	3.4	3.2
7	10.7	9.8	3.4	8.5	.6	2.3	2.6	1.3	3.7	2.3	3.4	3.9
8	8.7	5.8	4.3	7.0	1.3	5.9	2.6	2.8	3.6	2.1	2.8	24
9	8.0	1.7	6.2	4.6	.9	7.6	2.4	2.8	3.8	1.9	1.4	5.5
10	8.0	3.4	11.4	6.8	.4	7.6	2.1	14.2	3.7	1.9	3.2	6.8
11	12.3	3.4	4.6	1.9	.3	7.2	2.1	5.1	3.7	.6	3.4	19.8
12	6.4	3.5	6.8	6.1	.1	6.8	4.3	5.0	3.7	2.4	3.8	31
13	6.1	4.2	21	8.5	.0	6.8	5.2	3.8	5.9	1.5	4.9	1.1
14	13.5	3.8	27	7.2	.0	7.2	3.1	2.6	8.5	1.8	4.3	6.0
15	11.9	3.7	8.0	6.5	.0	8.7	2.4	4.4	19.2	1.6	3.2	4.3
16	9.0	4.4	5.0	4.9	.0	8.7	5.9	4.0	6.8	1.7	2.0	1.9
17	7.2	4.5	4.3	3.1	.0	9.0	7.0	8.5	5.4	6.1	3.6	3.0
18	6.2	3.9	3.6	1.3	.0	3.5	12.0	5.5	4.4	1.6	6.2	3.8
19	7.0	4.5	3.1	2.7	.0	.7	8.3	4.6	4.2	2.4	13.2	.6
20		6.8	1.1	2.6	.0	1.1	6.5	4.6	5.7	6.8	5.2	.6
21		4.8	1.7	2.8	.0	1.4	6.2	6.2	4.3	3.7	10.8	.8
22		9	23	2.9	2.6	.0	.7	4.9	5.2	3.8	3.0	10.5
23			4.9	4.1	2.6	.0	.55	1.8	4.6	6.2	5.0	3.5
24			5.0	3.7	2.4	.0	4.4	.55	4.0	6.4	3.1	4.9
25			9.6	3.5	.9	.0	2.4	1.7	8.3	4.2	2.3	4.6
26	13.0	26	3.7	2.6	.0	2.5	3.7	13.2	2.9	3.7	4.3	9.1
27	8.8	17.9	51	2.4	.0	1.8	4.0	4.9	2.7	3.4	4.2	1.6
28	8.3	31	5.2	7.4	.0	1.9	5.2	5.9	1.1	3.2	4.0	3.2
29	17.0	17.4	3.7	2.1	.0	2.1	5.5		2.6	3.3	4.3	2.6
30	10.3	7.8	3.6	1.0	.0	1.4	5.3		2.5	3.7	6.0	2.4
31	5.6	6.6		.8		.9	5.5		2.4		7.0	

NOTE.—Braced figure gives mean discharge for period indicated, estimated by comparison with records of near-by streams; gage-height record faulty.

*Monthly discharge of Kapahi ditch near Kealia, Kauai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	17.0	2.4	8.76	13.6	272	833
August.....	31	1.7	8.12	12.6	252	772
September.....	51	1.1	7.23	11.2	217	666
October.....	15.6	.8	4.90	7.58	152	466
November (11 days).....	55	.0	8.45	13.1	93.0	285
December (25 days).....	9.0	.0	4.13	6.39	103	317
January.....	12.0	.55	3.80	5.88	118	362
February.....	14.2	1.3	5.42	8.39	152	466
March.....	19.2	1.1	4.68	7.24	145	445
April.....	6.8	.6	2.69	4.16	80.6	248
May.....	13.2	1.4	4.71	7.29	146	448
June.....	31	.6	6.10	9.44	183	562
The year (340 days)....	55	.0	5.63	8.71	1,910	5,870

NOTE.—No water in ditch Nov. 3 and Nov. 13 to Dec. 6, owing to artificial regulation.

**ANAHOLA RIVER NEAR KEALIA, KAUAI**

**LOCATION.**—A quarter of a mile above dam at Kiokala and 4½ miles (6 miles by road and trail) northwest of Kealia.

**RECORDS AVAILABLE.**—August 22 to November 2, 1910, and December 30, 1912, to June 30, 1926. Fragmentary record December 15, 1910, to December 28, 1912, at dam a quarter of a mile below present site.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank. Discharge measurements made by wading near gage.

**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 out from low-water channel then rises abruptly. Control composed of boulders; permanent for low and medium stages; subject to shifts during floods.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 710 million gallons a day, or 1,100 second-feet, at 10.30 p. m. November 4, (gage height from water-stage recorder, 6.44 feet); minimum discharge, 1.6 million gallons a day, or 2.5 second-feet, several hours May 7-9 (gage height, 1.71 feet).

1910; 1912-1926: Maximum discharge recorded, 1,450 million gallons a day, or 2,240 second-feet, at 7.30 p. m. September 26, 1915 (gage height, from water-stage recorder, 12.9 feet); minimum discharge, 1.4 million gallons a day, or 2.2 second-feet, several hours September 12-13, 1923 (gage height, 1.83 feet).

**DIVERSIONS AND REGULATION.**—Part of flow diverted 3 miles above station by Anahola ditch; see Anahola ditch above Kaneha Reservoir, near Kealia, Kauai.

**OBJECT OF STATION.**—To determine feasibility of additional diversions for irrigation of sugar cane. Water owned by Territory and leased to Makee Sugar Co.

**UTILIZATION.**—Water used for irrigation of sugarcane.

ACCURACY.—Stage-discharge relation changed at times of floods November 4 and June 11 and affected by backwater September 2 to November 4. The three rating curves used are fairly well defined below 30 million gallons a day; extensions above uncertain. The curve used November 4 to June 11 checked very closely by four of the five discharge measurements well distributed during period and covering range from 1.7 to 8.4 million gallons a day. Curve used after June 11 checked closely by several measurements made after June 30. Operation of water-stage recorder satisfactory subsequent to September 2. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages except during backwater period, for which they are fair, and those estimated, which are poor; high-stage records poor.

*Discharge, in million gallons a day, of Anahola River near Kealia, Kauai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.-----	}	5.5	3.5	3.9	4.8	8.9	5.2	4.4	2.9	2.7	1.8	4.5
2.-----			3.0	3.9	4.1	6.9	4.4	3.4	2.6	2.6	1.8	4.7
3.-----			2.8	3.8	3.7	6.3	14.0	3.2	2.4	2.6	1.8	4.5
4.-----			2.8	13.1	54	6.1	12.6	3.1	2.4	2.5	1.8	2.5
5.-----			2.7	4.5	105	6.1	5.9	3.1	2.3	2.6	1.7	2.2
6.-----	}	3.2	2.7	3.7	21	5.7	5.2	4.1	2.3	2.5	1.7	3.6
7.-----			2.5	5.4	15.1	9.1	8.9	3.2	2.3	2.5	1.7	2.3
8.-----			2.3	5.6	19.4	6.7	5.0	3.1	2.3	2.4	1.6	9.9
9.-----			11.4	4.3	16.0	5.7	4.4	3.0	2.2	2.3	1.7	3.4
10.-----			33	13.8	12.4	5.2	4.1	4.8	2.2	2.2	1.7	5.0
11.-----			5.0	10.4	13.3	4.9	3.9	3.4	2.3	2.3	2.2	25
12.-----			5.2	9.7	15.8	4.5	3.8	3.0	2.3	2.7	2.2	30
13.-----			32	5.4	10.2	4.2	3.6	2.9	3.2	2.0	2.0	8.4
14.-----			31	3.7	9.2	13.0	3.6	2.9	3.0	2.2	2.0	5.3
15.-----			12.5	3.4	10.3	8.0	3.5	2.9	14.1	2.0	1.8	27
16.-----	}	3.2	6.8	3.0	15.2	4.4	4.7	2.7	4.1	2.2	1.8	7.9
17.-----			5.6	2.8	8.7	4.1	5.2	3.1	3.1	2.4	1.9	4.7
18.-----			5.0	2.7	7.7	17.0	6.1	2.9	2.7	2.4	4.0	3.5
19.-----			4.8	2.7	7.3	5.5	4.7	2.6	2.5	2.2	7.2	3.1
20.-----			4.8	2.5	6.9	4.1	4.1	2.6	2.4	2.7	3.8	2.8
21.-----			4.3	2.5	6.3	3.8	3.6	2.7	2.7	2.6	3.9	2.7
22.-----			3.9	2.2	5.9	5.7	21	2.7	2.5	2.3	6.1	2.6
23.-----			3.7	2.2	28	4.1	5.5	2.6	3.4	2.7	2.9	2.5
24.-----			3.5	2.2	48	3.5	4.4	2.6	6.0	2.4	2.3	2.6
25.-----			4.1	2.3	15.1	3.4	4.1	22	4.1	2.0	2.0	5.6
26.-----	}	15	4.1	2.7	10.5	3.2	3.9	23	2.9	1.9	1.9	9.2
27.-----			38	3.7	8.7	3.1	3.6	3.8	3.5	1.8	1.8	6.2
28.-----			5.8	5.9	7.5	3.1	3.5	3.6	2.9	1.8	1.7	4.0
29.-----			4.1	53	7.3	3.9	3.4	-----	2.6	1.9	1.8	3.2
30.-----			3.7	14.8	16.2	4.1	3.2	-----	2.6	1.9	1.8	2.8
31.-----			-----	5.8	-----	11.9	6.1	-----	2.6	-----	1.9	-----

NOTE.—Estimated discharge Sept. 1. Braced figures give estimated mean discharge for periods indicated. Estimates made by comparison with record of Halaupani Stream near Kilauea, Kauai; gage-height record either faulty or missing. Discharge Sept. 2 to Nov. 4 from gage heights corrected for backwater determined from three discharge measurements and study of recorder graph.

*Monthly discharge of Anahola River near Kealia, Kauai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....			5.10	7.89	158	485
August.....			6.31	9.76	196	600
September.....	38	2.3	8.49	13.1	255	782
October.....	53	2.2	6.79	10.5	211	646
November.....	105	3.7	17.1	26.5	514	1,570
December.....	17.0	3.1	6.01	9.30	186	572
January.....	21	3.2	5.65	8.74	175	538
February.....	23	2.6	4.55	7.04	127	391
March.....	14.1	2.2	3.21	4.97	99.4	305
April.....	2.7	1.8	2.31	3.57	69.3	213
May.....	7.2	1.6	2.40	3.71	74.3	228
June.....	30	2.2	6.72	10.4	202	619
The year.....	105	1.6	6.21	9.61	2,270	6,950

**ANAHOLA DITCH ABOVE KANEHA RESERVOIR, NEAR KEALIA, KAUAI**

**LOCATION.**—At upper end of second tunnel (about a quarter of a mile) above Kaneha Reservoir, 7 miles from Kealia.

**RECORDS AVAILABLE.**—December 9, 1921, to June 20, 1926. May 29, 1915, to December 9, 1921, at site 100 feet upstream at lower end of third tunnel above reservoir. Flow at the two stations not exactly comparable owing to occasional operation of check gate and spillway between.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank. Discharge measurements made by wading at gage.

**CHANNEL AND CONTROL.**—Channel at gage is short straight stretch of open ditch cut in firm earth between two tunnels. Control is rock section of ditch in tunnel; probably permanent. Some backwater effect from reservoir below, when reservoir is overflowing.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 32 million gallons a day, or 50 second-feet, at 4.15 p. m. September 14 (gage height from water-stage recorder, 2.98 feet; minimum discharge, no flow when water was shut out of ditch (see footnote to daily-discharge table).

1915-1926: Maximum discharge recorded, 130 million gallons a day, or 201 second-feet, at 7.10 a. m. January 16, 1921 (gage height, 6.25 feet at old station); minimum discharge, no flow, occasionally, when water is turned out of ditch.

**DIVERSIONS AND REGULATION.**—Occasionally excess water diverted at gate and spillway about 50 feet upstream. Completely regulated by gates and spillways.

**OBJECT OF STATION.**—To determine amount of water diverted from Anahola River into Kaneha Reservoir. Water owned by Territory and leased to Makee Sugar Co.

**UTILIZATION.**—Water is stored in Kaneha Reservoir for irrigation of sugarcane and for domestic supply near Anahola and Kealia.

**ACCURACY.**—Stage-discharge relation changed at times of floods August 4 and May 19. The three rating curves used are well defined between 1 and 15 million gallons a day. These curves checked very closely by seven discharge measurements well distributed during year and covering a range from 0.8 to 3.5 million gallons a day. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined

from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages; probably fair for extremely high and low stages.

Anahola ditch diverts water from Anahola River at a point about  $3\frac{1}{2}$  miles above gaging station and dam on the river at Kiokala and carries it southeastward for about one-half mile to Kanaha Reservoir, where it is stored.

*Discharge, in million gallons a day, of Anahola ditch above Kaneha Reservoir, near Kealia, Kauai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	6.5	4.6	3.0	2.2	1.1	0.0	0.0	-----	-----	1.0	0.7	9.0
2.....	4.3	3.4	2.6	2.2	.8	.0	.0	-----	1.4	1.1	.7	6.0
3.....	3.2	3.0	2.3	4.7	.7	.0	.0	-----	1.2	.9	.6	8.0
4.....	2.6	5.3	2.0	7.8	4.0	.0	.0	1.2	1.1	.9	.7	2.2
5.....	2.4	3.7	2.0	3.8	2.8	.0	.0	1.3	1.1	.8	.6	1.7
6.....	3.3	.0	2.2	3.2	.0	.0	.0	-----	1.1	.8	.6	8.2
7.....	5.9	.0	1.8	5.6	.0	.0	.0	-----	1.1	1.0	.7	2.1
8.....	3.2	.0	1.6	4.3	.0	.0	.0	-----	1.1	.9	.6	8.0
9.....	2.9	1.0	4.8	5.7	.0	.0	.8	-----	1.1	.9	.7	2.5
10.....	2.4	2.1	9.8	7.2	.0	.0	1.9	-----	1.0	.9	.7	3.4
11.....	4.1	2.0	4.8	6.7	.0	.0	1.8	-----	1.1	1.2	2.0	11.9
12.....	2.9	3.4	5.3	6.2	.0	.0	1.7	-----	1.1	1.6	1.5	15.9
13.....	2.1	4.4	9.9	.0	.0	1.0	1.6	-----	4.2	.9	1.6	6.6
14.....	5.2	2.2	5.8	.0	.0	4.8	1.4	-----	1.9	.8	1.1	9.2
15.....	4.5	1.9	1.0	2.1	.0	1.5	1.4	-----	11.0	.8	.8	6.5
16.....	4.2	2.9	3.0	2.5	.0	3.3	5.6	-----	3.0	.7	.7	.1
17.....	2.6	2.1	3.1	2.2	.0	3.0	6.1	-----	2.2	1.1	.7	1.1
18.....	2.2	1.9	2.7	2.0	.0	2.5	4.5	-----	1.5	1.8	4.9	2.9
19.....	3.1	2.1	2.7	1.8	.0	.0	3.3	-----	1.3	1.0	11.5	2.3
20.....	2.6	2.4	2.6	1.8	.0	.0	-----	-----	1.3	3.6	3.0	2.2
21.....	5.1	1.8	2.2	1.6	.0	.0	-----	-----	1.3	2.0	4.8	1.8
22.....	3.7	6.1	1.8	1.5	.0	.0	-----	-----	1.1	1.1	7.4	1.7
23.....	6.0	3.6	1.6	1.5	.0	.0	-----	-----	5.7	4.9	2.2	1.6
24.....	3.8	2.5	1.5	1.5	.0	.0	-----	-----	2.9	1.7	1.4	1.7
25.....	5.5	2.6	4.1	1.4	.0	.0	-----	-----	1.6	1.1	1.2	4.0
26.....	11.7	6.0	2.4	1.5	.0	.0	-----	-----	1.4	1.0	1.0	9.9
27.....	11.6	8.0	9.8	1.4	.0	.0	-----	-----	1.8	.9	.9	5.4
28.....	3.7	10.2	3.8	7.9	.0	.5	-----	-----	1.1	.8	1.0	2.8
29.....	1.3	9.0	2.6	6.8	.0	2.4	-----	-----	1.1	.8	.9	2.1
30.....	5.0	5.8	2.3	.9	.0	.9	-----	-----	1.0	1.0	1.2	1.7
31.....	5.2	3.7	-----	1.5	-----	.0	-----	-----	1.0	-----	2.0	-----

NOTE.—Water shut out of ditch from 9.30 a. m. to 5.15 p. m. July 29, 8 a. m. Aug. 5, to 10 a. m. Aug. 9, 6 p. m. Sept. 14 to 1.30 p. m. Sept. 15, 2 p. m. Oct. 13 to 6 a. m. Oct. 15, 10 p. m. Oct. 29 to 2 p. m. Oct. 30, 12 m. Nov. 5 to 8 a. m. Dec. 13, 11 a. m. Dec. 15 to 6 a. m. Dec. 16, 4 p. m. Dec. 18 to 2 p. m. Dec. 28, and 8 a. m. Dec. 30 to 3 p. m. Jan. 9. Discharge estimated Feb. 4 and Mar. 2. Data insufficient for making estimate Jan. 20 to Feb. 3 and Feb. 6 to Mar. 1, when recorder was not operating.

*Monthly discharge of Anahola ditch above Kaneha Reservoir near Kealia, Kauai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	11.7	1.3	4.28	6.62	133	407
August (28 days).....	10.2	.0	3.85	5.96	108	331
September.....	9.8	1.0	3.47	5.37	104	319
October (30 days).....	7.9	.0	3.38	5.23	101	311
November (5 days).....	4.0	.0	1.88	2.91	9.4	29
December (9 days).....	4.8	.0	2.21	3.42	19.9	61
January.....	-----	.0	-----	-----	-----	-----
March.....	11.0	1.0	-----	-----	-----	-----
April.....	4.9	.7	1.27	1.96	38.0	117
May.....	11.5	.6	1.88	2.91	58.4	179
June.....	15.9	.1	4.74	7.33	142	436

NOTE.—Owing to artificial regulation there was no water in ditch Aug. 6-8, Oct. 14, Nov. 6-30, and Dec. 1-12, 19-27, and 31.

## HALAULANI STREAM NEAR KILAUEA, KAUAI

**LOCATION.**—3½ miles south of Kilauea and 1½ miles above confluence with Pohakuhanu Stream.

**RECORDS AVAILABLE.**—April 29, 1922, to October 17, 1925 (station destroyed by flood of October 29, 1925).

**EQUIPMENT.**—Stevens continuous water-stage recorder. Discharge measurements made by wading or from footbridge at gage.

**CHANNEL AND CONTROL.**—Recorder situated on pool at foot of low falls. Stream bed composed of small gravel and boulders. Right bank vertical; left bank sloping and covered with dense vegetation. Control composed of boulders dividing the stream into two channels at ordinary stages; shifts, especially in left channel.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during period, 181 million gallons a day, or 280 second-feet, at 2.45 p. m. September 13 (gage height, from water-stage recorder, 3.10 feet); minimum discharge, 1.0 million gallons a day, or 1.6 second-feet, from 5 to 7 p. m. July 5 and 2 to 10 p. m. July 13 (gage height, 0.67 foot).

1922-1926: Maximum discharge recorded, 405 million gallons a day, or 627 second-feet, at 5.10 a. m. March 31, 1923 (gage height from water-stage recorder, 4.75 feet); minimum discharge, 0.5 million gallons a day, or 0.8 second-foot, at 6 p. m. December 29, 1924 (gage height, 0.62 foot).

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine feasibility of using water for domestic supply and development of power. This stream is typical of a number of small streams along this mountain side.

**ACCURACY.**—Stage-discharge relation probably permanent during period. Rating curve fairly well defined between 1 and 3 million gallons a day; extension beyond uncertain. Curve checked closely at 1.1, 1.4, and 1.5 million gallons a day by three discharge measurements well distributed during period. Operation of water-stage recorder satisfactory during period. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair for ordinary stages and poor for high stages.

*Discharge, in million gallons a day, of Halaulani Stream near Kilauea, Kauai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Day	July	Aug.	Sept.	Oct.
1.....	3.1	1.6	1.9	1.5	16.....	1.3	1.2	2.0	1.5
2.....	1.5	1.4	1.7	1.4	17.....	1.1	1.2	1.7	1.4
3.....	1.2	1.3	1.6	1.7	18.....	1.1	1.3	1.6	-----
4.....	1.1	2.1	1.6	3.1	19.....	1.2	1.3	1.5	-----
5.....	1.0	5.2	1.5	1.7	20.....	1.1	1.2	1.5	-----
6.....	1.2	1.9	1.6	1.5	21.....	1.6	1.2	1.4	-----
7.....	1.6	1.6	1.6	3.4	22.....	1.6	2.6	1.4	-----
8.....	1.3	1.5	1.5	3.0	23.....	1.8	1.7	1.3	-----
9.....	1.1	1.4	7.9	4.0	24.....	1.4	1.3	1.3	-----
10.....	1.1	1.3	7.9	5.2	25.....	1.6	1.9	1.5	-----
11.....	1.1	1.3	2.8	3.2	26.....	1.8	4.2	1.4	-----
12.....	1.1	1.3	3.0	2.3	27.....	4.9	6.3	11.5	-----
13.....	1.0	1.3	15.8	2.0	28.....	12.7	9.2	2.0	-----
14.....	1.7	1.3	5.2	1.7	29.....	3.5	6.4	1.6	-----
15.....	1.5	1.2	2.6	1.6	30.....	1.9	4.2	1.5	-----
					31.....	1.6	2.4	-----	-----

*Monthly discharge of Halaulani Stream near Kilauea, Kauai, for the year ending June 30, 1926*

Month	Discharge			Total run-off		
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	12.7	1.0	1.96	3.03	60.8	186
August.....	9.2	1.2	2.36	3.65	73.3	225
September.....	15.8	1.3	3.05	4.72	91.4	281
October 1-17.....	5.2	1.4	2.36	3.65	40.2	123
The period.....	15.8	1.0	2.44	3.78	266	815

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

**LOCATION.**—2 miles west of Kauai Electric Co.'s power line and 10 miles above mouth of stream.

**RECORDS AVAILABLE.**—July 20, 1921, to June 30, 1926. January 26, 1914, to July 20, 1921, at site 300 feet downstream.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank. Discharge measurements made by wading near gage or from footbridge about 250 feet downstream.

**CHANNEL AND CONTROL.**—One channel at all stages. Bed composed of boulders; rough. Right bank steep and high; left bank slopes gently. Control composed of boulders; subject to shifts.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 1,940 million gallons a day, or 3,000 second-feet, at 11 p. m. June 14 (gage height, from water-stage recorder, 5.84 feet); minimum discharge, 5.8 million gallons a day, or 9.0 second-feet, several hours April 28 and May 1-3 (gage height, 0.50 foot).

1914-1926: Maximum discharge recorded, 6,500 million gallons a day, or 10,100 second-feet, at 11.20 a. m. January 16, 1921 (gage height from water-stage recorder, 7.50 feet); minimum discharge, that of April 28 and May 1-3, 1926.

**DIVERSIONS AND REGULATION.**—About July 1, 1925, Lihue Plantation Co. began diverting water about 2 miles upstream through Hanalei Tunnel into basin of North Fork of Wailua River.

**OBJECT OF STATION.**—Record valuable in connection with high-level diversion to Territorial agricultural lands. Territorial water.

**UTILIZATION.**—Small part of flow used for irrigation of rice and taro and for domestic supply.

**ACCURACY.**—Stage-discharge relation changed at times of floods September 13 and November 4. The three rating curves used are fairly well defined between 10 and 150 million gallons a day; extensions above uncertain. These curves checked very closely by eight discharge measurements well distributed during year and covering a range from 12 to 40 million gallons a day. Operation of water-stage recorder satisfactory during year. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good except for high stages records, for which they are poor.

*Discharge, in million gallons a day, of Hanalei River at elevation 625 feet, near Hanalei, Kauai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	58	27	32	26	25	29	19.6	19.2	18.4	7.8	7.5	26
2	29	25	29	23	24	22	17.0	16.2	17.3	8.3	7.5	22
3	23	25	27	44	26	23	15.8	15.8	18.1	6.9	7.2	15.8
4	23	48	27	46	121	19.6	18.8	17.0	13.5	6.6	8.0	12.7
5	19.7	148	25	37	54	23	14.8	19.2	14.8	6.6	8.6	11.9
6	27	40	25	32	33	21	16.6	19.2	13.1	8.3	12.4	18.2
7	52	28	25	29	33	30	19.2	17.3	12.7	7.5	8.9	12.7
8	25	25	21	31	46	19.6	17.0	15.8	15.5	7.2	8.6	38
9	30	23	45	38	52	20	14.4	13.7	13.7	6.9	8.6	14.4
10	25	25	76	60	46	20	15.8	56	7.8	8.3	8.6	15.1
11	33	21	37	64	31	20	16.6	19.2	8.9	11.0	9.5	17.7
12	21	105	27	68	60	19.6	15.5	17.7	9.2	8.9	8.9	43
13	21	32	119	48	48	18.4	15.1	14.1	9.2	7.5	8.9	21
14	40	27	91	31	36	20	14.4	15.1	9.5	6.9	8.3	208
15	27	25	59	28	74	20	14.8	15.5	26	6.9	8.3	125
16	25	39	40	25	113	23	39	14.4	26	7.2	8.3	46
17	23	27	30	24	40	22	57	40	17.2	8.0	8.3	30
18	19.7	23	28	22	37	56	37	17.3	9.8	7.8	10.2	21
19	27	27	28	22	37	44	39	17.0	8.3	7.2	18.1	19.6
20	19.7	22	25	21	30	24	26	14.8	13.1	9.8	10.8	16.6
21	48	21	26	19.9	26	34	36	21	10.5	15.2	13.5	15.5
22	23	41	22	19.1	22	118	45	15.5	8.3	10.2	22	14.8
23	25	25	23	20	27	34	32	15.8	17.0	16.4	12.0	14.1
24	23	23	21	19.9	40	26	28	15.1	15.0	10.2	10.2	14.1
25	28	34	96	18.7	28	19.2	22	38	13.9	8.3	10.8	15.5
26	54	88	28	22	24	20	19.6	41	8.6	8.0	9.5	18.4
27	87	89	82	18.7	21	20	23	20	8.3	11.0	9.5	15.8
28	143	120	34	64	19.6	19.6	19.6	15.1	8.6	7.8	9.5	14.1
29	62	89	26	136	29	29	16.6	-----	8.6	7.8	9.5	12.7
30	34	50	24	51	57	46	14.4	-----	7.2	7.8	12.7	12.4
31	29	40	-----	32	-----	30	29	-----	6.9	-----	10.8	-----

*Monthly discharge of Hanalei River at elevation 625 feet, near Hanalei, Kauai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	143	19.7	36.3	56.2	1,120	3,450
August	148	21	44.6	69.0	1,380	4,240
September	119	21	39.9	61.7	1,200	3,670
October	136	18.7	36.8	56.9	1,140	3,500
November	121	19.6	42.0	65.0	1,260	3,870
December	118	18.4	28.7	44.4	890	2,730
January	57	14.4	23.5	36.4	729	2,240
February	56	13.7	20.6	31.9	576	1,770
March	26	6.9	12.7	19.6	395	1,210
April	16.4	6.6	8.61	13.3	258	793
May	22	7.2	10.2	15.8	316	970
June	208	11.9	29.4	45.5	882	2,710
The year	208	6.6	27.8	43.0	10,100	31,200

#### WAIOLI STREAM NEAR HANAIEI, KAUAI

LOCATION.—2½ miles (4 miles by trail) south of Hanalei and 3 miles above mouth of stream.

RECORDS AVAILABLE.—July 1, 1914, to June 30, 1926.

EQUIPMENT.—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading or from cable at gage.

**CHANNEL AND CONTROL.**—One channel at all stages; straight for 30 feet above and 20 feet below gage. Right bank steep; left bank slopes gently. Control composed of boulders; subject to shifts.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 234 million gallons a day, or 362 second-feet, at 4.45 p. m. October 29 (gage height from water-stage recorder, 3.55 feet); minimum discharge, 5.3 million gallons a day, or 8.2 second-feet, from 1 p. m. June 23 to 10 a. m. June 24, (gage height, 1.41 feet).

1914–1926: Maximum discharge recorded, 955 million gallons a day, or 1,480 second-feet, at 6.30 a. m. December 19, 1916 (gage height from water stage recorder, 6.15 feet); minimum discharge, 2.0 million gallons a day, or 3.1 second-feet, July 22, 1914 (gage height, 0.6 foot).

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine feasibility of high-level diversions, in connection with Territorial Hanalei River project. Territorial land and water.

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

**ACCURACY.**—Stage-discharge relation changed at times of floods July 17, February 25, and June 11. The four rating curves used are fairly well defined below 60 million gallons a day; extensions above uncertain. These curves checked closely by seven discharge measurements well distributed during year and covering a range from 6 to 13 million gallons a day. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair except for high stages, for which they are poor.

*Discharge, in million gallons a day, of Waioli Stream near Hanalei, Kauai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	27	14.1	10.4	8.3	11.0	10.4	11.8	9.8	7.3	7.3	6.2	11
2.....	14.1	11.2	9.1	7.6	9.6	8.5	9.1	8.0	7.1	8.4	6.2	
3.....	10.7	9.6	8.5	41	9.4	8.0	8.5	7.6	6.6	6.2	6.2	
4.....	9.7	33	8.3	23	22	8.0	9.4	7.4	6.6	6.0	7.3	
5.....	9.3	73	9.1	11.8	15.0	8.0	8.0	7.4	6.5	6.0	6.3	
6.....	21	17.9	9.8	12.2	13.0	8.0	19.0	10.1	6.4	8.8	6.2	8.6
7.....	27	11.8	8.9	15.7	21	12.1	30	7.8	6.2	6.8	6.2	
8.....	13.4	9.8	7.6	15.2	44	9.1	11.2	7.1	6.2	6.5	6.2	
9.....	11.9	9.1	29	21	32	8.3	8.9	7.0	6.4	5.9	6.2	
10.....	10.7	8.7	38	20	20	7.8	8.3	42	6.4	5.9	6.2	
11.....	14.3	8.5	15.5	12.7	31	7.6	7.8	10.4	6.4	6.5	21	48
12.....	13.0	14.0	18.2	11.3	30	7.6	7.6	8.3	6.4	7.5	14.2	
13.....	9.5	9.6	54	10.1	33	7.5	7.4	7.4	11.8	7.3	16.2	
14.....	24	8.9	21	8.3	21	19.8	7.3	7.3	8.4	7.3	22	
15.....	35	8.3	29	7.6	36	11.5	7.3	7.1	17.8	7.3	6.0	
16.....	17.8	8.3	14.1	7.6	30	10.4	16.0	7.0	11.0	7.5	13.8	8.6
17.....	39	8.5	9.8	7.6	14.1	9.1	14.3	25	8.4	7.1	8.6	
18.....	23	12.1	9.1	7.1	12.1	13.2	13.3	8.5	7.1	7.1	7.1	
19.....	18.9	9.8	10.1	7.0	11.5	13.1	8.7	7.4	8.0	7.1	6.3	
20.....	12.1	10.4	10.1	7.0	11.5	9.4	8.4	7.3	9.6	7.1	6.0	
21.....	24	9.1	9.1	7.1	9.4	10.4	20	8.3	7.5	12.9	5.8	5.6
22.....	17.6	19.2	8.3	7.3	8.5	26	48	7.4	7.0	8.2	5.6	
23.....	17.9	10.4	7.8	12.1	22	11.2	13.4	7.1	9.8	23	5.5	
24.....	13.8	8.3	7.6	9.4	54	8.7	9.6	6.8	7.9	9.0	5.6	
25.....	22	12.7	13.4	8.3	18.6	8.3	8.7	41	7.1	7.1	12.4	
26.....	48	21	8.9	7.8	11.8	7.6	8.0	36	6.5	6.6	27	14.9
27.....	49	68	10.4	7.8	10.1	7.6	7.8	9.0	7.7	6.5	8.6	
28.....	106	51	8.3	73	9.1	7.4	7.6	7.9	6.6	6.5	6.8	
29.....	23	46	7.8	118	11.5	7.4	7.4	-----	6.2	6.4	6.8	
30.....	13.8	19.9	8.0	31	19.6	8.0	7.4	-----	6.2	6.4	6.0	
31.....	11.8	13.0	-----	14.1	-----	26	19.3	-----	6.2	-----	-----	-----

NOTE.—Braced figures give mean discharge for periods indicated, estimated by comparison with record of flow for Lumahai River near Hanalei, Kauai; recorder not operating properly.

*Monthly discharge of Waioli Stream near Hanalei, Kauai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	106	9.3	22.8	35.3	708	2,170
August.....	73	8.3	18.6	28.8	575	1,770
September.....	64	7.6	14.0	21.7	419	1,290
October.....	118	7.0	18.0	27.9	558	1,710
November.....	64	8.5	20.1	31.1	602	1,850
December.....	26	7.4	10.5	16.2	326	999
January.....	48	7.3	12.2	18.9	380	1,160
February.....	42	6.8	11.9	18.4	333	1,020
March.....	17.8	6.2	7.72	11.9	239	734
April.....	23	5.9	7.73	12.0	232	712
May.....			8.03	12.4	249	764
June.....	48	5.5	12.1	18.7	362	1,110
The year.....	118	-----	13.7	21.2	4,980	15,300

**LUMAHAI RIVER NEAR HANALEI, KAUAI**

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

**RECORDS AVAILABLE.**—May 23, 1914, to October 11, 1917, and July 1, 1920, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank. Discharge measurements made by wading near gage or from cable just below gage.

**CHANNEL AND CONTROL.**—One channel at all stages; straight for 350 feet above and 150 feet below station. Bed composed of large boulders and cobblestones. Right bank high and vertical; left bank low, wooded, and sloping. Control composed of large boulders; subject to shifts.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 1,150 million gallons a day, or 1,780 second-feet, at 1 p. m. September 13 (gage height from water-stage recorder, 4.33 feet); minimum discharge, 13.6 million gallons a day, or 21 second-feet, several hours May 15 and 17 (gage height, 0.75 foot).

1914-1917; 1920-1926: Maximum discharge recorded, estimated 5,000 million gallons a day, or 7,740 second-feet at 4.30 p. m. September 11, 1922 (gage height from water-stage recorder, 9.41 feet); minimum discharge, that of May 15 and 17, 1926.

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine feasibility of high-level diversions in cooperation with Territorial Hanalei River project.

**UTILIZATION.**—Small part of flow used for irrigation of rice and taro.

**ACCURACY.**—Stage-discharge relation changed at time of flood September 13.

The two rating curves used are well defined between 20 and 75 million gallons a day and fairly well defined between 75 and 200 million gallons a day; extension above uncertain. These curves checked very closely by five discharge measurements well distributed during year and covering a range from 18 to 30 million gallons a day. Operation of water-stage recorder satisfactory except for three days in July. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good except for high stages, for which they are probably poor.

*Discharge, in million gallons a day, of Lumahai River near Hanalei, Kauai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1-----	87	40	38	27	41	43	34	23	22	21	16.2	51
2-----	41	35	33	27	36	34	27	20	21	23	15.7	36
3-----	32	30	31	126	36	30	24	19.9	20	17.3	15.7	17.8
4-----	29	114	28	84	99	30	24	19.9	19.9	18.4	17.3	19.4
5-----	26	282	28	48	63	27	22	20	19.4	17.3	15.7	17.3
6-----	49	62	29	44	44	27	25	23	19.4	28	15.3	39
7-----	75	44	27	50	57	33	47	19.9	19.4	19.9	15.3	19.4
8-----	42	37	25	55	121	28	27	19.4	18.9	17.8	15.3	35
9-----	39	32	61	63	109	26	24	20	18.9	17.3	15.3	24
10-----	32	30	62	62	63	25	22	193	18.9	16.8	15.3	19.9
11-----	48	29	36	47	60	24	22	43	18.9	17.3	23	30
12-----	38	57	36	40	72	24	21	30	18.9	18.4	16.8	110
13-----	30	34	122	36	92	23	21	25	25	16.8	14.9	46
14-----	77	29	62	31	70	30	20	23	22	16.2	14.4	80
15-----	66	28	63	30	126	26	21	22	36	16.2	14.0	92
16-----	45	29	40	27	125	27	45	22	25	17.8	14.0	46
17-----	47	28	34	27	58	25	46	132	22	26	14.0	30
18-----	36	29	33	26	48	42	38	44	19.9	20	21	26
19-----	36	27	35	26	42	44	27	31	21	17.3	51	22
20-----	30	28	34	25	40	32	32	27	28	21	22	19.4
21-----	77	26	31	24	35	39	73	29	21	35	42	18.4
22-----	40	48	28	23	32	100	94	24	20	27	67	17.8
23-----	38	32	28	32	38	44	37	22	28	54	26	16.8
24-----	38	27	27	26	88	32	30	22	26	27	18.4	16.8
25-----	56	42	83	23	58	28	28	73	21	20	18.4	22
26-----	167	180	46	22	42	26	26	66	19.4	18.9	16.2	54
27-----	185	198	39	22	37	24	24	29	19.4	17.8	15.3	34
28-----	156	174	33	203	32	24	23	24	17.8	17.3	14.9	22
29-----	71	131	29	398	39	24	22	-----	17.3	16.8	16.2	18.4
30-----	48	71	28	116	72	30	20	-----	17.3	16.8	22	16.8
31-----	40	46	-----	54	-----	45	31	-----	17.3	-----	17.8	-----

NOTE.—Discharge estimated July 21–23 from fragmentary 'gage-height graph; recorder not operating.

*Monthly discharge of Lumahai River near Hanalei, Kauai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July-----	185	26	58.7	90.8	1,820	5,580
August-----	282	26	64.5	99.8	2,000	6,140
September-----	122	25	41.0	63.4	1,230	3,770
October-----	398	22	59.5	92.1	1,840	5,690
November-----	126	32	62.5	96.7	1,880	5,750
December-----	100	23	32.8	50.7	1,020	3,120
January-----	94	20	31.5	48.7	977	3,000
February-----	193	19.4	38.1	58.9	1,070	3,270
March-----	36	17.3	21.3	33.0	659	2,030
April-----	54	16.2	21.1	32.6	634	1,940
May-----	67	14.0	20.5	31.7	636	1,950
June-----	110	16.8	33.9	52.5	1,020	3,120
The year-----	398	14.0	40.5	62.7	14,800	45,300

#### MISCELLANEOUS DISCHARGE 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 during the year ending June 30, 1926*

Date	Stream	Locality	Gage height, feet	Discharge	
				Second-feet	Million gallons a day
Oct. 19.....	Wailua ditch.....	Near Kapaa.....	1.97	17.8	11.5
Do.....	do.....	do.....	2.39	27.8	18.0
Do.....	do.....	do.....	2.81	35.3	22.8
Do.....	do.....	do.....	3.37	48.2	31.2
Oct. 20.....	do.....	do.....	1.52	12.6	8.11
Do.....	do.....	do.....	1.13	7.38	4.77
Do.....	do.....	do.....	.80	4.26	2.75
Do.....	do.....	do.....	.24	.058	
Nov. 18.....	do.....	do.....	2.14	24.9	16.1
Nov. 25.....	do.....	do.....	2.11	23.3	15.4
Do.....	do.....	do.....	1.18	7.96	5.14
Do.....	do.....	do.....	3.00	42.5	27.5
Dec. 4.....	do.....	do.....	2.40	27.8	18.0
Jan. 18.....	do.....	do.....	3.15	41.8	27.0

## ISLAND OF OAHU

### KALIHI STREAM NEAR HONOLULU, OAHU

**LOCATION.**—At Kioi Pool, three-eighths of a mile upstream from Catholic orphanage, 3 miles up Kalihi Road from King Street, and 5 miles north of Honolulu post office.

**RECORDS AVAILABLE.**—September 6, 1913, to June 30, 1926.

**EQUIPMENT.**—An 60-day fuzee recorder on right bank about 200 feet from Kalihi Road. Discharge measurements made by wading near gage.

**CHANNEL AND CONTROL.**—Channel is solid rock with steep, high banks. Water drops over a 10-foot fall into deep pool at gage. The control at outlet of this pool is solid rock, quite narrow for low and medium stages but overflows a much wider section above a stage of 6 feet. Low-water control improved by a low concrete dam.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 622 million gallons a day, or 962 second-feet, at 8.15 p. m. November 4 (gage height, from water-stage recorder, 8.95 feet); minimum discharge, 0.1 million gallons a day, or 0.2 second-foot, several hours May 12-25 (gage height, 0.69 foot).

1913-1926: Maximum discharge estimated 1,250 million gallons a day, or 1,930 second-feet, January 16, 1921 (gage height from floodmarks, 14.0 feet); minimum discharge, 0.1 million gallons a day, or 0.15 second-foot, at 4 a. m. April 3, 1924 (gage height, 0.80 foot) and several hours May 12-25, 1926, (gage height, 0.69 foot).

**DIVERSIONS AND REGULATION.**—None until May, 1920, when the Catholic orphanage began diverting water about 300 feet upstream from gaging station through 4-inch pipe (reduced to 1 inch at outlet), for domestic use. Between February 4 and June 7, 1924, City of Honolulu completed several tunnels about 1½ miles upstream and began diverting about 0.3 million gallons a day to supply upper Kalihi district.

**OBJECT OF STATION.**—To determine feasibility of using stream to augment water supply of City of Honolulu. Part of water rises on Territorial lands.

**UTILIZATION.**—Part of water used about 400 feet below station for small power development. Entire low flow is used farther downstream for irrigation of taro.

**ACCURACY.**—Stage-discharge relation probably permanent during the year except as indicated in footnote to daily-discharge table. Rating curve fairly well defined below 150 million gallons a day; extension above uncertain. Four

discharge measurements made during the year at about 1 million gallons a day check the curve roughly. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good, except for periods estimated, for which they are fair.

*Discharge, in million gallons a day, of Kalihi Stream near Honolulu, Oahu, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	2.6	1.6	3.9	1.2	0.9	1.6	1.2	0.6	0.3	0.3	0.3	0.3
2	2.3	5.8		1.5	.9	1.5	1.5			.3	.2	.3
3	2.1	4.0		2.4	.9	1.3	1.9			.3	.2	.3
4	2.0	2.6	1.3	1.9	26	1.2	1.5	0.6	0.3	.3	.2	.3
5	2.0	2.2	1.2	1.2	7.1	1.9	1.0			.3	.2	.3
6	2.9	1.9	1.1	1.2	2.5	1.4	1.0			.3	.2	.3
7	2.1	1.6	1.0	1.1	4.6	1.6	1.0	.7	.3	.3	.1	.2
8	1.9	1.5	1.0	1.0	21	3.0	.9			.3	.2	.6
9	1.8	1.8	1.0	1.9	5.4	2.6	.9			.3	.2	1.8
10	1.7	1.5	.9	13.1	5.5	1.7	.8	.4	.3	.3	.1	.6
11	1.6	1.4	1.3	4.6	3.3	1.4				1.2	.1	7.9
12	1.6	1.5	30	3.0	2.6	1.3				.5	.6	9.6
13	1.6	1.4	3.5	1.9	3.8	1.2	.7	.7	.3	.3	.4	2.4
14	1.6	1.4	3.5	1.6	2.8	1.1				.3	.2	31
15	1.6	1.3	1.7	1.4	2.9	1.1				.3	.1	16.7
16	1.5	1.2	1.6	1.2	2.7	1.0	.7	.7	.3	.3	.1	10.3
17	8.1	1.1	1.5	1.1	3.9	1.0				1.0	.1	6.3
18	1.9	1.0	1.6	1.1	3.5	5.7				.6	.1	5.5
19	1.6		1.3	1.0	3.0	2.7	.3	.3	.3	.4	.1	3.9
20	1.8		1.3	1.0	2.4	1.6				.5	.1	3.1
21	1.5	1.5	1.4	1.0	2.1	1.4	2.2	.3	.3	.4	.1	2.4
22	2.2		1.2	1.0	1.9	12.1				.6	.1	1.9
23	1.6		1.2	1.0	2.0	3.1				.5	.1	1.7
24	1.5	2.7	1.2	1.0	2.0	1.8	1.1	.3	.6	.4	.1	1.6
25	1.7		1.7	1.0	1.6	1.5				.4	.1	1.5
26	11.2		1.2	1.0	1.6	1.3	1.4			.6	.3	1.2
27	16.9	5.6	1.2	1.2	1.5	1.1	1.0	.3	.3	.3	.1	1.2
28	3.4		1.1	1.0	1.4	1.1	1.0			.6	.3	1.1
29	2.6		1.0	.9	1.4	1.1	.9			.4	.3	1.0
30	2.3	1.8	1.0	1.3	2.0	1.1	.6	.3	.3	.3	.3	.9
31	1.8		1.0	1.0	-----	2.6	.7			.3	.3	-----

NOTE.—Discharge estimated Sept. 4 and 5. Braced figures give estimated mean discharge for periods indicated. Estimates made by comparison with record of flow for West Branch of Manoa Stream; gage-height record either faulty or missing. Discharge March 21-28 from gage heights corrected for backwater determined from study of gage-height graph and engineers' notes.

*Monthly discharge of Kalihi Stream near Honolulu, Oahu, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	16.9	1.5	2.94	4.55	91.0	279
August	-----	-----	2.31	3.57	71.6	220
September	30	.9	2.62	4.05	78.7	241
October	13.1	-----	1.80	2.79	55.8	171
November	26	.9	4.11	6.36	123	378
December	12.1	1.0	2.07	3.20	64.1	197
January	-----	-----	1.07	1.66	33.3	102
February	-----	-----	.45	.70	12.7	39
March	2.8	-----	.48	.74	14.0	46
April	1.2	.3	.41	.63	12.2	38
May	.6	.1	.17	.26	5.4	16
June	31	.2	3.87	5.99	116	357
The year	31	-----	1.86	2.88	679	2,080

## 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, 1926. No record January 17 to September 11, 1921.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank about 20 feet from Pali Road. Discharge measurements made by wading near gage.

**CHANNEL AND CONTROL.**—Channel straight for about 75 feet above and below gage, stream bed is solid rock below control and filled with gravel and subject to dense growth of grass at and above control. Banks high and covered with vegetation. Control is two sharp-crested weirs with complete end contractions; one is 4 feet high and 2 feet wide with crest at elevation 0.04 foot gage datum; the other, 3 feet high and 12 feet wide, with crest about elevation 1.08 feet gage datum. Weir basin is too small to prevent velocity of approach above medium stage.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 56 million gallons a day, or 87 second-feet, at 6.30 p. m. June 14 (gage height, from water-stage recorder, 2.27 feet); minimum discharge, 0.06 million gallons a day, or 0.09 second-foot, from 1 p. m. September 10 to 3 a. m. September 11 (gage height, 0.09 foot).

1913-1926: Maximum discharge recorded, 1,600 million gallons a day, or 2,480 second-feet, January 16, 1921 (gage height from floodmarks, 8.74 feet); minimum discharge, that of September 10-11, 1925.

**DIVERSIONS AND REGULATION.**—Nuuanu Reservoirs Nos. 2, 3, and 4 are above this gaging station and have a rated capacity of 7.3, 10.7, and 500 million gallons, respectively. The stream flow is regulated and diverted somewhat by this reservoir system and by several pipe lines for development of power and domestic supply.

**OBJECT OF STATION.**—To determine flow of stream at this location in connection with investigation of water supply for city of Honolulu.

**UTILIZATION.**—This station measures the waste water and seepage from Reservoirs Nos. 2, 3, and 4 and Luakaha Weir. Low flow used for irrigation.

**ACCURACY.**—Stage-discharge relation probably permanent during the year except as indicated in footnote to daily-discharge table. Rating curve fairly well defined below 200 million gallons a day by 19 discharge measurements below 25 million gallons a day and 5 between 25 and 200 million gallons a day. One of these measurements, at 0.25 million gallons a day, made during the year and 11, covering a range from 1 to 65 million gallons a day, made during 1927-28, check the curve fairly well. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair for medium stages, except during periods of backwater and estimated periods, for which they are poor; low and high stage records poor.

*Discharge, in million gallons a day, of Nuuanu Stream below Reservoir No. 2 wasteway near Honolulu, Oahu, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	0.9	0.55		0.4	0.35		0.45	0.35	0.25	0.2	0.15	0.2
2.....	.85	.6		.35	.35		.55	.3	.25	.2	.15	.2
3.....	.8	.7	0.7	.65	.35		.5	.3	.25	.2	.15	.2
4.....	.75	.7		.45			.5	.3	.25	.2	.15	.2
5.....	.8	.65		.4			.4	.3	.25	.2	.15	.2
6.....	1.2	.6		.4		1.0	.4	.3	.25	.2	.15	.2
7.....	.9	.55		.4	1.0		.4	.3	.25	.15	.15	.15
8.....	.8			.35			.4	.3	.25	.15	.15	.35
9.....	.7		.5	.35			.4	.3	.25	.15	.15	.35
10.....	.7			1.1			.4	.3	.2	.15	.15	.3
11.....	.7			.6			.4	.3	.2	.45	.2	.35
12.....	.65		1.2	.5			.4	.3	.2	.25	.2	.65
13.....	.6		.6	.45			.35	.3	.2	.2	.25	.4
14.....	.6		.5	.4		.7	.4	.3	.2	.2	.2	9.3
15.....	.6	.5		.4			.4	.3	.2	.2	.2	9.3
16.....	.6			.35		3.2	.4	.3	.2	.2	.2	5.3
17.....	.9			.35			.4	.35	.2	.3	.2	4.0
18.....	.65			.35		1.3	.35	.3	.2	.25	.2	2.1
19.....	.55		.4	.35		1.1	.35	.3	.2	.2	.2	.9
20.....	.55			.35		.55	.35	.25	.2	.4	.2	.8
21.....	.55			.35		.5	.4	.25	.2	.3	.2	.75
22.....	.6			.35		1.9	.65	.25	.3	.25	.2	.65
23.....	.55			.35		.9	.4	.25	.45	.2	.2	.6
24.....	.55		.35	.3		.55	.35	.25	.45	.15	.2	.65
25.....	.55		.35	.3		.5	.35	.25	.3	.15	.15	.7
26.....	1.2	.6	.35	.35	1.0	.45	.35	.25	.3	.15	.15	.7
27.....	3.0		.40	.35		.45	.35	.25	.35	.15	.15	.75
28.....	1.2		.35	.35		.4	.35	.25	.25	.15	.15	.7
29.....	.85		.35	.3		.4	.3		.25	.15	.15	.7
30.....	.75		.35	.35		.4	.3		.25	.15	.2	.65
31.....	.6			.35		.45	.35		.25		.2	

NOTE.—Braced figures give mean discharge for periods indicated, estimated by comparison with records of near-by streams and study of diversions and regulations; gage-height record either faulty or missing. Discharge Dec. 17-28, Jan. 5-27, Feb. 28 to Mar. 10, and June 21-30 from gage heights corrected for back-water effect of grass in weir basin determined from study of gage-height graph, engineers' notes, and diversions and regulation.

*Monthly discharge of Nuuanu Stream below Reservoir No. 2 wasteway, near Honolulu, Oahu, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	3.0	0.55	0.813	1.26	25.2	77
August.....			.560	.866	17.4	53
September.....	1.2	.35	.497	.769	14.9	46
October.....	1.1	.3	.408	.631	12.6	39
November.....		.35	3.77	5.83	113	347
December.....			.789	1.22	24.4	75
January.....	.65	.3	.398	.616	12.4	38
February.....	.35	.25	.288	.446	8.05	25
March.....	.45	.2	.252	.390	7.50	24
April.....	.45	.15	.208	.322	6.25	19
May.....	.25	.15	.179	.277	5.55	17
June.....	9.3	.15	1.41	2.18	42.3	130
The year.....		.15	.794	1.23	290	890

## WEST BRANCH OF MANOA STREAM NEAR HONOLULU, OAHU

**LOCATION.**—75 feet above highway bridge, one-eighth mile above confluence with East Branch of Manoa Stream, and 4 miles northeast of Honolulu post office.

**RECORDS AVAILABLE.**—August 5, 1925, to June 30, 1926. From May 29, 1913, to May 4, 1914, at site about 75 feet upstream and May 5, 1914, to January 16, 1921, at site about 225 feet upstream.

**EQUIPMENT.**—Gurley 7-day water-stage recorder on left bank. Discharge measurements made by wading near gage or from highway bridge 75 feet downstream.

**CHANNEL AND CONTROL.**—Stream bed composed of gravel and boulders and is straight for 50 feet above and below gage. A low artificial concrete control 10 feet below gage makes a pool about 15 feet wide and extending upstream about 40 feet at ordinary stages; subject to filling up during floods. Above and below pool stream bed is quite steep. Banks are covered with dense vegetation and are overflowed at stage of about 9 feet.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during period, 96 million gallons a day, or 149 second-feet, at 7.45 p. m. June 14 (gage height, from water-stage recorder, 5.66 feet); minimum discharge about 0.05 million gallons a day, or 0.08 second-foot, from midnight March 16 to 7 p. m. March 22 (gage height, 3.45 feet).

1913-1921; 1926: Maximum stage from floodmarks, 10.4 feet January 16, 1921 (discharge, estimated 2,100 million gallons a day, or 3,250 second-feet); minimum discharge, that of March 16-22, 1926.

**DIVERSIONS AND REGULATION.**—None above station.

**OBJECT OF STATION.**—To determine feasibility of using stream to augment water supply of city of Honolulu.

**UTILIZATION.**—Practically the entire low-water flow of Manoa Stream is used for irrigation of rice and taro.

**ACCURACY.**—Stage-discharge relation fairly permanent during period except as indicated in footnote to daily-discharge table. Rating curve fairly well defined between 1 and 60 million gallons a day and poorly defined beyond these limits. Curve based on 22 discharge measurements below 41 million gallons a day, made during 1925 to 1927 when control was clean, and one discharge measurement of 165 million gallons a day made when control was not clean. Operation of water-stage recorder satisfactory during period. Daily discharge ascertained by applying to rating table mean daily gage heights determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair, except for low and high stages and period of backwater, for which they are poor.

*Discharge, in million gallons a day, of West Branch of Manoa Stream near Honolulu, Oahu, for the year ending June 30, 1926*

Day	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	-----	3.0	0.8	0.6	1.3	0.7	0.3	0.1	0.2	0.25	0.5
2.....	-----	2.1	.65	.65	1.2	.9	.25	.1	.15	.25	.4
3.....	-----	1.2	2.7	.6	1.1	.8	.2	.1	.15	.3	.45
4.....	-----	1.1	.9	11.3	1.1	.5	.2	.1	.15	.25	.6
5.....	-----	2.6	1.1	.8	4.5	1.1	.45	.2	.1	.15	.35
6.....	-----	1.8	1.1	.7	3.8	1.1	.45	.25	.1	.1	.25
7.....	-----	1.1	1.1	.8	7.8	1.1	.4	.25	.1	.1	.25
8.....	-----	.8	1.0	.9	10.8	1.8	.45	.25	.1	.1	.3
9.....	-----	.8	1.2	1.5	5.1	1.1	.45	.25	.1	.15	.3
10.....	-----	.8	1.1	6.8	3.8	1.0	.4	.2	.1	.15	.3

*Discharge, in million gallons a day, of West Branch of Manoa Stream near Honolulu, Oahu, for the year ending June 30, 1926—Continued*

Day	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
11.....	0.7	1.3	1.45	2.5	0.7	0.4	0.15	0.05	2.4	0.3	5.6
12.....	1.1	7.7	1.1	2.1	.6	.35	.15	.05	.45	1.5	4.9
13.....	.65	2.0	1.2	4.3	.6	.8	.15	.05	.2	.8	2.0
14.....	.65	1.8	.8	3.2	.6	.3	.15	.05	.15	.3	25
15.....	.65	1.1	.65	4.3	.5	.3	.15	.05	.15	.2	10.2
16.....	.8	1.0	.6	2.9	.5	.35	.2	.05	.15	.2	5.2
17.....	.65	.9	.6	3.8	.45	.5	.8	.05	3.3	.15	2.1
18.....	.65	1.2	.6	2.9	3.2	.35	.25	.05	1.1	.15	2.0
19.....	.6	1.0	.5	2.3	1.8	.3	.15	.05	1.2	.15	1.2
20.....	.5	.8	.45	2.1	.9	.25	.15	.05	4.0	.15	.8
21.....	.4	.7	.45	1.8	.8	1.8	.15	.05	1.3	.15	.6
22.....	1.7	.65	.35	1.45	2.5	2.1	.1	.2	1.2	.15	.45
23.....	.8	.6	.4	1.3	1.3	.65	.1	2.4	.8	.1	.45
24.....	.9	.5	.4	1.45	1.0	.45	.1	1.4	.6	.1	.45
25.....	2.6	.7	.45	1.45	.8	.45	.1	.45	.5	.15	.45
26.....	2.1	.5	.5	1.3	.7	.35	.1	.4	.5	.15	.35
27.....	1.6	.9	.7	1.2	.7	.3	.15	.6	.45	.15	.4
28.....	1.2	.6	.6	1.2	.7	.25	.15	.35	.35	.15	.35
29.....	2.1	.5	.45	1.3	.7	.25	-----	.25	.25	.15	.25
30.....	2.0	.45	1.1	3.2	.65	.25	-----	.25	.25	.9	.2
31.....	4.9	-----	.65	-----	.6	.3	-----	.2	-----	.35	-----

NOTE.—Discharge June 3 and 4 estimated by comparison with record of flow for East Branch of Manoa Stream; gage-height record faulty. Discharge June 15–30 from gage heights corrected for backwater determined by comparison with record of flow for East Branch of Manoa Stream.

*Monthly discharge of West Branch of Manoa Stream near Honolulu, Oahu, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
August 5-31.....	4.9	0.4	1.30	2.01	35.2	108
September.....	7.7	.45	1.30	2.01	33.9	120
October.....	6.8	.35	.985	1.52	30.6	94
November.....	11.3	.6	3.17	4.90	95.0	292
December.....	3.2	.45	1.04	1.61	32.2	99
January.....	2.1	.25	.518	.801	16.0	49
February.....	.8	.1	.200	.309	5.60	17
March.....	2.4	.05	.260	.402	8.05	25
April.....	4.0	.1	.690	1.07	20.7	64
May.....	1.5	.1	.294	.455	9.10	28
June.....	25	.2	2.34	3.62	70.2	215
The period.....	25	.05	1.10	1.70	362	1,110

#### EAST BRANCH OF MANOA STREAM NEAR HONOLULU, OAHU

**LOCATION.**—Just below highway bridge, 400 feet upstream from confluence with West Branch of Manoa Stream, and 4 miles northeast of Honolulu post office.

**RECORDS AVAILABLE.**—May 29, 1913, to January 13, 1921, and August 18, 1925, to June 30, 1926.

**EQUIPMENT.**—Gurley 7-day water-stage recorder on right bank about 5 feet downstream from highway bridge. Discharge measurements made by wading near gage or from highway bridge just above gage.

**CHANNEL AND CONTROL.**—Channel straight for about 100 feet above and below gage. A low artificial concrete control 5 feet below gage makes a pool about 20 feet wide and extending upstream about 40 feet at ordinary stages; subject to filling up during floods. Stream bed composed of gravel and boulders, quite steep above pool but much flatter below. Banks are covered with vegetation and are high above gage, but below gage right bank is overflowed at stage of about 7.5 feet.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during period, 95 million gallons a day, or 147 second-feet, at 7.15 p. m. June 14 (gage height from water-stage recorder, 5.56 feet); minimum discharge, 0.4 million gallons a day, or 0.6 second-foot, from 4 p. m. June 7 to 5 a. m. June 8 (gage height, 3.91 feet).

1913-1921; 1926: Maximum stage from floodmarks, 10.4 feet January 16, 1921 (discharge, estimated 2,000 million gallons a day, or 3,090 second-feet). Minimum discharge, that of June 7-8, 1926.

**DIVERSIONS AND REGULATION.**—East Manoa ditch diverts water about a quarter of a mile upstream and city of Honolulu diverts about 0.4 million gallons a day from tunnels about half a mile upstream.

**OBJECT OF STATION.**—To determine feasibility of using stream to augment water supply of city of Honolulu.

**UTILIZATION.**—Practically entire flow of Manoa Stream is used for irrigation of rice and taro.

**ACCURACY.**—Stage-discharge relation permanent during period. Rating curve well defined below 50 million gallons a day by 16 discharge measurements covering a range from 0.5 to 40 million gallons a day and one measurement at 151 million gallons a day. Six of the seven measurements, poorly distributed during the year and covering a range from 0.5 to 1.5 million gallons a day, check this curve closely. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages except periods estimated, for which they are fair; high-stage records probably fair.

*Discharge, in million gallons a day, of East Branch of Manoa Stream near Honolulu, Oahu, for the year ending June 30, 1926*

Day	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.		2.2	1.4	1.1	1.4	1.2	0.9	0.7	0.55	0.55	0.6
2.		2.0	1.5	1.1	1.4	1.3	.8	.7	.55	.55	.5
3.		1.6	4.0	1.1	1.1	1.1	.75	.75	.55	.5	.55
4.		1.5	1.5	6.0	1.4	1.0	.75	.7	.55	.5	.7
5.		1.4	1.2	5.2	1.4	.9	.75	.6	.55	.5	.45
6.		1.5	1.2	3.3	1.4	.9	.9	.7	.55	.5	.45
7.		1.4	1.1	9.6	1.1	1.0	.8	.7	.55	.55	.4
8.		1.4	1.2	8.8	2.6	.9	.75	.6	.55	.6	1.1
9.		1.5	1.5	3.8	1.5	.8	.75	.6	.55	.55	.65
10.		1.2	5.4	3.1	1.4	.8	.8	.6	.5	.5	.5
11.		1.9	2.8	2.2	1.2	.75	.8	.6	1.9	.5	5.4
12.		7.8	1.6	1.9	1.1	.75	.8	.6	.75	1.2	4.3
13.		2.4	3.4	3.4	1.0		.7	.6	.6	.9	1.3
14.		2.4	1.9	2.4	1.0		.7	.6	.55	.6	19.0
15.		1.2	1.4	3.1	.9	.9	.6	.6	.55	.5	9.0
16.		1.2	1.1	2.0	.9		.6	.6	.55	.5	5.2
17.		1.4	1.1	3.5	.75	1.5	1.2	.6	2.7	.55	2.6
18.	1.1	1.8	1.1	2.6	3.2	.8	.55	.6	.9	.55	1.9
19.	1.1	1.4	1.1	2.2	1.4	.8	.55	.6	.85	.5	1.5
20.	1.1	1.4	1.2	1.9	1.1	.75	.55	.55	1.5	.55	1.2
21.	1.1	1.4	1.1	1.9	1.1	3.2	.55	.5	.75	.55	1.0
22.	2.4	1.2	1.1	1.9	3.1	2.0	.55	.75	.7	.55	.8
23.	1.9	1.2	1.2	1.7	1.5	.9	.6	2.4	.7	.5	.8
24.	1.9	1.1	1.2	1.7	1.2	.8	.7	1.9	.6	.45	.75
25.	3.0	1.5	1.1	1.6	1.2	.8	.7	.8	.6	.55	.75
26.	1.9	1.1	1.1	1.2	1.2	.8	.7	.75	.6	.45	.75
27.	1.7	1.1	2.0	1.2	1.2	.8	.75	.75	.6	.5	.75
28.	1.7	1.1	1.1	1.4	1.2	.8	.75	.7	.55	.45	.75
29.	2.4	1.0	1.1	1.7	1.5	.8		.6	.55	.5	.6
30.	2.0	1.1	2.9	2.8	1.2	.8		.55	.55	.8	.55
31.	5.0		1.1		1.4	1.0		.5		.5	

NOTE.—Discharge estimated Dec. 29 to Jan. 2 and Mar. 13-18. Braced figure gives estimated mean discharge for period indicated. Estimates made by comparison with record of flow for West Branch of Manoa Stream; gage-height record either faulty or missing.

*Monthly discharge of West Branch of Manoa Stream near Honolulu, Oahu, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
August 18-31.....	5.0	1.1	2.02	3.13	28.3	87
September.....	7.8	1.0	1.68	2.60	50.4	155
October.....	5.4	1.1	1.67	2.58	51.7	159
November.....	9.6	1.1	2.85	4.41	85.4	262
December.....	3.2	.75	1.39	2.15	43.0	132
January.....	3.2	-----	1.02	1.58	31.6	97
February.....	1.2	.55	.725	1.12	20.3	62
March.....	2.4	.5	.735	1.14	22.8	70
April.....	2.7	.5	.750	1.16	22.5	69
May.....	1.2	.45	.563	.871	17.4	54
June.....	19.0	.4	2.16	3.34	64.8	199
The period.....	19.0	.4	1.38	2.14	438	1,350

**EAST MANOA DITCH NEAR HONOLULU, OAHU**

**LOCATION.**—150 yards east of highway and gaging station on East Branch of Manoa Stream, a quarter of a mile below intake from East Branch of Manoa Stream, and 4 miles northeast of Honolulu post office.

**RECORDS AVAILABLE.**—May 24, 1915, to December 31, 1916, January 26, 1918, to January 16, 1921, and August 9, 1925, to June 30, 1926.

**EQUIPMENT.**—Gurley 7-day water-stage recorder on left bank. Discharge measurements made by wading or from foot plank near gage.

**CHANNEL AND CONTROL.**—Ditch in earth cut about 4 feet wide, is straight for about 100 feet above and 25 feet below gage; subject to obstruction from growth of grass. Control is thin-edged weir 2 feet high and 2 feet wide with complete end contractions set in wooden frame. Weir basin, when clean, is sufficient to prevent velocity of approach at ordinary stages but is subject to filling in with mud and grass.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during period, 5.4 million gallons a day, or 8.4 second-feet, at 1.30 a. m. June 15 (gage height from water-stage recorder, 1.22 feet); minimum discharge uncertain owing to plugged intake.

1915-1917; 1918-1921; 1926: Maximum discharge recorded, about 26 million gallons a day, or 40 second-feet, at 3 a. m. January 16, 1921 (gage height, from water-stage recorder, 2.27 feet); minimum discharge, 0.05 million gallons a day, or 0.08 second-foot at 3 p. m. March 16, 1919 (gage-height, 0.03 foot).

**DIVERSIONS AND REGULATION.**—Flow somewhat regulated by altering crude stone dam at intake.

**OBJECT OF STATION.**—To determine feasibility of using water to augment water supply for City of Honolulu.

**UTILIZATION.**—Water used for irrigation of rice and taro.

**ACCURACY.**—Stage-discharge relation probably permanent during year. Rating curve, based on weir formulas, is well defined and checked closely during the year by one discharge measurement of 1 million gallons a day. Operation of water-stage recorder very unsatisfactory prior to February 13. Discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records poor prior to February 13; subsequent records good.

*Discharge, in million gallons a day, of East Manoa ditch near Honolulu, Oahu, for the year ending June 30, 1926*

Day	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....		1.15	0.8	0.8	0.7	0.8	0.3	0.35	0.4	0.35	0.45
2.....		1.0	.8				.35	.35	.4	.35	.35
3.....		.9	1.0				.4	.35	.35	.35	.4
4.....			.9				.4	.35	.35	.35	.45
5.....			.85	1.5			.45	.3	.35	.35	.35
6.....		1.0	.85		1.0	.8	.45	.3	.35	.35	.35
7.....			.8		.9		.45	.35	.35	.35	.35
8.....			.8	1.05	1.3		.45	.35	.35	.35	.8
9.....	0.75		.85	1.0	1.05		.45	.45	.35	.35	.45
10.....	.75		1.05	.85			.45	.45	.35	.3	.4
11.....	.75	1.4	.85	.85		.45	.45	.35	.6	.2	1.4
12.....	.85		.75	.85	.85	.45	.45	.35	.45	.45	1.8
13.....	.95		.8	.95	.8	.45	.45	.35	.35	.35	.9
14.....	.9		.65	.95	.8	.45	.45	.35	.35	.3	2.5
15.....	.85		.8	1.0	.8	.45	.45	.35	.35	.3	2.4
16.....	.9	.9	.95	1.0	.8	.45	.45	.35	.35	.3	1.7
17.....	.85		.85	.95			.6	.35	.6	.3	1.0
18.....	.85		.85	.95	.7	.5	.45	.3	.45	.3	.85
19.....	.85		.85	.8			.4	.3	.4	.3	.6
20.....	.85		.85	.8			.4	.3	.5	.3	.55
21.....	.85		.85	.75	.5		.45	.4	.4	.3	.55
22.....	.95		.85	.75	.7	1.0	.45	.45	.35	.3	.5
23.....	1.0		.8	.75	.65	.5	.45	1.0	.35	.3	.5
24.....	1.0		.8	.75		.5	.4	.85	.35	.3	.5
25.....	1.45		.85	.7		.5	.4	.5	.35	.35	.45
26.....	1.35			.8	.6	.45	.4	.5	.35	.35	.4
27.....	1.3		.7			.35	.4	.5	.35	.35	.35
28.....	1.15		.7			.35	.4	.45	.35	.35	.35
29.....	1.1		.7			.65	.35	.45	.35	.3	.35
30.....	1.05		.75	.9		.55	.35	.4	.35	.35	.35
31.....	1.25					.5	.35	.4		.35	

NOTE.—Discharge estimated Dec. 31. Braced figures give estimated mean discharge for periods indicated. Estimates made by comparison with record of flow for East Branch of Manoa Stream; gage-height record either faulty or missing.

*Monthly discharge of East Manoa ditch near Honolulu, Oahu, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
August 9-31.....	1.45	0.75	0.980	1.52	22.6	69
September.....		.7	.958	1.48	28.8	88
October.....	1.05		.831	1.29	25.8	79
November.....		.7	.973	1.51	29.2	90
December.....	1.3		.742	1.15	23.0	71
January.....	1.0	.35	.674	.888	17.8	55
February.....	.6	.3	.430	.665	12.0	37
March.....	1.0	.3	.408	.631	12.6	39
April.....	.6	.35	.385	.596	11.6	35
May.....	.45	.2	.326	.504	10.1	31
June.....	2.5	.35	.745	1.15	22.4	69
The period.....		.2	.662	1.02	216	663

#### RIGHT BRANCH OF NORTH FORK OF KAUKONAHUA STREAM NEAR WAHIAWA, OAHU

LOCATION.—200 feet upstream from intake of Wahiawa Water Co.'s tunnel, which is just below confluence of Right and Left Branches of North Fork of Kaukonahua Stream, 8 miles northeast of Wahiawa.

RECORDS AVAILABLE.—May 29, 1913, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage or from footbridge just above gage.

**CHANNEL AND CONTROL.**—Channel is straight for about 100 feet above and below gage. Below control stream bed is full of boulders and gravel but for 75 feet above the large boulders have been removed. Banks are steep and covered with vegetation. The control is composed of large boulders; somewhat improved for low stages; subject to shifts.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 490 million gallons a day, or 758 second-feet, at 9.45 p. m. November 4 (gage height from water-stage recorder, 6.13 feet); minimum discharge, 0.09 million gallons a day, or 0.15 second-foot at 2.15 p. m. March 22 (gage height, 0.71 foot).

1913-1926: Maximum discharge recorded, about 985 million gallons a day, or 1,520 second-feet, at 3 a. m. March 26, 1920 (gage height, 9.0 feet; determined from floodmarks and by comparison with record of Left Branch of North Fork of this stream); minimum discharge, that of March 22 1926.

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine amount of water taken from Territorial land by Wahiawa Water Co. All water comes from Territorial land.

**UTILIZATION.**—Wahiawa Water Co.'s tunnel diverts entire low-water flow of both Right and Left Branches of North Fork of Kaukonahua Stream for domestic water supply and irrigation in vicinity of Wahiawa. Nearly the entire flow of North Fork, except that diverted, is stored in Wahiawa Reservoir for irrigation of sugarcane on Waialua plantation.

**ACCURACY.**—Stage-discharge relation permanent during year except after June 8, when shifting-control method was used. Rating curve fairly well defined below 150 million gallons a day; extension above uncertain. Four discharge measurements, fairly well distributed during the year, check this curve closely; and one measurement made June 20 indicates a shifting control. These measurements cover a range from 0.1 to 4 million gallons a day. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good, except for high stages, for which they are poor.

*Discharge, in million gallons a day, of Right Branch of North Fork of Kaukonahua Stream near Wahiawa, Oahu, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	11.1	2.5	-----	5.9	1.0	3.2	0.6	0.5	-----	0.1	0.1	4.0
2.....	6.2	2.1	-----	1.3	1.0	2.5	1.5	.35	-----	.09	.1	.5
3.....	4.7	1.9	-----	4.4	1.9	2.1	.65	.35	-----	.09	.1	.4
4.....	3.9	15.5	-----	1.6	.75	1.9	.5	.35	-----	.1	.1	.2
5.....	3.6	18.1	-----	7.6	.31	2.5	.5	.35	-----	.09	.1	.15
6.....	7.1	6.3	-----	2.2	10.6	1.7	.5	.35	-----	.1	.1	.1
7.....	12.6	4.5	-----	2.6	14.7	1.6	.8	.35	-----	.1	.1	.1
8.....	4.3	3.1	-----	1.5	.35	5.6	.65	.35	-----	.1	.1	6.2
9.....	3.4	2.5	-----	1.8	17.7	2.8	.45	.35	-----	.1	.1	3.2
10.....	2.9	2.2	-----	46	21	1.6	.4	.35	-----	.1	.1	1.8
11.....	3.7	-----	-----	10.2	9.1	1.4	.4	.35	-----	1.3	.1	14.0
12.....	2.6	-----	-----	4.6	8.4	1.2	.35	.35	-----	.25	2.0	12.2
13.....	2.2	-----	-----	2.8	12.8	1.0	.35	.3	-----	.1	.8	-----
14.....	2.3	-----	-----	2.3	6.5	1.0	.35	.35	-----	.1	.15	-----
15.....	2.2	-----	-----	1.9	16.8	.95	.35	-----	0.1	.1	.1	-----

*Discharge, in million gallons a day, of Right Branch of North Fork of Kaukonahua Stream near Wahiawa, Oahu, for the year ending June 30, 1926—Continued*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
16.....	1.8			1.6	7.9	1.0	0.35		0.1	0.1	0.1	
17.....	1.7			1.4	9.2	.85	3.1		.1	4.2	.1	
18.....	1.6			1.3	6.8	9.0	.7		.1	.25	.1	
19.....	2.7			1.2	5.6	3.5	.4		.1	1.2	.1	
20.....	1.6			1.1	4.9	1.2	.35		.1	21	.1	
21.....	3.0			1.0	4.4	.95	2.2		.09	.4	.1	1.2
22.....	1.4			1.0	3.9	1.1	15.4		.1	.2	.1	.85
23.....	1.5			5.4	3.7	1.4	2.2		9.6	.15	.1	.65
24.....	1.5			3.6	3.7	.8	1.0		.25	.15	.1	.5
25.....	2.1			2.0	3.4	.7	.5		.15	.15	.1	.45
26.....	1.5			1.6	2.8	.65	.4		.1	.5	.1	.4
27.....	9.5			1.3	2.5	.6	.4		.15	.2	.1	2.0
28.....	69			.9	2.2	.6	.35		.15	.15	.1	.8
29.....	8.0			2.3	2.2	.6	.35		.1	.1	.1	.35
30.....	3.9		1.2	3.2	12.6	.55	.35		.1	.1	2.3	.25
31.....	3.4			1.4		.6	.4		.1		1.5	

NOTE.—Data insufficient for making estimate Aug. 11 to Sept. 29, Feb. 15 to Mar. 14, and June 13-20 when recorder was not operating.

*Monthly discharge of Right Branch of North Fork of Kaukonahua Stream near Wahiawa, Oahu, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	69	1.4	6.03	9.33	187	574
October.....	46	.9	4.10	6.34	127	390
November.....	75	1.0	11.3	17.5	338	1,040
December.....	9.0	.55	1.78	2.75	55.2	169
January.....	15.4	.35	1.19	1.84	36.8	113
April.....	21	.09	1.06	1.64	31.7	98
May.....	2.3	.1	.302	.467	9.35	29

#### LEFT BRANCH OF NORTH FORK OF KAUKONAHUA STREAM NEAR WAHIAWA, OAHU

LOCATION.—100 feet upstream from intake of Wahiawa Water Co.'s tunnel, which is just below confluence of the Right and Left Branches of North Fork of Kaukonahua Stream, 8 miles northeast of Wahiawa.

RECORDS AVAILABLE.—May 25, 1913, to June 30, 1926.

EQUIPMENT.—Au continuous water-stage recorder on left bank. Discharge measurements made by wading near gage or from cable just below gage.

CHANNEL AND CONTROL.—Channel straight for 100 feet above and below gage. Stream bed composed of boulders and gravel. Banks steep and covered with brush. Control composed of large and small boulders; fairly permanent; probably subject to backwater from Right Branch at high stages.

EXTREMES OF DISCHARGE.—Maximum and minimum discharge during year are unknown owing to faulty gage-height record.

1913-1926: Maximum discharge recorded, about 4,080 million gallons a day, or 6,310 second-feet at 5 a. m. January 14, 1923 (gage height from water-stage recorder, 10.3 feet); minimum discharge, 0.1 million gallons a day, or 0.16 second-foot, at 4 a. m. February 18 and 11.30 p. m. March 5, 1920.

DIVERSIONS AND REGULATION.—None.

**OBJECT OF STATION.**—To determine amount of water diverted from Territorial land by Wahiawa Water Co. All water comes from Territorial lands.

**UTILIZATION.**—Wahiawa Water Co.'s tunnel diverts entire low-water flow of both Right and Left Branches of North Fork of Kaukonahua Stream for domestic supply and irrigation near Wahiawa. Nearly the entire flow of North Fork, except that diverted, is stored in Wahiawa Reservoir for irrigation of sugarcane on Waialua plantation.

**ACCURACY.**—Stage-discharge relation not permanent during year. During periods of gage-height record two rating curves were used and are fairly well defined below 50 million gallons a day; extended above on basis of a slope determination at gage height 8.82 feet (discharge, 2,500 million gallons a day). Four of the six discharge measurements well distributed during the year and covering a range from 2 to 15 million gallons a day check these curves fairly well. Operation of water-stage recorder very unsatisfactory, as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair except for estimated periods, for which they are poor.

*Discharge, in million gallons a day, of Left Branch of North Fork of Kaukonahua Stream near Wahiawa, Oahu, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1		3.8		14.7				0.7		0.2		
2		3.6		3.0	2.3					.2		2.7
3	7.5	3.6		11.5						.2		
4		25		3.4		3.5				.2		.5
5		24		4.5	38		1.1			.2		
6		11.8		4.5						.2	0.2	
7	10	7.7		4.8		8		.4		.2		.2
8				3.0	32					.2		
9				8.1						.2		
10		4.0								.2		12
11				20						1.7		
12					10					.7		
13	4.0						.5			.2		
14					8.1	1.7				.2	1.2	
15			3.9		24				0.3	.2		
16			3.1		8.8				.2	.2		
17				2.5	16.2				.2	15.5		
18						15	1.7		.2	1.2		
19									.2	7.2		
20					8				.2	23		
21	2.6								.2	2.8		
22									.3	1.2	.2	
23						1.4	18		5.7	.6		
24				5.5					.7	.6		
25									.3	.4		
26					4.5				.3			
27									.4			
28				1.9		.9	.7		.3	.3		
29	24								.3			
30			4.9	4.1	42				.2		3.1	
31									.2			

NOTE.—Discharge estimated Aug. 1, Nov. 30, and Feb. 1. Braced figures give estimated mean discharge for periods indicated. Estimates made by comparison with record of flow for Right Branch of North Fork; gage-height record either faulty or missing. Data insufficient for making estimate Aug. 11 to Sept. 14, Sept. 17-29, Feb. 15 to Mar. 14, and June 13-30; recorder not operating.

*Monthly discharge of Left Branch of North Fork of Kaukonahua Stream near Wahiawa, Oahu, for the year ending June 30, 1926*

Month	Discharge			Total run-off		
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July			8.61	13.3	267	819
October			5.81	8.99	180	553
November			15.0	23.2	450	1,380
December			4.36	6.75	135	415
January			2.57	3.98	79.8	244
April	23		1.97	3.05	59.2	181
May			.52	.80	16.0	50

**MISCELLANEOUS DISCHARGE 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 year ending June 30, 1926*

Date	Stream	Tributary to	Locality	Discharge	
				Second-foot	Million gallons a day
Aug. 11.....	Tunnel No. 1.....	Waianae Stream	Near Waianae.....	0.010	0.006
Aug. 12.....	Tunnel No. 2.....	do.....	do.....	1.16	.750
Do.....	Tunnel No. 3.....	do.....	do.....	.047	.031
Do.....	Tunnel No. 4.....	do.....	do.....	.032	.021
Do.....	Tunnel No. 6.....	do.....	do.....	.770	.498
Do.....	Tunnel No. 7.....	do.....	do.....	.074	.048
Do.....	Tunnel No. 8.....	do.....	do.....	.016	.010
Do.....	Tunnel No. 9.....	do.....	do.....	.151	.098
Do.....	Tunnel No. 11.....	do.....	do.....	.004	.002
Do.....	Tunnels Nos. 12 and 13.....	do.....	do.....	.011	.007
Do.....	Tunnel No. 14.....	do.....	do.....	.099	.064
Aug. 11.....	Tunnel No. 15.....	do.....	do.....	.353	.228
Aug. 12.....	Tunnel No. 16.....	do.....	do.....	.042	.027
Do.....	Tunnel No. 17.....	do.....	do.....	.034	.022
Aug. 15.....	do.....	do.....	do.....	.036	.023
Do.....	Tunnel No. 18.....	do.....	do.....	.057	.037
Aug. 11.....	Springs Nos. 3 and 4.....	do.....	do.....	.008	.005
Aug. 12.....	Spring No. 6.....	do.....	do.....	.011	.007
Do.....	Spring No. 7.....	do.....	do.....	.020	.013
Do.....	Springs Nos. 13-15.....	do.....	do.....	.011	.007
Do.....	Springs Nos. 23-25.....	do.....	do.....	.015	.010
Aug. 15.....	Kumaipo Stream.....	do.....	Below tunnel No. 16, near Waianae.....	.067	.043
Sept. 24.....	Tunnel No. 1.....	do.....	Near Waianae.....	.049	.032
Do.....	Tunnel No. 2.....	do.....	do.....	1.13	.730
Do.....	Tunnel No. 3.....	do.....	do.....	.076	.049
Do.....	Tunnel No. 4.....	do.....	do.....	.038	.025
Do.....	Tunnel No. 6.....	do.....	do.....	.971	.628
Do.....	Tunnel No. 7.....	do.....	do.....	.076	.049
Do.....	Tunnel No. 8.....	do.....	do.....	.043	.028
Do.....	Tunnel No. 9.....	do.....	do.....	.167	.108
Sept. 25.....	Tunnel No. 11.....	do.....	do.....	Dry.	-----
Do.....	Tunnels Nos. 12 and 13.....	do.....	do.....	.024	.016
Do.....	Tunnel No. 14.....	do.....	do.....	.084	.054
Do.....	Tunnel No. 15.....	do.....	do.....	.425	.275
Do.....	Tunnel No. 16.....	do.....	do.....	.069	.045
Do.....	Tunnel No. 17.....	do.....	do.....	.038	.025
Sept. 24.....	Tunnel No. 18.....	do.....	do.....	.049	.032
Do.....	Spring No. 1.....	do.....	do.....	.021	.014
Do.....	Spring No. 2.....	do.....	do.....	.021	.014
Do.....	Springs Nos. 3 and 4.....	do.....	do.....	.028	.018
Do.....	Spring No. 6.....	do.....	do.....	.021	.014
Do.....	Spring No. 7.....	do.....	do.....	.028	.018
Sept. 25.....	Springs Nos. 12-15.....	do.....	do.....	.005	.003
Do.....	Springs Nos. 23-25.....	do.....	do.....	.012	.008
Sept. 24.....	Honua Stream.....	do.....	Below tunnel No. 18, near Waianae.....	.6	.4
Do.....	Hiu Stream (makai).....	do.....	Near Waianae.....	.024	.016

*Miscellaneous discharge measurements on Oahu during the year ending June 30, 1926—Continued*

Date	Stream	Tributary to—	Locality	Discharge	
				Second-foot	Million gallons a day
Sept. 25.....	Waianae power plant tailrace.	Waianae Stream..	Near Waianae.....	3.34	2.16
Nov. 3.....	Tunnel No. 2.....	do.....	do.....	.968	.626
Do.....	Tunnel No. 3.....	do.....	do.....	.047	.031
Do.....	Tunnel No. 4.....	do.....	do.....	.020	.013
Do.....	Tunnel No. 6.....	do.....	do.....	.54	.35
Do.....	Tunnel No. 7.....	do.....	do.....	.082	.053
Do.....	Tunnel No. 8.....	do.....	do.....	.029	.019
Do.....	Tunnel No. 9.....	do.....	do.....	.176	.114
Do.....	Tunnel No. 11.....	do.....	do.....	Dry.....	
Do.....	Tunnels Nos. 12 and 13.....	do.....	do.....	.053	.034
Do.....	Tunnel No. 14.....	do.....	do.....	.047	.031
Do.....	Tunnel No. 15.....	do.....	do.....	.418	.270
Nov. 2.....	Tunnel No. 16.....	do.....	do.....	.039	.025
Do.....	Tunnel No. 17.....	do.....	do.....	.011	.007
Do.....	Tunnel No. 18.....	do.....	do.....	.023	.015
Nov. 3.....	Spring No. 6.....	do.....	do.....	.016	.010
Do.....	Spring No. 7.....	do.....	do.....	.011	.007
Do.....	Spring No. 8.....	do.....	do.....	Dry.....	
Nov. 2.....	Springs Nos. 12-15.....	do.....	do.....	.005	.003
Do.....	Springs Nos. 23-25.....	do.....	do.....	.008	.005
Do.....	Hu Stream.....	do.....	At upper trail near Waianae.	.020	.013
Do.....	do.....	do.....	At highway near Waianae.	.027	.018
Do.....	Kumaipo Stream.....	do.....	Above springs Nos. 12-15, near Waianae.	.082	.053
Do.....	do.....	do.....	At highway, near Waianae.....	.013	.009
Dec. 8.....	Tunnel No. 1.....	do.....	Near Waianae.....	.020	.013
Do.....	Tunnel No. 2.....	do.....	do.....	1.41	.91
Do.....	Tunnel No. 3.....	do.....	do.....	.027	.018
Do.....	Tunnel No. 4.....	do.....	do.....	.015	.010
Do.....	Tunnel No. 6.....	do.....	do.....	.79	.51
Do.....	Tunnel No. 7.....	do.....	do.....	.021	.014
Do.....	Tunnel No. 8.....	do.....	do.....	.016	.010
Do.....	Tunnel No. 9.....	do.....	do.....	.099	.064
Do.....	Tunnel No. 11.....	do.....	do.....	Dry.....	
Do.....	Tunnels Nos. 12 and 13.....	do.....	do.....	.012	.008
Do.....	Tunnel No. 14.....	do.....	do.....	.020	.013
Do.....	Tunnel No. 15.....	do.....	do.....	.255	.165
Dec. 7.....	Tunnel No. 16.....	do.....	do.....	.020	.013
Do.....	Tunnel No. 17.....	do.....	do.....	.011	.007
Do.....	Tunnel No. 18.....	do.....	do.....	.027	.018
Dec. 8.....	Spring No. 1.....	do.....	do.....	.005	.003
Do.....	Spring No. 2.....	do.....	do.....	.010	.006
Do.....	Springs Nos. 3 and 4.....	do.....	do.....	.008	.005
Do.....	Spring No. 6.....	do.....	do.....	.008	.005
Do.....	Spring No. 7.....	do.....	do.....	.010	.006
Dec. 7.....	Springs Nos. 12-15.....	do.....	do.....	.010	.006
Do.....	Springs Nos. 23-25.....	do.....	do.....	.008	.005
Dec. 8.....	Left Branch of Kane-wai Stream.	do.....	At trail above tunnel No. 2, near Waianae.	.016	.010
Dec. 7.....	Hu Stream.....	do.....	Near Waianae.....	.032	.020
Do.....	Kumaipo Stream.....	do.....	Above springs Nos. 12-15, near Waianae.	.151	.098
Do.....	do.....	do.....	At road crossing, near Waianae.	.296	.191
Do.....	Honua Stream.....	do.....	Above tunnel No. 18, near Waianae.	.007	.004
Dec. 8.....	Waianae power plant tailrace.	do.....	Near Waianae.....	3.05	1.97
Jan. 13.....	Tunnel No. 1.....	do.....	do.....	.036	.024
Do.....	Tunnel No. 2.....	do.....	do.....	.920	.595
Do.....	Tunnel No. 3.....	do.....	do.....	.067	.043
Do.....	Tunnel No. 4.....	do.....	do.....	.042	.027
Do.....	Tunnel No. 6.....	do.....	do.....	.738	.477
Do.....	Tunnel No. 7.....	do.....	do.....	.082	.053
Do.....	Tunnel No. 8.....	do.....	do.....	.060	.039
Do.....	Tunnel No. 9.....	do.....	do.....	.201	.130
Jan. 12.....	Tunnels Nos. 12 and 13.....	do.....	do.....	.016	.010
Do.....	Tunnel No. 14.....	do.....	do.....	.090	.058
Do.....	Tunnel No. 15.....	do.....	do.....	.441	.285
Do.....	Tunnel No. 16.....	do.....	do.....	.036	.024
Do.....	Tunnel No. 17.....	do.....	do.....	.034	.022
Jan. 13.....	Tunnel No. 18.....	do.....	do.....	.109	.070
Do.....	Spring No. 1.....	do.....	do.....	.013	.008
Do.....	Spring No. 2.....	do.....	do.....	.016	.010
Do.....	Springs Nos. 3 and 4.....	do.....	do.....	.027	.018
Do.....	Spring No. 5.....	do.....	do.....	.020	.013
Do.....	Spring No. 6.....	do.....	do.....	.016	.010
Do.....	Spring No. 7.....	do.....	do.....	.027	.018
Jan. 12.....	Springs Nos. 21-24.....	do.....	do.....	.016	.010

*Miscellaneous discharge measurements on Oahu during the year ending June 30, 1926—Continued*

Date	Stream	Tributary to—	Locality	Discharge	
				Second-foot	Million gallons a day
Jan. 13.....	Kumaipo Stream.....	Waianae Stream.....	At highway near Waianae.....	0.202	0.131
Do.....	Hiu Stream.....	do.....	do.....	.042	.027
Jan. 12.....	Tunnel No. 12.....	do.....	do.....	.008	.005
Do.....	Kumaipo Stream.....	do.....	Above tunnel No. 16, near Waianae.....	.179	.116
Jan. 13.....	Waianae Stream.....	Pacific Ocean.....	Near Waianae.....	2.76	1.78
Feb. 9.....	Spring No. 1.....	Waianae Stream.....	do.....	.011	.007
Do.....	Spring No. 2.....	do.....	do.....	.011	.007
Do.....	Springs Nos. 3 and 4.....	do.....	do.....	.016	.010
Do.....	Spring No. 5.....	do.....	do.....	.011	.007
Do.....	Spring No. 6.....	do.....	do.....	.011	.007
Do.....	Spring No. 7.....	do.....	do.....	.020	.013
Feb. 10.....	Springs Nos. 21-24.....	do.....	do.....	.011	.007
Feb. 9.....	Tunnel No. 1.....	do.....	do.....	.036	.024
Do.....	Tunnel No. 2.....	do.....	do.....	1.24	.801
Do.....	Tunnel No. 3.....	do.....	do.....	.053	.034
Do.....	Tunnel No. 4.....	do.....	do.....	.020	.013
Do.....	Tunnel No. 6.....	do.....	do.....	.80	.52
Do.....	Tunnel No. 7.....	do.....	do.....	.075	.048
Do.....	Tunnel No. 8.....	do.....	do.....	.026	.041
Do.....	Tunnel No. 9.....	do.....	do.....	.16	.10
Do.....	Tunnel Nos. 12 and 13.....	do.....	do.....	.023	.015
Do.....	Tunnel No. 14.....	do.....	do.....	.129	.083
Do.....	Tunnel No. 15.....	do.....	do.....	.374	.242
Feb. 10.....	Tunnel No. 16.....	do.....	do.....	.042	.027
Do.....	Tunnel No. 17.....	do.....	do.....	.020	.013
Do.....	Tunnel No. 18.....	do.....	do.....	.074	.048
Do.....	Hiu Stream (makai).....	do.....	do.....	.053	.034
Do.....	Hiu Stream (mauka).....	do.....	do.....	.027	.018
Do.....	Kumaipo Stream (makai).....	do.....	do.....	.129	.083
Do.....	do.....	do.....	Above tunnel No. 16, near Waianae.....	.15	.10
Feb. 26.....	Luluku Stream.....	Kaneohe Stream.....	At old highway bridge near Waianae.....	1.45	.94
Do.....	Kuou Stream.....	do.....	Near Kaneohe.....	1.54	1.00
Do.....	Luluku Stream.....	do.....	At elevation 545 feet, near Kaneohe.....	.97	.63
Mar. 18.....	do.....	do.....	At old highway bridge near Kaneohe.....	1.24	.80
Do.....	do.....	do.....	At elevation 500 feet, near Kaneohe.....	1.08	.70
Apr. 15.....	Tunnel No. 1.....	Waianae Stream.....	Near Waianae.....	.038	.025
Do.....	Tunnel No. 2.....	do.....	do.....	1.09	.704
Do.....	Tunnel No. 3.....	do.....	do.....	.102	.066
Do.....	Tunnels Nos. 4 and 5.....	do.....	do.....	.083	.021
Do.....	Tunnel No. 6.....	do.....	do.....	.836	.540
Do.....	Tunnel No. 7.....	do.....	do.....	.076	.049
Do.....	Tunnel No. 8.....	do.....	do.....	.038	.025
Do.....	Tunnel No. 9.....	do.....	do.....	.206	.133
Apr. 16.....	Tunnel No. 10.....	do.....	do.....	Dry.....	-----
Do.....	Tunnel No. 11.....	do.....	do.....	Dry.....	-----
Do.....	Tunnel No. 12.....	do.....	do.....	.009	.006
Do.....	Tunnel No. 13.....	do.....	do.....	.007	.005
Do.....	Tunnel No. 14.....	do.....	do.....	.069	.045
Do.....	Tunnel No. 15.....	do.....	do.....	.459	.297
Do.....	Tunnel No. 16.....	do.....	do.....	.049	.032
Do.....	Tunnel No. 17 and spring No. 26.....	do.....	do.....	.038	.025
Do.....	Tunnel No. 18.....	do.....	do.....	.076	.049
Apr. 15.....	Spring No. 1.....	do.....	do.....	.009	.006
Do.....	Spring No. 2.....	do.....	do.....	.009	.006
Do.....	Springs Nos. 3 and 4.....	do.....	do.....	.024	.016
Do.....	Spring No. 5.....	do.....	do.....	.014	.009
Do.....	Spring No. 6.....	do.....	do.....	.024	.016
Do.....	Spring No. 7.....	do.....	do.....	.024	.016
Apr. 16.....	Springs Nos. 10 and 11.....	do.....	do.....	.017	.011
Do.....	Springs Nos. 12-15.....	do.....	do.....	.021	.014
Do.....	Springs Nos. 16-20.....	do.....	do.....	.521	.337
Do.....	Springs Nos. 21-25.....	do.....	do.....	.017	.011
Do.....	Hiu Stream (mauka).....	do.....	do.....	.021	.014
Do.....	Hiu Stream (makai).....	do.....	do.....	.038	.025
Do.....	Kumaipo Stream (mauka).....	do.....	Above tunnel No. 16, near Waianae.....	.521	.337
Do.....	Kumaipo Stream (makai).....	do.....	Near Waianae.....	.236	.153
Do.....	Honua Stream.....	do.....	Below tunnel No. 18, near Waianae.....	.167	.108
Do.....	Waianae power plant tailrace.....	do.....	Near Waianae.....	2.89	1.87

## ISLAND OF MOLOKAI

## HALAWA STREAM NEAR HALAWA, MOLOKAI

**LOCATION.**—750 feet below confluence of two main branches and 2 miles above mouth of stream and Halawa schoolhouse.

**RECORDS AVAILABLE.**—June 25, 1923, to June 30, 1926. For old station 500 feet upstream August 28, 1917, to June 24, 1923.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank. Discharge measurements made by wading.

**CHANNEL AND CONTROL.**—Recorder situated at lower end of a pool about 60 feet long which is directly below steep rapids. One channel at all stages; banks not subject to overflow. Control formed of rocks and small boulders grouted in place; subject to slight shifts owing to encroachment of hono-hono grass.

**EXTREMES OF DISCHARGE.**—Maximum and minimum discharge during year are unknown owing to missing gage-height record.

1917-1926: Maximum discharge recorded about 1,550 million gallons a day, or 2,400 second-feet, at 10 a. m. March 31, 1923 (gage height, from water-stage recorder, 11.65 feet); minimum discharge, 0.8 million gallons a day, or 1.2 second-feet, October 13-15 and 19, 1917 (gage height on old gage, 0.35 foot).

**DIVERSIONS AND REGULATIONS.**—A 1-inch pipe line laid about July 1, 1925, diverts small amount of water for Halawa village.

**OBJECT OF STATION.**—To determine feasibility of water-supply project for Halawa village and amount of water available for irrigation on leeward Molokai.

**UTILIZATION.**—Water used for irrigation of taro and for domestic supply.

**ACCURACY.**—Stage-discharge relation changed at time of flood June 11. The rating curves used are well defined between 2 and 25 million gallons a day; extended above on basis of one discharge measurement at 82 million gallons a day. These curves checked very well by four discharge measurements made from January to June and covering a range from 2.5 to 16 million gallons a day. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages, except those estimated, which are probably fair, and those for extremely high and low stages, which are poor.

*Discharge, in million gallons a day, of Halawa Stream near Halawa, Molokai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	12.5	10	30	9.3	18	5.5	4.6	32	3.2	9.6		
2	15.4			6.7				4.0	11.4	6.8		
3	8.4			16.3				3.9	6.0	10.3		
4	7.0			12.6				3.9	4.2	4.9		
5	6.3			10.2				3.4	3.5	3.4		
6	5.8	20	10.2	13.4	5	4.3	3.1	7.4	3.1	3.2		
7	9.7		9.0				2.8	9.0	3.4			
8	7.0		13.7				2.7	10.8	8.0	2.7		
9	5.4		12.6				2.7	4.9	8.1	2.4		
10	4.9		14.0				2.6	4.0	3.7	2.4		
11	10.5	20	34	22	4.4	5.6	2.8	3.9	3.0	120		
12	6.3						28	5.1	3.4	28	77	
13	6.0						16.5	4.2	4.0	9.0	47	
14	5.1						10.2	3.9	3.7	5.8	44	
15	4.9						8.7	3.7	2.8	4.7	14.9	
16	4.6	6	8.7	6	28	65	3.7	6.6	4.2	3.1	19.2	
17	4.2		15.5				25	4.4	8.6	3.0	8.4	
18	4.6		13.3				28	3.1	21	2.6	5.6	
19	4.6		15.6				6.3	2.7	24	2.4	4.6	
20	4.6		10.2				4.4	2.7	51	24.4	4.1	
21	20	17	8.7	26	16	4.7	2.6	11.6	2.4	3.5		
22	7.0		8.1				3.9	8.4	2.2	2.9		
23	5.1		7.2				3.5	6.3	2.2	2.7		
24	5.5		7.0				47	7.8	6.5	2.2	2.4	
25			10				40	5.4	6.0	2.6	2.7	
26	30	26	8.1	9.5	22	6.5	4.4	6.0	2.8	2.5		
27			7.5				8.7	4.9	2.4	2.5		
28			6.5				6.3	7.2	4.2	2.5	2.9	
29			10.9				4.4	3.7	2.7	2.1		
30			40				4.0	3.5	7.7	1.8		
31							9.0		6.7			

NOTE.—Discharge estimated Sept. 11. Braced figures give estimated mean discharge for periods indicated. Estimates made from fragmentary gage-height record and by comparison with records for Papalaua and Pulea Streams near Wailau, Molokai, gage-height record either faulty or missing.

*Monthly discharge of Halawa Stream near Halawa, Molokai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July		4.2	10.9	16.9	336	1,040
August			16.4	25.4	507	1,560
September		6.5	13.6	21.0	409	1,250
October			14.5	22.4	450	1,380
November			20.3	31.4	610	1,870
December			14.4	22.3	447	1,370
January			19.9	30.8	616	1,890
February	47	3.5	9.44	14.6	264	811
March	82	2.6	8.30	12.8	257	790
April	51	3.5	11.1	17.2	334	1,020
May	28	2.2	4.45	6.89	138	423
June	120	1.8	13.9	21.5	417	1,280
The year	120	1.8	13.1	20.3	4,780	14,700

## PAPALAUA STREAM NEAR WAILAU, MOLOKAI

**LOCATION.**—A quarter of a mile above mouth, 2 miles east of Wailau landing, 5 miles by foot trail west of Halawa village, and  $6\frac{1}{2}$  miles due north of Pukoo village.

**RECORDS AVAILABLE.**—September 17, 1919, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank. Discharge measurements made by wading or from footbridge near gage.

**CHANNEL AND CONTROL.**—Bed rocky and boulder strewn. Banks high and rocky. Control composed of large boulders and gravel; subject to shifts.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 522 million gallons a day, or 808 second-feet, at 6 p. m. October 25 (gage height from water-stage recorder, 5.50 feet); minimum discharge, 1.5 million gallons a day, or 2.3 second-feet, from 10 to 11 p. m. March 10 (gage height, 0.73 foot). A higher and lower discharge may have occurred when recorder was not operating properly.

1919-1926: Maximum discharge recorded, about 1,140 million gallons a day, or 1,760 second-feet, at 10.30 a. m. December 24, 1920 (gage height, from water-stage recorder, 8.58 feet); minimum discharge, 1.0 million gallons a day, or 1.6 second-feet, February 26 and 27, 1920 (gage height, 1.02 feet).

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine amount of water in stream available for irrigation on leeward Molokai.

**UTILIZATION.**—Entire flow now wastes into sea.

**ACCURACY.**—Stage-discharge relation changed, presumably at times of floods March 22 and June 11 and affected by backwater July 30 to October 10. The two rating curves used are fairly well defined below 40 million gallons a day; extended above on basis of one discharge measurement at 170 million gallons a day. These curves checked very closely in February and April by two discharge measurements at 1.8 and 1.9 million gallons a day and roughly in June by one measurement at 1.2 million gallons a day; another measurement in August helps define backwater. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages except those estimated and those affected by backwater, which are probably fair; extremely high stage records poor.

*Discharge, in million gallons a day, of Papalaua Stream near Wailau, Molokai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	7.2	4.6	22	3.6	3.6	6.1	23	6.9	2.3	23	1.7	9.5
2.....	8.6	4.4	21	2.3	4.5	5.1	5.2	3.4	2.0	9.2		6.3
3.....	4.2	3.8	9.0	15.0	12.1	3.2	3.4	2.8	2.1	4.6		6.6
4.....	3.2	5.6	5.7	3.6	29	2.6	11.4	2.6	1.9	3.3		3.4
5.....	2.8	22	4.4	4.6	38	2.5	18.7	2.5	1.8	2.9		2.7
6.....	2.9	28	4.4	7.6	12.4	2.4	19.8	2.3	1.7	8.5	3.8	5.4
7.....	10.1	12.8	3.5	7.4	25	2.4	4.4	2.3	1.6	10.4		3.5
8.....	4.5	7.7	7.6	4.8	23	2.5	3.2	2.2	1.6	8.2		2.7
9.....	3.0	5.2	9.1	13.7	25	2.4	2.7	2.0	1.6	3.8		2.4
10.....	2.6	3.6	7.4	59	13.1	2.4	2.6	3.8	1.5	3.0		2.7

*Discharge, in million gallons a day, of Papalaua Stream near Wailau, Molokai, for the year ending June 30, 1926—Continued*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
11.....	7.9	3.0	13.7	7.8	7.2	2.3	2.4	3.2	1.8	3.0		92
12.....	3.6	5.6	25	5.1	6.1	2.3	2.2	2.5	3.7			46
13.....	3.2	3.1	10.6	3.9	17.7	2.3		2.3	2.4			36
14.....	2.9	2.6	6.8	3.6	11.0	2.2		2.2	2.2		7	29
15.....	2.6	2.4	4.2	4.4	22	3.6	2.8	2.1	1.8			8.7
16.....	2.3	4.5	3.6	2.7	9.2	5.5		1.8	4.3			18.3
17.....	2.4	2.8	6.9	2.5	43	2.5	3.9	25	2.2	12	2.5	14.9
18.....	3.0	3.4	6.2	2.3	12.6	39	2.5	24	1.8		2.4	2.7
19.....	2.2	2.4	7.5	2.2	9.9	51	2.3	3.2	1.6		2.3	2.5
20.....	2.4	3.8	5.2	2.1	8.3	4.4	8.4	2.1	1.6		2.3	2.7
21.....	13.3	2.5	3.9	5.0	5.6	4.5	171	2.5	1.6		2.3	2.1
22.....	3.7	25	2.7	15.8	4.5	46	16.6	1.9	49		2.2	1.5
23.....	2.6	7.0	2.5	7.9	3.8	13.0	11.0	1.8	33		2.3	1.3
24.....	2.2	5.5	2.3	16.6	59	4.2	5.2	36	4.4		2.2	1.2
25.....	3.5	31	8.8	53	9.6	10.4	3.7	23	3.2		2.6	1.5
26.....	2.8	34	3.0	10.6	5.6	4.5	3.0	3.2	2.8	2.8	2.4	1.2
27.....	24	12.0	3.2	5.6	4.2	2.9	3.8	5.2	18.3		2.5	1.5
28.....	16.2	7.9	2.6	3.9	3.5	2.5	9.0	3.5	4.8		2.6	1.5
29.....	43	15.5	2.4	3.6	3.6	2.4	9.8		3.1		2.8	1.1
30.....	5.9	11.5	8.0	3.7	9.7	2.4	3.8		3.1		9.5	1.0
31.....	5.1	55		3.4		52	34		15.0		5.7	

NOTE.—Braced figures give mean discharge for periods indicated, estimated by comparison with records for Halawa Stream near Halawa, Molokai, and for Pulena Stream near Wailau, Molokai; gage-height record either faulty or missing. Discharge July 30 to Oct. 10 from gage heights corrected for backwater determined from one discharge measurement and study of recorder graph.

*Monthly discharge of Papalaua Stream near Wailau, Molokai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	43	2.2	6.58	10.2	204	626
August.....	55	2.4	10.9	16.9	338	1,040
September.....	25	2.3	7.44	11.5	223	685
October.....	59	2.1	9.24	14.3	287	882
November.....	59	3.5	14.7	22.7	442	1,350
December.....	52	2.2	9.40	14.5	292	894
January.....	171		12.7	19.6	392	1,210
February.....	36	1.8	6.30	9.75	176	541
March.....	49	1.5	5.80	8.97	180	552
April.....			7.81	12.1	234	719
May.....			3.68	5.69	114	350
June.....	92	1.0	10.5	16.2	315	967
The year.....	171		8.76	13.6	3,200	9,820

#### WAIKAEAKUA STREAM NEAR WAILAU, MOLOKAI

LOCATION.—Half a mile above confluence with Pulena Stream, 3 miles south of Wailau landing, and 4 miles northwest of Pukoo village.

RECORDS AVAILABLE.—October 30, 1919, to June 30, 1926.

EQUIPMENT.—Stevens continuous water-stage recorder on right bank. Discharge measurements made by wading or from footbridge at gage.

CHANNEL AND CONTROL.—Stream bed rocky and boulder strewn. Banks steep, high, and covered with vegetation. Control formed of boulders, cobblestones, and gravel; subject to shifts during floods.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 253 million gallons a day, or 391 second-feet, at 4.30 p. m. June 11 (gage height, from water-stage recorder, 4.55 feet); minimum discharge, 1.5 million gallons a day, or 2.3 second-feet, from 12 m. to 5 p. m. June 9 (gage height, 1.12 feet).

1919-1926: Maximum discharge recorded, about 710 million gallons a day, or 1,100 second-feet, at 1.15 p. m. March 31, 1923 (gage height from water-stage recorder, 7.15 feet); minimum discharge, 1.3 million gallons a day, or 2.0 second-feet, March 7, 1920 (gage height, 0.92 foot).

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine amount of water available for irrigation on leeward Molokai.

**UTILIZATION.**—Small amount of water being used for irrigation of taro. Most of flow wastes into sea.

**ACCURACY.**—Stage-discharge relation changed, presumably, at times of floods January 6 and 21, March 22, and June 11. The three rating curves used are well defined between 2 and 150 million gallons a day; extensions beyond uncertain. These curves checked very closely by four discharge measurements well distributed during year and covering a range from 2.5 to 6.3 million gallons a day. Operation of water-stage recorder satisfactory, except prior to July 12, when intake to stilling well was partly obstructed. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair except for extremely high and low stages, for which they are poor.

*Discharge, in million gallons a day, of Waiakeakua Stream near Wailau, Molokai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1-----	4.4	4.9	15.6	4.6	4.4	4.7	7.5	4.3	3.7	8.9	2.6	3.2
2-----	4.4	4.7	15.0	4.0	4.2	4.4	4.3	3.5	3.6	5.9	2.5	2.1
3-----	3.6	4.2	8.8	8.9	6.1	4.3	4.0	3.4	3.5	4.2	2.4	2.0
4-----	3.4	4.4	7.0	4.4	11.2	4.0	5.2	3.2	3.3	3.8	2.4	1.8
5-----	3.4	7.9	6.3	4.6	18.3	3.9	5.0	3.0	3.2	3.7	2.3	1.8
6-----	3.5	17.0	5.9	4.7	8.6	3.7	21	2.9	2.9	3.7	2.3	1.9
7-----	4.9	10.2	5.0	6.1	13.7	3.6	4.5	2.7	2.9	3.8	2.2	1.8
8-----	3.5	7.0	5.5	4.9	12.3	3.6	4.1	2.7	2.8	3.5	3.4	1.6
9-----	3.2	5.5	5.4	5.5	12.3	3.4	3.8	2.6	2.7	3.1	3.0	1.6
10-----	2.9	4.7	4.6	18.3	8.4	3.3	3.9	3.4	2.7	3.0	2.1	1.8
11-----	4.3	4.4	5.4	6.4	7.4	3.3	3.5	2.9	2.7	3.2	2.0	41
12-----	3.9	5.8	6.1	5.2	6.4	3.2	3.4	2.6	2.8	5.0	8.7	16.6
13-----	3.7	4.2	8.0	4.6	15.3	3.0	3.2	2.6	2.6	3.1	2.9	13.0
14-----	3.6	3.7	4.6	4.3	8.8	3.0	3.2	2.5	2.5	2.9	2.4	12.0
15-----	3.5	3.6	3.5	4.0	11.7	3.7	3.4	2.4	2.4	2.8	2.2	7.0
16-----	3.4	4.3	3.3	3.7	7.8	3.6	5.0	2.4	3.2	2.7	2.2	5.4
17-----	3.3	3.6	5.1	3.6	21	3.0	3.1	21	2.5	5.1	2.0	4.7
18-----	3.4	3.5	5.9	3.4	10.7	20	3.0	16.0	2.4	7.6	2.0	4.1
19-----	3.2	3.4	5.5	3.3	8.8	41	2.8	4.9	2.4	8.7	1.9	3.9
20-----	3.3	3.5	4.6	3.2	7.2	7.6	3.0	4.2	2.3	12.1	1.9	3.5
21-----	9.0	3.2	3.6	3.6	6.3	6.4	23	4.2	2.4	5.0	1.9	3.3
22-----	3.7	12.1	3.2	6.4	5.7	26	7.6	3.5	45	4.1	1.8	3.0
23-----	3.5	5.7	2.9	7.9	5.2	12.3	5.7	3.4	14.0	4.2	1.8	2.8
24-----	3.4	4.3	2.6	6.5	8.4	7.4	4.6	13.3	5.2	3.9	1.8	2.7
25-----	5.0	10.7	10.4	13.3	5.5	6.4	4.2	7.3	4.1	3.4	2.0	2.6
26-----	3.9	16.2	4.4	7.6	4.9	5.5	3.9	4.3	3.7	3.2	1.8	2.5
27-----	4.9	8.4	4.7	4.9	4.6	5.0	3.7	5.0	7.6	3.0	1.9	2.8
28-----	7.3	6.6	4.4	4.4	4.4	4.7	3.6	4.3	3.8	2.8	2.0	2.6
29-----	19.5	12.1	4.2	4.4	4.6	4.4	3.7	-----	3.5	2.6	2.0	2.4
30-----	5.9	9.2	8.2	4.3	6.1	4.3	3.4	-----	3.4	2.6	2.9	2.4
31-----	6.1	24	-----	4.3	-----	5.5	7.6	-----	7.9	-----	2.3	-----

*Monthly discharge of Waiakeakua Stream near Wailau, Molokai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	19.5	2.9	4.68	7.24	145	445
August.....	24	3.2	7.19	11.1	223	684
September.....	15.6	2.6	5.99	9.27	180	551
October.....	18.3	3.2	5.65	8.74	175	538
November.....	21	4.2	8.68	13.4	260	799
December.....	41	3.0	7.04	10.9	218	670
January.....	23	2.8	5.42	8.39	168	516
February.....	21	2.4	4.95	7.66	138	425
March.....	45	2.3	5.09	7.88	158	484
April.....	12.1	2.6	4.39	6.79	132	404
May.....	8.7	1.8	2.44	3.78	75.6	232
June.....	41	1.6	5.26	8.14	158	484
The year.....	45	1.6	5.56	8.60	2,030	6,230

#### PULENA STREAM NEAR WAILAU, MOLOKAI

**LOCATION.**—Half a mile above confluence with Waiakeakua Stream, 3 miles south of Wailau landing, and 4 miles northwest of Pukoo village.

**RECORDS AVAILABLE.**—October 30, 1919, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage or from footbridge just below station.

**CHANNEL AND CONTROL.**—Channel rocky and boulder strewn. Banks steep, high, and fairly clean. Control composed of boulders and gravel; subject to shifts.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 457 million gallons a day, or 707 second-feet, from 5.30 to 6 p. m. June 11 (gage height from water-stage recorder, 5.26 feet); minimum discharge, 4.7 million gallons a day, or 7.3 second-foot, several days in March and June (gage height, 0.81 foot).

1919-1926: Maximum discharge recorded, about 1,400 million gallons a day, or 2,170 second-feet, about noon December 24, 1920 (gage height, from water-stage recorder, 11.5 feet); minimum discharge, 3.0 million gallons a day, or 4.6 second-feet, June 28 and July 14, 1920 (gage height, 0.89 foot).

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine amount of water available for irrigation on leeward Molokai.

**UTILIZATION.** Small amount of flow used for irrigation of taro. Most of flow wastes into sea.

**ACCURACY.**—Stage-discharge relation permanent during year except July 1 to August 25, when shifting-control method was used. The basic rating curve is a slight revision above 10 million gallons a day of former curves but owing to probable error of high-stage records a revision of previous data is not practical. This curve is well defined between 4 and 20 million gallons a day and fairly well defined between 20 and 200 million gallons a day; extensions beyond uncertain. A discharge measurement in July of 8.5 million gallons a day is basis of shifting-control method used; four other measurements covering a range from 7.7 to 14 million gallons a day and well distributed during year, check this curve closely. Operation of water-

stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection and corrected when necessary for shifting control or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages except those affected by shifting control and those estimated, which are fair; extremely high stage records poor.

*Discharge, in million gallons a day, of Pulena Stream near Wailau, Molokai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	11.1	8.4	32	7.2	7.2			14.0	7.2	35	5.9	5.8
2.....	9.2	7.9	21	6.6	7.0			8.9	6.6	15.9	5.8	5.1
3.....	8.2	6.8	14.9	13.0	8.4			7.9	6.6	9.7	5.3	5.1
4.....	7.5	8.7	11.7	7.2	12.3		12	7.5	6.1	7.7	5.5	5.0
5.....	7.2	16.8	10.3	7.7	18.1			7.0	5.8	6.8	5.1	5.0
6.....	7.9	19.4	9.5	8.4	14.6			6.8	5.6	9.8	5.3	7.8
7.....	16.2	14.2	8.4	9.5	43			6.6	5.5	8.7	5.0	5.4
8.....	8.2	10.6	8.7	8.2	54		7.9	6.1	5.5	7.5	8.4	5.1
9.....	7.2	8.2	7.9	9.5	39	7.5	7.5	5.9	5.5	6.3	7.0	5.0
10.....	7.5	7.2	7.2	36	23		7.7	9.9	5.3	5.8	4.8	12.0
11.....	12.2	6.8	7.7	11.1	17.7		7.2	7.9	6.3	9.4	4.7	121
12.....	8.2	8.7	11.9	8.4	13.3		6.6	6.1	7.6	22	6.3	44
13.....	7.7	6.6	12.4	7.5	50		6.3	5.9	5.1	8.7	4.8	19.4
14.....	7.5	5.9	8.4	6.8	29		6.3	5.9	5.0	6.6	4.7	16.3
15.....	6.6	5.8	6.8	6.1	38		7.0	5.6	5.0	5.9	4.7	10.6
16.....	6.6	7.0	6.1	5.8	22		11.1	5.3	5.9	5.8	4.8	9.8
17.....	6.1	5.9	7.0	5.6	41		7.7	36	5.0	19.4	4.8	10.1
18.....	6.1	5.9	10.6	5.5	26		6.6	35	4.8	11.6	4.8	8.7
19.....	5.8	6.4	11.0	5.3	24		5.9	11.1	5.5	14.5	4.8	7.9
20.....	5.9	7.2	10.0	5.1	17.7		6.9	8.4	4.8	30	4.8	6.8
21.....	11.3	5.9	7.7	5.9	14.2	24	65	9.5	4.7	11.1	4.8	6.1
22.....	7.0	19.1	6.3	7.5	12.6		26	6.8	23	8.4	4.8	5.8
23.....	6.6	10.4	6.1	5.8	11.4		14.2	6.6	29	13.2	4.8	5.5
24.....	5.9	7.0	5.8	15.2	30		10.3	24	6.8	11.2	4.8	5.3
25.....	10.2	21	12.9	52			8.7	16.2	5.6	7.7	4.8	5.5
26.....	6.8	52	6.3	33			8.2	8.9	5.3	7.7	4.8	5.3
27.....	6.6	25	5.9	13.6	8.5		7.7	9.5	29	6.6	5.0	5.6
28.....	7.7	15.2	5.9	9.5			7.5	8.4	8.4	6.1	5.9	5.3
29.....	29	31	5.8	8.4		8.5	9.8		7.0	5.7	5.7	5.0
30.....	8.9	26	15.6	8.2			7.9		6.6	5.6	10.6	4.8
31.....	9.5	51		7.2			27		32		5.1	

NOTE.—Braced figures give mean discharge for periods indicated, estimated by comparison with record of Waiakeakua Stream near Wailau, Molokai; recorder not operating.

*Monthly discharge of Pulena Stream near Wailau, Molokai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	29	5.8	8.79	13.6	272	836
August.....	52	5.8	14.1	21.8	438	1,340
September.....	32	5.8	10.1	15.6	302	930
October.....	52	5.1	11.2	17.3	347	1,070
November.....	54		20.8	32.2	624	1,910
December.....			12.5	19.3	386	1,190
January.....	65	5.9	12.0	18.6	371	1,140
February.....	36	5.3	10.6	16.4	298	911
March.....	32	4.7	8.78	13.6	272	835
April.....	35	5.6	11.0	17.0	330	1,010
May.....	10.6	4.7	5.43	8.40	168	517
June.....	121	4.8	12.3	19.0	370	1,130
The year.....	121	4.7	11.4	17.6	4,180	12,800

## PELEKUNU STREAM NEAR PELEKUNU, MOLOKAI

**LOCATION.**—Half a mile above confluence with Lanipuni Stream, 2 miles south of Pelekunu Landing, 6 miles north of Kamalo village, and 12 miles by trail northwest of Pukoo village.

**RECORDS AVAILABLE.**—December 1, 1919, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right branch. Discharge measurements, made by wading near gage or from footbridge about 1,000 feet downstream.

**CHANNEL AND CONTROL.**—Stream bed rocky with scattered boulders. Banks steep and rocky. Control, larger boulders wedged into cleft in rock ledge; subject to shift.

**EXTREMES OF DISCHARGE**—Maximum discharge recorded during year, 328 million gallons a day, or 507 second-feet, at 6.45 p. m. December 22 (gage height from water-stage recorder, 7.13 feet); minimum discharge, 2.0 million gallons a day, or 3.1 second-feet, several hours October 21, 23, and 24 (gage height, 2.63 feet).

1919-1926: Maximum discharge recorded, about 1,020 million gallons a day, or 1,580 second-feet, at 10.20 a. m. December 24, 1920 (gage height from water-stage recorder, 8.35 feet); minimum discharge, 1.8 million gallons a day, or 2.8 second-feet, from 5 to 9 p. m. March 7 and July 13, 1920 (gage height, 1.65 feet).

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine amount of water available for irrigation on leeward Molokai.

**UTILIZATION.**—Entire flow wastes into sea.

**ACCURACY.**—Stage-discharge relation changed at time of flood January 31 and affected by backwater during part of August and June. The two rating curves used are well defined between 2 and 20 million gallons a day; extensions beyond uncertain. These curves checked closely by four of the six discharge measurements well distributed during year and covering a range from 4 to 11 million gallons a day; two measurements help define backwater. Operation of water-stage recorder satisfactory during year, except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair for ordinary stages except those estimated, which are poor; high-stage records poor.

*Discharge, in million gallons a day, of Pelekunu Stream near Pelekunu, Molokai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1			13.8	2.8	3.2	6.1	13.1	11.3	4.6	17.2	4.9	3.2
2			9.4	2.4	3.1	5.3	6.2	7.2	4.2	9.0	4.8	3.0
3			6.8	4.7	3.3	5.2	5.2	6.2	4.5	6.0	4.2	2.8
4			5.5	2.8	5.4	4.7	7.7	5.6	4.1	4.9	4.4	2.8
5			4.7	2.4	5.2	4.2	4.8	5.3	4.0	4.6	4.0	2.7
6			4.2	3.1	6.1	3.8	4.2	4.9	3.8	5.7	4.2	6.7
7		4.6	3.8	3.2	23	3.6	4.1	4.8	3.7	5.6	4.0	3.6
8			3.8	3.0	38	3.3	3.6	4.5	3.7	4.9	6.7	3.0
9			3.7	2.8	19.5	3.2	3.3	4.2	3.7	4.2	4.9	2.9
10			3.4	11.2	14.9	2.8	3.4	8.1	3.6	3.9	3.7	6.4
11			3.3	3.8	10.9	2.7	3.2	5.8	4.1	7.1	3.3	63
12			4.4	3.1	8.1	2.6	2.7	4.4	3.8	19.7	3.9	30
13			6.0	2.7	21	2.5	2.5	4.1	3.6	7.1	3.3	12.0
14	4.2		4.1	2.5	16.0	2.4	2.5	4.0	3.6	5.6	3.1	8.8
15	3.6		3.2	2.3	22	3.1	2.7	3.7	3.3	4.9	2.8	6.3
16	3.4		2.8	2.2	13.2	3.3	4.7	3.6	3.8	4.8	2.9	6.3
17	3.3		3.1	2.1	32	2.6	3.0	38	3.3	14.8	2.9	6.4
18	3.3		4.0	2.1	13.0	37	2.4	27	3.1	7.6	2.8	5.1
19	3.1		4.6	2.1	13.1	90	2.2	11.4	3.9	8.5	2.7	4.5
20	3.3		3.8	2.1	9.4	19.8	3.0	8.3	3.1	16.4	2.7	3.9
21	4.4		3.2	2.2	7.4	20	48	8.2	2.9	7.9	2.8	3.4

*Discharge, in million gallons a day, of Pelekunu Stream near Pelekunu, Molokai, for the year ending June 30, 1926—Continued*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
22.....	3.4	14	2.7	2.5	6.4	66	14.4	6.2	5.0	6.4	2.7	3.3
23.....	3.2		2.6	2.1	5.7	45	9.4	5.7	6.0	15.0	2.7	3.0
24.....			2.5	3.4	21	20	6.2	9.0	3.4	14.0	2.6	2.8
25.....			2.4	33	11.8	18.3	5.0	8.4	3.1	8.1	3.1	2.8
26.....	5	15.2	2.3	17.6	8.3	11.4	4.4	5.6	3.0	6.9	3.0	2.6
27.....			2.2	8.1	6.8	8.5	4.1	5.6	18.0	6.0	3.1	2.7
28.....			8.3	2.2	5.3	6.1	7.0	4.0	5.1	4.5	5.4	4.3
29.....			13.2	2.3	4.2	6.4	6.1	5.4	-----	4.0	5.0	3.9
30.....			13.2	5.1	4.0	12.3	5.2	4.0	-----	4.7	4.8	7.0
31.....			19.3	-----	3.4	-----	15.9	22	-----	17.8	-----	3.2

NOTE.—Braced figures give mean discharge for periods indicated, estimated by comparison with record for Lanipuni Stream near Pelekunu, Molokai; recorder not operating. Discharge Aug. 27-29 and June 12-30 from gage heights corrected for backwater determined from two discharge measurements and study of recorder graph.

*Monthly discharge of Pelekunu Stream near Pelekunu, Molokai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July .....			4.35	6.73	135	414
August .....			7.40	11.4	230	704
September .....	13.8	2.2	4.20	6.50	126	387
October .....	33	2.1	4.81	7.44	149	458.
November .....	38	3.1	12.4	19.2	373	114
December .....	90	2.4	13.9	21.5	432	1,320
January .....	48	2.2	6.82	10.6	211	649
February .....	38	3.6	8.08	12.5	226	694
March .....	18.0	2.9	4.77	7.38	148	454
April .....	19.7	3.9	8.07	12.5	242	743
May .....	7.0	2.6	3.70	5.72	115	352
June .....	63	2.2	7.04	10.9	211	648
The year .....	90	2.1	7.12	11.0	2,600	6,940

#### LANIPUNI STREAM NEAR PELEKUNU, MOLOKAI

**LOCATION.**—Half a mile above junction with Pelekunu Stream, 2 miles south of Pelekunu landing, 6 miles north of Kamolo village, and 13 miles by trail northwest of Pukoo village.

**RECORDS AVAILABLE.**—December 1, 1919, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage or from footbridge 200 feet downstream.

**CHANNEL AND CONTROL.**—Channel rocky and boulder strewn. Banks high and rocky. Control of boulders and gravel; subject to shifts.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 300 million gallons a day, or 464 second-feet, at 9.30 p. m. March 31 (gage height from water-stage recorder, 2.95 feet); minimum discharge, 2.2 million gallons a day, or 3.4 second-feet, from 5 to 6 p. m. June 30 (gage height, 0.56 foot).

1919-1926: Maximum discharge recorded, about 1,250 million gallons a day, or 1,930 second-feet, at 10 a. m. December 24, 1920 (gage height from water-stage recorder, 5.90 feet); minimum discharge 1.9 million gallons a day, or 2.9 second-feet, at 3.30 p. m. July 13, 1920 (gage height, 0.68 foot), and at 3 p. m. November 18, 1921 (gage height, 0.12 foot).

DIVERSIONS AND REGULATION.—None.

OBJECT OF STATION.—To determine amount of water available for irrigation on leeward Molokai.

UTILIZATION.—Entire flow wastes into sea.

ACCURACY.—Stage-discharge relation changed at times of floods August 29, April 11, and June 11. The three rating curves used are fairly well defined below 50 million gallons a day and extended above on basis of one old discharge measurement at 156 million gallons a day. These curves checked very closely by seven discharge measurements well distributed during year and covering a range from 2.3 to 29 million gallons a day. Operation of water-stage recorder satisfactory except as indicated in footnote to daily discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair for ordinary stages except those estimated, which are poor; extremely high stage records poor.

*Discharge, in million gallons a day, of Lanipuni Stream near Pelekunu, Molokai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	7.3	6.1	11.9	3.8	5	7.5		5.5	3.7	11.4	4.4	3.7
2.....	6.7	6.3	7.7	3.7				4.6	3.3	5.8	4.0	3.3
3.....	6.3	5.6	6.2	6.6				4.1	3.7	3.6	3.8	3.3
4.....	6.1	6.9	5.3	4.1				3.8	3.6	3.1	3.7	3.3
5.....	6.1	9.9	5.3	3.7				3.7	3.6	3.0	3.4	3.2
6.....	6.9	10.0	5.0	4.4	4.5		4.2	3.6	3.6	6.0	3.5	4.0
7.....	9.4	8.3	4.7	4.4			4.2	3.4	3.6	7.0	3.5	3.3
8.....	6.4	7.3	4.6	4.1			3.8	3.3	3.6	4.2	6.6	3.3
9.....	5.9	6.4	4.6	6.0			3.6	3.3	3.6	3.4	5.4	3.3
10.....	6.1	5.8	4.4	12.4			3.8	9.2	3.7	3.2	3.8	3.9
11.....	7.4	5.6	4.4	5.0	15		3.7	4.4	4.1	4.5	3.5	28
12.....	6.9	5.8	10.4	4.4			3.3	3.7	3.8	13.3	4.1	18.7
13.....	6.4	5.3	6.1	4.1			3.2	3.6	3.6	5.6	3.5	11.9
14.....	6.1	5.2	5.0	3.8			3.1	3.4	3.6	4.6	3.3	7.6
15.....	5.7	5.0	4.6	3.7			3.2	3.2	3.3	4.3	3.0	5.0
16.....	5.6	5.3	4.4	3.6	40		4.2	3.2	4.0	4.1	3.2	4.4
17.....	5.3	5.3	4.6	3.6			3.4	4.6	3.3	13.6	3.2	3.8
18.....	5.3	5.3	5.5	3.3			3.2	25	3.2	7.2	3.1	3.4
19.....	5.2	6.4	5.0	3.3			3.1	7.4	3.2	7.8	3.1	3.4
20.....	5.5	5.8	5.2	3.3			3.8	5.7	3.0	10.8	3.2	3.2
21.....	7.1	5.2	4.7	3.6	9		77	5.0	3.0	5.7	3.1	3.0
22.....	5.8	15.0	4.4	3.6			15.8	4.4	3.9	5.0	3.0	2.7
23.....	5.3	7.3	4.1	3.3			7.4	4.2	5.1	8.2	2.9	2.7
24.....	5.3	6.6	3.8	3.6			5.7	9.5	3.2	6.2	2.8	2.6
25.....	7.0	16.4	4.0	14.4			5.0	5.8	3.0	5.1	3.1	2.6
26.....	5.6	33	3.7	5.9	9		4.6	4.4	3.0	5.0	3.0	2.6
27.....	5.6	21	3.7	4.4			4.4	4.4	6.0	4.3	3.1	3.0
28.....	6.5	10.6	3.6	4.1			4.1	3.8	3.2	4.1	3.9	2.6
29.....	15.1	19.6	3.6				4.8		3.1	3.9	5.1	2.4
30.....	6.9	11.5	7.2	4.0			4.0		3.7	3.8	6.2	2.3
31.....	6.7	23					19.2		22		3.4	

NOTE.—Braced figures give mean discharge for periods indicated, estimated by comparison with record of flow for Pelekunu Stream near Pelekunu, Molokai; gage-height record either faulty or missing.

*Monthly discharge of Lanipuni Stream near Pelekunu, Molokai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	15.1	5.2	6.56	10.1	204	624
August.....	33	5.0	9.57	14.8	297	910
September.....	11.9	3.6	5.26	8.14	158	484
October.....	14.4	3.3	4.72	7.30	146	449
November.....			13.0	20.1	390	1,200
December.....			14.5	22.4	450	1,330
January.....	77	3.1	7.85	12.1	243	747
February.....	46	3.2	6.84	10.6	192	588
March.....	22	3.0	4.20	6.50	130	400
April.....	13.6	3.0	5.93	9.18	178	546
May.....	6.6	2.8	3.71	5.74	115	353
June.....	28	2.3	5.02	7.77	150	462
The year.....			7.27	11.2	2,650	8,090

**WAIKOLU STREAM AT PIPE-LINE CROSSING NEAR KALAUPAPA, MOLOKAI**

**LOCATION.**—At 300-foot elevation 1 mile above mouth of stream and 4 miles southeast of Kalaupapa.

**RECORDS AVAILABLE.**—June 2, 1919, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank. Discharge measurements made by wading near gage.

**CHANNEL AND CONTROL.**—Stream bed composed of sand, gravel, and boulders. Right bank steep and rocky; left bank is overflowed at high stages. Control is concrete casing of 8-inch water main; not sensitive at low stages and subject to shifts caused by grass and flood damage, and subsequent repairs.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 449 million gallons a day, or 695 second-feet, at 6 a. m. January 21 (gage height from water-stage recorder, 7.36 feet); minimum discharge 3.2 million gallons a day, or 5.0 second-feet, several hours November 1-2 and at 11 p. m. June 5 (gage height, 4.17 feet).

1919-1926: Maximum discharge recorded, 1,270 million gallons a day, or 1,960 second-feet, at 10.30 a. m. December 24, 1920 (gage height from water-stage recorder, 10.20 feet); minimum discharge, 2.8 million gallons a day, or 4.3 second-feet, from 6 to 8 a. m. September 26, 1921 (gage height, 3.92 feet).

**DIVERSIONS AND REGULATION.**—Intake ditch for Kalaupapa water supply diverts about 2.5 million gallons a day at about 500-foot elevation. Some of this water returns to stream just below station.

**OBJECT OF STATION.**—To determine amount of water available for proposed power and irrigation project for leper settlement and for irrigation on leeward Molokai.

**UTILIZATION.**—Part of water used for irrigation of taro; remainder wastes into sea.

**ACCURACY.**—Stage-discharge relation practically permanent except from December 18 to January 21, when shifting-control method was used. Basic rating curve fairly well defined below 50 million gallons a day; extension above uncertain. This curve checked closely by three discharge measurements made in July, May, and June and covering a range from 3.6 to 6.8 million gallons a day. A measurement of 5.0 million gallons a day in January is basis of shifting-control method used. Operation of water-stage recorder satisfactory during year. Daily discharge ascertained by applying to rating table mean daily

gage height determined from recorder graph by inspection and corrected when necessary for shifting control or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair except high-stage records, which are poor.

*Discharge, in million gallons a day, of Waikolu Stream at pipe-line crossing near Kalaupapa, Molokai, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	9.7	5.6	9.7	5.0	3.4	5.3	19.6	9.5	4.7	21	4.4	4.7
2	7.2	5.6	6.5	5.0	3.4	4.7	6.2	5.3	4.4	8.8	4.1	4.7
3	7.2	5.6	5.3	6.8	3.4	4.7	5.6	4.7	4.4	5.6	4.1	3.8
4	6.5	5.9	5.0	6.2	3.4	4.4	10.1	4.7	4.4	4.7	4.1	3.6
5	6.5	9.3	4.7	5.3	3.6	4.4	5.9	4.4	4.4	4.4	4.1	3.4
6	6.8	11.4	4.7	5.3	4.4	4.4	5.3	4.7	4.1	7.0	4.1	4.1
7	7.2	8.8	4.7	5.3	16.5	4.4	5.9	4.4	4.1	8.0	4.1	4.7
8	6.5	6.8	4.7	5.0	22	4.7	5.0	4.4	4.1	6.2	5.9	3.8
9	5.6	6.2	5.3	4.7	16.2	4.7	4.7	4.4	4.1	5.0	6.8	3.8
10	5.6	5.9	5.0	10.2	6.8	4.4	4.7	11.8	4.1	4.7	4.7	3.8
11	5.9	5.9	4.7	6.5	4.4	4.4	4.7	7.6	4.1	7.4	4.4	62
12	6.2	5.9	9.0	5.3	4.1	4.4	4.4	5.3	4.1	26	4.4	23
13	6.8	5.6	10.1	4.7	9.6	4.4	4.4	5.0	4.1	7.2	4.1	9.7
14	6.2	5.6	7.2	4.4	9.3	4.4	4.1	4.7	4.1	5.3	4.1	7.6
15	5.9	5.6	5.6	4.4	19.7	4.4	4.1	4.7	4.1	4.7	4.1	5.6
16	5.6	5.6	5.3	4.4	6.2	4.4	4.4	4.4	4.1	4.7	4.1	5.6
17	5.6	5.6	5.3	4.4	10.4	4.4	4.4	53	4.1	8.8	4.1	5.9
18	5.6	5.6	5.3	4.4	8.8	61	4.4	26	4.1	6.2	4.1	5.9
19	5.6	5.6	5.3	4.4	6.2	56	4.1	6.8	4.1	5.9	4.1	4.7
20	5.9	5.3	5.6	4.4	5.6	8.4	4.7	5.6	4.1	10.4	4.1	4.4
21	6.2	5.3	5.6	4.4	4.7	12.8	104	5.3	4.1	5.6	4.1	4.1
22	6.5	8.0	5.3	4.4	4.4	40	14.8	5.3	4.1	5.0	4.1	3.8
23	6.2	7.2	5.3	4.4	4.1	16.5	6.2	5.3	5.6	5.0	4.1	3.8
24	5.9	5.9	5.0	4.4	45	6.8	5.3	5.3	4.4	7.6	4.1	3.8
25	6.5	5.9	5.0	55	10.3	9.7	4.7	6.2	4.1	4.7	4.1	3.8
26	6.8	24	5.0	15.2	5.6	5.6	4.4	5.3	3.8	4.7	4.1	3.8
27	5.9	16.4	4.7	6.5	5.0	4.7	4.7	5.0	14.4	4.4	4.1	3.8
28	5.6	9.3	5.0	3.8	4.7	4.1	4.4	4.7	5.9	4.4	4.4	3.8
29	14.3	11.0	5.0	3.6	4.7	4.1	7.4	-----	5.3	4.4	4.7	3.8
30	7.6	11.7	5.0	3.6	6.8	3.8	5.9	-----	6.2	4.4	5.6	3.8
31	6.2	14.6	-----	3.4	-----	30	27	-----	22	-----	5.0	-----

*Monthly discharge of Waikolu Stream at pipe-line crossing near Kalaupapa, Molokai, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	14.3	5.6	6.64	10.3	206	632
August	24	5.3	7.96	12.3	247	757
September	10.1	4.7	5.66	8.76	170	521
October	55	3.4	6.93	10.7	215	659
November	45	3.4	8.76	13.6	263	807
December	61	3.8	11.0	17.0	340	1,050
January	104	4.1	9.85	15.2	306	937
February	53	4.4	7.99	12.4	224	687
March	22	3.8	5.28	8.17	164	502
April	26	4.4	7.07	10.9	212	651
May	6.8	4.1	4.40	6.81	136	419
June	62	3.4	7.10	11.0	213	654
The year	104	3.4	7.38	11.4	2,700	8,280

## ISLAND OF MAUI

## HONOKAHAU STREAM NEAR HONOKAHAU, MAUI

**LOCATION.**—1,000 feet above intake of Honokahau ditch, at elevation 910 feet, and 6 miles southeast of Honokahau.

**RECORDS AVAILABLE.**—March 7, 1913, to September 19, 1920, and May 2, 1922, to June 30, 1926. Staff gage readings at old site on diversion dam August 13 to December 31, 1911.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank. Discharge measurements made by wading near gage or from cable 600 feet downstream.

**CHANNEL AND CONTROL.**—Bed of stream composed of small boulders and gravel. One channel at all stages; curved above and below gage. Left bank high and clean; right bank sloping and covered with vegetation. Control composed of large boulders and coarse gravel; subject to shifts.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, about 720 million gallons a day, or 1,110 second-feet, at 7.45 a. m. December 19 (gage height from faulty water-stage recorder graph, about 5.00 feet); minimum discharge, 6.2 million gallons a day, or 9.6 second-feet, at 3.30 p. m. to 12 p. m. June 30 (gage height, 0.92 foot; affected by backwater).

1913-1920; 1922-1926: Maximum discharge recorded, 2,200 million gallons a day, or 3,400 second-feet, at 6.40 a. m. February 15, 1924 (gage height from water-stage recorder, 7.92 feet); minimum discharge, that of June 30, 1926.

**DIVERSIONS AND REGULATION.**—None above station. All ordinary stream flow and the inflow from two development tunnels below gage is diverted into Honokahau ditch 1,000 feet below station.

**OBJECT OF STATION.**—To determine resources of stream.

**UTILIZATION.**—Normal flow of stream diverted into Honokahau ditch for irrigation of sugarcane and for development of power.

**ACCURACY.**—Stage-discharge relation shifted at times of floods August 26 and February 17; affected by backwater as indicated in footnote to daily-discharge table. The three rating curves used are fairly well defined below 40 million gallons a day; extension above uncertain. These curves are checked closely by five discharge measurements, well distributed during year and covering a range from 6 to 35 million gallons a day. Three other measurements help determine backwater during year. Operation of water-stage recorder satisfactory during year. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair to poor.

*Discharge, in million gallons a day, of Honokahau Stream near Honokahau, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	19.5	21	42	13.8	13.8	12.3	34	13.0	8.9	12.0	8.2	9.0
2.....	21	33	22	12.9	13.5	11.6	12.5	10.6	8.7	9.4	8.3	8.5
3.....	16.9	16.9	16.3	21	13.1	11.3	11.3	10.3	8.7	8.8	8.7	8.3
4.....	16.4	25	14.6	13.6	27	11.3	35	10.2	8.7	8.6	9.1	8.2
5.....	16.4	93	14.6	13.1	28	11.3	12.5	10.2	8.6	8.5	8.8	8.0
6.....	17.5	86	14.0	19.6	17.0	11.1	11.3	10.2	8.6	9.1	9.4	8.0
7.....	52	26	13.6	15.8	103	11.1	11.1	10.2	8.5	13.6	15.5	8.1
8.....	17.5	23	13.8	21	59	11.3	11.0	10.0	8.5	10.0	25	8.0
9.....	14.6	18.7	19.2	40	72	11.1	11.0	10.3	8.8	8.9	10.2	7.9
10.....	14.2	16.4	17.3	56	16.7	11.0	11.0	34	8.6	8.5	8.5	8.8
11.....	23	16.1	26	14.8	17.4	11.0	22	18.9	8.7	8.6	8.2	78
12.....	15.6	16.9	33	13.1	12.9	11.0	11.3	11.3	8.6	19.7	50	47
13.....	14.8	15.8	15.8	12.7	29	11.0	10.8	10.3	8.5	11.2	9.9	22
14.....	16.1	15.8	14.6	12.5	23	11.0	10.6	10.2	9.5	9.1	8.5	35
15.....	14.6	16.4	13.6	12.3	52	12.1	11.3	10.0	8.5	8.7	8.3	12.9

*Discharge, in million gallons a day, of Honokahau Stream near Honokahau, Maui, for the year ending June 30, 1926—Continued*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
16.....	14.0	24	13.1	12.0	44	13.2	16.5	9.8	9.5	9.5	8.5	7.5
17.....	14.6	16.9	18.5	12.0	75	11.1	11.4	87	8.7	23	8.1	7.2
18.....	15.8	19.8	38	12.0	26	11.1	10.8	49	8.5	15.7	8.1	6.9
19.....	14.0	23	28	12.0	18.5	99	10.5	10.3	8.6	12.7	8.1	8.7
20.....	15.1	20	26	12.0	13.4	12.3	10.5	9.5	8.6	15.6	8.1	7.5
21.....	23	19.3	20	13.4	12.5	11.3	156	11.5	8.5	9.4	8.1	6.7
22.....	15.8	77	13.6	12.7	12.0	16.2	15.9	9.0	9.4	8.6	8.1	6.4
23.....	14.6	27	13.4	11.8	12.0	17.0	11.6	9.0	9.9	11.7	8.7	6.4
24.....	14.2	66	12.9	19.1	18.6	11.3	11.0	26	8.6	12.8	8.2	6.4
25.....	16.7	28	14.0	23	15.6	11.3	10.5	11.8	8.5	13.7	9.2	6.4
26.....	14.4	109	12.7	19.1	12.3	11.1	10.5	9.1	8.3	10.2	8.7	6.3
27.....	17.2	118	12.7	13.1	12.7	11.0	10.5	10.8	9.0	8.7	10.9	6.3
28.....	15.1	36	13.9	12.0	12.0	11.0	10.5	10.3	8.8	8.5	8.6	6.3
29.....	72	55	13.1	11.6	12.9	10.8	10.6	-----	8.8	8.2	33	6.2
30.....	19.5	23	41	11.8	18.8	10.6	13.1	-----	8.6	8.2	23	6.2
31.....	25	95	-----	12.0	-----	21	22	-----	9.1	-----	9.9	-----

NOTE.—Discharge July 7-28 and June 11-30 from gage heights corrected for backwater determined from three discharge measurements and study of recorder graph and engineers' notes.

*Monthly discharge of Honokahau Stream near Honokahau, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	72	14.0	19.7	30.5	611	1,870
August.....	118	15.8	38.6	59.7	1,200	3,670
September.....	42	12.7	19.4	30.0	581	1,790
October.....	56	11.6	16.5	25.5	512	1,570
November.....	103	12.0	27.1	41.9	814	2,500
December.....	99	10.6	14.8	22.9	459	1,410
January.....	156	10.5	18.3	28.3	569	1,740
February.....	87	9.0	16.2	25.1	453	1,390
March.....	9.9	8.3	8.74	13.5	271	831
April.....	23	8.2	11.0	17.0	331	1,010
May.....	50	8.1	12.1	18.7	374	1,150
June.....	78	6.2	12.6	19.5	379	1,160
The year.....	156	6.2	17.9	27.7	6,550	20,100

#### HONOKAWAI DITCH NEAR LAHAINA, MAUI

**LOCATION.**—75 feet below intake on Honokawai Stream, 2½ miles above Pioneer Mill Co.'s power house, and 7½ miles northeast of Lahaina.

**RECORDS AVAILABLE.**—May 28, 1921, to June 30, 1926. At station 1¼ miles downstream November 14, 1918, to May 27, 1921; at station half a mile downstream on old ditch line, July 1, 1912, to December 31, 1917. Records not comparable.

**EQUIPMENT.**—Gurley 7-day water-stage recorder on left bank about 25 feet inside of tunnel portal. Records changed by employee of Pioneer Mill Co. Discharge measurements made from plank across ditch at gage.

**CHANNEL AND CONTROL.**—Concrete-lined ditch section in tunnel a quarter of a mile long; subject to backwater from collection of gravel at a point about 500 feet below gage where tunnel widens.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 48 million gallons a day, or 74 second-feet, at 6.30 a. m. August 26 (gage height, from water-stage recorder, 2.08 feet); minimum discharge, 3.1 million gallons a day, or 4.8 second feet, at 10 p. m. April 9 (gage height, 0.20 foot).

1912-1926: Maximum discharge recorded, 69 million gallons a day, or 107 second-feet, at 4.15 p. m. September 10, 1922 (gage height, from water-

stage recorder, 2.71 feet); minimum discharge, no flow, occasionally, when water is shut out of ditch.

**DIVERSIONS AND REGULATION.**—Completely regulated by head gates at intake.

A diversion ditch  $1\frac{1}{2}$  miles below station takes care of excess flood waters when head gates are open.

**OBJECT OF STATION.**—Most of drainage area in Territorial lands. Data valuable in relation to Territorial lease to Pioneer Mill Co.

**UTILIZATION.**—Water used for development and irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation changed, presumably, November 7, December 8, and April 9 and possibly at other times not indicated by available data; affected by backwater May 31 to June 30. Two rating curves used fairly well defined between 3 and 15 million gallons a day; extension beyond these limits uncertain. These curves checked fairly well by 10 discharge measurements well distributed during year; two other measurements help define backwater. Operation of water-stage recorder satisfactory during year, but gage-height record is very unsatisfactory owing to doubtful corrections. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by use of integrator. Records poor.

Honokawai ditch diverts from Honokawai Stream at elevation about 1,570 feet. The water is carried southwestward through a tunnel about  $1\frac{1}{4}$  miles long to elevation about 1,550 feet. Here the general course of the ditch changes to north of west and the water is carried down a small gulch to power house No. 1 at elevation about 950 feet and thence nearly due south to the vicinity of Lahaina where the water is used by the Pioneer Mill Co. for irrigation and development of sugarcane. The system comprises about  $5\frac{1}{2}$  miles of main ditch.

*Discharge, in million gallons a day, of Honokawai ditch near Lahaina, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	5.8	5.8	10.1	5.1	4.2	4.2	10.7	4.7	4.3	3.8	3.5	3.2
2	5.8	9.4	6.9	4.6	4.6	3.8	4.8	4.0	4.3	3.6	3.5	3.2
3	4.4	4.7	5.4	5.4	4.6	3.7	4.4	4.0	4.2	3.4	3.5	3.2
4	4.4	7.5	5.0	5.1	8.5	3.7	9.8	4.0	4.1	3.4	3.5	3.2
5	4.4	28	4.8	4.8	6.7	3.7	5.0	4.0	4.1	3.3	3.5	3.1
6	4.6	18.6	4.7	6.6	6.5	3.7	4.6	4.0	4.1	3.3	3.8	3.1
7	13.3	5.9	4.6	6.8	19.4	3.6	4.4	4.1	4.0	3.4	7.8	3.1
8	5.9	5.0	4.6	8.0	18.2	3.8	4.3	4.1	4.0	3.2	7.5	3.1
9	4.6	4.7	4.6	11.0	18.6	4.1	4.3	4.1	4.0	3.2	3.9	3.1
10	4.6	4.6	5.1	13.2	5.5	4.1	4.3	9.2	3.9	3.4	3.4	3.1
11	8.0	4.4	4.9	5.1	4.8	4.1	6.5	6.6	3.9	3.2	3.4	13.4
12	4.7	4.6	7.0	4.6	3.8	4.1	4.7	4.4	3.9	5.1	11.5	13.3
13	4.7	4.6	5.4	4.4	9.3	4.1	4.6	4.2	3.9	3.3	3.7	5.8
14	4.8	4.6	5.1	4.4	7.5	4.1	4.4	4.2	3.8	3.3	3.5	11.4
15	4.7	4.4	5.1	4.3	17.6	4.1	4.3	4.2	3.8	3.5	3.5	6.7
16	4.6	4.6	4.6	4.3	12.3	4.4	5.6	4.2	3.8	3.5	3.5	3.7
17	4.6	4.6	4.7	4.3	17.2	4.3	4.6	18.2	3.7	13.2	3.5	3.2
18	4.6	5.9	10.4	4.3	7.6	4.2	4.2	17.3	3.7	4.9	3.5	3.2
19	4.6	7.7	8.6	4.3	6.8	19.9	4.2	4.9	3.8	4.9	3.5	3.2
20	4.7	6.1	8.0	4.3	4.1	5.5	4.2	4.4	3.7	6.7	3.5	3.0
21	6.4	5.6	7.6	4.3	3.9	4.9	24	7.0	3.8	3.7	3.5	3.0
22	4.9	19.4	4.8	4.3	3.8	7.2	5.6	4.8	3.7	3.6	3.5	3.0
23	4.7	7.3	4.6	4.3	4.7	8.4	4.3	4.7	3.6	3.8	3.5	3.0
24	4.7	13.9	4.6	8.6	4.7	4.9	4.2	7.4	3.7	4.4	3.5	2.9
25	5.4	9.3	4.6	12.0	3.9	4.8	4.2	5.6	3.7	3.7	3.8	2.9
26	4.3	33	4.6	8.2	4.3	4.7	4.2	4.6	3.6	3.7	3.6	2.9
27	4.3	31	4.6	5.4	3.7	4.7	4.2	5.5	3.6	3.6	4.6	2.9
28	4.3	12.6	4.4	4.7	3.7	4.7	4.2	5.2	3.6	3.5	3.7	2.9
29	14.0	20	4.4	4.4	3.9	4.7	4.2	-----	3.5	3.5	10.4	2.9
30	4.9	10.2	14.6	4.3	6.0	4.7	4.2	-----	3.5	3.5	16.1	2.9
31	6.3	26	-----	4.3	-----	5.9	7.3	-----	3.5	-----	3.4	-----

NOTE.—Discharge May 31 to June 30 from gage heights corrected for backwater determined from two discharge measurements and study of gage-height graph and engineer's notes.

*Monthly discharge of Honokawai ditch near Lahaina, Maui, for the year ending June 30, 1926*

Month	Discharge			Total run-off	
	Million gallons a day			Second-feet (mean)	Acre-feet
	Maximum	Minimum	Mean		
July.....	14.0	4.3	5.55	8.59	528
August.....	33	4.4	10.8	16.7	1,030
September.....	14.6	4.4	5.95	9.21	548
October.....	13.2	4.3	5.80	8.97	552
November.....	19.4	3.7	7.68	11.9	707
December.....	19.9	3.6	5.06	7.83	481
January.....	24	4.2	5.63	8.71	536
February.....	18.2	4.0	5.84	9.04	502
March.....	4.3	3.5	3.83	5.93	364
April.....	13.2	3.2	4.09	6.33	377
May.....	16.1	3.4	4.73	7.32	450
June.....	13.4	2.9	4.25	6.58	391
The year.....	33	2.9	5.77	8.93	6,470

#### KANAHĀ STREAM ABOVE PIPE-LINE INTAKE, NEAR LAHAINA, MAUI

**LOCATION.**—200 feet above intake of pipe line supplying Lahaina and Lahainaluna School and 2½ miles northeast of Lahaina, at elevation 1,057 feet.

**RECORDS AVAILABLE.**—February 29, 1916, to June 30, 1926. From August 5, 1911, to January 18, 1916, at a station about 1 mile downstream.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank. Discharge measurements made by wading near gage.

**CHANNEL AND CONTROL.**—One channel at all stages; fairly straight near gage; filled with large boulders. Banks steep and high. Control composed of large boulders; subject to shift. Control stabilized to some extent by grouting on June 21, 1923.

**EXTREMES OF DISCHARGE.**—Maximum and minimum discharges during year are unknown owing to faulty gage-height record.

1916-1926: Maximum discharge recorded, 314 million gallons a day, or 486 second-feet at 10.30 a. m. November 26, 1918 (gage height from water-stage recorder, 3.79 feet); minimum discharge, 1.8 million gallons a day, or 2.8 second-feet, August 9-11 and 17-19, 1920 (gage height, 0.92 foot), and at 11 p. m. November 14, 1921 (gage height, 0.93 foot).

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—Data valuable with relation to Territorial agreement with Pioneer Mill Co. pertaining to division of water.

**UTILIZATION.**—Water used for domestic supply, development of power, and irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation changed several times as indicated by nine discharge measurements well distributed during year. Rating curves used during periods of discharge record fairly well defined between 1 and 15 million gallons a day; extended above on basis of one discharge measurement at 49 million gallons a day. This curve checked very closely at 1.5 million gallons a day by two discharge measurements made during June. One other measurement helps to define backwater April 11 to June 11. Operation of water-stage recorder mostly unsatisfactory as indicated in footnote to daily discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair.

*Discharge, in million gallons a day, of Kanaha Stream above pipe-line intake near Lahaina, Maui, for the year ending June 30, 1926*

Day	Nov.	Apr.	May	June	Day	Nov.	Apr.	May	June
1-----			1.9	1.9	16-----	5.1	2.3	1.8	1.9
2-----			1.9	1.8	17-----	5.4	10.5	1.8	2.1
3-----			1.9	1.7	18-----	5.5	2.3	1.8	1.9
4-----			2.0	1.7	19-----	5.8	2.5	1.8	1.7
5-----			1.9	1.7	20-----		2.3	1.8	1.6
6-----			2.7	1.8	21-----		2.0	1.8	1.6
7-----			6.6	1.8	22-----		1.9	1.8	1.6
8-----	18.6		7.3	1.8	23-----		1.9	1.9	1.6
9-----	11.0		2.0	1.8	24-----		1.9	1.8	1.6
10-----	2.9		1.9	1.8	25-----		1.9	2.5	1.6
11-----	2.8	2.4	1.8	13.1	26-----		1.9	2.0	1.6
12-----	2.4	2.5	2.4	8.7	27-----		1.9	2.0	1.8
13-----	8.3	2.0	1.9	2.0	28-----		1.9	2.2	1.7
14-----	10.5	2.0	1.8	9.9	29-----		1.9	4.6	1.6
15-----	17.4	2.0	1.8	2.4	30-----		1.9	7.9	1.6
					31-----			1.9	

NOTE.—Data insufficient for estimating discharge July 1 to Nov. 6 and 20 to Apr. 10 when gage-height record is valueless owing to plugged intake to stilling well. Discharge Apr. 11 to June 11 from gage height corrected for backwater determined from one discharge measurement and study of recorder graph and engineer's notes.

*Monthly discharge of Kanaha Stream above pipe-line intake near Lahaina, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
April-----	10.5					
May-----	7.9	1.8	2.55	3.95	79.2	243
June-----	13.1	1.6	2.65	4.10	79.4	244

#### OLOWALU DITCH NEAR OLOWALU, MAUI

**LOCATION.**—425 feet above intake to penstock of hydroelectric power station, 1 mile above Olowalu, and 7 miles east of Lahaina.

**RECORDS AVAILABLE.**—July 28, 1916, to June 30, 1926. Replaces old station in tailrace of power house, for which records are available August 12, 1911, to June 30, 1916.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank. Discharge measurements made from ditch banks near gage (ditch only about 3 feet wide at measuring section).

**CHANNEL AND CONTROL.**—Channel about 3.5 feet wide, cut in earth and rock; straight for 50 feet above and below gage. Channel control; subject to shifts.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 8.6 million gallons a day, or 13.3 second-feet, at 7 a. m. December 19 (gage height from water-stage recorder, 1.19 feet); minimum discharge, 0.9 million gallons a day, or 1.4 second-feet, from 10 a. m. to 2.15 p. m. October 26 (gage height, -0.11 foot).

1916-1926: Maximum discharge recorded, 18 million gallons a day, or 28 second-feet, at 3 a. m. December 25, 1920 (gage height from water-stage recorder, 1.53 feet); minimum discharge, no flow, occasionally, when water is shut out of ditch.

DIVERSIONS AND REGULATION.—Regulated by head gates.

OBJECT OF STATION.—Data valuable in relation to Territorial lease to Olowalu Co.

UTILIZATION.—After passing through power house water is used for irrigation of sugarcane. A small amount is sometimes diverted for irrigation at higher levels and does not pass through power house.

ACCURACY.—Stage-discharge relation changed presumably when ditch was cleaned May 6 and at time of flood May 29. Shifting-control method used July 2 to October 25 and February 19 to May 6. Two rating curves used are fairly well defined. The rating for the year is well supported by 12 discharge measurements well distributed during year and covering a range from 2.5 to 5.0 million gallons a day. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair except those estimated, which are poor.

Olowalu ditch diverts from Olowalu Stream at elevation about 450 feet. The water is carried about 1 mile southwestward along the side of Olowalu Gulch to a point where it drops about 200 feet to a power house; thence it continues southwestward for about 1 mile to near Olowalu, where the water is used for irrigation of sugarcane by the Olowalu Co.

*Discharge, in million gallons a day, of Olowalu ditch near Olowalu, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	7.0	3.4	7.3	3.2	4.1	4.4	5.6	4.4	3.2	2.2	2.4	2.5
2.....	5.9	3.8	7.3	3.0	3.8	4.4	4.7	3.8	3.1	2.2	2.4	2.4
3.....	5.3	3.4	7.3	3.5	3.8	4.7	4.4	3.5	3.0	2.1	2.4	2.4
4.....	5.0	4.0	6.6	3.1	3.8	4.4	4.4	3.4	3.0	2.1	2.4	2.5
5.....	4.7	6.0	5.9	2.9	4.1	4.1	4.4	3.5	2.9	2.0	2.3	
6.....	4.8	6.2	5.0	3.2	4.1	3.8	4.1	3.4	2.8	2.1	2.5	
7.....	5.1	6.2	4.7	3.0	5.8	3.8	3.8	3.4	2.8	2.2	3.2	2.5
8.....	4.7	5.6	4.4	3.3	8.0	3.8	3.8	3.3	2.8	2.2	4.2	
9.....	4.4	4.4	4.1	3.0	8.0	3.8	3.8	3.3	2.9	2.2	3.3	
10.....	4.1	3.8	4.4	4.7	8.0	3.5	3.5	3.9	2.8	2.2	2.8	
11.....	4.7	3.4	4.1	3.4	7.0	3.5	4.1	4.1	2.8	2.6	2.6	
12.....	4.1	3.2	5.6	3.0	6.2	3.5	3.5	3.5	2.8	2.4	3.9	
13.....	3.8	3.0	4.6	2.8	6.9	3.4	3.3	3.4	2.7	1.9	3.4	4.8
14.....	4.1	3.0	4.4	2.7	7.3	3.4	3.3	3.3	2.7	1.9	2.8	
15.....	3.8	2.8	4.1	2.6	8.4	3.4	3.4	3.2	2.6	1.9	2.7	
16.....	3.8	3.4	3.8	2.5	8.4	3.5	3.4	3.2	2.8	2.0	2.6	
17.....	3.8	3.0	4.1	2.5	8.4	3.4	3.2	5.0	2.8	3.5	2.6	
18.....	3.8	3.0	4.7	2.5	8.4	4.1	3.1	7.6	2.6	2.6	2.5	
19.....	3.5	2.8	6.1	2.5	8.4	5.9	3.1	4.7	2.5	2.6	2.5	
20.....	3.8	3.2	5.3	2.5	8.0	5.0	3.4	4.1	2.5	2.6	2.4	
21.....	4.1	3.2	6.1	2.6	7.3	3.2	6.2	4.7	2.5	2.2	2.4	
22.....	3.9	6.3	4.7	2.4	6.6	3.0	5.6	3.8	2.6	2.4	2.4	2.4
23.....	3.8	7.0	4.0	2.4	5.9	3.5	4.1	3.5	2.4	2.2	2.4	
24.....	3.5	5.6	3.8	3.2	6.2	3.5	3.8	4.3	2.4	2.4	2.5	
25.....	3.5	6.6	3.4	3.7	5.6	3.2	3.8	4.1	2.4	2.5	2.6	
26.....	3.4	8.0	3.3	3.0	5.3	2.8	3.5	3.5	2.6	2.5	2.6	
27.....	3.4	8.0	3.1	4.8	4.7	2.6	3.8	3.4	3.3	2.4	2.6	
28.....	3.8	8.0	3.1	4.7	4.6	3.8	4.4	3.4	2.5	2.4	2.6	2.5
29.....	5.8	7.6	3.0	3.3	4.7	4.4	3.8		2.4	2.4	2.7	2.5
30.....	4.1	7.6	3.9	4.1	5.1	4.4	3.5		2.3	2.4	4.8	2.4
31.....	3.5	7.3		4.4		5.3	5.1		2.2		2.8	

NOTE.—Braced figures give mean discharge for periods indicated, estimated by comparison with records of near-by streams; recorder not operating properly.

*Monthly discharge of Olowalu ditch near Olowalu, Maui, for the year ending  
June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	7.0	3.4	4.29	6.64	133	408
August.....	8.0	2.8	4.93	7.63	153	469
September.....	7.3	3.0	4.74	7.33	142	436
October.....	4.8	2.4	3.18	4.92	98.5	303
November.....	8.4	3.8	6.23	9.64	187	574
December.....	5.9	2.6	3.85	5.96	120	366
January.....	6.2	3.1	4.00	6.19	124	381
February.....	7.6	3.2	3.88	6.00	109	333
March.....	3.3	2.2	2.70	4.18	83.7	257
April.....	3.5	1.9	2.31	3.57	69.3	213
May.....	4.8	2.3	2.78	4.30	86.3	264
June.....	-----	-----	2.91	4.50	87.4	268
The year.....	8.4	1.9	3.81	5.89	1,390	4,270

**HANAWI STREAM NEAR NAHIKU, MAUI**

**LOCATION.**—200 feet above Koolau ditch intake and trail, 2 miles southwest of Nahiku post office, 6½ miles east of Upper Keanae, and 11½ miles by road and trail west of Hana.

**RECORDS AVAILABLE.**—January 9, 1914, to January 6, 1916, and November 1, 1921, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage or from footbridge 100 feet upstream.

**CHANNEL AND CONTROL.**—Channel at gage is a pool with nearly vertical rock walls. Control is rock ledge.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 414 million gallons a day, or 641 second-feet, at 5 p. m. September 13 (gage height from water-stage recorder, 6.10 feet); minimum discharge, 1.4 million gallons a day, or 2.2 second-feet, from 1 to 5 p. m. April 10 (gage height, 0.18 foot).

1914-1916; 1921-1926: Maximum stage from floodmarks, about 20 feet, during flood of January 18, 1916 (discharge not determined). Minimum discharge recorded, that of April 10, 1926.

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine amount of water diverted into Koolau ditch in connection with Territorial water license to ditch company.

**UTILIZATION.**—Normal flow is diverted into Koolau ditch for irrigation of sugar-cane.

**ACCURACY.**—Stage-discharge relation probably permanent during year. Rating curve fairly well defined between 2 and 100 million gallons a day; extension above uncertain. One of the two discharge measurements made during year checks this curve closely at 10 million gallons a day. Operation of water-stage recorder satisfactory during year. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages; high and low stage records poor.

*Discharge, in million gallons a day, of Hanawi Stream near Nahiku, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	9.1	7.3	18.4	5.6	3.3	5.9	7.1	2.4	2.2	1.6	1.6	1.8
2.....	6.7	12.8	11.6	4.8	3.3	5.6	3.1	2.3	2.1	1.6	1.6	1.6
3.....	5.6	5.8	8.8	5.9	3.6	5.2	2.7	2.2	2.1	1.5	1.6	1.6
4.....	5.0	6.8	8.2	4.7	4.4	4.9	3.8	2.2	2.0	1.5	1.6	1.6
5.....	4.6	29	8.1	4.5	13.4	4.7	3.0	2.1	2.0	1.5	1.6	1.6
6.....	4.3	19.7	8.0	6.1	6.2	4.5	2.6	2.0	1.9	1.6	1.6	1.8
7.....	6.5	11.8	7.8	6.0	71	4.3	2.5	2.0	1.8	1.5	3.6	1.6
8.....	5.2	8.0	7.7	6.7	32	4.0	2.5	2.0	1.8	1.6	3.2	1.5
9.....	4.2	6.7	7.7	6.7	19.0	3.9	2.5	2.2	1.8	1.4	2.1	1.5
10.....	4.0	5.8	7.5	7.1	9.0	3.6	2.4	3.6	1.8	1.4	1.9	1.6
11.....	5.8	4.8	13.7	4.9	7.1	3.5	2.7	3.2	1.8	1.4	3.8	42
12.....	5.0	4.5	11.4	4.5	5.7	3.2	2.4	2.1	1.7	1.9	2.5	45
13.....	4.4	4.1	66	4.3	8.3	3.1	2.3	2.1	1.7	2.2	2.1	30
14.....	4.0	3.9	13.1	3.9	8.4	3.0	2.3	2.0	1.7	1.6	2.0	7.7
15.....	3.9	3.0	8.2	3.7	28	3.0	2.3	1.9	1.6	1.5	2.0	3.0
16.....	3.8	4.6	7.2	3.8	11.2	2.9	2.3	1.9	1.7	1.6	1.9	2.5
17.....	3.9	4.0	6.6	3.6	15.0	2.6	2.1	27	1.6	4.7	1.8	2.2
18.....	3.7	3.9	7.4	3.4	11.4	2.6	2.1	19.2	1.6	2.2	1.8	2.1
19.....	3.5	4.3	9.2	3.2	15.3	10.0	2.0	4.2	1.6	2.0	1.7	2.0
20.....	3.5	4.6	7.0	3.2	8.0	2.7	2.0	3.1	1.6	2.1	1.7	2.0
21.....	4.2	4.6	8.5	3.2	6.7	2.5	83	3.5	1.6	1.8	1.6	1.9
22.....	3.8	11.5	6.2	3.0	6.1	2.4	6.1	2.7	1.6	1.8	1.6	1.8
23.....	3.3	10.2	5.6	3.0	5.8	2.4	3.2	2.6	1.6	1.7	1.6	1.8
24.....	3.4	6.2	5.1	27	13.7	2.4	2.7	2.9	1.6	2.5	1.6	1.8
25.....	4.1	8.3	5.0	24	7.8	2.4	2.5	2.5	1.6	2.0	1.8	1.7
26.....	3.5	56	4.6	33	7.0	2.4	2.4	2.4	1.6	1.8	1.6	1.6
27.....	8.1	126	4.3	6.2	6.7	2.3	2.2	2.4	1.6	1.8	1.5	1.6
28.....	7.2	26	4.2	3.9	6.4	2.2	2.2	2.3	1.5	1.8	1.6	1.6
29.....	8.1	23	4.8	3.6	6.2	2.1	2.7	-----	1.5	1.7	2.6	1.6
30.....	5.3	16.9	27	3.5	6.3	2.1	3.7	-----	1.5	1.6	4.2	1.5
31.....	7.0	31	-----	3.4	-----	10.6	2.5	-----	1.5	-----	2.0	-----

*Monthly discharge of Hanawi Stream near Nahiku, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	9.1	3.3	4.99	7.72	155	475
August.....	126	3.0	15.3	23.7	475	1,460
September.....	66	4.2	10.6	16.4	319	976
October.....	33	3.0	6.79	10.5	210	646
November.....	71	3.3	11.9	18.4	356	1,100
December.....	10.6	2.1	3.77	5.83	117	359
January.....	83	2.0	5.42	8.39	168	516
February.....	27	1.9	3.96	6.13	111	340
March.....	2.2	1.5	1.72	2.66	53.3	164
April.....	4.7	1.4	1.83	2.83	54.9	168
May.....	4.2	1.5	2.05	3.17	63.4	195
June.....	45	1.5	5.72	8.85	172	527
The year.....	126	1.4	6.18	9.56	2,250	6,930

#### KAPAUOLA STREAM NEAR NAHIKU, MAUI

**LOCATION.**—150 feet above Koolau ditch intake, 300 feet above ditch trail, 2½ miles southwest of Nahiku post office, and 6 miles east of Upper Keanae.

**RECORDS AVAILABLE.**—November 1, 1921, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank. Discharge measurements made by wading or from footbridge at gage.

**CHANNEL AND CONTROL.**—Channel fairly straight for 75 feet above gage and curves to right over series of falls below. Banks nearly vertical for 20 feet with little vegetation. Control is rock ledge.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 322 million gallons a day, or 498 second-feet, at 2.30 a. m. October 24 (gage height, from water-stage recorder, 4.23 feet); minimum discharge, 0.6 million gallons a day, or 0.9 second-foot several hours April 5–12 (gage height, 0.40 foot).

1921–1926: Maximum discharge recorded, 930 million gallons a day, or 1,440 second-feet, at 2.45 a. m. December 13, 1921 (gage height from water-stage recorder, 8.45 feet); minimum discharge, that of April 5–12, 1926.

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine amount of water diverted into Koolau ditch in connection with Territorial water license to ditch company.

**UTILIZATION.**—Ordinary flow diverted into Koolau ditch for irrigation of sugar-cane.

**ACCURACY.**—Stage-discharge relation permanent during year. Rating curve well defined between 1.5 and 30 millions gallons a day; extension above uncertain. One discharge measurement made during year checks this curve closely at 3.5 million gallons a day. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages except for periods estimated, for which they are fair; high-stage records poor.

*Discharge, in million gallons a day, of Kapaula Stream near Nahiku, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	6.0	6.1	20	4.1	1.8	2.4	10.1	1.7	1.2	1.0	0.8	1.6
2.....	3.8	17.4	8.6	3.0		2.3	2.4	1.4	1.1	.7	.8	1.2
3.....	3.2	4.6	5.9	4.3		2.2	1.8	1.3	1.1	.7	.8	1.0
4.....	2.9	5.2	5.1	2.9		2.0	3.2	1.2	1.1	.7	.8	1.0
5.....	2.7	48	4.6	2.9		10.6	2.0	2.7	1.2	1.1	.6	.8
6.....	2.6	24	4.1	4.5	5.2	2.0	1.7	1.1	1.1	.7	1.0	1.0
7.....	4.2	10.8	3.8	4.9	83	1.9	1.5	1.1	1.1	.7	2.4	1.0
8.....	3.8	5.8	3.2	5.2	32	1.8	1.4	1.1	1.0	.6	4.1	.8
9.....	2.6	5.1	3.2	5.2	21	1.8	1.4	1.4	1.0	.6	2.6	.8
10.....	2.2	4.4	3.2	6.3	6.6	1.8	1.4	1.9	1.0	.6	1.6	.8
11.....	3.2	3.7	13.3	3.0	4.7	1.8	1.4	2.9	1.0	.6	1.5	38
12.....	3.4	3.0	9.7	2.7	3.6	1.7	1.4	1.7	1.0	1.1	3.4	64
13.....	2.7	2.7	58	2.6	9.3	1.7	1.3	1.4	1.0	1.4	2.0	43
14.....	2.2	2.4	9.2	2.2	15.2	1.7	1.2	1.3	1.0	1.0	1.4	11.4
15.....	2.0	2.2	4.4	2.0	35	1.7	1.2	1.2	.9	.8	1.2	2.3
16.....	2.0	2.7	3.8	2.0	13.1	1.6	1.2	1.1	.9	.8	1.1	1.7
17.....	2.0	2.6	3.5	2.0	18.1	1.5	1.2	50	.9	1.6	1.0	1.4
18.....	2.0	2.2	5.3		12.1	1.6	1.2	27	.9	2.1	1.0	1.2
19.....	1.8	2.3	8.8		17.1	3.1	1.2	3.4	.9	1.5	.9	1.1
20.....	1.8	2.9	6.3		5.8	2.0	1.2	2.1	.9	1.5	.9	1.0
21.....	2.1	2.8	8.4	1.7	4.3	1.6	95	2.2	.9	1.1	.9	1.0
22.....	2.4	9.9	4.3		3.6	1.6	5.4	1.7	.8	1.0	.8	1.0
23.....	1.9	8.3	3.4		3.1	1.5	2.3	1.5	.8	.9	.8	1.0
24.....	2.0	3.6	3.1	30	17.1	1.4	2.0	1.8	.8	3.9	.8	.9
25.....	2.2	5.6	3.0	8.6	4.6	1.5	2.0	1.4	.8	1.9	1.0	.8
26.....	2.2	82	2.6	27	3.2	1.4	2.0	1.4	.8	1.4	1.0	.8
27.....	7.7	146	2.4	4.6	3.2	1.4	1.8	1.3	.8	1.1	.9	.8
28.....	6.0	22	2.2	2.6	2.8	1.4	1.4	1.2	.8	1.0	.9	.8
29.....	7.0	26	2.4	2.1	2.6	1.3	1.5		.8	.9	1.2	.7
30.....	3.8	17.1	43	1.8	2.7	1.3	4.0		.7	.8	3.6	.7
31.....	5.2	46		1.7		14.8	2.0		.7		2.8	

NOTE.—Discharge estimated Oct. 31. Braced figures give estimated mean discharge for periods indicated. Estimates made by comparison with record of Hanawi Stream near Nahiku, Maui; recorder not operating.

*Monthly discharge of Kapaula Stream near Nahiku, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	7.7	1.8	3.21	4.97	99.6	305
August.....	146	2.2	17.0	26.3	527	1,620
September.....	58	2.2	8.63	13.4	259	795
October.....	30	-----	4.79	7.41	148	456
November.....	83	-----	11.6	17.9	348	1,070
December.....	14.8	1.3	2.19	3.39	67.8	208
January.....	95	1.2	5.15	7.97	160	490
February.....	50	1.1	4.21	6.51	118	362
March.....	1.2	.7	.93	1.44	28.9	88
April.....	3.9	.6	1.11	1.72	33.4	102
May.....	4.1	.8	1.45	2.24	44.8	138
June.....	64	.7	6.12	9.47	184	563
The year.....	146	.6	5.53	8.56	2,020	6,200

#### KOOLAU DITCH AT NAHIKU WEIR, NEAR NAHIKU, MAUI

**LOCATION.**—Between Kapaula and Waiohue Streams, three-quarters of a mile southwest of Nahiku post office, 6 miles east of Upper Keanae, and 12 miles by road and trail west of Hana.

**RECORDS AVAILABLE.**—February 12, 1919, to June 30, 1926. Gage readings made by East Maui Irrigation Co. available January 1, 1912, to February 11, 1919.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank. Discharge measurements made from plank across ditch near gage.

**CHANNEL AND CONTROL.**—Ditch is straight for about 100 feet above and below gage. The control is rectangular, sharp-crested weir 13.1 feet long and 2 feet high with complete end contractions. Weir basin is large enough to partly eliminate velocity of approach.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 39 million gallons a day, or 60 second-feet, at 7 p. m. September 13 (gage height from water-stage recorder, 1.28 feet); minimum discharge, no flow from 11.15 a. m. to 2 p. m. March 13; water shut out of ditch.

1919-1926: Maximum discharge recorded, 47.8 million gallons a day, or 74.0 second-feet, during morning of September 3, 1919 (gage height from water-stage recorder, 1.48 feet); minimum discharge, no flow, occasionally, when intake gates are closed.

**DIVERSIONS AND REGULATION.**—Flow completely regulated by gates and spillways above station.

**OBJECT OF STATION.**—To determine amount of water diverted through Koolau ditch from Territorial lands.

**UTILIZATION.**—Water used for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation permanent during year. Rating curve, based on weir formulas, well defined above 5 million gallons a day. No discharge measurements were made during year. Operation of water-

stage recorder satisfactory during year. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records excellent.

Koolau<sup>\*</sup> ditch, at elevation about 1,200 feet, diverts the ordinary flow of all streams on the windward side of the crater of Haleakala between Makapipi and Alo Streams, inclusive. The continuation of the ditch west of Alo Stream, called Wailoa ditch, diverts the ordinary flow of all streams between Waikamoi and Halehaku Streams, inclusive. The general course of the ditch is north-westward along the side of Haleakala. The water is carried to a point near Paia where it is distributed for irrigation of sugar cane, the development of power, and domestic supply on the plantations of Hawaiian Commercial & Sugar Co. and Maui Agricultural Co. The system comprises 18 miles of main ditch, which has a maximum carrying capacity of 145 million gallons a day; it is the most important of the East Maui Irrigation Co.'s ditches. Koolau ditch proper is about 8 miles long and has a carrying capacity of about 100 million gallons a day.

*Discharge, in million gallons a day, of Koolau ditch at Nahiku Weir, near Nahiku, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.-----	34	24	34	19.6	9.5	17.4	22	6.6	7.6	2.6	2.6	4.3
2.-----	28	28	34	16.4	9.5	16.7	10.1	5.6	7.3	2.3	2.6	3.6
3.-----	23	21	32	20	10.5	15.6	7.9	5.4	7.1	2.5	2.6	3.4
4.-----	18.9	23	30	16.4	13.8	15.3	11.2	5.4	7.3	2.5	2.6	3.4
5.-----	16.7	36	28	16.0	22	15.3	8.1	5.1	7.3	2.5	2.6	3.4
6.-----	15.3	36	26	18.9	20	14.6	6.3	4.9	7.6	2.6	3.0	3.8
7.-----	19.6	36	24	19.9	29	13.9	5.9	4.9	7.9	2.5	7.9	3.6
8.-----	16.4	32	23	22	36	13.2	5.9	5.1	7.9	2.5	11.5	3.4
9.-----	13.6	26	23	21	34	12.6	5.4	5.6	7.6	2.3	7.6	3.4
10.-----	12.3	23	22	26	28	12.0	5.6	9.2	7.3	2.2	5.4	3.2
11.-----	15.6	18.9	28	18.9	26	11.6	5.9	8.4	7.3	2.0	6.1	10.6
12.-----	14.6	16.7	32	16.7	21	11.3	4.9	4.9	7.1	3.2	11.6	30
13.-----	12.6	14.6	30	15.6	28	10.7	4.9	4.7	7.1	3.6	6.6	31
14.-----	11.3	13.6	32	14.2	26	10.4	4.5	4.5	6.8	2.3	6.1	27
15.-----	10.7	12.3	28	12.9	34	10.7	4.5	4.3	6.3	2.3	5.6	14.2
16.-----	10.1	13.9	24	12.6	28	10.7	4.7	4.3	6.3	2.3	5.6	11.0
17.-----	10.1	12.6	23	12.0	36	10.1	4.3	18.5	5.9	9.7	5.1	9.3
18.-----	9.8	11.3	24	10.7	34	10.1	4.1	32	5.9	4.5	5.1	7.9
19.-----	9.3	12.0	26	10.1	34	17.7	3.8	17.1	5.6	3.6	4.7	7.3
20.-----	8.5	13.2	24	9.8	28	10.7	3.8	11.8	4.7	4.1	4.5	6.3
21.-----	10.4	13.2	26	9.3	24	9.5	27	12.3	4.3	3.0	4.3	5.9
22.-----	9.8	28	21	8.7	22	9.0	19.0	9.3	3.6	2.8	4.3	5.4
23.-----	8.7	28	18.1	8.1	19.9	8.7	10.1	8.4	3.0	2.8	4.1	4.7
24.-----	9.0	18.9	16.7	23	28	8.4	7.6	10.4	2.5	7.3	3.8	4.5
25.-----	10.1	26	16.7	19.2	26	8.4	6.6	9.0	2.2	4.1	4.1	4.3
26.-----	9.0	34	14.6	28	22	7.9	6.1	8.4	2.0	3.2	3.6	3.8
27.-----	18.7	36	13.9	20	20	7.6	6.8	8.1	2.0	3.2	3.2	3.0
28.-----	24	34	13.6	13.9	19.2	7.3	5.6	7.6	2.0	3.0	3.0	3.0
29.-----	26	34	13.9	12.0	18.5	6.8	7.0	-----	1.8	2.6	3.6	2.6
30.-----	17.4	34	30	10.7	18.5	6.6	11.0	-----	1.8	2.6	9.5	2.6
31.-----	23	36	-----	10.1	-----	14.7	7.3	-----	2.2	-----	6.8	-----

*Monthly discharge of Koolau ditch at Nahiku Weir, near Nahiku, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	34	8.5	15.4	23.8	476	1,470
August.....	36	11.3	24.1	37.3	746	2,290
September.....	34	13.6	24.4	37.8	732	2,250
October.....	28	8.1	15.9	24.6	493	1,510
November.....	36	9.5	24.2	37.4	725	2,230
December.....	17.7	6.6	11.5	17.8	356	1,090
January.....	27	3.8	8.00	12.4	248	761
February.....	32	4.3	8.64	13.4	242	742
March.....	7.9	1.8	5.33	8.25	165	507
April.....	9.7	2.0	3.22	4.98	96.7	296
May.....	11.6	2.6	5.15	7.97	160	490
June.....	10.6	2.6	7.66	11.9	230	705
The year.....	36	1.8	12.8	19.8	4,670	14,300

#### WAIHUE STREAM NEAR NAHIKU, MAUI

**LOCATION.**—200 feet above Koolau ditch intake, 300 feet above ditch trail, 4 miles southwest of Nahiku post office, and 5 miles east of Upper Keanae.

**RECORDS AVAILABLE.**—October 9, 1921, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank. Discharge measurement made by wading near gage.

**CHANNEL AND CONTROL.**—One channel; straight for 150 feet above station and curved to left just below. Banks covered with brush, are subject to overflow at high stages. Control for low stages is solid rock ledge; subject to scour at ends during high stages.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 225 million gallons a day, or 348 second-feet, at 7 a. m. August 27 and at 12.30 a. m. October 24 (gage height from water-stage recorder, 3.49 feet); minimum discharge, 1.7 million gallons a day, or 2.6 second-feet at 10 p. m. April 11 (gage height, 0.52 foot).

1921-1926: Maximum discharge recorded, 630 million gallons a day, or 975 second-feet, at 3 a. m. December 13, 1921 (gage height from water-stage recorder, 6.23 feet); minimum discharge, that of April 11, 1926.

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine amount of water diverted into Koolau ditch in connection with Territorial water license to ditch company.

**UTILIZATION.**—Ordinary flow diverted into Koolau ditch for irrigation of sugar-cane.

**ACCURACY.**—Stage-discharge relation probably permanent during year. Rating curve fairly well defined between 2.5 and 30 million gallons a day; extensions beyond these limits uncertain. This curve checked fairly well at 6 and 12 million gallons a day by two discharge measurements made during year. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair for ordinary stages except for periods estimated, for which they are poor; records poor for high and low stages.

*Discharge, in million gallons a day, of Waiohue Stream near Nahiku, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	6.6	5.9	15.6	4.4	3.6	4.6	5.7	3.0	3.1 3.0	2.2	2.1	2.6
2	6.4	8.4	9.8	4.2	3.6	4.5	3.2	2.8			2.0	2.4
3	5.9	5.0	8.0	5.3	4.6	4.2	2.9	2.8			1.8	2.3
4	5.8	7.5	7.4	4.2	4.4	4.1	3.6	2.7			1.8	2.0
5	5.6	19.3	7.0	4.5	6.1	4.0	3.0	2.7			1.8	2.0
6	5.3	14.4	6.6	4.7	4.6	3.9	2.8	2.6	2.2	1.9	2.3	2.4
7	6.6	9.9	6.1	5.1	3.4	3.8	2.7	2.6		1.9	4.6	2.2
8	5.3	7.4	5.8	5.1	15.6	3.6	2.6	2.7		1.8	5.3	2.1
9	4.8	7.0	5.8	5.4	12.9	3.5	2.6	2.8		1.8	3.1	2.0
10	4.7	6.4	5.4	6.2	7.0	3.4	2.8	5.0		1.8	2.6	2.1
11	5.4	5.8	13.6	4.4	6.4	3.4	3.0	3.9	2.2	1.8	3.3	16.9
12	5.0	5.6	8.5	4.2	5.9	3.3	2.6	2.9		2.4	4.1	21
13	4.7	5.3	25	4.1	7.9	3.2	2.6	2.7		2.6	2.7	18.9
14	4.5	5.1	6.6	4.0	7.4	3.2	2.6	2.6		2.0	2.5	6.3
15	4.4	4.8	5.4	3.9	18.1	3.2	2.6	2.6		1.9	2.4	3.1
16	4.2	5.4	5.1	3.8	13.6	3.1	2.7	2.6	2.2	2.0	2.3	2.7
17	4.2	5.0	5.0	3.7	16.4	3.0	2.6	26		5.1	2.3	2.6
18	4.2	4.6	6.2	3.6	9.8	3.2	2.5	11.0		2.7	2.3	2.6
19	3.9	4.8	5.6	3.5	11.0	4.7	2.4	3.9		2.6	2.2	2.5
20	4.0	5.1	6.8	3.4	7.4	3.2	2.4	3.3		2.8	2.2	2.4
21	4.5	5.1	6.5	3.3	6.6	3.0	43	3.8	2.2	2.3	2.1	2.3
22	4.0	11.6	5.0	3.2	6.2	2.9	4.2	3.2		2.1	2.1	
23	3.8	6.9	4.7	4.4	5.9	2.8	3.2	3.1		2.2	2.1	
24	3.9	5.3	4.6	21	15.1	2.7	2.8	3.6		4.3	2.0	
25	4.0	8.0	4.5	5.1	6.6	2.7	2.7	3.3		2.7	2.3	
26	3.6	29	4.2	9.7	6.1	2.6	2.6	3.2	2.2	2.4	2.1	2.3
27	11.8	66	4.1	4.1	5.6	2.6	2.6	3.2		2.3	2.1	
28	7.0	13.2	4.0	3.7	5.3	2.6	2.6	3.1		2.2	2.1	
29	7.5	18.6	4.4	3.5	5.0	2.6	3.7	-----		2.1	3.1	
30	4.7	13.3	14.4	3.4	5.1	2.5	3.5	-----		2.1	4.0	
31	5.0	25	-----	3.4	-----	13.1	3.2	-----	-----	-----	3.1	-----

NOTE.—Discharge estimated Nov. 6, 7, June 19 and 20. Braced figures give estimated mean discharge for periods indicated. Estimates made by comparison with record of flow for West Kopiliula Stream near Keanae, Maui; recorder not operating properly.

*Monthly discharge of Waiohue Stream near Nahiku, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	11.8	3.6	5.20	8.05	161	495
August	66	4.6	11.1	17.2	345	1,060
September	25	4.0	7.39	11.4	222	680
October	21	3.2	4.92	7.61	152	468
November	-----	3.6	8.93	13.8	268	822
December	13.1	2.5	3.65	5.65	113	347
January	43	2.4	4.26	6.59	132	405
February	26	2.6	4.20	6.50	118	361
March	-----	-----	2.25	3.48	69.9	214
April	5.1	1.8	2.32	3.59	69.6	214
May	5.3	2.0	2.63	4.07	81.4	250
June	21	-----	4.14	6.41	124	381
The year	66	-----	5.09	7.88	1,860	5,700

## WEST KOPILIULA STREAM NEAR KEANAE, MAUI

**LOCATION.**—600 feet above Koolau ditch crossing and highway bridge, 4½ miles by trail east of Upper Keanae, and 7 miles east of Keanae post office.

**RECORDS AVAILABLE.**—January 3, 1914, to September 17, 1917, and October 1, 1921, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage or from footbridge 200 feet downstream.

**CHANNEL AND CONTROL.**—Recorder operates in a pool at foot of falls. Channel below is straight for 200 feet. Left bank is covered with vegetation and overflows at medium stages; right bank steep. Control composed of medium-sized boulders; subject to shift.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 620 million gallons a day, or 959 second-feet, at 9.30 a. m. January 21 (gage height from water-stage recorder, 5.11 feet); minimum discharge, 1.9 million gallons a day, or 2.9 second-feet, several hours April 10 and 11 (gage height, 1.20 feet).

1914-1917; 1921-1926: Maximum discharge recorded, about 2,000 million gallons a day, or 3,090 second-feet at 5.30 a. m. January 18, 1916, (gage height from water-stage recorder, 9.25 feet); minimum discharge, 0.6 million gallons a day, or 0.9 second-foot, September 15-17, 1917 (gage height, 0.6 foot).

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine amount of water diverted into Koolau ditch in connection with Territorial water license to ditch company.

**UTILIZATION.**—Ordinary flow diverted into Koolau ditch for irrigation of sugar-cane.

**ACCURACY.**—Stage-discharge relation probably permanent during year. Rating curve fairly well defined between 2 and 40 million gallons a day; extended above on basis of one discharge measurement at 500 million gallons a day. This curve checked very closely by two discharge measurements made during year at 4 and 17 million gallons a day. Operation of water-stage recorder satisfactory except later part of June. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair for ordinary stages; high and low stage records probably poor.

*Discharge, in million gallons a day, of West Kopiliula Stream near Keanae, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	12.2	10.8	27	9.2	5.2	5.9	12.6	4.4	3.4	3.2	2.4	3.0
2.....	8.8	25	15.2	7.2	4.9	5.6	3.6	3.8	3.3	2.2	2.3	2.6
3.....	7.2	9.4	11.0	8.1	5.4	5.3	3.3	3.6	3.2	2.1	2.3	2.4
4.....	6.5	12.2	9.6	6.2	5.8	5.3	7.5	3.4	3.1	2.2	2.1	2.2
5.....	6.0	61	9.0	6.5	11.2	4.9	4.4	3.3	3.0	2.1	2.4	2.2
6.....	5.9	33	8.5	8.3	9.4	4.7	3.6	3.2	3.0	2.5	3.2	3.0
7.....	11.5	16.6	7.5	8.3	115	4.6	3.5	3.0	3.0	2.5	7.3	2.4
8.....	6.7	10.7	7.0	8.5	55	4.5	3.3	3.2	2.9	2.3	9.1	2.2
9.....	5.7	9.4	7.4	8.3	32	4.3	3.3	3.7	2.9	2.2	4.4	2.1
10.....	5.6	7.9	7.4	9.8	12.5	4.0	3.7	7.6	2.9	2.0	3.0	2.3
11.....	8.5	7.2	19.8	6.7	9.6	4.0	4.6	6.2	2.8	1.9	5.1	41
12.....	6.7	7.0	11.5	6.7	8.1	3.8	3.2	3.6	2.7	3.9	6.8	120
13.....	5.6	6.3	98	6.0	12.5	3.8	3.0	3.3	2.6	4.4	3.2	64
14.....	5.2	6.5	15.7	5.6	18.9	3.7	2.9	3.1	2.6	2.5	2.8	25
15.....	4.9	5.9	9.0	5.2	59	3.9	3.0	3.1	2.5	2.8	2.6	7.2

*Discharge, in million gallons a day, of West Kopiliula Stream near Keanae, Maui, for the year ending June 30, 1926—Continued*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
16.....	4.6	7.2	7.4	5.4	21	3.7	3.5	3.0	2.6	3.0	2.5	5.0
17.....	4.7	5.9	6.8	5.2	23	3.5	2.9	61	2.5	10.5	2.4	4.3
18.....	4.7	5.3	10.4	4.6	17.0	3.7	2.8	47	2.5	4.0	2.2	3.7
19.....	4.3	6.4	11.7	4.5	25	7.6	2.7	8.8	2.7	3.4	2.2	3.3
20.....	4.6	5.6	11.8	4.5	12.8	3.8	2.6	6.5	2.7	3.6	2.2	3.0
21.....	6.3	6.0	12.1	4.4	9.8	3.6	185	5.8	2.2	2.7	2.2	2.7.
22.....	4.4	15.8	7.7	4.2	8.5	3.3	12.8	4.5	2.2	2.4	2.2	
23.....	4.2	11.8	7.2	4.6	7.5	3.3	6.0	4.2	2.3	2.4	2.2	
24.....	4.7	6.3	6.3	93	19.3	3.1	4.6	4.9	2.2	13.6	2.1	
25.....	5.4	9.8	5.9	10.6	9.2	3.2	4.0	3.9	2.2	4.4	3.0	
26.....	4.4	98	5.6	47	8.5	3.0	3.7	3.7	2.1	3.4	2.4	
27.....	11.5	193	5.3	15.8	8.1	2.9	3.5	3.8	2.1	2.9	2.2	2.7.
28.....	8.6	33	5.3	8.1	6.7	2.9	3.3	3.5	2.1	2.7	2.5	
29.....	11.8	30	6.4	6.2	6.5	2.8	6.0	-----	2.1	2.4	4.3	
30.....	5.7	22	53	5.6	6.8	2.7	8.7	-----	2.1	2.3	10.2	
31.....	11.2	51	-----	5.2	-----	18.4	4.5	-----	2.2	-----	4.1	

NOTE.—Discharge estimated June 19 and 20. Braced figure gives estimated mean discharge for period indicated. Estimates made by comparison with record of East Walluaiki Stream near Keanae, Maui; recorder not operating properly.

*Monthly discharge of West Kopiliula Stream near Keanae, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	12.2	4.2	6.71	10.4	208	638
August.....	193	5.3	23.7	36.7	736	2,250
September.....	98	5.3	14.2	22.0	426	1,310
October.....	93	4.2	11.0	17.0	340	1,050
November.....	115	4.9	18.5	28.6	554	1,700
December.....	18.4	2.7	4.51	6.98	140	429
January.....	185	2.6	10.4	16.1	322	989
February.....	61	3.0	7.82	12.1	219	672
March.....	3.4	2.1	2.60	4.02	80.7	247
April.....	13.6	1.9	3.42	5.29	102	315
May.....	10.2	2.1	3.48	5.38	108	331
June.....	120	-----	10.9	16.9	328	1,000
The year.....	193	-----	9.77	15.1	3,560	10,900

#### 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  $6\frac{1}{4}$  miles east of Keanae post office.

RECORDS AVAILABLE.—December 21, 1913, to October 23, 1917, July 1, 1922, to June 30, 1926. Fragmentary unpublished record October 21, 1921, to June 30, 1922.

EQUIPMENT.—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading at intake to Koolau ditch or from footbridge 100 feet upstream from this intake.

CHANNEL AND CONTROL.—Recorder operates in pool at foot of 10-foot falls. Left bank steep and high; right bank sloping, is overflowed at extremely high stage. Control composed of boulders; subject to shifts.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 502 million gallons a day, or 777 second-feet, at 7.15 a. m. August 27 (gage height from

water-stage recorder, 5.67 feet); minimum discharge, 1.9 million gallons a day, or 2.9 second-feet, from 11 a. m. to midnight April 11 (gage height, 0.30 foot).

1913-1917; 1922-1926: Maximum discharge recorded, 1,900 million gallons a day, or 2,940 second-feet, at 8 a. m. January 18, 1916 (gage height from water-stage recorder, 8.35 feet); minimum discharge, 1.0 million gallons a day, or 1.6 second-feet, October 22 and 23, 1917 (gage height, 0.5 foot), and from 11 p. m. August 1 to 1 a. m. August 2, 1922 (gage height, 0.37 foot).

Flood of December 24, 1921, may have reached a higher stage but owing to destruction of station no data is available for this peak.

DIVERSIONS AND REGULATION.—None.

OBJECT OF STATION.—To determine amount of water diverted into Koolau ditch in connection with territorial water license to ditch company.

UTILIZATION.—Ordinary flow is diverted into Koolau ditch for irrigation of sugarcane.

ACCURACY.—Stage-discharge relation probably permanent during year. Rating curve fairly well defined below 150 million gallons a day; extension above uncertain. This curve checked closely at 3 and 5 million gallons a day by discharge measurements made during year. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages except for periods estimated, for which they are fair; high-stage records poor.

*Discharge, in million gallons a day, of East Wailuaiki Stream near Keanae, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	
1-----	11.8	11.8	23	8.5	4.5	5.5	18.4	4.1	3.0	2.7	2.2	2.2	
2-----	9.1	24	13.3	6.2	4.4	5.3	4.0	3.4	2.9	2.1			
3-----	7.8	8.5	10.4	7.4	4.9	5.0	3.3	3.2	2.8	2.0			
4-----	7.0	11.2	9.1	5.6	5.7	4.8	8.8	3.1	2.8	2.0			
5-----	6.5	59	8.5	6.0	10.1	4.6	4.7	3.0	2.8	2.0			
6-----	6.2	29	7.8	7.7	9.8	4.4	3.5	2.9	2.6	2.2	2.8	2.2	
7-----	13.2	15.0	7.0	8.5	100	4.3	3.1	2.9	2.6	2.2	8.7		
8-----	7.4	10.4	6.6	8.5	52	4.2	2.9	2.9	2.6	2.1	10.9		
9-----	5.8	9.1	6.8	7.9	27	4.0	2.9	3.5	2.6	2.0	4.7		
10-----	5.6	7.8	7.1	9.1	11.1	3.8	3.1	7.7	2.5	2.0	3.1		
11-----	8.5	6.8	22	6.5	9.1	3.8	4.4	7.0	2.6	1.9	6.0	55	
12-----	6.9	6.5	14.1	6.0	7.8	3.7	3.0	3.5	2.4	3.2	7.9		
13-----	5.7	5.8	35	5.5	11.1	3.6	2.9	3.1	2.4	4.1	3.3		
14-----	5.2	5.9	15.3	5.1	19.4	3.5	2.8	2.9	2.4	2.4	2.9		
15-----	4.9	5.3	8.5	4.7	51	3.6	2.9	2.9	2.4	2.5	2.7		
16-----	4.7	6.9	6.9	5.2	17.7	3.5	3.2	2.8	2.4	4.5	2.6	3.5	
17-----	5.0	5.5	6.6	4.7	21	3.2	2.9	64	2.4		2.6		
18-----	4.7	5.0	9.3	4.7	15.0	3.3	2.8	44	2.4		2.4		
19-----	4.3	5.6	12.5	4.2	21	7.0	2.8	7.9	2.5		2.1		
20-----	4.8	5.5	10.4	4.2	10.4	3.9	2.7	5.4	2.3				
21-----	7.4	6.1	13.0	4.0	8.5	3.3	155	5.4	2.2		2.8		
22-----	5.0	16.9	7.6	3.8	7.5	3.1	13.6	4.0	2.2		2.7		
23-----	4.4	13.3	6.8	4.0	6.8	3.0	5.2	3.7	2.2		2.6		
24-----	5.1	6.8	6.2	54	15.8	2.9	4.2	4.3	2.1		2.6		
25-----	5.9	8.9	5.7	10.7	8.5	3.0	3.7	3.5	2.1		2.6		
26-----	4.6	91	5.4	42	7.5	2.9	3.4	3.3	2.1	5.5	2.6	2.3	
27-----	11.4	191	5.1	13.9	7.6	2.9	3.3	3.3	2.1		2.5		
28-----	10.8	29	4.9	7.2	6.3	2.8	3.2	3.1	2.1		2.4		
29-----	14.7	26	5.8	5.5	5.9	2.8	6.2	2.1	2.0		2.3		
30-----	6.7	21	53	5.0	6.3	2.7	11.1		2.1		2.3		
31-----	11.4	46	-----	4.6	-----	17.2	4.7	-----	2.1	-----	-----	-----	

NOTE.—Braced figures, which give mean discharge for periods indicated, estimated by comparison with record of flow for West Kopiliula Stream near Keanae, Maui; recorder not operating properly.

*Monthly discharge of East Wailuaiki Stream near Keanae, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	14.7	4.3	7.18	11.1	222	683
August.....	191	5.0	22.6	35.0	701	2,150
September.....	53	4.9	11.8	18.3	354	1,090
October.....	54	3.8	9.06	14.0	281	862
November.....	100	4.4	16.5	25.5	494	1,520
December.....	17.2	2.7	4.25	6.58	132	404
January.....	155	2.7	9.64	14.9	299	917
February.....	64	2.8	7.53	11.7	211	647
March.....	3.0	2.0	2.41	3.73	74.7	229
April.....			3.43	5.31	103	316
May.....			3.52	5.45	109	335
June.....			11.3	17.5	340	1,040
The year.....	191		9.09	14.1	3,320	10,200

#### 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 October 22, 1917, and November 1, 1921, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage or from footbridge 90 feet downstream.

**CHANNEL AND CONTROL.**—Recorder operates in a pool at foot of falls. Flow at ordinary stages on left side of channel but at high stages the sloping right bank is overflowed. Left bank nearly vertical and extremely high stages are confined by both banks. Stream bed below gage is covered with medium-sized boulders; subject to shift.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 1,190 million gallons a day, or 1,840 second-feet, at 7.40 a. m. August 27 (gage height from water-stage recorder, 7.00 feet); minimum discharge, 0.7 million gallons a day, or 1.1 second-feet, at 5 a. m. April 6 (gage height, 0.40 foot).

1914-1917; 1921-1926: Maximum discharge recorded, estimated 4,500 million gallons a day, or 6,960 second-feet, at 1.45 p. m. January 14, 1923 (gage height from floodmarks, about 13.5 feet); minimum discharge, 0.3 million gallons a day, or 0.45 second-foot, from noon to 1 p. m. July 26, 1922 (gage height, 0.44 foot).

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine amount of water diverted into Koolau ditch in connection with Territorial water license to ditch company.

**UTILIZATION.**—Ordinary flow is diverted into Koolau ditch for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation probably permanent during year. Rating curve fairly well defined between 1 and 500 million gallons a day; extension beyond these limits uncertain. This curve checked roughly at 1.5 and very closely at 2.5 million gallons a day by two discharge measurements made during year. Operation of water-stage recorder satisfactory during year.

Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair for ordinary stages and poor for high and low stages.

*Discharge, in million gallons a day, of West Wailuaiki Stream near Keanae, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1-----	15.2	17.8	36	11.7	5.3	5.5	22	5.0	2.5	2.3	1.7	2.8
2-----	9.8	34	17.9	7.6	5.0	5.0	4.4	3.7	2.2	1.1	1.5	2.0
3-----	7.6	11.7	12.8	8.6	5.5	4.8	3.0	3.3	2.1	.9	1.6	1.7
4-----	6.5	14.6	10.6	6.8	6.0	4.5	10.0	2.9	2.0	.8	1.2	1.5
5-----	6.0	80	9.4	7.0	14.2	4.2	5.8	2.6	1.8	.7	1.4	1.4
6-----	5.8	44	8.4	9.6	12.2	3.9	3.5	2.6	1.7	1.2	1.8	2.1
7-----	14.9	22	7.3	10.1	178	3.7	2.8	2.6	1.6	1.5	8.3	1.7
8-----	7.8	13.6	6.7	11.0	62	3.6	2.5	2.5	1.6	1.3	12.2	1.3
9-----	5.7	11.1	7.4	9.6	36	3.5	2.4	3.4	1.4	1.0	5.8	1.2
10-----	5.4	9.0	7.4	12.4	14.6	3.1	2.3	7.8	1.4	.9	3.5	2.2
11-----	10.0	7.6	25	9.4	11.5	3.1	4.5	9.0	1.4	.7	6.1	119
12-----	7.4	7.3	18.8	8.6	9.0	2.8	2.5	4.1	1.3	3.4	10.1	160
13-----	5.8	6.2	50	7.3	14.8	2.8	1.9	3.3	1.2	6.5	4.1	100
14-----	5.1	6.4	19.9	6.5	38	2.6	1.7	2.8	1.2	3.1	3.1	32
15-----	4.6	5.4	9.8	6.0	58	2.7	2.0	2.5	1.1	3.3	2.7	9.4
16-----	4.4	7.6	7.6	6.1	24	2.6	2.6	2.4	1.2	4.0	2.2	6.4
17-----	4.9	5.8	7.1	5.5	28	2.2	1.8	94	1.1	14.2	1.9	5.3
18-----	4.6	5.1	10.5	4.9	23	2.2	1.7	56	1.2	4.2	1.7	4.4
19-----	4.0	5.7	17.7	4.6	29	8.1	1.5	10.9	1.4	3.3	1.5	4.0
20-----	5.2	5.7	12.3	4.6	13.6	3.9	1.4	7.1	1.0	3.3	1.6	3.4
21-----	8.1	6.2	18.7	4.2	10.0	2.6	292	6.1	1.0	2.1	1.4	3.0
22-----	5.5	18.8	9.6	4.1	8.4	2.1	17.1	4.8	1.0	1.8	1.3	2.8
23-----	4.8	17.1	8.0	4.2	7.3	2.1	6.8	4.1	1.1	1.8	1.4	2.6
24-----	5.7	7.6	7.0	97	17.1	1.8	5.0	4.4	1.0	16.9	1.1	2.4
25-----	7.0	9.3	6.2	17.9	10.7	2.0	4.1	3.6	.9	5.3	2.2	2.1
26-----	5.1	121	5.7	66	8.4	1.7	3.5	3.1	.9	3.6	1.6	2.0
27-----	11.1	369	5.3	18.2	9.8	1.6	3.3	3.3	.9	2.8	1.2	2.1
28-----	13.7	46	5.1	9.6	6.7	1.5	3.1	2.7	.8	2.4	1.4	1.7
29-----	10.7	35	6.0	7.1	6.4	1.4	7.4	-----	.8	1.9	3.4	1.6
30-----	8.4	32	74	6.1	6.5	1.4	17.4	-----	.8	1.7	12.6	1.5
31-----	17.1	62	-----	5.4	-----	17.6	5.7	-----	.9	-----	4.5	-----

*Monthly discharge of West Wailuaiki Stream near Keanae, Maui, for the year ending June 30, 1926*

Month	Discharge			Total run-off		
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July-----	17.1	4.0	7.67	11.9	238	730
August-----	369	5.1	33.7	52.1	1,040	3,210
September-----	74	5.1	14.9	23.1	448	1,370
October-----	97	4.1	12.8	19.8	398	1,220
November-----	178	5.0	22.6	35.0	679	2,080
December-----	17.6	1.4	3.57	5.52	111	340
January-----	292	1.4	14.4	22.3	446	1,370
February-----	94	2.4	9.31	14.4	261	800
March-----	2.5	.8	1.31	2.03	40.5	125
April-----	16.9	.7	3.27	5.06	98.0	301
May-----	12.6	1.1	3.42	5.29	106	325
June-----	160	1.2	16.1	24.9	484	1,490
The year-----	369	.7	11.9	18.4	4,350	13,400

## EAST WAILUANUI STREAM NEAR KEANAE, MAUI

**LOCATION.**—125 feet above Koolau ditch intake, 250 feet above trail, 2½ miles east of Upper Keanae, and 5 miles east of Keanae post office.

**RECORDS AVAILABLE.**—November 23, 1921, to June 30, 1926. At site 500 feet upstream, January 1, 1914, to October 24, 1917.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading just above intake to Koolau ditch or from footbridge 500 feet above gage.

**CHANNEL AND CONTROL.**—Recorder operates in pool at base of 12-foot falls. Channel is fairly straight below gage and banks are nearly vertical. Control is rock ledge forming crest of 4-foot falls.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 288 million gallons a day, or 446 second-feet, at 7.45 a. m. August 27 (gage height from water-stage recorder, 3.12 feet); minimum discharge, 0.1 million gallons a day, or 0.2 second-foot, several hours April 11 (gage height, 0.28 foot).

1921-1926: Maximum discharge recorded, 1,050 million gallons a day, or 1,620 second-feet, at 4 p. m. February 12, 1925 (gage height from water-stage recorder, 6.96 feet); minimum discharge, that of April 11, 1926.

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine amount of water diverted into ditch in connection with territorial water license to ditch company.

**UTILIZATION.**—Ordinary flow diverted into Koolau ditch for irrigation of sugar-cane.

**ACCURACY.**—Stage-discharge relation probably permanent during year. Rating curve fairly well defined below 20 million gallons a day; extension above uncertain. This curve checked fairly well at 2.5 and 0.8 million gallons a day by two discharge measurements made during the year. Operations of water-stage recorder satisfactory during year. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages; poor for high stages.

*Discharge, in million gallons a day, of East Wailuanui Stream near Keanae, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	4.8	3.6	13.1	2.1	1.4	1.7	8.2	1.6	1.0	0.9	0.8	1.1
2	3.1	8.7	6.3	1.8	1.4	1.6	1.1	1.2	.9	.4	.8	.9
3	2.6	2.8	4.0	2.3	1.7	1.4	.9	1.1	.9	.3	.8	.8
4	2.3	5.6	3.1	1.7	2.2	1.3	2.0	1.0	.8	.2	.6	.7
5	2.1	25	2.8	2.0	3.3	1.2	1.1	.9	.8	.2	.7	.6
6	2.0	18.4	2.6	2.3	2.6	1.1	.9	.9	.8	.4	.9	.8
7	5.5	8.4	2.3	3.2	34	1.1	.8	.9	.8	.5	4.9	.7
8	2.3	4.3	2.0	3.2	14.0	1.0	.8	.9	.7	.4	6.5	.5
9	1.8	3.1	2.2	2.9	11.6	1.0	.9	1.2	.7	.3	2.1	.5
10	1.6	2.6	2.0	3.6	4.8	1.0	.9	5.6	.7	.2	1.3	1.1
11	2.8	2.3	14.9	2.3	3.3	.9	2.0	2.5	.7	.2	4.3	11.8
12	1.8	2.1	7.8	2.1	2.6	.8	.9	1.3	.6	1.5	4.3	14.5
13	1.6	1.8	7.5	1.9	4.3	.8	.8	1.1	.5	1.9	1.6	33
14	1.3	1.9	4.0	1.8	4.5	.8	.8	1.0	.5	.6	1.3	8.3
15	1.3	1.7	2.6	1.6	11.8	.8	.9	1.0	.5	.7	1.1	2.1
16	1.2	2.4	2.1	1.7	11.3	.8	1.1	.9	.6	1.0	1.0	1.7
17	1.3	1.8	2.0	1.6	17.1	.7	.8	30	.4	7.9	.9	1.4
18	1.2	1.6	3.4	1.3	6.2	.8	.8	12.9	.5	1.7	.8	1.2
19	1.0	1.9	3.8	1.3	7.3	1.8	.8	2.6	.6	1.4	.8	1.2
20	1.7	1.9	3.5	1.2	3.5	.8	.8	2.1	.4	1.7	.8	1.0

*Discharge, in million gallons a day, of East Wailuanui Stream near Keanae, Maui, for the year ending June 30, 1926—Continued*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
21-----	2.3	2.0	4.2	1.1	2.8	0.7	40	2.1	0.4	1.0	0.7	0.9
22-----	1.6	10.6	2.3	1.1	2.4	.7	3.4	1.7	.4	.9	.7	.9
23-----	1.3	6.4	1.9	1.1	2.1	.6	1.9	1.4	.4	.8	.7	.8
24-----	1.6	2.6	1.8	18.2	7.8	.6	1.6	1.8	.3	3.9	.5	.8
25-----	1.8	3.8	1.7	2.9	2.7	.7	1.4	1.3	.3	2.0	.9	.7
26-----	1.2	29	1.6	8.8	2.4	.6	1.3	1.2	.3	1.2	.7	.6
27-----	8.9	75	1.4	2.4	2.3	.6	1.2	1.2	.3	.9	.5	.7
28-----	5.8	12.2	1.4	1.9	1.8	.5	1.1	1.1	.3	.9	.6	.6
29-----	8.6	17.8	1.9	1.7	1.8	.4	4.2	-----	.3	.8	2.4	.5
30-----	2.4	12.2	14.2	1.6	1.9	.4	2.7	-----	.2	.8	6.4	.5
31-----	4.8	2.4	-----	1.6	-----	8.6	1.8	-----	.3	-----	1.8	-----

*Monthly discharge of East Wailuanui Stream near Keanae, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July-----	8.9	1.0	2.70	4.18	83.6	257
August-----	75	1.6	9.60	14.9	298	913
September-----	14.9	1.4	4.15	6.42	124	382
October-----	18.2	1.1	2.72	4.21	84.3	259
November-----	34	1.4	5.90	9.13	177	543
December-----	8.6	.4	1.15	1.78	35.8	109
January-----	40	.8	2.84	4.39	87.9	270
February-----	30	.9	2.95	4.56	82.5	253
March-----	1.0	.2	1.55	.85	16.9	52
April-----	7.9	.2	1.19	1.84	35.6	110
May-----	6.5	.5	1.68	2.60	52.2	160
June-----	33	.5	3.03	4.69	90.9	279
The year-----	75	.2	3.20	4.95	1,170	3,590

#### WEST WAILUANUI STREAM NEAR KEANAE, MAUI

**LOCATION.**—150 feet above Koolau ditch crossing at intake, 2 miles east of Upper Keanae, and 4½ miles east of Keanae post office.

**RECORDS AVAILABLE.**—July 1, 1922, to June 30, 1926. At site 100 feet downstream December 19, 1913, to October 22, 1917.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage or from footbridge just above gage.

**CHANNEL AND CONTROL.**—One channel at low and medium stages and two at high stages. Straight for about 75 feet above and 150 feet below gage. Stream is a series of falls and is boulder strewn; left bank high and right bank is overflowed at high stages. Control is a broad-crested concrete structure roughly parabolic in shape; subject to shift owing to wear.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 314 million gallons a day, or 486 second-feet, at 2 a. m. June 12 (gage height from water-stage recorder, 3.75 feet); minimum discharge uncertain owing to faulty gage-height record.

1923-1926: Maximum discharge recorded, 1,220 million g gallons a day, or 1,890 second-feet, at 2.30 p. m. January 14, 1923 (gage height from water-stage recorder, 7.70 feet); minimum discharge, 0.2 million gallons a day, or 0.3 second-feet, several hours July 16-21, 1922 (gage height, 0.50 foot).

OBJECT OF STATION.—To determine amount of water diverted into Koolau ditch in connection with Territorial water license to ditch company.

UTILIZATION.—Ordinary flow diverted into Koolau ditch for irrigation of sugarcane.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined below 20 million gallons a day; extended above on basis of one discharge measurement at 60 million gallons a day. This curve checked closely by four discharge measurements fairly well distributed during year and covering a range from 0.5 to 13 million gallons a day. Operation of water-stage recorder satisfactory except as indicated in footnote to daily discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages except for periods estimated, for which they are fair; high-stage records poor.

*Discharge, in million gallons a day, of West Wailuanui Stream near Keanae, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	6.8	12	20	4.0	2.2	3.1	8.0	1.0	0.9	0.8	1.1	.8
2.....	4.8		10.4	2.8	2.1	2.5	1.4	.8				
3.....	3.8		7.8	3.9	2.4	2.1	.9	.7				
4.....	3.4		6.2	2.5	2.9	1.8	3.2	.7				
5.....	3.2		5.7	2.8	4.7	1.8	1.6	.6				
6.....	3.1	12	5.2	3.2	5.2	1.8	1.0	.7	.6	1.0	.9	.8
7.....	6.8		4.4	4.6	62	1.6	.8	.8				
8.....	3.4		4.2	4.6	37	1.6	.8	.8				
9.....	2.6		4.8	4.4	20	1.5	.8	1.3				
10.....	2.6		3.6	5.0	9.8	1.4	.9	4.8				
11.....	3.5	3.4	15.2	4.0	6.5	1.4	1.8	3.4	0.7	.4	3.7	9.9
12.....		3.4	10.2	3.8	5.0	1.3	.6	1.4		1.7	4.3	87
13.....		3.2	24	2.9	7.5	1.4	.6	1.1		1.8		36
14.....		3.1	12.6	2.8	10.1	1.4	.5	1.0		.6		22
15.....		2.6	5.5	2.8	28	1.5	.6	1.0		.7		5.4
16.....	3.5	4.0	4.0	2.8	15.7	1.5	.8	.9	0.7	1.1	1.2	3.1
17.....		2.8	3.6	2.5		1.3	.4	24		9.0		2.6
18.....		2.1	5.5	1.9	13	1.3	.4			1.6		1.8
19.....		2.6	6.8	1.9		3.0	.4	12		1.3		1.7
20.....		2.6	6.0	1.9	7.8	1.4	.4			1.7		1.4
21.....	6.6	2.9	7.0	1.6	6.0	.9	91	2.5	.8	.8	1.2	1.0
22.....		11.8	4.0	1.5	5.2	.8	8.9	2.1				
23.....		8.2	3.4	2.1	4.8	.8	2.1	1.8				
24.....		3.6	2.8	30	10.4	.8	1.2	2.1		7.0		.9
25.....		5.2	2.8	7.8	5.5	.8	.9	1.6		2.4		.8
26.....	6.6	38	2.5	29	5.2	.8	.8	1.5	1.4	1.0	.8	1.1
27.....		106	2.1	11.8	5.2	.8	.6	1.5				
28.....		25	1.9	4.8	4.0	.7	.6	1.4				
29.....		21	3.5	3.2	3.8	.6	3.2					
30.....		16.1	2.2	2.9	3.8	.6	3.7					
31.....		17.9		2.5		9.6	1.3			.8	1.7	.6
										2.2		

NOTE.—Discharge estimated July 2-10 and June 6. Braced figures give estimated mean discharge for periods indicated. Estimates made by comparison with record of flow for East Wailuanui Stream near Keanae, Maui; gage-height record either faulty or missing.

*Monthly discharge of West Wailuanui Stream near Keanae, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....			4.18	6.47	130	398
August.....	106	2.1	13.1	20.3	406	1,250
September.....	24	1.9	6.60	10.2	198	608
October.....	30	1.5	5.24	8.11	162	499
November.....	62	2.1	10.7	16.6	322	985
December.....	9.6	.6	1.67	2.58	51.9	159
January.....	91	.4	4.52	6.99	140	430
February.....	24	.6	3.41	5.28	95.5	293
March.....			.70	1.08	21.7	67
April.....	9.0	.4	1.40	2.17	42.0	129
May.....	7.4	.7	1.92	2.97	59.5	183
June.....	87	.6	6.33	9.79	190	583
The year.....	106	.4	4.98	7.71	1,820	5,580

#### KOOLAU DITCH NEAR KEANAE, MAUI

**LOCATION.**—5 feet above portal of tunnel in west side of Keanae Valley, a quarter of a mile above ditch foreman's house, and 3 miles southwest of Keanae post office.

**RECORDS AVAILABLE.**—January 1, 1910, to December 31, 1912, and November 2, 1917, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank close to ditch trail. Discharge measurements made from foot plank 20 feet above gage.

**CHANNEL AND CONTROL.**—Concrete-lined ditch; straight for 100 feet above gage and enters tunnel 5 feet below. Control is in tunnel; not well defined.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 138 million gallons a day, or 214 second-feet, at 4.15 p. m. November 7 (gage height, from water-stage recorder, 5.22 feet); minimum discharge, 9.0 million gallons a day, or 13.9 second-feet, from 9 a. m. April 11 to 1 a. m. April 12 (gage height, 0.90 foot).

1910-1912; 1917-1926: Maximum discharge recorded, 175 million gallons a day, or 271 second-feet, at 7.15 p. m. January 4, 1922 (gage height, from water-stage recorder, 6.36 feet); minimum discharge no flow, occasionally, when water is shut out of ditch.

**DIVERSIONS AND REGULATION.**—Flow completely regulated by gates and spillways above station.

**OBJECT OF STATION.**—To determine amount of water diverted through ditch from Territorial lands.

**UTILIZATION.**—Water used for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation permanent during year. Rating curve well defined and checked very closely by four discharge measurements made in November, February, and April, and covering a range from 11 to 125 million gallons a day. Operation of water-stage recorder satisfactory during year. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records excellent.

For description of ditch see "Koolau ditch at Nahiku Weir, near Nahiku, Maui."

*Discharge, in million gallons a day, of Koolau ditch near Keanae, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1-----	90	91	97	72	39	48	79	30	20	18.2	13.2	20
2-----	79	100	94	54	39	45	30	22	19.0	11.2	13.2	16.8
3-----	66	75	91	72	43	42	23	20	18.0	10.4	13.0	15.5
4-----	57	85	84	51	56	39	51	19.0	18.0	10.0	12.3	14.4
5-----	51	107	78	54	77	38	32	18.0	16.8	9.8	12.8	14.4
6-----	51	107	78	69	84	36	23	18.0	16.8	11.4	15.8	19.1
7-----	80	107	69	75	100	34	20	16.8	15.5	12.8	64	15.5
8-----	61	97	63	78	100	32	19.0	16.8	15.5	11.2	78	13.2
9-----	48	87	69	72	107	31	18.0	23	15.5	10.2	38	13.2
10-----	42	75	66	87	100	30	19.4	43	15.5	9.6	22	17.5
11-----	68	63	87	66	87	27	33	51	15.5	9.2	32	41
12-----	54	57	104	60	72	26	18.0	23	14.4	26	64	120
13-----	45	51	97	54	100	26	16.8	19.0	13.2	35	26	124
14-----	42	51	102	48	104	24	15.5	16.8	13.2	14.4	20	105
15-----	38	45	81	45	118	26	16.8	16.8	13.0	15.5	18.0	60
16-----	36	60	69	45	107	24	20	15.5	13.2	18.1	16.8	42
17-----	39	48	63	42	107	22	16.8	70	12.8	84	15.5	35
18-----	38	42	79	38	111	22	15.5	110	13.0	28	15.5	30
19-----	32	48	91	36	114	55	14.4	63	14.4	23	15.5	27
20-----	36	50	99	36	97	27	14.4	45	12.3	26	15.5	23
21-----	57	54	97	34	81	23	95	46	11.9	15.5	14.4	20
22-----	39	100	69	32	72	20	72	32	11.7	14.4	14.4	19.0
23-----	34	92	63	31	63	20	39	28	12.5	14.1	14.4	18.0
24-----	39	63	54	105	85	19.0	30	37	11.4	70	13.0	18.0
25-----	48	81	54	80	75	19.0	24	27	11.2	31	18.0	16.8
26-----	35	104	48	99	69	18.0	22	24	11.0	20	15.5	16.8
27-----	64	97	44	84	69	16.8	20	24	10.8	16.8	13.2	16.8
28-----	88	97	45	57	57	16.8	20	22	10.6	15.5	14.4	15.5
29-----	95	110	51	48	54	15.5	44	-----	10.4	14.4	27	14.4
30-----	60	104	104	42	57	15.5	64	-----	10.2	13.2	80	14.4
31-----	89	107	-----	39	-----	38	33	-----	10.4	-----	36	-----

*Monthly discharge of Koolau ditch near Keanae, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July-----	95	32	54.9	84.9	1,700	5,220
August-----	110	42	79.2	123	2,460	7,530
September-----	104	44	76.3	118	2,290	7,020
October-----	105	31	58.2	90.0	1,800	5,540
November-----	118	39	81.5	126	2,440	7,500
December-----	55	15.5	28.2	43.6	876	2,680
January-----	95	14.4	30.9	47.8	959	2,940
February-----	110	15.5	32.0	49.5	897	2,750
March-----	20	10.2	13.8	21.4	428	1,310
April-----	84	9.2	20.6	31.9	619	1,900
May-----	80	12.3	25.2	39.0	781	2,400
June-----	124	13.2	31.2	48.3	936	2,870
The year-----	124	9.2	44.4	68.7	16,200	49,700

#### HONOMANU STREAM AT HAIKU-UKA BOUNDARY NEAR KAILIILI, MAUI

LOCATION.—At end of Haiku-uka boundary trail, 8 miles east of Kailiili.

RECORDS AVAILABLE.—October 9, 1919, to June 30, 1926.

EQUIPMENT.—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage or from footbridge just below gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for 50 feet above and below station; narrows into a gorge below station. Control composed of 2-man boulders; subject to shifts.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 497 million gallons a day, or 769 second-feet, at 5.45 a. m. August 27 (gage height from water-stage recorder, 5.80 feet); minimum discharge, 0.2 million gallons a day, or 0.3 second-foot, at 8 p. m. March 21 (gage height, 0.61 foot).

1919-1926: Maximum discharge recorded, 1,290 million gallons a day, or 2,000 second-feet, at 2.45 p. m. January 14, 1923 (gage height from water-stage recorder, 9.93 feet); minimum discharge, 0.2 million gallons a day, 0.3 second-foot, from 4 to 8 p. m. September 19, 1924 (gage height, 0.59 foot) and at 8 p. m. March 21, 1926 (gage height, 0.61 foot).

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine discharge of stream at boundary between fee-simple land above and Territorial lands below.

**UTILIZATION.**—Water picked up below by East Maui Irrigation Co.'s ditches for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation changed, presumably, at times of floods August 27, November 7, and June 11. Three rating curves used are rather poorly defined below 100 million gallons a day; extended above on basis of peak-flow comparison with the lower station on this stream. These curves checked fairly well by three of the four discharge measurements made in August, September, and February, and covering a range from 0.5 to 4 million gallons a day. Operation of water-stage recorder satisfactory during year. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records poor.

*Discharge, in million gallons a day, of Honomanu Stream at Haiku-uka boundary near Kailih, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	4.9	7.3	7.9	2.1	0.6	1.1	5.3	2.4	0.6	2.8	0.7	1.0
2	2.9	17.5	4.0	1.1	.6	1.0	1.2	1.1	.5	1.3	.6	.6
3	2.3	3.5	2.4	2.0	.6	.9	.8	.8	.5	1.0	.6	.5
4	2.0	3.7	1.7	1.3	1.1	.8	3.4	.6	.5	.5	.5	.4
5	1.7	46	1.6	1.1	15.7	.8	1.5	.6	.4	.4	.5	.4
6	1.7	19.5	1.3	2.8	3.4	.8	1.0	.6	.4	.8	.5	.3
7	7.5	8.1	1.2	1.6	87	.6	.6	.5	.3	2.5	2.3	.3
8	3.3	5.0	1.0	2.1	21	.6	.6	.5	.3	1.6	3.3	.3
9	1.9	4.0	11.8	1.3	7.9	.6	.5	1.0	.3	.9	2.1	.2
10	1.6	2.9	2.3	1.9	2.8	.5	.5	2.5	.3	.6	1.2	.4
11	4.2	2.2	4.1	1.3	2.3	.5	.8	2.6	.3	.4	1.2	37
12	2.9	1.9	7.7	1.0	1.8	.5	.6	1.6	.3	2.4	3.4	88
13	2.1	1.7	5.2	.8	4.4	.4	4	1.0	.3	2.8	1.3	26
14	1.5	1.7	2.4	.8	16.2	.4	4	.7	.3	1.4	.8	9.2
15	1.3	1.5	1.2	.7	23	.4	4	.6	.3	1.9	.6	1.6
16	1.1	2.5	.9	.6	3.7	.4	.6	.5	.3	1.4	.5	1.9
17	1.4	1.9	.9	.6	6.7	.4	.6	43	.3	2.8	.4	1.5
18	2.0	1.5	7.9	.6	6.3	.3	.5	21	.3	2.1	.4	.9
19	1.3	1.4	3.9	.6	7.9	2.0	4	2.0	.3	2.2	.3	.7
20	1.5	1.5	3.9	.6	2.5	1.0	.3	1.5	.2	2.0	.3	1.2
21	4.2	1.6	4.1	.6	1.8	.6	90	1.2	.2	1.6	.3	1.2
22	2.6	6.0	2.0	.8	1.6	.5	3.3	1.0	4.2	1.2	.3	.7
23	2.4	5.5	1.6	.8	1.5	.5	1.3	.9	2.0	3.1	.3	.5
24	1.8	3.2	1.1	6.0	1.9	.4	1.0	1.9	.8	6.2	.3	.4
25	3.4	7.3	1.0	2.7	2.4	.4	.8	1.6	.5	9.6	.4	.4
26	2.1	85	1.2	2.3	1.7	.4	.6	1.0	.4	2.3	.4	.3
27	4.8	154	.8	1.5	2.9	.3	.5	.8	.3	1.3	.3	.3
28	15.0	9.7	.8	.8	1.5	.3	.5	.7	.3	1.0	.3	.3
29	11.6	10.9	1.4	.7	1.2	.3	1.6	-----	.3	.9	.5	.3
30	3.6	6.2	41	.6	1.2	.3	4.2	-----	.3	.8	4.3	.3
31	10.0	27	-----	.6	-----	3.7	2.5	-----	.3	-----	1.8	-----

*Monthly discharge of Honomanu Stream at Haiku-uka boundary near Kailiili, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	15.0	1.1	3.57	5.52	111	340
August.....	154	1.4	14.6	22.6	452	1,390
September.....	41	.8	4.28	6.62	128	394
October.....	6.0	.6	1.36	2.10	42.3	129
November.....	87	.6	7.77	12.0	233	715
December.....	3.7	.3	1.70	1.08	21.7	67
January.....	90	.3	4.09	6.33	127	389
February.....	43	.5	3.36	5.20	94.2	289
March.....	4.2	.2	.54	.84	16.6	51
April.....	9.6	.4	1.99	3.08	59.8	183
May.....	4.3	.3	.99	1.53	30.7	94
June.....	88	.2	5.90	9.13	177	543
The year.....	154	.2	4.09	6.33	1,490	4,580

**HONOMANU STREAM NEAR KEANAE, MAUI**

**LOCATION.**—500 feet above Spreckels ditch intake and trail bridge and 6 miles south of Keanae post office.

**RECORDS AVAILABLE.**—November 15, 1913, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage or from cable 75 feet downstream.

**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; subject to shifts.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 654 million gallons a day, or 1,010 second-feet at 7 a. m. August 27 (gage height from water-stage recorder, 6.15 feet); minimum discharge, 0.2 million gallons a day, or 0.3 second-foot, at 3 p. m. March 10 (gage height, 0.33 foot).

1913-1926: Maximum discharge recorded, 1,180 million gallons a day, or 1,830 second-feet at 8 a. m. October 16, 1924 (gage height from water-stage recorder, 8.76 feet); minimum discharge 0.17 million gallons a day, or 0.26 second-foot July 14, 1920 (gage height, 1.77 feet, old datum).

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—Data valuable in relation to Territorial water licenses to ditch company.

**UTILIZATION.**—Ordinary flow is diverted by Spreckels ditch for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation changed, presumably, at time of flood June 11. Two rating curves used are fairly well defined below 500 million gallons a day; extension above uncertain. One of these curves was checked closely by three discharge measurements well distributed during the year and covering a range from 0.8 to 11.5 million gallons a day; the other is based on subsequent measurements. Operation of water-stage recorder unsatisfactory owing to frequent stopping of clock and paper running crooked which caused large gage-height corrections. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records poor.

*Discharge, in million gallons a day, of Honomanu Stream near Keanae, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June			
1.....	8.8	11.9	21	7.3	1.6	2.6	17.5	2.7	1.2	6.6	1.1	2.3			
2.....	5.0	25	12.6	3.7	1.8	2.3	2.1			1.6	1.1	1.6			
3.....	3.8	6.0	8.1	6.9	1.9	2.3	1.0			1.0	1.0	1.3			
4.....	3.3	9.0	6.0	4.3	3.5	2.1	6.4			.8	.9	1.2			
5.....	2.9	67	5.4	3.6	19.6	1.9				.7	1.0	1.1			
6.....	2.8	35	4.4	7.6	9.5	1.7	2.6	4.1	1.0	1.0	1.3	1.1			
7.....	16.2	15.2	4.0	6.5	96	1.6				4.1	7.8	1.0			
8.....	5.6	8.6	3.4	7.5		1.6				2.2	11.2	.9			
9.....	3.2	7.0	15.0	4.5		1.5	.8			1.0	5.0	.9			
10.....	2.6	5.2	7.8	6.0		1.4	.8			.7	2.5	1.2			
11.....	7.8	4.2	16.7	5.8	15	1.3	3.0	1.0	3.3	.7	5.1	12.2			
12.....	4.5	3.7	21	4.0		1.3	1.0			5.6	10.0	137			
13.....	3.4	3.3	11.7	3.2		1.2	.8			6.8	3.2	58			
14.....	2.6	3.4	7.8	4.8	39	1.1	.8			2.3	2.1	33			
15.....	2.4	3.0	4.2	3.1		1.0	.8			3.3	1.6	6.8			
16.....	2.1	5.2	3.4	2.6	13.4	1.0	.9	18	3.3	3.3	1.5	6.1			
17.....	2.7	3.4	3.1	2.6	29	.9	.9			11.6	1.2	6.3			
18.....	3.4	3.0	10.8	2.3	15.5	.9	.8			4.1	1.0	3.2			
19.....	2.3	3.0	13.7	2.2	9.4	3.3	.7			4.7	1.0	2.4			
20.....	4.5	3.4	7.7	2.1	6.5	1.9				3.5	.9	2.4			
21.....	8.0	3.5	12.6	2.0	4.3	1.0	37	3.1	3.2	2.7	.9	3.7			
22.....	3.8	15.0	6.7	2.8	3.6	.8				2.0	.8	2.1			
23.....	3.5	12.2	7.8	1.9	3.3	.7				4.5	.9	1.5			
24.....	3.0	5.1	4.4	21	5.4	.7	2.0			15.3	.8	1.3			
25.....	5.0	9.5	3.5	7.9	6.0	.6				11.5	1.2	1.2			
26.....	3.0	108	3.4	6.7	4.2	.7	1.0			4.8	1.1	1.1			
27.....	13.4	227	2.8	5.4	6.4	.6				6.5			2.3	.9	1.1
28.....	18.1	30	2.9	2.8	3.3	.6							1.7	.8	1.0
29.....	21	24	4.0	2.3	3.0	.5							1.3	2.2	1.0
30.....	6.0	20	67	1.9	3.1	.5							1.2	17.8	.9
31.....	15.2	117		1.7		.7					4.6				

NOTE.—Braced figures give mean discharge for periods indicated, estimated by comparison with record of Honomanu Stream at Haiku-uka boundary and adjacent streams; gage-height record either faulty or missing.

*Monthly discharge of Honomanu Stream near Keanae, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	21	2.1	6.13	9.48	190	583
August.....	227	3.0	25.7	39.8	797	2,440
September.....	67	2.8	10.1	15.6	303	930
October.....	21	1.7	4.74	7.33	147	451
November.....	96	1.6	13.1	20.3	394	1,210
December.....	3.3	.5	1.30	2.01	40.3	124
January.....		.7	7.30	11.3	226	694
February.....			6.48	10.0	181	557
March.....			1.48	2.29	45.8	141
April.....	15.3	.7	3.76	5.82	113	346
May.....	17.8	.8	2.98	4.61	92.5	284
June.....	137	.9	9.83	15.2	295	905
The year.....	227	.5	7.74	12.0	2,820	8,660

## HAIPUAENA STREAM AT HAIKU-UKA BOUNDARY NEAR KAILIILI, MAUI

**LOCATION.**—50 feet upstream from Haiku-uka boundary trail and 7½ miles by trail east of Kailiili.

**RECORDS AVAILABLE.**—June 3, 1922, to June 30, 1926. May 27, 1919, to June 2, 1922, at site 250 feet upstream.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage or from footbridge 25 feet downstream.

**CHANNEL AND CONTROL.**—One channel at all stages; straight for 50 feet above gage and 100 feet below. Artificial control composed of heavy boulders anchored with concrete; subject to shifts.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 82 million gallons a day, or 127 second-feet, at 10.45 a. m. August 27 (gage height from water-stage recorder, 3.53 feet); minimum discharge, 0.2 million gallons a day, or 0.3 second-foot, at midnight June 30 (gage height, 0.60 foot).

1919-1926: Maximum discharge recorded, 162 million gallons a day, or 251 second-feet, at 8.15 a. m. October 16, 1924 (gage height from water-stage recorder, 5.43 feet); minimum discharge, 0.1 million gallons a day, or 0.2 second-foot, from 6.15 to 9 p. m. September 19, 1924 (gage height, 0.52 foot).

**DIVERSIONS AND REGULATION.**—Low flow practically all diverted into Kula pipe line at elevation 4,200 feet (about 1½ miles above station).

**OBJECT OF STATION.**—To determine discharge of stream at boundary between fee-simple land above and Territorial lands below.

**UTILIZATION.**—Water diverted below into East Maui Irrigation Co.'s ditches for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation permanent during year except August 6-11, when shifting-control method was used. Rating curve fairly well defined below 6 million gallons a day; extension above uncertain. Shifting-control method based on one discharge measurement made August 8. Curve checked closely by two of three other measurements made during year at 0.4 and 1.3 million gallons a day. Operation of water-stage recorder satisfactory during year. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection and corrected when necessary for shifting control or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages; poor for high stages.

*Discharge, in million gallons a day, of Haipuaena Stream at Haiku-uka boundary near Kailiili, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	3.3	5.0	7.3	2.2	0.7	1.0	4.6	2.2	0.6	3.2	0.7	0.8
2.....	2.0	9.7	4.4	1.5	.8	.9	.8	.8	.6	.9	.7	.6
3.....	1.7	2.2	2.9	2.4	.8	.9	.6	.7	.5	.7	.7	.5
4.....	1.5	2.8	2.4	1.6	1.2	.8	3.2	.6	.6	.5	.7	.5
5.....	1.3	9.3	2.2	1.4	6.3	.8	1.1	.6	.5	.4	.6	.5
6.....	1.3	8.4	2.0	3.0	3.5	.7	.7	.6	.5	.9	.7	.4
7.....	5.4	3.4	1.7	2.2	22	.7	.6	.5	.5	2.0	2.5	.4
8.....	2.3	1.8	1.6	2.6	9.8	.7	.5	.5	.4	1.0	3.7	.4
9.....	1.4	1.7	5.4	1.8	6.3	.7	.5	.9	.4	.7	1.7	.4
10.....	1.3	1.5	2.8	2.3	2.3	.7	.5	2.6	.4	.5	1.0	.5
11.....	3.4	1.4	3.3	1.5	1.9	.6	.7	2.0	.4	.4	1.4	7.5
12.....	2.1	1.4	6.3	1.3	1.4	.6	.5	1.1	.4	2.6	3.5	18.8
13.....	1.7	1.3	4.0	1.2	4.3	.6	.5	.8	.4	2.3	1.0	11.5
14.....	1.3	1.3	2.5	1.1	8.0	.6	.4	.6	.4	1.1	.7	5.2
15.....	1.1	1.2	1.7	1.0	11.3	.5	.5	.5	.4	1.4	.6	1.7

*Discharge, in million gallons a day, of Haipuaena Stream at Haiku-uka boundary near Kailili, Maui, for the year ending June 30, 1926—Continued*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
16.....	1.0	1.7	1.4	1.0	3.1	0.5	0.6	0.5	0.4	1.1	0.5	2.0
17.....	1.3	1.3	1.3	1.0	9.6	.5	.5	15.0	.4	2.4	.5	1.4
18.....	1.4	1.1	5.2	.9	5.4	.5	.5	10.7	.4	2.1	.5	.8
19.....	1.1	1.1	4.5	.9	5.8	3.1	.4	1.7	.4	2.0	.5	.6
20.....	1.3	1.1	3.9	.9	2.1	.8	.4	1.1	.4	1.6	.4	1.2
21.....	3.0	1.2	4.3	1.0	1.6	.6	22	.9	.4	1.2	.4	.9
22.....	1.7	4.5	2.3	1.1	1.4	.5	2.1	.8	3.1	.9	.4	.6
23.....	1.6	4.1	1.8	.9	1.3	.5	.9	.7	1.3	2.3	.4	.5
24.....	1.3	2.2	1.4	5.7	2.2	.5	.7	1.5	.7	4.9	.4	.4
25.....	2.5	4.4	1.4	3.0	2.2	.5	.6	1.1	.5	5.2	.5	.4
26.....	1.5	8.1	1.4	2.3	1.7	.5	.5	.7	.4	2.1	.5	.4
27.....	4.1	34	1.1	1.9	2.4	.5	.5	.7	.4	1.1	.4	.4
28.....	6.4	7.0	1.2	.9	1.2	.4	.5	.7	.4	1.0	.4	.3
29.....	7.2	6.5	2.1	.8	1.1	.4	1.7	-----	.4	.9	.6	.3
30.....	2.2	6.7	17.3	.8	1.1	.4	3.4	-----	.4	.8	4.1	.2
31.....	6.3	12.4	-----	.7	-----	2.7	2.7	-----	.4	-----	1.3	-----

*Monthly discharge of Haipuaena Stream at Haiku-uka boundary near Kailili, Maui, for the year ending June 30, 1926*

Month	Discharge			Total run-off		
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	7.2	1.0	2.42	3.74	75.0	230
August.....	34	1.1	4.83	7.47	150	460
September.....	17.3	1.1	3.37	5.21	101	310
October.....	5.7	.7	1.64	2.54	50.9	156
November.....	22	.7	4.09	6.33	123	377
December.....	3.1	.4	.76	1.18	23.7	72
January.....	22	.4	1.73	2.68	53.7	165
February.....	15.0	.5	1.82	2.82	51.1	156
March.....	3.1	.4	.56	.87	17.4	53
April.....	5.2	.4	1.61	2.49	48.2	148
May.....	4.1	.4	1.03	1.59	32.0	98
June.....	18.8	.2	2.00	3.09	60.1	184
The year.....	34	.2	2.15	3.33	786	2,410

#### HAIPUAENA STREAM NEAR HUELO, MAUI

**LOCATION.**—200 feet above inflow of Spreckels ditch and 7 miles by trail east of Huelo.

**RECORDS AVAILABLE.**—October 19, 1913, to June 30, 1926. Also records of combined flow of stream and Spreckels ditch at staff-gage station 600 feet below present site December 18, 1910, to September 30, 1913.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank about 500 feet upstream from ditch trail. Discharge measurements made by wading near gage or from footbridge just below gage.

**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; subject to shifts.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 340 million gallons a day, or 526 second-feet at 7.15 a. m. August 27 (gage height from water-stage recorder, 4.47 feet); minimum discharge uncertain owing to plugged intake to stilling well.

1913-1926: Maximum discharge recorded, 530 million gallons a day, or 820 second-feet, at 7.40 p. m. January 16, 1921 (gage height from water-stage recorder, 5.67 feet); minimum discharge, 0.3 million gallons a day, or 0.5 second-foot, frequently during December, 1919 (gage height, 0.20 foot).

**DIVERSIONS AND REGULATION.**—See under "Diversions" in description of station on this stream at Haiku-uka boundary.

**OBJECT OF STATION.**—Data valuable in relation to water valuation appraisal under Territorial lease to ditch company.

**UTILIZATION.**—Ordinary flow diverted by ditches of East Maui Irrigation Co. for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation changed, presumably, at times of floods August 5, January 21, and April 4. Three rating curves used are fairly well defined below 100 million gallons a day; extension above uncertain. These curves checked fairly well by six discharge measurements well distributed during the year and covering a range from 1 to 4 million gallons a day. Operation of water-stage recorder very unsatisfactory during year owing to plugged intake to stilling well. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records poor:

*Discharge, in million gallons a day, of Haipuaena Stream near Huelo, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....		9.6	16.7	4.1								
2.....		19.2	9.8	2.8	1.5		4.9			2.6		
3.....		6.8	6.9	5.1						1.0	1.0	
4.....		10.1	5.0	3.0	3.3			1.8	1.2	.8		
5.....		49	4.4	2.9	11.1	1.8	2.6					0.9
6.....		26	3.8	4.4	5.1		1.4			1.2		
7.....	4.4	12.1	3.3	4.2	51		1.2			2.6		
8.....		6.6	2.9	5.5	30		1.1			2.0		
9.....		5.4	6.9	4.1	16.5					1.4		
10.....		4.1	4.6	5.2	5.6					1.1	4.5	
11.....		3.5	13.8	5.2	4.2		1.0	2.0		1.0		
12.....		3.0	13.9	3.8	3.3					4.6		35
13.....		2.7	7.1	2.9	7.6	1.2				4.8		
14.....		2.7	5.6	4.5	10.6				.9	2.0		
15.....		2.4	3.9	2.5	26					2.3		
16.....	2.4	4.2	3.2	2.2	12.4		8			2.4	1.2	2.8
17.....		2.8	3.2	2.4	23					9.8		
18.....		2.5	6.4	2.0	10.6			16		3.5		
19.....		2.8	9.6	2.0	11.8					4.1		
20.....		3.0	5.1	1.8	5.6	1.5				3.1		
21.....							18			2.4		2.0
22.....		3.3	8.3	1.9	3.9					1.9		
23.....	3.9	10.3	3.8	2.0	3.5					2.3		
24.....		9.9	4.2	1.7	3.2				2.5	9.2	1.0	
25.....		4.1	3.3	15.4	4.6			1.6		5.8		
26.....		6.6	2.8	5.4	5.0							
27.....						.6				3.7		.8
28.....	14.7	63	2.7	4.2	3.1		1.2					
29.....	12.7	126	2.3	3.7	4.2							
30.....	12.7	16.5	2.3		2.9					1.5		
31.....	17.0	19.0	2.8	1.8	2.8				.9			
32.....	5.8	15.3	41		2.9		5.0				6.0	
33.....	12.4	32										

NOTE.—Discharge estimated Aug. 11, Oct. 13, 15, Nov. 20, 21, 24, 26, 30, and Apr. 20. Braced figures give estimated mean discharge for periods indicated. Estimates made by comparison with record of flow for this stream at Haiku-uka boundary and adjacent streams; gage-height record faulty owing to plugged intake.

*Monthly discharge of Haipuaena Stream near Huelo, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	17.0	-----	5.21	8.06	162	496
August.....	126	2.4	15.6	24.1	484	1,480
September.....	41	2.3	6.99	10.8	210	644
October.....	15.4	-----	3.62	5.60	112	344
November.....	51	-----	9.28	14.4	278	854
December.....	-----	-----	1.20	1.86	37.2	114
January.....	-----	-----	4.15	6.42	128	395
February.....	-----	-----	4.34	6.71	121	373
March.....	-----	-----	1.29	2.00	39.9	123
April.....	9.8	-----	2.89	4.47	86.8	266
May.....	-----	-----	2.15	3.33	66.7	205
June.....	-----	-----	5.85	9.05	175	539
The year.....	126	-----	5.21	8.06	1,900	5,830

#### SPRECKELS DITCH AT HAIPUAENA WEIR, NEAR HUELO, MAUI

**LOCATION.**—Between Haipuaena and Puohokamoa Streams on Spreckels ditch trail and about 7 miles southeast of Huelo.

**RECORDS AVAILABLE.**—April 23, 1922, to June 30, 1926. The East Maui Irrigation Co. obtained records at this station prior to April 23, 1922.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank. Discharge measurements made by wading about 100 feet above gage.

**CHANNEL AND CONTROL.**—Recorder operates in weir basin 16 feet by 65 feet. Control is sharp-crested trapezoidal weir 6 feet long and 2 feet high with side slopes 1:4; practically no velocity of approach.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 65 million gallons a day, or 101 second-feet, at 10 a. m. January 21 (gage height from water-stage recorder, 2.56 feet); minimum discharge, 2.0 million gallons a day, or 3.1 second-feet, from 4 to 11 a. m. March 22 (gage height, 0.29 foot).

1922-1926: Maximum discharge recorded, 65 million gallons a day, or 101 second-feet, at 11 a. m. September 10, 1922 (gage height from water-stage recorder, 2.57 feet), at 4.30 a. m. February 13, and 8 a. m. October 16, 1924 (gage height from water-stage recorder, 2.56 feet), and at 10 a. m. January 21, 1926 (gage height from water-stage recorder, 2.56 feet). Minimum discharge, no flow, nearly entire time April 9-23, 1925, when water was shut out of ditch.

**DIVERSIONS AND REGULATION.**—Flow completely regulated by gates and spillways above station.

**OBJECT OF STATION.**—To determine the amount of water diverted through ditch from Territorial lands.

**UTILIZATION.**—Water used for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation permanent during year. Rating curve, based on weir formulas, well defined below 40 million gallons a day and fairly well defined above. No discharge measurements were made during year. Operation of water-stage recorder satisfactory during year. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records excellent.

Spreckels ditch diverts water from all streams on the windward side of the crater of Haleakala between Nuaailua Gulch and Kailua Stream. It diverts above Koolau ditch as far as Puohokamoa Stream; from Puohokamoa Stream to

Kailua Stream it diverts below Koolau (Wailoa), and New Hamakua ditches, and above Center ditch. At Kailua Stream the water is diverted into Lowrie ditch and carried to a point near Paia where it is distributed for irrigation of sugar cane. Spreckels ditch proper is about 6 miles long and has a rated carrying capacity of 45 million gallons a day. It was originally one of the main irrigation ditches on East Maui but with the completion of Koolau (Wailoa), and Haiku ditches it was abandoned west of Kailua Stream and became mainly a storm-water ditch east of Kailua Stream.

*Discharge, in million gallons a day, of Spreckels ditch at Haipuaena Weir, near Huelo, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	18.0	20	10.6	15.5	7.5	8.7	16.7	13.6	4.5	31	5.0	7.0
2	14.0	24	9.0	12.1	8.3	7.8	5.8	6.7	4.1	6.5	4.8	5.0
7	12.9	16.9	13.7	17.2	9.4	7.3	5.0	5.6	3.9	4.3	4.6	4.2
4	11.5	19.4	16.9	12.7	12.6	6.8	13.5	5.0	3.7	3.3	4.1	3.8
5	10.1	30	15.7	13.2	17.9	6.5	9.0	4.6	3.7	2.7	4.6	3.4
6	9.9	26	14.2	16.2	18.7	6.2	5.9	4.5	3.3	4.5	8.0	3.3
7	18.7	22	12.7	15.9	23	5.8	4.6	4.3	3.2	10.4	19.2	3.2
8	15.0	19.1	11.7	17.6	14.0	5.5	4.2	3.9	3.1	6.5	21	2.7
9	10.1	17.8	15.2	14.8	12.9	5.3	3.9	7.7	3.1	3.6	14.2	2.6
10	9.0	15.7	16.5	16.9	11.1	5.0	4.7	13.2	2.9	2.9	9.0	5.6
11	18.0	13.4	21	15.3	13.3	4.8	13.2	15.1	3.1	2.4	10.5	11.8
12	13.8	12.5	23	12.9	14.4	4.6	5.3	8.5	2.7	14.5	19.4	27
13	10.6	10.8	18.4	11.3	22	4.5	4.2	5.9	2.6	15.5	11.0	25
14	8.7	11.4	16.1	12.7	23	4.3	3.8	5.0	2.6	7.2	7.8	20
15	7.8	9.6	13.2	11.1	32	4.6	4.3	4.6	2.5	9.2	6.7	13.6
16	7.2	17.0	11.7	9.7	26	4.5	6.6	4.2	2.7	9.7	5.8	13.6
17	10.2	11.7	11.1	9.7	33	3.9	4.3	25	2.4	24	5.2	12.3
18	11.8	9.5	15.6	8.3	26	4.1	3.8	27	2.5	13.7	4.6	8.1
19	7.5	11.5	19.4	8.5	25	10.9	3.4	11.5	2.8	14.3	4.3	7.3
20	10.3	12.0	15.9	8.3	17.2	5.9	3.3	9.0	2.4	14.1	4.2	6.7
21	18.3	13.6	19.1	7.8	14.5	4.3	29	8.8	2.2	9.2	3.8	8.3
22	11.7	24	14.7	9.0	12.9	3.8	11.6	7.5	19.9	7.3	3.3	5.8
23	11.0	21	14.9	7.3	11.7	3.4	9.5	6.5	20	7.5	3.4	5.0
24	9.7	15.6	12.5	25	19.1	3.3	7.3	8.8	4.2	22	2.9	4.5
25	13.8	20	10.8	17.9	16.7	3.4	6.1	8.2	3.2	17.0	7.1	4.1
26	9.4	34	10.6	17.5	13.2	3.4	5.3	5.8	2.7	13.2	4.5	3.8
27	17.3	24	9.2	14.2	15.3	3.2	4.9	5.5	2.7	8.0	3.6	3.8
28	21	8.0	9.5	10.4	10.6	2.9	4.8	4.8	2.6	6.7	4.5	3.3
29	24	8.3	12.2	9.2	9.9	2.8	8.4	-----	2.4	5.5	8.7	3.1
30	15.9	9.6	29	8.3	10.8	2.7	11.9	-----	2.2	4.9	20	2.8
31	21	12.7	-----	7.6	-----	10.2	9.7	-----	2.6	-----	11.9	-----

*Monthly discharge of Spreckels ditch at Haipuaena Weir, near Huelo, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	24	7.2	13.2	20.4	408	1,260
August	34	8.0	16.8	26.0	521	1,600
September	29	9.0	14.8	22.9	444	1,360
October	25	7.3	12.7	19.6	394	1,210
November	33	7.5	16.8	26.0	503	1,550
December	10.9	2.7	5.17	8.00	160	492
January	29	3.3	7.55	11.7	234	718
February	27	3.9	8.60	13.3	241	739
March	20	2.2	4.08	6.31	126	388
April	31	2.4	10.1	15.6	302	930
May	21	2.9	7.99	12.4	248	760
June	27	2.6	7.69	11.9	231	708
The year	34	2.2	10.4	16.1	3,810	11,700

## PUOHOKAMOA STREAM NEAR HUELO, MAUI

LOCATION.—150 feet above Spreckels ditch inflow and trail crossing and 7 miles east of Huelo.

RECORDS AVAILABLE.—June 13, 1913, to June 30, 1926. December 18, 1910, to June 18, 1913, at site just below Spreckels ditch inflow.

EQUIPMENT.—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage or from footbridge 200 feet upstream.

CHANNEL AND CONTROL.—One channel at all stages; straight for 100 feet above and below gage. Banks steep and high. Stream bed very rough and steep. Control composed of large boulders; subject to shifts.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 650 million gallons a day, or 1,010 second-feet, at 7.45 a. m. August 27 (gage height from water-stage recorder, 6.10 feet); minimum discharge, 1.7 million gallons a day, or 2.6 second-feet, from 7 to 10 p. m. April 11 (gage height, 0.81 foot).

1910-1926: Maximum discharge recorded, 1,100 million gallons a day, or 1,700 second-feet, at 2.30 p. m. January 14, 1923 (gage height from water-stage recorder, 7.85 feet); minimum discharge, 0.4 million gallons a day, or 0.6 second-foot, October 26, 1917 (gage height, 0.25 foot).

DIVERSIONS AND REGULATION.—Kula pipe line diverts small amount of water above station at elevation 4,300 feet.

OBJECT OF STATION.—To furnish data for water valuation appraisal in connection with Territorial water license to ditch company.

UTILIZATION.—Ordinary flow is diverted by East Maui Irrigation Co.'s ditches for irrigation of sugarcane.

ACCURACY.—Stage-discharge relation probably permanent during year. Rating curve fairly well defined below 50 million gallons a day; extension above uncertain. This curve checked fairly well at 2.5 million gallons a day by three discharge measurements made during January, April, and May. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair for ordinary stages; high-stage records poor.

*Discharge, in million gallons a day, of Puohokamoa Stream near Huelo, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	21	19.0	56	13.9	3.8	6.1	30	11.0	3.0	27		4.2
2.....	13.9	45	30	9.6	4.2	5.6	4.5	4.5	2.7	4.2		3.0
3.....	11.1	12.9	20	15.8	4.2	5.2	3.0	3.8	2.6	3.0	3.2	2.6
4.....	9.6	19.4	16.0	9.6	7.2	4.8	11.7	3.3	2.5	2.4		
5.....	8.2	122	14.9	9.6	21	4.5	5.7	2.8	2.4	2.0		
6.....	7.6	77	12.9	12.8	12.9	3.8	3.3	3.0	2.2	2.8	3.6	
7.....	25	35	11.1	11.9	127	3.8	2.8	2.8	2.2	6.1	18.3	3.2
8.....	12.5	18.6	9.6	17.0	68	3.6	2.6	2.6	2.2	3.6	27	
9.....	7.6	14.9	16.3	10.4	50	3.6	2.5	4.2	2.4	2.5	9.4	
10.....	6.6	12.0	16.3	12.9	17.2	3.3	2.6	11.4	2.3	2.0	5.2	

*Discharge, in million gallons a day, of Puohokamoa Stream near Huelo, Maui, for the year ending June 30, 1926—Continued*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
11-----	14.9	9.6	25	11.4	13.9	3.0	7.2	12.0	2.4	1.8	11.7	48
12-----	8.9	8.9	47	8.2	10.4	3.0	2.8	5.2	2.2	11.1	24	
13-----	7.6	7.6	16.8	7.0	40	2.8	2.4	3.6	2.1	11.5	6.1	
14-----	5.6	7.6	13.9	7.0		2.7	2.4	3.0	2.1	4.2	4.5	
15-----	5.2	6.6	10.4	6.1		2.8	2.4	2.8	2.0	4.8	3.8	
16-----	4.8	10.8	8.2	5.6		2.8	3.3	2.5	2.1	5.6	3.3	
17-----	5.9	7.6	8.2	5.6		2.5	2.5	86	2.0	34	3.0	
18-----	7.0	6.1	12.0	4.8	2.4	2.2	64	2.0	9.4	2.7		
19-----	4.8	6.6	23	5.2	8.4	2.0	10.9	2.2	9.5	2.5		
20-----	5.8	7.6	11.0	4.8	16.0	4.2	2.0	7.0	1.9	9.6	2.5	
21-----	14.6	7.3	19.0	4.5	12.0	2.7	150	6.1	1.8	5.6	2.4	6.5
22-----	7.0	32	9.6	5.2	10.4	2.5	15.2	5.0	27	4.5	2.2	
23-----	6.1	30	9.9	3.8	8.9	2.4	7.0	4.5	7.9	4.2	2.2	
24-----	5.2	10.4	8.2	45	18.5	2.3	5.2	5.5	3.3	20	2.0	
25-----	7.6	13.9	7.0	12.7	14.7	2.4	4.5	5.6	2.6	3.1	2.5	
26-----	5.6	127	6.6	10.4	8.9	2.4	3.8	4.2	2.5	3.0	2.4	
27-----	33	313	6.1	7.6	11.1	2.2	3.6	4.2	2.5	2.2	2.3	
28-----	29	56	6.1	5.6	7.6	2.1	3.6	3.6	2.6	2.1	2.0	
29-----	34	57	7.1	4.8	7.0	1.9	7.3	-----	2.2	5.7	2.0	
30-----	30	56	115	4.5	7.6	1.9	15.5	-----	2.1	35	1.8	
31-----	25	81	-----	3.8	-----	13.7	7.6	-----	2.2	-----	8.7	

NOTE.—Discharge estimated July 28-30 and Aug. 26. Braced figures give estimated mean discharge for periods indicated. Estimates made by comparison with the records of the three branches of this stream at Haiku-uka boundary, Puohokamoa intake to Koolau ditch, Spreckels ditch at Haipuaena Weir, and Haipuaena Stream; recorder not operating properly.

*Monthly discharge of Puohokamoa Stream near Huelo, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July-----	34	4.8	12.6	19.5	391	1,200
August-----	313	6.1	39.9	61.7	1,240	3,800
September-----	115	6.1	19.1	29.6	573	1,760
October-----	45	3.8	9.58	14.8	297	911
November-----	127	3.8	24.8	38.4	742	2,280
December-----	13.7	1.9	3.72	5.76	115	354
January-----	150	2.0	10.4	16.1	321	989
February-----	86	2.5	10.2	15.8	285	876
March-----	27	1.8	3.30	5.11	102	314
April-----	34	1.8	7.78	12.0	233	716
May-----	35	2.0	6.85	10.6	212	652
June-----	-----	1.8	13.9	21.5	416	1,280
The year-----	313	1.8	13.5	20.9	4,930	15,100

#### EAST BRANCH OF PUOHOKAMOA STREAM AT HAIKU-UKA BOUNDARY NEAR KAILILI, MAUI

LOCATION.—200 yards downstream from trail crossing and 7 miles by trail south-east of Kailili.

RECORDS AVAILABLE.—October 9, 1919, to June 30, 1926.

EQUIPMENT.—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage or from footbridge at gage.

CHANNEL AND CONTROL.—Bed of stream boulder strewn; banks steep and high. Pool at station 20 feet wide by 35 feet long, clear and smooth. Control, large boulders; subject to shift during floods.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 45 million gallons a day, or 70 second-feet, at 6.30 a. m. August 27 (gage height from water-stage recorder, 5.69 feet); minimum discharge, 0.2 million gallons a day, or 0.3 second-foot, from 10 p. m. January 19 to 4 a. m. January 20 and 10 a. m. January 20 to 2 a. m. January 21 (gage height, 3.80 feet).

1919-1926: Maximum discharge recorded about 102 million gallons a day, or 158 second-feet, March 22, 1920 (gage height, old datum 3.27 feet; estimated by comparison with flow for West and Middle Branches of Puohokamoa Stream); minimum, no flow several days in December, 1919, and July 14, 1920.

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine discharge of stream at boundary between fee-simple land above and Territorial lands below.

**UTILIZATION.**—Water picked up below by East Maui Irrigation Co.'s ditches for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation probably permanent during year. Rating curve fairly well defined below 10 million gallons a day. This curve checked roughly by three discharge measurements made in August, January, and June and covering a range from 0.2 to 1.0 million gallons a day. Operation of water-stage recorder satisfactory except as indicated in footnote to daily discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair for ordinary stages; high-stage records poor.

*Discharge, in million gallons a day, of East Branch of Puohokamoa Stream at Haiku-uka boundary near Kailiiki, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	1.3	1.1	1.9	1.0	0.4	0.5	0.8	0.6	0.3	0.9	0.3	0.4
2.....	1.0	2.3	1.3	.8	.4	.4	.3	.4	.3		.3	.3
3.....	.9	.8	1.1	.9	.4	.4	.3	.3	.3		.3	.3
4.....	.9	1.2	1.0	.7	.4	.4	.9	.3	.3		.3	.3
5.....	.8	5.1	.9	.7	1.2	.4	.4	.3	.3		.3	.3
6.....	.8	2.9	.8	.9	.8	.4	.3	.3	.3	.4	.3	.3
7.....	2.3	1.5	.7	.8	7.0	.3	.3	.3	.3		1.0	.3
8.....	1.0	1.1	.7	1.0	2.6	.3	.2	.3			1.2	.2
9.....	.7	1.0	1.5	.7	1.7	.3	.2	.4			.3	.7
10.....	.7	.9	.9	.7	.9	.3	.2	.9			.3	.4
11.....	1.3	.8	1.5	.6	.7	.3	.4	.6		.3	.8	1.8
12.....	.8	.7	1.6	.5	.6	.3	.3	.4		.9	1.1	3.9
13.....	.7	.7	.9	.5	1.0	.3	.2	.3		.9	.5	4.6
14.....	.6	.7	.7	.5	1.7	.3	.2	.3		.5	.4	1.4
15.....	.6	.6	.7	.5	2.8	.3	.2	.3		.6	.4	.7
16.....	.5	.8	.6	.5	1.2	.3	.3	.3		.5	.3	.7
17.....	.6	.6	.6	.4	2.3	.3	.2	4.0		1.5	.3	.5
18.....	.6	.5	1.0	.4	1.6	.3	.2	2.5		.6	.3	.5
19.....	.5	.5	1.1	.4	1.2	.5	.2	.7		.5	.3	.4
20.....	.8	.6	1.1	.4	.9	.3	.2	.5	.3	.4	.3	.4
21.....	1.1	.6	1.1	.4	.7	.3	7.5	.4		.4	.3	.4
22.....	.7	1.8	.7	.4	.7	.2	.8	.4		.4	.3	.4
23.....	.6	1.5	.8	.4	.6	.2	.5	.4		.7	.3	.3
24.....	.6	.7	.7	2.2	.9	.2	.4	.4		1.2	.3	.3
25.....	.7	1.0	.6	.7	.7	.3	.4	.3		.7	.3	.3
26.....	.7	8.2	.5	.6	.7	.2	.3	.3		.5	.3	.3
27.....	1.5	14.9	.5	.5	.7	.2	.3	.3		.4	.3	.3
28.....	1.3	1.2	.5	.4	.5	.2	.3	.3		.4	.3	.3
29.....	1.9	2.4	.7	.4	.5	.2	.9			.3	.5	.3
30.....	.7	1.8	6.3	.4	.5	.2	.9			.3	2.3	.3
31.....	1.2	3.4		.4		1.1	.7				.6	

NOTE.—Braced figures, which give mean discharge for periods indicated, estimated by comparison with records of flow for adjacent streams; recorder not operating properly.

*Monthly discharge of East Branch of Puohokamoa Stream at Haiku-uka boundary near Kailiili, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	2.3	0.5	0.92	1.42	28.4	88
August.....	14.9	.5	2.03	3.14	62.9	193
September.....	6.3	.5	1.10	1.70	33.0	101
October.....	2.2	.4	.64	.99	19.7	61
November.....	7.0	.4	1.21	1.87	36.3	111
December.....	1.1	.2	.33	.51	10.2	31
January.....	7.5	.2	.62	.96	19.3	59
February.....	4.0	.3	.60	.93	16.8	52
March.....			.30	.46	9.3	28
April.....		.3	.64	.99	19.3	59
May.....	2.3	.3	.50	.77	15.6	48
June.....	4.6	.2	.70	1.08	21.0	64
The year.....	14.9	.2	.80	1.24	292	895

**MIDDLE BRANCH OF PUOHOKAMOA STREAM AT HAIKU-UKA BOUNDARY NEAR KAILIILI, MAU**

**LOCATION.**—At trail crossing 200 feet above Haiku-uka boundary line and  $6\frac{3}{4}$  miles southeast of Kailiili.

**RECORDS AVAILABLE.**—March 14, 1919, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage or from footbridge just above gage.

**CHANNEL AND CONTROL.**—One channel at all stages; straight for 25 feet above and below control. Right bank vertical; left bank about  $1\frac{1}{2}$  on 1 slope. Stream bed composed of gravel and boulders. Control subject to shifts.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 113 million gallons a day, or 175 second-feet, at 8 a. m. August 27 (gage height from water-stage recorder, 7.30 feet); minimum discharge, 0.1 million gallons a day, or 0.2 second-foot, from 1 p. m. March 20 to 1 p. m. March 22 (gage height, 4.02 feet).

1919-1926: Maximum discharge recorded, 207 million gallons a day, or 320 second-feet, at 5 p. m. March 22, 1920 (gage height from water-stage recorder, 8.47 feet); minimum discharge, 0.06 million gallons a day, or 0.09 second-foot, at noon December 22, 1919 (gage height, 3.91 feet) and from 7 to 9 p. m. July 14, 1920 (gage height, 4.06 feet).

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine discharge of stream at boundary between fee-simple land above and Territorial lands below.

**UTILIZATION.**—Water picked up below by East Maui Irrigation Co.'s ditches for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation permanent during year. Rating curve fairly well defined below 26 million gallons a day; extension above uncertain. This curve checked fairly well by three discharge measurements made in September, April, and June and covering a range from 0.3 to 0.9 million gallons a day. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair for ordinary stages; high-stage records poor.

*Discharge, in million gallons a day, of Middle Branch of Puohokamoa Stream at Haiku-uka boundary near Kailiili, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	2.0	2.8	4.4	1.6	0.4	0.8	2.0	1.0	0.2	1.9	0.3	0.5
2	1.3	5.9	2.7	.9	.4		.5	.4	.2	.6	.3	.4
3	1.0	1.4	1.8	1.2	.5		.3	.3	.2	.4	.3	.3
4	.9	1.5	1.5	.9	.7		1.7	.3	.2	.3	.2	.3
5	.8	19.7	1.3	.8	4.1		.6	.2	.2		.3	.3
6	.8	7.0	1.1	1.6	1.9	.4	.4	.3	.2	.6	.3	.3
7	3.0	3.2	1.0	1.2	23	.4	.3	.2	.2		1.4	.3
8	1.3	1.9	.9	1.6	6.0	.4	.3	.2	.2		2.2	.3
9	.8	1.6	2.4	1.0	3.5	.3	.2	.4	.2		1.2	.2
10	.7	1.2	1.8	1.3	1.6	.3	.3	1.2	.2		.6	.3
11	1.7	.9	1.8	.9	1.3	.3	.4	1.2	.2	.2	.8	3.8
12	1.1	.9	3.5	.7	1.0	.3	.2	.6		1.6	2.2	18.9
13	.8	.7	1.8	.6	2.4	.3	.2	.4		1.5	.7	10.2
14	.6	.7	1.6	.6	6.1	.3	.2	.3	.2	.6	.5	4.9
15	.6	.6	1.0	.5	7.0	.3	.2	.3		.8	.4	1.8
16	.5	.9	.8	.5	2.2	.3	.3	.2		.6	.3	2.0
17	.6	.8	.7	.5		.3	.3	12.2	.1	1.5	.3	1.4
18	.7	.6	2.2	.4		.3	.2	6.1	.1	1.3	.3	.8
19	.5	.6	2.6	.4			.2	1.0	.1	1.4	.3	.6
20	.6	.6	1.8	.4		.7	.2	.6	.1	1.3	.3	.8
21	1.4	.6	2.6	.5			21	.6	.1	.7	.2	.9
22	.9	2.5	1.3	.6		.3	1.2	.5	1.1	.5	.2	.5
23	.8	2.9	1.0	5.9	1.6	.3	.6	.4	.9	.6	.3	.4
24	.6	1.5	.8	2.8		.2	.4	1.2	.2	2.5	.2	.4
25	1.4	2.3	.7	1.9		.3	.3	.7	.2	3.1	.3	.4
26	.8	24	.7	1.2		.2	.3	.4	.2	1.3	.3	.4
27	2.2	43	.6	1.0		.2	.3	.3	.2	.6	.2	.3
28	3.1	5.4	.6	.6		.2	.3	.3	.2	.4	.2	.3
29	4.0	4.7	.8	.5		.2	.8		.2	.3	.3	.2
30	1.2	4.4	15.3	.4		.2	2.0		.2	.3	2.6	.2
31	3.0	9.1		.4		2.5	1.4		.2		1.0	

NOTE.—Discharge estimated June 25 and 26. Braced figures give estimated mean discharge for periods indicated. Estimates made by comparison with records of flow for adjacent streams; recorder not operating properly.

*Monthly discharge of Middle Branch of Puohokamoa Stream at Haiku-uka boundary near Kailiili, Maui, for the year ending June 30, 1926*

Month	Discharge			Total run-off	
	Million gallons a day			Million gallons	Acre-feet
	Maximum	Minimum	Mean		
July	4.0	0.5	1.28	1.98	39.7
August	43	.6	4.96	7.67	154
September	15.3	.6	2.04	3.16	61.1
October	5.9	.4	1.08	1.67	33.4
November	23	.4	2.82	4.36	84.5
December	2.5	.2	.45	.70	13.8
January	21	.2	1.21	1.87	37.6
February	12.2	.2	1.14	1.76	31.8
March	1.1	.1	.24	.37	7.3
April	3.1	.2	.91	1.41	27.3
May	2.6	.2	.61	.94	19.0
June	18.9	.2	1.75	2.71	52.4
The year	43	.1	1.54	2.38	562
					1,730

#### WEST BRANCH OF PUOHOKAMOA STREAM AT HAIKU-UKA BOUNDARY NEAR KAILIILI, MAUI

LOCATION.—At trail crossing 500 feet above Haiku-uka boundary and 6½ miles by trail southeast of Kailiili.

RECORDS AVAILABLE.—March 15, 1919, to June 30, 1926.

EQUIPMENT.—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage or from footbridge 200 feet downstream.

CHANNEL AND CONTROL.—One channel at all stages; straight for 30 feet above and 50 feet below gage. Right bank vertical; left bank about 1 on 1½ slope. Stream bed, rock and gravel. Control composed of large boulders; subject to shifts.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 126 million gallons a day, or 195 second-feet, at 6.30 a. m. August 27 (gage height from water-stage recorder, 6.15 feet); minimum discharge, 0.1 million gallons a day, or 0.2 second-foot, from 7 a. m. to 12.45 p. m. March 22 (gage height, 3.34 feet).

1919-1926: Maximum discharge recorded, estimated 250 million gallons a day, or 387 second-feet, at 5.30 p. m. March 22, 1920 (gage height estimated from faulty water-stage recorder graph, 8 feet); minimum discharge 0.08 million gallons a day, or 0.12 second-foot at 8.30 a. m. December 22 and 2. a. m. December 23, 1919 (gage height, 3.48 feet).

**DIVERSIONS AND REGULATION.**—Small amount of water diverted by Kula pipe line above station at elevation 4,300 feet.

**OBJECT OF STATION.**—To determine discharge of stream at boundary between fee-simple lands above and Territorial lands below.

**UTILIZATION.**—Water diverted by ditches of East Maui Irrigation Co. for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation probably permanent during year. Rating curve fairly well defined below 20 million gallons a day; extension above uncertain. This curve checked roughly at 0.2 and 0.8 million gallons a day by two discharge measurements made in January and April. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records probably poor.

*Discharge, in million gallons a day, of West Branch of Puohokamoa Stream at Haiku-uka boundary near Kailili, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	2.6	3.2	5.3	2.0	}	0.8	3.5	1.9	0.5	4.5	0.6	0.6
2	1.8	7.3	3.3	1.4			.6	.8	.4	1.1	.5	.4
3	1.5	1.9	2.4	1.7		.6	.4	.6	.4	.8	.5	.4
4	1.2	2.5	2.0	1.3		.6	2.1	.4	.4	.6	.4	.4
5	1.2	18.2	1.8	1.2		.6	.8	.4	.4	.4	.4	.3
6	1.1	8.4	1.6	2.2	}	.6	.6	.4	.4	1.0	.5	.3
7	4.2	4.0	1.4	2.0		.5	.4	.4	.4	2.0	2.3	.3
8	1.8	2.6	1.2	2.2		.4	.4	.3	.4	1.0	3.2	.3
9	1.2	2.2	3.0	1.5		.4	.4	.6	.4	.6	1.5	.2
10	1.0	1.8	1.9	1.6		.4	.4	1.8	.3	.4	.8	.3
11	2.6	1.5	3.1	1.2	}	.4	.6	1.8	.3	.3	1.4	9.4
12	1.6	1.3	4.4	1.0		.4	.4	.9	.3	2.4	2.8	17.9
13	1.3	1.2	2.4	.9		.4	.4	.6	.3	2.0	.8	11.0
14	1.0	1.2	1.9	.8		.4	.3	.4	.3	.9	.6	3.7
15	1.0	1.0	1.3	.8		.4	.4	.4	.3	1.2	.6	1.4
16	.9	1.5	1.2	.8	3.9	.4	.4	.3	.3	1.0	.5	1.9
17	1.0	1.1	1.1	.8		.3	.4	14.6	.3	3.0	.4	1.4
18	1.1	1.0	3.4	.8		.3	.3	8.6	.3	1.4	.4	1.0
19	.8	1.0	2.9	.7		1.8	.3	1.6	.3	1.5	.4	.8
20	1.1	1.0	3.0	.7		.6	.3	1.0	.2	1.2	.4	.9
21	2.2	1.1	2.8	.8	}	.4	27	.9	.2	1.0	.4	.8
22	1.2	4.1	1.5	.9		.4	2.0	.8	2.6	.8	.3	.6
23	1.1	3.0	1.4	.9		.4	1.0		1.2	1.3	.4	.6
24	1.0	1.8	1.1	4.2		.4	.7		.6	2.7	.3	.5
25	1.6	3.3	1.0	2.3		.4	.6	1.1	.4	2.8	.4	.4
26	1.3	31	1.0	1.5	}	.4	.5		.3	1.4	.4	.4
27	3.5	50	.8	1.2		.4	.4	.6	.4	.8	.3	.4
28	3.8	5.6	.9	.8		.3	.4	.6	.4	.7	.3	.4
29	5.1	6.5	1.4			.3	1.5		.3	.6	.6	.3
30	1.7	4.7	18.9	.7		.3	2.8		.3	.6	4.4	.3
31	2.9	11.4				1.9	2.2		.3		1.1	

NOTE.—Braced figures, which give mean discharge for periods indicated, estimated by comparison with records of adjacent streams; recorder not operating properly.

*Monthly discharge of West Branch of Puohokamoa Stream at Haiku-uka boundary near Kailiili, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-foot (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	5.1	0.8	1.79	2.77	55.4	170
August.....	50	1.0	6.01	9.30	186	572
September.....	18.9	.8	2.65	4.10	79.4	244
October.....	4.2		1.30	2.01	40.3	124
November.....			3.90	6.03	117	359
December.....	1.9	.3	.54	.84	16.7	51
January.....	27	.3	1.69	2.61	52.5	161
February.....	14.6	.3	1.61	2.49	45.1	138
March.....	2.6	.2	.45	.70	13.9	43
April.....	4.5	.3	1.33	2.06	40.0	122
May.....	4.4	.3	.90	1.39	27.9	86
June.....	17.9	.2	1.92	2.97	57.6	177
The year.....	50	.2	2.01	3.11	732	2,250

**PUOHOKAMOA INTAKE OF KOOLAU DITCH NEAR HUELO, MAUI**

**LOCATION.**—20 feet below intake on short feeder canal from Puohokamoa Stream to Koolau ditch, 7 miles southeast of Huelo.

**RECORDS AVAILABLE.**—March 23, 1922, to June 30 1926. East Maui Irrigation Co. previously obtained records at this site.

**EQUIPMENT.**—Au continuous water-stage recorder Discharge measurements made from concrete stringers over weir basin or by wading in stream above intake.

**CHANNEL AND CONTROL.**—Control formed by 6-foot sharp-crested trapezoidal weir 21 feet below gage; some velocity of approach; permanent. Recorder operates in weir basin 14 by 40 feet. Below weir channel slopes downward at 30° entering Koolau ditch in tunnel.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 39 million gallons a day, or 61 second-foot, at 5.15 a. m. June 12 (gage height from water-stage recorder, 2.01 feet); minimum discharge, 3.6 million gallons a day, or 5.6 second-foot, from midnight March 21 to 2.45 p. m. March 22 (gage height, 0.43 foot).

1922-1926: Maximum discharge recorded, 88 million gallons a day, or 136 second-foot, at 8 a. m. October 22, 1922 (gage height, from water-stage recorder, 3.04 feet); a higher discharge may have occurred during period of no record September 4-15, 1923. Minimum discharge recorded, 0.5 million gallons a day, or 0.8 second-foot, from 2 p. m. January 27 to 1.45 p. m. January 28, 1923 (gage height, 0.08 foot; water turned out of ditch).

**DIVERSIONS AND REGULATION.**—Entire flow of Spreckels ditch empties into Puohokamoa Stream about 400 feet above this station. Water in Puohokamoa Stream that is wasted over diversion dam at this canal intake is picked up by Spreckels ditch about 120 feet downstream. Can be completely regulated by gates just above gage.

**OBJECT OF STATION.**—To determine amount of water diverted into ditch from Territorial lands.

**UTILIZATION.**—Water used for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation permanent during year. Rating curve, based on discharge measurements and weir formulas, is well defined below 39 million gallons a day; extension above somewhat uncertain owing to water overtopping weir wing walls. This curve checked fairly well at 6 and 13 mil-

lion gallons a day by two discharge measurements made in January and February. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good except those estimated, which are fair.

*Discharge, in million gallons a day, of Puohokamoa intake of Koolau ditch near Huelo, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	22	20	20	17.8		14.7		16.6	7.2	19.8	8.7	12.5
2	25	22	18.9	17.8	14	13.4	18	11.0	6.8	12.2	8.3	9.4
3	24	20	17.8	17.8		12.1		9.2	6.4	7.8	7.9	7.9
4	22	20	18.9	16.6		11.2		8.3	6.1	5.5	7.1	7.2
5	18.9	24	17.8	17.8		10.5		7.6	6.1	4.8	7.4	6.9
6	17.8	23	17.8	17.8	26	9.9	8.5	7.8	5.7	7.8	12.5	6.8
7	26	22		17.8		9.4		7.6	5.5	16.6	29	6.8
8	24	20		18.9		9.0		7.2	5.4	11.1	30	6.0
9	18.9	20		17.8		8.7		12.4	5.2	6.4	24	5.5
10	15.4	18.9		17.8	18.9	8.5	6.9	14.7	5.1	5.2	15.2	9.1
11	25	18.9			17.8	7.8	17.1	20	5.2	4.5	15.0	16.9
12	23	17.8			17.8	7.6	8.7	15.4	4.7	17.1	28	34
13	18.9	17.8			18.9	7.4	6.8	10.8	4.5	22	18.9	33
14	15.0	17.8			18.9	7.1	6.1		4.7	12.8	13.4	31
15	13.6	16.6			22	7.1		7.5	4.3	15.0	11.0	25
16	12.5	18.9	19		20	8.3	10.2		4.5	16.4	9.6	25
17	16.6	17.8		16	22	6.9	6.8		4.0	31	8.5	23
18	19.8	16.6			20	6.6	5.8		4.2	24	7.6	15.4
19	12.8	16.6			20	9.8	5.2	19	4.7	23	6.9	13.9
20	15.1	17.8			18.9	16.6	4.8		4.0	24	6.6	12.3
21		17.8			17.8	9.2	18.9		3.8	16.6	6.3	14.4
22	18.9	20			17.8	7.4	17.8		9.4	12.5	5.5	10.3
23	17.8	20			16.6	6.8	15.4	11.2	14.5	13.1	5.8	9.0
24	16.6	18.9			17.8	6.3	11.7		6.6	30	5.1	7.9
25	23	20			17.8	6.0	9.6		5.2	25	10.6	7.4
26	16.6	24	16		16.6	6.1	8.3	9.7	4.7	21	8.8	6.9
27	24	26			17.8	5.8	7.4	9.4	5.0	13.4	6.1	7.1
28	25	20			16.6		8.2	7.9	5.2	11.0	6.6	6.3
29	22	20			15.4	5			4.8	9.6	11.8	5.8
30	20	18.9			16.6		17.0		4.3	8.7	30	5.5
31	22	22				25	12.9		4.8		21	

NOTE.—Discharge estimated Dec. 31. Braced figures give estimated mean discharge for periods indicated. Estimates made by comparison with records of flow for Puohokamoa Stream near Huelo, Spreckels ditch at Haipuaena Weir, and Wailoa ditch at Honopou; gage-height record either faulty or missing.

*Monthly discharge of Puohokamoa intake of Koolau ditch near Huelo, Maui, for the year ending June 30, 1926*

Month	Discharge			Total run-off		
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	26	12.5	19.9	30.8	618	1,890
August	26	16.6	19.8	30.6	614	1,880
September			18.5	28.6	554	1,700
October			17.2	26.6	533	1,640
November			19.1	29.6	572	1,760
December	25		9.04	14.0	280	860
January		4.8	10.9	16.9	339	1,040
February			12.5	19.3	351	1,070
March	14.5	3.8	5.57	8.62	173	530
April	31	4.5	14.9	23.1	448	1,370
May	30	5.1	12.7	19.6	393	1,210
June	34	5.5	12.9	20.0	388	1,190
The year	34	3.8	14.4	22.3	5,260	16,100

## MANUEL LUIS DITCH AT PUOHOKAMOA GULCH, NEAR HUELO, MAUI

**LOCATION.**—In Puohokamoa Gulch at lower portal of tunnel between Haipuaena and Puohokamoa Streams, 6 miles east of Huelo.

**RECORDS AVAILABLE.**—December 15, 1917, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank. Discharge based on weir formula.

**CHANNEL AND CONTROL.**—The control is a rectangular sharp-crested weir with complete end contractions, 4.5 feet long and 2.0 feet high, situated at outlet of tunnel. Weir basin is enlarged part of tunnel; insufficient to eliminate velocity of approach above medium stage.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 77 million gallons a day, or 119 second-feet, at 7.30 a. m. August 27 (gage height from water-stage recorder, 3.95 feet); minimum discharge, 0.1 million gallons a day, or 0.2 second-foot, from 2 to 11 p. m. April 11 (gage height, 0.05 foot).

1919-1926: Maximum discharge recorded, 116 million gallons a day, or 179 second-feet, at 2.10 p. m. January 24, 1923 (gage height from water-stage recorder, 4.93 feet); minimum discharge, 0.05 million gallons a day, or 0.08 second-foot, at 6.30 p. m. March 3, 1920 (gage height, 0.03 foot).

**DIVERSIONS AND REGULATION.**—This ditch is an extension of Center ditch and picks up water not diverted by ditches at higher elevations. The flow is regulated by gates at frequent intervals.

**OBJECT OF STATION.**—To determine amount of water diverted by ditch from areas involved under Territorial water license.

**UTILIZATION.**—Water used for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation probably permanent during year. Rating curve, based on weir formulas, is well defined but not checked by discharge measurements during year. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by use of integrator, except November 3 to January 5 when discharge was averaged for intervals of day. Records good except those estimated which are poor.

Manuel Luis ditch, at elevation about 500 feet, diverts the flow of Kolea, Haipuaena, and Puohokamoa Streams below Koolau and Spreckels ditches and discharges into Waikamoi Stream. The water is then picked up by Center ditch (see Center ditch below Kolea Reservoir, near Huelo) and carried to Kailua Stream where it is diverted into Lowrie ditch (see Lowrie ditch at Opana Weir, near Huelo), and carried to the vicinity of Paia for use in irrigation of sugar cane on the plantation of Hawaiian Commercial & Sugar Co. The system comprises about 20 miles of main ditch. Manuel Luis ditch proper is about 1½ miles long and has a rated carrying capacity of 30 million gallons a day.

*Discharge, in million gallons a day, of Manuel Luis ditch at Puohokamoa Gulch, near Huelo, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	14.1	13.8	29	1.7	0.5	1.0	15.8	1.8	0.5	5.2	0.3	0.5
2.....	5.8	20	21	.6	.6	.9	.8	.6	.5	.4	.3	.3
3.....	2.7	4.2	13.2	7.0	.9	.8	.8	.6	.5	.3	.3	.3
4.....	2.1	10.9	6.1	.6	2.2	.7	5.5	.6	.5	.3	.3	.3
5.....	1.6	34	4.5	.8	12.9	.7	.9	.5	.5	.2	.3	.2
6.....	1.4	30	3.3	2.4	6.7	.7	.6	.5	.4	.6	.4	.2
7.....	12.6	25	2.2	5.7	25	.7	.6	.5	.4	.4	7.3	.2
8.....	3.2	14.4	1.9	2.5	33	.6	.5	.5	.4	.3	12.9	.2
9.....	1.1	7.6	7.2	6.4	31	.6	.5	.7	.4	.2	.7	.2
10.....	.9	3.6	5.0	6.7	27	.5	.6	6.4	.4	.2	.4	.4

*Discharge, in million gallons a day, of Manuel Luis ditch at Puohokam oa Gulch, near Huelo, Maui, for the year ending June 30, 1926—Continued*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
11-----	7.6	2.1	13.7	2.2	9.3	0.5	1.9	4.3	0.4	0.1	4.6	6.9
12-----	1.6	1.9	23	1.0	1.5	.5	.5	.5	.4	3.8	11.1	35
13-----	1.0	1.3	14.6	.9	15.3	.5	.5	.4	.3	2.2	.6	31
14-----	.8	1.3	14.2	1.6	16.0	.5	.4	.3	.3	.4	.4	23
15-----	.7	1.1	4.2	.7	28	.5	.5	.4	.3	.3	.4	1.7
16-----	.6	12.0	2.0	} .8	21	.5	.8	.4	.4	.5	.3	1.0
17-----	1.2	1.3	1.7		29	.4	.5	19.4	.3	17.0	.3	.9
18-----	1.5	1.0	7.2		22	.5	.4	27	.3	1.0	.3	.7
19-----	.6	17.7	14.3		22	3.6	.4	3.6	.3	.9	.3	.7
20-----	7.1	2.4	6.0		10.6	.6	.4	1.3	.3	1.7	.3	.6
21-----	13.8	2.1	14.6	} 10	2.8	.4	28	1.5	.2	.6	.3	.6
22-----	.9	23	3.0		1.4	.4	9.6	.9	4.2	.5	.3	.5
23-----	.7	17.9	1.8		1.3	.4	.9	.8	.9	1.5	.3	.5
24-----	.7	2.1	1.3		12.3	.4	.7	1.5	.3	11.3	.2	.5
25-----	1.3	10.0	.9		5.0	.4	.6	.9	.2	3.3	.4	.5
26-----	.6	37	.7	} 10	1.6	.4	.5	.7	.2	.6	.3	.5
27-----	12.7	49	.6		1.7	.4	.5	.7	.2	.4	.3	.5
28-----	15.8	30	.5		1.1	.4	.7	.6	.2	.4	.3	.4
29-----	21	32	2.3		1.1	.3	6.8	-----	.2	.3	2.2	.4
30-----	2.8	27	27		1.3	.3	8.8	-----	.2	.3	18.4	.3
31-----	18.2	32	-----	.5	-----	5.3	1.5	-----	.3	-----	1.3	-----

NOTE.—Braced figures give mean discharge for periods indicated, estimated by comparison with record of Honomanu Stream near Keanae, Maui; recorder not operating properly.

*Monthly discharge of Manuel Luis ditch at Puohokamoa Gulch, near Huelo, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July-----	21	0.6	5.05	7.81	157	480
August-----	49	1.0	15.1	23.4	468	1,440
September-----	29	.5	8.23	12.7	247	758
October-----	33	-----	2.91	4.50	90.1	277
November-----	5.3	.5	11.5	17.8	344	1,060
December-----	28	.3	.79	1.22	24.4	75
January-----	28	.4	2.95	4.56	91.5	281
February-----	27	.3	2.78	4.30	77.9	239
March-----	4.2	.2	.48	.74	14.9	46
April-----	17.0	.1	1.84	2.85	55.2	169
May-----	18.4	.2	2.13	3.30	66.1	203
June-----	35	.2	3.63	5.62	109	334
The year-----	49	.1	4.78	7.40	1,750	5,360

#### KOOLAU DITCH AT WAHINEPE, NEAR HUELLO, MAUI

LOCATION.—Between Puohokamoa and Waikamoi Streams, half a mile below Puohokamoa intake, and 7 miles southeast of Huelo.

RECORDS AVAILABLE.—March 25, 1922, to June 30, 1926. East Maui Irrigation Co. previously obtained records at this site.

EQUIPMENT.—Stevens continuous water-stage recorder. Discharge measurements made from plank across tunnel at gage or across open ditch about 1,000 feet downstream.

CHANNEL AND CONTROL.—A long intake pipe connects stilling well with ditch in tunnel cut through rock. Channel control in rock tunnel.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 112 million gallons a day, or 173 second-feet, from 5 to 6 p. m. November 7 (gage height, from water-stage recorder, 5.26 feet); minimum discharge, 11.3 million gallons a day, or 17.5 second-feet, at midnight April 11 (gage height, 1.05 feet).

1922-1926: Maximum discharge recorded, about 120 million gallons a day, or 186 second-feet, at 2 a. m. May 6, 1923 (gage height, from faulty recorder graph, about 5.55 feet); minimum discharge, 3.6 million gallons a day, or 5.6 second-feet, from 5 to 6 a. m. April 1, 1925 (gage height, 0.34 foot).

**DIVERSIONS AND REGULATION.**—Completely regulated at various intake gates and spillways. One spillway at gage takes care of flood water through cross-cut tunnel.

**OBJECT OF STATION.**—To determine amount of water diverted through Koolau ditch from territorial lands.

**UTILIZATION.**—Water used for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation considered permanent during year. Rating curve well defined between 25 and 80 millions gallons a day; extensions beyond these limits somewhat uncertain. Rating not checked by discharge measurements during year. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for medium stages except when estimated; estimated records and high and low stage records fair.

For description of ditch see "Koolau ditch at Nahiku Weir, near Nahiku, Maui."

*Discharge, in million gallons a day, of Koolau ditch at Wahinepe, near Huelo, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	104	108	107	91	49	64	99	54	27	53	19.4	33
2.....	99	105	104	70	52	59	43	33	26	24	19.4	27
3.....	85	96	104	91	54	56	32	30	25	16.8	18.4	23
4.....	75	99	101	70	73	52	64	28	25	15.1	17.5	21
5.....	67	111	96	72	85	49	50	26	23	12.8	17.3	19.3
6.....	64	111	93	88	101	47	33	25	22	16.6	25	24
7.....	98	108	85	91	107	44	28	24	21	28	92	21
8.....	77	108	80	99	110	42	26	24	20	21	104	18.6
9.....	62	105	83	88	110	39	26	36	20	25.0	64	17.7
10.....	57	87	88	101	107	37	25	55	20	12.8	37	16.8
11.....	91	80	101	88	104	36	61	78	19.4	12.0	38	28
12.....	73	75	107	77	93	34	28	39	18.4	49	95	105
13.....	60	67	104	70	107	32	25	31	17.5	64	46	105
14.....	53	67	104	67	107	31	23	27	17.5	26	34	105
15.....	48	59	96	62	110	32	25	26	16.6	30	29	87
16.....	43	80	83	58	107	32	32	24	17.5	31	26	68
17.....	58	64	77	59	110	28	24	63	15.8	102	24	63
18.....	58	56	88	52	107	27	21	108	16.0	55	23	43
19.....	44	61	104	49	107	76	20	90	18.6	49	22	41
20.....	41	69	88	49	104	41	19.3	63	16.8	52	21	34
21.....	84	67	104	47	100	30	76	68	15.1	31	21	33
22.....	55	104	88	44	91	28	105	46	14.3	25	19.4	28
23.....	50	104	83	42	83	26	58	41	29	25	20	26
24.....	48	80	72	105	92	25	43	48	18.6	99	17.5	25
25.....	68	96	67	96	99	27	36	42	15.1	63	30	24
26.....	48	110	62	104	88	26	36	34	14.3	44	22	22
27.....	54	110	56	99	91	23	30	34	14.3	28	19.4	22
28.....	108	107	56	72	75	22	33	29	13.5	25	21	20
29.....	108	107	66	62	70	21	54	-----	12.8	22	48	19.4
30.....	84	107	110	54	75	20	90	-----	12.8	20	107	18.4
31.....	108	107	-----	52	-----	44	41	-----	12.8	-----	63	-----

NOTE.—Discharge estimated July 12 to Aug. 9, Dec. 18 to Feb. 24, Mar. 18 to Apr. 4, and May 31 to June 21 by comparison with East Maui Irrigation Co.'s record of staff gage reading at Koolau ditch at Waikamoi Weir about 1 mile downstream and records of Koolau ditch at Keanae and Wailoa ditch at Honopou; recorder not operating.

*Monthly discharge of Koolau ditch at Wahinepe, near Huelo, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	108	41	70.1	108	2,170	6,670
August.....	111	56	90.8	140	2,820	8,640
September.....	110	56	88.6	137	2,660	8,160
October.....	105	42	73.2	113	2,270	6,960
November.....	110	49	92.3	143	2,770	8,500
December.....	76	20	37.1	57.4	1,150	3,530
January.....	105	19.3	42.1	65.1	1,310	4,010
February.....	108	24	43.8	67.8	1,230	3,760
March.....	29	12.8	18.6	28.8	576	1,770
April.....	102	12.0	35.6	55.1	1,070	3,280
May.....	106	17.3	37.4	57.9	1,160	3,560
June.....	105	16.8	37.9	58.6	1,140	3,490
The year.....	111	12.0	55.6	86.0	20,300	62,300

#### WAIKAMOI STREAM ABOVE WAILOA DITCH NEAR HUELLO, MAUI

**LOCATION.**—250 feet above Wailoa ditch intake, one-quarter of mile above Spreckels ditch trail, and  $4\frac{1}{2}$  miles southeast of Huelo.

**RECORDS AVAILABLE.**—January 28, 1922, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage or from footbridge at gage.

**CHANNEL AND CONTROL.**—One channel at all stages. Banks high, steep, and covered with vegetation; not subject to overflow. Control composed of boulders and solid rock; subject to shifts.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 452 million gallons a day, or 699 second-feet, at 8 a. m. August 27 (gage height from water-stage recorder, 5.56 feet); minimum discharge, 0.5 million gallons a day, or 0.8 second-foot, from 11 a. m. to 7 p. m. March 21 and 7 a. m. to 2 p. m. March 22 (gage height, 0.64 foot).

1922-1926: Maximum discharge recorded, 1,360 million gallons a day, or 2,100 second-feet, at 9.45 a. m. October 16, 1924 (gage height from water-stage recorder, 10.45 feet); minimum discharge, that of March 21 and 22, 1926.

**DIVERSIONS AND REGULATION.**—A small amount of water is diverted by Haleakala ranch pipe line above station at elevation 5,300 feet and by Kula pipe line at elevation 4,300 feet.

**OBJECT OF STATION.**—To determine feasibility of additional diversions or flood storage; also to assist valuation appraisers in relation to Territorial water license to ditch company.

**UTILIZATION.**—Low water is all diverted below station by ditches of East Maui Irrigation Co. for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation changed at time of flood January 21. The two rating curves used are well defined below 35 million gallons a day; extensions above, uncertain. These curves checked fairly well by seven discharge measurements well distributed during year and covering a range from 1.3 to 7 million gallons a day. Operation of water-stage recorder satisfactory during year. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages; high-stage records poor.

*Discharge, in million gallons a day, of Waikamoi Stream above Wailoa ditch near Huelo, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	14.0	14.9	29	9.0	1.9	3.2	17.3	10.3	1.4	21	1.9	2.6
2.....	7.7	33	16.5	4.8	2.1	2.9	2.8	3.1	1.3	4.1	1.7	1.5
3.....	5.8	9.0	10.6	6.6	2.4	2.6	1.4	1.9	1.1	2.4	1.6	1.3
4.....	4.8	10.8	7.9	4.9	4.0	2.4	5.5	1.4	1.0	1.3	1.3	1.0
5.....	4.1	81	6.8	4.4	13.7	2.2	3.5	1.2	1.1	.8	1.4	.9
6.....	4.0	48	5.6	6.4	9.2	2.0	1.6	1.3	.9	1.7	2.1	.8
7.....	12.4	19.6	4.8	6.8	93	1.9	1.2	1.1	.8	6.1	10.0	.9
8.....	7.2	11.1	4.1	9.7	58	1.8	1.0	1.0	.8	3.0	14.9	.7
9.....	4.1	8.6	5.8	5.8	29	1.7	1.0	2.0	.8	1.5	6.8	.6
10.....	3.4	6.6	7.3	7.9	10.9	1.6	1.1	5.7	.8	1.0	3.7	.8
11.....	8.3	5.0	10.9	5.4	8.1	1.5	2.7	8.6	.8	.8	5.1	14.9
12.....	6.1	4.6	18.9	3.9	6.5	1.4	1.3	3.9	.7	9.8	11.7	100
13.....	4.4	4.0	10.6	3.2	13.8	1.4	.9	2.0	.7	8.9	4.9	50
14.....	3.2	4.1	9.0	3.0	22	1.3	.8	1.4	.6	3.7	3.1	27
15.....	2.9	3.4	5.8	2.8	57	1.4	.9	1.4	.6	4.1	2.3	8.1
16.....	2.7	5.2	4.4	2.5	17.6	1.4	1.4	1.1	.7	4.0	1.8	8.3
17.....	3.6	3.8	3.8	2.5	44	1.2	1.0	54	.6	15.3	1.5	6.9
18.....	4.0	3.2	5.9	2.2	21	1.2	.8	38	.6	6.2	1.3	4.9
19.....	2.7	3.4	16.2	2.3	24	6.7	.7	8.7	.7	7.2	1.1	3.7
20.....	3.0	3.9	8.0	2.2	9.9	3.3	.7	5.0	.6	6.8	1.1	2.9
21.....	7.0	4.0	14.7	2.0	6.8	1.6	105	4.2	.5	4.6	1.1	4.0
22.....	3.9	16.1	6.3	2.7	5.4	1.2	13.6	3.1	7.0	3.2	.8	2.5
23.....	3.6	16.3	5.2	2.1	4.5	1.2	4.6	2.6	4.5	3.3	1.0	1.8
24.....	3.1	6.5	4.0	17.9	9.8	1.1	2.9	3.6	1.2	15.3	.8	1.4
25.....	5.4	11.9	3.3	7.9	11.2	1.1	2.0	5.1	.8	11.2	1.6	1.3
26.....	3.8	113	3.1	6.7	5.5	1.2	1.7	2.8	.6	8.3	1.4	1.1
27.....	17.1	200	3.0	4.4	8.1	.9	1.4	2.3	.7	4.2	1.0	1.2
28.....	15.5	36	3.0	3.4	4.6	.8	1.3	1.7	.9	3.0	.9	1.0
29.....	26	30	3.4	2.5	3.9	.8	3.3	-----	.9	2.2	2.1	.8
30.....	7.7	29	67	2.2	4.0	.8	11.2	-----	.7	1.9	17.2	.8
31.....	16.5	52	-----	2.0	-----	6.1	6.8	-----	.8	-----	6.1	-----

*Monthly discharge of Waikamoi Stream above Wailoa ditch near Huelo, Maui, for the year ending June 30, 1926*

Month	Discharge			Total run-off		
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	26	2.7	7.03	10.9	218	669
August.....	200	3.2	25.7	39.8	798	2,440
September.....	67	3.0	10.2	15.8	305	939
October.....	17.9	2.0	4.84	7.49	150	460
November.....	93	1.9	17.1	26.5	512	1,570
December.....	6.7	.8	1.93	2.99	59.9	184
January.....	105	.7	6.50	10.1	201	618
February.....	54	1.0	6.38	9.87	178	548
March.....	7.0	.5	1.13	1.75	35.0	108
April.....	21	.8	5.56	8.60	167	512
May.....	17.2	.8	3.65	5.65	113	347
June.....	100	.6	8.46	13.1	254	779
The year.....	200	.5	8.20	12.7	2,990	9,170

#### EAST BRANCH OF WAIKAMOI STREAM AT HAIKU-UKA BOUNDARY NEAR KAILILI, MAUI

LOCATION.—200 feet above Haiku-uka boundary trail, at elevation 3,020 feet, and  $5\frac{1}{2}$  miles east of Kailili.

RECORDS AVAILABLE.—May 26, 1918, to June 30, 1926.

EQUIPMENT.—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage or from footbridge just below gage.

CHANNEL AND CONTROL.—Channel has gravel and boulder bed with steep, high banks of hardpan. Control is rough broad-crested concrete weir with low-

water section about 0.7 foot lower than rest of structure; is drowned out at high stages and subject to shifts owing to filling in of weir basin.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 75 million gallons a day, or 116 second-feet, at 7.30 a. m. August 27 (gage height from water-stage recorder, 6.02 feet); minimum discharge, 0.2 million gallons a day or 0.3 second-foot, several hours January 20 and March 13–31 (gage height, 3.90 feet).

1918–1926: Maximum discharge recorded, about 230 million gallons a day, or 356 second-feet, at 5.20 p. m. March 22, 1920 (gage height from water-stage recorder, 7.92 feet); minimum discharge, 0.07 million gallons a day, or 0.11 second-foot, April 15, 1919 (gage height, 3.77 feet).

**DIVERSIONS AND REGULATION.**—A little water is diverted above station by Kula pipe line.

**OBJECT OF STATION.**—To determine discharge of stream at boundary between fee-simple lands above and Territorial lands below.

**UTILIZATION.**—Water diverted by ditches of East Maui Irrigation Co. for Irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation probably permanent during year. Rating curve fairly well defined below 15 million gallons a day; extension above uncertain. This curve checked very roughly at 0.5 million gallons a day by one discharge measurement made in January. Operation of water-stage recorder satisfactory during year. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records probably fair.

*Discharge, in million gallons a day, of East Branch of Waikamoi Stream at Haiku-uka boundary near Kailiili, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	1.8	2.6	4.0	1.2	0.4	0.5	3.2	0.9	0.3	4.2	0.3	0.4
2.....	1.2	6.0	2.3	.7	.4	.4	.4	.4	.3	.6	.3	.3
3.....	.9	1.3	1.7	1.1	.4	.4	.3	.3	.3	.4	.3	.3
4.....	.8	1.9	1.2	.7	.7	.4	2.0	.3	.3	.3	.3	.3
5.....	.7	13.1	1.2	.6	2.8	.4	.6	.3	.3	.2	.3	.3
6.....	.7	6.8	.9	1.7	1.6	.4	.3	.3	.3	.7	.4	.3
7.....	4.0	3.1	.8	1.4	17.1	.3	.3	.3	.3	1.3	2.2	.3
8.....	1.3	1.8	.7	1.8	6.7	.3	.3	.3	.2	.5	3.1	.3
9.....	.7	1.5	1.9	.9	4.0	.3	.3	.4	.2	.3	1.0	.3
10.....	.6	1.1	1.4	1.2	1.4	.3	.3	1.8	.2	.3	.5	.3
11.....	2.4	.8	2.5	.7	1.1	.3	.4	1.2	.2	.3	1.0	5.4
12.....	1.2	.7	3.9	.6	.8	.3	.3	.5	.2	2.3	2.7	13.1
13.....	.8	.6	1.6	.5	2.5	.3	.3	.3	.2	1.6	.6	9.7
14.....	.6	.7	1.3	.5	3.9	.3	.2	.3	.2	.6	.4	3.0
15.....	.5	.6	.8	.5	8.5	.3	.3	.3	.2	.8	.4	1.0
16.....	.5	.9	.6	.4	2.2	.3	.3	.3	.2	.7	.3	1.2
17.....	.6	.6	.6	.4	6.3	.3	.3	11.2	.2	2.5	.3	1.0
18.....	.7	.6	2.1	.4	3.3	.3	.2	6.1	.2	1.1	.3	.7
19.....	.5	.6	2.2	.4	4.0	1.5	.2	.8	.2	1.2	.3	.5
20.....	.7	.6	2.4	.4	1.4	.4	.2	.5	.2	.9	.3	.7
21.....	1.8	.6	2.2	.5	.9	.3	17.3	.4	.2	.7	.3	.6
22.....	.8	3.8	1.0	.6	.8	.3	1.0	.3	1.9	.5	.3	.4
23.....	.7	2.8	.7	.4	.7	.3	.4	.3	.6	1.3	.3	.4
24.....	.6	1.3	.6	3.7	1.7	.3	.3	.9	.3	2.7	.3	.3
25.....	1.3	2.4	.6	2.0	1.7	.3	.3	.6	.2	2.2	.3	.3
26.....	.8	19.8	.5	1.0	.9	.3	.3	.3	.2	1.1	.3	.3
27.....	3.1	32	.5	.7	1.6	.3	.3	.3	.2	.5	.3	.3
28.....	2.8	4.4	.5	.5	.7	.3	.3	.3	.3	.4	.3	.3
29.....	4.3	4.8	1.0	.4	.6	.2	1.6	.3	.3	.4	.5	.3
30.....	1.2	3.6	14.3	.4	.6	.2	1.9	.3	.2	.4	4.3	.3
31.....	3.0	8.1	-----	.4	-----	2.0	1.6	-----	.2	-----	.9	-----

*Monthly discharge of East Branch of Waikamoi Stream at Haiku-uka boundary near Kailili, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July .....	4.3	0.5	1.34	2.07	41.6	127
August .....	32	.6	4.18	6.47	130	398
September .....	14.3	.5	1.87	2.89	56.0	172
October .....	3.7	.4	.86	1.33	26.7	82
November .....	17.1	.4	2.66	4.12	79.7	245
December .....	2.0	.2	.41	.63	12.8	39
January .....	17.3	.2	1.16	1.79	36.0	110
February .....	11.2	.3	1.08	1.67	30.2	93
March .....	1.9	.2	.30	.46	9.3	28
April .....	4.2	.2	1.03	1.59	31.0	95
May .....	4.3	.3	.75	1.16	23.4	71
June .....	13.1	.3	1.43	2.21	42.9	132
The year .....	32	.2	1.42	2.20	520	1,590

# **WEST BRANCH OF WAIKAMOI STREAM AT HAIKU-UKA BOUNDARY NEAR KAILILI, MAUI**

**LOCATION.**—At Haiku-uka boundary trail at elevation 3,000 feet, 5 miles east of Kailili.

**RECORDS AVAILABLE.**—May 28, 1918, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank near trail. Discharge measurements made by wading near gage or from footbridge 35 feet upstream.

**CHANNEL AND CONTROL.**—Channel is solid rock with steep rock and hardpan banks. Control is solid rock ledge.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 326 million gallons a day, or 504 second-feet, at 7 a. m. August 27 (gage height from water-stage recorder, 3.61 feet); minimum discharge, 0.2 million gallons a day, or 0.3 second-foot, several hours March 21-22 (gage height, 0.39 foot).

1918-1926: Maximum discharge recorded, about 2,020 millions gallons a day, or 3,130 second-feet, at noon December 6, 1918 (gage height from water-stage recorder, 9.85 feet); minimum discharge, that of March 21-22, 1926.

**DIVERSIONS AND REGULATION.**—A small amount of water is diverted above station by Haleakala ranch pipe line at elevation 5,300 feet and by Kula pipe line at elevation 4,300 feet.

**OBJECT OF STATION.**—To determine discharge of stream at boundary between fee-simple lands above and Territorial lands below.

**UTILIZATION.**—Water diverted by ditches of East Maui Irrigation Co. for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation probably permanent during year. Rating curve fairly well defined below 200 million gallons a day, extension above uncertain. This curve checked roughly at 0.4 million gallons a day by one discharge measurement made in January. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair except those estimated, which are poor.

*Discharge, in million gallons a day, of West Branch of Waikamoi Stream at Haiku-uka boundary near Kailili, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	5.2	7.3	11.0	3.4	0.6	1.3		4.0	0.7	8.0	0.7	0.7
2	2.8	18.0	6.3	1.6	.7	1.2		1.0	.6	1.3	.7	.6
3	2.1	3.3	3.5	1.6	.7	1.1		.7	.6	1.0	.6	.4
4	1.6	3.5	2.7	1.5	.9	1.1		.6	.6	.6	.6	.4
5	1.3	47	2.1	1.2	8.6	1.0		.6	.6	.5	.6	.4
6	1.3	18.8	1.7	2.4	3.8		1.5	.6	.6	.8	.6	.4
7	4.8	7.3	1.5	2.5	84			.6	.5	1.7	2.1	.4
8	2.5	4.0	1.3	3.3	23			.6	.5	1.0	3.8	.3
9	1.6	3.3	1.9	1.7	10.4			.9	.5	.6	1.8	.2
10	1.3	2.3	2.5	2.5	4.2			2.6	.4	.5	1.0	.3
11	3.0	1.7	3.5	1.5	3.2			2.4	.4	.4	1.1	16.3
12	2.3	1.4	8.3	1.1	2.3			1.3	.4	3.2	3.8	69
13	1.6	1.3	4.3	.9	6.6		.4	.8	.4	2.5	1.4	18.2
14	1.3	1.3	3.5	.9	20		.4	.7	.4	1.1	.9	9.2
15	1.1	1.2	2.1	.8	23		.5	.6	.3	1.2	.7	3.4
16	1.0	1.4	1.4	.8	5.8		.6	.6	.3	1.0	.7	2.7
17	1.2	1.2	1.1	.7	17.5		.6	34	.3	2.7	.6	2.0
18	1.2	1.1	4.8	.7	9.7		.5	24	.3	1.8	.6	1.3
19	1.0	1.0	6.3	.7	9.5	.8	.4	2.3	.3	2.1	.6	.8
20	1.1	1.0	5.4	.7	3.3		.4	1.3	.3	1.6	.5	.8
21	1.8	1.1	6.0	.7	2.1		78	1.0	.2	1.3	.5	1.1
22	1.3	4.5	2.7	.8	1.6		5.4	.8	1.2	1.0	.4	.7
23	1.2	4.6	1.6	.9	1.4		1.1	.7	1.0	2.1	.5	.6
24	1.1	4.2	1.3	3.3	3.5		.7	1.5	.5	4.4	.4	.6
25	2.2	7.0	1.0	4.0	4.2		.6	1.5	.4	4.9	.6	.6
26	1.3	85	1.0	1.6	3.0		.6	.9	.3	3.3	.6	.6
27	4.2	134	.9	1.8	3.8		.6	.8	.4	1.4	.4	.5
28	8.4	13.8	.9	1.1	1.7		.6	.7	.5	1.0	.4	.5
29	10.3	12.6	1.3	.7	1.4		1.5	-----	.4	.8	.6	.5
30	2.8	10.6	41	.7	1.3		3.9	-----	.4	.7	4.2	.4
31	9.2	26	-----	.7	-----		4.8	-----	.4	-----	1.3	-----

NOTE.—Braced figures give mean discharge for periods indicated, estimated by comparison with record of flow for East Branch of Waikamoi Stream at Haiku-uka boundary near Kailili, Maui; recorder not operating properly.

*Monthly discharge of West Branch of Waikamoi Stream at Haiku-uka boundary near Kailili, Maui, for the year ending June 30, 1926*

Month	Discharge			Total run-off	
	Million gallons a day			Second-feet (mean)	Acre-feet
	Maximum	Minimum	Mean		
July	10.3	1.0	2.68	4.15	83.1
August	134	1.0	13.9	21.5	431
September	41	.9	4.43	6.85	133
October	4.0	.7	1.51	2.34	46.8
November	84	.6	8.73	13.5	262
December	-----	-----	.85	1.32	26.5
January	78	-----	3.86	5.97	120
February	34	.6	3.15	4.87	88.1
March	1.2	.2	.47	.73	14.7
April	8.0	.4	1.82	2.82	54.5
May	4.2	.4	1.07	1.66	33.3
June	69	.2	4.46	6.90	134
The year	134	.2	3.91	6.05	1,430
					4,380

#### ALO STREAM NEAR HUELO, MAUI

LOCATION.—300 feet above Spreckels ditch inflow and trail crossing and 5 miles east of Huelo.

RECORDS AVAILABLE.—December 18, 1910, to June 30, 1926.

EQUIPMENT.—Stevens continuous water-stage recorder on right bank. Discharge measurements made by wading or from footbridge at gage.

**CHANNEL AND CONTROL.**—Channel at gage in a fairly large pool at foot of rapids. Banks steep and high. Control, at outlet of pool, composed of rock ledge and large boulders; permanent.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 248 million gallons a day, or 384 second-feet, at 3.50 p. m. August 27 (gage height from water-stage recorder, 3.15 feet); minimum discharge, 0.4 million gallons a day, or 0.6 second-foot, several hours March 13-16 (gage height, 0.43 foot).

1910-1926: Maximum discharge recorded, 638 million gallons a day, or 987 second-feet, at 7 p. m. December 9, 1916 (gage height from water-stage recorder, 4.35 feet); minimum discharge, 0.4 million gallons a day, or 0.6 second-foot from 4 to 6 p. m. September 19, 1924 (gage height, 0.4 foot), and several hours March 13-16, 1926 (gage height, 0.47 foot).

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To furnish data for appraisal of water value under Territorial lease to ditch company.

**UTILIZATION.**—Ordinary flow diverted below station by ditches of East Maui Irrigation Co. for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation permanent during year. Rating curve fairly well defined below 45 million gallons a day; extension above uncertain. This curve checked fairly well at 1 and 2 million gallons a day by two discharge measurements made in January and April. Operation of water-stage recorder satisfactory during year. Daily discharge ascertained by applying to rating table mean daily gage heights determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages; high-stage records poor.

*Discharge, in million gallons a day, of Alo Stream near Huelo, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1-----	3.7	2.9	10.1	1.2	0.9	1.0	4.1	1.1	0.6	10.2	0.8	1.0
2-----	2.3	5.5	4.6	1.0	1.0	1.0	1.0	.7	.5	1.0	.8	.7
3-----	1.9	2.2	3.3	4.7	2.2	.9	.7	.7	.5	.7	.7	.7
4-----	1.6	4.2	2.6	1.2	1.8	.8	1.7	.7	.5	.6	.7	.6
5-----	1.4	22	2.0	1.7	3.9	.8	.9	.6	.5	.5	.7	.6
6-----	1.3	15.6	1.8	2.0	3.0	.7	.7	.6	.4	.8	1.1	.6
7-----	2.0	6.9	1.5	1.6	28.0	.7	.7	.6	.4	.8	4.8	.6
8-----	1.3	3.5	1.4	2.3	13.3	.7	.6	.6	.4	.5	5.6	.5
9-----	1.1	2.6	1.8	1.8	10.4	.6	.6	1.0	.4	.5	1.5	.5
10-----	1.0	2.1	1.6	4.5	3.6	.6	.8	5.4	.4	.4	1.1	.7
11-----	3.3	1.8	11.5	1.9	2.6	.5	2.6	2.4	.4	.4	3.6	8.5
12-----	1.4	1.6	6.5	1.5	2.0	.5	.8	1.0	.4	4.6	4.4	15.2
13-----	1.0	1.4	2.8	1.3	6.1	.5	.7	.9	.4	2.3	1.4	24
14-----	.9	1.4	2.0	1.2	5.1	.5	.6	.8	.4	.9	1.2	8.6
15-----	.9	1.2	1.5	1.1	9.0	.6	.7	.9	.4	.8	1.0	2.0
16-----	.8	2.9	1.4	1.0	11.0	.6	1.2	.7	.4	1.0	.9	1.8
17-----	1.4	1.4	1.3	1.0	19.0	.5	.7	32	.4	7.5	.8	1.4
18-----	1.8	1.2	5.0	.9	5.8	.6	.6	9.2	.4	2.3	.7	1.2
19-----	.9	2.1	2.2	1.0	5.8	2.5	.5	2.2	.5	2.0	.7	1.2
20-----	.9	1.7	1.9	.9	2.9	.7	.5	1.7	.4	4.3	.7	1.0
21-----	2.1	2.5	1.9	.9	2.3	.5	28	1.9	.4	1.5	.6	.9
22-----	1.0	11.1	1.2	.8	2.0	.5	2.7	1.2	2.2	1.2	.6	.8
23-----	.9	4.8	1.1	.7	1.6	.5	1.3	1.1	1.0	1.1	.6	.8
24-----	.9	2.1	1.0	11.9	8.7	.5	1.0	1.4	.6	5.7	.5	.7
25-----	1.3	6.2	1.0	2.0	2.5	.5	.9	1.0	.5	2.3	1.1	.7
26-----	.8	19.6	.8	1.9	1.6	.5	.8	.8	.5	1.4	.7	.7
27-----	12.8	44	.8	1.3	1.4	.4	.7	.9	.6	1.2	.7	.7
28-----	2.7	7.7	.8	1.1	1.2	.4	.7	.7	.6	1.1	.8	.6
29-----	12.3	14.1	1.0	1.0	1.2	.4	1.3	-----	.6	1.0	2.1	.5
30-----	2.1	7.4	8.5	1.0	1.4	.4	1.4	-----	.5	.9	4.6	.5
31-----	5.3	18.3	-----	.9	-----	11.5	1.4	-----	.8	-----	1.6	-----

*Monthly discharge of Alo Stream near Huelo, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	12.8	0.8	2.36	3.65	73.1	225
August.....	44	1.2	7.16	11.1	222	681
September.....	11.5	.8	2.83	4.38	84.9	261
October.....	11.9	.7	1.85	2.86	57.3	176
November.....	28	.9	5.38	8.32	161	495
December.....	11.5	.4	1.01	1.56	31.4	96
January.....	28	.5	1.96	3.03	60.9	186
February.....	32	.6	2.60	4.02	72.8	223
March.....	2.2	.4	.55	.85	17.0	52
April.....	10.2	.4	1.98	3.06	59.5	182
May.....	5.6	.5	1.52	2.35	47.1	145
June.....	24	.5	2.61	4.04	78.3	240
The year.....	44	.4	2.65	4.10	965	2,960

**KAAIEA STREAM NEAR KAILUA, MAUI**

**LOCATION.**—700 feet above Hamakua ditch trail crossing and 1½ miles (3½ miles by road and trail) southeast of Kailua.

**RECORDS AVAILABLE.**—December 30, 1921, when station was established, to June 30, 1926. No discharge data yet published.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage or from footbridge about 200 feet upstream.

**CHANNEL AND CONTROL.**—One channel at all stages; straight for about 100 feet above and 75 feet below gage. Stream bed composed of rock ledge, boulders, and gravel. Banks quite steep and covered with grass. Control is solid ledge about 20 feet below gage; probably permanent.

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—Data valuable in connection with Territorial water leases to ditch company.

**UTILIZATION.**—Ordinary flow of stream diverted below station for irrigation of sugarcane.

**ACCURACY.**—Data insufficient to determine stage-discharge relation.

*Discharge measurements of Kaaiea Stream near Kailua, Maui, during the period December 30, 1921, to June 30, 1926*

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Sec- ond- feet	Mil- lion gallons a day			Sec- ond- feet	Mil- lion gallons a day
1921				1924			
Dec. 30.....	0.66	4.29	2.77	June 11.....	0.45	0.623	0.403
1922				Sept. 12.....	.46	1.06	.68
1923				1925			
June 26.....	.44	.68	.44	Feb. 23.....	.49	1.02	.66
Sept. 14.....	.59	2.39	1.54	Do.....	.49	.90	.58
Nov. 17.....	.67	4.21	2.72	Mar. 31.....	.72	5.68	3.67
1926				Nov. 23.....	.59	2.32	1.50
Jan. 5.....	.52	1.13	.73	1926			
May 18.....	.60	2.70	1.75	Apr. 6.....	.48	1.14	.74
Aug. 12.....	.76	9.48	6.13	May 6.....	.51	1.24	.80
Oct. 6.....	.64	4.86	3.14				
Nov. 28.....	.55	1.82	1.18				

## SPRECKELS DITCH BELOW KAAIEA GULCH, NEAR HUELO, MAUI

**LOCATION.**—1,000 feet below intake in Kaaiea Stream and 2½ miles by trail southeast of ditch superintendent's house at Kailua.

**RECORDS AVAILABLE.**—December 15, 1917, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank, close to ditch trail. Discharge measurements made by wading or from plank across ditch near gage.

**CHANNEL AND CONTROL.**—Ditch is straight for about 50 feet above and 20 feet below gage; cut in earth. Channel control subject to backwater effect during heavy rains from two small streams which enter ditch a short distance downstream.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 67 million gallons a day, or 104 second-feet, at 3.45 p. m. August 27 (gage height from water-stage recorder, 3.90 feet); minimum discharge, 0.05 million gallons a day, or 0.1 second-foot, several hours March 24-26 (gage height, 0.29 foot).

1917-1926: Maximum discharge recorded, 110 million gallons a day, or 170 second-feet, at 7.30 p. m. January 16, 1921 (gage height from water-stage recorder, 5.65 feet); and at 6.40 p. m. May 16, 1924 (gage height from water-stage recorder, 5.45 feet); minimum discharge, no flow, occasionally, when water is turned out of ditch.

**DIVERSIONS AND REGULATION.**—Ditch diverts water from a dozen or more streams east of Nailililihaele Stream and is regulated by gates and spillways at frequent intervals.

**OBJECT OF STATION.**—To determine discharge of ditch at boundary between Territorial lands above and fee-simple lands below.

**UTILIZATION.**—Water used for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation practically permanent during year. Rating curve fairly well defined below 50 million gallons a day; extension above somewhat uncertain. This curve checked fairly well by four discharge measurements made in August, April, and June and covering a range from 0.1 to 1.0 million gallons a day. Operation of water-stage recorder satisfactory except that recorder graph frequently required large gage-height corrections. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair.

For description of ditch see "Spreckels ditch at Haipuaena Weir, near Huelo, Maui."

*Discharge, in million gallons a day, of Spreckels ditch below Kaaiea Gulch, near Huelo, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1-----	1.1	0.5	2.8	0.4	0.3	0.4	2.9	0.2	0.2	3.8	0.1	0.2
2-----	.7	1.0	1.8	.2	.3	.3	.5	.1	.2	.2	.2	.1
3-----	.6	.4	1.1	1.0	.8	.3	.4	.1	.2	.1	.1	.1
4-----	.6	.6	.9	.9	.8	.2	.9	.1	.2	.1	.2	.1
5-----	.6	4.9	.6	.3	1.2	.2	.4	.1	.1	.1	.1	.1
6-----	.7	4.3	.6	.4	1.0	.2	.4	.1	.1	.1	.1	.1
7-----	.9	1.4	.6	.4	9.9	.2	.2	.1	.1	.1	.3	.1
8-----	.7	.9	.4	.6	4.2	.2	.2	.1	.1	.1	.7	.1
9-----	.6	.9	.6	.6	3.1	.2	.2	.2	.1	.1	.2	.1
10-----	.6	.7	.6	8.5	1.1	.2	.3	.5	.1	.1	.1	.1

*Discharge, in million gallons a day, of Spreckels ditch below Kaaiea Gulch, near Huelo, Maui, for the year ending June 30, 1926—Continued*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
11.....	0.7	0.6	2.8	1.2	0.9	0.2	0.5	0.3	0.1	0.1	0.1	1.3
12.....	.6	.6	1.4	.9	1.1	.1	.2	.1	.1	2.5	1.1	3.2
13.....	.5	.5	.8	.8	2.7	.1	.1	.1	.1	.2	.2	3.8
14.....	.4	.5	.5	.5	1.2	.1	.1	.1	.1	.1	.1	1.7
15.....	.4	.4	.4	.4	3.2	.1	.1	.2	.1	.1	.2	.2
16.....	.4	.9	.3	.3	3.3	.2	.2	.1	.1	.1	.5	.2
17.....	.5	.4	.3	.3	9.3	.1	.2	12.0	.1	1.0	.4	.2
18.....	.6	.4	.6	.3	2.7	.1	.1	5.3	.1	.3	.2	.2
19.....	.3	.4	.4	.3	3.0	1.1	.1	1.0	.1	.4	.1	.2
20.....	.3	.6	.6	.3	1.4	.2	.1	.6	.1	.4	.1	.2
21.....	.4	.6	.4	.3	1.0	.1	7.5	.5	.05	.2	.1	.2
22.....	.4	1.9	.3	.2	.9	.1	.4	.6	.05	.2	.1	.2
23.....	.3	.7	.4	.2	.6	.1	.2	.5	.05	.2	.1	.1
24.....	.4	.4	.4	4.1	5.4	.1	.2	.6	.05	.6	.1	.1
25.....	.4	1.4	.4	.6	1.2	.2	.2	.2	.05	.3	.1	.1
26.....	.3	9.9	.3	1.0	.6	.1	.2	.2	.05	.2	.1	.1
27.....	2.0	15.6	.3	.5	.6	.1	.2	.2	.1	.2	.1	.2
28.....	.5	1.7	.3	.6	.4	.1	.2	.2	.05	.2	.1	.2
29.....	4.4	3.9	.4	.8	.4	.1	.2	-----	.05	.1	.1	.2
30.....	.4	2.2	1.8	.6	.4	.1	.2	-----	.05	.2	.4	.1
31.....	.8	6.1	-----	.3	-----	2.5	.4	-----	.2	-----	-----	-----

*Monthly discharge of Spreckels ditch below Kaaiea Gulch, near Huelo, Maui, for the year ending June 30, 1926*

Month	Discharge			Total run-off		
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	4.4	0.3	0.71	1.10	22.1	68
August.....	15.6	.4	2.11	3.26	65.3	201
September.....	2.8	.3	.77	1.19	23.1	71
October.....	8.5	.2	.90	1.39	27.8	86
November.....	9.9	.3	2.10	3.25	63.0	193
December.....	2.5	.1	.27	.42	8.3	26
January.....	7.5	.1	.58	.90	18.0	55
February.....	12.0	.1	.87	1.35	24.4	75
March.....	.2	.05	.102	.158	3.15	10
April.....	3.8	.1	.41	.63	12.4	38
May.....	1.1	.1	.21	.32	6.6	20
June.....	3.8	.1	.46	.71	13.8	42
The year.....	15.6	.05	.789	1.22	288	885

#### CENTER DITCH BELOW KOLEA RESERVOIR, NEAR HUEL0, MAUI

**LOCATION.**—200 feet below intake from Kolea Reservoir spillway, half a mile below intake in Waikamoi Stream, and 3½ miles by trail east of Huelo.

**RECORDS AVAILABLE.**—May 1, 1922, to June 30, 1926. For station half a mile upstream at Waikamoi March 6, 1918, to April 30, 1922.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank close to trail. Discharge measurements made from plank across ditch or by wading near gage.

**CHANNEL AND CONTROL.**—Ditch cut in hardpan and rock, curved slightly at gage and sharply about 75 feet downstream. Channel control; subject to shifts.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 94 million gallons a day, or 145 second-feet, at 6.15 p. m. August 27 (gage height, from water-stage recorder, 5.41 feet); minimum discharge, about 0.9 million gallons a day, or 1.4 second-feet, several hours March 26 to April 11 (gage height, 0.73 foot; affected by backwater).

1922-1926: Maximum discharge recorded, that of August 27, 1925; minimum discharge, 0.38 million gallons a day, or 0.6 second-foot, at noon February 19, 1923 (gage height, 0.49 foot).

**DIVERSIONS AND REGULATION.**—Ditch diverts water that rises below or passes Spreckels ditch. Flow, regulated by head gates and spillways and by storage in Kolea Reservoir. The flow at this station is the same as that at the old station at Waikamoi except for occasional regulation by Kolea Reservoir.

**OBJECT OF STATION.**—The discharge at this station less the discharge at the Manuel Luis ditch station gives amount of water diverted from Territorial lands under water license No. 974.

**UTILIZATION.**—Water used for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation probably permanent during year except as affected by backwater from February to June. Rating curve fairly well defined below 45 million gallons a day; extension above somewhat uncertain. Three discharge measurements made in February, April, and June help define the backwater corrections applied to gage-height record. Operation of water-stage recorder satisfactory during year. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records poor.

Center ditch, at elevation about 500 feet, diverts below all other main ditches on the windward side of the crater of Haleakala between Waikamoi and Kailua Streams. It receives the water from Manuel Luis ditch at Waikamoi Stream. (See Manuel Luis ditch at Puohokamoa Gulch, near Huelo.) At Kailua Stream the flow of the ditch is diverted into Lowrie ditch and carried to a point near Paia where it is used for irrigation of sugar cane. Center ditch proper is about 3 miles long and has a carrying capacity of 100 million gallons a day.

*Discharge, in million gallons a day, of Center ditch below Kolea Reservoir, near Huelo, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	25	23	45	12.8	4.3	5.7	27	9.5	2.6	17.4	1.7	1.9
2.....	15.5	34	30	4.7	3.1	5.2	4.3	2.9	7.5	1.4	1.7	1.5
3.....	8.8	16.4	26	15.2	4.3	4.7	5.4	2.8	6.2	1.0	1.8	1.3
4.....	6.9	20	22	6.0	9.1	4.3	11.3	2.6	2.1	1.0	1.7	1.3
5.....	7.6	59	18.0	6.0	18.4	4.0	4.7	2.4	2.0	.8	1.6	1.2
6.....	10.6	54	12.3	11.1	18.0	3.6	2.6	2.4	1.9	1.4	1.7	1.2
7.....	17.3	32	9.4	10.2	40	3.1	2.4	2.4	1.8	1.4	15.6	1.4
8.....	10.8	26	12.3	17.2	54	8.8	2.4	2.4	1.7	1.2	22	1.2
9.....	4.5	18.0	7.4	7.7	41	6.0	2.4	3.8	1.7	1.0	4.3	1.1
10.....	3.8	13.1	16.0	26	26	2.6	2.6	8.6	1.7	.9	1.9	1.3
11.....	14.2	7.9	17.5	10.9	18.8	2.5	7.2	15.8	1.7	.9	3.9	8.7
12.....	5.7	7.3	36	7.0	9.4	2.4	2.6	8.8	1.6	13.1	21	60
13.....	3.6	9.5	24	10.2	28	2.4	2.2	2.7	1.6	6.8	2.6	47
14.....	2.8	10.1	24	6.1	28	2.1	2.1	2.4	1.6	1.7	1.8	39
15.....	2.6	5.4	12.3	4.5	54	2.2	2.4	2.9	1.5	1.6	1.7	8.8
16.....	2.5	12.9	7.5	4.0	30	2.5	3.8	2.4	1.7	1.7	1.5	4.7
17.....	3.4	6.2	6.6	4.0	51	2.0	2.5	32	1.5	26	1.5	3.8
18.....	5.0	4.5	9.6	3.4	32	1.9	2.1	53	1.4	4.7	1.4	2.8
19.....	2.4	4.7	25	3.6	34	10.6	2.1	12.6	1.6	5.0	1.4	2.6
20.....	3.3	8.1	9.7	3.1	25	3.4	2.0	5.9	1.6	5.9	1.4	2.5
21.....	13.1	6.4	25	3.1	13.9	2.4	46	6.6	1.4	2.5	1.3	2.4
22.....	2.9	27	11.0	2.9	8.8	2.1	18.4	4.3	9.2	1.9	1.3	2.1
23.....	2.2	26	8.6	2.8	7.4	2.0	5.5	3.6	2.8	1.9	1.3	2.0
24.....	2.2	7.9	6.4	30	22	1.9	4.0	6.6	1.1	22	1.3	1.8
25.....	4.3	14.7	5.0	14.4	17.6	2.4	3.1	3.8	1.0	8.1	1.6	7.7
26.....	2.2	68	3.8	18.0	8.1	2.1	2.9	2.9	1.0	3.6	1.6	1.6
27.....	8.5	79	3.1	12.3	10.8	1.8	2.8	3.4	1.0	2.2	1.4	1.7
28.....	22	49	2.9	4.5	6.9	1.8	2.9	2.8	1.0	2.0	1.3	1.6
29.....	35	36	3.6	3.4	6.2	1.8	8.9	-----	1.0	1.8	2.7	1.5
30.....	8.8	46	48	3.1	6.7	1.7	16.2	-----	.9	1.7	26	1.5
31.....	26	49	-----	5.4	-----	13.2	5.5	-----	1.1	-----	6.5	-----

NOTE.—Discharge Feb. 18 to June 30 from gage heights corrected for backwater determined from three discharge measurements and study of recorder graph.

*Monthly discharge of Center ditch below Kolea Reservoir, near Huelo, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	35	2.2	9.15	14.2	284	870
August.....	79	4.5	25.2	39.0	781	2,400
September.....	48	2.9	16.3	25.2	488	1,500
October.....	30	2.8	8.83	13.7	274	840
November.....	54	3.1	21.2	32.8	637	1,950
December.....	13.2	1.7	3.65	5.65	113	347
January.....	46	2.0	6.78	10.5	210	645
February.....	53	2.4	7.58	11.7	212	651
March.....	9.2	.9	2.15	3.33	66.5	205
April.....	26	.8	4.75	7.35	143	437
May.....	26	1.3	4.47	6.92	138	425
June.....	60	1.1	7.24	11.2	217	667
The year.....	79	.8	9.76	15.1	3,560	10,900

#### NAILILIHAELE STREAM NEAR HUELO, MAUI

**LOCATION.**—200 feet above Wailoa ditch intake, 700 feet above New Hamakua ditch trail, and 3 miles south of Huelo.

**RECORDS AVAILABLE.**—October 8, 1913, to June 30, 1918, and August 6, 1919, to June 30, 1926. Also at old staff-gage station below New Hamakua ditch from December 9, 1910, to December 31, 1912.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading or from footbridge near gage.

**CHANNEL AND CONTROL.**—One channel at all stages; straight for 100 feet above and below gage. Stream bed very rough and steep and banks are high and covered with dense vegetation. Control composed of large boulders with low-water section improved with concrete; subject to shifts due to deposits of gravel.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 351 million gallons a day, or 543 second-feet, at 4.45 p. m. August 27 (gage height from water-stage recorder, 4.90 feet); minimum discharge, 1.9 million gallons a day, or 2.9 second-feet, several hours March 21–22 (gage height, 0.06 foot).

1913–1926: Maximum discharge recorded, 1,800 million gallons a day, or 2,790 second-feet, at 6.30 p. m. May 1, 1916 (gage height from water-stage recorder, 6.3 feet); minimum discharge, 0.45 million gallons a day, or 0.7 second-foot, from 11 a. m. to 7 p. m. July 14, 1920 (gage height, –0.52 foot).

**DIVERSIONS AND REGULATIONS.**—Low flow of left branch of this stream diverted above station by Old Hamakua ditch from about March 1, 1918, to February 28, 1922.

**OBJECT OF STATION.**—To determine feasibility of additional diversions or flood storage. Also to assist valuation appraisers in relation to Territorial water license to ditch company.

**UTILIZATION.**—Ordinary flow is diverted below station by ditches of East Maui Irrigation Co. for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation permanent during year. Rating curve well defined between 2 and 40 million gallons a day; extension above uncertain. This curve checked closely at 3 and 6 million gallons a day by two of the three discharge measurements made during year. Operation

of water-stage recorder satisfactory during year. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages; high-stage records poor.

*Discharge, in million gallons a day, of Nailiilihaele Stream near Huelo, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	24	16.8	58	12.2	4.7	7.8	27	7.9	4.1	45	5.0	6.1
2	16.4	33	34	9.0	5.0	6.8	5.2	4.6	4.0	6.4	4.8	4.8
3	13.4	13.7	24	19.0	7.1	6.3	3.8	4.0	3.6	4.1	4.7	4.4
4	11.7	24	18.9	9.5	9.4	5.9	12.0	3.6	3.5	3.4	4.4	4.0
5	10.3	94	16.4	12.8	21	5.5	5.9	3.4	3.4	2.9	4.4	3.8
6	9.9	66	13.9	14.6	13.4	5.0	4.1	3.5	3.1	6.5	6.0	3.6
7	18.2	36	12.2	12.7	83	4.7	3.5	3.3	3.0	6.4	28	3.6
8	11.6	21	10.6	18.5	61	4.7	3.3	3.1	2.9	4.1	37	3.3
9	8.6	16.1	11.2	12.0	50	4.4	3.1	4.7	2.9	3.4	11.9	3.0
10	7.8	13.4	11.0	19.1	21	4.1	3.7	16.4	2.8	3.0	7.8	4.9
11	17.3	11.7	31	10.1	15.6	4.0	12.9	13.5	2.9	2.9	13.9	23
12	9.5	10.6	47	8.8	12.9	3.8	4.1	5.2	2.5	26	28	76
13	7.8	9.0	23	8.0	27	3.5	3.3	4.1	2.4	15.0	9.5	73
14	6.8	9.5	17.4	7.2	30	3.4	3.0	3.6	2.3	6.4	7.6	39
15	6.4	8.0	12.0	6.7	56	3.6	3.3	4.5	2.2	5.7	6.4	13.2
16	6.3	12.2	10.1	6.3	48	3.6	4.6	3.4	2.3	6.8	5.9	11.2
17	8.4	8.2	9.7	6.1	69	3.1	3.3	71	2.1	44	5.4	9.9
18	9.4	7.0	14.3	5.5	36	3.3	2.9	50	2.1	14.2	4.9	8.3
19	5.9	8.6	18.3	5.7	38	13.1	2.8	12.9	2.4	13.9	4.6	7.8
20	7.4	9.6	12.4	5.3	20	4.6	2.7	9.2	2.1	18.7	4.4	6.8
21	14.2	10.2	17.8	5.0	15.8	3.3	90	9.2	1.9	9.2	4.2	5.9
22	7.4	45	10.1	5.2	13.4	3.0	16.5	6.6	18.1	7.6	4.0	5.4
23	6.3	32	9.7	4.6	11.7	2.9	8.4	6.0	7.2	6.8	4.0	5.0
24	6.3	12.4	8.8	42	35	2.8	6.4	6.4	3.1	27	3.6	4.6
25	8.8	17.2	8.0	12.6	17.8	3.1	5.4	5.4	2.5	13.6	5.2	4.5
26	5.9	90	7.4	9.7	11.7	2.9	4.7	4.8	2.3	8.8	4.7	4.2
27	42	168	6.8	7.2	11.0	2.7	4.4	4.8	2.9	7.2	4.0	4.1
28	16.7	54	6.8	5.9	9.0	2.5	4.2	4.4	2.8	6.4	3.6	3.9
29	43	65	8.1	5.4	8.6	2.4	6.6	-----	2.3	5.7	8.5	3.5
30	12.2	53	66	5.2	9.5	2.3	8.7	-----	2.1	5.2	37	3.5
31	20	72	-----	4.8	-----	18.4	7.8	-----	3.0	-----	11.6	-----

*Monthly discharge of Nailiilihaele Stream near Huelo, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	43	5.9	12.9	20.0	400	1,230
August	168	7.0	33.8	52.3	1,050	3,220
September	66	6.8	18.5	28.6	555	1,700
October	42	4.6	10.2	15.8	317	970
November	83	4.7	25.7	39.8	772	2,370
December	18.4	2.3	4.76	7.36	148	453
January	90	2.7	8.95	13.8	278	851
February	71	3.1	9.98	15.4	280	858
March	18.1	1.9	3.38	5.23	105	322
April	45	2.9	11.2	17.3	336	1,030
May	37	3.6	9.52	14.7	295	906
June	76	3.0	11.8	18.3	354	1,090
The year	168	1.9	13.4	20.7	4,890	15,000

## KAILUA STREAM AT HAIKU-UKA BOUNDARY NEAR KAILILI, MAUI

**LOCATION.**—At trail crossing 100 feet above Haiku-uka boundary and 1½ miles by horse trail southeast of Kailili.

**RECORDS AVAILABLE.**—July 11, 1918, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage or from footbridge just below gage.

**CHANNEL AND CONTROL.**—One channel at all stages; straight for 25 feet above and 50 feet below bridge. Right bank low; left bank steep. Control for low stages is concrete slab, 1.5 feet thick, across stream 15 feet below gage; permanent. Control for high stages is crest of falls 100 feet below gage; may shift.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 162 million gallons a day, or 251 second-feet, at 9.45 a. m. August 27 (gage height from water-stage recorder, 4.07 feet); minimum discharge, 0.02 million gallons a day, or 0.03 second-foot, from 5 a. m. June 7 to 3 p. m. June 10 (gage height, 0.60 foot).

1918-1926: Maximum discharge recorded, 386 million gallons a day, or 597 second-feet, at 8.30 a. m. October 16, 1924 (gage height from water-stage recorder, 7.83 feet); minimum discharge, that of June 7-10, 1926.

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine discharge of stream at boundary between fee-simple lands above and Territorial lands below.

**UTILIZATION.**—Water picked up by East Maui Irrigation Co.'s ditches for irrigation of cane lands.

**ACCURACY.**—Stage-discharge relation permanent during year. Rating curve fairly well defined below 10 million gallons a day; extended above on basis of one discharge measurement at 72 million gallons a day. This curve checked very closely at 0.05 million gallons a day by discharge measurement made in January. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good except those estimated and those for high stages, which are probably fair.

*Discharge, in million gallons a day, of Kailua Stream at Haiku-uka boundary near Kailili, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	2.0	2.0	5.6	1.2	0.06	0.19	4.4	3.1	0.13	6.7	0.1	0.05
2.....	.8	7.9	2.5	.25	.06	.13	.45	.35	.1	1.0	.1	.05
3.....	.35	1.2	1.2	.19	.06	.13	.19	.19	.1	.45	.10	.04
4.....	.25	.8	.8	.13	.1	.13	1.0	.13	.1	.19	.08	.04
5.....	1.9	26.	.6	.08	2.4	.13	.8	.13	.1	.1	.08	.04
6.....	1.9	9.6	.35	.13	1.0	.13	.25	.1	.08	.19	.08	.03
7.....	1.0	2.7	.25	.25	42.	.1	.19	.1	.08	1.0	.35	.02
8.....	.45	1.0	.19	.35	13.2	.1	.13	.08	.06	.25	1.0	.02
9.....	.19	.6	.19	.19	5.6	.1	.1	.1	.06	.13	.35	.02
10.....	.13	.35	.19	.25	1.6	.08	.1	.19	.06	.1	.13	.02
11.....	.6	.25	.32	.19	.8	.08	.1	.8	.06	.1	.1	4.4
12.....	.45	.13	2.0	.13	.45	.08	.08	.45	.06	2.5	.8	28.
13.....	.25	.13	4.0	.1	2.0	.08	.05	.19	.06	1.8	.19	8.2
14.....	.19	.1	1.8	.1	10.6	.08	.05	.13	.06	.45	.1	4.2
15.....	.13	.1	.6	.08	14.8	.08	.05	.13	.05	.45	.08	1.2
16.....	.13	.1	.25	.08	2.2	.06	.05	.13	.05	.25	.06	.6
17.....	.13	.1	.19	.08		.06	.05	19.0	.05	1.2	.06	.35
18.....	.13	.08	.35	.08	5.0	.06	.05	17.3	.04	.45	.05	.25
19.....	.1	.08	2.0	.06		2.4	.04	1.80	.04	1.0	.04	.13
20.....	.1	.08	1.2	.05		.6	.04	.6	.04	.8	.04	.08

*Discharge, in million gallons a day, of Kailua Stream at Haiku-uka boundary near Kailili, Maui, for the year ending June 30, 1926—Continued*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
21.....	0.19	0.1	2.0	0.06	0.9	0.13	42.	0.35	0.03	0.6	0.04	0.08
22.....	.13	1.1	.6	.08		.08	3.0	.19	.06	.25	.03	.06
23.....	.1	1.3	.35	.06		.08	.45	.13	.08	1.0	.04	.06
24.....	.1	.35	.19	.45		.1	.19	.25	.05	2.6	.04	.06
25.....	.13	1.7	.13	3.0	2.7	.1	.13	.45	.04	1.0	.04	.05
26.....	.13	47.	.1	.6	.8	.1	.1	.25	.04	1.2	.04	.04
27.....	1.1	75.	.08	.35	1.2	.1	.1	.19	.05	.35	.03	.04
28.....	2.9	9.3	.08	.13	.45	.08	.08	.13	.08	.25	.03	.04
29.....	3.5	5.4	.1	.1	.35	.08	.13	-----	.08	.19	.04	.04
30.....	.6	5.4	21.	.08	.25	.08	1.4	-----	.08	.13	.8	.04
31.....	2.2	13.2	-----	.06	-----	.45	2.2	-----	.08	-----	.1	-----

NOTE.—Discharge estimated Nov. 16. Braced figures give estimated mean discharge for periods indicated. Estimates made from fragmentary gage-height record and by comparison with records of flow for West Branch of Waikamoi Stream at Haiku-uka boundary near Kailili and for Kailua Stream near Huelo; gage-height record either faulty or missing.

*Monthly discharge of Kailua Stream at Haiku-uka boundary near Kailili, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	3.5	0.10	0.718	1.11	22.3	68
August.....	75	.08	6.88	10.6	213	655
September.....	21	.08	1.64	2.54	49.2	151
October.....	3.0	.05	.288	.446	8.94	27
November.....	42	.06	4.21	6.51	126	388
December.....	2.4	.06	.199	.308	6.18	19
January.....	42	.04	1.87	2.89	58.0	178
February.....	19.0	.08	1.68	2.60	46.9	144
March.....	.13	.03	.066	.102	2.05	6
April.....	6.7	.10	.889	1.38	26.7	82
May.....	1.0	.03	.165	.255	5.12	16
June.....	28	.02	1.61	2.49	48.2	148
The year.....	75	.02	1.68	2.60	613	1,880

#### KAILUA STREAM NEAR HUEL0, MAUI

LOCATION.—400 feet above Wailoa ditch intake and 1 mile south of Huelo.

RECORDS AVAILABLE.—December 8, 1910, to June 30, 1918, and July 1, 1919, to June 30, 1926.

EQUIPMENT.—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage 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; seldom shifts.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 520 million gallons a day, or 805, second-feet, at 10.45 a. m. August 27 (gage height from water-stage recorder, 6.30 feet); minimum discharge, 1.1 million gallons a day, or 1.7 second-feet, several hours March 21-22 (gage height, 1.07 feet).

1910-1926: Maximum discharge recorded, about 1,500 million gallons a day, or 2,300 second-feet, at about 2 a. m. February 1, 1922 (gage height,

determined from floodmarks, 10.5 feet); minimum discharge, 0.07 million gallons a day, or 0.11 second-foot, from 3 to 4 a. m. June 27, 1921 (gage height, 0.57 foot).

**DIVERSIONS AND REGULATION.**—Nearly all low-water flow diverted above station by Old Hamakua ditch from February 5, 1918, to February 28, 1922.

**OBJECT OF STATION.**—Data valuable in connection with Territorial water leases to ditch company.

**UTILIZATION.**—Ordinary flow of stream is diverted by ditches of East Maui Irrigation Co. for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation permanent during year. Rating curve fairly well defined below 50 million gallons a day; extended above on basis of one discharge measurement at 273 million gallons a day. This curve checked closely at 3 and 7 million gallons a day by two of the three discharge measurements made during the year. Operation of water-stage recorder very unsatisfactory as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages except those that are estimated which are fair; high-stage records probably fair.

*Discharge, in million gallons a day, of Kailua Stream near Huelo, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	19.6	13.3	33	10.0	2.9	5.7		4.2	2.2	13	2.8	2.3
2.....	12.2	27	19.2	5.9	2.9	5.5		2.6	2.0			
3.....	9.4	11.1	13.3	7.4	3.2	4.8		2.3	2.0			
4.....	7.8	11.7	11.4	4.8	4.0	4.4		1.9	1.9			
5.....	5.7	95	9.4	4.0	5.9	4.2		1.6	1.8			
6.....	5.7	49		5.7	8.4	3.7	4.8	1.6	1.8	2.2	2.3	2.3
7.....	10.2	21		5.7	106	3.5		1.4	1.7	4.0	12.8	
8.....	8.7	13.3		9.4	64	3.4		1.5	1.6	2.6	17.2	
9.....	5.5	10.4	8	5.9	38	3.3			1.6	2.2	7.1	
10.....	5.5			6.8	13.3	3.0			1.6	1.7	3.7	
11.....	9.5			4.6	9.0	2.9	3.7		1.6	1.7	6.7	32
12.....	6.8			4.2	7.1	2.6	2.3	4.4	1.6	15.9		
13.....				16.9	3.8	12.5	1.9		1.6	10.4		
14.....				3.5	17.0		1.8		1.5	4.0		
15.....				3.3	66		1.7		1.4	3.7		
16.....			5				1.8		1.6	6.0	2.3	5.3
17.....				3.2	27		1.7		1.4	21		
18.....				3.2	49		1.5		1.4	8.4		
19.....				3.2	21		1.4		1.4	8.4		
20.....				3.2	67		1.4	24	1.2	8.1		
21.....					12.9							
22.....				3.0	9.4	2.8	131		1.1	5.3	2.1	2.2
23.....				3.4	7.7		9.4		7.0	0		
24.....				3.0	6.8		4.2		2.1			
25.....	3.5			24	17.6		2.9		1.5			
26.....	5.1			15.6	13.7		2.4					
27.....							2.0	2.6	1.5	6.5	9.5	2.1
28.....	4.0	119	3.8	10.4	8.4		1.9	2.4				
29.....	23	265	3.7	6.2	8.7		1.9	2.3				
30.....	13.1	52	3.4	4.8	7.4		3.2					
31.....	26	37	3.8	4.0	6.8		4.2					
32.....	8.7	36	72	3.7	7.1		6.8					
33.....	12.5	54		3.5								

NOTE.—Braced figures give mean discharge for periods indicated, estimated by comparison with record of Nāililihaele Stream near Huelo, Maui; recorder not operating properly.

*Monthly discharge of Kailua Stream near Huelo, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	26	-----	8.02	12.4	249	763
August.....	265	-----	30.6	47.3	950	2,910
September.....	72	3.4	11.2	17.3	337	1,030
October.....	24	3.0	5.89	9.11	183	560
November.....	106	2.9	21.0	32.5	631	1,930
December.....	5.7	-----	3.22	4.98	99.7	306
January.....	131	1.4	7.65	11.8	237	728
February.....	-----	1.4	7.59	11.7	212	652
March.....	7.0	1.1	1.78	2.75	55.1	169
April.....	-----	1.7	7.18	11.1	215	661
May.....	-----	-----	4.86	7.52	151	462
June.....	-----	-----	9.41	14.6	282	866
The year.....	265	-----	9.87	15.3	3,600	11,000

#### HOOLAWALILII STREAM NEAR HUELO, MAUI

**LOCATION.**—400 feet above New Hamakua ditch crossing and 4 miles by trail west of Huelo.

**RECORDS AVAILABLE.**—April 6, 1911, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank. Discharge measurements made by wading near gage or from footbridge at gage.

**CHANNEL AND CONTROL.**—Channel at gage is a pool about 100 feet long and 20 feet wide formed by concrete control about 20 feet long at brink of falls over which water makes a drop of about 50 feet. Banks slope gently and are covered with dense growth of vegetation.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 88 million gallons a day, or 136 second-feet, at 9.45 a. m. January 21 (gage height from water-stage recorder, 2.38 feet); minimum discharge, 0.2 million gallons a day, or 0.3 second-foot, from 6 p. m. to midnight June 8 (gage height, 0.46 foot).

1911-1926: Maximum discharge recorded, 485 million gallons a day, or 750 second-feet, at 11 a. m. November 21, 1921 (gage height from water-stage recorder, 4.82 feet); minimum discharge, that of June 8, 1926.

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To furnish data for appraisal of water value under Territorial lease to ditch company.

**UTILIZATION.**—All water during low and medium stages picked up below station by ditches of East Maui Irrigation Co. for irrigation of sugar cane.

**ACCURACY.**—Stage-discharge relation permanent during year. Rating curve well defined below 30 million gallons a day; extension above uncertain. This curve checked closely at 2 and 8 million gallons a day by two discharge measurements made in August and January. Operation of water-stage recorder satisfactory during year. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages; high-stage records poor.

*Discharge, in million gallons a day, of Hoolawaliili Stream near Huelo, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1-----	7.7	3.3	9.6	2.4	1.7	3.0	4.0	2.2	2.2	8.3	2.6	1.4
2-----	6.1	3.7	7.0	2.3	1.8	2.8	2.0	2.0	2.2	2.3	2.6	1.2
3-----	5.1	3.3	5.4	2.4	2.0	2.6	1.7	2.0	2.0	2.2	2.6	1.0
4-----	4.4	3.5	4.4	2.2	2.0	2.4	2.4	2.0	2.0	1.8	2.3	.7
5-----	3.9	10.6	3.9	2.2	2.0	2.4	1.8	1.8	2.0	1.8	2.2	.5
6-----	3.7	10.6	3.5	2.3	2.2	2.3	1.7	1.8	2.0	1.8	2.4	.3
7-----	3.7	6.7	3.3	2.3	9.7	2.3	1.7	1.8	2.0	2.0	3.0	.3
8-----	3.3	4.8	2.8	2.3	9.1	2.2	1.7	1.8	2.0	2.2	4.6	.2
9-----	3.0	4.1	2.8	2.3	8.3	2.2	1.7	2.0	2.0	2.2	3.3	.2
10-----	3.0	3.9	2.6	3.0	4.8	2.2	1.7	2.7	2.0	2.2	3.0	.9
11-----	3.0	3.7	3.2	2.4	3.9	2.0	2.4	2.3	2.0	2.2	3.3	3.0
12-----	2.6	3.5	3.9	2.3	3.7	2.2	1.8	2.0	2.0	6.3	4.4	11.0
13-----	2.6	2.8	5.1	2.2	4.8	2.0	1.8	2.0	2.0	3.3	3.5	8.3
14-----	2.4	2.8	3.5	2.2	4.4	2.0	1.8	1.8	1.8	2.8	3.0	6.7
15-----	2.4	2.6	2.6	2.0	8.3	2.0	1.8	2.0	1.8	2.8	3.0	3.7
16-----	2.3	2.6	2.6	2.0	7.7	2.0	1.8	1.8	1.8	2.8	2.8	3.3
17-----	2.4	2.4	2.4	1.8	13.4	2.0	1.8	16.4	1.8	5.1	2.6	3.0
18-----	2.4	2.4	2.6	1.8	8.0	1.8	1.8	8.6	1.8	3.9	2.6	2.6
19-----	2.3	2.3	2.4	2.0	8.3	3.1	1.8	4.1	1.7	3.9	2.4	2.6
20-----	2.3	2.4	2.8	1.8	5.8	2.0	1.7	3.5	1.7	4.1	2.3	2.4
21-----	2.3	2.4	2.4	1.8	4.6	1.8	16.3	3.3	1.7	3.7	2.0	2.4
22-----	2.3	3.9	2.3	1.8	4.1	1.7	3.7	2.8	2.7	3.5	1.7	2.4
23-----	2.3	3.9	2.3	1.7	3.7	1.7	2.8	2.6	2.0	3.3	1.2	2.3
24-----	2.3	2.6	2.3	4.3	9.0	1.7	2.6	2.6	1.8	4.1	.9	2.3
25-----	2.3	3.1	2.3	2.3	5.1	1.8	2.3	2.4	1.7	3.7	1.2	2.3
26-----	2.3	12.0	2.2	2.2	4.4	1.8	2.2	2.3	1.7	3.5	.9	2.2
27-----	6.8	22	2.2	2.0	3.9	1.7	2.2	2.3	2.0	3.3	.9	2.2
28-----	3.1	9.9	2.2	1.8	3.7	1.7	2.2	2.2	1.8	3.0	.9	2.0
29-----	10.4	9.6	2.2	1.8	3.5	1.7	2.2		1.7	3.0	1.0	2.0
30-----	3.3	9.6	5.0	1.7	3.5	1.6	2.2		1.7	2.8	2.2	1.7
31-----	3.5	11.5		1.7		3.6	2.2		1.7		1.8	

*Monthly discharge of Hoolawaliili Stream near Huelo, Maui, for the year ending June 30, 1926*

Month	Discharge			Total run-off		
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July-----	10.4	2.3	3.53	5.46	110	336
August-----	22	2.3	5.56	8.60	172	529
September-----	9.6	2.2	3.39	5.25	102	312
October-----	4.3	1.7	2.17	3.36	67.3	206
November-----	13.4	1.7	5.25	8.12	157	483
December-----	3.6	1.6	2.14	3.31	66.3	204
January-----	16.3	1.7	2.57	3.98	79.8	244
February-----	16.4	1.8	3.04	4.70	85.1	261
March-----	2.7	1.7	1.91	2.96	59.3	182
April-----	8.3	1.8	3.26	5.04	97.9	300
May-----	4.6	.9	2.36	3.65	73.2	225
June-----	11.0	.2	2.50	3.87	75.1	230
The year-----	22	.2	3.14	4.86	1,140	3,510

#### HOOLAWANUI STREAM NEAR HUELLO, MAUI

**LOCATION.**—200 feet above intake of Wailoa ditch and 5 miles by trail west of Huelo; elevation 1,240 feet.

**RECORDS AVAILABLE.**—December 12, 1910, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank. Discharge measurements made by wading near gage or from footbridge at gage.

**CHANNEL AND CONTROL.**—Stream drops over a low waterfall into large circular pool with gently sloping banks. Control for ordinary stages is narrow

outlet of pool near the left bank; composed of boulders and subject to shift. At high stage the control becomes much wider by overflowing the right bank, which is covered with dense growth of grass.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 156 million gallons a day, or 241 second-feet at 10.45 a. m. January 21 (gage height from water-stage recorder, 4.18 feet; affected by backwater); minimum discharge, 0.5 million gallons a day, or 0.8 second-foot from 4 to 6 p. m. December 30 (gage height, 0.41 foot; affected by backwater).

1910-1926: Maximum discharge recorded, about 550 million gallons a day, or 851 second-feet, at 3 a. m. February 1, 1922 (gage height from water-stage recorder, 8.40 feet); minimum discharge, 0.15 million gallons a day, or 0.2 second-foot, at 7 p. m. October 25, 1917 (gage height, — 0.19 foot).

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To furnish data for appraisal of water value under Territorial lease to ditch company.

**UTILIZATION.**—All water during low and medium stages picked up below station by ditches of East Maui Irrigation Co. for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation permanent during year except as affected by backwater as indicated in footnote to daily-discharge table. Rating curve well defined below 100 million gallons a day; extension above uncertain. This curve checked closely at 2 and 2.5 million gallons a day by two discharge measurements made in February and June. Two other measurements in September and January help determine the backwater corrections. Operation of water-stage recorder satisfactory during year. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records poor.

*Discharge, in million gallons a day, of Hoolawanui Stream near Huelo, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	15.4	4.2	19.2	2.8	0.9	2.4	4.3	2.2	1.9	15.1	2.1	1.6
2.....	11.0	6.6	13.2	1.8	.9	2.1	.8	1.6	1.8	1.8	2.0	1.4
3.....	8.8	4.3	9.9	2.3	1.1	1.8	.7	1.6	1.8	1.4	1.9	1.4
4.....	7.4	5.0	7.9	1.7	1.1	1.7	1.5	1.4	1.6	1.2	1.8	1.3
5.....	6.5	30	6.5	1.7	1.0	1.6	.8	1.4	1.6	1.1	1.8	1.2
6.....	5.9	21	5.4	2.0	1.1	1.4	.7	1.4	1.5	1.2	1.9	1.3
7.....	6.2	13.2	4.7	1.9	21	1.3	.6	1.3	1.4	1.3	4.7	1.3
8.....	5.3	9.4	4.1	2.6	15.8	1.2	.6	1.2	1.4	1.2	8.0	1.2
9.....	4.4	7.9	3.8	2.0	12.8	1.2	.6	1.4	1.4	1.2	3.8	1.0
10.....	4.1	6.8	3.3	2.3	6.1	1.0	.7	3.0	1.3	1.2	2.6	1.8
11.....	4.8	6.2	5.0	1.6	4.5	1.0	1.4	8.5	1.3	1.3	3.1	5.2
12.....	3.9	5.6	6.6	1.4	3.9	.9	.7	1.4	1.2	8.7	6.2	30
13.....	3.4	4.8	7.8	1.4	5.6	.9	.7	1.4	1.2	3.3	3.1	21
14.....	3.2	4.7	5.4	1.3	5.5	.8	.6	1.2	1.1	2.1	2.6	15.1
15.....	2.8	4.1	3.9	1.2	18.6	.9	.7	1.2	1.0	1.8	2.3	6.9
16.....	2.6	4.3	3.3	1.2	13.3	.8	.7	1.2	1.1	1.9	2'2	6.1
17.....	3.0	3.6	2.9	1.0	25	.7	.6	25	1.0	10.1	2.1	5.3
18.....	2.7	3.4	3.3	1.0	12.1	.7	.6	17.8	1.0	4.8	1.9	4.5
19.....	2.1	3.5	3.2	1.0	14.2	2.8	.6	5.6	1.0	4.4	1.8	4.3
20.....	2.1	3.2	3.2	1.0	8.7	.8	.6	4.2	.9	4.8	1.8	3.9
21.....	2.5	3.5	3.1	1.0	6.5	.7	38	3.8	.9	3.4	1.7	3.4
22.....	2.1	8.0	2.3	.9	5.4	.6	6.8	3.1	2.7	3.0	1.6	3.0
23.....	1.9	7.6	2.1	.8	4.5	.6	4.0	2.8	1.3	2.7	1.6	2.8
24.....	1.8	4.4	1.9	7.7	12.4	.6	3.1	2.8	.9	5.1	1.5	2.6
25.....	2.0	5.0	1.7	3.2	6.3	.7	2.6	2.6	.9	3.9	1.9	2.5
26.....	1.7	28	1.6	1.9	4.5	.6	2.3	2.4	.9	3.1	1.6	2.2
27.....	9.9	83	1.4	1.3	4.0	.6	2.1	2.2	1.5	2.7	1.5	2.2
28.....	4.4	26	1.4	1.2	3.3	.6	2.0	2.1	1.0	2.4	1.5	2.1
29.....	14.1	22	1.6	1.0	3.0	.5	2.1	-----	.9	2.2	1.9	2.0
30.....	4.3	19.2	15.3	1.0	2.9	.5	2.0	-----	.9	2.1	4.1	1.8
31.....	4.7	24	-----	.9	-----	3.3	2.0	-----	1.2	-----	2.3	-----

NOTE.—Discharge Aug. 29 to Jan. 21 from gage heights corrected for backwater determined from two discharge measurements and by comparison with records of adjacent streams.

*Monthly discharge of Hoolawanui Stream near Huelo, Maui, for the year ending June 30, 1926*

Month	Discharge			Total run-off		
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	15.4	1.7	5.00	7.74	155	476
August.....	83	3.2	12.3	19.0	382	1,170
September.....	19.2	1.4	5.17	8.00	155	476
October.....	7.7	.8	1.75	2.71	54.1	166
November.....	25	.9	7.53	11.7	226	693
December.....	3.3	.5	1.14	1.76	35.3	108
January.....	38	.6	2.76	4.27	85.5	263
February.....	25	1.2	3.78	5.85	106	325
March.....	2.7	.9	1.28	1.98	39.6	122
April.....	15.1	1.1	3.35	5.18	100	308
May.....	8.0	1.5	2.55	3.95	78.9	243
June.....	30	1.0	4.68	7.24	140	431
The year.....	83	.5	4.27	6.61	1,560	4,780

#### HONOPOU STREAM NEAR HUELO, MAUI

**LOCATION.**—200 feet above New Hamakua ditch crossing and 6 miles west of Huelo; elevation 1,250 feet.

**RECORDS AVAILABLE.**—December 12, 1910, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder on left bank. Discharge measurements made by wading near gage or from footbridge at gage.

**CHANNEL AND CONTROL.**—One channel at all stages; straight for 50 feet above and below gage. Right bank is overflowed during floods; left bank steep and high. Control an old iron weir set in concrete; subject to shifts due to growth of grass in weir basin.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 69 million gallons a day, or 107 second-feet, at 2.30 a. m. June 12 (gage height from water-stage recorder, 2.38 feet); minimum discharge 0.4 million gallons a day, or 0.6 second-foot, from 5 to 7 p. m. December 29 (gage height, 0.16 foot).

1910-1926: Maximum discharge recorded, 658 million gallons a day, or 1,020 second-feet, at 3.25 a. m. February 1, 1922 (gage height from water-stage recorder, 5.50 feet); minimum discharge, 0.15 million gallons a day, or 0.23 second-foot, from 2 to 8 p. m. July 14, 1920 (gage height, 0.05 foot).

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To furnish data for appraisal of water value under Territorial lease to ditch company.

**UTILIZATION.**—Ordinary flow is diverted below station by ditches of East Maui Irrigation Co. for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation probably permanent during year. Rating curve well defined below 25 million gallons a day by discharge measurements; extended above on basis of weir formulas. This curve checked closely at 0.8 and 2.0 million gallons a day by two discharge measurements made in November and January. Operation of water-stage recorder satisfactory during year. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair.

*Discharge, in million gallons a day, of Honopou Stream near Huelo, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1-----	5.2	1.5	7.3	1.5	0.7	1.9	2.1	1.2	1.1	6.0	1.1	0.7
2-----	3.8	1.8	5.7	1.3	.7	1.6	.7	1.1	1.1	1.0	1.0	.7
3-----	3.3	1.3	4.5	1.4	1.0	1.5	.6	1.1	1.1	.7	1.0	.6
4-----	2.9	1.5	3.8	1.2	1.0	1.5	1.3	1.0	1.1	.7	.9	.6
5-----	2.5	6.5	3.5	1.2	.8	1.4	.7	1.0	1.1	.6	.9	.6
6-----	2.3	5.6	3.0	1.3	.8	1.3	.6	1.0	1.0	.6	.9	.6
7-----	2.3	3.7	2.5	1.2	6.4	1.2	.6	.9	1.1	.6	1.5	.6
8-----	1.9	3.0	2.3	1.4	4.7	1.2	.6	.9	1.1	.6	2.5	.6
9-----	1.8	2.5	2.1	1.2	4.1	1.1	.6	.8	1.1	.5	1.2	.6
10-----	1.6	2.2	1.9	1.5	2.6	1.0	.8	1.6	1.1	.5	1.0	1.0
11-----	1.6	2.0	2.2	1.2	2.1	1.0	1.4	1.2	1.1	.6	1.2	3.4
12-----	1.5	1.9	2.8	1.0	1.9	.9	.7	.9	1.1	4.2	1.9	10.0
13-----	1.3	1.6	4.7	1.0	2.9	.9	.7	.8	1.0	1.1	1.1	6.0
14-----	1.3	1.6	2.4	1.0	2.4	.8	.7	.7	1.0	.7	1.0	3.7
15-----	1.2	1.5	1.9	1.0	4.7	.8	.7	.7	1.0	.7	1.0	2.5
16-----	1.2	1.5	1.8	1.0	4.8	.7	.7	.7	.9	.7	.9	2.3
17-----	1.2	1.3	1.7	1.0	8.8	.7	.7	* 13.4	.9	2.7	.9	1.9
18-----	1.2	1.3	1.9	1.0	5.5	.6	.6	2.9	.9	1.5	.9	1.8
19-----	1.0	1.3	1.8	.9	5.4	2.5	.6	1.9	.9	1.4	.9	1.8
20-----	1.0	1.2	2.2	1.0	3.8	.7	.6	1.6	.9	1.8	.9	1.6
21-----	1.0	1.3	1.8	1.0	3.3	.6	* 15.0	1.5	.8	1.2	.8	1.5
22-----	1.0	2.7	1.5	.9	3.0	.5	3.2	1.3	1.3	1.2	.7	1.4
23-----	1.0	2.0	1.5	.9	2.6	.6	2.2	1.3	1.0	1.1	.8	1.3
24-----	.9	1.5	1.3	3.0	7.3	.5	1.9	1.2	.8	1.8	.7	1.2
25-----	.9	1.8	1.3	1.2	3.1	.6	1.7	1.2	.7	1.5	.9	1.2
26-----	.8	8.1	1.2	1.0	2.6	.5	1.6	1.2	.7	1.3	.8	1.2
27-----	4.7	16.6	1.2	.9	2.3	.5	1.5	1.2	1.0	1.2	.7	1.2
28-----	1.4	8.1	1.2	.8	2.1	.5	1.4	1.2	.7	1.2	.7	1.1
29-----	7.1	8.0	1.2	.8	2.0	.5	1.4	-----	.7	1.2	.9	1.0
30-----	1.5	7.5	3.7	.7	2.0	.4	1.3	-----	.7	1.1	1.2	1.0
31-----	1.6	8.9	-----	.7	-----	2.6	1.3	-----	.7	-----	.9	-----

\* Estimated from fragmentary gage-height record.

*Monthly discharge of Honopou Stream near Huelo, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July-----	7.1	0.8	2.00	3.09	62.0	190
August-----	16.6	1.2	3.60	5.57	112	342
September-----	7.3	1.2	2.53	3.91	75.9	233
October-----	3.0	.7	1.14	1.76	35.2	108
November-----	8.8	.7	3.18	4.92	95.4	293
December-----	2.6	.4	1.00	1.55	31.1	95
January-----	15.0	.6	1.56	2.41	48.5	148
February-----	13.4	.7	1.62	2.51	45.5	139
March-----	1.3	.7	.96	1.49	29.7	91
April-----	6.0	.5	1.33	2.06	40.0	122
May-----	2.5	.7	1.03	1.59	31.8	98
June-----	10.0	.6	1.79	2.77	53.7	165
The year-----	16.6	.4	1.81	2.80	661	2,020

## WAILOA DITCH AT HONOPOU, NEAR HUELO, MAUI

**LOCATION.**—100 feet below intake of Honopou Stream, half a mile west of Lupi, and 7 miles southwest of Huelo.

**RECORDS AVAILABLE.**—November 19, 1922, to June 30, 1926.

**EQUIPMENT.**—Stevens continuous water-stage recorder at outer end of an adit tunnel. Discharge measurements made from plank across ditch at adit tunnel or at concrete viaduct at Halehaku Gulch 1 mile below gage.

**CHANNEL AND CONTROL.**—Channel is concrete-lined ditch in tunnel. Channel control; permanent.

**EXTREMES OF DISCHARGE.**—Maximum discharge during year is unknown owing to missing gage-height record. Minimum discharge recorded, 27 million gallons a day, or 42 second-feet, from 6 to 11 a. m. March 22 and 4 to 7 a. m. March 30 (gage height, 1.60 feet).

1922-1926: Maximum discharge recorded, 169 million gallons a day, or 261 second-feet, at 6.30 p. m. November 20 and 5.30 a. m. November 21, 1924 (gage height from water-stage recorder, 5.67 feet); minimum discharge, that of March 22 and 30, 1926.

**DIVERSIONS AND REGULATION.**—This ditch as a continuation of Koolau ditch diverts the ordinary flow of all streams on windward side of Haleakala between Makapipi Stream and Halehaku Gulch; completely regulated by spillways and gates.

**OBJECT OF STATION.**—To determine total amount of water diverted through the Koolau-Wailoa ditch system from Territorial lands.

**UTILIZATION.**—Water used for irrigation of sugarcane, power development, and domestic supply.

**ACCURACY.**—Stage-discharge relation permanent during year. Rating curve well defined; was not checked during year by discharge measurements. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good.

Wailoa ditch, at elevation about 1,200 feet, diverts the ordinary flow of all streams on the windward side of the crater of Haleakala between Waikamoi and Halehaku Streams, inclusive. As the continuation of Koolau ditch it carries also the ordinary flow of all streams east of Waikamoi as far as Makapipi Stream. The Koolau-Wailoa system comprises about 18 miles of main ditch, Wailoa ditch proper being about 10 miles long with a rated carrying capacity of 146 million gallons a day. The general course of the ditch is northwestward along the side of Haleakala. The water is carried to a point near Paia where it is distributed for the irrigation of sugarcane and for power and domestic uses on the plantations of Hawaiian Commercial & Sugar Co. and Maui Agricultural Co. The Koolau-Wailoa system is not only the largest of the East Maui Irrigation Co.'s ditch lines but is the largest ditch line in the Hawaiian Islands.

*Discharge, in million gallons a day, of Wailoa ditch at Honopou, near Huelo, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1-----	120	150	166	138	67	96	145	97	48	121	45	57
2-----			162	107	71	88	71	57	48	54	45	45
3-----			158	134	76	85	51	51	45	40	42	42
4-----			154	111	107	78	94	48	42	34	40	38
5-----			150	111	104	74	83	45	42	30	40	37
6-----			142	130	120	71	54	45	40	40	51	39
7-----		130	134	130	154	67	48	42	40	56	129	40
8-----			122	146	162	64	45	42	38	42	154	36
9-----			122	130	162	60	42	57	37	33	111	34
10-----			130	150	134	57	42	76	37	30	67	40
11-----			146	126	130	57	100	119	37	29	67	140
12-----			154	111	142	54	51	64	34	122	142	
13-----		107	150	99	158	51	42	51	33	119	81	
14-----			150	96	154	51	40	45	32	57	64	
15-----			96	138	88	51	42	48	30	57	54	75
16-----			130	126	81	158	51	54	42	33	60	51
17-----	95	99	118	81	166	45	42	108	30	152	48	48
18-----		88	126	74	162	45	38	162	30	106	45	45
19-----		96	146	74	162	115	37	138	33	103	42	42
20-----		107	130	71	158	67	36	103	29	108	42	42
21-----		111	146	67	154	48	119	103	28	71	42	54
22-----		154	130	67	142	45	146	78	55	57	38	
23-----		150	118	60	130	42	96	71	65	53	40	
24-----		111	107	140	142	42	74	81	34	143	37	
25-----		146	99	134	154	42	60	72	30	114	50	45
26-----		166	92	138	138	40	57	60	28	88	48	42
27-----		166	85	126	138	38	54	57	30	60	38	42
27-----		166	85	96	114	37	51	54	30	54	38	40
28-----		166	94	81	107	36	74	-----	28	48	51	38
29-----		166	162	78	114	34	120	-----	27	45	130	37
31-----		166	-----	71	-----	54	76	-----	29	-----		-----

NOTE.—Discharge estimated May 25 and 26 and June 1. Braced figures give estimated mean discharge for periods indicated. Estimates made by comparison with records of flow for Koolau ditch at Wahinepe, near Huelo, Maui, and study of faulty gage-height record; recorder not operating properly.

*Monthly discharge of Wailoa ditch at Honopou, near Huelo, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July-----	-----	-----	105	162	3,270	9,990
August-----	166	88	136	210	4,220	12,900
September-----	166	85	131	203	3,940	12,100
October-----	150	60	105	162	3,250	9,990
November-----	166	67	135	209	4,040	12,400
December-----	115	34	57.6	89.1	1,780	5,480
January-----	146	36	67.2	104	2,080	6,390
February-----	162	42	72.0	111	2,020	6,190
March-----	65	27	36.2	56.0	1,120	3,440
April-----	152	29	70.9	110	2,130	6,530
May-----	154	37	64.6	100	2,000	6,150
June-----	-----	34	65.1	101	1,950	5,990
The year-----	166	27	87.1	135	31,800	97,600

## NEW HAMAKUA DITCH AT HONOPOU, NEAR HUELO, MAUI

**LOCATION.**—800 feet below Honopou Stream crossing, 15 feet above tunnel portal, and 7 miles by road and trail west of Huelo.

**RECORDS AVAILABLE.**—May 14, 1921, to June 30, 1926. January 25, 1918, to May 13, 1921, at site 300 feet upstream. Records comparable.

**EQUIPMENT.**—Stevens continuous water-stage recorder on right bank. Discharge measurements made by wading or from plank across ditch near gage.

**CHANNEL AND CONTROL.**—Sides and bottom of ditch composed of hardpan; fairly smooth. Channel straight for 25 feet above and about 1,000 feet below station. No well-defined control; stage-discharge relation affected by deposition of mud and gravel on ditch bottom and by caving of tunnel roof.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 103 million gallons a day, or 159 second-feet at 4.45 p. m. August 27 (gage height from water-stage recorder, 5.02 feet); minimum discharge, 0.1 million gallons a day, or 0.2 second-foot, at 2.30 p. m. March 31 (gage height, -0.19 foot).

1918-1926: Maximum discharge recorded, 124 million gallons a day, or 192 second-feet, at 2.40 a. m. February 1, 1922 (gage height from water-stage recorder, 6.15 feet affected by backwater); minimum discharge, 0.07 million gallons a day, or 0.11 second-foot, from 6 to 10 a. m. August 7, 1923 (gage height, -0.23 foot).

**DIVERSIONS AND REGULATION.**—Ditch receives small amount of seepage and, during floods, the waste water from Wailoa ditch intakes. Flow regulated by gates and spillways.

**OBJECT OF STATION.**—To determine amount of water diverted from Territorial lands above to fee-simple lands below.

**UTILIZATION.**—Water used for irrigation of sugarcane.

**ACCURACY.**—Stage-discharge relation changed at time of flood June 11. Two rating curves used fairly well defined below 80 million gallons a day; extension above, somewhat uncertain. These curves checked closely at 0.7, 1.9, and 45 million gallons a day by three discharge measurements made in November, May, and June. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair except those estimated, which are poor.

New Hamakua ditch, at elevation about 500 feet, diverts from all streams on the windward side of Haleakala, below Wailoa ditch and between Waikamoi and Halehaku Streams. The water is carried to a point near Paia where it is distributed for the irrigation of sugarcane. The system comprises about 14 miles of main ditch and has a rated carrying capacity of 75 million gallons a day. Upon completion of Wailoa ditch New Hamakua ditch was abandoned west of Halehaku and became a storm-water ditch east of Halehaku.

*Discharge, in million gallons a day, of New Hamakua ditch at Honopou, near Huelo, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	47	26	76	8.2	1.0	1.4	33		0.6	31		0.9
2.....	17.5	42	64	.8	1.0	1.2	.6		.6	.4		1.2
3.....	4.2	13.2	36	16.0	2.0	1.0			.6	.2		.7
4.....	2.2	20	19.2	1.4	6.4	.9	8.5		.5	.2		.4
5.....	1.9	77	11.9	.8	9.8	.8	1.5		.5	.2	2.5	.4
6.....	1.8	74	6.9	7.0	11.9	.7	.4		.4	.2		.4
7.....	14.4	61	2.6	4.3	46	.6	.3		.4	.2		.4
8.....	8.7	35	2.1	18.7	72	.7	.3		.4	.2	43	.3
9.....	1.2	18.6	4.4	2.4	69	.6	.3		.4	.2	2.2	.3
10.....	1.2	8.0	6.4	37	37	.5	.3		.4	.2	.4	.3
11.....	13.8	2.0	28	3.4	17.0	.4	5.5		.4	.2	3.5	9.7
12.....	1.4	1.7	51	1.8	6.5	.3	.4		.3	.2	28	68
13.....	.7	1.4	33	1.6	43	.3	.3	5.5	.3	5.7	.7	65
14.....	.6	1.3	25	1.3	36	.3	.3		.3	.5	.4	55
15.....	.6	1.2	6.1	1.0	74	.3	.3		.3	.4	.4	7.9
16.....	.5	6.2	1.6	.8	55	.4	.4		.3	.3	.4	2.2
17.....	.5	1.4	1.5	.8	80	.3			.3	43	.4	1.6
18.....	1.0	1.0	7.6	.8	62	.2			.2		.3	1.2
19.....	.5	1.0	26	.8	65	11.4			.2		.3	1.2
20.....	.4	4.0	8.3	.8	31	.8			.2		.3	1.2
21.....	5.6	1.6	24	.8	14.5	.4			.2		.5	1.1
22.....	.6	44	3.8	.8	5.4	.3			6.9		.3	1.0
23.....	.6	30	1.3	1.0	2.3	.2			1.6		.2	.9
24.....	.6	3.7	1.3	35	40	.2	3.6		.2	3.7	.2	.9
25.....	.6	15.8	.9	8.2	28	.2			.2		.3	.9
26.....	.6	80	.8	10.0	3.2	.2		.8	.2		.2	1.0
27.....	26	90	.7	3.4	6.0	.2		.8	.2		.2	1.0
28.....	16.4	76	.7	1.0	1.9	.2		.7	.2		.2	1.0
29.....	58	75	.7	.7	1.6	.2			.1		.2	.9
30.....	7.4	73	60	.8	1.7	.2			.1		43	.8
31.....	31	77		.9		10.0			.1		6.2	

NOTE.—Braced figures give mean discharge for periods indicated, estimated by comparison with East Maui Irrigation Co.'s record of this ditch at Lupe; recorder not operating properly.

*Monthly discharge of New Hamakua ditch at Honopou, near Huelo, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	58	0.4	8.63	13.4	268	821
August.....	90	1.0	31.0	48.0	962	2,950
September.....	76	.7	17.1	26.5	512	1,570
October.....	37	.7	5.56	8.60	172	529
November.....	80	1.0	27.7	42.9	830	2,550
December.....	11.4	.2	1.14	1.76	35.4	108
January.....	33	.3	3.45	5.34	107	328
February.....		.7	4.99	7.72	140	429
March.....	6.9	.1	.57	.88	17.6	54
April.....	43	.2	5.11	7.91	153	470
May.....	43	.2	4.82	7.46	149	459
June.....	68	.3	7.59	11.7	228	699
The year.....	90	.1	9.79	15.1	3,570	11,000

## KAUHIKOA DITCH AT OPANA WEIR, NEAR HUELO, MAUI

**LOCATION.**—A short distance below crossing of Opana Stream and 8 miles by road west of Huelo post office.

**RECORDS AVAILABLE.**—January 1, 1910, to June 30, 1926.

**EQUIPMENT.**—Friez water-stage recorder. Discharge measurements made from plank across ditch below gate.

**CHANNEL AND CONTROL.**—Recorder operates in large pool. Control is a 25-foot sharp-crested weir.

**EXTREMES OF DISCHARGE.**—See monthly discharge table for maximum and minimum daily discharge.

**DIVERSIONS AND REGULATION.**—Regulated by gates at frequent intervals.

**OBJECT OF STATION.**—Opana Weir is one of four weirs that measure water diverted from Territorial lands through Kauhikoa, New Hamakua, Lowrie, and Haiku ditches by East Maui Irrigation Co.

**UTILIZATION.**—Water used for irrigation of sugarcane.

**ACCURACY.**—Records good.

**COOPERATION.**—Daily-discharge record copied from records of East Maui Irrigation Co.

Kauhikoa ditch at elevation about 900 feet, above Lowrie and Haiku ditches, diverts from all streams on the windward side of the crater of Haleakala between Halehaku and Maliko Streams inclusive. The water is carried to a point near Paia and distributed for irrigation of sugar cane. The ditch comprises about 6 miles of main channel and has a carrying capacity of 90 million gallons a day. Kauhikoa ditch replaced Old Hamakua ditch west of Halehaku.

*Discharge, in million gallons a day, of Kauhikoa ditch at Opana Weir, near Huelo, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	61	13.8	93	7.2	1.4	3.2	22	4.4	1.8	31	1.2	1.2
2.....	37	33	92	2.2	1.4	3.0	1.6	1.8	1.5	1.9	1.2	1.4
3.....	25	5.3	85	19.9	5.0	2.6	1.6	1.4	1.5	1.3	1.2	1.0
4.....	22	26	74	2.6	5.0	2.6	11.4	1.4	1.5	1.2	1.2	.8
5.....	21	75	64	2.2	10.8	2.5	2.2	1.4	1.4	1.2	1.2	.8
6.....	21	71	37	9.0	14.6	2.4	1.4	1.4	1.4	1.2	10.3	.8
7.....	40	76	6.1	10.6	68	2.3	1.4	1.4	1.4	1.1	44	.8
8.....	22	53	5.2	17.7	88	2.2	1.3	1.4	1.3	1.0	18.3	.8
9.....	16.4	22	10.0	11.4	82	2.0	1.2	1.6	1.3	.9	1.4	.8
10.....	5.5	8.8	15.5	33	43	1.9	1.8	20	1.3	.8	1.3	.8
11.....	8.9	4.6	42	4.4	20	1.8	5.2	8.0	1.3	2.2	13.9	28
12.....	2.0	4.2	60	2.5	10.7	1.6	1.5	1.4	1.3	28	25	69
13.....	1.8	3.9	54	2.2	57	1.4	1.3	1.3	1.3	7.0	1.3	82
14.....	1.5	3.8	33	2.1	57	1.4	1.3	1.2	1.3	1.3	1.2	52
15.....	1.3	3.7	12.0	2.0	87	1.5	1.4	1.8	2.3	1.2	1.2	42
16.....	1.3	8.8	6.7	1.9	76	1.8	1.4	1.2	.8	1.1	1.2	37
17.....	1.6	3.6	5.4	1.8	90	1.5	1.3	66	.8	59	1.2	30
18.....	1.3	3.2	29	1.7	80	1.6	1.3	76	.8	4.3	1.1	24
19.....	1.2	4.0	32	1.7	79	18.7	1.3	14.0	.8	2.8	1.0	22
20.....	1.2	4.0	23	1.7	46	2.5	1.3	3.4	.8	11.1	1.0	20
21.....	1.8	6.8	25	1.6	20	1.5	33	2.4	.8	1.7	1.0	19.2
22.....	1.2	55	9.2	1.6	6.4	1.4	24	2.5	8.1	1.5	1.0	16.6
23.....	21	25	7.6	2.3	4.0	1.4	3.6	2.2	1.2	2.5	1.0	15.2
24.....	4.7	5.1	7.2	46	64	1.3	2.6	2.7	1.0	31	1.0	14.3
25.....	1.3	31	6.8	12.7	33	1.3	2.2	2.3	.9	1.8	2.0	13.8
26.....	1.2	90	6.3	9.8	6.3	1.2	2.0	2.1	.9	1.5	1.6	13.0
27.....	29	99	6.1	3.6	7.7	1.2	1.9	1.9	1.1	1.2	1.5	13.0
28.....	21	84	2.2	1.8	4.0	1.2	1.7	1.8	.9	1.2	.7	11.9
29.....	36	84	5.5	1.8	3.8	1.2	3.8	-----	.8	1.2	8.6	11.1
30.....	2.8	75	68	1.5	3.8	1.2	6.2	-----	.8	1.2	36	10.7
31.....	26	92	-----	1.5	-----	24	9.4	-----	10.4	-----	2.7	-----

# 134 SURFACE WATER SUPPLY OF HAWAII, 1925-1926

*Monthly discharge of Kauhikoa ditch at Opana Weir, near Huelo, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Millions gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	61	1.2	14.2	22.0	439	1,350
August.....	99	3.2	34.7	53.7	1,070	3,300
September.....	93	2.2	30.8	47.7	923	2,840
October.....	46	1.5	7.16	11.1	222	681
November.....	90	1.4	35.8	55.4	1,070	3,300
December.....	24	1.2	3.08	4.77	95.4	293
January.....	33	1.2	4.95	7.66	154	471
February.....	76	1.2	8.16	12.6	228	701
March.....	10.4	.8	1.70	2.63	52.8	162
April.....	59	.8	6.81	10.5	204	627
May.....	44	.7	6.02	9.31	186	573
June.....	82	.8	18.5	28.6	554	1,700
The year.....	99	.7	14.3	22.1	5,210	16,000

## LOWRIE DITCH AT OPANA WEIR, NEAR HUELLO, MAUI

**LOCATION.**—A short distance west of Halehaku Gulch and 8 miles by road north-west of Huelo post office.

**RECORDS AVAILABLE.**—January 1, 1910, to June 30, 1926.

**EQUIPMENT.**—Friez water-stage recorder. Discharge measurements made from plank across ditch 100 feet downstream.

**CHANNEL AND CONTROL.**—Recorder operates in large pool. Control is a 16½-foot sharp-crested weir with end contractions.

**EXTREMES OF DISCHARGE.**—See monthly discharge table for maximum and minimum daily discharge.

**DIVERSIONS AND REGULATION.**—Regulated by gates at frequent intervals.

**OBJECT OF STATION.**—Opana Weir is one of four weirs which measure water diverted from Territorial lands through Kauhikoa, New Hamakua, Lowrie, and Haiku ditches by East Maui Irrigation Co.

**UTILIZATION.**—Water used for irrigation of sugarcane.

**ACCURACY.**—Records good.

**COOPERATION.**—Daily discharge record copied from records of East Maui Irrigation Co.

Lowrie ditch at elevation about 500 feet above Haiku ditch and below Wailoa and New Hamakua ditches, is a continuation of Manuel Luis and Center ditches and diverts from streams on the windward side of the crater of Haleakala between Kailua and Halehaku Streams inclusive. At Kailua Stream it receives the combined flow of Manuel Luis and Center ditches. The water is carried to a point near Paia and distributed for the irrigation of sugarcane. The ditch comprises about 15 miles of main channel and has a carrying capacity of 65 million gallons a day. With the completion of Wailoa ditch, Lowrie ditch became a storm-water ditch or reservoir feeder.

*Discharge, in million gallons a day, of Lowrie ditch at Opana Weir, near Huelo, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	60	60	61	9.3	4.4	6.8	21	3.4	3.5	17.0	2.1	1.8
2	60	60	61	6.0	4.5	6.6	5.2	2.6	3.2	3.2	2.1	1.4
3	59	60	61	10.0	5.6	6.4	4.8	2.6	3.1	2.7	2.1	1.4
4	57	60	59	6.0	5.2	6.2	8.4	2.6	3.1	2.3	2.0	1.3
5	53	62	55	5.3	9.3	5.9	5.4	2.5	2.9	2.1	1.9	1.2
6	51	61	54	6.9	8.3	5.7	4.8	2.6	2.8	2.1	2.2	1.2
7	58	61	59	6.2	26	5.4	4.2	2.7	2.9	2.1	5.0	1.2
8	52	60	58	8.5	28	5.4	3.8	2.7	2.7	1.4	12.3	1.0
9	39	60	58	12.5	26	5.6	3.8	2.8	2.5	1.8	3.2	1.1
10	49	60	59	23	16.7	5.0	4.0	5.9	2.4	1.6	1.8	1.2
11	56	60	58	6.0	10.2	4.8	4.0	4.9	2.7	2.3	2.0	7.6
12	51	57	58	3.7	8.8	4.8	3.8	2.8	2.6	13.2	12.5	27
13	43	46	59	3.5	21	4.7	3.4	2.8	2.4	4.4	1.6	28
14	44	51	61	6.4	13.7	4.6	3.2	2.4	2.5	4.2	1.6	27
15	36	51	61	6.3	37	4.8	3.6	3.9	2.4	3.9	1.6	3.7
16	45	59	60	5.9	16.6	4.9	3.7	2.4	2.5	3.8	1.6	1.8
17	52	48	57	5.7	47	4.5	3.4	26	2.4	24	1.6	1.6
18	48	44	58	5.5	31	4.6	3.2	36	2.6	8.5	1.4	1.2
19	36	9.0	59	5.8	33	14.3	3.2	9.1	2.5	3.7	1.3	1.2
20	48	41	60	5.4	16.7	7.2	3.2	4.8	2.3	4.2	1.4	1.1
21	57	58	59	5.3	11.4	4.0	25	4.6	2.3	3.1	1.4	1.2
22	44	60	59	5.2	9.0	3.9	7.5	3.8	4.9	3.0	1.4	1.3
23	34	60	56	4.7	7.8	3.9	3.7	3.8	2.2	2.8	1.3	1.3
24	41	60	53	20	24	3.8	3.7	5.4	2.2	5.3	1.2	1.3
25	52	60	53	6.2	9.1	3.4	3.2	3.8	2.1	4.2	1.9	1.3
26	42	62	48	9.6	4.4	3.6	3.0	3.6	2.0	2.9	1.5	1.3
27	60	61	45	7.0	5.9	3.6	2.9	4.0	4.2	2.4	1.5	1.0
28	60	61	10.7	5.0	7.5	3.6	2.8	3.7	2.6	2.4	1.5	.7
29	61	61	6.9	4.8	7.4	3.6	2.8	-----	2.2	2.2	2.0	.7
30	57	61	37	4.7	7.4	3.6	3.0	-----	2.1	2.1	11.8	.7
31	60	61	-----	4.5	-----	14.6	3.5	-----	2.9	-----	2.7	-----

*Monthly discharge of Lowrie ditch at Opana Weir, near Huelo, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	61	34	50.5	78.1	1,560	4,800
August	62	9.0	56.0	86.6	1,740	5,330
September	61	6.9	53.5	82.8	1,600	4,930
October	23	3.5	7.25	11.2	225	690
November	47	4.4	15.4	23.8	463	1,420
December	14.6	3.4	5.48	8.48	170	521
January	25	2.8	5.20	8.05	161	495
February	36	2.4	5.65	8.74	158	485
March	4.9	2.0	2.70	4.18	83.7	257
April	24	1.4	4.63	7.16	139	426
May	12.5	1.2	2.89	4.47	89.5	275
June	28	.7	4.13	6.39	124	380
The year	62	.7	17.9	27.7	6,520	20,000

#### HAIKU DITCH AT MANAWAI GULCH, NEAR PEAHI, MAUI

LOCATION.—In the bottom of western branch of Manawai Gulch just west of Keaaula-Opana boundary, a quarter of a mile north of Peahi, and 8 miles by road northwest of Huelo.

RECORDS AVAILABLE.—October 7, 1914, to June 30, 1926. January 1, 1910, to October 7, 1924, at Peahi Weir, on old Haiku ditch.

EQUIPMENT.—Friez water-stage recorder. Discharge measurements made from concrete footbridge across ditch.

CHANNEL AND CONTROL.—Control is submerged concrete weir across ditch. Station rated by engineers of East Maui Irrigation Co.; subject to shifts from gradual accumulation of debris on upstream side of control.

EXTREMES OF DISCHARGE.—See monthly discharge table for maximum and minimum daily discharge.

DIVERSIONS AND REGULATION.—Regulated by gates at frequent intervals.

OBJECT OF STATION.—To determine amount of water diverted from Territorial Lands by East Maui Irrigation Co.

UTILIZATION.—Water used for irrigation of sugarcane.

ACCURACY.—Records good.

COOPERATION.—Daily-discharge record copied from records of East Maui Irrigation Co.

Haiku ditch, at elevation about 250 feet and below all other main ditches, diverts from all streams on the windward side of the crater of Haleakala between Kailua Stream and Maliko Gulch. The water is carried to a point near Paia and distributed for irrigation of sugar cane. The ditch comprises about 16 miles of main channel and has a carrying capacity of 87 million gallons a day. Haiku ditch replaced Spreckels ditch west of Kailua Stream.

*Discharge, in million gallons a day, of Haiku ditch at Manawai Gulch, near Peahi, Maui, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	88	51	100	17.2	9.3	14.4	34	10.3	17.1	34	4.4	4.6
2	62	79	88	8.0	8.7	14.0	10.0	5.7	16.8	5.3	4.4	4.8
3	37	47	60	20	12.8	16.2	9.5	5.0	13.2	3.4	4.3	4.2
4	21	69	39	10.4	14.7	15.4	18.9	4.7	11.8	4.8	4.1	4.1
5	17.8	90	50	11.4	28	15.3	13.3	4.4	11.5	4.4	3.9	4.0
6	42	100	40	17.0	24	17.1	21	4.4	10.8	14.4	4.4	3.9
7	63	83	43	16.1	66	18.4	14.6	4.4	10.0	14.6	18.6	4.2
8	40	60	38	19.5	88	17.8	6.2	6.8	5.4	9.4	7.9	4.0
9	25	56	95	26	74	16.0	6.2	9.3	4.9	4.0	4.6	2.4
10	23	51	54	52	37	20	7.4	18.3	4.6	3.8	13.2	2.7
11	35	38	72	22	35	16.2	12.0	21	4.7	6.1	30	14.4
12	25	39	57	15.8	31	7.0	6.2	18.8	4.4	37	7.3	65
13	24	28	98	24	42	6.5	5.4	22	4.1	10.0	16.5	67
14	22	27	66	30	46	6.2	5.1	12.6	3.9	7.8	16.2	39
15	8.3	16.8	38	25	77	6.4	5.6	14.9	3.7	8.2	9.7	10.9
16	7.9	34	40	15.4	63	6.4	6.9	5.8	3.8	11.6	4.8	8.0
17	13.6	19.8	45	14.0	90	5.6	5.6	61	3.1	37	3.8	6.6
18	21	9.2	46	19.3	64	6.4	4.8	73	3.1	9.4	3.4	8.7
19	7.5	10.4	53	12.5	60	19.9	4.6	19.0	3.4	10.4	3.4	12.6
20	10.6	11.1	40	8.8	40	7.4	4.3	13.0	3.0	11.8	3.2	12.4
21	33	21	73	8.3	32	5.6	78	13.3	2.9	10.7	3.3	11.6
22	18.9	61	44	7.8	27	5.2	25	9.8	12.2	13.9	3.2	10.9
23	9.9	69	24	10.3	24	5.2	10.0	8.8	6.8	14.4	3.2	15.8
24	3.7	33	14.7	57	63	4.9	7.7	14.5	2.9	31	3.1	14.1
25	10.9	63	11.9	25	30	5.7	7.0	9.2	2.8	13.4	3.8	14.9
26	6.0	94	9.8	27	20	4.8	6.5	8.1	2.6	9.8	3.4	8.5
27	52	100	9.3	17.6	21	5.0	6.0	8.7	4.1	11.1	3.4	5.9
28	72	100	9.0	12.0	16.8	5.0	5.6	18.0	2.9	10.4	3.5	2.9
29	82	100	9.3	25	15.7	4.6	14.9	-----	2.6	8.4	7.2	1.5
30	38	99	61	28	15.7	4.3	16.1	-----	2.6	4.6	30	1.6
31	84	100	-----	19.8	-----	32	10.5	-----	8.6	-----	7.6	-----

*Monthly discharge of Haiku ditch at Manawai Gulch, near Peahi, Maui, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	88	3.7	32.4	50.1	1,000	3,080
August.....	100	9.2	56.8	87.9	1,760	5,400
September.....	100	9.0	47.6	73.6	1,430	4,380
October.....	57	7.8	20.1	31.1	622	1,910
November.....	90	8.7	39.2	60.7	1,180	3,610
December.....	32	4.3	10.8	16.7	335	1,030
January.....	78	4.3	12.5	19.3	389	1,190
February.....	73	4.4	15.2	23.5	425	1,310
March.....	17.1	2.6	6.27	9.70	194	596
April.....	37	3.4	12.5	19.3	375	1,150
May.....	30	3.1	7.74	12.0	240	736
June.....	67	1.5	12.4	19.2	371	1,140
The year.....	100	1.5	22.8	35.3	8,320	25,500

#### MISCELLANEOUS DISCHARGE 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 year ending June 30, 1926*

Date	Stream	Locality	Gage height, feet	Discharge	
				Second- feet	Million gallons a day
Aug. 14.....	Honokohau ditch.....	At Mahinahina, near Hono- kohau.	1.10	13.9	9.01
Do.....	do.....	do.....	1.10	13.8	8.92
Aug. 17.....	do.....	do.....	1.18	15.7	10.1
Do.....	do.....	do.....	1.18	15.4	9.95
Sept. 20.....	do.....	do.....	1.65	22.1	14.3
Mar. 2.....	Wahikuli ditch.....	Near Lahaina.....	.60	6.24	4.03
Do.....	do.....	do.....	.60	6.28	4.06
Mar. 4.....	Hawaiian Commercial & Sugar Co.'s station 16.	Near Puunene.....	.60	6.28	6.82
Do.....	do.....	do.....	1.19	10.6	7.10
Do.....	do.....	do.....	1.19	11.0	7.10
Do.....	do.....	do.....	.78	8.85	5.72
Do.....	do.....	do.....	.11	3.66	2.37
Apr. 9.....	Honokohau ditch.....	Near Honokohau.....		17.4	11.2
Do.....	do.....	do.....		19.3	12.5
May 11.....	do.....	do.....	1.28	14.9	9.63
June 28.....	Honokohau ditch at 4-foot weir.	do.....	.38	2.09	1.35
Do.....	do.....	do.....	.61	2.98	1.93
Do.....	do.....	do.....	.58	2.41	1.56
June 29.....	Kamole by-pass.....	Near Paia.....	.65	12.9	8.34
Do.....	do.....	do.....	.55	9.74	6.30
Do.....	do.....	do.....	.215	2.08	1.34
Do.....	do.....	do.....	.36	4.94	3.19
Do.....	do.....	do.....	.275	3.11	2.01
Do.....	do.....	do.....	.44	7.45	4.82
Do.....	do.....	do.....	.91	22.5	14.5

\* Head on orifice of Lyman flow meter.

## ISLAND OF HAWAII

## WAILUKU RIVER AT PUKAMAUI, NEAR HILO, HAWAII

**LOCATION.**—At Pukamaui three-quarters of a mile above intake of Hilo Boarding school ditch and 4 miles west of Hilo.

**RECORDS AVAILABLE.**—April 24, 1923, to June 30, 1926. March 21, 1911, to July 21, 1913, and January 2 to June 30, 1918, at station above Hilo Electric Co.'s power house, near Hilo; records not comparable.

**EQUIPMENT.**—Gurley 7-day graph water-stage recorder. Charts changed by employee of county engineer. Discharge measurements made by wading near gage.

**CHANNEL AND CONTROL.**—One channel at all stages. Banks high, sloping about 1:4. Stream bed composed of solid lava rock. Control, lava flow and is permanent between severe floods; forms large pool.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year at least 1,150 million gallons a day, or 1,780 second-feet, on August 27 (gage height from water-stage recorder, 9.95 feet). A higher discharge undoubtedly occurred shortly before this peak, but gage-height record is valueless. Minimum discharge recorded during year, no flow from 7.45 a. m. June 11 to 1.30 a. m. June 12, 6 p. m. June 12 to 10.15 a. m. June 15, 9 a. m. June 24, 4.30 p. m. June 26 to 12 p. m. June 30, and possibly at other times when gage-height record is missing (gage height, 0.50 foot or less).

1922-1926: Maximum discharge recorded, 1,570 million gallons a day, or 2,430 second-feet, at 6.30 p. m. December 18, 1923 (gage height from water-stage recorder, 11.48 feet); minimum discharge, that of June 11-12, 12-15, 24, and 26-30, 1926.

**DIVERSIONS AND REGULATION.**—Intake of Hilo waterworks diverts water from gage pool; diversions regulated by head gates.

**OBJECT OF STATION.**—To determine amount of water passing intake of Hilo waterworks and available to other users.

**UTILIZATION.**—Ordinary flow used for power and irrigation.

**ACCURACY.**—Stage-discharge relation changed, presumably, May 12. The two rating curves used are fairly well defined below 40 million gallons a day; extension above uncertain. The two rating curves are based at the lower end on five discharge measurements and above 2 million gallons a day on 13 measurements ranging from 2 to 64 million gallons a day. Three of the low discharge measurements were made during the year and the 13 higher ones were made after June 30. Operation of water-stage recorder mostly unsatisfactory as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages except those estimated, which are poor; high-stage records poor.

*Discharge, in million gallons a day, of Wailuku River at Pukamau, near Hilo, Hawaii, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	May	June
1	99	9.9		130	0.1	3.1
2	48			47	.15	5.0
3	33				.2	2.9
4	25				.3	2.3
5		70			.2	1.9
6					.2	1.9
7					.2	1.4
8			75		2.0	.45
9		36			4.7	.25
10					1.8	.2
11	30	17.5			2.5	.05
12		19.8			40	.07
13		14.4			12.2	.00
14		14.4			6.3	.00
15		22	16.4		2.4	.3
16		19.8	11.6		1.4	.55
17		13.4	9.8		.9	.5
18		10.8	9.9		.6	.1
19	9.4		35		.4	.3
20	9.9	7.5	18.6		.3	.35
21	9.4		17.5		.2	.35
22	9.2	5.2	13.4		.3	.15
23	9.2	26	10.8		.3	.15
24	9.6	8.4	15.4		.25	.3
25	11.6	51	17.5		.2	.35
26	9.3	106	13.4			.2
27	9.0	790	14.4		1.0	.00
28	9.0		12.5			.00
29	13.4		24		6.2	.00
30	21	55	106		5.3	.00
31	11.6				3.9	

NOTE.—Discharge estimated May 1. Braced figures give estimated mean discharge for periods indicated. Estimates made by comparison with record of Honolii Stream near Hilo; recorder not operating. Data insufficient for estimating discharge Oct. 3 to Apr. 30 when recorder was not operating.

*Monthly discharge of Wailuku River at Pukamau, near Hilo, Hawaii, for the year ending June 30, 1926*

Month	Discharge			Total run-off	
	Millions gallons a day			Million gallons	Acre-feet
	Maximum	Minimum	Mean		
July		9.0	24.7	767	2,350
August	790		61.3	1,900	5,830
September	106		46.5	1,400	4,280
May	40	.1	3.11	96.5	296
June	5.0	.0	.771	23.1	71

#### HONOLII STREAM NEAR HILO, HAWAII

LOCATION.—500 feet above intake of Hilo Sugar Co.'s upper ditch, 2 miles from end of Kaiwiki road, and 10 miles from Hilo.

RECORDS AVAILABLE.—February 21, 1924, to June 30, 1926. Also June 1, 1911, to March 24, 1913, at site about 2 miles downstream. Records not comparable.

EQUIPMENT.—Stevens continuous water-stage recorder on right bank. Discharge measurements made by wading near gage or from cable 1,000 feet downstream. Cable is below Hilo Sugar Co.'s upper ditch intake, so the flow of ditch must be added to discharge measured at cable section.

**CHANNEL AND CONTROL.**—Stream bed rocky and free from weeds. Channel fairly straight for 100 feet above and 500 feet below gage. Banks are steep. Control is solid rock somewhat improved with short low concrete walls on either side; permanent.

**EXTREMES OF DISCHARGE.**—Maximum discharge recorded during year, 1,620 million gallons a day, or 2,510 second-feet, at midnight August 26 (gage height from water-stage recorder, 11.70 feet); minimum discharge, 0.1 million gallon a day, or 0.2 second-foot, from 7 a. m. to midnight February 9, and 9 to 11 p. m. April 14 (gage height, 4.16 feet).

1924-1926: Maximum discharge recorded, about 3,060 million gallons a day, or 4,730 second-feet, at 2.15 p. m. November 21, 1924 (gage height estimated from floodmarks, 16.5 feet); minimum discharge, that of February 9 and April 14, 1926.

**DIVERSIONS AND REGULATION.**—None.

**OBJECT OF STATION.**—To determine characteristic flow of near-by streams, of which Honolii is typical.

**UTILIZATION.**—All of low flow used for irrigation and fluming of sugarcane.

**ACCURACY.**—Stage-discharge relation permanent during year. Rating curve well defined below 40 million gallons a day; extension above uncertain. This curve checked fairly well by five discharge measurements well distributed during year and covering a range from 1.3 to 8.7 million gallons a day. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable fluctuation, by averaging discharge for intervals of day. Records good for ordinary stages; high-stage records poor.

*Discharge, in million gallons a day, of Honolii Stream near Hilo, Hawaii, for the year ending June 30, 1926*

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	38	6.9	30	46	4.2	3.7	0.8	0.9	19.1	0.8	0.7	3.7
2	15.4	51	40	18.2	7.6	3.4	.8	.9	10.4	.8	.9	3.7
3	10.0	43	18.6	20	49	3.2	.8	.8	7.3	.8	1.1	2.6
4	7.3	13.6	14.1	20	32	2.8	.8	.6	5.8	.8	1.3	2.1
5	6.1	208	10.0	23	26	2.6	.8	.4	5.0	.6	.8	2.1
6	5.2	169	9.3	36	118	2.5	1.0	.3	3.9	.6	.6	3.0
7	35	51	8.6	62	93	2.5	1.1	.2	3.4	.3	.6	2.1
8	41	18.6	7.6	29	212	2.3	1.1	.2	3.4	.3	4.1	1.7
9	14.6	11.2	8.0	15.9	86	2.1	1.0	.2	4.4	.3	10.4	1.6
10	10.8	7.6	40	12.0	39	2.0	.8	.2	3.4	.2	4.7	1.3
11	7.3	6.1	29	10.0	55	1.9	2.5	.2	3.2	.2	3.0	1.1
12	5.2	5.5	12.5	11.6	42	1.7	2.8	.9	2.5	.2	112	1.3
13	5.0	4.4	106	16.4	21	1.6	1.9	1.0	2.1	.2	23	1.9
14	3.9	4.4	26	9.7	60	3.0	1.4	.8	1.9	.2	9.0	2.6
15	3.5	5.8	12.5	7.6	29	4.7	1.1	.6	1.7	.2	5.2	6.6
16	3.2	18.4	9.3	6.1	32	2.8	1.1	.6	1.5	1.1	3.4	5.0
17	2.8	12.9	7.6	5.0	50	2.1	1.1	1.0	1.4	2.7	2.5	10.0
18	2.6	9.0	38	4.4	35		1.1	82	1.5	3.2	2.0	7.6
19	2.3	6.6	28	4.4	19.7		1.1	33	1.5	9.3	1.5	5.2
20	2.1	7.3	15.4	4.7	13.3		3.4	36	2.5	7.6	1.4	3.9
21	2.1	6.1	12.5	10.2	10.8		3.5	31	2.3	5.2	1.3	3.5
22	2.1	9.5	9.0	9.3	9.0	1.7	2.3	15.0	1.7	3.7	1.1	2.5
23	1.9	27	8.6	15.0	7.3		2.3	40	3.9	3.2	1.9	1.9
24	2.5	12.4	12.0	10.0	6.1		2.3	78	4.2	2.6	1.7	1.6
25	3.0	77	11.6	9.0	5.8		1.9	66	3.0	2.1	1.4	1.4
26	2.8	519	9.3	7.3	5.2		1.5	17.7	2.3	1.7	3.7	1.1
27	2.5	650	8.3	6.3	4.4	1.5	1.1	88	2.0	1.6	2.6	1.0
28	2.8	130	12.0	5.2	4.2	1.3	.9	56	1.6	1.4	1.9	.8
29	8.3	58	37	4.4	4.2	1.1	.8		1.4	1.0	8.6	.8
30	9.0	67	281	4.7	4.2	1.0	.7		1.1	.9	8.3	.6
31	6.1	29		4.4		.9	.8		1.0		6.9	

NOTE.—Discharge estimated Aug. 27 and 28 from faulty gage-height record. Braced figure gives mean discharge for period indicated, estimated from faulty gage-height record, rainfall record, and engineer's notes.

*Monthly discharge of Honolii Stream near Hilo, Hawaii, for the year ending June 30, 1926*

Month	Discharge				Total run-off	
	Million gallons a day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July.....	41	1.9	8.53	13.2	264	812
August.....	650	4.4	72.4	112	2,250	6,890
September.....	281	7.6	29.1	45.0	872	2,680
October.....	62	4.4	14.4	22.3	448	1,370
November.....	212	4.2	36.2	56.0	1,080	3,330
December.....	4.7	.9	2.13	3.30	66.0	203
January.....	3.5	.7	1.44	2.23	44.6	137
February.....	88	.2	19.7	30.5	552	1,690
March.....	19.1	1.0	3.56	5.51	110	339
April.....	9.3	.2	1.79	2.77	53.8	165
May.....	112	.6	7.34	11.4	228	698
June.....	10.0	.6	2.81	4.35	84.2	259
The year.....	650	.2	16.6	25.7	6,050	18,600

**MISCELLANEOUS DISCHARGE MEASUREMENTS**

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

*Miscellaneous discharge measurements on Hawaii during the year ending June 30, 1926*

Date	Stream	Tributary to—	Locality	Gage height, feet	Discharge	
					Second-feet	Million gallons a day
Dec. 24....	Wailuku River....	Pacific Ocean....	Above intake of Hilo water-works near Hilo.	0.925	4.55	2.94
June 6....	do.....	do.....	do.....		3.61	2.33



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