DEPARTMENT OF THE INTERIOR
Roy O. West, Secretary

U. S. GEOLOGICAL SURVEY
George Otis Smith, Director

Water-Supply Paper 595

SURFACE WATER SUPPLY OF HAWAII

JULY 1, 1923, TO JUNE 30, 1924

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Prepared in cooperation with the
TERRITORY OF HAWAII

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AUTHORITY FOR INVESTIGATIONS

This volume contains results of measurements of the flow of certain streams and ditches in the Territory of Hawaii made during the year ending June 30, 1924. The investigations leading to the report were made by the United States Geological Survey in cooperation with the Territory of Hawaii, under the general sanction of the organic law of the Survey (Stat. L., vol. 20, p. 394), which contains the following paragraph:

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

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

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

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."[1]

The principal features of this agreement are:

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

2. 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 80 per cent of the cost thereof.

Until June 30, 1913, the Territory of Hawaii was represented in 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

Special investigations have been made 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 Survey.

[1] The United States Geological Survey also cooperated with the Territory of Hawaii in mapping the islands. The whole of the islands of Kauai, Oahu, Lani, and Molokai and parts of the islands of Hawaii and Maui have been mapped.

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

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 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—Kekaha Sugar Co., Waimea Sugar Co., Kilauea Sugar Plantation Co., and Princeville Plantation Co.; Island of Oahu—Wahiawa Water Co.; Island of Maui—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 which represent a rate of flow, as "second-feet," "gallons per minute," "gallons per day," "miner's inches," and "run-off in second-feet per square mile," and (2) those which represent the actual quantity of water, as "run-

off in inches," "million gallons," and "acre-feet." Those used in this report may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second, and is the unit for the rate of discharge of water flowing in a stream 1 square foot in cross section at a rate of 1 foot per second. It is generally adopted as the fundamental unit in the measurement of flowing water and is the "natural" unit, as the foot and the second are the units used in making the physical determinations.

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 per day" is inferred, 1,000,000 gallons being taken as the unit of quantity and 24 hours as the unit of time. With this meaning the term is generally used in connection with pumping and irrigation. In the latter sense "million gallons" as an absolute quantity is used in the measurement of storage capacities of reservoirs.

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

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

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 TABLES

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

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

In addition to statements regarding the location and installation of current-meter stations, the descriptions give information in regard to any condition that may affect the constancy of the relation of gage height to discharge, covering such points as shifting controls and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the utilization of the water, the maximum and minimum stage and discharge, and the accuracy of the data.

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

The table of daily discharge gives the discharge in million gallons per day corresponding to the observed gage height as determined from the rating table, the number of significant figures used varying with the size of the discharge, but never more than three.

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 which is given under the heading "Extremes of discharge." Likewise, in the column of "Minimum" the quantity given is the flow for the day when the total discharge was least. The columns headed "Mean" give the average flow in million gallons per day and in cubic feet per second during the month. The "Total in million gallons" is the sum of the daily flows and "Total in acre-feet" is computed from the mean monthly discharge in million gallons per 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 various station descriptions.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS

The accuracy of stream-flow data depends (1) on permanence of the relation between discharge and stage, (2) number, accuracy, and distribution of discharge measurements, and (3) on the accuracy of observations of stage and interpretation of data.

The accuracy recorded in the station description is based on the accuracy of the rating curve, the reliability of the gage-height record, the range of the fluctuation in stage, and knowledge of local conditions. The use of "excellent," "good," "fair," or "poor," indicates that the probable errors are within 5, 10, 15, and 25 per cent, respectively.

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

DIVISION OF WORK

The data were collected and prepared for publication under the direction of E. D. Burchard and Max H. Carson, district engineers, Honolulu, Hawaii, by Max H. Carson and Burke L. Bigwood, office engineers, John McCombs, Karl Jetter, Freeman K. Walker, Penn P. Livingston, Knute N. Vaksvik, Samuel Wong, John Kaheaku, William W. Achuck, Paul P. T. Goo, and Miss Marie A. Davison. The manuscript has been prepared by B. L. Bigwood and J. L Lamson and reviewed by Max H. Carson.

PUBLICATIONS

The following table gives, by years, the numbers of the papers on the surface-water supply of Hawaii published from 1903 to 1923. The data for any particular station will be found in the reports covering the years during which the station was maintained. This table in conjunction with the list of stations following provides a convenient index for finding the data for any station. For example, to find the data for Koolau ditch near Keanae, Maui, refer to the list of stations which shows that this station was operated from 1910 to 1912 and 1917 to date. Then referring to the table below it is found that Water-Supply Papers 318, 336, 485, 515, 516, 535, 555, 575, and 595 contain the data for the years during which the station was operated.

Numbers of papers on surface-water supply of Hawaii, 1903–1923

Year	Number	Year	Number	Year	Number
1903	[a] 77	1915–16	445	1920–21	535
1909–1911 [b]	318	1916–17	465	1921–22	555
1912 [b]	336	1917–18	485	1922–23	575
1913 [b]	373	1918–19	515	1923–24	595
1913–1915	430	1919–20	516		

[a] Water resources of Molokai, by Waldemar Lindgren.
[b] Calendar years; reports subsequent to Water-Supply Paper 373 cover the year beginning July 1 and ending June 30.

GAGING STATIONS MAINTAINED IN HAWAII

The following list comprises the gaging stations maintained in Hawaii by the United States Geological Survey and cooperating parties. The stations are arranged by stream basins and appear in systematic order for the several islands, tributaries of main streams being indicated by indention. The dates show the years or parts of years for which records are available. A dash following the date indicates that the station was being maintained June 30, 1924:

KAUAI ISLAND

Waimea River below Kekaha ditch intake near Waimea, 1921–
Waimea River near Waimea, 1910–1919.
Poomau River:
Kawaikoi Stream near Waimea, 1909–1917; 1919–
Kauikinana Stream near Waimea, 1919–
Waiakoali Stream near Waimea, 1909–1912; 1919–
Mohihi Stream at elevation 3,500 feet, near Waimea, 1919–
Mohihi Stream near Waimea, 1909–1912.
Waiahulu Stream near Waimea, 1916–1918.
Koaie Stream at elevation 3,700 feet, near Waimea 1919–
Koaie Stream near Waimea, 1916–1918.
Waialae River at elevation 3,700 feet, near Waimea, 1920–
Waialae River near Waimea, 1910–1916.
Waialae River at elevation 800 feet, near Waimea, 1916–1921.
Kekaha ditch at camp No. 1, near Waimea, 1910–1915, 1917–
Kekaha ditch at flume No. 3, near Waimea, 1910–1912
Kekaha ditch at flume No 4, near Waimea, 1916–17.
Kekaha ditch at siphon, near Waimea, 1910–1912.
Kekaha ditch at tunnel No. 12, near Waimea, 1910–1914.
Kekaha ditch below tunnel No. 12, near Waimea, 1916–
Waimea ditch near Waimea, 1911–1913; 1916–1921.
Kamenehune ditch near Waimea, 1911–1919.
Makaweli River near Waimea, 1911–1917.
Halekua Stream near Waimea, 1912–13.
Olokele River near Waimea, 1915–17.
Olokele ditch at tunnel No. 12, near Makaweli, 1904–1917.
Olokele ditch at weir, near Makaweli, 1912–1917.
Poowaiomahaihai ditch near Waimea, 1911–1913.
Hanapepe River above Hanapepe Falls, near Eleele, 1911–12.
Hanapepe River at Koula, near Eleele 1910–1916; 1917–1921.
Hiloa ditch near Eleele, 1911–1915.
East Branch of Hanapepe River below Hanapepe Falls, near Eleele, 1911–12.
Hanapepe ditch at Hanapepe Falls, near Eleele, 1911–1915.
Hanapepe ditch at Koula, near Eleele, 1910–1021.
Hanapepe ditch at weir, near Hanapepe, 1910–1917.
Manuahi Stream near Eleele, 1917–1920.
Huleia River near Lihue, 1912–1915.
Hanamaulu River at Kapaia, near Lihue, 1911–1914.
Wailua River:
South Fork of Wailua River at siphon, near Lihue, 1910–11.
South Fork of Wailua River near Lihue, 1911–
Hanamaulu ditch near Lihue, 1910–1919.
Lihue ditch near Lihue, 1910–1919.
North Fork of Wailua River near Lihue, 1910–1914.
North Fork of Wailua River at elevation 650 feet, near Lihue, 1914–
Kanaha ditch near Lihue, 1910–
East Branch of North Fork of Wailua River near Lihue, 1912–
Uhau Iole Stream at elevation 750 feet, near Lihue, 1912.
Keahua Stream at elevation 750 feet, near Lihue, 1912.
Kawi Stream at elevation 750 feet, near Lihue, 1912.
Konohiki Stream at Makakualeie Weir (mauka), near Kapaa, 1911–1913.

Kaehulua Stream at Kuhinoa (mule stable) Weir, near Kapaa, 1911–1913.
South Fork of Kaehulua Stream at Wainamuamu Weir, near Kapaa, 1911–12.
North Fork of Kaehulua Stream at Wainamuamu Weir, near Kapaa, 1911–1913.
Kapaa River near Kealia, 1910–20.
Akulikuli Spring near Kealia, 1911–1913.
Kapahi ditch near Kealia, 1909–
Tunnel ditch at Kapahi, near Kapaa, 1909–1911.
Kapaa ditch at Kapahi, near Kapaa, 1909–1911.
Pipe ditch at Kapahi, near Kapaa, 1909–1911.
Kealia Stream:
Kaneha ditch near Kealia, 1909–1913.
Anahola River at elevation 1,140 feet near Kealia, 1912.
Anahola River near Kealia, 1910–1912.
Anahola River at Kiokala Dam, near Kealia, 1910–1912.
Anahola ditch above Kaneha Reservoir, near Kealia, 1914–
Anahola ditch at Kiokala, near Kealia, 1909–1914.
Anahola ditch at Makai Weir, near Kealia, 1909–1911.
Halaulani Stream near Kilauea, 1922–
Kalihiwai River near Hanalei, 1914–1923.
Kalihiwai River near Kilauea, 1912–1914.
Hanalei River at elevation 625 feet, near Hanalei, 1914–
Hanalei River near Hanalei, 1911–1919.
China ditch near Hanalei, 1911–1919.
Kuna ditch near Hanalei, 1912–13; 1916–1919.
Waioli Stream near Hanalei, 1914–
Lumahai River near Hanalei, 1914–1917; 1920–
Lumahai River near Wainiha, 1912.
Wainiha River near Hanalei, 1914–1917.
Wainiha River, East Channel, near Wainiha, 1912–1916.
Wainiha River, West Channel, near Wainiha, 1911–1916.
Wainiha Canal at intake, near Wainiha, 1910–1916.
Wainiha Canal at tunnel No. 18, near Wainiha, 1911.
Wainiha Canal at tailrace, near Wainiha, 1911.

OAHU ISLAND

Kalihi Stream near Honolulu, 1913–
Nuuanu Stream at Luakaha Weir in upper Nuuanu Valley, near Honolulu, 1903; 1910–1913.
Nuuanu Stream below Reservoir No. 2 wasteway, near Honolulu, 1913–
Nuuanu Stream at Kuakini Street, near Honolulu, 1911–12.
Lulumaha ditch at upper Nuuanu Reservoir, near Honolulu, 1911–1913.
Maole ditch, mauka station, near Honolulu, 1917–1920.
Maole ditch, makai station, near Honolulu, 1917–1923.
Pauoa Stream at upper Pauoa Valley, near Honolulu, 1911–1913.
Kahuawai Spring near Honolulu, 1912–1914.
Manoa Stream at upper Manoa Valley, near Honolulu, 1910–1913.
Manoa Stream at College of Hawaii, near Honolulu, 1909–1918.
West Branch of Manoa Stream near Honolulu, 1913–1921.
East Branch of Manoa Stream near Honolulu, 1913–1921.
East Manoa ditch near Honolulu, 1915–16; 1918–1921.

Palolo Stream:
Pukele Stream at Mahoe springs, near Honolulu, 1912–13.
Waiomao Stream at upper Palolo Valley, near Honolulu, 1911–1913.
Waiomao Stream above Pukele, near Honolulu, 1911–12.
Waimanalo ditch below main reservoir, near Waimanalo, 1912–13.
Pump ditch near Waimanalo, 1912.
Makawao ditch near Kailua, 1912–1916.
Kailua Stream above Wong Leong's ditch, near Kailua, 1922–23.
Kailua Stream near Kailua, 1912–1916.
Wong Leong's ditch near Kailua, 1912–1916.
Makawao Stream near Kailua, 1912–1916.
Makawao Spring near Kailua, 1914–1916.
Kaimi Stream near Kailua, 1912–1916.
Main Spring near Kailua, 1914–1916.
Kamakalepo Stream near Kailua, 1912–1916.
Pohakea Stream near Kailua, 1912–1914.
Kahanaiki Stream in Kailua Valley, near Kailua, 1912.
Kahanaiki Stream near Kailua, 1914–1916.
South Branch of Kahanaiki Stream near Kailua, 1913–14.
North Branch of Kahanaiki Stream near Kailua, 1913–14.
Kahanaiki ditch in Kailua Valley, near Kailua, 1912–13.
Kaneohe Stream near Kaneohe, 1914–1916.
Young Mau ditch near Kaneohe, 1914–1916.
Ahlo ditch near Kaneohe, 1914–1916.
Hooleinaiwa Stream near Kaneohe, 1914–1916.
Piho Stream near Kaneohe, 1914–1916.
Kuou Stream near Kaneohe, 1914–1916.
Kuou ditch near Kaneohe, 1914–1916.
Luluku Stream near Kaneohe, 1914–1916.
North Luluku ditch near Kaneohe, 1914–1916.
Kawa Stream near Kaneohe, 1914–1916.
Heeia Stream:
Wing Wo Tai ditch near Heeia, 1914–1916.
Hop Tuck ditch near Heeia, 1914–1916.
Lee ditch near Heeia, 1914–1916.
Haiku Stream near Heeia, 1914–1919.
Reservoir ditch near Heeia, 1914–1916.
Waipio ditch near Heeia, 1914–1916.
Iolekaa Stream near Heeia, 1914–1916.
Waiahole Stream below power house near Waiahole, 1915.
Waiahole Stream near Waiahole, 1911–1916.
Waiahole Stream at Waiahole, near Waikane, 1911–12.
Waihi Stream near Waikane, 1911.
Halona Stream near Waikane, 1911.
Waianu Stream near Waikane, 1911.
Waikane Stream near Waikane, 1911–12.
Kahana Stream near Kahana, 1914–1917.
East branch of Kahana Stream near Kahana, 1914–1917.
Punaluu Stream at elevation 539 feet, near Punaluu, 1915–1918.
Punaluu Stream at elevation 250 feet, near Punaluu, 1914–1918.
Punaluu Stream near Hauula, 1906–7.
Waihoi Stream near Punaluu, 1915–1917.
Kaluanui Stream near Hauula, 1906–7, 1915–1917.
Kaipapau Stream near Hauula, 1906–7.

Koloa Stream near Laie, 1914–1918.
Wailele Stream near Laie, 1914–1918.
East Branch of Kahawainui Stream near Laie, 1914–1918.
East Branch of Malaekahana Stream near Kahuka, 1914–1918.
Middle Branch of Malaekahana Stream near Kahuka, 1914–1918.
Kaukonahua Stream:
North Fork of Kaukonahua Stream near Wahiawa, 1911.
Right Branch of North Fork of Kaukonahua Stream near Wahiawa, 1913–
Left Branch of North Fork of Kaukonahua Stream near Wahiawa, 1913–
South Fork of Kaukonahua Stream above United States Army Reservoir, near Wahiawa, 1911, 1913–1917.
United States Army ditch at reservoir, near Wahiawa, 1914–15.
South Fork of Kaukonahua Stream below United States Army Reservoir, near Wahiawa, 1914–1917.
Wahiawa Reservoir ditch near Wahiawa, 1910–11.

MOLOKAI ISLAND

Halawa Stream near Halawa, 1917–
Papulaua Stream near Wailau, 1919–
Wailau Stream:
Waiakeakua Stream near Wailau, 1919–
Pulena Stream near Wailau, 1919–
Pelekunu Stream near Pelekunu, 1919–
Lanipuni Stream near Pelekunu, 1919–
Waikolu Stream at elevation 650 feet, near Kalaupapa, 1920–1923.
Waikolu Stream at pipe-line crossing, near Kaluapapa, 1919–

MAUI ISLAND

WEST MAUI

Iao Stream near Wailuku, 1910–1915.
Maniania ditch near Wailuku, 1909–1913.
Waiehu Stream:
South Waiehu Stream near Wailuku, 1910–1917.
South Waiehu ditch near Wailuku, 1912–1915.
North Waiehu Stream near Wailuku, 1912–1917.
North Waiehu ditch near Wailuku, 1910–11, 1916–17.
Waihee Stream near Waihee, 1910–1912, 1913–1917.
Waihee Canal near Waihee, 1910–1912.
Waihee Canal at weir, near Wailuku, 1911–12.
Spreckels ditch near Waihee, 1910–1913.
Spreckels ditch at Waiale Weir, near Wailuku, 1910–11.
Kahakuloa Stream at Kahakuloa, near Waihee, 1912–13.
Kahakuloa Stream near Honokahau, 1913–14.
Honokahau Stream near Honokahau, 1913–1920; 1922–
Honokahau ditch at intake, near Honokahau, 1907–1913.
Honokahau ditch above Honolua Stream, near Honokahau, 1910–11.
Honokahau ditch at Honokawai Weir, near Lahaina, 1910–1912.
Honolua Stream at Honolua ranch, 1911.
Honolua Stream near Honokahau, 1913–1917.
Honolua ditch near Honokahau, 1911–12.
Honokawai Stream near Lahaina, 1911; 1912–1917.

Honokawai Stream at Weir No. 1, near Lahaina, 1901.
Honokawai ditch near Lahaina, 1912–1917; 1918–
Kahoma Stream near Lahaina, 1911–12; 1913–1917.
Kahoma Stream at Weir No. 1, near Lahaina, 1901.
Kahoma Stream at Weir No. 2, near Lahaina, 1901.
Kahoma development tunnel near Lahaina, 1911–1917.
Kanaha Stream above pipe line intake, near Lahaina, 1916–
Kanaha Stream near Lahaina, 1911–1916.
Lahainaluna Stream same as Kanaha Stream.
Lahainaluna Weir No. 1 near Lahaina, 1901.
Lahainaluna Weir No. 2 near Lahaina, 1901.
Lahainaluna ditch near Lahaina, 1913–14.
Kauaula Stream near Lahaina, 1912; 1913–1917.
Kauaula Stream at Weir No. 3, near Lahaina, 1901.
Kauaula ditch near Lahaina, 1911–1917.
Kauaula Stream, North Fork, at Weir No. 1, near Lahaina, 1901.
Kauaula Stream, South Fork, at Weir No. 2, near Lahaina, 1901.
Launiupoko Stream near Lahaina, 1911–1917.
Olowalu Stream near Olowalu, 1913–1916.
Olowalu ditch near Olowalu, 1911–
Ukumehame Stream near Olowalu, 1911–12; 1913–1919.
Waikapu Stream near Waikapu, 1910–1917.
Palolo (Everett) ditch near Waikapu, 1910–1917.
South Side Waikapu ditch near Waikapu, 1910–1917.

EAST MAUI

Koolau ditch region:
Hanawi Stream near Nahiku, 1914–15; 1921–
Kapaula Stream near Nahiku, 1921–
Waiohue Stream near Nahiku, 1921–
West Kopiliula Stream near Keanae, 1914–1917; 1921–
East Wailuaiki Stream near Keanae, 1913–1917; 1922–
West Wailuaiki Stream near Keanae, 1914–1917; 1921–
East Wailuanui Stream near Keanae, 1914–1917; 1921–
West Wailuanui Stream near Keanae, 1913–1917.
Koolau ditch at Nahiku Weir, near Nahiku, 1919–
Koolau ditch near Keanae, 1910–1912, 1917–
Koolau ditch at Wahinepe, near Huelo, 1922–
Koolau ditch at Alo division weir, near Huelo, 1908–1911.
Spreckels ditch region:
Honomanu Stream at Haiku-uka boundary, near Kailiili, 1919–
Honomanu Stream near Keanae, 1913–
Haipuaena Stream at Haiku-uka boundary, near Kailiili, 1919–
Haipuaena Stream near Huelo, 1910–
Puohakamoa Stream near Huelo, 1910–
East Branch of Puohakamoa Stream at Haiku-uka boundary, near Kailiili, 1919–
Middle Branch of Puohakamoa Stream at Haiku-uka boundary, near Kailiili, 1919–
West Branch of Puohakamoa Stream at Haiku-uka boundary, near Kailiili, 1919–
Puohakamoa intake of Koolau ditch near Huelo, 1922–
Waikamoi Stream above Wailoa ditch, near Huelo, 1922–

Spreckels ditch region—Continued.
Waikamoi Stream near Huelo, 1910–1922.
East Branch of Waikamoi Stream at Haiku-uka boundary, near Kailiili, 1918–
West Branch of Waikamoi Stream at Haiku-uka boundary, near Kailiili, 1918–
Alo Stream near Huelo, 1910–
Oopuola Stream near Huelo, 1910–1915.
Spreckels ditch at station No. 1, near Huelo, 1910–1913.
Spreckels ditch at station No. 2, near Huelo, 1911–1913.
Spreckels ditch at station No. 3, near Huelo, 1910–1913.
Spreckels ditch at Haipuaena Weir, near Huelo, 1922–
Spreckels ditch at station No. 4, near Huelo, 1910–1913.
Spreckels ditch at station No. 5, near Huelo, 1911–1913.
Spreckels ditch at station No. 6, near Huelo, 1911–1913.
Spreckels ditch below Kaaiea Gulch, near Huelo, 1917–
Spreckels ditch at station No. 7, near Huelo, 1911–1912.
Spreckels ditch at station No. 8, near Huelo, 1911–1913.
Center ditch region:
Manuel Luis ditch at Puohakamoa Gulch, near Huelo, 1917–
Center ditch at Waikamoi, near Huelo, 1918–1922.
Center ditch below Kolea Reservoir, near Huelo, 1922–
Center ditch near Huelo, 1910–1912.
Hamakua ditch region:
Nailiilihaele Stream near Huelo, 1910–1912; 1913–1918; 1919–
Kailua Stream at Haiku-uka boundary, near Kailiili, 1918–
Kailua Stream near Huelo, 1910–1912; 1913–1918; 1919–
Oanui Stream near Huelo, 1910–11; 1913–1916.
Hoolawaliillii Stream near Huelo, 1911-
Hoolawanui Stream near Huelo, 1911–
Honopou Stream near Huelo, 1910–
Wailoa ditch at Honopou, near Huelo, 1922–
Halehaku Stream at dam, near Huelo, 1910–11.
Halehaku Stream Weir near Huelo, 1910–1912.
Opana Stream near Huelo, 1910–1912.
Opana ditch near Huelo, 1910–1912.
New Hamakua ditch at Nailiilihaele Weir, near Huelo, 1910–1912.
New Hamakaua ditch at Honopou, near Huelo, 1918–
New Hamakua ditch at Halehaku Weir, near Huelo, 1910–1923.
New Hamakua ditch at station No. 1, near Huelo, 1912.
New Hamakua ditch at station No. 2, near Huelo, 1912.
New Hamakua ditch at station No. 3, near Huelo, 1912.
New Hamakua ditch at station No. 4, near Huelo, 1912.
New Hamakua ditch at station No. 5, near Huelo, 1912.
Old Hamakua ditch at Kailua, near Huelo, 1919–1922.
Old Hamakua ditch at Honopou, near Huelo, 1918–1922.
Old Hamakua (Kauhikoa) ditch at Opana Weir, near Huelo, 1910–
Kaluanui ditch at Puuomalei, near Hamakuapoko, 1910–1912.
Lowrie ditch at Opana Weir, near Huelo, 1910–
Haiku ditch at Peahi Weir, near Huelo, 1910–1914.
Haiku ditch at Manawai Gulch, near Peahi, 1914–

HAWAII ISLAND

Hilo group:
- 81 stations at elevation 2,700 feet, in forest back of Hilo, 1911–1913.
- Olaa flume at Kaumana, near Hilo, 1917–1920.
- Wailuku River near Hilo, 1911–1913, 1918–19.
- Wailuku River at Pukamaui, near Hilo, 1923–
- Hilo Boarding School ditch near Hilo, 1918–19.
- Honolii River at Kaiwiki, near Hilo, 1911–1913.
- Honolii Stream near Hilo, 1924–
- Honolii ditch at Kaiwiki, near Hilo, 1911.
- Kawainui River at Kawainui, near Pepeekeo, 1911–12.
- 4 stations at Piihonua, near Hilo, 1912.

Hamakua group:
- Waipio River below Koiawe, near Waipio, 1911–12.
- Waipio River below Waima, near Waipio, 1911–12.
- Waipio River at elevation 360 feet, near Waipio, 1901–2.
  - New Hamakua ditch at Waima Stream, near Waipio, 1912.
  - Lower Hamakua ditch at main weir, near Kukuihaele, 1910–1920.
  - Upper Hamakua ditch at Puualala and Reservoir No. 3 Weirs, near Kukuihaele, 1913–1920.
  - Kawainui Branch of Waipio River near Waipio, 1911–12.
  - Kawainui Stream at elevation 2,120 feet, near Waipio, 1901–2.
  - Kawainui Stream at elevation 1,435 feet, near Waipio, 1901–2.
  - Kawainui Stream at elevation 775 feet, near Waipio, 1901–2.
    - Branch No. 3 of Kawainui Stream at elevation 1,700 feet, near Waipio, 1901–2.
    - Branch No. 2 of Kawainui Stream at elevation 1,405 feet, near Waipio, 1901–2.
    - Branch No. 1 of Kawainui Stream at elevation 1,380 feet, near Waipio, 1901–2.
  - Alakahi Stream at elevation 1,200 feet, near Waipio, 1901–2.
  - Alakahi Stream at elevation 730 feet, near Waipio, 1901–2.
  - Koiawe Stream at elevation 610 feet, near Waipio, 1901–2.
  - Waima Stream at elevation 790 feet, near Waipio, 1901–2.
  - Waima Stream at elevation 385 feet, near Waipio, 1901–2.

Kohala group:
- Honokane Stream—
  - East Branch of Honokane Stream at elevation 1,300 feet, near Honokane, 1901.
  - East Branch of Honokane Stream at elevation 770 feet, near Honokane, 1901.
  - West Branch of Honokane Stream at elevation 1,370 feet, near Honokane, 1901.
  - West Branch of Honokane Stream at elevation 775 feet, near Honokane, 1901.
  - Kohala ditch above Honokane Gulch, near Kohala, 1908–1918.
  - Kohala ditch at Awini Weir, near Kohala, 1907–1917.
  - Kohala ditch at Niulii Weir, near Kohala, 1907–1917.
  - Kehena ditch at Honokane mauka, near North Kohala, 1912–13.
  - Kehena ditch near Kohala, 1917–1919.

Kau group:
- Waiohinu Springs, mauka station, near Naalehu, 1917–18.
- Waiohinu Springs, makai station, near Naalehu, 1917–18.

GAGING-STATION RECORDS

ISLAND OF KAUAI

KAUAIKINANA STREAM NEAR WAIMEA, KAUAI

LOCATION.—1 mile east of Kokee, 12 miles north of Waimea (20 miles from Waimea by road), and 200 feet above Kokee-Mohihi trail.

RECORDS AVAILABLE.—July 1, 1919, to June 30, 1924. Miscellaneous measurements 1911-1916.

GAGE.—Stevens continuous water-stage recorder.

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

CHANNEL AND CONTROL.—Rocky, boulder-strewn bed and high rocky banks. Control composed of large boulders; subject to shift during high floods.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 150 million gallons per day or 232 second-feet at 12.15 p. m. December 23 (gage height, 6.43 feet); minimum recorded, 0.45 million gallons per day or 0.7 second-foot, for several hours during period September 10–30 (gage height, 1.78 feet).

1919–1924: Maximum discharge recorded, 380 million gallons per day or 588 second-feet, December 24, 1920 (gage height, 8.30 feet); minimum recorded, 0.17 million gallons per day or 0.26 second-foot at 2 p. m. October 23, 1921 (gage height, 1.71 feet).

DIVERSIONS.—None.

REGULATION.—None.

OBJECT OF STATION.—To determine feasibility of high-level diversion (3,100 feet) to serve semiarid territorial lands now idle on account of lack of water.

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

ACCURACY.—Stage-discharge relation changed several times owing to deposition on control of material thrown into stream during excavation of ditch tunnel above gage. Rating curve used July 1 to December 10 well defined below 30 million gallons per day; curve used December 11 to 6 p. m. December 23 based on one discharge measurement and form of previous curve; curve used 6 p. m. December 23 to noon April 21 fairly well defined below 15 million gallons per day; curve used noon April 21 to June 30 based on two discharge measurements and form of previous curve. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records fair for ordinary stages; high stage records, particularly after December 10, may be considerably in error.

Discharge measurements of Kauaikinana Stream near Waimea, Kauai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 22	1.92	1.65	1.05	Jan. 31	2.50	2.6	1.7
Sept. 8	1.80	.85	.55	Mar. 19	2.47	2.5	1.65
Oct. 19	2.01	2.8	1.8	May 5	2.40	3.9	2.5
Oct. 20	2.00	1.65	1.05	June 4	2.25	2.0	1.3
Dec. 19	3.02	27.5	17.6				

Discharge, in million gallons per day, of Kauaikinana Stream near Waimea, Kauai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	0.8	0.7	0.6	20	3.2	0.8	6.9	1.9	2.0	1.2	3.0	1.5
2	.8	.7	.6	4.4	2.8	.8	5.0	1.8	2.0	1.3	2.8	1.5
3	.8	.7	.6	1.3	1.6	.8	5.4	1.6	2.0	1.4	2.7	1.4
4	.8	.6	.6	.8	10.8	1.0	4.3	1.6	1.9	1.3	2.6	1.4
5	.8	.6	.6	.7	6.4	.9	3.8	1.6	2.1	2.6	2.5	1.4
6	.8	.6	.5	.6	3.3	.8	3.6	1.5	2.0	11.5	2.5	1.3
7	.7	.6	.5	.7	3.9	2.6	3.3	1.4	1.9	3.0	2.5	1.3
8	.7	1.2	.5	.8	2.2	1.2	3.2	1.4	1.8	2.6	2.3	1.3
9	.7	1.5	.5	.5	1.6	1.0	3.0	1.3	1.7	2.0	2.8	1.3
10	.7	.8	.5	.6	1.6	42	3.0	1.3	1.6	1.8	2.2	1.3
11	.7	.7	.5	.6	1.5	24	3.2	3.3	2.0	1.6	2.1	1.3
12	.7	.7	.5	.6	1.2	21	2.9	7.7	1.9	1.6	2.1	1.2
13	.7	1.0	.5	.6	1.3	23	2.7	3.1	1.6	2.3	8.4	1.2
14	.7	1.2	.5	.6	1.9	39	3.3	1.9	1.5	2.4	4.2	1.2
15	.7	1.7	.5	.6	2.8	24	4.4	1.6	1.9	4.2	3.3	1.2
16	.7	1.8	.6	.6	1.8	22	2.8	11.9	2.5	7.4	2.3	1.2
17	.7	1.2	.7	.6	1.4	5.6	3.0	5.6	2.7	3.0	2.1	1.1
18	.7	3.5	.6	.8	1.2	6.4	2.6	2.7	1.7	2.4	2.0	1.1
19	.7	2.6	.5	2.3	1.2	12.5	2.4	2.1	1.6	3.3	1.9	1.1
20	.7	1.2	1.6	1.2	1.0	8.0	2.3	1.9	2.9	2.9	1.9	1.1
21	1.0	.8	3.5	.7	1.0	4.5	2.1	1.8	2.8	25	1.8	1.0
22	1.0	.7	2.3	.6	1.0	3.6	2.1	1.8	1.6	8.6	2.7	1.0
23	9.7	.6	1.0	.6	.9	38	2.0	2.6	1.6	5.5	2.5	1.0
24	2.5	.6	.7	.6	.9	12.0	1.9	3.9	2.1	4.4	3.0	1.0
25	1.0	.6	.6	.5	.8	11.7	1.9	3.3	1.6	3.8	2.5	1.1
26	.8	.6	.5	.5	.8	9.8	1.9	2.2	1.4	3.6	2.2	2.1
27	.7	.6	.5	3.2	.8	8.7	1.9	2.1	1.4	5.8	2.1	1.8
28	.7	.6	.5	26	.8	7.5	1.8	2.0	1.4	3.7	1.9	2.6
29	.7	.5	.5	18.6	.8	23	1.8	2.0	1.4	3.4	1.7	3.6
30	.7	.6	.7	2.7	.8	7.6	1.8	-------	1.2	3.1	1.6	3.0
31	.6	.6	-------	1.7	-------	6.9	1.8	-------	1.2	-------	1.6	-------

Monthly discharge of Kauaikinana Stream near Waimea, Kauai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	9.7	0.6	1.10	1.70	34.0	105
August	3.5	.5	.98	1.52	30.4	93
September	3.5	.5	.76	1.18	22.8	70
October	26	.5	3.05	4.72	94.6	290
November	10.8	.8	2.04	3.16	61.3	188
December	42	.8	12.0	18.6	371	1,140
January	6.9	1.8	2.97	4.60	92.1	283
February	11.9	1.3	2.72	4.21	78.9	242
March	2.9	1.2	1.84	2.85	57.0	175
April	25	1.2	4.22	6.53	127	389
May	8.4	1.6	2.56	3.96	79.3	244
June	3.6	1.0	1.44	2.23	43.1	133
The year	42	.5	2.98	4.61	1,090	3,350

KAWAIKOI STREAM NEAR WAIMEA, KAUAI

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

RECORDS AVAILABLE.—April 13, 1909, to July 11, 1917, and July 1, 1919, to June 30, 1924. No record of value after December 17, 1916, until July 3, 1919.

GAGE.—Stevens continuous water-stage recorder installed August 4, 1919. Staff gage April 13, 1909, to May 26, 1910; Friez water-stage recorder May 26, 1910, to October 11, 1911; Barrett and Lawrence water-stage recorder October 11, 1911, to August 4, 1919.

DISCHARGE MEASUREMENTS.—Made by wading or from cable near trail crossing 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; shifts slightly.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 1,200 million gallons per day or 1,860 second-feet at 6.45 p. m. December 23 (gage height, 10.05 feet); minimum recorded during year, 2.5 million gallons per day or 3.9 second-feet, for several hours September 12–13 (gage height, 1.48 feet).

1909–1924: Maximum stage recorded, 15.2 feet December 18, 1916 (discharge not determined); minimum recorded, 1.3 million gallons per day or 2.0 second-feet, for several hours September 15, 1921 (gage height, 1.28 feet).

DIVERSIONS.—None.

REGULATION.—None.

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

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

ACCURACY.—Stage-discharge relation changed July 21, December 23, and May 12. Two rating curves used well defined between 2 and 200 million gallons per day; shifting-control method used May 13 to June 30. Operation of water-stage recorder satisfactory except during December, April, and May. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good except those estimated and those for period for which shifting-control method was used, which were fair.

Discharge measurements of Kawaikoi Stream near Waimea, Kauai during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 23	2.64	54	34.5	Jan. 31	1.62	2.6	5.6
Sept. 9	1.52	3.7	2.4	May 5	1.79	6.5	4.2
Oct. 20	2.00	16.7	10.8	June 5	1.65	7.9	5.1
Dec. 19	3.98	260	168				

Discharge, in million gallons per day, of Kawaikoi Stream near Waimea, Kauai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	12.6	3.5	3.0	229	37	3.9	66	5.5	8.3	10.4		
2	7.3	6.3	2.9	37	26	3.7	25	5.6	8.4		10	5.5
3	5.9	3.9	3.5	9.0	11.1	3.6	39	5.5	14.4			
4	6.1	3.3	4.1	6.0	90	9.4	22	6.1	8.3			
5	6.7	3.6	4.2	4.9	56	6.1	15.5	5.6	6.9		8.5	5.0
6	5.9	3.5	3.7	4.6	49	14.1	16.1	5.2	6.6		8.3	4.8
7	5.3	5.7	3.2	5.0	47	30	13.4	4.9	6.1	25	8.2	4.4
8	4.9	21	2.9	7.0	16.7	6.4	12.1	4.8	5.6		7.8	4.3
9	4.8	8.2	2.8	5.5	11.1	5.2	11.3	4.5	5.2		7.4	4.4
10	4.6	4.1	2.6	4.1	15.2	230	14.6	4.4	4.9		7.3	4.5
11	4.6	4.5	2.5	3.6	9.9		22	109	27		7.1	4.6
12	4.5	13.2	2.5	3.5	9.6	170	21	167	13.2		10.6	4.1
13	4.4	15.7	2.5	3.4	13.3		16.6	40	7.3			3.7
14	4.3	11.4	3.5	3.3	33		30	16.7	6.6			4.4
15	4.5	14.4	6.8	3.3	36	186	22	11.8	23		25	4.3
16	4.9	9.4	16.6	3.7	13.2	104	13.4	122	30	55		3.7
17	5.2	6.8	9.2	3.5	8.1	48	12.1	32	32			3.3
18	5.2	73	4.0	45	7.0	110	15.2	14.3	11.8			3.3
19	16.7	26	34	23	6.1		10.8	11.3	21			3.2
20	16.7	9.2	25	16.0	5.8	49	9.3	9.5	33			3.0
21	28	5.4	21	6.6	5.4	21	8.5	8.5	26			2.8
22	10.1	4.5	14.5	7.4	5.0	15.7	8.3	8.2	10.2			2.7
23	73	4.0	6.0	6.1	4.9	172	7.8	12.4	8.5	65		2.7
24	17.5	3.7	4.1	4.6	4.6	49	7.3	43	17.7			2.7
25	5.6	3.5	3.4	4.2	4.5	54	6.9	22	9.5		15	11.3
26	4.2	3.3	3.2	3.9	4.4	31	6.7	10.2	7.4			40
27	3.6	3.2	3.0	81	4.1	21	6.4	10.2	6.6			7.0
28	3.3	3.1	2.9	270	4.1	18.3	6.3	9.3	6.1	45		41
29	3.1	3.0	2.8	126	4.0	116	6.1	11.6	5.9			50
30	3.2	3.1	34	19.0	3.9	33	5.9	-------	6.3			29
31	3.2	3.3	-------	13.5	-------	44	5.6	-------	8.6	-------		-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow of adjacent streams.

Monthly discharge of Kawaikoi Stream near Waimea, Kauai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	73	3.1	9.35	14.5	290	890
August	73	3.0	9.25	14.3	287	880
September	34	2.5	7.81	12.1	234	719
October	270	3.3	31.1	48.1	963	2,960
November	90	3.9	18.2	28.2	546	1,680
December	----------	3.6	70.2	109	2,180	6,689
January	66	5.6	15.6	24.1	483	1,480
February	167	4.4	24.9	38.5	721	2,220
March	33	4.9	12.7	19.6	392	1,210
April	----------	----------	43.5	67.3	1,310	4,000
May	----------	----------	14.5	22.4	450	1,380
June	50	2.7	9.21	14.2	276	848
The year	----------	2.5	22.2	34.3	8,120	24,900

WAIAKOALI STREAM NEAR WAIMEA, KAUAI

LOCATION.—150 feet below Kokee-Mohihi trail, a quarter of a mile below old Waiakoali camp, and 12 miles northeast of Waimea (22 miles from Waimea by road and trail).

RECORDS AVAILABLE.—April 13, 1909, to December 4, 1912, and July 1, 1919, to June 30, 1924. Occasional measurements 1913 to 1917 reported as miscellaneous.

GAGE.—Stevens continuous water-stage recorder installed July 30, 1919. Staff gage April 13, 1909, to December 4, 1912.

DISCHARGE MEASUREMENTS.—Made by wading or from cable near trail.

CHANNEL AND CONTROL.—Channel a series of pools with mud and silt bottom divided by rapids of boulders and cobblestones. High sloping banks covered with ferns and underbrush. Control, large boulders; shifts slightly.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 620 million gallons per day or 959 second-feet at 7 p. m. December 23 (gage height, 8.07 feet); minimum recorded during year, 0.8 million gallons per day or 1.2 second-feet for several hours September 14–15 (gage height, 1.33 feet).

1909–1924: Maximum discharge recorded on December 23, 1923; minimum recorded, 0.3 million gallons per day or 0.45 second-foot November 29, 1909 (gage height, 1.45 feet on old staff gage).

DIVERSIONS.—None.

REGULATION.—None.

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

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

ACCURACY.—Stage-discharge relation changed during flood of December 10. Rating curve used prior to December 10 well defined below 15 million gallons per day and extended above 15 million gallons per day on basis of form of other curves; curve used subsequent to December 10 well defined below 50 million gallons per day. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good except for high stages.

Discharge measurements of Waiakoali Stream near Waimea, Kauai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 23	2.21	15.0	9.7	Dec. 20	2.59	20.9	13.5
Sept. 9	1.35	1.25	.8	May 6	1.75	4.6	3.0
Oct. 21	1.60	2.9	1.9	June 5	1.58	2.6	1.65
Oct. 31	1.78	5.8	3.8				

Discharge, in million gallons per day, of Waiakoali Stream near Waimea, Kauai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	1.3	1.1	0.9	46	5.8	1.2	14.8	1.8	2.2	2.0	4.2	2.1
2	1.4	1.1	.9	13.1	8.0	1.2	9.4	1.8	2.0	2.0	3.8	2.0
3	1.4	1.1	.9	3.6	3.7	1.1	8.4	1.8	2.0	2.2	3.5	2.0
4	1.3	1.1	.9	2.4	8.3	1.2	7.4	1.8	2.1	2.0	3.2	1.9
5	1.3	1.1	.9	1.6	15.0	1.4	5.6	1.8	2.1	5.0	3.1	1.8
6	1.3	1.1	.9	1.4	10.1	1.5	5.1	1.8	2.2	27	3.0	1.8
7	1.3	1.1	.9	1.4	14.8	3.8	4.6	1.7	2.0	5.5	3.0	1.8
8	1.2	1.2	.8	1.7	5.8	1.9	4.2	1.6	1.8	3.5	2.9	1.8
9	1.2	1.5	.8	1.4	3.7	1.5	3.9	1.6	1.8	2.8	2.8	1.9
10	1.2	1.3	.9	1.3	3.0	58	3.8	1.6	1.8	2.4	2.7	1.8
11	1.2	1.2	.8	1.2	2.8	21	4.7	4.7	2.8	2.2	2.6	1.8
12	1.2	1.2	.8	1.1	2.2	29	5.3	21	3.8	2.1	2.6	1.7
13	1.1	1.8	.8	1.1	2.2	54	4.8	9.0	2.0	3.0	13.6	1.6
14	1.1	1.8	.8	1.1	3.4	48	6.8	3.7	1.8	16.4	8.6	1.6
15	1.1	1.8	.9	1.0	7.7	38	5.0	2.8	3.8	29	6.2	1.6
16	1.1	1.4	4.3	1.0	3.7	25	4.0	38	6.2	45	3.7	1.5
17	1.1	1.2	4.2	1.0	2.3	11.3	3.5	11.8	7.3	16.1	2.9	1.5
18	1.1	1.2	1.4	1.0	1.9	14.2	3.6	5.0	3.2	8.7	2.8	1.4
19	1.2	5.5	2.0	6.9	1.8	19.2	3.2	3.6	5.0	6.0	2.8	1.5
20	1.9	3.0	9.4	3.1	1.6	13.6	2.8	3.0	5.7	6.8	4.3	1.5
21	4.3	1.6	3.4	1.9	1.6	7.2	2.6	2.7	6.8	66	2.8	1.4
22	2.1	1.2	5.4	2.5	1.5	5.6	2.6	2.5	3.2	14.8	5.3	1.4
23	6.0	1.0	2.0	1.7	1.4	74	2.4	3.8	2.8	9.0	4.8	1.3
24	5.0	1.0	1.4	1.3	1.4	24	2.2	8.3	7.4	7.5	6.5	1.3
25	2.0	1.0	1.2	1.2	1.3	22	2.2	5.5	3.4	7.2	5.4	1.4
26	1.5	.9	1.0	1.1	1.3	13.6	2.1	3.2	2.5	5.5	4.2	3.6
27	1.4	.9	1.0	12.1	1.3	9.3	2.0	2.6	2.2	15.5	3.8	2.0
28	1.2	.9	.9	78	1.2	7.7	2.0	2.5	2.0	7.2	4.9	5.9
29	1.2	.9	.9	34	1.2	34	1.9	2.3	1.9	5.4	2.9	5.3
30	1.1	.9	.9	7.2	1.2	18.2	1.9	-------	1.9	4.7	2.5	6.4
31	1.1	.9	-------	3.7	-------	12.1	1.8	-------	1.8	-------	2.2	-------

Monthly discharge of Waiakoali Stream near Waimea, Kauai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	6.0	1.1	1.67	2.58	51.9	159
August	5.5	.9	1.39	2.15	43.0	132
September	9.4	.8	1.74	2.69	52.3	160
October	78	1.0	7.65	11.8	237	728
November	15.0	1.2	4.04	6.25	121	372
December	74	1.1	18.5	28.6	574	1,760
January	14.8	1.8	4.34	6.71	135	413
February	38	1.6	5.29	8.18	153	471
March	7.4	1.8	3.15	4.87	97.5	300
April	66	2.0	11.1	17.2	332	1,020
May	13.6	2.2	4.12	6.37	128	392
June	6.4	1.3	2.15	3.33	64.6	198
The year	78	.8	5.44	8.42	2,990	6,100

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, 1924. 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.

GAGE.—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 except at low-water measuring section where it is composed of boulders. 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 through collection of débris.

EXTREMES OF DISCHARGE.—Maximum recorded during year, about 400 million gallons per day or 619 second-feet at 6 p. m. December 23 (gage height, 5.91 feet); minimum recorded during year 0.3 million gallons per day or 0.45 second-foot at 7 p. m. July 14 and 5 p. m. July 15 (gage height, 0.80 foot); a lower discharge probably occurred during September when recorder clock was stopped.

1919–1924: Maximum recorded, about 520 million gallons per day or 805 second-feet, at 1.35 p. m. January 16, 1921 (gage height, 6.91 feet); minimum recorded, 0.2 million gallons per day or 0.3 second-foot, from 4 to 6 p. m. July 16, 1921, 2 to 5 p. m. September 14, and noon to 3 p. m. September 15, 1921, and 8 p. m. August 7 to 2 a. m. August 8, 1922.

DIVERSIONS.—None.

REGULATION.—No artificial regulation. Stream is a series of long pools and short rapids, and heads in the Alakai swamps.

OBJECT OF STATION.—To determine feasibility of diverting flood water into high level (3,100 feet) ditch to serve Territorial lands now idle 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 practically permanent during year. Rating curve well defined below 30 million gallons per day. Operation of water-stage recorder unsatisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good except those estimated which are subject to error.

Discharge measurements of Mohihi Stream at elevation 3,500 feet, near Waimea, Kauai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 23	1.69	15.5	10.0	Jan. 13	0.98	1.5	1.0
Sept. 9	.80	.55	.35	Mar. 19	1.52	8.6	5.5
Oct. 21	1.16	3.3	2.1	May 6	1.14	3.5	2.2
Dec. 20	1.75	16.8	10.9	June 5	1.01	1.5	1.0

Discharge, in million gallons per day, of Mohihi Stream at elevation 3,500 feet, near Waimea, Kauai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	0.6				7.3		19.6	1.0	1.5	1.7		1.7
2	.9				8.1		11.1	1.0	1.4	2.0		1.4
3	.6				3.7		7.1	1.1	1.4	2.4		1.2
4	.6	0.5			6.3		8.6	1.0	1.4	2.0	2.5	1.2
5	.6				6.9		5.8	1.0	1.3	6.3		1.1
6	.8				10.0		4.8	.8	1.4	32		1.1
7	.9		0.4		12.6		4.2	.8	1.2	5.6	2.2	1.0
8	.6				4.7		3.7	.8	1.0	3.1	2.4	1.0
9	.5				3.1		3.5	.8	.9	2.4	1.9	1.4
10	.5			4.5	2.7		3.3	.8	.8	2.0	1.7	1.2
11	.4				2.6	17	5.1	3.2	3.4	1.6	1.6	1.2
12	.4				2.0		5.0	23	4.4	1.3	1.6	.9
13	.4				2.0		4.5	10.9	1.8	2.7	6.3	.8
14	.4				4.0		7.5	4.3	1.2	24	10.6	.9
15	.3				7.4		4.8	3.0	3.7		7.1	.9
16	.3	1.6			3.6		3.6	34	6.4		3.5	.8
17	.4				2.3		3.2	9.8	7.4		2.4	.6
18	.4				1.7		3.3	4.0	3.2		2.2	.7
19	1.2				1.3		2.8	2.8	6.1		3.6	.6
20	2.0				1.1		2.4	2.1	8.2		4.8	.6
21	5.8				1.0	6.3	2.0	1.7	7.8		2.8	.6
22	2.3		3.0	2.2	.8	4.6	1.9	1.5	3.3	16	7.8	.5
23	9.9					61	1.7	4.1	2.9		6.3	.5
24						24	1.6	8.8	7.2		7.9	.5
25						28	1.4	5.8	3.2		7.2	.8
26					.8	16.1	1.4	2.8	2.2		5.4	5.9
27	1.3					10.4	1.3	2.1	1.7		4.5	2.6
28		.4				8.6	1.2	2.0	1.4		7.8	9.5
29				28		27	1.2	1.7	1.3		3.3	8.8
30						17.0	1.1	-------	1.2		2.4	8.5
31			-------	-------	-------	15.8	1.0	-------	1.2	-------	2.0	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow of adjacent streams.

Monthly discharge of Mohihi Stream at elevation 3,500 feet, near Waimea, Kauai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	9.9	0.3	1.33	2.06	41.2	127
August	----------	----------	1.12	1.73	34.6	107
September	----------	----------	1.79	2.77	53.6	165
October	----------	----------	7.62	11.8	236	725
November	12.6	----------	3.39	5.25	102	312
December	----------	----------	18.0	27.9	559	1,710
January	19.6	1.0	4.18	6.47	130	398
February	34	.8	4.71	7.29	137	419
March	8.2	.8	2.95	4.56	91.5	281
April	----------	1.3	11.5	17.8	345	1,060
May	----------	1.6	4.01	6.20	124	381
June	9.5	.5	1.95	3.02	58.5	180
The year	----------	----------	5.22	8.08	1,910	5,860

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

LOCATION.—At elevation 3,700 feet, 4 miles east of Mohihi station, a 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, 1924.

GAGE.—Stevens continuous water-stage recorder installed September 5, 1919.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 200 feet above gage.

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, about 2,350 million gallons per day or 3,640 second-feet, at 6.20 a. m. April 16 (gage height, 4.62 feet); minimum recorded during year, 1.5 million gallons per day or 2.3 second-feet, for several hours January 31 and February 8-10 (gage height, 0.32 foot); discharge may have been lower in September when clock was stopped.

1919–1924: Maximum discharge recorded,about 3,750 million gallons per day or 5,800 second-feet, January 16, 1921 (gage height, 5.70 feet); minimum recorded, 1.3 million gallons per day or 2.0 second-feet, September 28, 1919 (gage height, 0.39 foot).

DIVERSIONS.—None.

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 not permanent. Two rating curves used; one, applicable July 1 to August 19, December 24 to February 16, and April 16 to June 30, well defined between 1 and 30 million gallons per day; the other, applicable August 20 to December 23 and February 17 to April 15 well defined between 1.5 and 150 million gallons per day. Operation of water-stage recorder satisfactory except during September and October. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good except those estimated and those for high stages which are subject to some error.

Discharge measurements of Koaie Stream at elevation 3,700 feet, near Waimea, Kauai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 24	0.75	25	16.2	Feb. 1	0.33	2.5	1.6
Sept. 9	.50	3.4	2.2	Mar. 20	.90	43.5	28
Oct. 21	.86	36.5	23.7	May 6	.47	4.0	2.6
Dec. 20	.78	24.9	16.1	Do	.47	4.4	2.9

Discharge, in million gallons per day, of Koaie Stream at elevation 3,700 feet, near Waimea, Kauai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	10.8	2.7			16.7	2.6	81	1.6	2.2	3.0	4.3	2.6
2	4.3	3.0			21	2.6	18.6	1.6	1.9	3.2	4.6	2.5
3	3.3	3.3			6.5	2.6	17.7	1.7	3.2	4.2	3.7	2.4
4	5.6	2.8			18.3	10.0	8.6	1.8	2.8	4.9	3.3	2.4
5	10.0	3.0	2.5		32	18.9	4.6	1.6	2.2	7.6	3.0	2.5
6	17.4	3.7			25	11.8	3.7	1.6	2.3	86	2.8	2.4
7	9.2	3.3			27	29	3.5	1.6	2.5	6.8	2.8	2.4
8	4.9	3.2			11.8	4.9	3.3	1.6	2.3	3.4	2.8	2.6
9	3.7	3.2			6.5	3.6	3.3	1.6	1.9	2.7	2.7	2.8
10	3.2	3.0	2.1		4.9	104	3.0	1.6	1.8	2.5	2.6	2.8
11	3.0	4.9	1.9	10	4.2	46	7.4	13.8	12.1	2.2	3.0	3.9
12	2.8	15.6	1.7		3.4	53	4.3	54	7.6	2.1	3.2	3.3
13	2.6	7.9	1.7		5.0	96	4.1	16.5	2.6	3.6	76	3.5
14	2.5	7.9	1.9		14.3	74	6.3	4.6	2.2	167	26	4.9
15	2.5	4.3			17.9	91	4.3	3.3	6.3	410	13.0	4.1
16	2.5	3.5			6.5	39	3.3	56	14.0	539	4.9	3.0
17	2.6	3.2			4.2	16.1	3.0	5.0	14.7	51	3.7	2.8
18	4.9	15.2			3.2	44	3.0	2.3	4.2	17.0	3.3	2.7
19	35	56			2.8	49	2.8	1.9	7.6	6.3	3.5	2.5
20	17.1	10.9			2.6	24	2.5	1.6	23	4.6	3.7	3.4
21	31	3.2			2.6	5.4	2.4	1.6	10.2	77	3.9	3.7
22	6.3	2.5	15	8.8	2.5	4.9	2.2	1.6	3.9	15.7	22	2.8
23	91	2.2		3.9	2.4	193	2.0	2.5	5.5	6.3	15.8	2.7
24	20	2.0		3.0	2.4	27	1.9	8.7	15.2	5.9	20	2.6
25	5.2	1.8		2.8	2.4	99	1.8	2.8	4.2	4.6	18.5	2.8
26	3.9	1.7		2.8	2.4	34	1.8	2.2	3.0	4.6	16.0	33
27	3.2	1.7		31	2.7	10.8	1.8	2.5	2.6	33	6.7	5.9
28	2.8	1.7		111	3.4	8.5	1.7	3.1	2.4	10.2	5.5	41
29	2.7	1.7		38	3.0	56	1.7	2.5	2.4	5.9	3.7	27
30	2.7	1.7		7.8	2.7	17.8	1.6	-------	2.4	4.6	3.3	22
31	2.6		-------	4.5	-------	53	1.6	-------	2.7	-------	3.0	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow of Waialae River.

Monthly discharge of Koaie Stream at elevation 3,700 feet, near Waimea, Kauai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	91	2.5	10.3	15.9	319	980
August	56	1.7	5.89	9.11	182	560
September	-------	-------	9.06	14.0	272	834
October	111	-------	13.7	21.2	424	1,300
November	32	2.4	8.68	13.4	260	799
December	193	2.6	39.7	61.4	232	3,780
January	81	1.6	6.74	10.4	209	641
February	56	1.6	6.99	10.8	203	622
March	23	1.8	5.55	8.59	172	528
April	539	2.1	49.8	77.1	1,490	4,590
May	76	2.6	9.40	14.5	291	894
June	41	2.4	6.77	10.5	203	623
The year	539	-------	14.4	22.3	5,260	16,200

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 Gay's mountain house.

RECORDS AVAILABLE.—January 26, 1920, to June 30, 1924, at present site; August 1, 1910, to January 25, 1916, at old site 2 miles downstream.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading.

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 shoulder about 15 feet below well intake.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 2,600 million gallons per day or 4,020 second-feet at 5.45 p. m. December 23 (gage height, 6.00 feet); a higher discharge probably occurred on April 16 when recorder was not operating. Minimum recorded during year 0.8 million gallons per day or 1.2 second-feet, for several hours August 28–29 (gage height, 0.83 foot).

1920–1924: Maximum discharge estimated, 4,500 million gallons per day or 6,960 second-feet, January 16, 1921 (gage height, 8.44 feet); minimum recorded on August 28 and 29, 1923.

DIVERSIONS.—None.

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 August 19 and April 16. Rating curves used July 1 to August 19 and August 20 to April 16, well defined below 150 million gallons per day; curve used April 17 to June 30 somewhat uncertain for low stages. Operation of water-stage recorder not satisfactory during period February to May. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good except those estimated and those for high stages which are subject to some error.

Discharge measurements of Waialae River at elevation 3,700 feet, near Waimea, Kauai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 24	1.15	13.0	8.4	Mar. 20	1.31	22.5	14.5
Sept. 10	.86	1.4	.9	May 7	.87	2.4	1.6
Dec. 21	1.18	12.9	8.3	June 6	.84	2.5	1.6
Feb. 1	.86	3.3	2.1				

Discharge, in million gallons per day, of Waialae River at elevation 3,700 feet, near Waimea, Kauai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	4.8	1.6	1.0	62	17.1	2.8	104	1.0				1.6
2	3.0	1.6	1.0	18.5	16.8	3.1	19.2	1.4				1.5
3	2.3	1.8	1.1	5.4	6.6	2.9	13.9	1.6				1.4
4	4.1	1.6	1.6	3.1	12.5	8.3	8.3	1.9			2.4	1.4
5	7.0	1.9	2.6	2.4	19.2	15.2	5.6	1.3				1.4
6	11.2	1.9	2.2	2.1	13.4	6.6	4.6	1.2	1.3			1.5
7	6.1	1.8	1.7	5.0	18.4	33	3.8	1.1		7.0		1.6
8	3.5	1.7	1.3	5.1	8.7	6.6	3.6	1.0			1.9	1.6
9	2.5	1.9	1.1	4.4	5.9	4.4	3.1	1.0			1.7	1.7
10	2.0	1.8	1.0	2.9	5.1	82	3.4	1.0			1.6	2.3
11	1.8	2.2	1.0	2.2	4.6	25	5.1	1.5			1.6	2.9
12	1.7	9.9	.9	2.4	3.8	32	4.6				1.6	2.1
13	1.6	5.4	.9	2.4	5.0	52	4.1				42	2.2
14	1.6	5.4	1.0	1.9	10.2	61	5.4	21			9.5	3.2
15	1.6	3.0	1.3	2.1	11.4	44	3.8				6.2	2.5
16	1.6	2.1	5.1	2.8	5.9	41	2.9				3.2	1.8
17	1.6	1.9	2.9	3.1	4.6	11.9	2.4				2.1	1.6
18	2.1	2.4	1.7	13.2	3.8	25	2.2		5.5	160	2.2	1.6
19	21	31	13.1	14.0	3.1	38	2.1				2.7	1.5
20	10.0	8.2	28	7.3	2.8	19.6	1.9				2.4	2.2
21	23	3.1	53	7.3	2.6	8.3	1.7				1.9	2.2
22	5.4	1.9	60	6.6	2.4	8.0	1.6				6.5	1.7
23	73	1.3	5.9	3.6	2.4	244	1.4	1.9			4.8	1.6
24	16.0	1.1	3.6	2.8	2.2	36	1.2				12.3	1.5
25	5.1	1.0	2.4	2.4	2.2	103	1.2				16.0	1.6
26	3.4	1.0	2.1	2.1	2.4	39	1.2			8.5	14.3	24
27	2.5	.9	1.7	14.3	3.1	18.0	1.2		1.7		5.8	4.8
28	2.0	.9	1.6	79	3.8	13.4	1.1				4.8	34
29	1.8	.9	1.3	30	3.4	70	1.1				2.7	20
30	1.8	.9	3.7	6.6	2.9	18.7	1.1	-------			1.9	10.2
31	1.6	1.0	-------	4.6	-------	66	1.0	-------		-------	1.7	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow of Koaie Stream.

Monthly discharge of Waialae River at elevation 3,700 feet, near Waimea, Kauai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	73	1.6	7.31	11.3	227	695
August	31	.9	3.33	5.15	103	317
September	60	.9	6.86	10.6	206	632
October	79	1.9	10.4	16.1	322	989
November	19.2	2.2	6.88	10.6	206	633
December	244	2.8	36.7	56.8	1,140	3,490
January	104	1.0	7.03	10.9	218	669
February	----------	----------	4.96	7.67	144	441
March	----------	----------	3.29	5.09	102	313
April	----------	----------	48.2	74.6	1,450	4,440
May	42	----------	5.43	8.40	168	517
June	34	1.4	4.64	7.18	139	427
The year	----------	----------	12.1	18.7	4,420	13,600

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

LOCATION.—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, 1924. Staff at flume No. 4 1 mile below intake, March 18, 1916, to August 2, 1917; weir, 1,000 feet above present site, November 8, 1907, to June 30, 1915.

GAGE.—Stevens continuous water-stage recorder; installed July 26, 1923, replacing Gurley printing water-stage recorder used since July 12, 1921. Vertical staff gage 900 feet upstream prior to July 12, 1921.

DISCHARGE MEASUREMENTS.—Made from upper end of covered section of ditch.

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

EXTREMES OF DISCHARGE.—Maximum recorded during year, 61 million gallons per day or 94 second-feet at 10.50 p. m. April 5 (gage height, 4.00 feet); minimum recorded during year, about 0.10 million gallons per day or 0.15 second-foot, from 6 to 7.15 p. m. November 11 (gage height, 0.36 foot).

1907–1924: Maximum recorded, 67 million gallons per day or 104 second-feet, on January 4, 1921, and March 6, 1922. Water occasionally shut off.

DIVERSIONS.—None above station. Numerous diversions in vicinity of Waimea and Kekaha.

REGULATION.—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.

UTILIZATION.—Water used for irrigation of sugar cane and for domestic supply along the coastal plain east of Waimea and Kekaha.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined except for extremely low stages. Operation of water-stage recorders satisfactory except as noted in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height obtained from printing recorder by averaging hourly gage heights, or from continuous recorder by integrating the gage-height graph with the discharge integrator. Records excellent except those estimated which are fair.

Kekaha ditch diverts water from Waimea River at a point 8 miles by trail north of Waimea, 500 feet above gaging station on river and 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 4½ miles where it crosses and then continues roughly parallel to the river for about 2½ miles to a point about half a mile north of and at an elevation of about 400 feet above Waimea. Here, at the lower end of the river valley, it swings eastward and continues roughly parallel to the coast line for about 10 miles.

Discharge measurements of Kekaha ditch at camp No. 1, near Waimea, Kauai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 26	3.00	60	39	Feb. 2	2.85	55	35.5
Sept. 11	2.50	42	27.5	May 8	3.39	74	48
Oct. 22	3.30	69	44.5	June 7	2.81	53	34
Dec. 22	3.60	78	50				

Discharge, in million gallons per day, of Kekaha ditch at camp No. 1, near Waimea, Kauai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	43	30	28		50	32	17.4	36	42	37		37
2	41	33	27		48	31	12.5	38	38	43		36
3	36	31	28		48	30	22	38	46	47		34
4	34	30	29		46	42	34	39	45	41	45	35
5	43	24	31	40	48	50	40	36	39	39		35
6	46	30	32		49	50	41	34	39	32		35
7	43	31	30		49	51	41	32	37	49		34
8	38	39	32		48	48	41	33	37	52	47	34
9	34	43	30		48	38	42	32	34		45	36
10	32	33	28		47	42	44	32	33		42	36
11	32	31	28		14.5	45	44	34	38		41	37
12	31	43	27		45	48	47	46	51		42	35
13	30	48	27		48	47	48	48	43	45	54	34
14	30	44	27		49	47	46	48	36		54	35
15	29	42	28	30	51	49	47	47	44		54	37
16	30	41	39		52		46	30	53		54	33
17	30	36	48		47		46	35	53		50	32
18	31	34	35		41		49	49	51		48	32
19	43	43			38	45	46	52	52		49	31
20	46	50		50	36		44	47	54	25	51	31
21	46	43	40		34		44	43	54		47	34
22	43	36			34		44	40	49		52	32
23	41	33		43	33	35		46	44		52	31
24	43	31		36	33	19.2		51	47		54	30
25	43	29		36	32	14.5		51	51		54	34
26	38	28		32	32	13.6	40	48	42		53	46
27	35	28		38	32	11.0		45	38	45	52	48
28	32	28	30	48	32	16.1		47	35		50	45
29	30	28		47	32	14.9		47	34		47	53
30	30	28		47	33	10.1		-------	34		42	53
31	31	28	-------	47	-------	14.1		-------	34	-------	39	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage height record, by comparison with flow of this ditch below tunnel No. 12.

Monthly discharge of Kekaha ditch at camp No. 1, near Waimea, Kauai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	46	29	36.6	56.6	1,130	3,480
August	50	24	34.7	53.7	1,080	3,300
September			32.8	50.7	984	3,020
October			39.2	60.7	1,210	3,730
November	52	14.5	41.0	63.4	1,230	3,770
December	51	10.1	35.9	55.5	1,110	3,420
January	49	12.5	40.2	62.2	1,250	3,820
February	52	30	41.5	64.2	1,200	3,700
March	54	33	42.8	66.2	1,330	4,070
April			39.0	60.3	1,170	3,590
May	54	39	48.0	74.3	1,490	4,570
June	53	30	36.5	56.5	1,100	3,360
The year	54	10.1	39.0	60.3	14,300	43,800

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, 1924. April 7, 1908, to November 30, 1914, and July 20, 1916, to July 15, 1921, at site half a mile downstream.

GAGE.—Stevens continuous water-stage recorder installed July 20, 1923, replacing Gurley printing water-stage recorder used since July 15, 1921. Vertical staff gage half a mile downstream prior to July 15, 1921.

DISCHARGE MEASUREMENTS.—Made from plank at gage.

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

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 47 million gallons per day or 73 second-feet at 12.30 a. m. December 29 (gage height, 3.74 feet); minimum recorded during year, 4.7 million gallons per day or 7.3 second-feet at 11.15 p. m. November 11 (gage height, 1.20 feet).

1916–1924: Maximum discharge recorded, 64 million gallons per day or 99 second-feet at 8.30 a. m. December 22, 1921 (gage height, 4.40 feet). Water occasionally shut off.

DIVERSIONS.—Small amount of water is diverted above station for domestic supply and occasionally for irrigation of rice and taro.

REGULATION.—By head gates.

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

UTILIZATION.—Water used for irrigation of sugar cane, rice, and taro and for domestic supply.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined. Operation of water-stage recorders satisfactory except as noted in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height obtained from printing recorder by averaging hourly gage heights or from continuous recorder by inspection of gage-height graph. Records excellent except those estimated which are fair.

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

Discharge measurements of Kekaha ditch below tunnel No. 12, near Waimea, Kauai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 21	3.38	57	37	Dec. 22	3.38	64	41.5
Sept. 7	2.48	37.5	24.2	Feb. 2	2.86	48	31
Oct. 19	3.48	64	41.5	June 8	2.69	46.5	30

Discharge, in million gallons per day, of Kekaha ditch below tunnel No. 12, near Waimea, Kauai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	34			41	41	26	10.1	30	32	29	36	32
2	37			41	39	26	6.3		30	32	36	30
3	30	25		41	39	25	10.1	34	34	36	34	29
4	29			37	39	30	22	34	34	34	34	29
5	34		25	30	41	41	34	32	30	30	36	29
6	37			27	41	43	34	30	30	27	36	29
7	37			27	41	43	32	30	29	39	36	29
8	34		27	37	41	43	32	29	29	41	37	29
9	30	30	26	36	41	36	34	29	27	39	37	30
10	29		23	30	41	36	34	27	26	34	36	30
11	27		22	25	17.2	41	34	29	26	32	36	30
12	27		21	27	36	43	36	41	39	30	36	30
13	26		19.2	27	39	43	36	41	36	29	44	29
14	25		17.5	24	39	43	37	39	30	41	46	30
15	25		19.2	22	41	43	37	39	32	43	46	34
16	25		29	23	43	43	37	25	39	41	46	30
17	25	35	41	24	41	41	36	27	39	22	44	29
18	26		29	26	36	41	37	37	39	17.5	41	29
19	32		25	41	34	39	36	41	37	10.9	43	27
20	34		39	43	30	41	36	37	37	15.0	44	27
21	36		37	41	29	41		34	39	19.2	41	30
22			41	41	29	41		32	37	23	44	29
23			39	37	27	32		34	32	22	44	27
24			36	32	27	10.9		37	36	26	44	25
25			29	29	26	8.8		37	37	29	44	30
26	30	25	24	29	25	7.9	35	37	32	30	44	41
27			22	30	25	5.9		34	29	39	44	43
28			21	43	27	6.0		36	26	41	44	41
29			21	43	29	18.2		36	25	41	43	46
30			19.2	41	27	10.1		-------	25	37	37	46
31			-------	39	-------	7.2		-------	25	-------	34	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow of this ditch at camp No. 1.

Monthly discharge of Kekaha ditch below tunnel No. 12, near Waimea, Kauai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	37	----------	30.3	46.9	939	2,880
August	----------	----------	29.4	45.5	910	2,790
September	41	17.5	26.7	41.3	802	2,460
October	43	22	33.4	51.7	1,030	3,180
November	43	17.2	34.4	53.2	1,030	3,170
December	43	5.9	30.8	47.7	956	2,930
January	37	6.3	32.1	49.7	996	3,060
February	41	25	33.7	52.1	978	3,000
March	39	25	32.2	49.8	998	3,060
April	43	10.9	31.0	48.0	930	2,850
May	46	34	40.2	62.2	1,250	3,820
June	46	25	31.6	48.9	949	2,910
The year	46	5.9	32.2	49.8	11,800	36,100

SOUTH FORK OF WAILUA RIVER NEAR LIHUE, KAUAI

LOCATION.—One-third of a mile above Waiehu Falls and 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, 1924.

GAGE.—Stevens continuous water-stage recorder installed November 19, 1918. Friez water-stage recorder December 19, 1911, to November 8, 1918. Staff gage December 10–16, 1911.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—One channel at all stages; straight for 600 feet above and 300 feet below station. Right bank steep and high, left bank slopes gently. Control composed of solid rock ledge; somewhat shifting due to boulders lodging in water-worn grooves at left end of control.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 4,890 million gallons per day or 7,570 second-feet at 7.50 p. m. December 23 (gage height, 6.45 feet); minimum recorded during year, 4.3 million gallons per day or 6.6 second-feet September 18–19 (gage height, 0.94 foot); discharge may have been slightly lower during afternoon of September 19, but this is uncertain because pencil tore the record paper.

1911–1924: Maximum discharge recorded, 29,000 million gallons per day or 44,900 second-feet, at 7.25 a. m. January 16, 1920 (gage height, 11.25 feet); minimum recorded, 2.8 million gallons per day or 4.3 second-feet, at 6 p. m. October 7, 1918 (gage height, 2.06 feet on old gage).

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

REGULATION.—By diversions above station only.

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 permanent during year. Rating curve well defined below 200 million gallons per day; fairly well defined between 200 and 15,000 million gallons per day. Operation of water-stage recorder not satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good except those estimated.

Discharge measurements of South Fork of Wailua River near Lihue, Kauai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 2	1.34	18.7	12.1	Dec. 13	2.28	158	102
Sept. 17	1.15	9.7	6.3	Jan. 29	1.00	8.0	5.1
Oct. 27	1.05	8.3	5.4	May 4	1.55	31	19.9

Discharge, in million gallons per day, of South Fork of Wailua River near Lihue, Kauai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	44	5.1	4.7	356	8.1		325			4.8	31	8.3
2	10.8	13.6	4.8	92	25		224			4.9	54	7.4
3	5.1	6.1	4.7	33	14.2		124			5.0	25	7.0
4	5.2	5.0	4.8	18.4	12.9	30				5.0	24	7.0
5	22	5.0	4.9	10.9	37			6.0		5.0	16.4	6.6
6	13.6	4.9	4.9	8.1	30					44	13.2	7.2
7	11.5	5.0	42	84	33	42				7.6	11.2	7.0
8	7.8	4.9	32	107	29	11.4				5.3	18.0	7.0
9	5.0	25	7.2	46	17.2	7.5			9.5	4.9	20	7.6
10	4.8	11.5	4.9	16.4	15.5	238				5.0	49	11.4
11	4.7	6.4	4.8	9.1	17.6	57				6.0	122	7.2
12	4.7	26	4.8	6.3	12.8	47				5.1	37	6.6
13	4.8	9.0	4.8	5.4	7.5	104				5.8	136	6.4
14	4.7	6.2	8.2	5.0	15.8	199				102	134	14.8
15	4.8	5.0	6.0	5.6	21	98				633	72	8.8
16	4.8	4.8	5.0	6.2		102	12			1,090	34	7.2
17	4.7	4.8	7.3	11.4		64			4.8	1,090	23	7.0
18	9.4	5.0	4.6	15.0		122			4.8	614	19.8	7.6
19	127	64		55		163			4.9	106	36	7.6
20	22	30	95	16.3		115		30	4.9	81	26	17.4
21	60	8.8		59		75			4.9	415	13.2	9.6
22	17.2	5.3	732	28		103			4.9	249	63	7.6
23	125	5.0	129	11.6	10	439			5.0	134	46	7.7
24	51	4.9	48	6.4		217			5.8	93	55	7.2
25	15.1	4.9	22	8.8		285			5.7	62	37	6.6
26	9.9	4.9	12.9	16.7		256			5.1	51	117	39
27	6.4	4.8	9.6	5.9		145			5.1	127	58	11.8
28	5.1	4.7	7.4	32		115			5.0	52	30	65
29	5.0	4.7	5.7	49		419	5.0		4.9	34	19.0	59
30	5.0	4.6	5.0	8.3		259	4.9	-------	4.8	26	13.5	24
31	5.0	4.7	-------	6.7	-------	182		-------	4.6	----------	10.4	-------

NOTE.—Gage-height graph partly estimated Dec. 24 to Jan. 3. Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow of North Fork of Wailua River.

Monthly discharge of South Fork of Wailua River near Lihue, Kauai, for the year year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	127	4.7	20.2	31.3	626	1,920
August	64	4.6	9.83	15.2	305	935
September	732	4.6	47.2	73.0	1,420	4,350
October	356	5.0	36.8	56.9	1,140	3,500
November	37	----------	14.9	23.1	447	1,370
December	439	7.5	130	201	4,040	12,400
January	325	----------	31.9	49.4	988	3,030
February	----------	----------	21.7	33.6	630	1,930
March	----------	----------	7.33	11.3	227	697
April	1,090	4.8	169	261	5,070	15,600
May	136	10.4	44.0	68.1	1,360	4,190
June	65	6.4	13.5	20.9	405	1,240
The year	1,090	4.6	45.5	70.4	16,700	51,200

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

LOCATION.—1½ miles above intake of Kanaha ditch and 10 miles northwest of Lihue.

RECORDS AVAILABLE.—September 21, 1914, to June 30, 1924. Records available for old station at elevation 500 feet, August 1 to October 28, 1910, and December 28, 1910, to September 25, 1914.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from cable.

CHANNEL AND CONTROL.—One channel at all stages; straight for 80 feet above and 50 feet below gage. Right bank steep and high; left bank slopes gently. Control composed of boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 1,250 million gallons per day or 1,930 second-feet at 7.10 p. m. December 23 (gage height, 6.50 feet); minimum recorded during year, 13.6 million gallons per day or 21.0 second-feet from 2 to 6 p. m. April 12 (gage height, 0.59 foot).

1914–1924: Maximum discharge recorded, from extension of rating curve, 2,200 million gallons per day or 3,400 second-feet at 6.30 p. m. September 26, 1914 (gage height, 9.5 feet); minimum discharge, 12.9 million gallons per day or 20 second-feet May 7, 1919.

DIVERSIONS.—None.

REGULATION.—None.

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

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

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined below 100 million gallons per day; extended above that quantity and subject to error. Operation of water-stage recorder satisfactory subsequent to October. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of day. Records good for ordinary stages except those estimated; high-stage records subject to error.

Discharge measurements of North Fork of Wailua River at elevation 650 feet, near Lihue, Kauai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 2	1.16	54	35	Dec. 12	1.32	67	43
Sept. 17	.80	31.5	20.4	Jan. 29	.71	23.4	15.1
Oct. 29	1.26	66	43	May 4	1.10	53	34.5

Discharge, in million gallons per day, of North Fork of Wailua River at elevation 650 feet, near Lihue, Kauai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1		25			37	24	101	16.3	16.6	14.8	46	23
2		32			40	26	75	16.3	21	14.5	55	22
3		25			32	59	52	23	25	18.6	38	21
4		24			56	34	41	19.1	16.9	27	33	20
5		27			55	42	36	16.9	30	28	31	21
6		22		70	48	36	32	16.6	30	52	27	19.0
7		23			47	40	31	16.6	19.0	17.8	28	19.0
8		21			41	26	32	16.3	17.5	15.4	25	23
9		56	19		32	23	26	14.5	18.1	14.5	28	20
10	25	35			29	178	34	14.5	19.0	13.9	53	19.8
11					26	60	30	58	25	13.3	66	18.4
12					25	60	26	75	18.4	13.0	32	21
13					34	116	24	46	16.6	29	89	19.8
14		30			39	114	26	30	15.7	104	71	29
15				30	32	90	22	49	16.6	300	41	18.4
16					27	76	21	110	16.6	304	32	18.4
17			22		25	48	21	33	16.3	356	28	21
18			19.8		24	101	20	24	16.9	253	49	18.4
19			83		22	94	19.4	21	19.0	84	44	22
20		45	66		21	61	18.7	19.4	16.9	71	32	45
21	60		106		21	52	18.4	18.7	16.6	182	32	18.4
22					21	64	18.1	18.4	15.7	98	67	17.2
23			140	45	28	182	17.8	19.0	15.7	76	54	17.5
24					21	83	17.5	18.1	18.1	56	48	16.3
25					22	122	17.5	17.2	15.4	44	48	17.8
26		25			24	87	17.2	16.3	15.1	41	88	37
27	25		35		26	56	16.9	20	14.8	97	41	18.1
28					26	41	16.9	16.9	14.5	44	33	55
29				44	24	119	16.6	16.3	15.1	38	30	44
30				36	22	64	16.3	-------	14.8	33	28	36
31			-------	36	-------	75	16.3	-------	15.1	-------	25	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow of South Fork of Wailua River.

Monthly discharge of North Fork of Wailua River at elevation 650 feet, near Lihue, Kauai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	----------	----------	31.8	49.2	985	3,030
August	----------	----------	30.6	47.3	950	2,910
September	----------	----------	41.0	63.4	1,230	3,770
October	----------	----------	50.4	78.0	1,560	4,790
November	56	21	30.9	47.8	927	2,840
December	182	23	72.7	112	2,250	6,920
January	101	16.3	28.3	43.8	878	2,690
February	110	14.5	27.5	42.5	796	2,450
March	30	14.5	18.1	28.0	562	1,720
April	356	13.0	81.8	127	2,450	7,530
May	89	25	43.3	67.0	1,340	4,120
June	55	16.3	23.9	37.0	716	2,200
The year	356	13.0	40.0	61.9	14,700	45,000

KANAHA DITCH NEAR LIHUE, KAUAI

LOCATION.—300 feet below point where Kauai Electric Co.'s power line crosses ditch and 9 miles north of Lihue.

RECORDS AVAILABLE.—July 26, 1921, to June 30, 1924. August 6, 1910, to July 25, 1921, at site 800 feet upstream.

GAGE.—Stevens continuous water-stage recorder; installed January 26, 1923. Gurley printing water-stage recorded at same location used July 25, 1921, to January 25, 1923. Vertical staff gage, 800 feet upstream, prior to July 25, 1921.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Channel cut in conglomerate and clay; straight for 300 feet above and 10 feet below gage, where a sharp turn is made into a ¾-mile tunnel. Control composed of soft lava rock; shifting probably due to caving in of tunnel roof.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 24 million gallons per day or 37 second-feet at 1.50 p. m. April 15 (gage height, 3.58 feet); minimum recorded during year, 11.2 million gallons per day or 17.3 second-feet from 9 to 11 p. m. March 30 (gage height, 2.43 feet); a minimum discharge of about 5.3 million gallons per day or 8.2 second-feet, may have occurred during period June 25–30, 1924, when clock was stopped.

1910–1924: Maximum discharge recorded, 24 million gallons per day or 37 second-feet at 2.30 a. m. October 1, 1921 (gage height, 4.01 feet), and at 1.50 p. m. April 15, 1924 (gage height, 3.58 feet). Ditch occasionally dry.

DIVERSIONS.—All diversions below station.

REGULATION.—By head gates.

OBJECT OF STATION.—To determine discharge of ditch which diverts water from river and delivers it 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 sugar cane and for domestic supply.

ACCURACY.—Stage-discharge relation not permanent. Four fairly well defined rating curves used. Operation of water-stage recorder unsatisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection. Records probably poor owing to number of changes in control and uncertainty as to time of changes and owing to poor operation of recorder.

Kanaha ditch diverts from North Fork of Wailua River at a point about 8½ miles above mouth of river, 9 miles north of Lihue, and at an elevation of about 600 feet. The course of the ditch is due east, about parallel to the river, for about 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 about 5 miles to the vicinity of Lihue.

Discharge measurements of Kanaha ditch near Lihue, Kauai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 2	3.32	32	20.6	Mar. 18	2.64	20.8	13.4
Sept. 17	3.20	30.5	19.6	May 4	2.67	26	16.8
Dec. 12	3.03	30	19.5	June 9	2.86	26.5	17.2
Jan. 29	2.36	23.8	15.4				

Discharge, in million gallons per day, of Kanaha ditch near Lihue, Kauai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	21	21	21		21			14.9	-------	11.8	15.4	
2	21	21	19.0		21			14.9	-------	11.8	15.4	
3	19.8	19.8	19.8		19.8			16.4	-------	14.9	16.9	
4	21	21	19.8		19.8			-------	-------	14.9	16.9	
5	21	21	19.8		19.0			-------	-------	15.7	16.2	17
6	21	21	19.0		18.3	18		-------	-------	15.7	17.5	
7	21	21	19.8		18.3			-------	-------	15.7	18.3	
8	21	19.8	19.8		17.5			-------	-------	14.1	18.3	
9	19.8	21	19.0		16.8			-------	-------	13.3	18.3	
10	19.8	19.8	19.0		16.8			-------	-------	13.3	17.5	17.5
11	19.0	21	18.3		16.8			-------	-------	13.3	16.8	19.0
12	18.3	21	17.5		17.5			-------	-------	12.5	18.3	19.0
13	18.3	21	19.8		21	17.7		-------	-------	16.5	16.8	19.8
14	18.3	19.8	21		21			-------	-------	18.2	16.8	18.3
15	18.3	19.8	19.8	20	21		16	-------	-------	21	16.8	19.8
16	18.3	21	19.8		19.8			-------	-------	18.5	17.5	19.8
17	21	19.8	19.8		19.0			-------	-------	16.9	18.3	19.0
18	19.8	19.8	19.8		18.3			-------	-------	16.2	19.0	19.0
19	18.3	19.8	21		18.3			-------	14.9	15.4	18.3	19.0
20	19.8	19.8	19.8		17.5			-------	14.1	15.4	17.5	18.3
21	19.8	19.8	19.8		17.5			-------	13.3	14.7	18.3	18.3
22	19.8	19.8	19.0		16.8	19		-------	12.5	16.9	16.8	18.3
23	19.8	19.8			18.3			-------	12.5	16.9	17.5	21
24	18.3	19.8			16.8			-------	14.1	16.2	17.5	19.8
25	19.8	19.8			16.8			-------	13.3	15.4	18.3	-------
26	21	19.0	20		17.5			-------	12.5	15.4		-------
27	21	19.8						-------	11.8	15.4		-------
28	21	18.3						-------	11.8	14.7	18	-------
29	21	18.3			18			-------	11.8	14.7		-------
30	21	19.0		19.8			14.9	-------	11.8	14.7		-------
31	21	19.8	-------	19.8	-------		14.9	-------	11.8	-------		-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated on basis of range of stage recorded by pencil while clock was stopped and comparison with flow of North Fork of Wailua River. Data insufficient for estimating mean discharge for the periods Feb. 4 to Mar. 18 and June 25–30.

Monthly discharge of Kanaha ditch near Lihue, Kauai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	21	18.3	20.0	30.9	619	1,900
August	21	18.3	20.1	31.1	622	1,910
September	----------	----------	19.7	30.5	591	1,820
October	----------	----------	20.0	30.9	620	1,900
November	21	16.8	18.5	28.6	554	1,700
December	----------	----------	18.6	28.8	576	1,770
January	----------	----------	15.9	24.6	494	1,520
April	21	11.8	15.3	23.7	460	1,410
May	----------	15.4	17.5	27.1	543	1,670

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

LOCATION.—1,200 feet above confluence with North Fork and 8 miles north of Lihue.

RECORDS AVAILABLE.—July 31, 1912, to June 30, 1924.

GAGE.—Stevens continuous water-stage recorder installed December 31, 1914. Staff gage 800 feet below, July 31, 1912, to September 30, 1914.

DISCHARGE MEASUREMENTS.—Made by wading or from cable.

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; shifting.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 1,440 million gallons per day or 2,230 second-feet at 6 p. m. April 17 (gage height, 6.72 feet); minimum recorded during year, 7.0 million gallons per day or 10.8 second-feet from 4 p. m. September 12 to 9.30 a. m. September 13 (gage height, 1.73 feet).

1912–1924: Maximum discharge recorded, about 3,000 million gallons per day or 4,640 second-feet at 8 a. m. March 3, 1916 (gage height, 8.9 feet); minimum recorded, 7.0 million gallons per day or 10.8 second-feet, February and March, 1915 (gage height, 1.60 feet), and from 4 p. m. September 12 to 9.30 a. m. September 13, 1923 (gage height, 1.73 feet).

DIVERSIONS.—None.

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, part of water is diverted for irrigation of sugar cane, but most of it is wasted.

ACCURACY.—Stage-discharge relation changed for low and medium stages during flood of August 9. Two rating curves used well defined between 9 and 600 million gallons per day. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection, or for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good.

Discharge measurements of East Branch of North Fork of Wailua River near Lihue, Kauai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 2	1.93	29	18.7	Dec. 12	2.62	121	78
Sept. 17	1.80	16.5	10.7	Jan. 29	1.86	17.7	11.4
Oct. 29	2.20	52	33.5	May 4	2.08	41	26.5

Discharge, in million gallons per day, of East Branch of North Fork of Wailua River near Lihue, Kauai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	23	14.9	9.2	158	24	11.7	84	12.2	12.7	9.9	39	22
2	14.9	20	8.8	43	28	11.7	66	11.7	13.6	9.9	31	21
3	13.4	14.9	9.9	30	20	17.5	49	15.1	19.4	10.8	28	19.4
4	14.4	13.4	9.2	30	29	16.7	40	14.5	14.5	23	26	18.9
5	14.9	17.8	8.8	25	44	22	37	12.2	16.7	15.6	27	18.4
6	13.4	14.4	8.8	21	39	18.9	32	11.7	23	21	24	17.2
7	15.4	13.9	17.7	46	42	18.9	30	11.3	14.5	13.6	23	17.2
8	14.4	13.4	13.6	40	28	16.2	27	11.3	13.1	11.7	21	18.4
9	13.4	126	9.2	27	24	14.0	25	10.8	12.7	11.3	21	17.2
10	13.0	27	8.4	22	22	220	43	10.4	12.7	11.3	26	16.7
11	13.0	21	8.0	19.4	19.4	52	31	25	18.7	10.8	36	15.6
12	13.0	24	7.7	17.8	18.4	55	26	61	15.6	10.8	24	14.5
13	12.0	17.8	7.7	16.2	25	124	24	42	13.1	30	92	15.6
14	11.6	15.6	11.3	15.6	27	117	24	26	12.7	38	74	16.2
15	12.0	13.6	8.0	15.6	30	80	21	52	12.7	90	38	14.0
16	12.0	13.6	8.8	17.8	21	67	18.9	94	13.1	272	30	13.6
17	12.5	12.2	12.7	15.0	17.8	45	17.8	33	14.5	429	27	13.1
18	14.9	23	9.2	32	16.7	74	17.2	24	12.7	328	70	13.1
19	42	29	44	24	15.6	83	16.2	21	16.7	90	37	12.7
20	18.9	18.9	41	21	14.5	60	15.6	18.4	14.5	57	29	14.0
21	26	16.2	35	23	14.0	46	15.0	16.7	23	148	28	12.2
22	16.3	13.6	155	17.8	13.6	50	14.5	15.0	17.8	110	53	12.2
23	37	12.7	47	15.6	14.5	146	14.0	16.7	14.0	80	44	12.2
24	23	11.7	28	16.2	13.6	76	13.6	17.8	15.0	58	47	11.7
25	17.8	10.8	21	17.8	13.1	83	13.6	15.0	13.6	56	38	12.7
26	16.8	10.4	21	15.0	12.7	71	13.6	14.0	11.7	48	57	22
27	14.4	9.9	17.2	43	12.2	52	13.1	15.0	11.3	108	38	13.6
28	13.9	9.5	15.6	76	11.7	42	13.1	15.0	10.8	49	30	27
29	13.4	9.2	14.0	42	11.7	122	12.7	13.6	10.4	40	28	24
30	14.9	8.8	22	27	11.3	66	12.2	-------	9.9	34	26	25
31	13.9	9.2	-------	23	-------	64	12.2	-------	9.9	-------	24	-------

NOTE.—Record paper exhausted May 3; discharge interpolated.

Monthly discharge of East Branch of North Fork of Wailua River near Lihue, Kauai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	42	11.6	16.8	26.0	520	1,600
August	126	8.8	18.9	29.2	586	1,800
September	155	7.7	21.3	33.0	638	1,960
October	158	15.0	30.7	47.5	953	2,920
November	44	11.3	21.1	32.6	634	1,940
December	220	11.7	62.7	97.0	1,940	5,960
January	84	12.2	25.6	39.6	792	2,440
February	94	10.4	22.6	35.0	656	2,010
March	23	9.9	14.3	22.1	445	1,360
April	429	9.9	74.2	115	2,220	6,830
May	92	21	36.6	56.6	1,140	3,480
June	27	11.7	16.7	25.8	501	1,540
The year	429	7.7	30.1	46.6	11,000	33,800

KAPAHI DITCH NEAR KEALIA, KAUAI

LOCATION.—500 feet below intake and 5 miles west of Kealia.

RECORDS AVAILABLE.—April 15, 1909, to May 2, 1914; May 10, 1915, to June 30, 1924.

GAGE.—Stevens continuous water-stage recorder installed March 4, 1920. Stevens eight-day water-stage recorder used May 10, 1915, to March 3, 1920. Watson recorder used prior to May 10, 1915.

DISCHARGE MEASUREMENTS.—Made by 20-foot sharp-crested weir immediately below gage and by wading in ditch 50 feet below gage.

CHANNEL AND CONTROL.—Channel straight for 50 feet above weir.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 101 million gallons per day or 156 second-feet at 8.40 p. m. September 19 (gage height, 1.80 feet); minimum recorded during year, 0.3 million gallons per day or 0.5 second-foot from midnight December 11 to 7 a. m. December 12 (gage height, 0.05 foot.)

1915–1924: Maximum discharge recorded, 233 million gallons per day or 361 second-feet at 3 and 4 a. m. March 31, 1923 (gage height, about 3.15 feet); minimum recorded, no flow, when water is occasionally turned out of ditch.

DIVERSIONS.—All diversions below station.

REGULATION.—Flow regulated by head gates.

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

UTILIZATION.—Water used for irrigation of sugar cane and for domestic supply.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined. Operation of water-stage recorder satisfactory except for short period in June. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good.

Kapahi ditch diverts from Kapaa River at a point about 5 miles west 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 measurements of Kapahi ditch near Kealia, Kauai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 1	0.46	21.4	13.8	Dec. 11	0.12	1.1	0.7
Sept. 16	.32	10.7	6.9	Jan. 28	.32	10.7	6.9
Oct. 26	.35	13.0	8.4	May 3	.17	3.5	2.2

Discharge, in million gallons per day, of Kapahi ditch near Kealia, Kauai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	15.8	13.1	6.8	19.6	9.4	9.0	1.3	7.6	4.0	6.5	1.5	2.4
2	8.3	13.1	6.8	18.7	14.9	7.6	1.1	8.0	2.1	7.2	2.4	5.5
3	7.2	9.4	7.6	15.8	9.0	9.0	1.1	9.8	9.4	8.0	2.6	8.7
4	10.7	8.0	7.2	11.9	10.3	10.3	.9	9.4	12.3	10.7	2.6	8.7
5	10.3	11.4	7.2	11.1	19.6	14.5	1.1	8.7	10.7	9.4	2.9	8.7
6	9.0	8.0	7.2	11.9	16.3	11.9	1.1	8.0	8.7	11.9	2.9	8.7
7	13.6	10.3	17.7	9.8	12.7	6.2	1.7	8.0	5.5	8.7	3.2	8.7
8	9.4	9.8	13.1	17.7	12.3	3.4	2.6	7.6	4.6	8.0	5.2	8.3
9	9.4	32	7.6	15.8	11.4	.55	2.6	8.0	2.9	7.6	8.7	8.3
10	8.0	15.4	6.5	13.1	8.7	2.6	2.9	8.3	7.6	7.6	7.2	11.1
11	8.3	13.6	5.9	11.4	2.9	1.5	2.9	12.7	8.0	5.5	2.9	9.0
12	8.0	14.9	5.9	9.8	2.6	1.7	2.9	16.3	8.3	3.7	9.4	8.0
13	7.2	11.1	5.9	9.0	4.3	1.9	2.9	11.9	6.8	1.9	10.7	9.0
14	6.8	10.7	11.9	8.7	4.0	1.7	2.9	8.0	6.2	2.6	11.1	9.0
15	6.8	8.3	6.5	8.7	4.0	1.7	2.9	5.9	5.9	2.4	12.7	9.0
16	6.8	8.0	7.6	11.9	1.9	1.5	2.9	4.0	3.7	1.9	9.8	8.7
17	7.6	8.0	13.6	9.0	1.5	1.5	2.9	1.5	6.8	1.3	6.8	8.7
18	11.9	19.6	8.7	10.7	1.5	1.7	2.9	1.5	9.0	2.1	5.2	8.3
19	27.5	6.2	23.5	14.0	3.2	2.1	2.9	1.5	12.3	1.3	9.4	8.0
20	11.4	16.3	27	11.4	4.3	1.7	2.9	1.7	10.7	1.5	9.0	9.0
21	15.8	12.3	23.5	7.6	4.6	1.5	2.9	5.9	10.3	1.5	8.7	8.0
22	9.0	9.0	23	9.0	4.6	1.7	3.7	6.5	7.2	1.3	6.5	7.6
23	27.5	8.3	1.5	9.0	6.5	1.9	6.2	3.4	2.6	1.3	4.9	
24	12.3	7.6	12.3	10.3	5.5	1.5	7.6	2.1	9.0	1.3	3.4	
25	9.8	7.2	10.3	12.3	2.6	1.5	7.6	6.2	9.0	1.3	3.2	9.5
26	10.3	6.8	10.3	9.0	7.6	1.3	7.6	8.7	7.6	1.1	3.2	
27	8.0	6.8	9.4	15.4	8.3	1.3	7.6	9.0	6.8	1.1	4.6	
28	7.2	6.8	8.7	18.7	8.7	1.3	8.0	6.5	6.5	.9	4.6	24
29	6.8	6.5	8.0	13.6	8.7	1.7	7.6	5.5	6.2	1.1	3.4	10.3
30	9.0	6.2	17.3	9.8	8.3	1.3	7.6	-------	6.2	1.1	3.4	6.2
31	9.4	6.2	-------	8.7	-------	1.3	7.6	-------	6.2	-------	2.6	-------

NOTE.—Braced figure shows mean discharge for period indicated; estimated, because of lack of gage-height record, by comparison with flow of Anahola ditch.

Monthly discharge of Kapahi ditch near Kealia, Kauai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	27.5	6.8	10.6	16.4	329	1,010
August	32	6.2	10.7	16.6	331	1,020
September	27	1.5	11.0	17.0	328	1,010
October	19.6	7.6	12.0	18.6	373	1,150
November	19.6	1.5	7.34	11.4	220	676
December	14.5	.55	3.50	5.42	108	332
January	8.0	.9	3.85	5.96	119	366
February	16.3	1.5	6.97	10.8	202	620
March	12.3	2.1	7.20	11.1	223	685
April	11.9	.9	4.06	6.28	122	374
May	12.7	1.5	5.64	8.73	175	536
June	24	2.4	8.98	13.9	269	827
The year	32	.55	7.65	11.8	2,800	8,610

ANAHOLA RIVER NEAR KEALIA, KAUAI

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

RECORDS AVAILABLE.—August 22 to November 2, 1910, December 30, 1912, to June 30, 1924. Fragmentary record December 15, 1910, to December 28, 1912, at dam a quarter of a mile below present site.

GAGE.—Stevens continuous water-stage recorder installed March 14, 1920. Friez water-stage recorder used August 22 to November 2, 1910, and December 28, 1912, to March 7, 1920.

DISCHARGE MEASUREMENTS.—Made by wading.

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; shifts during floods.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 1,200 million gallons per day or 1,860 second-feet at 5.10 p. m. May 26 (gage height, 8.27 feet); minimum recorded during year, 1.4 million gallons per day or 2.2 second-feet, for several hours September 12–13 (gage height, 1.83 feet).

1910; 1912–1924: Maximum discharge recorded, from extension of rating curve, 1,450 million gallons per day or 2,240 second-feet at 7.30 p. m. September 26, 1915 (gage height, 12.9 feet); minimum recorded on September 12 and 13, 1923.

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

REGULATION.—None except by diversions.

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

UTILIZATION.—Water used for irrigation of sugar cane.

ACCURACY.—Stage-discharge relation changed July 4 owing to construction of dam on control by picnickers; changed also by floods of December 11 and 29, February 13, April 17, and May 13. Three rating curves used are well defined for ordinary stages; for high stages they are uncertain. Shifting-control method used December 11–29. Operation of water-stage recorder satisfactory except as noted in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records fair for ordinary stages; high-stage records subject to error.

Discharge measurements of Anahola River near Kealia, Kauai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 1	1.96	5.2	3.4	Jan. 28	2.00	8.4	5.4
Sept. 18	1.92	3.8	2.5	Mar. 17	1.82	6.1	4.0
Oct. 27	2.04	8.1	5.2	May 3	2.09	12.3	7.9
Dec. 11	2.40	11.8	7.6				

Discharge, in million gallons per day, of Anahola River near Kealia, Kauai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	6.1	5.1	1.5	101	6.2	6.2	59	4.0	4.8	2.8		9.5
2	3.4	8.2	1.6	20	10.6	5.3	42	4.0	4.8	2.8	10	9.2
3	3.0	3.5	1.9	9.3	6.6	7.8	30	7.8	5.2	2.8		10.4
4	3.0	2.8	1.6	7.8	18.4	6.9	23	9.3	4.8	7.1	6.6	9.5
5	2.2	3.5	1.6	6.9	17.6	12.5	19.0	4.2	6.1	4.1	6.6	8.0
6	2.0	3.0	1.6	7.8	13.3	10.6	17.0	3.5	9.4	6.0	5.9	7.6
7	2.3	2.5	11.6	10.9	13.3	7.8	15.1	3.3	5.0	3.9	5.3	7.3
8	2.5	3.5	4.5	10.9	8.2	5.9	13.8	3.0	4.3	3.2	4.7	7.8
9	2.3	31	1.9	6.9	7.5	5.9	12.0	3.3	4.1	7.6	4.5	7.6
10	2.5	4.5	1.8	5.3	10.4	92	16.5	2.8	4.1	20	5.3	7.0
11	2.3	3.3	1.5	4.5	8.9	8.9	11.1	21	10.2	7.6	5.6	6.8
12	2.0	3.5	1.5	3.7	7.8	9.6	10.0	53	5.4	6.8	4.7	6.6
13	2.0	2.8	1.8	3.3	12.8	61	9.3	15.7	4.1	56	52	6.0
14	2.0	3.0	11.3	3.3	27	53	9.3	14.4	3.7	34	24	6.0
15	4.0	2.8	2.5	3.3	74	20	8.9	18.0	3.9	27	10.4	5.6
16	4.2	5.4	4.0	3.7	25	11.5	7.8	24	3.9	63	7.6	5.4
17	4.0	2.8	3.7	3.5	15.6	7.2	7.5	13.9	4.0	118	7.0	5.6
18	2.8	15.8	2.5	26	12.0	41	7.2	8.3	4.1		12.1	5.2
19	15.8	9.6	6.8	10.5	9.6	37	6.9	7.0	3.7		6.8	4.8
20	4.5	5.6	14.5	5.6	8.5	19.0	6.6	6.3	3.5		6.3	4.8
21	5.9	3.7	24	7.6	6.9	15.1	6.2	6.0	8.4	30	10.2	4.3
22	4.0	3.0	13.0	5.9	6.6	14.6	5.9	6.3	5.8		58	3.9
23	12.4	2.5	15.3	4.5	6.9	38	5.6	6.0	3.7		65	3.7
24	6.4	2.5	4.7	8.6	6.6	18.5	5.3	7.3	3.7		36	3.9
25	3.7	2.2	3.5	6.2	5.6	36	5.3	5.8	3.4		20	4.3
26	3.0	2.2	3.3	5.3	5.9	22	4.7	5.2	3.0		135	11.1
27	2.5	2.0	3.3	5.3	5.3	11.5	4.7	5.2	2.8	12	42	4.3
28	2.2	1.9	3.0	27	5.0	8.9	4.7	5.4	3.7		22	9.1
29	2.2	1.9	3.3	34	4.5	50	4.5	5.2	2.8		15.3	8.3
30	2.2	1.9	6.2	6.9	4.5	51	4.2	-------	2.7		12.4	7.6
31	2.5	1.8	-------	5.6	-------	41	4.2	-------	2.7	-------	10.4	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow of Halaulani Stream.

Monthly discharge of Anahola River near Kealia, Kauai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	15.8	2.0	3.87	5.99	120	368
August	31	1.8	4.77	7.38	148	454
September	24	1.5	5.31	8.22	159	489
October	101	3.3	12.0	18.6	371	1,140
November	74	4.5	12.4	19.2	371	1,140
December	92	5.3	23.7	36.7	736	2,250
January	59	4.2	12.5	19.3	387	1,190
February	53	2.8	9.63	14.9	279	857
March	10.2	2.7	4.57	7.07	142	435
April	118	2.8	21.8	33.7	655	2,010
May	135	4.5	20.4	31.6	632	1,940
June	11.1	3.7	6.71	10.4	201	618
The year	135	1.5	11.5	17.8	4,200	12,900

ANAHOLA DITCH ABOVE KANEHA RESERVOIR, NEAR KEALIA, KAUAI

LOCATION.—At upper end of second tunnel above Kaneha Reservoir, 7 miles from Kealia.

RECORDS AVAILABLE.—December 9, 1921, to June 30, 1924. At station 100 feet upstream at lower end of third tunnel above reservoir May 29, 1915, to December 9, 1921. Flow at the two stations not exactly comparable owing to occasional operation of check gate and spillway between.

GAGE.—Stevens continuous water-stage recorder. At old station 100 feet upstream a Friez recorder was used from May 29 to June 26, 1915, a Stevens eight-day recorder from June 26, 1915, to April 10, 1920, and a Stevens continuous recorder from April 10, 1920, to December 9, 1921.

DISCHARGE MEASUREMENTS.—Made by wading.

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. Possible backwater effect from reservoir below.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 93 million gallons per day or 144 second-feet at 4 p. m. May 26 (gage height, 5.00 feet). Ditch dry several days during December and January and occasionally on a few other days during year.

1915–1924: Maximum recorded, 130 million gallons per day or 201 second-feet at 7.10 a. m. January 16, 1921 (gage height, 6.25 feet at old station) Water occasionally turned out of ditch so it does not flow into reservoir.

DIVERSIONS.—None except that occasionally excess water is diverted through spillway 50 feet above station.

REGULATION.—By operation of headgates and spillway gates.

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 sugar cane and for domestic supply in the vicinity of Anahola and Kealia.

ACCURACY.—Stage-discharge relation changed several times during year. Three fairly well defined rating curves used. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records fair to good.

Anahola ditch diverts water from Anahola River at a point about 3½ miles above gaging station and dam on the river at Kiokala and carries it southeastward for about 1½ miles to Kaneha Reservoir, where it is stored.

Discharge measurements of Anahola ditch above Kaneha Reservoir, near Kealia, Kauai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 1	1.90	15.2	9.8	Jan. 28	1.25	4.5	2.9
Sept. 18	1.34	4.6	3.0	Mar. 17	1.44	6.3	4.1
Oct. 27	1.48	7.6	4.9	May 3	1.54	9.4	6.1

Discharge, in million gallons per day, of Anahola ditch above Kaneha Reservoir, near Kealia, Kauai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	6.5	6.6	1.8	11.3	6.4	3.1	-------	2.7	2.3	1.9	7.9	3.2
2	2.0	6.5	1.8	8.6	9.0	3.1	-------	2.6	2.3	2.0	7.2	1.8
3	1.6	2.9	2.1	7.4	5.3	3.4	2.4	4.6	3.9	2.7	6.2	.6
4	2.0	2.9	1.8	4.8	8.5	3.2	2.9	5.0	2.6	6.2	5.6	2.8
5	2.2	4.4	1.8	4.5	12.4	3.2	2.8	3.0	3.2	3.8	5.4	4.4
6	1.6	2.3	1.7	4.8	11.6	3.1	2.7	2.7	4.6	6.5	5.0	4.1
7	2.7	4.7	8.3	4.9	10.4	3.0	2.6	2.6	2.8	2.9	4.8	4.0
8	2.1	4.6	3.5	4.3	7.1	2.9	2.5	2.5	2.3	2.4	4.4	5.1
9	3.0	11.1	2.6	4.5	3.8	2.9	4.5	2.5	2.2	2.4	4.7	4.4
10	2.3	4.4	2.6	4.5	2.0	1.0	7.6	2.4	2.2	6.8	5.7	5.2
11	1.7	3.9	2.2	4.0	1.9	-------	6.1	4.7	6.7	2.8	6.6	4.1
12	1.4	4.1	2.1	3.7	1.8	.8	5.8	9.0	3.4	3.7	6.0	3.7
13	1.3	4.3	2.8	3.4	2.5	1.1	5.2	7.8	2.8	17.8	8.0	4.1
14	1.2	3.9	7.1	3.0	5.0	.05	5.7	7.5	2.4	18.2	7.6	4.5
15	1.3	3.0	2.6	3.2	4.2	-------	2.4	7.4	2.9	10.3	7.2	3.4
16	1.4	4.6	6.7	3.7	2.0	-------	1.8	8.0	2.7	2.2	6.1	3.2
17	1.6	2.6	3.9	3.1	3.4	-------	3.3	6.7	3.5	2.2	5.4	3.3
18	6.5	13.0	3.2	12.9	3.1	-------	3.8	5.0	2.5	2.3	6.0	3.0
19	10.2	10.0	9.0	8.6	3.1	-------	3.6	4.0	2.8	2.3	5.8	2.9
20	4.8	6.8	10.7	6.0	3.5	-------	3.4	3.5	2.6	.3	4.8	3.5
21	6.4	4.2	9.0	8.8	3.7	-------	3.3	3.1	7.0	.2	6.2	2.9
22	3.2	3.4	14.5	7.0	3.6	-------	3.2	2.8	3.9	.1	3.0	2.7
23	11.5	3.0	11.0	4.6	4.3	-------	2.6	3.2	2.7	2.6	.3	2.6
24	5.7	2.7	6.3	8.5	3.6	.05	2.9	4.4	2.6	2.0	.3	2.6
25	3.4	2.3	4.5	7.1	3.1	.05	3.0	3.1	2.4	.4	5.1	3.4
26	2.7	2.2	4.0	4.9	3.1	-------	2.9	2.5	2.2	4.9	10.7	6.8
27	2.2	2.1	4.0	5.4	2.9	-------	2.9	2.5	2.2	8.5	3.5	3.2
28	1.9	1.9	3.2	14.1	2.9	-------	2.8	2.9	2.2	8.0	4.0	8.4
29	1.8	1.8	3.0	10.8	3.0	.05	2.8	2.5	2.0	8.0	4.2	9.4
30	2.2	1.9	8.6	6.4	2.9	.05	2.7	-------	1.9	7.6	4.0	8.0
31	3.6	1.8	-------	5.0	-------	-------	2.7	-------	1.9	-------	3.5	-------

NOTE.—No flow on days for which no discharge is given.

Monthly discharge of Anahola ditch above Kaneha Reservoir, near Kealia, Kauai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	11.5	1.2	3.29	5.09	102	313
August	13.0	1.8	4.32	6.68	134	411
September	14.5	1.7	4.88	7.55	146	449
October	14.1	3.0	6.25	9.67	194	595
November	12.4	1.8	4.67	7.23	140	430
December (17 days)	3.4	.05	1.83	2.83	31.0	95
January (29 days)	7.6	1.8	3.48	5.38	101	310
February	9.0	2.4	4.18	6.47	121	372
March	7.0	1.9	2.96	4.58	91.7	282
April	18.2	.1	4.73	7.32	142	435
May	10.7	.3	5.33	8.25	165	507
June	9.4	.6	4.04	6.25	121	372
The year (350 days)	18.2	.05	4.26	6.59	1,490	4,570

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 June 30, 1924.

GAGE.—Stevens continuous water-stage recorder.

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

CHANNEL AND CONTROL.—Recorder located 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 year, about 208 million gallons per day or 322 second-feet at 1 a. m. October 1 (gage height, 3.33 feet); a higher discharge may have occurred during period when recorder was not operating. Minimum discharge recorded, 0.85 million gallons per day or 1.3 second-feet from 3 to 7 p. m. September 6 and 6 to 8 a. m. September 7 (gage height, 0.55 foot).

1922–1924: Maximum discharge recorded, about 405 million gallons per day or 627 second-feet at 5.10 a. m. March 31, 1923 (gage height, 4.75 feet); minimum recorded on September 6 and 7, 1923.

DIVERSIONS.—None.

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 changed August 19, and on an unknown date during period December 18 to January 27 when recorder was not operating. Three rating curves used are well defined for ordinary stages; for high stages they are subject to error. Operation of water-stage recorder unsatisfactory at times. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good except those for high stages and those estimated.

Discharge measurements of Halaulani Stream near Kilauea, Kauai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 29	0.59	2.8	1.8	Dec. 10	1.52	22.4	14.5
Sept. 16	.56	1.45	.95	Jan. 27	.62	2.5	1.6
Do	.56	3.1	2.0	Mar. 13	.64	2.6	1.7
Oct. 26	.66	2.0	1.3	May 2	.74	4.3	2.8
Dec. 10	1.82	47	30.5				

Discharge, in million gallons per day, of Halaulani Stream near Kilauea, Kauai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	2.3	2.0	0.9	18.2	1.5			1.5	1.6	1.3	3.5	2.0
2	1.4	2.2	.9	3.6	1.2			1.4	1.8	1.3	2.6	2.0
3	1.3	1.6	.9	1.8	1.4			2.9	1.8	1.3	2.3	2.0
4	1.4	1.4	.9	1.4	2.8		6.5	2.2	1.6	9.4	2.1	1.9
5	1.4	1.6	.9	1.4	1.6	3.8		1.6		2.6	2.0	1.9
6	1.3	1.4	.9	1.4	1.8			1.6		2.5	2.0	1.7
7	1.3	1.6	2.8	1.6				1.5		1.8	1.9	1.7
8	1.3	1.7	1.2	1.8				1.4	2.2	1.6	1.9	1.8
9	1.3	7.8	.9	1.4				1.4		5.8	1.8	1.7
10	1.3	1.9	.9	1.2	1.4		2.7	1.4		5.3	2.0	1.6
11	1.3	1.7	.9	1.1		2.4		5.0		2.4	1.8	1.6
12	1.3	1.7	.9	1.0		2.3		7.2	1.9	2.5	2.9	1.6
13	1.2	1.6	.9	1.0		17.1		2.9	1.6	12.1	7.7	1.6
14	1.2	1.4	1.8	.9		9.7		2.9	1.6	16.5	4.8	2.0
15	1.3	1.4	.9	1.0		3.1		4.8	1.6	16.2	2.8	1.6
16	1.3	1.6	1.0	1.0	4.6	2.2		5.2	1.6	12.3	2.1	1.5
17	1.3	1.4	1.0	1.0		1.8		3.0	1.6	34	2.0	1.5
18	1.6	6.0	.9	4.4				2.2	1.6	18.6	2.8	1.4
19	3.7	3.2	1.8	2.4				2.0	1.6	6.1	2.0	1.4
20	1.8	2.0	2.1	1.6			1.8	1.7	1.6	4.3	1.9	1.5
21	2.2	1.5	3.8	2.0				1.6	2.0	11.6	3.1	1.3
22	1.7	1.2	3.1	1.6				1.6	1.7	5.0	9.8	1.3
23	4.9	1.1	3.3	1.3				1.7	1.5	3.9	17.8	1.3
24	2.6	1.0	1.4	1.8				1.8	1.5	3.3	6.1	1.4
25	1.8	1.0	1.2	1.5	1.6	5.0		1.7	1.3	3.2	4.0	1.4
26	1.6	1.0	1.1	1.3				1.6	1.3	3.1	16.3	2.4
27	1.4	1.0	1.1	2.2				1.8	1.4	4.5	5.3	1.5
28	1.4	.9	1.0	3.3			1.6	1.7	1.3	2.8	3.4	2.1
29	1.4	.9	1.0	1.4			1.6	1.6	1.3	3.0	2.8	2.1
30	1.4	.9	1.8	1.0			1.6	-------	1.3	2.5	2.4	2.4
31	1.4	.9	-------	1.0	-------		1.5	-------	1.3	-------	2.2	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow of Anahola River. Gage-height graph partly estimated Dec. 14–17.

Monthly discharge of Halaulani Stream near Kilauea, Kauai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	4.9	1.2	1.68	2.60	52.1	160
August	7.8	.9	1.83	2.83	56.6	174
September	3.8	.9	1.41	2.18	42.2	130
October	18.2	.9	2.18	3.37	67.6	207
November	-------	-------	2.38	3.68	71.5	219
December	-------	-------	4.73	7.32	147	450
January	-------	1.5	2.85	4.41	88.5	272
February	7.2	1.4	2.38	3.68	68.9	212
March	-------	1.3	1.70	2.63	52.8	162
April	34	1.3	6.69	10.4	201	616
May	17.8	1.8	4.07	6.30	126	387
June	2.4	1.3	1.71	2.65	51.2	157
The year	34	.9	2.80	4.33	1,030	3,150

HANALEI RIVER AT ELEVATION 625 FEET, NEAR HANALEI, KAUAI

LOCATION.—2 miles west of Kauai Electric Co.'s power line and 10 miles south of Hanalei. Trail to station leaves power line at pole No. 334.

RECORDS AVAILABLE.—January 26, 1914, to June 30, 1924.

GAGE.—Stevens continuous water-stage recorder moved 300 feet upstream on July 20, 1921.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

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; shifts during floods.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 4,000 million gallons per day or 6,190 second-feet at 3.45 p. m. April 15 (gage height, 7.37 feet); minimum recorded during year, 24 million gallons per day or 37 second-feet for several hours February 9–10 (gage height, 0.96 foot).

1914–1924: Maximum discharge recorded, from extension of rating curve, 6,500 million gallons per day or 10,100 second feet at 11.20 a. m. January 16, 1921 (gage height, 7.50 feet at old location); minimum recorded, 14 million gallons per day or 22 second-feet, January 6 and 10, 1918 (gage height, 0.35 foot).

DIVERSIONS.—None.

REGULATION.—None.

OBJECT OF STATION.—To determine feasibility of high-level diversion to Territorial agricultural lands. Territorial water.

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

ACCURACY.—Stage-discharge relation changed several times during year. Four fairly well defined rating curves used. Operation of water-stage recorder satisfactory except during May and part of June. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records fair.

Discharge measurements of Hanalei River at elevation 625 feet, near Hanalei, Kauai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 30	1.29	71	46	Mar. 12	1.15	63	40.5
Sept. 15	1.03	53	34.5	May 1	2.00	180	116
Dec. 9	1.15	66	42.5	June 10	1.10	46	30
Jan. 26	1.04	41.5	27				

Discharge, in million gallons per day, of Hanalei River at elevation 625 feet, near Hanalei, Kauai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	51	40	36	288	58	36	112	25	36	33		
2	32	50	36	112	62	36	90	25	41	33		
3	32	37	38	75	48	60	66	29	48	36		
4	37	37	36	62	78	47	54	29	38	59		
5	40	46	36	58	92	64	47	27	50	51		30
6	40	37	36	54	74	58	40	25	55	78		
7	40	37	45	132	80	63	40	25	41	41		
8	34	34	38	96	58	44	40	25	38	38		
9	32	60	36	66	51	44	37	23	36	36		
10	32	40	33	58	48	349	37	23	38	36		
11	32	44	33	51	44	122	44	56	61	36		27
12	30	46	33	48	41	129	37	155	41	36		29
13	30	43	36	48	56	232	34	73	38	68		29
14	27	37	50	44	71	222	37	54	38	207		34
15	30	48	33	44	70	169	34	80	41	739		27
16	30	40	33	48	51	157	32	123	44	436	60	27
17	37	34	36	41	44	94	32	58	44	353		27
18	46	66	33	76	41	160	29	48	38	276		27
19	94	105	123	59	38	164	29	44	41	111		27
20	50	58	82	54	38	130	29	41	48	119		39
21	52	48	157	67	36	89	27	38	49	220		27
22	37	41	571	51	36	84	27	38	41	105		27
23	118	38	114	44	41	231	27	44	38	93		27
24	57	38	66	44	36	120	27	44	38	70		25
25	46	36	54	55	38	138	27	38	36	78		29
26	43	36	54	44	38	109	27	36	36	74		49
27	37	36	48	68	38	66	27	44	33	153		29
28	37	36	48	180	38	54	27	38	33	75		65
29	34	36	44	113	38	102	25	38	33	66		47
30	40	36	91	62	36	76	25	-------	33	58		44
31	37	36	-------	54	-------	88	25	-------	33	-------		-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow of adjacent streams.

Monthly discharge of Hanalei River at elevation 625 feet, near Hanalei, Kauai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	118	27	42.4	65.6	1,310	4,030
August	105	34	43 7	67.6	1,360	4,160
September	571	33	70.3	109	2,110	6,470
October	288	41	74.1	115	2,300	7,050
November	92	36	50.6	78.3	1,520	4,660
December	349	36	114	176	3,540	10,800
January	112	25	38.4	59.4	1,190	3,650
February	155	23	46.4	71.8	1,350	4,130
March	61	33	40.6	62.8	1,260	3,860
April	739	33	127	196	3,810	11,700
May	----------	----------	60.0	92.8	1,860	5,710
June	65	25	32.1	49.7	962	2,960
The year	739	23	61.6	95.3	22,600	69,200

WAIOLI STREAM NEAR HANALEI, KAUAI

LOCATION.—3 miles above mouth of stream and 4 miles from Hanalei.

RECORDS AVAILABLE.—July 1, 1914, to June 30, 1924. Data from December 19, 1916, to June 30, 1918, have been revised in Water-Supply Paper 515.

GAGE.—Stevens continuous water-stage recorder.

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; shifting.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 640 million gallons per day or 990 second-feet at 12.15 a. m. April 16 (gage height, 5.16 feet); minimum recorded during year, 7.0 million gallons per day or 10.8 second-feet, for several hours June 16–19 and 22–23 (gage height, 1.48 feet).

1914–1924: Maximum discharge recorded, from extension of rating curve, 955 million gallons per day or 1,480 second-feet at 6.30 a. m. December 19, 1916 (gage height, 6.15 feet); minimum recorded, 2.0 million gallons per day or 3.1 second-feet, July 22, 1914 (gage height, 0.6 foot).

DIVERSIONS.—None.

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 diverted for irrigation of rice and taro.

ACCURACY.—Stage-discharge relation changed during flood of December 10. Two rating curves used well defined between 6 and 60 million gallons per day. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of day. Records good except those for high stages which are subject to error.

Discharge measurements of Waioli Stream near Hanalei, Kauai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 31	1.72	22.6	14.6	Jan. 27	1.53	11.5	7.4
Sept. 12	1.50	12.1	7.8	Mar. 13	1.64	15.8	10.2
Dec. 7	1.74	21.4	13.8	May 1	1.80	22.8	14.7

Discharge, in million gallons per day, of Waioli Stream near Hanalei, Kauai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	20	17.3	12.0	147	19.2	9.0	74	7.3	8.8	9.0	17.1	7.9
2	10.9	13.3	9.8	30	23	8.8	29	7.3	12.7	10.1	11.2	7.3
3	10.1	9.8	12.6	13.3	12.6	10.9	27	15.1	11.2	11.4	9.0	7.3
4	13.3	9.8	11.5	10.4	63	15.9	14.7	10.6	8.2	11.2	8.2	7.3
5	12.9	12.3	11.2	11.9	47	18.9	12.0	8.6	10.1	11.7	8.2	8.8
6	14.1	9.6	9.6	11.5	38	21	11.4	8.4	9.5	23	7.7	7.3
7	14.6	26	9.2	23	29	18.9	10 9	8.0	9.3	11.2	7.3	7.1
8	11.5	15.3	9.0	15.4	15.7	12.3	11.2	8.0	8.4	9.3	7.1	7.3
9	11.5	15.1	8.8	10.9	11.8	17.3	14.6	8.0	8.2	13.8	7.1	7.3
10	9.4	10.4	9.0	9.6	14.7	142	16.1	8.0	8.2	15.4	12.1	7.1
11	9.2	15.0	8.5	9.0	9.8	41	17.6	86	28	9.8	8.6	7.3
12	9.0	14.0	7.9	8.5	10.1	39	13.7	111	11.4	9.0	26	7.1
13	8.5	14.2	10.5	8.3	22	107	13.7	46	10.1	53	102	7.9
14	8.3	15.4	12.0	8.1	40	86	13.7	28	9.0	135	45	9.8
15	9.2	9.8	7.9	10.4	48	39	12.7	15.4	12.0	205	16.6	7.1
16	9.8	9.4	7.5	10.1	19.4	29	10.9	36	12.0	136	10.6	7.1
17	13.0	9.4	7.5	9.0	14.6	28	10.6	17.6	14.7	41	8.8	7.0
18	17.2	107	7.9	52	11.5	91	10.6	12.0	11.7	24	8.8	7.0
19	28	50	29	25	9.4	83	8.8	10.6	12.0	14.3	31	7.0
20	15.8	20	16.9	17.3	9.0	35	8.4	9.3	17.4	14.6	11.4	7.1
21	21	14.0	8.5	22	8.5	20	8.2	9.0	12.7	31	35	7.1
22	15.0	11.8	57	15.3	8.3	18.1	8.2	8.8	9.5	16.3	83	7.0
23	82	10.1	12.3	11.2	8.8	61	8.0	9.0	9.3	15.2	69	7.0
24	22	9.8	9.4	13.0	8.8	27	8.0	14.9	9.3	14.3	29	8.7
25	12.3	9.6	8.3	10.1	8.8	60	7.7	9.3	8.8	21	22	10.9
26	10.1	9.6	7.9	9.6	8.8	26	7.9	8.6	8.6	27	15.0	22
27	9.2	9.6	8.5	29	9.8	15.0	7.6	16.6	8.2	59	12.0	8.0
28	8.8	9.6	7.9	82	9.6	12.4	7.5	11.4	8.2	18.7	10.9	28
29	9.0	9.6	7.7	56	9.2	30	7.5	9.5	8.4	17.6	9.0	20
30	10.1	9.6	44	15.7	8.5	20	7.5	----	8.6	13.0	8.4	16.6
31	11.7	11.2	-------	12.9	-------	47	7.5	-------	8.2	-------	8.2	-------

Monthly discharge of Waioli Stream near Hanalei, Kauai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	82	8.3	15.1	23.4	468	1,440
August	107	9.4	16.7	25.8	518	1,590
September	57	7.5	13.0	20.1	390	1,200
October	147	8.1	23.1	35.7	718	2,200
November	63	8.3	18.6	28.8	557	1,710
December	142	8.8	38.4	59.4	1,190	365
January	74	7.5	13.8	21.4	427	1,310
February	111	7.3	19.3	29.9	558	1,720
March	28	8.2	10.7	16.6	333	1,020
April	205	9.0	33.4	51.7	1,000	3,080
May	102	7.1	21.5	33.3	665	2,050
June	28	7.0	9.48	14.7	284	873
The year	205	7.0	19.4	30.0	7,110	18,600

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, 1924.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from cable.

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; shifting.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 2,900 million gallons per day or 4,490 second-feet at 1.15 a. m. April 16 (gage height, 6.56 feet); minimum recorded during year, 24 million gallons per day or 37 second-feet for several hours September 17–18 (gage height, 1.05 feet) and June 19 and 21–23 (gage height, 1.00 feet).

1914–1917; 1920–1924: Maximum discharge estimated 5,000 million gallons per day or 7,740 second-feet at 4.30 p. m. September 11, 1922 (gage height, 9.41 feet); minimum recorded, 23 million gallons per day or 36 second-feet, at 7 p. m. June 29, 1922 (gage height, 0.64 foot), and at noon July 4, 1922 (gage height, 0.63 foot).

DIVERSIONS.—None.

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 gradually during period July 1–28 and during flood of December 10. Standard rating curve used July 1 to December 10, well defined between 20 and 200 million gallons per day; curve used December 11 to June 30, well defined between 18 and 220 million gallons per day. Shifting-control method used July 1–28. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day, except for period for which shifting-control method was used. Records good except those for high stages and those for period during which shifting-control method was used.

Discharge measurements of Lumahai River near Hanalei, Kauai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 28	1.16	52	33.5	Jan. 25	1.09	49	31.5
Sept. 13	1.06	34	22	Mar. 11	1.99	232	150
Dec. 8	1.23	52	33.5	Apr. 29	1.50	96	62

Discharge, in million gallons per day, of Lumahai River near Hanalei, Kauai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	55	42	30	646	69	28	243	28	32	31	54	32
2	35	39	29	145	70	28	96	28	41	33	44	31
3	32	33	33	57	47	31	124	32	41	36	40	30
4	39	33	32	44	259	42	64	29	33	33	37	29
5	40	38	30	41	225	48	51	28	36	32	38	32
6	41	33	28	38	127	56	46	28	36	88	36	29
7	43	59	27	84	114	61	42	28	32	44	35	28
8	36	52	27	54	62	38	41	27	29	36	34	28
9	34	46	26	41	48	48	40	27	29	33	33	28
10	31	36	26	35	51	557	43	27	28	32	41	28
11	30	51	26	33	40	288	54	417	84	30	39	27
12	29	47	25	31	40	303	44	631	44	29	41	26
13	28	51	31	30	52	558	46	221	38	125	468	28
14	28	54	35	28	67	558	50	90	34	517	270	32
15	30	41	26	31	76	524	43	59	44	1,250	132	26
16	29	39	26	30	51	237	39	137	54	944	59	25
17	32	35	25	28	43	126	39	59	60	286	46	25
18	40	204	25	165	38	307	37	45	48	163	40	25
19	88	137	116	81	35	409	35	40	52	70	43	25
20	52	62	68	55	33	186	33	36	64	59	40	26
21	62	46	50	67	32	76	32	34	52	146	50	25
22	43	40	418	49	31	59	32	34	40	70	246	24
23	212	36	56	39	32	295	31	36	36	53	139	25
24	73	34	40	38	30	110	30	62	34	48	120	27
25	46	33	33	35	30	121	29	40	31	60	70	33
26	39	32	32	33	30	92	29	34	29	89	73	83
27	35	30	30	171	31	59	29	47	29	381	50	30
28	33	30	28	483	30	48	29	38	28	88	44	117
29	31	28	27	287	30	99	28	35	29	64	38	83
30	32	29	162	71	28	64	28	-------	28	51	36	70
31	33	30	-------	52	-------	152	28	-------	31	-------	34	-------

Monthly discharge of Lumahai River near Hanalei, Kauai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	212	28	45.5	70.4	1,410	4,330
August	204	28	48.4	74.9	1,500	4,600
September	418	25	52.2	80.8	1,570	4,810
October	646	28	97.5	151	3,020	9,280
November	259	28	61.7	95.5	1,850	5,680
December	558	28	184	285	5,710	17,500
January	243	28	49.5	76.6	1,540	4,710
February	631	27	82.0	127	2,380	7,300
March	84	28	39.5	61.1	1,230	3,760
April	1,250	29	164	254	4,920	15,100
May	468	33	79.7	123	2,470	7,580
June	117	24	35.9	55.5	1,080	3,310
The year	1,250	24	78.3	121	28,700	88,000

MISCELLANEOUS MEASUREMENTS

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

Miscellaneous measurements on Kauai during the year ending June 30, 1924

Date	Stream	Tributary to—	Locality	Discharge	
				Second-feet	Million gallons per day
Jan. 30	Omou	Cane fields	At tunnel intake near Koloa	0.15	0.09
30	West Branch of Lawai	Pacific Ocean	At diversion flume, near Koloa.	.1	.08
30	East Branch of Lawai	do	At diversion near Koloa	.1	.07
30	Wahiawa	do	At pipe line near Koloa	.2	.15
Mar. 15	Pump No. 2	Cane field	Near Hanapepe	8.3	5.4
15	Lower rice ditch on right bank.	Rice lands	do	4.2	2.7
15	Pump No. 3	Cane fields	do	29.5	19.2
15	Taro ditch on right bank	Taro lands	do	.25	.15
15	Upper rice ditch on right bank.	Rice lands	do	1.55	1.0
15	Hanapepe	Pacific Ocean	Just below Makaweli ditch siphon near Hanapepe.	15.7	10.1
15	Ditch on right bank opposite diversion dam to Pump No. 3.	Taro lands	Near Hanapepe	.09	.06
15	Taro dam left bank	do	Just below Makaweli siphon near Hanapepe.	.2	.15
15	Ditch on left bank	Cane fields	Near Hanapepe	7.1	4.6
15	Hanapepe	Pacific Ocean	do	9.1	5.9
15	do	do	do	1.4	.9
15	Returns from fields on right bank below upper concrete dam.	Hanapepe River	do	.3	.2
15	Return flow from fields on right bank above upper dam.	do	do	1.3	.85
15	Lowest dam left on bank	Government lands	do	1.65	1.05
16	Pump No. 1	Cane fields	do	7.8	5.1
16	Return flow from fields	Hanapepe River	do	.65	.4
16	Rice dam on right bank	Rice fields	do	2.2	1.45
16	Hanapepe	Pacific Ocean	do	5.7	3.7

ISLAND OF OAHU

KALIHI STREAM NEAR HONOLULU, OAHU

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

RECORDS AVAILABLE.—September 6, 1913, to June 30, 1924.

GAGE.—Stevens continuous water-stage recorder installed September 21, 1923. Gurley 7-day water-stage recorder used June 25, 1918, to March 17, 1923, and June 3 to September 20, 1923. Au continuous water-stage recorder used March 18 to June 2, 1923. Friez recorder used September 8 to November 22, 1918, and Gurley printing recorder December 4, 1913, to June 25, 1918.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Water drops over a 10-foot fall into pool at gage. Channel is solid rock, with steep, high banks; two channels above gage height of 6.0 feet. High-water control, solid rock; low-water control, concrete dam completed January 11, 1919; shifts owing to deposition of gravel in pool above.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 1,170 million gallons per day or 1,810 second-feet at 6 p. m. December 30 (gage height, 11.76 feet); discharge may have been greater during period of no record April 15–27. Minimum recorded, 0.1 million gallons per day or 0.15 second-foot at 4 a. m. April 3 (gage height, 0.69 foot).

1913–1924: Maximum discharge estimated 1,250 million gallons per day or 1,930 second-feet, January 16, 1921 (gage height, 14.0 feet, determined from floodmarks); minimum recorded on April 3, 1924.

DIVERSIONS.—Catholic orphanage diverts water for domestic use into a 4-inch pipe (which is reduced by several stages to 1 inch at outlet) at a dam about 300 feet above station. Dam was installed May, 1920. Prior to this there were no diversions above station. During the period February 4 to June 7, 1924, the Honolulu water department completed several development tunnels about 1½ miles above station, which now supply water for upper Kalihi district. One of these tunnels diverts the entire low flow of a small tributary stream and it is possible that others divert ground water which formerly reached the stream.

REGULATION.—By diversion only.

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

ACCURACY.—Temporary changes in stage-discharge relation occurred as follows, owing to deposition of gravel in pool above control: 2 p. m. September 20 to noon September 21, 1 p. m. September 30 to 11.30 a. m. October 1, and 7 p. m. December 30 to 10 a. m. January 2. Standard rating curve well defined below 150 million gallons per day; extended above. Operation of water-stage recorder satisfactory except as noted in footnote to daily-discharge table. During period of no backwater daily discharge was ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. For periods during which backwater occurred daily discharge was ascertained similarly except that the gage-height graph was corrected, before entering rating table, by an amount derived from the plotting of individual discharge measurements with reference to the standard rating curve or from the observed fall in water surface caused by cleaning gravel from pool. Records good except those for extremely high stages and those estimated.

Discharge measurements of Kalihi Stream near Honolulu, Oahu, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day
Sept. 21	3.12	5.9	3.8
Jan. 2	1.79	15.3	9.9
Apr. 29	1.30	10.9	7.0

Discharge, in million gallons per day, of Kalihi Stream near Honolulu, Oahu, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	3.0	1.8	1.1	2.0	2.3	1.3	14.6	1.5	1.6	0.1	5.8	1.5
2	1.3	1.0	1.1	1.6	1.6	1.1	10.1	1.4	1.7	.1	5.6	
3	1.1	1.0	1.1	1.6	1.4	1.0	6.9	1.4	2.5	.2	4.9	.9
4	1.1	.9	1.1	1.6	2.4	2.4	5.6	1.5	3.6	.5	4.4	.9
5	1.1	.9	1.6	2.3	3.0	1.5	4.9	1.4	2.5	.2	4.3	.9
6	1.0	.9	1.1	7.2	2.2	2.1	4.3	1.3	2.0	4.8	4.0	.9
7	1.1	5.1	1.1	2.5	2.4	2.9	4.3	1.3	1.8	.7	3.8	1.0
8	1.0	16.1	1.0	3.0	1.7	1.6	3.9	1.4	1.6	.5	3.6	.9
9	1.0	3.1	1.1	2.1	1.7	1.4	3.8	1.3	1.6	.3	3.5	.9
10	.9	1.8	1.0	1.7	1.6	2.6	3.5	1.2	1.5	.2	3.5	1.0
11	1.0	3.2	.9	1.2	1.5	2.2	3.3	1.1	1.8	9.3	3.5	1.1
12	.9	1.9	1.0	1.1	1.5	12.7	3.1	2.6	1.5	1.4	2.9	1.2
13	1.0	1.6	2.6	1.0	2.4	12.1	3.5	4.9	1.4	.7	17.5	1.6
14	1.0	1.4	1.3	1.0	1.6	4.8	3.1	5.4	1.3	16.5	7.6	1.5
15	.9	1.2	1.1	1.1	1.6	44	2.9	3.1	1.3		5.5	1.1
16	.9	1.1	.9	1.1	1.7	9.9	2.7	3.3	1.2		3.8	1.0
17	1.3	1.1	.9	1.0	1.9	4.9	2.7	2.5	1.1			6.8
18	1.0	4.4	1.6	2.3	1.7	45	2.6	2.0	.8			1.6
19	1.6	8.0	10.2	3.0	1.6	14.6	2.4	1.7	.6			1.3
20	1.0	2.8	9.1	5.2	1.6	9.5	2.3	1.6	.5			.9
21	1.3	6.8	37	2.2	1.7	7.2	2.2	1.5	.4	35		.6
22	1.2	2.7	14.8	1.6	1.6	6.2	2.2	1.6	.3			.6
23	3.3	2.0	4.0	1.4	1.6	40	2.0	5.7	.3			.6
24	1.6	1.8	2.6	1.8	1.4		1.9	2.6	.6		2.3	.6
25	1.3	1.6	2.3	17.1	1.3		1.9	2.0	.3			.9
26	1.1	1.5	2.1	3.0	1.2	7.0	1.9	1.6	.3			.7
27	1.1	1.4	2.0	2.1	1.6		2.0	2.2	.3			.7
28	1.0	1.3	1.9	1.7	1.4		1.8	1.8	.3	7.2		.7
29	.9	1.3	1.8	2.8	1.2	16.5	1.7	1.6	.2	6.0		.8
30	.9	1.5	2.3	2.9	1.3	66	1.6	-------	.1	6.7		.7
31	.9	1.5	-------	1.9	-------	16.0	1.6	-------	.1	-------		-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow of Nuuanu Stream. Gage-height graph partly estimated Oct. 10–11 and Apr. 28–29. See under "Accuracy" in station description.

Monthly discharge of Kalihi Stream near Honolulu, Oahu, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	3.3	0.9	1.22	1.89	37.8	116
August	16.1	.9	2.67	4.13	82.7	254
September	37	.9	3.72	5.76	112	343
October	17.1	1.0	2.65	4.10	82.1	252
November	3.0	1.2	1.72	2.66	51.7	159
December	66	1.0	11.8	18.3	364	1,120
January	14.6	1.6	3.59	5.55	111	342
February	5.7	1.1	2.16	3.34	62.5	192
March	3.6	.1	1.13	1.75	35.1	108
April	-------	.1	17.0	26.3	510	1,570
May	17.5	-------	3.83	5.93	119	364
June	6.8	.6	1.18	1.83	35.4	109
The year	-------	.1	4.38	6.78	1,600	4,930

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 January 16, 1921, and September 12, 1921, to June 30, 1924. Station rebuilt September, 1921, after destruction by flood of January 16, 1921.

GAGE.—Stevens continuous water-stage recorder installed September 21, 1923. Gurley weekly water-stage recorder at same location September 12, 1921, to September 20, 1923, and at same location as old inclined staff, April 12, 1918, to August 7, 1920. Friez weekly water-stage recorder used August 7, 1920, to January 16, 1921. Datum practically unchanged.

DISCHARGE MEASUREMENTS.—Low-water discharge measured by 2-foot sharp-crested weir with end contractions; flood discharge measured by 12-foot sharp-crested weir with end contractions, which with flow over small weir, gives total flood discharge. Both weirs set in concrete. Crest of small weir is 1 foot lower than that of large weir. The weirs were reconstructed April 10-27, 1914, and September 12, 1921, but original dimensions were maintained.

CHANNEL AND CONTROL.—Channel originally in solid rock; has filled in considerably with gravel and silt; straight for about 75 feet above and below weir. Banks high and covered with vegetation.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 670 million gallons per day or 1,040 second-feet at 6.15 p. m. December 30 (gage height, 5.84 feet); minimum recorded during year, 0.2 million gallons per day or 0.3 second-foot at 12.30 a. m. August 7 (gage height, 0.16 foot).

1913–1924: Maximum discharge recorded, 1,600 million gallons per day or 2,480 second-feet January 16, 1921 (gage height, by leveling to flood-marks, 8.74 feet); minimum recorded, 0.07 million gallons per day or 0.11 second-foot, at 6 a. m. July 7, 1922 (gage height, 0.10 foot).

DIVERSIONS.—Most of low and medium stage flow is diverted above station for domestic supply and for development of power.

REGULATION.—Amount diverted above station varies.

OBJECT OF STATION.—To determine amount of water in the stream at this point in connection with investigations of water supply for city of Honolulu. Territorial land and water.

UTILIZATION.—Station measures waste water and seepage from Reservoirs Nos. 2, 3, and 4, and the Luakaha Weir. This waste water is used for irrigation.

ACCURACY.—Stage-discharge relation permanent during year except for backwater, May 1 to June 30, between recorder well and weir caused by heavy growth of hono-hono grass. Weir rating curve well defined below 200 million gallons per day; above that discharge water flows over weir wing walls, and the rating curve extension is subject to uncertainty. Operation of water-stage recorder satisfactory except during part of December. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection, or for days of considerable fluctuation in stage, by averaging discharge for intervals of the day; for period of backwater from hono-hono grass, the gage-height graph was corrected for backwater effect and the discharge then obtained as above. Records good except those estimated which are subject to some error.

The following discharge measurement was made:

September 21, gage height, 0.26 foot; discharge, 0.6 second-foot or 0.4 million gallons per day.

Discharge, in million gallons per day, of Nuuanu Stream below Reservoir No. 2 wasteway, near Honolulu, Oahu, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	0.65	0.4	0.3	0.4	0.55	0.4	8.6	0.9	0.5	0.4	7.4	3.0
2	.65	.35	.3	.4	.5	.4	6.1	.65	.8	.4	7.1	3.2
3	.55	.35	.25	.4	.5	.45	5.1	.9	1.4	.65	6.5	2.9
4	.55	.35	.3	.4	.6	.5	3.5	.85	1.1	.55	6.7	2.6
5	.65	.35	.25	.4	.85	.45	3.0	.6	.85	.4	6.9	2.4
6	.55	.35	.25	.5	.65	.55	2.8	.6	.75	1.4	6.7	2.3
7	.55	.4	.3	.45	.6	.7	2.9	.75	.8	.55	6.1	2.4
8	.5	3.6	.35	.55	.5	.6	2.7	.7	.8	.5	5.9	2.4
9	.45	.7	.35	.4	.5	.5	3.0	.5	.7	.4	5.9	2.2
10	.5	.4	.3	.35	.5	.5	2.7	.5	.55	.4	5.8	2.2
11	.5	.5	.25	.35	.45		2.4	.65	.6	1.4	5.5	2.2
12	.45	.45	.3	.35	.4		2.2	1.1	.55	.7	5.3	2.2
13	.55	.4	.6	.35	.55		2.3	1.3	.6	.7	10.9	2.6
14	.5	.4	.35	.35	.55		2.2	1.4	.6	2.2	7.6	2.4
15	.45	.3	.3	.4	.4		2.4	1.1	.5	10.0	6.3	2.1
16	.45	.3	.3	.4	.4		2.4	1.2	.5	5.4	5.9	1.8
17	.5	.3	.25	.4	.45		2.1	.95	.55	91	5.9	2.4
18	.4	.55	.35	.5	.5		1.3	.75	.55	12.6	5.5	1.1
19	.45	.75	.9	.9	.4	{13	1.5	.55	.55	6.7	5.3	2.1
20	.4	.5	.75	.95	.4		1.7	.5	.5	5.9	5.3	1.4
21	.4	.45	.75	.65	.4		1.5	.6	.5	33	4.9	1.2
22	.35	.4	1.6	.55	.4		1.1	.8	.45	69	4.9	1.1
23	.8	.35	.65	.45	.45		1.1	3.7	.5	12.2	4.9	.9
24	.5	.3	.55	.5	.4		1.2	.95	.75	9.9	4.7	.65
25	.45	.3	.5	4.8	.4		1.1	.8	.5	15.7	5.1	.9
26	.4	.3	.4	1.1	.55		.9	.8	.5	8.8	5.7	.8
27	.4	.3	.4	.75	.5		.85	.9	.5	9.3	4.5	.65
28	.4	.3	.4	.55	.45	3.0	.9	.65	.5	8.1	4.5	.55
29	.3	.3	.4	.6	.4	3.7	.85	.55	.4	7.6	4.0	.65
30	.35	.3	.4	.6	.4	61	.9	-------	.4	8.1	2.6	.8
31	.35	.3	-------	.5	-------	17.4	1.0	-------	.4	-------	2.7	-------

NOTE.—Braced figure shows mean discharge for period indicated; estimated, because of lack of gage-height record, by comparison with flow of Kalihi Stream and rainfall records at Luakaha (lower). Gage height partly estimated Dec. 28.

Monthly discharge of Nuuanu Stream below Reservoir No. 2 wasteway, near Honolulu, Oahu, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	0.8	0.3	0.482	0.746	15.0	46
August	3.6	.3	.494	.764	15.3	47
September	1.6	.25	.445	.689	13.4	41
October	4.8	.35	.653	1.01	20.2	62
November	.85	.4	.487	.754	14.6	45
December	61	.4	10.0	15.5	311	955
January	8.6	.85	2.33	3.61	72.3	222
February	3.7	.5	.903	1.40	26.2	80
March	1.4	.4	.618	.956	19.2	59
April	91	.4	10.8	16.7	324	994
May	10.9	2.6	5.71	8.83	177	543
June	3.2	.55	1.80	2.79	54.1	166
The year	91	.25	2.90	4.49	1,060	3,260

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 at confluence of Right and Left Branches, or two main branches, of North Fork of Kaukonahua Stream, 8 miles northeast of Wahiawa.

RECORDS AVAILABLE.—May 29, 1913, to June 30, 1924.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge 20 feet upstream from gage.

CHANNEL AND CONTROL.—Channel is a straight stretch 200 feet long that has been cleared of boulders. Banks steep and flow well distributed and confined. Natural control of large boulders has been improved somewhat for low-water stages.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 775 million gallons per day or 1,200 second-feet at 1.25 a. m. September 22 (gage height, 7.58 feet); minimum recorded during year, 0.4 million gallons per day or 0.6 second-foot from 4 to 10 p. m. February 9 (gage height, 1.21 feet).

1913–1924: Maximum discharge from extension of rating curve, 985 million gallons per day (revised determination) or 1,520 second-feet at 3 a. m March 26, 1920 (gage height, 9.0 feet, determined from floodmarks and comparison with Left Branch record); minimum mean daily discharge, 0.2 million gallons per day or 0.3 second-foot March 24 and 28, 1914.

DIVERSIONS.—None.

REGULATION.—None.

OBJECT OF STATION.—To determine amount of water taken from Territorial lands by Wahiawa Water Co. Water rises on Territorial lands.

UTILIZATION.—Wahiawa Water Co.'s ditch 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. All water, except the low flow, from North Fork is impounded in Wahiawa Reservoir for irrigation of sugar cane on Waialua plantation.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined below 30 million gallons per day; extended for high stages on basis of form of previous curves. Operation of water-stage recorder satisfactory except for a few short periods. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good except for high stages.

Discharge measurements of Right Branch of North Fork of Kaukonahua Stream near Wahiawa, Oahu, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 27	1.58	4.1	2.6	Jan. 3	1.94	10.6	6.8
Sept. 13	2.32	27	17.3	Feb. 29	1.30	.9	.6
Sept. 27	1.58	3.9	2.5	Apr. 21	2.07	15.1	9.8
Nov. 22	1.39	1.75	1.1				

Discharge, in million gallons per day, of Right Branch of North Fork of Kaukonahua Stream, near Wahiawa, Oahu, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	6.2	3.5	1.3	2.4	2.2	1.6	29	0.6	0.6	0.6	8.8	1.9
2	3.3	3.2	1.1	1.8	3.1	2.6	11.4	.6	4.2	.6	10.6	1.7
3	2.9	2.1	1.0	1.6	2.4	6.0	6.8	.8	13.3	3.8	4.5	1.6
4	2.9	4.2	1.0	1.8	11.3	4.4	5.6	.6	2.7	7.5	6.7	1.4
5	6.0	2.4	1.0	4.5	22	2.6	4.8	.5	7.8	1.2	9.1	1.3
6	3.3	1.7	1.2	5.6	5.7	6.6	4.3	.5	2.3	7.5	6.5	1.3
7	3.1	5.8	1.7	10.1	6.9	25	4.1	.5	2.2	1.9	4.1	1.1
8	2.1	3.9	1.1	10.4	5.3	6.5	3.7	.5	1.8	1.7	4.2	1.0
9	1.9	2.7	1.6	2.9	3.6	3.6	5.5	.5	1.7	1.1	9.1	1.0
10	1.7	1.8	1.2	2.1	3.2	3.8	4.3	.4	1.4	.8	21	.9
11	3.2	5.1	1.0	1.7	2.6	8.7	3.3	.4	1.8	1.6	15.6	.9
12	1.9	5.6	.8	1.6	2.2	21	2.9	15.6	1.4	1.8	5.2	1.2
13	4.2	2.7	15.0	1.4	4.1	14.8	2.8	8.7	1.1	11.0	25	1.4
14	3.3	1.8	2.7	1.3		5.0	3.0	12.6	1.0	187	11.3	2.6
15	1.7	1.6	1.2	2.0		7.5	2.4	4.3	1.0	106	5.7	1.0
16	1.5	1.4	.9	2.0		9.7	2.2	8.3	1.2	41	4.5	.8
17	13.4	1.3	.8	1.3	1.7	3.8	2.1	2.1	1.0	185	4.1	16.7
18	2.9	7.8	1.8	3.6		41	1.9	1.4	.8	68	5.7	1.7
19	8.2	29	16.0	4.7		17.9	1.7	1.1	1.0	19.7	3.8	8.7
20	2.6	4.4	17.4	8.2		13.0	1.6	.8	1.3	11.6	3.1	3.4
21	3.0	2.6	75	11.0		8.1	1.4	.8	1.0	44	2.8	1.3
22	3.1	2.2	90	4.3	1.2	12.0	1.3		.8	36	4.6	1.0
23	17.9	1.7	8.1	2.4	4.1	29	1.2		.7	11.9	4.1	.9
24	4.1	1.7	4.8	9.8	1.4	40	1.0		14.2	8.6	2.8	.7
25	3.5	1.5	3.5	29	1.9	9.3	1.0	2.5	1.6	18.2	11.2	3.4
26	3.8	1.4	3.7	5.6	5.2	7.0	.9		2.0	6.8	14.7	4.1
27	2.7	1.3	2.7	3.5	2.2	5.6	.8		1.6	14.3	3.5	1.1
28	2.3	1.3	2.5	5.6	1.7	4.8	.8		1.0	5.5	2.8	2.0
29	2.3	1.2	2.1	8.2	1.8	4.2	.7	.7	.8	4.5	2.5	1.3
30	2.2	1.1	3.4	3.4	3.3	15.0	.7	-------	.7	7.6	2.2	1.6
31	1.9	2.0	-------	2.5	-------	29	.6	-------	.7	-------	2.0	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow at Left Branch station. Gage-height graph partly estimated Nov. 13, 22, Feb. 12, 16, 29, Apr. 20 and 21. Discharge interpolated June 1-3.

Monthly discharge of Right Branch of North Fork of Kaukonahua Stream near Wahiawa, Oahu, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	17.9	1.5	3.97	6.14	123	378
August	29	1.1	3.55	5.49	110	338
September	90	.8	8.85	13.7	266	815
October	29	1.3	5.04	7.80	156	480
November	22	----------	3.70	5.72	111	341
December	41	1.6	11.9	18.4	369	1,130
January	29	.6	3.67	5.68	114	349
February	15.6	----------	2.75	4.25	79.8	245
March	14.2	.6	2.41	3.73	74.7	229
April	187	.6	27.2	42.1	817	2,510
May	25	2.0	7.15	11.1	222	681
June	16.7	.7	2.30	3.56	69.0	212
The year	187	----------	6.86	10.6	2,510	7,710

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

LOCATION.—100 feet above intake of Wahiawa Water Co.'s tunnel which is at confluence of Right and Left Branches, or two main branches, of North Fork of Kaukonahua Stream, 8 miles northeast of Wahiawa.

RECORDS AVAILABLE.—May 25, 1913, to June 30, 1924.

GAGE.—Au continuous water-stage recorder installed June 7, 1923. Prior to that date Stevens continuous water-stage recorder was used.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel straight for 100 feet above and below gage; fairly uniform in cross section with high, wooded banks; one channel at all stages. Stream bed composed of boulders and gravel. Control composed of large boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 1,850 million gallons per day or 2,860 second-feet at 12.25 a. m. September 22 (gage height, 7.95 feet); minimum recorded during year, 0.3 million gallons per day or 0.45 second-foot from 5 to 6 p. m. February 11 (gage height, 0.85 foot).

1913–1924: Maximum discharge recorded, from extension of rating curve, 4,080 million gallons per day or 6,310 second-feet at 5 a. m. January 14, 1923 (gage height, 10.3 feet); minimum recorded, 0.1 million gallons per day or 0.16 second-foot at 4 a. m. February 18 and 11.30 p. m. March 5, 1920.

DIVERSIONS.—None.

REGULATION.—None.

OBJECT OF STATION.—To determine amount of water diverted from Territorial land by Wahiawa Water Co. Water all rises on Territorial lands.

UTILIZATION.—Wahiawa Water Co.'s tunnel diverts entire low-water flow of both Right and Left Branches of North Fork, for domestic water supply and irrigation in vicinity of Wahiawa. All water, except the low flow, from North Fork of Kaukonahua Stream is impounded in Wahiawa Reservoir for irrigation of sugar cane on Waialua plantation.

ACCURACY.—Stage-discharge relation changed July 19, September 9 and 21, November 4, and February 16. Three rating curves used well defined for ordinary stages; extended for high stages on basis of form of old high-water curve which was based on a slope determination at gage height of 8.82 feet. Shifting-control method used July 19 to September 9. Operation of water-stage recorder satisfactory except during December. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good except those estimated.

Discharge measurements of Left Branch of North Fork of Kaukonahua Stream near Wahiawa, Oahu, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 27	1.51	6.1	3.9	Jan. 3	1.54	11.4	7.4
Sept. 13	1.95	32	20.7	Feb. 29	1.09	2.9	1.85
Sept. 27	1.34	8.7	5.6	Apr. 21	1.53	14.2	9.2
Nov. 22	1.16	2.1	1.4				

Discharge, in million gallons per day, of Left Branch of North Fork of Kaukonahua Stream, near Wahiawa, Oahu, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	7.0	5.6	1.8	5.6	3.6	1.6	25	0.9	1.7	0.6	15.1	3.2
2	3.7	6.7	1.6	3.6	5.5	1.6	.8	16.9	.6	10.4	3.0	
3	3.6	5.8	1.8	3.2	4.8	7.8	.8	27	3.7	6.2	2.8	
4	3.7	6.5	1.6	3.8	16.6	6.2	.8	13.3	5.4	6.1	2.7	
5	4.0	4.7	1.6	6.2	24	5.3	.9	19.6	1.6	6.6	2.6	
6	2.9	3.4	1.9	14.3	5.6	4.5	.7	6.0	10.0	5.6	2.4	
7	3.2	13.6	1.6	11.4	14.2	4.2	.6	4.8	2.4	4.4	2.4	
8	2.3	15.3	1.4	26	6.8	3.7	.5	3.4	1.9	8.5	2.2	
9	2.1	5.3	32	6.2	4.9	5.9	.4	2.7	1.4	15.6	2.2	
10	1.9	4.2	4.5	4.4	4.5	4.1	.4	2.5	1.2	21	2.0	
11	8.2	15.6	2.8	3.8	3.3	3.0	.3	3.2	2.2	17.8	1.9	
12	2.7	7.8	2.3	3.5	2.8	2.9	17.8	2.3	2.4	7.4	2.4	
13	11.6	4.7	19.6	3.0	5.0	3.0	11.8	2.0	3.1	27	3.3	
14	5.1	3.4	5.1	2.8	2.8	2.8	17.0	1.8	99	16.6	9.4	
15	3.2	4.7	2.9	7.4	2.4	2.3	5.4	1.6	50	8.4	2.5	
16	2.7	3.3	2.6	4.8	3.1	15	2.1	14.0	1.8	31	6.6	2.5
17	10.0	2.9	2.6	2.9	2.0	2.0	4.0	1.6	270	5.8	21	
18	9.9	14.9	6.2	5.7	1.9	1.9	2.4	1.5	73	10.6	3.0	
19	14.6	23	25	7.2	1.9	1.8	1.9	1.6	17.8	5.8	4.0	
20	5.4	4.7	29	13.2	1.8	1.7	1.7	2.1	10.9	4.6	3.4	
21	9.1	3.4	163	9.4	1.7	1.6	1.6	1.6	54	4.1	2.0	
22	8.0	3.2	93	8.3	1.6	1.6	1.4	1.3	37	6.3	1.8	
23	19.2	2.9	11.7	4.4	4.0	1.4	8.5	1.1	12.7	8.9	2.1	
24	6.0	2.6	7.9	8.8	1.8	1.3	1.9	12.3	9.2	4.8	1.6	
25	5.1	2.3	6.2	30	1.6	1.3	1.5	1.9	16.0	12.6	5.1	
26	5.1	2.2	8.9	7.2	2.8	1.2	1.3	1.5	8.6	17.2	8.6	
27	3.9	2.1	5.4	5.0	2.6	1.2	10.6	1.5	14.8	5.8	2.3	
28	3.7	2.0	4.6	7.2	2.0	1.1	3.4	1.3	7.2	4.4	4.9	
29	6.5	1.9	4.0	10.9	1.9	1.0	1.9	.9	6.0	4.1	2.4	
30	4.5	1.8	6.9	6.2	2.8	1.0	-------	.7	11.4	3.8	2.6	
31	3.4	2.9	-------	4.1	-------	1.0	-------	.6	-------	3.5	-------	

NOTE.—Braced figures show mean discharge for periods indicated; estimated because of lack of gage-height record, by comparison with flow at Right Branch station.

Monthly discharge of Left Branch of North Fork of Kaukonahua Stream, near Wahiawa, Oahu, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	19.2	1.9	5.88	9.10	182	559
August	23	1.8	5.92	9.16	183	563
September	163	1.4	15.3	23.7	460	1,410
October	30	2.8	7.76	12.0	240	738
November	24	1.6	4.68	7.24	140	430
December	----------	1.6	14.1	21.8	438	1,340
January	----------	1.0	4.16	6.44	129	396
February	17.8	.3	3.97	6.14	115	354
March	27	.6	4.58	7.09	142	436
April	270	.6	25.5	39.5	765	2,350
May	27	3.5	9.21	14.2	286	876
June	21	1.6	3.74	5.79	112	345
The year	270	.3	8.73	13.5	3,190	9,800

MISCELLANEOUS MEASUREMENTS

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

Miscellaneous measurements on Oahu during the year ending June 30, 1924

Date	Stream	Tributary to	Locality	Gage height	Discharge	
					Second-feet	Million gallons per day
				Feet		
Aug. 13	Kailua		Near Kailua	0.61	4.5	2.9
25	do		do	.59	3.5	2.2
13	Kawainui ditch		do	.56	5.6	3.6
13	do		do	.46	3.9	2.5
25	do		do	.57	5.4	3.5
25	do		do	.52	4.4	2.9
Sept. 7	Luluku		Near Kaneohe		.9	.6
7	North Luluku ditch		do		2.0	1.3
Aug. 29	Hiu	Waianae Stream	Near Waianae, at elevation 830 feet.		.2	.1
29	Waianae		Near Waianae, at mountain house.		3.0	1.95
29	Tunnel No. 2		Near Waianae, at trail crossing.		.6	.4
29	Hiu	Waianae Stream	Near Waianae, at elevation 1,500 feet.		.95	.6
29	Tunnel No. 3		Near Waianae, at mouth		.3	.2
29	Waianae		Near Waianae, at power house.		.25	.15
29	Waianae ditch		Near Waianae, at elevation 430 feet.		3.6	2.3
Sept. 28	Palolo tunnel		Near Honolulu, at Palolo Valley.		.4	.25
28	Palolo		Near Honolulu, at tunnel development.		.3	.2
Oct. 1	Kalihi	Pacific Ocean	Near Honolulu, at forest line boundary.		1.95	1.25
1	Waikalau	Manoa Stream	Near Honolulu, at forest line fence.		.7	.45
	Government springs:					
Feb. 2	Kawalloa		Near Kailua		.09	.06
2	Kahanaiki, South Branch.		do		.15	.1
2	Kahanaiki, North Branch.		do		.55	3.5
2	Pohakea (2 branches)		do			[a].1
2	Kamakalepo		do	3.72	1.15	.75
2	Kaimi		do		1.95	1.25
2	Makawao		do		1.7	1.1

[a] Estimated.

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, 1924. For old station 500 feet upstream, August 28, 1917, to June 24, 1923.

GAGE.—Stevens continuous water-stage recorder at both old and new locations.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Recorder located at lower end of pool about 60 feet long at foot of steep rapids. One channel at all stages; banks not subject to overflow. Control formed of rocks and small boulders grouted in place; shifts slightly owing to encroachment of hono-hono grass.

At old location stream was confined to one channel at all stages; straight for 150 feet above and 100 feet below gage. Control composed of large boulders; shifting.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 470 million gallons per day or 727 second-feet, at midnight September 29 (gage height, 7.10 feet); minimum recorded during year, 2.4 million gallons per day or 3.7 second-feet, at midnight September 8 (gage height, 1.03 feet).

1917–1924: Maximum discharge recorded, about 1,550 million gallons per day or 2,400 second-feet, at 10 a. m. March 31, 1923 (gage height, 11.65 feet); minimum recorded, 0.8 million gallons per day or 1.2 second-feet, October 13–15 and 19, 1917 (gage height, 0.35 foot, on old gage).

DIVERSIONS.—None.

REGULATION.—None.

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

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

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined below 100 million gallons per day. Operation of water-stage recorder satisfactory except during April and May. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good except those for extremely high stages and those estimated.

Discharge measurements of Halawa Stream, near Halawa, Molokai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 9	1.30	11.4	7.4	Feb. 15	2.77	127	82
Sept. 26	1.29	7.8	5.0	Apr. 2	1.09	4.8	3.1
Jan. 2	1.64	30	19.4	May 21	1.37	14.7	9.5

Discharge, in million gallons per day, of Halawa Stream, near Halawa, Molokai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	23	9.6	3.9	10.9	8.1	4.6	17.5	3.1	7.2			4.6
2	7.8	5.6	3.2	7.2	7.2	5.1	19.8	3.1	31			4.7
3	5.1	6.0	2.8	6.3	6.5	6.3	19.8	3.0	24	5.5		4.4
4	10.2	6.7	2.6	12.4	14.7	23	14.8	3.2	36			4.0
5	7.5	8.1	3.7	11.9	101	8.1	9.9	3.1	19.8			3.7
6	7.0	4.9	3.0	37	38	38	8.7	3.0	9.6			4.2
7	7.0	31	3.1	11.2	23	49	8.1	2.8	7.5		20	4.2
8	7.8	17.9	2.6	37	21	19.3	7.8	3.0	6.3			3.5
9	19.1	7.0	12.2	9.9	32	11.6	8.1	3.0	5.8			3.4
10	6.5	5.8	4.2	7.5	12.6	85	7.5	2.7	5.4			3.4
11	15.3	7.2	2.8	6.3	11.6	38	6.5	2.6	5.1			3.1
12	11.2	22	2.7	5.6	9.9	98	6.0	73	4.7	30		2.8
13	39	7.8	14.2	5.4	44	63	6.0	138	4.6			38
14	10.9	5.8	5.4	4.6	10.2	41	10.9	49	4.2			12.6
15	8.1	4.9	3.7	7.2	28	99	7.0	64	4.0			7.8
16	7.0	4.6	3.0	31	36	31	5.8	30	4.7		50	5.1
17	14.4	4.0	2.7	16.1	11.6	22	5.8	38	4.6			22
18	7.5	45	3.9	12.1	9.3	139	6.0	11.6	4.0			6.3
19	7.8	11.9	56	75	7.2	102	5.6	8.4	5.8			4.7
20	5.8	7.2	22	35	7.0	24	4.7	6.7	6.3		9.5	4.6
21	5.4	21	96	50	8.7	19.8	4.6	5.8	5.1			3.7
22	7.7	14.5	22	25	6.7	16.3	4.4	5.6	4.0		8.4	3.2
23	21	7.0	9.3	11.6	13.5	13.6	4.0	8.7	3.5		8.7	3.2
24	6.5	5.6	6.7	9.3	6.3	64	4.0	5.8	3.7	25	9.3	3.1
25	5.6	4.7	6.5	11.2	5.4	79	3.9	6.0	3.7		10.2	18.2
26	4.9	4.4	7.5	7.8	10.4	19.8	3.5	7.2	5.8		16.3	6.0
27	4.7	4.0	5.6	22	9.6	15.6	3.5	6.0	4.9		9.9	4.4
28	4.4	3.7	10.5	33	7.8	11.9	3.5	5.4	60		6.7	4.2
29	5.1	3.4	36	16.3	6.7	11.9	3.2	4.9	9.6		5.8	3.5
30	8.7	3.2	56	24	5.1	13.6	3.2	-------	4.9		5.4	12.4
31	11.2	5.9	-------	10.9	-------	19.8	3.2	-------	4.2	-------	4.9	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated because of lack of gage-height record, by comparison with flow of Papalaua Stream.

Monthly discharge of Halawa Stream, near Halawa, Molokai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	39	4.4	10.1	15.6	313	961
August	45	3.2	9.69	15.0	300	922
September	96	2.6	13.8	21.4	414	1,270
October	75	4.6	18.4	28.5	571	1,750
November	101	5.1	17.3	26.8	519	1,590
December	139	4.6	38.5	59.6	1,190	3,660
January	19.8	3.2	7.33	11.3	227	697
February	138	2.6	17.5	27.1	507	1,560
March	60	3.5	10.0	15.5	310	951
April	----------	----------	23.9	37.0	718	2,200
May	----------	----------	21.1	32.6	654	2,010
June	38	2.8	6.97	10.8	209	641
The year	139	2.6	16.2	25.1	5,930	18,200

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 6½ miles due north of Pukoo village.

RECORDS AVAILABLE.—September 17, 1919, to June 30, 1924.

GAGE.—Stevens continuous water-stage recorder installed May 22, 1920. Prior to that date Gurley printing water-stage recorder was used.

DISCHARGE MEASUREMENTS.—Made by wading or from suspension footbridge near station.

CHANNEL AND CONTROL.—Bed, rocky and boulder strewn. Banks high and rocky. Control composed of large boulders and gravel; shifts during floods.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 860 million gallons per day or 1,330 second-feet at 3 p. m. September 21 (gage height, 7.17 feet); minimum recorded during year, 1.4 million gallons per day or 2.2 second-feet at 9.30 p. m. February 11 (gage height, 0.71 foot).

1919–1924: Maximum discharge recorded, about 1,140 million gallons per day or 1,760 second-feet at 10.30 a. m. December 24, 1920 (gage height, 8.58 feet); minimum recorded, 1.0 million gallons per day or 1.6 second-feet February 26 and 27, 1920 (gage height, 1.02 feet).

DIVERSIONS.—None.

REGULATION.—None.

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

UTILIZATION.—Entire flow now wastes into sea.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve well defined below 200 million gallons per day; was used directly July 1 to August 7 and November 6 to June 30; shifting-control method used for intervening period. Operation of water-stage recorder satisfactory except for one period in February. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day, except for periods for which shifting-control method was used. Records fair.

Discharge measurements of Papalaua Stream, near Wailau, Molokai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 10	1.03	6.3	4.1	Feb. 16	1.32	12.8	8.3
Sept. 26	1.08	4.1	2.6	Apr. 3	1.49	17.6	11.4
Jan. 8	1.02	4.9	3.2	May 21	1.12	5.8	3.8

Discharge, in million gallons per day, of Papalaua Stream, near Wailau, Molokai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	14.0	7.5	2.6	3.7	2.9	2.5	10.0	1.6	6.3	1.9	11.6	2.3
2	4.8	3.8	2.3	2.7	2.5	2.8	22	1.6	33	1.8	18.7	2.5
3	3.6	3.6	2.2	2.6	2.5	5.2	7.1	1.6	18.1	4.6	7.2	2.2
4	7.9	7.3	2.1	4.9	2.5	17.4	12.2	1.9	22	5.9	5.7	2.0
5	6.1	5.7	2.7	5.9	98	4.4	4.6	1.6	13.5	2.3	38	1.9
6	4.5	3.0	2.3	25	29	30	3.6	1.6	5.2	45	24	2.1
7	6.1	27	2.2	5.1	18.4	33	3.4	1.6	4.1	8.5	7.5	1.9
8	8.8	13.2	2.0	22	13.6	13.8	3.0	1.7	3.2	35	7.7	1.8
9	11.8	5.4	19.1	3.6	19.4	5.7	3.8	1.6	2.6	12.6	10.2	1.7
10	3.9	4.4	4.2	2.6	7.6	75	3.1	1.5	2.5	23	23	1.7
11	13.1	10.6	2.3	2.5	5.1	21	2.6	1.5	2.5	21	11.8	1.8
12	12.1	23	2.2	2.6	5.7	95	2.5		2.2	11.7	5.6	1.7
13	32	7.2	19.4	2.5	26	25	3.5		2.0	9.5	52	33
14	7.7	5.4	5.7	2.6	6.5	18.2	9.9		1.9	27	124	7.8
15	6.1	3.9	3.1	2.6	4.7	67	4.1	50	1.9	16.1	18.0	5.4
16	6.0	3.4	2.3	3.6	26	26	2.9		3.0	6.1	17.8	4.8
17	15.1	3.2	2.2	2.6	5.6	12.5	3.8	18.0	2.1	6.3	19.6	27
18	6.5	52	2.5	3.6	6.2	115	4.4	5.7	1.9	55	19.4	3.6
19	6.1	10.9	49	31	3.8	90	3.9	4.1	3.9	8.4	6.6	3.5
20	3.2	5.4	23	36	3.8	17.8	2.3	3.0	4.5	6.5	5.4	2.8
21	4.9	6.6	130	27	6.2	12.1	2.2	2.6	2.4	5.2	4.4	2.2
22	15.8	7.2	15.9	10.4	4.1	9.7	2.1	3.0	1.9	31	3.8	2.1
23	12.8	3.7	4.1	4.2	7.3	8.8	2.0	6.1	1.7	9.4	3.9	2.0
24	4.2	2.9	2.8	3.8	3.2	45	2.9	3.0	2.0	7.6	5.8	2.0
25	3.5	2.7	2.7	7.9	3.2	44	1.8	2.8	1.8	6.6	8.6	15.0
26	3.0	2.5	2.6	2.8	5.6	10.6	1.7	4.1	2.0	11.3	17.3	3.8
27	2.5	2.4	2.6	15.0	6.1	6.8	1.7	4.1	1.9	75	6.2	2.6
28	2.5	2.2	4.9	22	4.7	5.2	1.7	3.4	64	9.1	3.8	2.4
29	2.6	2.1	13.4	10.9	3.2	4.2	1.6	2.5	4.6	6.1	3.0	2.1
30	7.2	2.2	39	16.7	2.5	8.8	1.6	-------	2.4	72	2.6	8.2
31	7.9	4.5	-------	4.6	-------	15.1	1.6	-------	2.2	-------	2.4	-------

NOTE.—Braced figure shows mean discharge for period indicated; estimated, because of lack of gage-height record, by comparison with flow of Halawa Stream near Halawa.

Monthly discharge of Papalaua Stream, near Wailau, Molokai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	32	2.5	7.95	12.3	246	756
August	52	2.1	7.90	12.1	245	752
September	130	2.0	12.4	19.2	371	1,140
October	36	2.5	9.45	14.6	293	899
November	98	2.5	11.2	17.3	336	1,030
December	115	2.5	27.3	42.2	848	2,600
January	22	1.6	4.28	6.62	133	407
February	----------	1.5	11.4	17.6	330	1,010
March	64	1.7	7.20	11.1	223	685
April	75	1.8	18.0	27.9	542	1,660
May	124	2.4	16.0	24.8	496	1,520
June	33	1.7	5.13	7.94	154	472
The year	130	1.5	11.5	17.8	4,220	12,900

WAIAKEAKUA 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, 1924.

GAGE.—Stevens continuous water-stage recorder.

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

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

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 388 million gallons per day or 593 second-feet at 11.30 p. m. September 29 (gage height, 5.42 feet); minimum recorded during year, 2.2 million gallons per day or 3.4 second-feet from 2.30 to 5.30 p. m. February 11 (gage height, 1.19 feet).

1919–1924: Maximum discharge recorded, about 710 million gallons per day or 1,100 second-feet at 1.15 p. m. March 31, 1923 (gage height, 7.15 feet); minimum recorded, 1.3 million gallons per day or 2.0 second-feet, March 7, 1920 (gage height, 0.92 foot).

DIVERSIONS.—None.

REGULATION.—None.

OBJECT OF STATION.—To determine amount of water available for irrigation of west end of Molokai.

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

ACCURACY.—Stage-discharge relation changed several times during year. Standard rating curve used July 1 to February 12 well defined between 3 and 15 million gallons per day and fairly well defined between 15 and 100 million gallons per day; shifting-control method used July 14 to September 29. Rating curve used Februray 13 to March 3 and June 26–30, fairly well defined between 3 and 180 million gallons per day; curve used March 4 to May 5, well defined between 2 and 180 million gallons per day; curve used May 6 to June 25, fairly well defined between 3 and 180 million gallons per day. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good to fair.

Discharge measurements of Waiakeakua Stream near Wailau, Molokai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 10	1.31	5.9	3.8	Feb. 18	1.45	9.8	6.4
Sept. 27	1.28	3.9	2.5	Apr. 5	1.20	3.8	2.5
Jan. 5	1.48	8.0	5.2	May 23	1.38	6.4	4.2

Discharge, in million gallons per day, of Waiakeakua Stream, near Wailau, Molokai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	7.3	4.1	3.3	5.9	5.4	3.6	8.0	2.7	5.2	2.7	7.0	3.4
2	4.2	3.8	3.2	4.9	4.9	3.5	7.3	2.6	15.8	2.6	9.5	3.5
3	3.9	4.0	3.2	4.6	4.5	4.1	7.2	2.5	10.8	3.3	6.1	3.1
4	4.2	4.1	3.4	4.8	8.6	8.2	5.6	2.7	11.9	2.8	5.4	2.9
5	3.9	3.8	3.4	5.1	15.2	4.2	5.0	2.5	8.0	2.5	26	2.9
6	3.6	3.5	3.1	10.0	12.4	10.2	4.7	2.5	5.7	11.8	20	2.8
7	3.7	6.8	3.1	5.3	8.6	13.4	4.6	2.4	5.0	4.3	10.1	2.7
8	4.0	4.7	3.1	9.2	8.9	7.9	4.3	2.4	4.6	10.5	8.0	2.5
9	6.6	4.0	6.2	5.3	9.6	5.6	4.6	2.3	4.4	5.4	7.2	2.5
10	3.7		3.3	4.7	6.0	30	4.2	2.3	4.2	10.8	8.4	2.7
11	3.8	5.9	3.1	4.5	7.0	11.7	4.0	2.3	4.0	8.1	7.6	2.7
12	6.2	7.9	3.6	4.3	5.3	16.5	3.9	27	3.9	6.4	5.7	2.6
13	14.3	4.6	5.9	4.2	12.5	12.8	4.1	48	3.7	5.7	21	4.8
14	6.5	4.1	3.5	4.1	5.3	8.8	4.3	25	3.5	10.1	24	9.2
15	5.3	3.9	3.2	4.6	6.0	25	3.7	14.5	3.6	6.4	9.9	3.2
16	4.9	3.7	3.2	4.1	6.8	11.6	3.6	10.7	3.6	5.0	8.9	2.8
17	6.8	3.7	3.1	3.8	4.8	11.3	3.6	8.4	3.4	6.2	7.2	6.3
18	5.3	11.9	4.3	6.1	4.5	33	3.6	6.7	3.7	22	6.0	3.4
19	5.3	6.0	13.2	18.8	4.1	31	3.4	6.0	4.7	9.0	5.4	2.8
20	4.6	4.6	6.4	9.1	4.3	10.9	3.3	5.4	4.0	7.0	4.8	2.8
21	4.3	4.5	7.6	14.6	4.1	8.2	3.2	5.2	3.4	5.9	4.5	2.6
22	6.4	4.3	5.6	9.1	4.1	6.6	3.2	5.2	3.3	17.0	4.4	2.5
23	7.4	4.0	3.3	6.0	6.4	5.8	3.1	6.0	3.2	8.0	4.3	2.5
24	4.7	3.8	2.8	5.3	3.9	15.7	3.0	5.4	3.3	6.3	4.2	2.4
25	4.3	3.7	2.9	6.8	3.7	21	2.9	4.8	2.9	5.7	4.5	5.8
26	4.2	3.6	2.9	4.9	5.7	7.8	2.9	4.7	2.9	8.4	5.7	5.3
27	4.0	3.5	2.7	10.8	4.6	6.5	2.9	4.6	2.8	21	4.7	3.7
28	4.0	3.4	3.6	11.6	4.1	5.6	2.8	4.4	5.4	8.0	3.9	3.5
29	3.9	3.3	12.1	9.5	4.1	5.1	2.8	4.1	3.2	8.2	3.8	3.4
30	4.6	3.7	21	10.2	3.7	4.9	2.8	-------	2.9	13.0	3.7	3.5
31	4.6	3.8	-------	6.5	-------	8.3	2.7	-------	2.8	-------	3.5	-------

NOTE.—Braced figures show mean discharge for period indicated; estimated, because of lack of gage-height record, by comparison with flow of Pulena Stream.

Monthly discharge of Waiakeakua Stream, near Wailau, Molokai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	14.3	3.6	5.18	8.01	160	493
August	11.9	3.3	4.54	7.02	141	432
September	21	2.7	4.98	7.71	149	458
October	18.8	3.8	7.05	10.9	219	671
November	15.2	3.7	6.30	9.75	189	580
December	33	3.5	11.6	17.9	359	1,100
January	8.0	2.7	4.04	6.25	125	384
February	48	2.3	7.70	11.9	223	685
March	15.8	2.8	4.83	7.47	150	460
April	22	2.5	8.14	12.6	244	749
May	26	3.5	8.24	12.7	255	784
June	9.2	2.4	3.49	5.40	105	321
The year	48	2.3	6.34	9.81	2,320	7,120

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, 1924.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge near station.

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

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 475 million gallons per day or 735 second-feet at 5.50 p. m. December 10 (gage height, 5.33 feet); minimum recorded during year, 3.8 million gallons per day or 5.9 second-feet at 8 a. m. September 27 (gage height, 0.74 foot).

1919–1924: Maximum discharge estimated 1,400 million gallons per day or 2,170 second-feet about noon December 24, 1920 (gage height, 11.5 feet); minimum recorded, 3.0 million gallons per day or 4.6 second-feet June 28 and July 14, 1920 (gage height, 0.89 foot).

DIVERSIONS.—None.

REGULATION.—None.

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

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

ACCURACY.—Stage-discharge relation changed August 20, September 19, and June 25. Two poorly defined rating curves used July 1 to September 19 and June 26–30; shifting-control method used August 20 to September 19. Curve used September 20 to June 25, well defined below 20 million gallons per day and extended above that point on basis of form of old high-water curve. Operation of water-stage recorder fairly satisfactory. Daily-discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records fair for ordinary stages; high-stage records subject to error.

Discharge measurements of Pulena Stream near Wailau, Molokai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 10	0.66	10.4	6.7	Feb. 18	1.22	24.3	15.7
Sept. 27	.76	6.6	4.3	Apr. 5	.90	8.6	5.6
Jan. 5	1.24	23.3	15.1	May 23	1.05	15.9	10.3

Discharge, in million gallons per day, of Pulena Stream, near Wailau, Molokai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	7.8	7.0	5.4	8.4	16.0	13.2		6.8	11.1	6.6	13.5	7.0
2	6.8	7.0	5.4	7.5	13.5	13.2		6.8	44	6.3	14.5	7.2
3	7.2	8.7	5.4	6.8	11.5	18.2	35	6.6	30	8.9	11.2	7.0
4	8.0	7.4	5.4	6.6	13.0	39		6.8	20	6.8	10.1	6.6
5	7.0	7.2	5.4	8.4	44	19.5		6.6	18.8	6.2	34	6.3
6	6.5	7.0	5.4	12.9	41	42	14.2	6.3	12.8	71	56	6.6
7	6.8	10.0	5.4	7.9	38	50	12.5	6.1	11.9	21	28	6.1
8	6.5	8.0	5.4	13.6	27	33	11.9	5.9	9.8	54	18.3	5.9
9	17.1	7.0	5.4	7.9	28	25	11.9	5.8	9.0	26	16.0	5.9
10	6.5	7.0	5.4	6.8	18.3	118	10.6	5.8	8.7	45	19.0	5.8
11	13.1	24	5.4	6.1	17.9	68	9.8	5.9	9.0	32	16.4	5.9
12	13.7	32	7.4	5.9	14.9	108	9.5	73	7.9	26	11.9	5.8
13	50	12.0	11.7	5.8	26	76	11.6	133	7.7	17.5	44	9.5
14	16.7	7.8	5.1	5.8	15.3	54	12.6	73	7.2	23	68	7.2
15	11.4	7.4	5.2	7.9	21	153	9.2	30	7.2	30	30	5.9
16	9.2	7.4	5.2	7.6	27	98	8.7	35	7.2	21	29	5.8
17	16.8	7.2	5.2	5.8	18.8	78	9.0	27	7.0	38	23	8.0
18	10.9	30		7.7	16.8	134	8.7	16.3	7.7	77	16.4	5.8
19	23	17.5		24	15.3	148	7.9	13.2	20	34	13.8	5.8
20	10.7	7.8	18	20	14.9	76	7.7	11.2	12.2	22	12.2	5.6
21	9.8	7.0		34	14.9	48	7.5	10.1	7.9	18.3	10.6	5.3
22	32	6.8		14.9	14.5	41	7.0	9.5	7.0	82	10.1	5.6
23	40	6.5	4.1	10.9	22	32	7.0	12.2	6.8	39	9.6	5.6
24	14.7	6.3	4.1	9.5	14.2		6.8	12.9	10.1	23	10.1	5.9
25	12.4	6.1	4.0	10.6	14.2		6.8	9.5	7.2	17.9	15.6	31
26	10.4	5.9	3.9	8.7	18.5		6.8	9.8	6.6	23	11.2	10.2
27	7.2	5.7	4.0	38	17.5	75	6.8	9.0	6.6	42	8.7	8.8
28	7.0	5.6	4.3	42	16.4		6.8	8.4	33	22	7.9	8.0
29	7.4	5.4	6.9	58	15.3		6.8	8.2	9.8	16.0	7.7	7.6
30	7.2	5.2	44	45	13.5		6.8	-------	7.7	17.2	7.2	10.2
31	6.8	5.7	-------	22	-------		6.8	-------	7.0	-------	7.2	-------

NOTE.—Braced figures show mean discharge for periods indicated, estimated, because of lack of gage-height record, by comparison with flow of Waiakeakua Stream.

Monthly discharge of Pulena Stream, near Wailau, Molokai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	50	6.5	13.2	20.4	411	1,260
August	32	5.2	9.54	14.8	296	908
September	44	3.9	8.82	13.6	264	812
October	58	5.8	15.4	23.8	477	1,470
November	44	11.5	20.0	30.9	599	1,840
December	153	13.2	67.3	104	2,090	6,400
January	----------	6.8	13.1	20.3	407	1,250
February	133	5.8	19.7	30.5	571	1,750
March	44	6.6	12.2	18.9	379	1,160
April	82	6.2	29.1	45.0	873	2,680
May	68	7.2	19.1	29.6	591	1,820
June	31	5.3	7.60	11.8	228	700
The year	153	3.9	19.6	30.3	7,180	22,000

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, 1924.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from suspension footbridge 1,000 feet below station.

CHANNEL AND CONTROL.—Stream bed rocky with scattered boulders. Banks steep and rocky. Control large boulders wedged into cleft in rock ledge; shifts during floods.

EXTREMES OF DISCHARGE.—Maximum recorded during year, about 288 million gallons per day or 446 second-feet at 4 a. m. December 24 (gage height, 6.86 feet); minimum recorded during year, 2.3 million gallons per day or 3.6 second-feet, at midnight September 17–18 (gage height, 2.77 feet).

1919–1924: Maximum recorded, about 1,020 million gallons per day or 1,580 second-feet at 10.20 a. m. December 24, 1920 (gage height, 8.35 feet); minimum recorded, 1.8 million gallons per day or 2.8 second-feet from 5 to 9 p. m. March 7 and July 13, 1920 (gage height, 1.65 feet).

DIVERSIONS.—None.

REGULATION.—None.

OBJECT OF STATION.—To determine amount of water available for irrigating West Molokai.

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

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined between 2 and 30 million gallons per day; extended above 30 million gallons per day on basis of form of previous curves. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records excellent for ordinary stages; high-stage records subject to some error.

Discharge measurements of Pelekunu Stream at elevation 550 feet, near Pelekunu, Molokai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 11	3.49	26	16.7	Feb. 18	3.44	27.5	17.7
Sept. 28	2.82	4.5	2.9	Apr. 4	2.94	6.6	4.2
Jan. 7	3.15	12.8	8.3	May 22	3.06	10.5	6.8

Discharge, in million gallons per day, of Pelekunu Stream, near Pelekunu, Molokai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	3.6	3.6	2.8	5.7	8.5	3.7	18.9	3.4	7.2	4.4	9.0	4.2
2	3.3	3.4	2.8	4.2	6.8	3.6	14.9	3.4	17.8	4.2	8.3	4.2
3	3.6	4.2	2.7	3.8	5.7	4.0	18.5	3.3	11.2	5.9	6.8	4.2
4	4.5	3.8	2.8	3.6	12.1	10.0	13.8	3.4	8.3	4.2	6.3	3.9
5	4.5	3.8	3.3	4.2	35	4.9	10.6	3.3	8.8	4.1	12.4	3.7
6	3.6	3.2	2.8	5.7	27	17.1	8.8	3.3	6.5	37	13.4	3.7
7	3.9	9.3	2.7	3.7	24	15.8	7.9	3.3	5.9	16.6	10.0	3.6
8	3.7	5.7	2.6	5.6	16.9	9.7	7.4	3.2	5.2	39	7.0	3.6
9	7.0	3.7	2.6	3.6	16.6	6.6	7.0	3.2	4.8	23	6.8	3.6
10	3.3	3.4	2.5	3.1	10.6	62	6.6	3.2	4.6	32	7.2	3.4
11	6.3	11.5	2.5	3.0	9.4	42	6.1	3.1	5.1	25	6.6	3.4
12	5.0	13.2	4.4	3.0	7.7	56	6.1	42	4.4	19.7	5.6	3.4
13	15.9	6.8	7.2	2.8	10.4	42	8.1	109	4.5	14.0	22	4.4
14	6.5	5.2	3.1	2.7	6.5	23	7.7	66	4.2	13.5	57	3.8
15	5.2	4.5	2.7	3.7	8.9	89	6.1	31	4.1	20	22	3.4
16	4.6	4.1	2.6	3.3	14.6	73	5.4	29	3.9	16.3	17.8	3.3
17	7.6	3.8	2.4	2.7	8.1	42	5.7	23	3.7	17.9	13.8	4.1
18	5.0	9.5	4.7	3.7	7.0	43	5.4	14.3	4.6	23	11.1	3.2
19	9.1	9.0	21	8.4	5.9	73	4.9	10.9	15.2	17.2	9.0	3.3
20	5.2	4.5	6.3	5.8	5.4	44	4.6	9.2	9.9	12.4	7.7	3.2
21	5.6	4.1	4.5	13.5	5.1	23	4.5	7.9	5.2	10.4	6.8	3.0
22	12.3	3.8	5.1	5.9	4.8	17.8	4.4	7.0	4.4	32	6.5	3.1
23	15.7	3.4	3.8	4.5	5.9	13.5	4.2	6.6	4.2	18.0	5.9	3.0
24	7.0	3.2	3.3	3.9	4.4	97	4.1	8.8	7.5	16.5	5.9	3.2
25	6.1	3.2	3.2	3.9	4.2	96	4.1	6.5	4.5	12.7	7.2	9.7
26	5.2	3.2	3.1	3.6	5.4	33	3.9	6.1	4.1	12.4	5.7	3.6
27	4.4	3.0	2.8	23	5.4	20	3.8	5.7	3.9	23	5.1	3.2
28	4.2	3.0	2.8	19.6	5.6	15.5	3.7	5.4	15.3	14.3	4.6	3.0
29	4.4	2.8	11.1	28	4.6	12.1	3.6	5.4	6.6	10.9	4.4	3.0
30	3.9	3.1	21	23	3.9	11.9	3.6	-------	5.2	11.6	4.2	4.6
31	3.8	3.6	-------	12.1	-------	26	3.4	-------	4.8	-------	4.2	-------

Monthly discharge of Pelekunu Stream, near Pelekunu, Molokai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	15.9	3.3	5.94	9.19	184	565
August	13.2	2.8	4.92	7.61	153	468
September	21	2.4	4.84	7.49	145	446
October	28	2.7	7.20	11.1	223	685
November	35	3.9	9.88	15.3	296	910
December	97	3.6	33.2	51.4	1,030	3,160
January	18.9	3.4	7.03	10.9	218	669
February	109	3.1	14.8	22.9	430	1,320
March	17.8	3.7	6.63	10.3	206	631
April	39	4.1	17.0	26.3	511	1,570
May	57	4.2	10.3	15.9	320	980
June	9.7	3.0	3.77	5.83	113	347
The year	109	2.4	10.5	16.2	3,830	11,800

LANIPUNI STREAM, NEAR PELEKUNU, MOLOKAI

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

RECORDS AVAILABLE.—December 1, 1919, to June 30, 1924.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from suspension footbridge 200 feet below gage.

CHANNEL AND CONTROL.—Channel rocky and boulder strewn. Banks high and rocky. Control of boulders and gravel; shifts during floods.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 364 million gallons per day or 563 second-feet at 7 p. m. December 10 (gage height, 3.20 feet); a higher discharge probably occurred December 24 when recorder was not operating properly. Minimum recorded during year, 3.0 million gallons per day or 4.6 second-feet, for a few hours June 23 (gage height, 0.63 foot).

1919–1924: Maximum discharge recorded, about 1,250 million gallons per day or 1,930 second-feet at 10 a. m. December 24, 1920 (gage height, 5.90 feet); minimum recorded, 1.9 million gallons per 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.—None.

REGULATION.—None.

OBJECT OF STATION.—To determine amount of water available for irrigating West Molokai.

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

ACCURACY.—Stage-discharge relation changed August 18 and February 13. Three rating curves used fairly well defined below 50 million gallons per day; extended above that point on basis of form of old high-water curve. Operation of water-stage recorder satisfactory except as noted in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records fair for ordinary stages; high-stage records uncertain.

Discharge measurements of Lanipuni Stream, near Pelekunu, Molokai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 11	1.23	30.5	19.6	Feb. 18	0.92	12.1	7.8
Sept. 28	.71	3.8	2.4	Apr. 4	.72	6.0	3.9
Jan. 6	.80	9.6	6.2	May 22	.75	6.8	4.4

Discharge, in million gallons per day, of Lanipuni Stream, near Pelekunu, Molokai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	7.5	5.8	4.6	7.0		4.4		4.0	5.3	4.4	6.2	3.8
2	6.4	5.8	4.5	5.8	12	4.3		4.0	22	4.2	6.1	3.8
3	6.7	6.9	4.5	5.4		4.9	10	4.0	10.1	5.3	5.0	4.0
4	7.3	6.9	5.0	5.4		10.9		4.1	6.8	4.2	4.8	3.6
5	7.3	6.1	5.0	7.2		5.4		4.0	7.7	3.8	7.7	3.6
6	6.6	5.6	4.5	7.6		15.4	6.0	4.0	5.7	16.1	7.4	3.6
7	6.9	17.4	4.4	5.7	30	17.1	5.7	3.9	5.2	6.2	5.2	3.4
8	7.2	8.0	4.4	7.2		9.3	5.4	3.9	4.8	16.5	4.8	3.4
9	10.7	6.3	4.3	5.2		6.8	5.6	3.9	4.6	9.2	5.2	3.3
10	6.7	6.6	4.1	5.0		52	5.2	3.9	4.6	12.4	5.3	3.3
11	13.5	16.4	4.0	4.6		12.9	5.1	3.9	4.6	11.7	5.2	3.3
12	10.4	19.9	8.5	4.6	10	54	5.2	68	4.2	8.7	5.2	3.3
13	22	9.4	8.9	4.4		15	8.2	162	4.4	6.4	35	5.9
14	9.4	7.7	5.0	4.4			8.1	80	4.1	7.2	70	3.8
15	8.1	7.1	4.5	5.2	15.1		5.6	22	4.0	12.7	13.1	3.4
16	7.3	6.7	4.4	4.6	13.1		5.1	14.5	4.4	8.6	9.5	3.3
17	8.8	7.5	4.3	4.3	7.8		5.4	12.0	4.0	8.6	7.7	4.1
18	7.7	24	11.9	6.1	6.8	40	5.2	7.6	4.6	11.7	6.1	3.3
19	8.9	11.7	32	13.6	5.8		5.0	6.2	7.7	7.7	5.5	3.4
20	7.3	7.6	12.1	9.3	5.7		4.8	5.7	5.5	6.1	5.2	3.2
21	6.9	6.6	7.8	13.9	5.6		4.6	5.2	4.4	5.5	4.8	3.1
22	24	6.2	8.2		5.4		4.5	5.0	4.1	9.5	4.7	3.4
23	16.4	5.8	5.8		5.6		4.4	4.8	3.8	6.6	4.4	3.1
24	8.3	5.6	5.2	8	5.0		4.4	5.5	4.4	7.5	5.2	3.4
25	7.5	5.6	5.4		4.8		4.3	4.7	3.8	6.2	6.7	11.4
26	6.7	5.2	5.0		5.6	25	4.3	4.6	3.7	7.7	4.7	4.1
27	6.3	5.2	4.8		5.4		4.3	5.0	3.6	28	4.2	3.6
28	6.4	5.1	4.7		5.4		4.1	4.7	38	9.0	4.0	3.3
29	6.4	4.8	14.2	30	5.0		4.1	4.6	6.4	6.6	4.0	3.3
30	6.3	5.4	23		4.5		4.1		5.2	8.6	3.8	5.0
31	6.3	5.1					4.1		4.6		3.8	

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow of Pelekunu Stream. Gage-height record partly estimated Oct. 21, Nov. 15, and Feb. 13–14. Stilling-well intake probably plugged for part of day Dec. 13.

Monthly discharge of Lanipunu Stream, near Pelekunu, Molokai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	24	6.3	8.97	13.9	278	853
August	24	4.8	8.19	12.7	254	779
September	32	4.0	7.50	11.6	225	690
October		4.3	10.5	16.2	326	999
November		4.5	12.5	19.3	375	1,150
December		4.3	25.2	39.0	782	2,400
January		4.1	5.90	9.13	183	561
February	162	3.9	16.1	24.9	466	1,430
March	38	3.6	6.65	10.4	206	633
April	28	3.8	8.90	13.8	267	819
May	70	3.8	8.73	13.5	270	831
June	11.4	3.1	3.88	6.00	116	357
The year	162	3.1	10.2	15.8	3,750	11,500

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, 1924.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading.

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 and is probably permanent, except for slight changes caused by flood damage and subsequent repairs.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during the year, 336 million gallons per day, or 520 second-feet, at 8.30 a. m. February 13 (gage height, 6.78 feet); minimum recorded during year, 5.3 million gallons per day, or 8.2 second-feet, at 3 a. m. December 26 (gage height, 4.18 feet).

1919–1924: Maximum discharge recorded, about 1,270 million gallons per day, or 1,960 second-feet, at 10.30 a. m. December 24, 1920 (gage height, 10.20 feet); minimum recorded, 2.8 million gallons per day, or 4.3 second-feet, from 6 to 8 a. m. September 26, 1921 (gage height, 3.92 feet).

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

REGULATION.—By diversion only.

OBJECT OF STATION.—To determine amount of water available for proposed power and irrigation project for leper settlement, and for irrigation on the leeward side of the island.

UTILIZATION.—Part of water used for irrigation of taro. Remainder wastes into sea.

ACCURACY.—Stage-discharge relation not permanent. Base curve used throughout the year poorly defined; shifting-control method used January 3 to February 12 and February 18 to June 30. Operation of water-stage recorder unsatisfactory owing to plugging of intake. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day, except for periods when shifting-control method was used. Records poor.

Discharge measurements of Waikolu Stream at pipe-line crossing, near Kalaupapa, Molokai, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Jan. 3	4.37	12.8	8.3	Apr. 3	4.27	9.7	6.2
Feb. 17	4.50	30.5	19.6	May 22	4.30	11.0	7.1

Discharge, in million gallons per day, of Waikolu Stream at pipe-line crossing, near Kalaupapa, Molokai, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	9.7	8.9	8.6	9.7	7.0	6.3	7.8		8.2	6.3	7.8	7.8
2	8.9	8.6	8.6	6.7	6.7	6.3	7.8		31	6.3	7.0	7.8
3	8.6	8.6	8.6	6.7	7.0	6.3	10.2		9.3	6.7	6.7	7.8
4	8.9	8.6	8.6	6.3	12.6	7.4	9.7		7.4	6.7	6.7	7.4
5	9.3	8.9	8.9	6.3	76	7.0	7.0		7.0	6.3	7.7	7.4
6	8.9	8.6	8.6	30	22	15.7	7.0	7.0	7.0	26	11.4	7.4
7	8.6	18.6	8.6	11.9	12.6	10.3	6.7		7.0	10.7	7.0	7.4
8	8.2	13.8	8.6	7.4	7.0	7.0	7.0		7.0	16.4	7.0	7.0
9	12.1	9.3	8.2	6.7	9.9	7.4	7.0		7.0	9.7	7.0	7.4
10	8.2	8.6	8.2	6.3	7.0	66	7.0		7.0	12.8	7.0	14.8
11	9.7	10.7	8.6	6.3	7.0	22	6.7		6.7	13.1	7.0	8.9
12	9.3	13.5	11.6	6.3	7.0	61	7.0	90	6.7	9.9	7.0	8.2
13	14.5	8.9	14.5	6.3	7.0	13.1	8.6	258	6.7	11.4	64	7.8
14	9.7	7.8	9.7	6.7	5.9	9.3	11.6	76	6.7	11.1	96	7.8
15	8.6	7.4	8.9	7.8	12.4	55	8.2	16.2	6.7	10.4	10.0	8.2
16	8.6	7.4	8.6	7.8	14.8	40	7.4	18.5	6.7	10.6	20	10.2
17	10.2	8.2	7.8	7.4	8.2	24		26	6.7	9.4	10.2	8.2
18	8.9	23	7.4	11.1	7.4	24		8.6	6.7	16.3	9.0	8.2
19	8.6	15.0	31	22	7.0	32		8.2	22	13.7	8.0	7.8
20	8.6	9.3	12.1	20	7.0	20		7.8	10.4	11.7	7.6	7.8
21	8.9	8.9	9.3	16.9	7.4	6.3		6.7	6.7	9.3	7.4	8.2
22	16.8	8.6	7.4	7.8	7.8	5.6		7.0	6.7	21	7.4	8.2
23	19.6	8.2	6.7	7.4	7.4	5.6		6.3	6.7	9.2	7.4	8.2
24	9.7	8.6	6.3	7.0	7.0	62	7.2	10.2	6.7	7.4	7.4	8.2
25	8.9	8.6	6.7	7.4	7.4	28		11.1	6.3	7.4	7.8	8.6
26	8.6	8.6	6.3	7.4	7.4	5.9		8.9	6.3	7.0	7.6	8.9
27	8.6	8.9	6.3	35	7.4	6.3		8.9	6.3	45	7.9	
28	8.6	8.9	6.3	25	7.0	6.3		8.6	42	7.8	8.2	8.2
29	8.6	8.9	9.7	25	6.7	6.7		9.3	6.3	7.4	8.6	
30	8.6	8.9	35	16.3	6.3	8.9		-------	6.3	16.5	8.2	
31	9.3	8.9	-------	7.0	-------	9.7		-------	6.3	-------	8.2	-------

NOTE.—Discharge Jan. 1–2 and May 5–20 and mean discharge for periods indicated by braces estimated by comparison with records of Pelekunu Stream near Pelekunu, gage-height record either faulty or missing.

Monthly discharge of Waikolu Stream at pipe-line crossing, near Kalaupapa, Molokai, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	19.6	8.2	9.82	15.2	304	934
August	23	7.4	9.99	15.5	310	950
September	35	6.3	10.2	15.8	306	938
October	35	6.3	11.7	18.1	362	1,110
November	76	5.9	10.8	16.7	323	992
December	66	5.6	19.1	29.6	591	1,820
January	11.6	----------	7.57	11.7	235	720
February	258	6.3	22.9	35.4	663	2,040
March	42	6.3	9.37	14.5	290	892
April	45	6.3	12.1	18.7	364	1,120
May	96	6.7	12.9	20.0	400	1,230
June	14.8	7.0	8.28	12.8	248	762
The year	258	5.6	12.0	18.6	4,400	13,500

MISCELLANEOUS MEASUREMENTS

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

Miscellaneous measurements on Molokai during the year ending June 30, 1924

Date	Stream	Locality	Discharge	
			Second-feet	Million gallons per day
Aug. 11	Kalaupapa water supply flume	Above pipe-line intake near Kalaupapa.	1.05	0.7
11	Kalaupapa water supply wasteway	Below pipe-line intake near Kalaupapa.	.35	.25

ISLAND OF MAUI

HONOKAHAU STREAM, NEAR HONOKAHAU, MAUI

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

RECORDS AVAILABLE.—March 7, 1913, to September 19, 1920, and May 2, 1922, to June 30, 1924. Staff gage readings at old site on diversion dam August 13 to December 31, 1911.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 600 feet below gage.

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 medium high, sloping and covered with vegetation. Control composed of large boulders and coarse gravel; shifts during extremely high stages.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 2,200 million gallons per day or 3,400 second-feet at 6.40 a. m. February 15 (gage height, 7.92 feet); minimum recorded during year, 9.4 million gallons per day or 14.5 second-feet, for several hours October 17 (gage height, 1.45 feet); recorder clock stopped October 17 making it impossible to determine the exact duration of this minimum flow.

1913–1920; 1922–1924: Maximum discharge recorded on February 15, 1924; minimum recorded, 5.1 million gallons per day or 7.9 second-feet from 10 a. m. to 2 p. m. August 11, 1920 (gage height, 1.19 feet).

DIVERSIONS.—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.

REGULATION.—None.

OBJECT OF STATION.—To determine resources of stream.

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

ACCURACY.—Stage-discharge relation permanent until flood of February 15, which badly scoured the control and left it in a very unstable condition. Three rating curves used as follows: July 1 to February 15, well defined between 7 and 100 million gallons per day and extended above 100 million gallons per day on basis of form of old curve; February 16 to April 27 and April 28 to June 30 two poorly defined curves used. Operation of water-stage recorder unsatisfactory during period September 22 to December 4.

Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by integrating the gage-height graph with the discharge integrator or by averaging discharge for intervals of the day. Records good prior to February 15 except those estimated which are fair; after February 15 records are subject to error owing to poor definition of rating curves and possibility of insufficient number of discharge measurements for determining all changes in control.

Discharge measurements of Honokahau Stream, near Honokahau, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 24	1.50	15.6	10.1	Mar. 13	1.20	26	16.9
Oct. 14	1.46	15.6	10.1	Apr. 28	1.46	33.5	21.8
Dec. 4	1.93	40	26	June 16	1.14	18.9	12.2
Jan. 24	1.59	22.6	14.6				

Discharge, in million gallons per day, of Honokahau Stream, near Honokahau, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	28	13.6	11.9				57	12.9	27	15.1	25	14.8
2	14.6	12.2	10.9			} 35	32	12.9	115	15.8	32	12.9
3	12.7	18.1	10.6				30	12.9	56	24	16.6	13.6
4	16.8	21	10.6				19.4	12.9	55	25	12.9	12.3
5	17.6	22	10.6			13.6	15.3	12.9	27	15.6	12.7	11.8
6	16.5	12.2	10.9			43	15.3	12.9	18.7	45	16.9	11.8
7	18.3	29	11.3	13	25	75	15.0	12.9	18.4	23	15.0	11.6
8	23	17.4	10.9			22	15.0	12.9	17.7	51	13.1	11.6
9	35	12.9	10.6			14.6	15.6	12.6	16.9	26	14.1	11.4
10	32	16.1	10.6			28	15.0	12.2	16.6	37	15.3	11.4
11	27	28	10.4			24	15.0	12.2	17.7	20	13.8	11.3
12	18.2	44	64			71	18.0	123	17.7	17.9	11.6	11.3
13	59	15.3	36			76	24	293	23	18.2	132	28
14	22	13.2	13.9			20	20	191	17.7	54	160	17.2
15	26	11.9	11.6	20		144	15.6	189	16.4	36	24	12.5
16	15.6	11.3	10.6	12.2		87	14.6	35	16.1	25	78	13.9
17	57	18.0	10.6			90	15.0	26	16.1	33	39	37
18	23	86	13.5			210	15.0	19.0	16.9	25	17.3	12.7
19	33	16.7	151			42	14.2	17.4	59	17.4	13.6	13.1
20	15.3	12.2	51			41	13.9	16.9	19.7	16.1	13.1	12.5
21	15.0	11.6	23	20	11	27	13.6	16.4	16.6	15.1	12.7	11.3
22	82	11.3				17.4	13.6	16.1	15.8	19.2	12.5	11.3
23	39	10.9				16.0	13.6	44	15.6	18.2	13.6	11.4
24	17.4	10.6				29	13.2	28	18.1	15.6	12.3	11.1
25	18.0	10.6				21	13.6	26	16.4	14.8	32	31
26	12.9	10.6	15			15.6	13.2	26	15.3	38	14.8	12.3
27	11.9	10.6				15.0	13.2	43	15.1	103	12.5	12.7
28	13.2	10.6				15.0	13.2	18.4	20	21	12.0	11.4
29	14.6	10.6		55		14.6	13.2	19.2	17.1	15.0	12.0	11.1
30	18.2	11.9				23	12.9	------	15.3	43	12.0	12.6
31	17.8	18.3	------		------	68	12.9	------	15.1	------	12.3	------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record by comparison with flow of Honokawai ditch.

Monthly discharge of Honokahau Stream, near Honokahau, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	82	11.9	24.9	38.5	771	2,360
August	86	10.6	18.0	27.9	559	1,710
September	151	----------	21.3	33.0	640	1,960
October	----------	----------	22.2	34.3	689	2,110
November	----------	----------	17.5	27.1	526	1,610
December	210	----------	45.3	70.1	1,400	4,300
January	57	12.9	17.5	27.1	541	1,660
February	293	12.2	44.4	68.7	1,290	3,950
March	115	15.1	24.8	38.4	769	2,360
April	103	14.8	28.1	43.5	843	2,590
May	160	11.6	26.9	41.6	835	2,560
June	37	11.1	14.3	22.1	429	1,320
The year	293	----------	25.4	39.3	9,290	28,500

HONOKAWAI DITCH, NEAR LAHAINA, MAUI

LOCATION.—75 feet below intake on Honokawai Stream, 25 feet inside of ditch tunnel, 2¼ miles above Pioneer Mill Co.'s power house, and 7½ miles northeast of Lahaina.

RECORDS AVAILABLE.—May 28, 1921, to June 30, 1924. At station 1½ 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.

GAGE.—Gurley weekly water-stage recorder installed April 15, 1919. Stevens continuous recorder November 14, 1918, to April 15, 1919. Staff gage prior to November 14, 1918.

DISCHARGE MEASUREMENTS.—Made from plank across ditch.

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 where tunnel widens, about 500 feet below gage.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 47 million gallons per day or 73 second-feet at 7.30 a. m. September 19 (gage height, 2.05 feet); minimum recorded during year probably no flow, from 6 a. m. to 3 p. m. February 15, when water was temporarily turned out of ditch.

1912–1924: Maximum discharge recorded during period, 69 million gallons per day or 107 second-feet at 4.15 p. m. September 10, 1922 (gage height 2.71 feet); minimum, no flow, when water is occasionally turned out of ditch.

DIVERSIONS.—Flood-water diversion ditch 1½ miles below station diverts part of flood flow when floodgates are open. Gates 30 feet above station may also be used to divert flood water.

REGULATION.—By head gates and by floodgates noted under "Diversions."

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 sugar cane.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined between 3 and 15 million gallons per day; extended beyond these limits. Operation of water-stage recorder satisfactory except for a few short periods. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good except those estimated and those for high stages.

Honokawai ditch diverts from Honokawai Stream at elevation about 1,570 feet. The water is carried southwest through a tunnel about 1¼ 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 sugar cane. The system comprises about 5½ miles of main ditch.

Discharge measurements of Honokawai ditch, near Lahaina, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Oct. 14	0.28	5.6	3.6	Mar. 14	0.30	6.2	4.0
Dec. 5	.30	6.5	4.2	Apr. 29	.33	6.8	4.4
Jan. 9	.29	5.6	3.6				

Discharge, in million gallons per day, of Honokawai ditch, near Lahaina, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	9.5	4.7	4.6	4.3	4.6	3.9	21	3.8	8.5	4.2	4.9	4.4
2	5.1	4.7	4.3	4.1	4.2	7.7	8.0	3.9	32	4.2	6.3	4.6
3	3.9	6.0	4.1	4.0	4.0	23	6.8	3.9	13.2	5.1		4.6
4	4.8	10.6	4.0	4.0	4.1	17.1	6.4	4.0	11.5	4.8		4.4
5	5.9	9.5	4.0	5.5	26	4.6		4.0	6.8	4.3		4.2
6	6.2	4.7	4.0	8.1	15.0	18.3		4.1	4.4	12.4		4.2
7	6.4	6.1	3.9	5.8	8.9	25		4.1	4.2	6.2	4.4	4.2
8	8.8	5.6	4.0	5.2	4.9	8.0	4.1	4.0	4.6	11.2		4.2
9	14.9	4.6	4.1	4.1	5.9	4.7		4.0	4.6	5.2		4.2
10	14.0	5.0	4.1	4.0	4.3	7.0		4.0	4.3	9.5		4.2
11	11.2	12.2	4.0	3.9	5.0	7.1		4.0	4.6	4.9		4.2
12	7.1	18.5	21	3.9	10.9	16.4	4.4	16.0	4.7	4.4		4.2
13	24	4.9	15.1	3.8	18.4	15.3	6.5	34	5.1	5.3		4.7
14	6.9	4.4	4.7	3.8	4.3	5.6	5.3	26	4.3	11.7		5.9
15	9.9	4.2	4.2	6.5	3.9	17.8	4.1	6.7	4.2	13.0	19	4.6
16	4.8	4.1	4.2	5.1	3.8	26	4.0	6.6	4.2	6.6		4.6
17	20	4.2	4.2	4.1	3.8	27	3.9	6.0	4.3	7.2		6.0
18	10.0	18.0	5.1	4.0	3.7	33	4.0	4.6	4.3	5.6	5.1	4.6
19	13.1	5.1	30	21	3.7	10.5	3.9	4.2	16.6	4.3	4.6	4.4
20	5.2	4.3	16.2	10.0	3.6	9.2	3.9	4.0	5.4	4.2	4.3	4.3
21	5.0	4.2	6.9	12.3	3.6	7.2	3.8	4.0	4.4	4.2	4.2	4.6
22	19.0	4.2	10.8	8.2	3.6	5.0	3.8	4.0		4.6	4.2	4.8
23	16.2	4.2	5.4	4.4	3.6	4.8	3.8	9.5		4.9	4.2	4.8
24	5.1	4.2	4.2	4.0	3.7	8.3	3.8	7.5		4.4	4.2	4.7
25	5.5	4.2	4.0	3.8	3.7	5.9	3.8	7.8	4.5	4.3	12.7	12.7
26	4.4	4.2	3.9	3.8	3.7	4.3	3.8	7.6		6.4	5.4	5.4
27	4.2	4.2	3.9	18.9	4.1	4.0	3.8	15.9		14.9	4.3	5.4
28	4.6	4.2	4.0	19.0	4.2	4.0	3.9	4.7		5.6	4.2	4.6
29	4.9	4.2	4.0	28	3.9	4.0	3.9	4.9	4.3	4.9	4.1	4.4
30	4.9	4.2	4.3	15.0	3.8	6.5	3.9	-------	4.3	6.2	4.1	4.6
31	5.2	5.4	-------	4.7	-------	22	3.8	-------	4.3	-------	4.1	-------

NOTE.—Braced figures show mean discharge for periods indicated, estimated, because of lack of gage-height record, by comparison with flow of Honokahau Stream.

Monthly discharge of Honokawai ditch near Lahaina, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	24	3.9	8.73	13.5	271	831
August	18.5	4.1	6.09	9.42	189	579
September	30	3.9	6.71	10.4	201	617
October	28	3.8	7.65	11.8	237	728
November	26	3.6	6.03	9.33	181	555
December	33	3.9	11.7	18.1	363	1,110
January	21	3.8	4.94	7.64	153	470
February	34	3.8	7.51	11.6	218	668
March	32	----------	6.47	10.0	201	616
April	14.9	4.2	6.49	10.0	195	598
May	----------	----------	7.09	11.0	220	675
June	12.7	4.2	4.89	7.57	147	450
The year	34	3.6	7.03	10.9	2,570	7,900

KANAHA STREAM[1] 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, 1924. From August 5, 1911, to January 18, 1916, at a station about a mile downstream.

GAGE.—Stevens continuous water-stage recorder installed August 27, 1919, to replace Gurley printing water-stage recorder previously used. Gage datum raised 0.48 foot on June 21, 1923.

DISCHARGE MEASUREMENTS.—Made by wading.

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; fairly permanent. Control stabilized to some extent by grouting, on June 21, 1923.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 88 million gallons per day or 136 second-feet at 4.35 p. m. December 15 (gage height, 2.67 feet); minimum recorded during year 2.1 million gallons per day or 3.2 second-feet from 8 a. m. June 29 to 5.30 p. m. June 30 (gage height, 0.43 foot).

1916–1924: Maximum discharge recorded, 314 million gallons per day or 486 second-feet at 10.30 a. m. November 26, 1918 (gage height, 3.79 feet); minimum recorded, 1.8 million gallons per 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).

DIVERSION.—None.

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 purposes, power development, and irrigation of sugar cane.

[1] Called "Lahainaluna Stream" in reports prior to 1922–23. Decision of U. S. Geographic Board.

ACCURACY.—Stage-discharge relation changed December 15, February 12, and March 19. Three rating curves used as follows: July 1 to December 15, well defined between 2 and 20 million gallons per day; December 16 to February 12 and March 20 to June 30, well defined between 2 and 15 million gallons per day; February 13 to March 19, poorly defined; all curves extended for high stages on basis of form of old high-water curve. Operation of water-stage recorder satisfactory except for period August 18 to December 6 when well intake became partly plugged. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records fair.

Discharge measurements of Kanaha Stream above pipe-line intake, near Lahaina, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 7	0.52	4.6	3.0	Jan. 25	0.50	3.8	2.4
Aug. 25	.48	3.9	2.6	Mar. 14	.52	3.5	2.3
Oct. 13	.42	3.5	2.3	Apr. 29	.50	3.7	2.4
Dec. 6	1.00	23.1	14.9				

Discharge, in million gallons per day, of Kanaha Stream above pipe-line intake, near Lahaina, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	2.8	2.8		2.4	3.1		13.4	2.5	8.9	2.5	2.6	2.3
2	2.5	2.8		2.3	2.8		4.1	2.5	16.8	2.5	2.6	2.6
3	2.6	4.0		2.3	2.6		6.0	2.5	5.0	2.5	2.5	2.6
4	4.1	6.4		2.3	2.4	6.5	3.6	2.5	4.9	2.4	2.5	2.3
5	2.8	4.6		2.4	7.0		2.5	2.5	4.3	2.4	2.5	2.3
6	3.2	2.9	2.6	3.3	8.2		2.5	2.4	2.5	6.9	2.6	2.3
7	4.9	2.9		2.5	5.4	14.2	2.5	2.4	2.4	3.4	2.6	2.3
8	6.0	3.0		2.3	3.2	5.8	2.5	2.4	2.6	6.8	2.6	2.3
9	13.5	2.8		2.3	3.5	2.9	2.5	2.4	2.4	2.9	2.5	2.3
10	5.8	3.8		2.3	2.7	2.8	2.5	2.4	2.4	6.0	2.4	2.2
11	7.0	10.3		2.3	3.7	3.0	2.9	2.4	2.9	2.7	2.4	2.2
12	6.6	11.7		2.3	5.8	3.9	4.1	13.2	3.0	2.6	2.4	2.2
13	10.2	3.1		2.3		7.1	8.0	20	2.8	2.6	10.5	2.5
14	3.6	2.9		2.3		3.4	3.6	13.8	2.4	2.9	10.2	2.6
15	5.6	2.8	4.1	3.0		12.8	2.6	8.7	2.2	3.1	2.6	2.3
16	3.0	2.8		2.4		10.6	2.5	3.6	2.2	2.8	3.1	2.3
17	6.1	2.7		2.3		11.2	2.5	2.5	2.2	2.7	3.5	2.6
18	7.0	15		2.2		18.7	2.5	2.3	2.2	2.7	2.4	2.2
19	16.8		12	5.1		6.6	2.5	2.3	8.5	2.5	2.4	2.2
20	3.7		4.2	4.2		2.9	2.5	2.3	3.5	2.5	2.4	2.2
21	4.2		3.8	3.8	2.8	2.9	2.5	2.2	2.9	2.5	2.3	2.2
22	15.4		4.3	3.1		2.4	2.5	2.2	2.6	2.9	2.3	2.2
23	6.4		3.1	2.4		2.4	2.4	5.8	2.6	2.8	2.3	2.3
24	3.0		2.5	2.3		4.3	2.4	8.3	3.7	2.6	3.0	3.2
25	2.9	2.7	2.4	2.2		3.2	2.5	7.5	2.7	2.5	4.8	15.1
26	2.8		2.3	2.2		2.4	2.5	6.5	2.6	2.6	2.5	2.3
27	2.8		2.3	9.3		2.4	2.5	8.1	2.6	3.3	2.3	2.5
28	3.1		2.3	12.8		2.4	2.5	2.7	2.5	2.6	2.3	2.1
29	3.1		2.3	18.8		2.4	2.5	3.4	2.5	2.5	2.3	2.1
30	2.8		2.4	11.8		2.4	2.5	-------	2.5	2.5	2.3	2.2
31	2.9		-------	3.1	-------	12.6	2.5	-------	2.5	-------	2.2	-------

NOTE.—Stilling-well intake partly plugged Aug. 18 to Dec. 6; corrections were applied to gage-height graph or original graph was used for determining daily discharge for Aug. 18 and Sept. 19 to Nov. 12; for the periods Aug. 19 to Sept. 18 and Nov. 13 to Dec. 6 gage-height record was useless and discharge was estimated by comparison with flow of Honokahua Stream. Braced figures show mean discharge for periods indicated.

Monthly discharge of Kanaha Stream above pipe-line intake, near Lahaina, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	16.8	2.5	5.39	8.34	167	513
August	15	----------	3.95	6.11	122	376
September	12	----------	3.37	5.21	101	311
October	18.8	2.2	4.02	6.22	125	382
November	----------	----------	3.36	5.20	101	309
December	18.7	2.4	5.96	9.22	185	567
January	13.4	2.4	3.33	5.15	103	316
February	20	2.2	4.91	7.60	142	437
March	16.8	2.2	3.67	5.68	114	349
April	6.9	2.4	3.07	4.75	92.2	283
May	10.5	2.2	3.09	4.78	95.9	294
June	15.1	2.1	2.77	4.29	83.0	255
The year	20	2.1	3.91	6.05	1,430	4,390

OLOWALU DITCH, NEAR OLOWALU, MAUI

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

RECORDS AVAILABLE.—July 28, 1916, to June 30, 1924. Replaces old station in tailrace of power house, for which records are available August 12, 1911, to June 30, 1916.

GAGE.—Stevens continuous water-stage recorder installed June 9, 1919, to replace staff gage installed July 28, 1916. Recorder ratio changed from 1:6 to 5:12 on May 31, 1923.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel about 3.5 feet wide cut in earth and rock; straight for 50 feet above and below gage. Control not well defined.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 9.1 million gallons per day or 14.1 second-feet at 12.15 p. m. February 16 (gage height, 1.25 feet); minimum recorded during year, 0.9 million gallons per day or 1.4 second-feet at 9.45 a. m. April 7 (gage height, −0.19 foot).

1916–1924: Maximum discharge recorded, 18 million gallons per day or 28 second-feet at 3 a. m. December 25, 1920 (gage height, 1.53 feet) minimum recorded, ditch occasionally dry.

DIVERSIONS.—None.

REGULATION.—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 sugar cane. A small amount is sometimes diverted for irrigation at higher levels and does not pass through power house.

ACCURACY.—Stage-discharge relation changed October 30. Two rating curves used well defined between 2 and 10 million gallons per day. Operation of water-stage recorder satisfactory except during July and parts of August and January. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good 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 sugar cane by the Olowalu Co.

Discharge measurements of Olowalu ditch, near Olowalu, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 23	0.60	6.0	3.9	Mar. 12	0.56	7.0	4.5
Oct. 13	.38	4.5	2.9	Apr. 26	.72	8.1	5.2
Dec. 3	.89	10.3	6.7	June 24	.61	7.4	4.8
Jan. 23	.46	5.8	3.7				

Discharge, in million gallons per day, of Olowalu ditch, near Olowalu, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1			3.2	3.2	5.9	3.5	8.4	3.5	5.9	4.4	5.6	5.3
2			2.9	2.9	5.0	3.5	8.4	3.5	7.5	4.4	5.9	5.0
3			2.9	2.9	4.7	5.8	8.0	3.5	5.9	4.7	5.6	5.0
4	4		2.9	2.9	4.4	7.4	8.0	3.5	5.6	4.4	5.6	4.7
5			2.9	3.2	8.0	5.2	7.0	3.5	5.6	4.4	5.6	4.7
6			2.9	4.5	8.4	5.6	6.2	3.5	5.3	4.1	5.9	4.7
7			2.9	4.2	8.4	8.2	5.6	3.5	5.3	4.6	6.0	4.7
8	4.9		2.9	3.2	7.3	7.0	5.3	3.5	5.0	5.8	5.6	4.7
9			2.9	2.9	6.2	5.3	5.3	3.5	5.0	6.2	5.3	4.7
10			2.8	2.9	5.3	4.7	5.0	3.5	4.7	6.7	5.0	4.4
11			2.9	2.9	4.7	4.4	5.0	3.5	4.7	6.6	5.0	4.4
12		4.5	5.0	2.9	5.2	5.2	5.0	5.2	4.6	6.2	5.0	4.4
13			5.0	2.8	8.7	8.1	5.5	8.7	4.4	5.9	5.6	5.0
14			3.4	2.8	8.0	8.4	5.6	8.7	4.4	5.6	5.6	4.7
15			3.2	3.6	6.2	7.9	4.7	7.5	4.4	5.3	7.9	4.4
16			3.2	3.2	5.6	8.4		5.6	4.7	5.3	8.4	4.4
17			2.9	2.9	5.0	8.4		6.2	4.7	5.0	8.4	4.4
18			2.9	2.7	4.7	8.4		6.2	4.4	5.0	8.0	4.1
19			6.3	6.3	4.4	7.0	4.3	5.9	5.6	5.0	7.6	4.1
20	6		6.5	6.5	4.4	6.1		5.6	5.3	5.0	7.0	4.1
21			5.8	4.5	4.1	7.9		5.3	5.3	5.0	6.6	4.1
22			5.3	3.9	4.1	5.9		5.0	5.3	5.3	6.2	4.1
23			4.4	3.4	4.1	5.0	4.0	6.4	5.6	5.3	4.5	3.8
24		3.6	3.9	3.2	3.8	5.6	3.8	7.6	7.0	5.3	5.9	3.8
25		3.6	3.9	2.9	3.8	5.0	3.8	7.0	7.0	5.0	5.9	5.6
26		3.6	3.6	2.8	3.8	4.1	3.8	7.0	6.2	5.3	5.9	4.1
27		3.4	3.4	4.8	3.5	3.8	3.8	7.6	5.9	6.2	5.6	3.8
28		3.4	3.4	7.4	3.5	3.5	3.8	6.6	5.3	5.9	5.3	3.8
29		3.4	3.4	7.1	3.5	3.4	3.8	5.9	5.0	5.6	5.3	3.8
30		3.4	3.4	7.1	3.5	4.4	3.5	-------	4.7	5.9	5.0	3.8
31		3.4	-------	7.3	-------	7.0	3.5	-------	4.7	-------	5.0	-------

NOTE.—Braced figures show mean discharge for periods indicated, estimated because of lack of gage-height record by comparison with flow of Kanaha Stream near Lahaina.

Monthly discharge of Olowalu ditch, near Olowalu, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	-------	-------	5.51	8.53	171	524
August	-------	-------	4.24	6.56	131	403
September	6.5	2.8	3.70	5.72	111	341
October	7.4	2.7	3.99	6.17	124	380
November	8.7	3.5	5.27	8.15	158	486
December	8.4	3.4	5.94	9.19	184	565
January	8.4	3.5	5.06	7.83	157	482
February	8.7	3.5	5.40	8.36	156	480
March	7.5	4.4	5.32	8.23	165	506
April	6.7	4.1	5.31	8.22	159	489
May	8.4	4.5	5.99	9.27	186	570
June	5.6	3.8	4.42	6.84	133	407
The year	8.7	-------	5.02	7.77	1,840	5,630

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, 1924.

GAGE.—Stevens continuous water-stage recorder. Datum November 1, 1921, 0.12 foot above old datum.

DISCHARGE MEASUREMENTS.—Made from footbridge 100 feet above gage or by wading.

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

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 720 million gallons per day or 1,110 second-feet at 6 p. m. December 18 (gage height, 8.27 feet); minimum recorded during year, 2.1 million gallons per day or 3.2 second-feet, for a few hours June 30 (gage height, 0.31 foot).

1914–1916; 1921–1924: Maximum stage, about 20 feet during flood of January 18, 1916 (determination of discharge not feasible). Minimum discharge recorded, 1.5 million gallons per day or 2.3 second-feet, for several hours July 16, 17, 20, and 21, 1922 (gage height, 0.20 foot).

DIVERSIONS.—None above station.

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 permanent during year. Rating curve well defined between 2 and 50 million gallons per day and fairly well defined between 50 and 150 million gallons per day; extended for high stages. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records excellent except for high stages.

Discharge measurements of Hanawi Stream, near Nahiku, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 16	0.56	6.1	3.9	Feb. 26	1.16	17.6	11.4
Oct. 3	.37	3.5	2.3	Apr. 15	1.50	28.0	18.2
Nov. 19	.84	10.8	7.0				

Discharge, in million gallons per day, of Hanawi Stream, near Nahiku, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	3.5	3.7	2.7	2.6	7.0	3.9	19.7	2.6	15.9	2.9	11.2	4.0
2	3.4	3.7	2.7	2.5	5.9	4.3	13.1	2.5	20	2.8	8.8	3.9
3	3.4	3.9	2.5	2.4	4.8	10.7	10.2	2.5	16.2	3.2	7.3	3.7
4	4.0	5.5	2.5	2.4	5.1	17.8	8.8	2.4	13.4	3.0	6.7	3.5
5	3.8	5.7	2.4	2.9	85	6.2	7.3	2.4	9.6	2.8	6.3	3.2
6	4.1	4.3	3.0	3.5	19.3	17.8	6.6	2.3	7.6	2.7	6.1	3.1
7	4.7	5.2	2.7	2.5	12.0	56	6.0	2.3	6.8	3.2	5.9	2.9
8	5.8	4.5	2.7	2.4	11.2	11.3	5.6	2.2	6.6	21	5.8	2.8
9	13.4	4.0	2.7	2.4	10.3	7.2	5.5	2.2	6.3	7.4	5.6	2.8
10	9.5	3.9	2.4	2.4	10.3	9.7	4.9	2.2	6.1	8.2	5.5	2.7
11	6.6	4.7	2.3	2.4	10.3	10.2	4.9	2.3	6.1	5.7	5.2	2.7
12	7.0	11.9	44	2.4	30	30	5.1	63	5.8	10.4	5.0	2.7
13	14.6	5.7	12.5	2.4	25	47	4.9	208	5.8	7.1	53	3.8
14	8.8	4.6	4.3	2.4	10.3	11.8	7.3	152	5.9	27	120	3.0
15	8.6	4.0	3.5	2.7	8.8	98	5.3	27	5.3	54	13.6	2.7
16	5.6	3.8	3.1	2.5	8.8	128	4.5	8.2	4.9	8.3	12.0	2.8
17	5.7	5.0	3.0	2.4	8.0	74	4.1	6.2	4.7	5.7	8.8	4.2
18	4.4	27	2.9	2.7	7.5	140	3.9	5.0	4.5	10.3	7.8	2.7
19	6.1	8.3	55	22	7.0	82	3.7	4.6	9.9	6.4	6.7	2.6
20	5.5	5.6	20	12.7	6.7	33	3.5	4.3	5.6	4.8	5.9	2.5
21	5.2	4.7	6.9	8.3	6.2	15.0	3.4	4.3	4.5	4.1	5.5	2.5
22	52	4.2	12.6	8.1	5.9	14.0	3.2	4.7	4.2	5.5	5.1	2.4
23	16.9	3.9	4.0	5.1	5.7	16.0	3.2	8.4	3.9	4.5	4.9	2.3
24	6.6	3.6	3.5	3.9	5.5	16.0	3.1	58	3.9	3.9	4.8	2.3
25	5.3	3.5	3.3	3.5	5.1	16.0	3.0	19.5	3.6	3.8	6.1	2.6
26	4.5	3.3	3.1	3.3	4.9	15.0	3.0	16.5	3.5	29	6.6	2.2
27	4.1	3.2	3.0	113	4.8	14.0	2.9	15.2	3.3	88	5.0	2.2
28	4.1	3.1	2.9	72	4.8	12.0	2.8	8.6	3.4	23	4.7	2.2
29	4.0	3.0	2.7	110	4.3	11.2	2.7	8.4	3.5	11.2	4.5	2.1
30	3.9	2.8	2.6	35	4.1	11.2	2.7	-------	3.2	14.3	4.3	2.1
31	3.9	2.9	-------	8.3	-------	27	2.6	-------	3.0	-------	4.2	-------

NOTE.—Recorder clock stopped May 23–25; gage-height graph estimated from recorded range in stage and comparison with gage-height record for Kapaula Stream.

Monthly discharge of Hanawi Stream, near Nahiku, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	52	3.4	7.71	11.9	239	733
August	27	2.8	5.26	8.14	163	500
September	55	2.3	7.38	11.4	222	679
October	113	2.4	14.6	22.6	451	1,390
November	85	4.1	11.5	17.8	345	1,060
December	140	3.9	31.2	48.3	966	2,970
January	19.7	2.6	5.40	8.36	168	514
February	208	2.2	22.3	34.5	648	1,980
March	20	3.0	6.68	10.3	207	636
April	88	2.7	12.8	19.8	384	1,180
May	120	4.2	11.7	18.1	363	1,110
June	4.2	2.1	2.84	4.39	85.2	261
The year	208	2.1	11.6	17.9	4,240	13,000

KAPAULA 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, 1924.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from suspension foot bridge at gage.

CHANNEL AND CONTROL.—One channel at all stages; fairly straight for 75 feet above gage and curving to right over a series of falls below. Banks nearly perpendicular for 20 feet with little vegetation. Control is rock ledge; probably permanent.

EXTREMES OF DISCHARGE.—Maximum discharge during year, from extension of rating curve, 840 million gallons per day or 1,300 second-feet at 7.10 p. m. December 18 (gage height, 7.85 feet); minimum recorded during year, 1.1 million gallons per day or 1.7 second-feet, for several hours October 18 (gage height, 0.49 foot).

1921–1924: Maximum discharge, from extension of rating curve, 930 million gallons per day or 1,440 second-feet at 2.45 a. m. December 13, 1921 (gage height, 8.45 feet); minimum recorded, 0.9 million gallons per day or 1.4 second-feet, for several hours July 15–18, 20, and 21, 1922 (gage height, 0.45 foot).

DIVERSIONS.—None above station.

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 million gallons per day; extended above and below these limits and subject to error for high stages. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records excellent for ordinary stages; extremely low-stage records uncertain; high-stage records should be used with caution.

Discharge measurements of Kapaula Stream, near Nahiku, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 1	0.62	0.95	0.6	Nov. 25	0.64	3.8	2.4
Aug. 16	.60	1.6	1.05	Jan. 7	.75	5.7	3.7
Oct. 3	.53	.65	.4	Feb. 26	1.01	13.3	8.6
Nov. 19	.74	4.6	3.0	Apr. 15	1.16	17.2	11.1
Nov. 25	.64	2.5	1.65				

Discharge, in million gallons per day, of Kapaula Stream, near Nahiku, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	2.2	2.3	1.5	1.4	5.9	1.9	20	1.4	18.4	1.8	8.6	2.0
2	2.2	2.1	1.4	1.4	5.2	2.3	9.7	1.4	26	1.8	6.5	1.9
3	2.2	2.1	1.4	1.4	4.0	10.9	7.6	1.4	15.8	2.0	4.4	1.8
4	2.8	3.3	1.4	1.4	3.6	28	9.1	1.4	12.4	1.9	3.9	1.8
5	2.8	4.3	1.4	1.8	112	4.3	4.7	1.4	6.5	1.8	3.5	1.8
6	3.0	2.7	1.7	2.6	21	23	4.1	1.4	4.6	1.8	3.1	1.7
7	3.6	3.1	1.7	1.8	9.1	72	3.8	1.3	3.9	2.4	2.9	1.6
8	4.6	3.2	1.4	1.6	8.1	9.4	3.5	1.3	3.9	25	2.7	1.6
9	18.8	2.4	1.6	1.4	7.3	4.4	3.8	1.3	3.5	11.7	2.6	1.6
10	9.4	2.0	1.4	1.4	6.7	11.8	3.1	1.2	3.1	14.6	2.6	1.5
11	5.1	2.7	1.4	1.4	7.2	13.0	3.2	1.2	3.1	5.7	2.3	1.5
12	5.6	12.6	69	1.4	37	45	3.8	41	3.0	18.9	2.3	1.4
13	18.9	4.1	13.2	1.3	33	61	7.6	228	3.4	8.6	79	2.1
14	8.1	3.0	3.0	1.2	5.8	12.0	6.6	171	3.5	36	124	1.8
15	8.8	2.3	2.0	1.4	4.7	99	4.1	36	2.8	42	7.8	1.8
16	4.3	2.0	1.8	1.3	5.4	134	3.0	4.0	2.6	7.0	12.2	2.0
17	4.4	3.5	1.6	1.2	4.3	90	2.7	2.9	2.3	4.3	5.4	3.0
18	3.4	44	1.6	1.3	4.0	144	2.4	2.3	2.2	13.7	5.2	1.8
19	5.4	6.1	83	40	3.6	77	2.3	2.2	16.7	5.6	3.9	1.7
20	4.6	3.4	24	16.1	3.4	33	2.1	2.2	4.1	3.9	3.4	1.6
21	4.9	2.6	4.2	8.3	3.1	10.4	2.0	1.9	3.1	3.4	3.0	1.5
22	63	2.1	7.1	7.5	2.9	7.1	1.8	1.8	2.7	7.1	2.8	1.4
23	40	1.9	2.4	3.5	2.8	5.9	1.8	19.3	2.3	3.9	2.7	1.4
24	5.2	1.8	2.1	2.3	2.6	5.6	1.8	52	2.3	3.0	2.7	1.4
25	3.9	1.8	1.8	1.8	2.4	6.5	1.8	26	2.2	2.7	4.9	1.6
26	3.4	1.8	1.8	1.7	2.3	6.9	1.7	14.5	2.0	48	4.5	1.4
27	3.0	1.7	1.7	107	2.2	6.9	1.6	16.1	2.0	108	2.9	1.4
28	2.9	1.6	1.7	74	2.2	6.7	1.6	4.9	2.2	27	2.4	1.4
29	2.9	1.6	1.6	113	2.2	6.1	1.6	6.3	2.3	7.5	2.2	1.4
30	2.7	1.6	1.5	36	2.0	7.3	1.6	------	2.0	15.7	2.1	1.4
31	2.7	1.6	------	6.1	------	35	1.5	------	1.9	------	2.0	------

Monthly discharge of Kapaula Stream, near Nahiku, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	63	2.2	8.22	12.7	255	782
August	44	1.6	4.24	6.56	131	403
September	83	1.4	8.05	12.5	241	741
October	113	1.2	14.3	22.1	444	1,360
November	112	2.0	10.5	16.2	316	967
December	144	1.9	31.6	48.9	980	3,010
January	20	1.5	4.06	6.28	126	386
February	228	1.2	22.3	34.5	647	1,980
March	26	1.9	5.38	8.32	167	512
April	108	1.8	14.6	22.6	437	1,340
May	124	2.0	10.3	15.9	318	980
June	3.0	1.4	1.68	2.60	50.3	155
The year	228	1.2	11.2	17.3	4,110	12,600

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, 1924. Gage reading made by East Maui Irrigation Co. available January 1, 1912, to February 11, 1919.

GAGE.—Stevens continuous water-stage recorder since April 27, 1922, when the Geological Survey began operating the station. Prior to that date Friez 7-day water-stage recorder was used, but discharge record is determined from twice daily staff gage readings made by East Maui Irrigation Co.'s ditchman.

DISCHARGE MEASUREMENTS.—Made by weir at gage (see under "Channel and control") or from plank across ditch near gage.

CHANNEL AND CONTROL.—Open, concrete-lined ditch below weir. Gage operates in weir basin into which the water discharges from a tunnel. Control formed by sharp-crested rectangular weir, 13.1 feet long, installed February 12, 1919; has complete end contractions and a free fall at all stages; velocity of approach negligible.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 44.0 million gallons per day or 68.1 second-feet at 2 a. m. December 30 (gage height, 1.39 feet); minimum recorded during year no flow from 6.45 a. m. to 3.30 p. m. December 23 and from 8.30 to 10 a. m. December 24.

1919–1924: Maximum discharge recorded, 47.8 million gallons per day or 74.0 second-feet in morning of September 3, 1919 (gage height, 1.48 feet); minimum recorded, no flow, when intake gates are occasionally closed.

DIVERSIONS.—None in vicinity of station except spillways.

REGULATION.—By gates at intervals.

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

UTILIZATION.—Water used for irrigation of sugar cane.

ACCURACY.—Stage-discharge relation permanent. Weir rating curve well defined. Operation of water-stage recorder satisfactory except for one short period. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records excellent.

Koolau 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 northwestward along the side of Haleakala. The water is carried to a point near Paia where it is distributed for the irrigation of sugar cane, the development of power, and for domestic purposes on the plantations of Hawaiian Commercial & Sugar Co. and Maui Agricultural Co. The system comprises about 18 miles of main ditch which has a maximum carrying capacity of 145 million gallons per 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 per day.

ischarge measurements were made at this station during the year.

Discharge, in million gallons per day, of Koolau ditch at Nahiku Weir, near Nahiku, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	11.6	13.2	8.1		30	12.0	34	7.6	34	8.7	36	11.6
2	11.3	12.6	7.9	7.5	26	13.2	32	7.3	38	8.4	34	11.0
3	11.6	12.3	7.3		22	26	30	6.8	36	8.7	30	10.4
4	12.9	17.1	7.1	7.3	19.6	30	28	6.6	36	8.7	26	10.1
5	12.6	17.8	6.8	8.4	36	21	26	6.6	34	8.1	23	9.5
6	13.9	13.6	9.0	12.0	34	30	23	6.3	30	7.9	21	9.3
7	16.7	16.4	7.3	7.9	34	34	21	6.1	26	9.3	20	8.7
8	21	15.0	6.6	7.3	34	32	19.6	5.9	24	28	18.9	8.4
9	32	12.3	7.6	6.8	34	30	18.9	5.9	22	24	17.8	8.1
10	32	11.6	6.6	6.6	32	28	17.1	5.6	21	28	17.1	7.9

Discharge, in million gallons per day, of Koolau ditch at Nahiku Weir, near Nahiku, Maui, for the year ending June 30, 1924—Continued

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
11	24	14.2	6.3	6.6	32	30	16.4	5.6	19.6	21	16.0	7.9
12	26	28	33	6.3	34	32	17.8	10.4	18.9	30	15.3	7.6
13	34	19.6	30	6.1	36	34	22	38	19.2	24	25	10.7
14	32	15.3	15.6	6.1	34	32	23	38	18.9	36	38	9.3
15	30	13.6	15.0	6.1	32	32	19.9	36	17.1	38	36	8.4
16	23	12.3	10.1	6.1	32	34	16.7	34	15.6	34	36	9.0
17	23	15.6	9.3	5.6	28	34	15.3	30	14.6	26	34	13.8
18	18.9	36	11.7	6.1	26	34	14.2	24	13.9	30	30	8.7
19	24	30	38	32	24	26	13.6	21	28	30	26	8.1
20	22	21	32	30	23	21	12.6	18.1	18.5	22	21	7.3
21	22	17.8	22	30	21	19.2	12.0	16.4	15.3	18.9	19.2	7.1
22	34	15.3	21	26	19.6	17.8	11.0	15.6	13.6	22	18.1	6.8
23	36	13.9	15.0	18.9	18.9	8.2	10.7	25	12.3	19.2	17.1	6.6
24	30	12.6	12.9	14.6	17.8	6.1	9.8	32	12.0	16.0	15.3	6.3
25	24	11.6	12.0	12.6	16.4	5.6	9.5	34	11.3	14.6	21	6.8
26	21	11.0	10.7	11.0	15.6	4.7	9.3	32	10.7	30	23	6.1
27	18.1	10.4	10.1	26	15.0	4.3	9.0	34	9.8	40	16.7	5.9
28	17.8	9.5	9.8	36	14.6	4.1	8.7	28	10.4	38	15.0	5.6
29	16.4	9.3	8.5	36	13.6	24	8.4	28	10.7	36	13.9	5.4
30	15.3	9.0		36	12.6	36	8.1	-------	9.5	38	13.2	5.1
31	14.2	8.7	-------	34	-------	36	7.9	-------	9.0	-------	12.6	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow of Koolau ditch near Keanae.

Monthly discharge of Koolau ditch at Nahiku Weir, near Nahiku, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	36	11.3	22.0	34.0	681	2,090
August	36	8.7	14.5	23.8	477	1,470
September	38	6.3	13.5	20.9	406	1,240
October	36	5.6	15.2	23.5	471	1,450
November	36	12.6	25.6	39.6	768	2,360
December	36	4.1	23.6	36.5	731	2,250
January	34	7.9	17.0	26.3	526	1,620
February	38	5.6	19.5	30.2	565	1,740
March	38	9.0	19.7	30.5	610	1,870
April	40	7.9	23.4	36.2	704	2,160
May	38	12.6	22.8	35.3	706	2,170
June	13.8	5.1	8.25	12.8	248	760
The year	40	4.1	18.8	29.1	6,890	21,200

WAIOHUE 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, 1924.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading.

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

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 600 million gallons per day or 930 second-feet at 5 p. m. December 18 (gage height, 5.95 feet); minimum recorded, 2.5 million gallons per day or 3.9 second-feet, for several hours June 29 and 30 (gage height, 0.65 foot.)

1921–1924: Maximum discharge recorded, about 630 million gallons per day or 975 second-feet at 3 a. m. December 13, 1921 (gage height, 6.23 feet); minimum recorded, 1.9 million gallons per day or 2.9 second-feet for several hours July 15–23, 1922 (gage height, 0.55 foot).

DIVERSIONS.—None above station.

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 2.5 and 30 million gallons per day; extended above 30 million gallons per day and subject to considerable error at high stages. Operation of water-stage recorder satisfactory except as noted in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good for ordinary stages; high-stage records subject to error and should be used with caution.

Discharge measurements of Waiohue Stream, near Nahiku, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 1	0.84	6.5	4.2	Jan. 8	0.90	7.4	4.8
Aug. 17	.80	5.8	3.7	Do	.90	7.7	5.0
Oct. 3	.75	6.0	3.9	Feb. 27	1.19	17.0	11.0
Nov. 19	.94	8.9	5.7	Apr. 16	1.07	11.2	7.2
Do	.94	10.4	6.7				

Discharge, in million gallons per day, of Waiohue Stream, near Nahiku, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	4.1	4.5			6.8	3.6	13.4	3.0	12.9	3.6	9.2	3.8
2	4.0	4.2		3.2	7.0	4.4	7.9	3.0	16.0	3.5	8.8	3.7
3	4.2	4.2			6.2	8.5	7.5	3.0	14.0	3.7	6.8	3.5
4	4.4	5.6		3.3	6.4	13.2	6.6	2.9	12.2	3.6	6.2	3.4
5	4.2	4.8		3.9	57	5.1	5.8	2.8	8.0	3.4	5.9	3.4
6	4.8	4.1	3.1	4.4	13.0	12.9	5.4	2.8	6.8	3.3	5.4	3.3
7	5.4	6.0		3.4	8.7	30	5.0	2.7	6.2	3.8	5.3	3.2
8	5.7	4.6		3.2	9.2	7.8	4.8	2.7	6.1	9.5	4.8	3.2
9	10.4	4.0		3.2	8.4	5.8	5.0	2.7	5.4	6.4	4.7	3.2
10	7.0	3.9		3.1	7.8	11.1	4.6	2.7	5.3	7.5	4.6	3.1
11	5.6	4.8		3.0	8.0	7.4	5.0	2.6	5.1	5.1	4.5	3.0
12	6.2	9.4		2.9	21	22	5.0	18.0	4.7	10.5	4.4	3.0
13	11.9	5.0		2.8	14.7	25	5.8	124	4.7	7.7	44	4.1
14	7.0	4.2		2.7	7.2	8.9	5.1	83	4.6	13.7	61	3.4
15	7.5	3.9		2.9	7.0	66	4.6	23	4.4	21	7.4	3.2
16	5.6	3.8		2.7	7.6	54	4.2	5.0	4.2	8.4	11.3	3.6
17	6.6	6.6	10	2.6	6.1	41	4.0	4.5	4.1	6.4	6.8	5.0
18	5.6	23		2.8	5.9	105	4.0	4.7	4.1	10.1	7.0	3.2
19	7.6	5.8		15.2	5.4	40	3.9	5.0	8.1	6.8	5.8	3.1
20	6.1	4.6		8.5	5.1	24	3.8	4.7	4.6	6.1	5.3	3.0
21	6.6	4.4		8.7	5.0	14.7	3.7	4.4	4.1	5.6	5.0	2.8
22	30			6.3	4.7	11.7	3.6	4.1	4.0	8.6	4.8	2.8
23	9.1			4.0	4.6	9.8	3.5	10.3	4.0	5.8	4.6	2.7
24	6.2			3.6	4.4	8.4	3.4	15.4	4.0	5.1	4.6	2.7
25	5.8			3.4	4.2	7.6	3.3	10.3	3.9	4.7	6.2	3.0
26	5.4	3.7	3.5	3.5	4.2	6.8	3.3	8.3	3.8	18.1	5.4	2.7
27	5.3			50	4.1	6.6	3.2	10.1	3.7	53	4.5	2.6
28	5.4			33	4.1	6.2	3.2	5.9	3.9	17.0	4.1	2.6
29	5.1			37	3.8	6.1	3.2	5.9	4.0	8.2	4.0	2.6
30	4.8			14.7	3.7	7.0	3.2	-------	3.8	14.7	3.9	2.6
31	4.7		-------	6.6	-------	22	3.1	-------	3.7	-------	3.8	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow of Hanawi and Kapaula Streams.

Monthly discharge of Waiohue Stream, near Nahiku, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	30	4.0	6.85	10.6	212	652
August	23		5.11	7.91	158	486
September			5.74	8.88	172	528
October	50	2.6	8.10	12.5	251	770
November	57	3.7	8.71	13.5	261	802
December	105	3.6	19.4	30.0	603	1,850
January	13.4	3.1	4.78	7.40	148	455
February	124	2.6	13.0	20.1	378	1,160
March	16.0	3.7	5.95	9.21	184	565
April	53	3.3	9.50	14.7	285	874
May	61	3.8	8.71	13.5	270	829
June	5.0	2.6	3.18	4.92	95.5	293
The year	124	2.6	8.25	12.8	3,020	9,260

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, 1924.

GAGE.—Stevens continuous water-stage recorder at same datum as Friez recorder used prior to September 17, 1917.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge 200 feet below gage or by wading.

CHANNEL AND CONTROL.—Channel straight for 200 feet below gage; falls above with channel divided. Stream bed composed of loose boulders. Left bank covered with vegetation and subject to overflow; right bank steep. Control composed of medium-sized boulders; shifts during floods.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 1,370 million gallons per day or 2,120 second-feet at 6 p. m. December 18 (gage height, 6.98 feet); minimum recorded during year, 1.8 million gallons per day or 2.8 second-feet, for several hours October 17–18 (gage height, 1.40 feet).

1914–1917; 1921–1924: Maximum discharge recorded, about 2,000 million gallons per day or 3,090 second-feet at 5.30 a. m. January 18, 1916 (gage height, 9.25 feet); minimum recorded, 0.6 million gallons per day or 0.8 second-foot, September 15–17, 1917 (gage height, 0.6 foot).

DIVERSIONS.—None.

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 changed during flood of October 27. Two rating curves used well defined between 2 and 700 million gallons per day. Operation of water-stage recorder satisfactory except during July and August. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good except those estimated.

Discharge measurements of West Kopiliula Stream, near Keanae, Maui, for the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 2	1.53	4.5	2.9	Jan. 8	1.60	8.7	5.6
Aug. 17	1.52	3.8	2.4	Feb. 27	2.19	40	26
Oct. 2	1.49	3.5	2.2	Apr. 16	1.92	19.2	12.4
Nov. 20	1.67	9.3	6.0	June 4	1.44	5.2	3.3

Discharge, in million gallons per day, of West Kopiliula Stream near Keanae, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	2.9		2.2	2.4	12.3	4.1	15.2	3.0	23	3.8	13.9	3.7
2	2.7		2.1	2.3	10.4	5.5	9.0	3.0	31	3.7	10.4	3.6
3	3.0		2.2	2.3	8.1	14.6	10.6	2.9	21	4.2	7.9	3.5
4	3.6	4.4	2.1	2.3	7.1	28	9.1	2.9	17.4	3.7	6.7	3.4
5	3.0		2.0	3.0	140	7.3	6.9	2.9	10.4	3.5	6.2	3.3
6	3.4		3.1	3.7	41	25	6.0	2.9	7.9	3.5	6.7	3.3
7	3.9		2.2	2.3	16.5	91	5.6	2.8	6.9	8.2	6.2	3.2
8	5.0		2.0	2.2	13.1	13.2	5.3	2.8	6.9	64	5.4	2.9
9	21		2.3	2.2	11.2	8.5	5.6	2.7	6.0	30	5.0	2.8
10	11.1	6.0	2.0	2.0	11.2	16.9	4.7	2.6	5.6	42	4.8	2.8
11	6.0		2.0	2.0	10.7	14.3	5.3	2.6	5.9	13.0	4.4	2.7
12	8.1		84	2.0	38	57	5.9	68	6.0	39	4.3	2.6
13	19.2		19.0	2.0	45	75	9.5	424	6.5	18.5	121	4.3
14	10.0		4.7	2.0	11.2	26	8.7	352	5.9	52	192	3.0
15	10.6	4.3	3.1	2.3	9.3	202	6.7	50	5.0	70	17.0	2.9
16	5.7		2.6	2.0	8.8	216	5.2	9.0	4.8	12.3	16.0	3.4
17	5.7	5.5	2.3	1.9	7.3	112	4.8	6.0	4.8	8.3	8.8	4.3
18	4.5	43	2.6	2.0	6.7	266	4.7	4.8	4.8	14.8	10.1	2.6
19	7.4	9.3	114	47	6.4	109	4.3	4.7	34	9.8	6.5	2.6
20	6.8	4.7	37	30	6.0	53	4.2	4.1	8.8	7.3	5.8	2.4
21	6.5	3.6	8.8	11.0	5.8	16.5	4.0	3.8	6.2	6.2	5.3	2.4
22	103	3.1	18.4	11.0	5.4	11.6	3.9	3.8	5.3	13.6	5.2	2.4
23	31	2.8	5.2	4.7	5.3	9.6	3.8	32	4.8	6.5	4.8	2.3
24	8.8	2.7	3.4	3.3	5.0	8.5	3.6	132	4.9	5.4	5.3	2.4
25		2.6	3.1	3.0	4.8	7.9	3.5	55	4.6	5.0	7.7	2.8
26		2.5	2.8	2.7	4.9	6.9	3.4	30	4.3	71	5.6	2.3
27	4.6	2.4	2.9	222	4.7	6.5	3.4	23	4.1	139	4.6	2.2
28		2.3	2.7	138	4.8	6.0	3.4	10.4	4.4	44	4.2	2.1
29		2.3	2.5	179	4.4	6.0	3.3	11.4	4.6	15.6	4.1	2.1
30		2.3	2.4	62	4.2	6.9	3.2	-------	4.2	21	3.9	2.1
31		2.3	-------	13.5	-------	27	3.1	-------	3.9	-------	3.8	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by compraison with flow of East and West Wailuaiki Streams. Gage-height graph estimated for part of day Aug. 17.

Monthly discharge of West Kopiliula Stream, near Keanae, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	103	2.7	10.5	16.2	325	999
August	43	2.3	5.52	8.54	171	525
September	114	2.0	11.5	17.8	346	1,060
October	222	1.9	24.8	38.4	768	2,360
November	140	4.2	15.7	24.3	470	1,449
December	266	4.1	47.0	72.7	1,460	4,470
January	15.2	3.1	5.67	8.77	176	540
February	424	2.6	43.3	67.0	1,260	3,850
March	34	3.9	8.84	13.7	274	841
April	139	3.5	24.6	38.1	739	2,270
May	192	3.8	16.6	25.7	514	1,580
June	4.3	2.1	2.88	4.46	86.4	265
The year	424	1.9	18.0	27.9	6,580	20,200

EAST WAILUAIKI STREAM, NEAR KEANAE, MAUI

LOCATION.—1,000 feet above Koolau ditch crossing and trail, 3¾ miles east of Upper Keanae, and 6¼ miles east of Keanae post office.

RECORDS AVAILABLE.—December 21, 1913, to October 23, 1917, and July 1, 1922, to June 30, 1924. Fragmentary unpublished record, October 21, 1921, to June 30, 1922.

GAGE.—Stevens continuous water-stage recorder; used at both old and new stations except for period December 21, 1913, to April 17, 1914, when Friez recorder was operated. Station was reestablished on October 21, 1921, at old location; flood of December 24, 1921, destroyed station and shifted channel; station moved upstream a short distance on April 25, 1922; landslide on May 1, 1922, demolished shelter; shelter repaired and recorder reinstalled July 9, 1922.

DISCHARGE MEASUREMENTS.—Made by wading 1,000 feet below gage near ditch intake or from footbridge 100 feet above ditch intake.

CHANNEL AND CONTROL.—Recorder operates in pool at foot of 10-foot falls. Left bank steep and high; right bank sloping and may be subject to overflow at extremely high stages. Control composed of boulders; shifts occasionally.

EXTREMES OF DISCHARGE.—Maximum recorded during year, from extension of rating curve 1,460 million gallons per day or 2,260 second-feet, at 6.15 p. m. December 18 (gage height, 8.60 feet); minimum recorded during year, 2.7 million gallons per day or 4.2 second-feet, from midnight to 6 a. m. June 30 (gage height, 0.48 foot).

1913–1917; 1922–1924: Maximum, from extension of rating curve, 1,900 million gallons per day or 2,940 second-feet, at 8 a. m. January 18, 1916 (gage height, 8.35 feet); minimum recorded, 1.0 million gallons per 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 been the highest on record but owing to destruction of station and loss of recorder no data is available for determining the crest discharge.

DIVERSIONS.—None above station.

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 sugar cane.

ACCURACY.—Stage-discharge relations permanent during year. Rating curve well defined between 2.5 and 175 million gallons per day; extended outside these limits. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records excellent except those for extremely low and high stages which are uncertain.

Discharge measurements of East Wailuaiki Stream, near Keanae, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 2	0.76	6.4	4.1	Jan. 8	0.95	10.1	6.5
Aug. 18	1.97	37.5	24.3	Feb. 28	1.22	15.5	10.0
Do	1.69	33.5	21.7	Apr. 16	1.28	16.7	10.8
Oct. 2	.55	4.6	3.0	June 3	.71	6.3	4.1
Nov. 20	.90	8.9	5.8				

Discharge, in million gallons per day, of East Wailuaiki Stream, near Keanae, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	4.6	5.4	3.7	3.5	15.5	3.9	20	3.6	25	3.9	17.2	4.4
2	4.5	5.1	3.6	3.3	11.5	6.3	12.8	3.5	35	3.9	12.4	4.3
3	5.0	5.5	3.6	3.2	8.1	27	13.8	3.5	23	4.6	9.2	4.2
4	6.3	10.8	3.5	3.3	7.6	37	14.4	3.4	21	3.8	8.0	3.9
5	4.8	8.1	3.4	4.1	152	8.4	8.4	3.3	12.4	3.7	7.4	3.9
6	5.5	5.4	4.8	5.7	37	30	7.9	3.3	9.2	3.6	7.0	3.8
7	6.9	8.7	3.6	3.3	17.8	92	7.4	3.2	8.1	7.8	7.6	3.6
8	9.2	6.3	3.3	3.1	13.4	16.2	6.9	3.2	8.1	53	6.9	3.6
9	31	5.0	3.9	3.0	12.4	9.9	7.4	3.1	6.9	28	5.9	3.5
10	15.5	5.1	3.3	3.0	12.4	19.0	6.3	3.0	6.5	86	5.5	3.4
11	9.9	7.0	3.3	2.9	12.4	22	7.0	3.0	7.0	14.3	5.0	3.3
12	12.7	22	96	2.9	47	56	8.0	35	6.6	38	5.0	3.3
13	26	9.2	21	2.9	43	75	12.0	327	7.8	18.4	98	5.7
14	15.5	6.7	6.3	2.8	12.4	29	12.4	300	7.5	33	197	3.9
15	14.4	5.7	4.6	3.6	9.9	165	9.2	59	6.0	62	23	3.6
16	9.2	5.2	4.1	3.0	9.9	199	6.9	12.4	5.6	13.5	18.4	3.8
17	9.2	9.1	3.8	2.9	7.8	108	6.3	8.3	5.5	8.4	14.2	6.8
18	7.5	57	4.4	3.0	7.1	236	6.0	6.4	6.1	15.5	14.9	3.5
19	11.1	12.7	140	59	6.3	106	5.6	6.0	42	14.5	9.2	3.3
20	10.7	7.5	33	33	5.9	51	5.2	5.0	10.7	8.0	7.4	3.2
21	9.9	6.0	10.7	13.2	5.6	20	5.0	4.6	6.9	6.5	6.5	3.1
22	108	5.4	17.2	14.1	5.2	14.4	4.7	4.3	5.7	16.5	6.3	3.1
23	30	4.9	6.6	6.7	5.1	11.5	4.6	30	5.2	7.8	5.8	3.0
24	10.7	4.6	5.0	4.8	5.0	9.9	4.4	114	5.6	6.3	5.9	3.0
25	8.4	4.5	4.6	4.3	4.6	9.2	4.2	50	5.9	5.6	9.9	3.6
26	7.6	4.3	4.2	3.9	4.8	8.4	4.2	34	4.6	64	8.3	3.0
27	6.7	4.2	4.2	184	4.6	7.9	4.0	27	4.4	140	5.6	2.9
28	7.5	4.1	4.0	116	5.1	7.4	3.9	10.7	4.6	45	5.0	2.8
29	6.5	3.9	3.7	160	4.3	7.4	3.8	13.5	4.8	18.8	4.8	2.8
30	6.3	4.0	3.6	52	4.1	8.0	3.8	-------	4.5	23	4.6	2.8
31	5.9	4.1	-------	15.5	-------	31	3.6	-------	4.1	-------	4.5	-------

Monthly discharge of East Wailuaiki Stream, near Keanae, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	108	4.5	13.8	21.4	427	1,310
August	57	3.9	8.31	12.9	258	791
September	140	3.3	13.9	21.5	417	1,280
October	184	2.8	23.4	36.2	726	2,230
November	152	4.1	16.6	25.7	498	1,530
December	236	3.9	46.2	71.5	1,430	4,400
January	20	3.6	7.42	11.5	230	706
February	327	3.0	37.4	57.9	1,080	3,330
March	42	4.1	10.2	15.8	315	970
April	140	3.6	23.6	36.5	707	2,170
May	197	4.5	17.6	27.2	546	1,670
June	6.8	2.8	3.64	5.63	109	335
The year	327	2.8	18.4	28.5	6,750	20,700

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, 1924.

GAGE.—Stevens continuous water-stage recorder. Datum unchanged.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge 90 feet below station or by wading.

CHANNEL AND CONTROL.—Gage located on a pool at base of a fall. Control at outlet of pool composed of boulders and rock ledge; probably permanent. Banks are nearly vertical rock walls; not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum recorded during year, about 3,100 million gallons per day or 4,800 second-feet at 7 p. m. December 18 (gage height, 11.70 feet); minimum recorded during year, 1.5 million gallons per day or 2.3 second-feet from 1 to 6 a. m. June 30 (gage height, 0.57 foot).

1914–1917; 1921–1924: Maximum stage about 13.5 feet at 1.45 p. m. January 14, 1923. Discharge estimated at 4,500 million gallons per day or 6,960 second-feet. Minimum discharge recorded, 0.3 million gallons per day or 0.45 second-foot, from noon to 1 p. m. July 26, 1922 (gage height, 0.44 foot).

DIVERSIONS.—None above station.

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 sugar cane.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined below 30 million gallons per day; fairly well defined between 30 and 500 million gallons per day; and extended for higher stages. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records excellent except for high stages.

Discharge measurements of West Wailuaiki Stream, near Keanae, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 2	0.81	6.9	4.5	Jan. 9	0.98	9.4	6.1
Aug. 18	1.70	37	23.8	Feb. 28	1.29	20.1	13.0
Oct. 2	.70	4.4	2.9	Apr. 16	1.31	20.6	13.3
Nov. 20	.93	9.7	6.2	June 4	.77	5.6	3.6

Discharge, in million gallons per day, of West Wailuaiki Stream, near Keanae, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	4.6	5.0	2.7	3.1	19.4	3.6	19.4	2.7	25	4.1	19.6	4.5
2	4.4	4.8	2.5	2.9	13.6	5.0	13.0	2.7	38	3.9	13.4	4.4
3	5.7	5.0	2.6	3.1	9.8	22	16.9	2.6	25	4.8	10.0	4.4
4	6.8	9.8	2.2	3.9	8.3	47	19.1	2.4	24	3.7	8.1	3.9
5	5.1	8.2	2.2	5.0	239	10.2	8.4	2.2	14.1	3.6	7.1	3.7
6	5.4	5.1	3.3	7.0	49	29	7.6	2.1	10.0	3.6	7.0	3.4
7	6.5	8.5	2.5	3.9	21	140	6.8	2.1	8.1	11.7	7.9	3.1
8	8.8	6.8	2.0	3.4	15.4	21	6.4	2.0	7.9	63	7.1	3.0
9	35	5.0	2.9	2.9	13.4	12.2	6.7	1.9	6.5	31	5.8	2.9
10	17.6	5.1	2.0	2.7	13.8	21	5.7	1.8	6.1	43	5.3	2.7
11	11.5	6.7	1.9	2.6	13.4	27	6.8	1.7	7.1	18.1	4.9	2.6
12	14.0	23	128	2.4	68	69	9.6	88	7.4	46	4.9	2.6
13	29	9.8	26	2.2	62	106	14.0	693	8.6	20	195	5.2
14	17.1	7.0	7.4	2.1	14.4	41	15.4	652	8.2	43	343	3.9
15	17.9	6.0	5.4	4.4	10.8	352	11.6	75	6.0	80	28	3.4

Discharge, in million gallons per day, of West Wailuaiki Stream, near Keanae, Maui, for the year ending June 30, 1924—Continued

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
16	10.6	5.1	4.6	3.1	10.2	323	7.3	15.1	5.7	15.2	28	3.5
17	9.8	7.5	4.0	2.4	8.2	157	6.7	9.8	8.1	9.8	18.1	5.9
18	7.8	73	4.5	2.2	7.3	526	6.2	7.4	8.1	16.5	17.5	3.1
19	13.0	15.5	257	75	6.5	182	6.0	6.7	56	14.9	10.4	2.7
20	12.2	8.2	51	43	6.0	75	5.4	5.8	12.4	8.2	8.1	2.5
21	10.6	6.2	14.0	16.0	5.5	22	4.9	5.3	7.8	6.8	7.0	2.2
22	183	5.4	16.1	17.9	5.4	14.8	4.6	4.8	6.4	21	6.5	2.4
23	38	4.8	7.6	9.4	5.3	11.5	4.4	47	5.7	9.4	6.1	2.1
24	12.8	4.2	5.8	6.7	4.9	9.8	4.1	203	5.8	6.8	6.7	2.1
25	9.6	4.0	5.0	5.7	4.5	8.6	3.9	61	5.3	6.1	10.0	3.5
26	7.8	3.6	4.6	5.0	4.6	7.6	3.7	36	4.9	80	8.1	2.5
27	6.8	3.4	4.4	492	4.6	6.8	3.5	30	4.6	205	5.8	2.2
28	7.1	3.3	4.1	191	5.1	6.4	3.4	13.2	5.0	58	5.1	1.9
29	6.4	2.9	3.7	266	4.1	6.1	3.1	15.4	6.1	23	5.0	1.6
30	6.0	3.4	3.5	68	3.9	7.1	3.0	-------	5.5	29	4.5	1.6
31	5.5	3.5	-------	19.4	-------	28	2.8	-------	4.5	-------	4.5	-------

Monthly discharge of West Wailuaiki Stream, near Keanae, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	183	4.4	17.3	26.8	536	1,650
August	73	2.9	8.71	13.5	270	829
September	257	1.9	19.4	30.0	584	1,790
October	492	2.1	41.1	63.6	1,270	3,910
November	239	3.9	21.9	33.9	657	2,020
December	526	3.6	74.1	115	2,300	7,050
January	19.4	2.8	7.75	12.0	240	737
February	693	1.7	68.7	106	1,990	6,110
March	56	4.5	11.4	17.6	354	1,080
April	205	3.6	29.6	45.8	889	2,730
May	343	4.5	26.4	40.8	818	2,510
June	5.9	1.6	3.12	4.83	98.5	287
The year	693	1.6	27.3	42.2	10,000	30,700

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, 1924. For station 500 feet upstream, January 1, 1914, to October 24, 1917.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading just above ditch intake or from suspension footbridge 500 feet above gage.

CHANNEL AND CONTROL.—One channel at all stages. Control is rock ledge at outlet of pool formed at foot of 12-foot falls; probably permanent.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 800 million gallons per day or 1,240 second-feet at 7 p. m. December 18 (gage height, 5.75 feet); minimum recorded during year, 0.45 million gallons per day or 0.7 second-foot, for several hours February 9–11 and June 29–30 (gage height, 0.33 foot).

1921–1924: Maximum discharge recorded on December 18, 1923; minimum recorded, 0.2 million gallons per day or 0.3 second-foot, for several hours July 16, 17, 20, and 21, 1922 (gage height, 0.30 foot).

DIVERSIONS.—None above station.

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 permanent during year. Rating curve well defined below 20 million gallons per day; extended above that quantity and subject to error. Operation of water-stage recorder satisfactory except during parts of October and November. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection, or for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good for ordinary stages; estimated records fair; high-stage records uncertain and should be used with caution.

Discharge measurements of East Wailuanui Stream, near Keanae, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 2	0.45	2.3	1.5	Oct. 2	0.39	13.5	0.9
Aug. 18	.78	14.8	9.6	Jan. 9	.49	3.1	2.0

Discharge, in million gallons per day, of East Wailuanui Stream, near Keanae Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	1.9	1.7	1.0	1.0		0.9	8.7	0.8	10.2	0.9	5.8	1.1
2	1.7	1.6	.9	1.0		2.1	4.7	.8	15.0	.9	4.6	1.0
3	1.9	1.7	.9	1.1		12.2	3.8	.7	12.4	1.3	3.0	1.0
4	2.1	4.4	.8	1.1		14.7	2.7	.7	9.6	1.0	2.4	.9
5	1.8	2.4	.8	1.6		2.6	2.0	.6	4.6	1.0	2.1	.9
6	2.0	1.7	1.3	3.0	7.3	13.0	1.9	.6	3.9	1.0	1.9	.8
7	2.8	3.9	1.0	1.2		32	1.7	.6	2.4	2.5	1.8	.8
8	3.5	2.0	.8	1.0		5.6	1.6	.6	2.3	5.6	1.7	.8
9	12.7	1.7	1.0	.9		2.8	1.9	.5	2.0	4.4	1.6	.8
10	7.0	1.7	.8	.9		8.1	1.7	.5	1.8	5.2	1.4	.8
11	4.0	2.4	.8	.8		6.4	2.1	.5	2.9	3.0	1.3	.7
12	5.3	11.3	30	.8		17.3	2.6	18.9	1.7	8.4	1.3	.7
13	12.0	3.3	5.9	.8		26	2.9	118	1.8	5.4	47	2.2
14	6.6	2.1	1.9	.8		6.0	2.6	67	1.6	9.7	63	1.2
15	6.9	1.9	1.6	1.2		71	2.1	22	1.4	15.5	5.3	.9
16	3.5	1.8	1.4	.9		37	1.8	3.3	1.3	3.8	9.3	1.2
17	3.5	4.8	1.2	.8		38	1.7	2.4	1.6	2.6	4.0	3.3
18	3.0	27	1.6	.9	3.8	90	1.6	2.0	1.6	2.6	4.2	1.0
19	4.1	4.2	44	18.8		32	1.6	2.0	6.6	2.4	2.4	.8
20	3.8	2.4	21	8.5		10.2	1.3	1.7	2.0	2.0	2.0	.8
21	3.6	2.0	2.6	7.7		6.0	1.3	1.4	1.6	1.8	1.8	.8
22	30	1.8	2.0	5.7		3.6	1.2	1.3	1.4	7.8	1.8	.8
23	7.7	1.7	1.8			2.8	1.2	3.9	1.3	2.4	1.7	.7
24	5.8	1.6	1.7			2.4	1.0	5.3	1.4	2.0	1.8	.7
25	3.0	1.6	1.6		1.2	2.1	1.0	7.3	1.2	1.8	2.8	.9
26	2.4	1.3	1.4	20	1.3	2.0	1.0	4.8	1.2	19.6	2.3	.7
27	2.3	1.3	1.4		1.2	1.8	.9	9.3	1.1	47	1.6	.7
28	2.3	1.2	1.3		1.4	1.7	.8	3.0	1.3	17.6	1.4	.6
29	2.1	1.2	1.1		1.1	1.6	.8	3.0	1.4	5.3	1.2	.5
30	1.9	1.2	1.1		1.0	1.8	.8	-------	1.1	11.2	1.1	.5
31	1.8	1.2	-------		-------	16.8	.8	-------	1.0	-------	1.0	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow of adjacent streams.

Monthly discharge o East Wailuanui Stream, near Keanae, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	30	1.7	4.94	7.64	153	470
August	27	1.2	3.23	5.00	100	307
September	44	.8	4.49	6.95	135	413
October		.8	7.76	12.0	240	738
November		1.0	4.56	7.06	137	420
December	90	.9	15.2	23.5	470	1,440
January	8.7	.8	1.99	3.08	61.8	190
February	118	.5	9.78	15.1	284	870
March	15.0	1.0	3.19	4.94	98.9	304
April	47	.9	6.52	10.1	196	601
May	63	1.0	5.95	9.21	185	567
June	3.3	.5	.95	1.47	28.6	88
The year	118	.5	5.71	8.83	2,090	6,410

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, 1924.

GAGE.—Stevens continuous water-stage recorder installed November 4, 1922. Gurley printing recorder used June 23 to November 3, 1922; Friez recorder used November 2, 1917, to June 23, 1922. Gage was moved to present location on March 25, 1922. East Maui Irrigation Co. obtained staff gage readings at this location since about 1904.

DISCHARGE MEASUREMENTS.—Made from plank 20 feet above gage.

CHANNEL AND CONTROL.—Concrete-lined ditch; straight for 100 feet above gage. Control not well defined but probably fairly permanent as ditch enters long tunnel 5 feet below gage.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year 139 million gallons per day or 215 second-feet at 4.50 a. m. February 13 (gage height, 5.27 feet); minimum recorded, no flow, January 5–9.

1910–1912; 1917–1924: Maximum discharge recorded, 175 million gallons per day or 271 second-feet at 7.15 p. m. January 4, 1922 (gage height, 6.36 feet). Ditch occasionally dry when gates are closed.

DIVERSIONS.—None in vicinity of station except spillways.

REGULATION.—By gates at intervals.

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

UTILIZATION.—Water used for irrigation of sugar cane.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records excellent.

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

Discharge measurements of Koolau ditch, near Keanae, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 2	2.02	59	38	Feb. 29	3.40	124	80
Aug. 15	2.28	68	44	Apr. 17	3.31	115	74
Oct. 4	1.70	43.5	28	June 2	1.87	51	33
Nov. 21	2.70	88	57				

Discharge, in million gallons per day, of Koolau ditch, near Keanae, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	39	42	24	26	107	34	4.3	22	110	30	107	36
2	38	39	23	24	94	46	1.7	20	117	28	100	34
3	42	42	23	24	75	117	.3	20	107	35	84	32
4	51	70	22	27	69	104	.1	19.0	107	31	72	31
5	42	62	22	35	117	72	-------	19.0	97	31	66	28
6	48	42	33	56	104	110	-------	18.0	84	28	63	27
7	60	61	24	27	107	100	-------	18.0	72	51	63	26
8	72	51	19.0	24	107	94	-------	16.8	69	100	57	24
9	107	39	26	22	107	94	-------	16.8	60	84	51	23
10	107	39	19.0	22	104	94	.1	16.8	57	94	48	23
11	84	54	19.0	20	104	114	.3	15.5	60	81	45	22
12	87	104	100	20	110	107	28	63	57	107	45	22
13	110	72	100	19.0	110	97	73	119	60	87	75	43
14	107	51	57	19.0	104	97	83	98	60	104	110	31
15	104	45	42	27	94	117	69	48	48	107	84	27
16	78	39	34	24	94	114	54	12.1	45	91	94	30
17	78	50	28	18.0	78	91	48	6.6	48	78	104	51
18	66	120	31	20	72	29	45	5.1	48	84	94	24
19	84	84	117	118	66	.4	42	4.3	100	91	78	22
20	84	63	124	110	60	.4	39	3.9	70	66	66	20
21	81	54	84	107	57	.4	36	23	51	57	57	19.0
22	120	45	87	97	54	.2	34	38	42	69	54	19.0
23	117	42	54	63	51	.2	32	80	39	60	51	18.0
24	94	36	45	48	48	.2	30	114	42	54	51	18.0
25	75	35	39	42	45	.2	28	114	38	51	75	24
26	63	32	36	36	45	.2	27	110	36	98	70	18.0
27	57	31	35	86	42	.1	26	114	34	109	48	16.8
28	57	30	34	107	45	.8	24	91	36	104	45	15.5
29	54	27	30	120	38	1.2	24	91	42	100	42	15.5
30	48	28	28	110	35	.7	23	-------	35	114	38	15.5
31	48	30	-------	107	-------	5.8	22	-------	31	-------	36	-------

NOTE.—No flow on days for which no discharge is given.

Monthly discharge of Koolau ditch, near Keanae, Maui, for year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	120	38	74.3	115	2,300	7,060
August	120	27	50.3	77.8	1,560	4,780
September	124	19.0	45.3	70.1	1,360	4,170
October	120	18.0	51.8	80.1	1,600	4,930
November	117	35	78.1	121	2,340	7,190
December	117	.1	53.0	82.0	1,640	5,040
January (26 days)	83	.1	30.5	47.2	794	2,440
February	119	3.9	45.8	70.9	1,330	4,070
March	117	31	61.4	95.0	1,900	5,840
April	114	28	74.1	115	2,220	6,830
May	110	36	66.9	104	2,070	6,360
June	51	15.5	25.2	39.0	755	2,320
The year (361 days)	124	.1	55.1	85.3	19,900	61,000

NOTE.—No flow Jan. 5-9.

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, 1924.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge or by wading.

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 two-man boulders; subject to shifts.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 1,100 million gallons per day or 1,700 second-feet at 8.10 p. m. December 18 (gage height, 9.01 feet); minimum recorded during year, 0.2 million gallons per day or 0.3 second-foot from 9 p. m. February 2 to 2 a. m. February 3, from 2 to 4 p. m. February 3, and from 10 p. m. February 11 to 1 a. m. February 12 (gage height, 0.62 foot).

1919–1924: Maximum discharge recorded, about 1,290 million gallons per day or 2,000 second-feet, at 2.45 p. m. January 14, 1923 (gage height, 9.93 feet); minimum recorded, 0.03 million gallons per day or 0.05 second-foot at 10 a. m. April 3 and noon April 5, 1920 (gage height, 0.28 foot).

DIVERSIONS.—None.

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 sugar cane.

ACCURACY.—Stage-discharge relation changed during flood of December 18. Rating curve used prior to December 19 well defined below 100 million gallons per day; extended above that point on basis of peak-flow comparison with lower station on this stream. Curve used after December 18, fairly well defined. Operation of water-stage recorder satisfactory except during July and August. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good except those for extremely high stages and those estimated.

Discharge measurements of Honomanu Stream at Haiku-uka boundary, near Kailiili, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 29	0.76	0.85	0.55	Jan. 22	0.75	0.7	0.45
Do	.76	.6	.4	Mar. 11	.79	1.75	1.15
Oct. 16	.82	1.45	.9	Apr. 25	.81	1.1	.7
Do	.82	1.7	1.1	June 12	.72	.6	.4
Dec. 1	.72	.6	.4				

Discharge, in million gallons per day, of Honomanu Stream at Haiku-uka boundary, near Kailiili, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1			1.0	6.6	7.3	0.4	3.6	0.2	4.2	6.6	4.5	6.6
2			.7	.6	3.9	.4	2.6	.2	6.0	.5	1.9	.6
3			.6	1.3	2.1	4.8	11.4	.2	15.5	.7	1.3	.6
4	1.7		.5	1.6	1.3	27	3.9	.3	7.9	1.2	1.0	.5
5			.4	1.4	90	2.1	1.2	.2	2.8	.6	.9	.5
6			.6	3.1	15.0	7.9	1.0	.3	1.6	.5	.8	.4
7			1.0	1.6	5.6	72	.8	.4	1.1	7.7	1.0	.4
8			.6	1.2	3.5	5.9	.8	.6	1.0	17.6	.9	.6
9			.7	.7	3.8	2.6	.8	.3	.8	12.8	.6	.5
10			.4	.6	3.6	8.5	.7	.3	.8	13.6	1.2	.5
11		5.0	.4	.4	3.5	17.4	1.0	.2	1.0	2.5	1.5	.8
12			66	.4	42	22	2.5	57	1.7	2.3	.7	.5
13	5.0		8.9	.3	26	30	4.6	264	2.3	1.3	75	2.2
14			2.1	.3	3.8	24	3.9	211	1.7	25	121	1.5
15			1.4	1.7	2.0	105	1.6	16.0	.8	26	6.6	1.2
16			1.2	1.2	1.4	127	1.0	3.3	.6	2.1	3.4	18.2
17			.9	.6	1.1	50	.8	2.0	.6	2.5	2.6	5.0
18			1.1	.4	1.0	143	.8	1.2	.6	2.6	1.9	.9
19	6.2		97	29	.8	57	.8	1.0	23	1.0	1.5	.5
20	2.2		21	14.0	.8	27	.6	.6	2.2	1.0	.8	.5
21	2.5		15.0	3.2	.8	4.7	.5	.5	.9	.7	.8	.4
22			4.0	8.4	1.1	3.0	.4	.5	.6	9.6	.8	.4
23			1.9	2.4	1.5	2.2	.4	21	.5	2.1	.8	.3
24			1.4	1.5	.8	1.6	.4	79	.8	.9	2.3	.3
25		1.0	1.1	1.6	.6	1.3	.3	22	.9	.7	3.2	1.2
26	12		1.0	1.2	.6	1.2	.3	12.0	.8	22	1.8	.5
27			.9	184	.6	.8	.3	6.1	.6	52	1.2	.4
28			.8	70	.8	.8	.3	2.3	1.1	15.6	.7	.3
29		.6	.8	130	.6	.7	.3	2.7	1.5	6.7	.5	.3
30		1.3	.8	30	.5	.7	.2	-------	1.0	12.2	.5	.3
31		1.8	-------	6.1	-------	6.7	.2	-------	.7	-------	.5	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage height record, by comparison with flow at lower station on this stream and flow of adjacent streams.

Monthly discharge of Honomanu Stream at Haiku-uka boundary, near Kailiili, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	----------	----------	6.38	9.87	198	607
August	----------	----------	3.60	5.57	112	343
September	97	0.4	7.81	12.1	234	719
October	184	.3	16.1	24.9	499	1,530
November	90	.5	7.55	11.7	226	695
December	143	.4	24.4	37.8	758	2,330
January	11.4	.2	1.55	2.40	48.0	147
February	264	.2	24.3	37.6	705	2,170
March	23	.5	2.76	4.27	85.6	263
April	52	.5	8.15	12.6	244	750
May	121	.5	7.81	12.1	242	743
June	18.2	.3	1.36	2.10	40.9	126
The year	264	.2	9.27	14.3	3,390	10,400

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, 1924.

GAGE.—Stevens continuous water-stage recorder. Datum raised 1.345 feet on May 12, 1922.

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

CHANNEL AND CONTROL.—One channel at all stages; straight for 200 feet above and below gage; stream bed filled with large boulders and very rough; right bank vertical wall of rock; left bank steep and high. Control composed of large boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum recorded during year, about 1,120 million gallons per day or 1,730 second-feet at 7.05 p. m. December 18 (gage height, 8.50 feet); minimum recorded during year, 0.9 million gallons per day or 1.4 second-feet from 10 p. m. February 11 to 12.45 a. m. February 12 and from 1 to 9 a. m. June 30 (gage height, 0.54 foot).

1913–1924: Maximum discharge recorded, about 1,170 million gallons per day or 1,810 second-feet from 3 to 4.30 p. m. January 14, 1923 (gage height, 8.73 feet); minimum recorded, 0.17 million gallons per day or 0.26 second-foot on July 14, 1920 (gage height, 1.77 feet, old datum).

DIVERSIONS.—None.

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 sugar cane.

ACCURACY.—Stage-discharge relation changed during flood of October 27. Rating curve used prior to change fairly well defined; curve used after change well defined below 15 million gallons per day and fairly well defined between 15 and 500 million gallons per day. Operation of water-stage recorder satisfactory except for parts of January and February. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good for ordinary stages, fair for high stages; estimated records fair.

Discharge measurements of Honomanu Stream, near Keanae, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 15	1.01	5.3	3.4	Jan. 10	0.79	3.8	2.4
Aug. 20	1.08	6.7	4.3	Feb. 29	1.33	16.8	10.9
Oct. 4	.95	4.5	2.9	Apr. 18	1.11	8.8	5.7
Nov. 21	.77	3.6	2.3	June 5	.72	2.9	1.85
Do	.77	3.2	2.1				

Discharge, in million gallons per day, of Honomanu Stream near Keanae, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	3.4	4.0	2.0	1.6	11.0	1.6	13.4		15.0	1.8	13.4	1.8
2	2.6	3.0	1.6	1.4	6.8	2.4	9.8		23	1.6	7.2	1.9
3	6.2	3.1	1.6	1.8	4.3	17.3	16.3		29	2.3	4.6	1.9
4	3.7	7.8	1.4	3.4	5.0	40	11.2	1.2	23	3.4	3.7	1.8
5	2.6	5.8	1.3	2.8	137	5.1	4.2		8.8	2.5	3.3	1.8
6	3.2	3.2	1.7	6.2	23	22	3.5		5.4	1.7	3.1	1.6
7	5.4	11.0	2.0	3.3	11.0	105	3.0	1.6	3.8	15.8	3.2	1.5
8	17.2	5.9	1.4	2.4	7.0	11.7	2.9	1.9	3.6	31	3.2	1.6
9	19.2	3.2	2.0	1.9	7.4	5.7	3.2	1.6	3.0	24	2.5	1.4
10	7.6	3.1	1.2	1.6	7.0	22	2.7	1.2	2.5	25	2.6	1.2
11	7.5	5.4	1.1	1.5	8.9	23	5.7	1.0	3.1	7.7	4.1	2.0
12	15.1	21	96	1.3	73	36	6.0	80	3.7	8.6	2.4	1.4
13	11.3	5.6	16.4	1.2	32	48	9.8	376	5.4	5.1	106	6.2
14	11.8	4.3	3.8	1.1	7.0	30		300	4.8	31	198	4.2
15	7.6	4.8	3.8	2.8	4.6	158		42	2.5	50	17.4	3.0
16	6.4	3.9	2.3	2.2	4.0	178		8.6	2.3	7.0	14.5	23
17	5.6	5.1	2.0	1.5	3.1	98		5.4	1.9	4.7	10.5	13.2
18	4.4	74	2.2	1.8	3.0	212		3.4	2.2	8.1	5.4	2.9
19	9.3	9.9	139	70	2.7	116		2.7	41	3.7	4.5	1.9
20	5.9	4.4	38	24	2.4	59		2.0	6.0	3.3	3.2	1.6
21	6.7	3.4	25	8.4	2.4	13.9		1.6	3.0	2.7	2.8	1.5
22	145	3.0	7.3	13.8	2.7	8.6	2.3	1.5	2.3	18.1	2.7	1.3
23	12.3	2.6	3.7	4.6	3.2	6.3		35	1.9	6.3	2.9	1.2
24	5.6	2.3	2.7	3.3	3.2	5.4		94	2.4	3.1	6.2	1.1
25	4.0	2.3	2.3	3.3	2.1	4.4		36	2.6	2.6	11.0	3.0
26	3.4	2.2	2.1	2.7	1.5	4.1		23	2.4	41	4.4	1.6
27	3.2	2.0	2.0	232	1.8	3.2		18.3	2.3	99	3.6	1.4
28	3.7	1.8	2.1	92	2.4	3.0		7.0	2.7	26	2.4	1.1
29	3.2	1.7	1.8	150	1.9	2.9		8.0	4.5	15.2	2.1	.9
30	3.5	2.1	1.7	38	1.6	2.9		-------	3.0	25	1.7	.9
31	6.4	2.9	-------	9.6	-------	23		-------	2.3	-------	1.7	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of partly obstructed well intake, by comparison with flow at upper station on this stream.

Monthly discharge of Honomanu Stream, near Keanae, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	145	2.6	11.4	17.6	353	1,080
August	74	1.7	6.93	10.7	215	659
September	139	1.1	12.4	19.2	372	1,140
October	232	1.1	22.3	34.5	692	2,120
November	137	1.5	12.8	19.8	383	1,180
December	212	1.6	40.9	63.3	1,270	3,890
January	16.3	----------	4.29	6.64	133	408
February	376	1.0	36.5	56.5	1,060	3,250
March	41	1.9	7.08	11.0	219	674
April	99	1.6	15.9	24.6	477	1,460
May	198	1.7	14.7	22.7	454	1,390
June	23	.9	3.00	4.64	89.9	276
The year	376	.9	15.6	24.1	5,720	17,500

HAIPUAENA STREAM AT HAIKU-UKA BOUNDARY, NEAR KAILIILI, MAUI

LOCATION.—50 feet upstream from Haiku-uka boundary trail crossing and 7½ miles by trail east of Kailiili.

RECORDS AVAILABLE.—June 3, 1922, to June 30, 1924, at present site; May 27, 1919, to June 2, 1922, at site 250 feet upstream. Records comparable.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge or by wading.

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; shifts owing to deposition of gravel in pool above.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, from extension of rating curve, 140 million gallons per day or 217 second-feet at 7.45 p. m. December 18 (gage height, 4.95 feet); minimum recorded during year, 0.1 million gallons per day or 0.15 seco nd-foot, from 6.30 p. m. to midnight February 11 (gage height, 0.51 foot).

1919–1924: Maximum stage occurred while recorder clock was stopped January 2–21, 1923. The recorder pencil continued to operate and shows that a stage of over 5 feet was reached, discharge probably 150 million gallons per day or 232 second-feet. Minimum discharge recorded, 0.06 million gallons per day or 0.09 second-foot at 1.30 p. m. May 27, 1920 (gage height, 0.15 foot).

DIVERSIONS.—Entire low-water flow at 4,200-foot elevation (about 1½ miles above station) diverted into Kula pipe line.

REGULATION.—None.

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 the irrigation of sugar cane.

ACCURACY.—Stage-discharge relation changed August 18. Two rating curves used fairly well defined below 6 million gallons per day; extended above that point and subject to error. Operation of water-stage recorder satisfactory except as noted in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good below 6 million gallons per day; high-stage records should be used with caution.

Discharge measurements of Haipuaena Stream at Haiku-uka boundary, near Kailiili, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 29	0.69	0.7	0.45	Mar. 10	0.76	1.35	0.85
Dec. 1	.68	.6	.4	June 12	.64	.55	.35
Jan. 22	.66	.75	.5				

Discharge, in million gallons per day, of Haipuaena Stream at Haiku-uka boundary, near Kailiili, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	0.6	1.0	0.6	0.5	4.0	0.4	3.2	0.2	3.8		3.4	0.7
2	.5	.5	.4	.4	1.9	.4	2.5	.2	5.8		1.7	.7
3	1.6	.4	.4	1.1	1.4	3.9	4.9	.2	8.9		1.3	.6
4	1.5	1.4	.4	1.0	1.3	11.9	3.1	.2	6.6	0.4	1.2	.6
5	.5	1.7	.4	.9	27	1.5	1.1	.2	2.4		1.0	.5
6	.5	.5	.5	2.5	7.8	6.7	1.0	.2	1.6		1.0	.4
7	.8	1.9	.6	1.1	3.1	25	.9	.4	1.3		1.0	.4
8	1.8	1.7	.4	.7	1.9	3.2	.8	.4	1.2		.9	.4
9	8.8	.5	.4	.5	2.4	1.7	.8	.2	1.0		.7	.4
10	2.4	.4	.4	4	2.3	5.4	.7	.2	.9		1.3	.4
11	1.6	1.0	.4	.4	2.9	9.6	1.3	.1	1.2	4.8	1.1	.5
12	2.0	4.7	22	.4	14.7	10.2	2.5	16.7	1.7		.7	.3
13	5.2	1.1	5.3	.3	10.2	12.9	3.1	61	2.2		21	2.1
14	2.4	.8	1.3	.4	2.2	8.9	3.2	51	1.5		30	1.5
15	2.9	1.4	.9	1.3	1.6	27	1.3	7.6	.8		3.6	1.2

Discharge, in million gallons per day, of Haipuaena Stream at Haiku-uka boundary, near Kailiili, Maui, for the year ending June 30, 1924—Continued

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
16	1.4	0.8	0.7	0.6	1.5	33	0.8	2.1	0.7		2.4	7.5
17	2.2	.8	.6	.4	1.3	18.1	.7	1.6	.7		2.0	4.1
18	.9	14.7	.7	.5	1.2	32	.6	1.1	.8		1.4	1.0
19	3.5	3.4	24	18.1	1.0	13.7	.6	.9	11.8		1.2	.6
20	1.6	1.4	9.3	6.8	.9	8.3	.4	.8	1.7		1.0	.6
21	1.3	1.1	6.2	2.1	.9	2.6	.4	.7	.9	1.2	.9	.4
22	26	.9	2.0	5.7	1.1	2.0	.4	.6			.9	.4
23	5.9	.9	1.2	1.5	1.2	1.7	.4	9.6			.8	.4
24	1.3	.7	.9	1.5	.8	1.5	.8	21			2.8	.8
25	1.0	.7	.9	1.3	.6	1.3	.2	9.5			3.4	1.5
26	.8	.6	.7	.9	.6	1.1	.2	6.4	.5	10.1	1.4	.5
27	.6	.6	.7	35	.7	1.0	.2	5.1		18.8	1.0	.4
28	.6	.5	.7	18.3	.9	.9	.2	1.8		9.2	.7	.2
29	.6	.5	.6	31	.6	.8	.2	2.6		9.0	.6	.2
30	.6	1.0	.5	11.1	.5	.8	.2	-------		8.4	.5	.2
31	1.8	1.1	-------	2.9	-------	4.7	.2	-------		-------	.6	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow at station on this stream near Huelo, and on Puohakamoa Stream near Huelo. Gage-height graph for the periods Dec. 19 to Jan. 22 and May 14 to June 12 corrected for back-water effect from fern logs lodged on control.

Monthly discharge of Haipuaena Stream at Haiku-uka boundary, near Kailiili, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	26	0.5	2.68	4.15	83.2	255
August	14.7	.4	1.57	2.43	48.7	150
September	24	.4	2.80	4.33	84.1	258
October	35	.3	4.83	7.47	150	459
November	27	.5	3.28	5.07	98.5	302
December	33	.4	8.14	12.6	252	774
January	4.9	.2	1.17	1.81	36.4	112
February	61	.1	6.99	10.8	203	622
March	11.8	----------	2.02	3.18	62.5	192
April	18.8	----------	3.77	5.83	113	347
May	30	.5	2.95	4.56	91.5	281
June	7.5	.2	.97	1.50	29.0	89
The year	61	.1	3.42	5.29	1,250	3,840

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, 1924; 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.

GAGE.—Stevens continuous water-stage recorder installed June 16, 1914, to replace original Friez recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

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

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 420 million gallons per day or 650 second-feet at 6.30 p. m. December 18 (gage height, 5.02 feet); minimum recorded during year, 1.2 million gallons per day or 1.9 second-feet from 6 a. m. to 2 p. m. February 11 (gage height, 0.45 foot).

1913–1924: Maximum discharge recorded, 530 million gallons per day or 820 second-feet at 7.40 p. m. January 16, 1921 (gage height, 5.67 feet); minimum recorded, 0.3 million gallons per day or 0.5 second-foot, frequently during December, 1919 (gage height, 0.20 foot).

DIVERSIONS.—See under "Diversions" in description of station on this stream at Haiku-uka boundary.

REGULATION.—None.

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 sugar cane.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined below 20 million gallons per day; extended above that point on basis of form of old high-water curve. Operation of water-stage recorder satisfactory except during July and August. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good except those for high stages which are probably fair.

Discharge measurements of Haipuaena Stream, near Huelo, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 13	0.92	9.3	6.0	Jan. 11	0.96	10.2	6.6
Aug. 20	.88	6.6	4.3	Jan. 19	.69	3.9	2.5
Oct. 8	.61	3.2	2.1	Feb. 29	1.10	12.5	8.1
Nov. 26	.62	3.1	2.0	Apr. 18	.90	7.2	4.6
Do	.62	2.6	1.65	June 5	.59	2.5	1.6

Discharge, in million gallons per day, of Haipuaena Stream, near Huelo, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	3.3		2.2	1.9	7.4	1.8	12.5	1.6	12.6	2.2	11.5	2.2
2	3.0		1.9	1.8	5.3	4.8	8.2	1.4	21	2.0	7.4	2.4
3	3.9		1.8	2.2	4.2	18.8	10.5	1.4	22	2.5	4.9	2.1
4	4.9		1.6	2.9	4.3	28	7.6	1.6	16.3	4.1	4.0	1.9
5	3.4		1.6	2.4	72	5.4	3.9	1.3	7.9	2.6	3.5	2.0
6	3.5		2.2	5.8	16.9	17.9	3.5	1.4	5.3	2.3	3.2	1.9
7	4.8	7.5	2.6	2.8	8.2	60	3.1	1.3	4.2	7.9	3.1	1.7
8	7.0		1.8	2.0	6.2	9.8	3.1	1.8	4.2	16.6	2.9	1.6
9	22		2.6	1.8	6.4	5.9	3.5	1.4	3.4	13.4	2.6	1.6
10	10.9		1.7	1.6	5.8	17.0	3.0	1.3	3.1	14.3	2.8	1.5
11	8.4		1.5	1.6	7.5	19.3	6.3	1.2	3.5	5.8	3.0	1.7
12	9.5		59	1.6	35	23	5.6	22	3.6	9.0	2.6	1.5
13	15.6		13.7	1.6	25	29	7.9	190	4.4	5.8	63	4.4
14	12.0	4.4	4.2	1.6	6.0	14.7	9.2	144	4.0	19.3	103	3.6
15	11.7	3.9	3.0	3.3	5.8	73	4.8	28	2.9	26	10.0	2.6
16	7.2	3.7	2.6	2.1	5.6	73	3.6	6.8	2.7	5.9	14.0	10.9
17	8.0	4.6	2.3	1.6	3.7	45	3.3	5.3	2.5	5.1	8.0	9.0
18	4.9	42	3.5	1.8	3.2	98	3.0	3.7	2.6	5.7	4.5	2.8
19	9.3	8.6	67	41	2.9	42	2.7	3.4	22	3.6	3.7	2.2
20	7.2	4.7	26	16.6	2.7	19.3	2.5	2.8	4.6	3.3	3.2	2.0
21	6.5	3.9	15.2	10.1	2.7	8.6	2.2	2.5	3.4	2.9	2.7	1.8
22	70	3.4	5.9	10.9	2.7	6.0	2.2	2.2	3.0	10.3	2.7	1.8
23		3.0	4.0	4.6	3.1	4.9	2.1	14.1	2.6	4.6	2.6	1.7
24		2.8	3.3	3.4	2.5	4.3	1.9	30	3.4	3.1	3.7	1.6
25		2.6	3.0	3.5	2.2	3.9	1.8	16.5	3.1	2.8	7.0	2.8
26	7.5	2.6	2.6	2.6	2.2	3.5	1.7	13.3	2.7	26	3.3	2.0
27		2.4	2.6	96	2.2	3.2	1.6	14.5	2.3	65	2.8	1.8
28		2.2	2.6	41	2.6	2.9	1.6	5.8	3.5	19.5	2.5	1.6
29		2.2	2.3	70	2.2	2.7	1.6	6.1	4.3	10.6	2.4	1.4
30		2.3	2.2	25	1.9	2.8	1.5	-------	3.0	19.8	2.3	1.4
31		3.0	-------	7.5	-------	20	1.5	-------	2.6	-------	2.2	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow at station on this stream at Haiku-uka boundary and on Puohakamoa Stream near Huelo. Gage-height graph partly estimated Nov. 17–21 and Mar. 23 to Apr. 3 owing to partly plugged well intake.

Monthly discharge of Haipuaena Stream, near Huelo, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	70	3.0	9.82	15.2	304	934
August	42	2.2	6.45	9.98	200	613
September	67	1.5	8.22	12.7	246	756
October	96	1.6	12.0	18.6	373	1,140
November	72	1.9	8.61	13.3	258	793
December	98	1.8	21.6	33.4	668	2,050
January	12.5	1.5	4.11	6.36	128	391
February	190	1.2	18.2	28.2	527	1,620
March	22	2.3	6.02	9.31	187	573
April	65	2.0	10.7	16.6	322	988
May	103	2.2	9.52	14.7	295	906
June	10.9	1.4	2.58	3.99	77.5	238
The year	190	1.2	9.80	15.2	3,590	11,000

SPRECKELS DITCH AT HAIPUAENA WEIR, NEAR HUELO, MAUI

LOCATION.—Between Haipuaena and Puohakamoa Streams on Spreckels ditch trail 7 miles southeast of Huelo.

RECORDS AVAILABLE.—April 23, 1922, to June 30, 1924. The East Maui Irrigation Co. obtained records at this station prior to April 23, 1922.

GAGE.—Stevens continuous water-stage recorder installed May 26, 1922, to replace Friez seven-day recorder used since April 23, 1922.

DISCHARGE MEASUREMENTS.—Made by weir just below gage or by current meter at section 90 feet above weir.

CHANNEL AND CONTROL.—Control formed by 6-foot, sharp-crested, trapezoidal weir with side slopes 1:4; permanent. Recorder operates in weir basin 16 by 65 feet.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 65 million gallons per day or 101 second-feet at 4.30 a. m. February 13 (gage height, 2.56 feet); minimum recorded during year 3.4 million gallons per day or 5.3 second-feet, for several hours February 11 (gage height, 0.41 foot).

1922–1924: Maximum discharge recorded, 65 million gallons per day or 101 second-feet,[3] at 11 a. m. September 10, 1922 (gage height, estimated 2.57 feet) and at 4.30 a. m. February 13, 1924 (gage height, 2.56 feet); minimum recorded, 1.1 million gallons per day or 1.7 second-feet at 4 a. m. January 18, 1923 (gage height, 0.19 foot).

DIVERSIONS.—Ditch diverts water from a dozen or more streams east of Nailiilihaele Stream.

REGULATION.—By head gates at intake in Haipuaena Stream.

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

UTILIZATION.—Water used for irrigation of sugar cane.

ACCURACY.—Stage-discharge relation permanent during year. Weir rating curve well defined below 40 million gallons per day; revised above. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the 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 Puohakamoa Stream; beyond Puohakamoa Stream to Kailua Stream it diverts below Koolau (Wailoa) and New Hamakua ditches,

[3] Previously published as 54 million gallons per day or 84 second-feet.

and above Center ditch. At Kailua Stream the water is diverted into Lowrie ditch and carried to the vicinity of Paia for irrigation and development of sugar cane. Spreckels ditch proper is about 6 miles long and has a rated carrying capacity of 45 million gallons per 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.

No discharge measurements were made at this station during the year.

Discharge, in million gallons per day, of Spreckels ditch at Haipuaena Weir, near Huelo, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	11.3	11.8	6.4	6.1	15.1	5.6	27	4.3	25	6.8	22	6.7
2	10.4	8.5	5.5	5.5	13.1	9.9	22	4.2	30	6.5	18.9	6.4
3	12.6	9.5	5.3	7.3	11.3	17.6	18.8	4.1	30	9.5	14.7	6.5
4	14.7	14.8	4.9	10.4	12.2	17.7	21	4.6	28	11.9	12.7	6.1
5	11.1	15.2	4.9	9.5	23	14.2	12.9	4.1	20	8.5	11.9	6.1
6	12.1	10.1	8.3	16.7	16.7	16.3	11.5	4.2	16.1	7.2	11.0	7.0
7	14.5	12.8	7.2	9.4	15.5	19.7	10.1	4.5	13.6	17.6	10.6	4.9
8	16.3	15.1	4.9	7.3	15.3	13.8	9.6	6.1	15.8	28	9.9	4.9
9	18.9	10.8	9.2	5.9	15.5	14.7	13.5	4.2	11.3	25	8.5	4.8
10	16.9	10.4	5.0	5.3	14.9	16.3	9.3	3.7	10.4	26	8.3	4.3
11	15.9	14.9	4.6	4.9	15.3	13.2	18.1	3.4	12.1	17.4	10.1	5.2
12	16.3	20	22	4.8	18.6	13.1	16.9	31	11.9	21	8.1	4.2
13	18.5	16.3	15.9	4.5	16.9	13.6	21	53	14.1	17.1	23	11.2
14	17.2	13.6	12.7	4.2	14.9	11.7	21	42	13.2	27	31	10.5
15	17.4	13.0	9.7	9.8	14.9	13.4	14.9	27	9.0	28	15.5	8.3
16	15.5	12.5	8.3	7.1	14.2	7.6	11.3	18.7	8.7	17.4	15.4	16.0
17	16.3	12.0	7.3	5.0	13.1	12.3	10.1	17.2	7.8	14.6	13.2	18.0
18	14.5	22	9.3	6.2	12.1	13.9	9.4	12.3	8.1	16.8	12.5	8.5
19	16.7	16.7	16.0	31	10.2	7.8	9.0	11.5	29	12.1	11.9	6.4
20	16.1	14.0	10.1	24	9.5	6.1	8.0	9.7	15.4	10.6	10.6	5.6
21	15.9	12.1	9.2	21	9.2	7.5	7.2	8.0	10.2	9.2	9.4	5.2
22	22	10.6	8.7	21	9.5	12.4	6.5	7.2	8.7	17.2	9.4	4.9
23	16.3	9.4	8.3	13.8	11.0	9.9	6.2	21	7.8	14.9	9.4	4.6
24	16.1	8.5	8.1	11.5	8.7	10.8	5.9	30	9.6	10.6	10.2	4.3
25	14.5	8.0	8.0	11.1	7.3	12.7	5.6	27	9.0	9.2	16.9	8.5
26	12.9	7.3	8.1	9.0	7.3	11.7	5.5	24	8.0	26	11.5	5.6
27	11.5	6.8	8.3	25	7.3	9.9	5.2	27	7.6	34	9.9	4.8
28	12.6	6.5	8.0	18.9	9.4	9.5	4.9	17.2	10.4	26	7.6	4.2
29	12.1	6.1	6.8	22	6.8	9.0	4.8	18.2	13.2	22	6.8	3.8
30	11.0	7.1	6.5	17.8	5.9	9.5	4.8	-------	9.4	26	6.2	3.8
31	12.9	9.5	-------	15.1	-------	27	4.5	-------	8.5	-------	6.4	-------

Monthly discharge of Spreckels ditch at Haipuaena Weir, near Huelo, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	22	10.4	14.9	23.1	461	1,420
August	22	6.1	11.8	18.3	366	1,120
September	22	4.6	8.58	13.3	258	790
October	31	4.2	12.0	18.6	371	1,140
November	23	5.9	12.5	19.3	375	1,150
December	27	5.6	12.5	19.3	388	1,190
January	27	4.5	11.5	17.8	356	1,090
February	53	3.4	15.1	23.4	438	1,350
March	30	7.6	13.9	21.5	430	1,320
April	34	6.5	17.5	27.1	524	1,610
May	31	6.2	12.4	19.2	384	1,180
June	18.0	3.8	6.71	10.4	201	618
The year	53	3.4	12.4	19.2	4,550	13,900

PUOHAKAMOA 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, 1924; December 18, 1910, to June 18, 1913, at station 150 feet downstream.

GAGE.—Stevens continuous water-stage recorder installed November 23, 1917, replacing Barrett & Lawrence water-stage recorder installed June 13, 1913. Old staff gage station was 150 feet downstream at trail bridge below inflow from Spreckels ditch.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge 200 feet above gage. Inflow of Spreckels ditch must be deducted from measurements made at trail bridge at old station.

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; shifts slightly.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 840 million gallons per day or 1,300 second-feet at 7.50 p. m. December 18 (gage height, 6.86 feet); minimum not recorded because stilling-well intake did not function properly below about 1.2 feet (3.3 million gallons per day); by deducting the flow of Spreckels ditch at Haipuaena Weir from the flow of Puohakamoa intake of Koolau ditch it is found that a minimum of about 2.0 million gallons per day or 3.1 second-feet occurred on February 11.

1910–1924: Maximum discharge recorded, from extension of rating curve, 1,100 million gallons per day or 1,700 second-feet at 2.30 p. m. January 14, 1923 (gage height, about 7.85 feet); minimum recorded, 0.4 million gallons per day or 0.6 second-foot, October 26, 1917 (gage height, 0.25 foot).

DIVERSIONS.—Kula pipe line diverts small amount of water above station at elevation 4,300 feet.

REGULATION.—None.

OBJECT OF STATION.—To furnish data for water valuation appraisal in connection with territorial water license to ditch company.

UTILIZATION.—Ordinary flow of stream is diverted by East Maui Irrigation Co.'s ditches for irrigation of sugar cane.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined between 2 and 50 million gallons per day; extended above 50 million gallons per day and subject to error for high stages. Operation of water-stage recorder satisfactory except that stilling-well intake did not function below about 1.2 feet (discharge, 3.3 million gallons per day). Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day, except for days during which the discharge was below 3.3 million gallons per day for which it was ascertained by the method outlined in footnote to table of daily discharge. Records good except for high stages.

Discharge measurements of Puohakamoa Stream, near Huelo, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 14	1.92	14.7	9.5	Jan. 19	1.58	8.8	5.7
Oct. 5	1.66	11.0	7.1	Mar. 1	2.71	54	35
Nov. 25	1.54	7.4	4.8	Apr. 18	1.96	16.8	10.9
Jan. 11	2.24	24.3	15.7	June 5	1.35	5.8	3.8

Discharge, in million gallons per day, of Puohakamoa Stream, near Huelo, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr	May	June
1	6.6	11.1	5.2	4.8	22	4.2	40	2.6	36	3.8	30	5.2
2	6.1	8.2	4.5	4.5	16.0	8.5	28	2.6	62	3.6	18.6	5.2
3	9.0	8.2	4.2	5.2	12.0	56	25	2.7	64	4.5	12.9	4.8
4	11.3	18.7	3.6	6.1	10.6	76	23	3.0	46	7.8	10.4	4.5
5	7.0	19.9	3.6	6.1	194	12.9	11.1	2.5	20	4.5	8.9	4.4
6	7.0	8.9	5.1	14.7	56	51	9.6	2.6	12.9	3.8	8.2	3.8
7	8.2	25	4.5	6.1	26	156	8.2	2.3	10.4	13.6	7.6	3.6
8	12.9	15.8	3.2	4.8	18.6	28	8.3	3.1	9.6	35	7.0	3.2
9	48	8.9	5.5	4.2	20	14.9	9.1	2.4	7.6	26	6.1	3.1
10	24	8.2	3.3	3.6	16.0	49	7.0	2.1	7.0	27	5.6	3.1
11	17.0	13.2	2.6	3.4	23	53	13.9	2.1	8.2	12.0	6.1	3.5
12	17.9	58	156	3.0	85	63	12.6	67	7.0	18.7	5.2	3.2
13	36	14.2	30	2.7	81	77	20	448	9.2	11.8	182	5.9
14	23	10.4	9.6	2.9	18.6	36	19.1	332	9.1	36	284	7.3
15	28	8.9	7.0	5.7	15.5	166	10.4	90	5.6	64	33	4.8
16	13.9	8.9	6.1	4.2	15.8	166	7.6	22	5.2	12.9	35	22
17	16.2	11.2	5.2	3.3	11.1	131	6.6	17.2	4.8	9.6	24	25
18	11.1	112	8.9	3.9	9.6	214	6.6	11.1	4.8	11.3	12.9	6.1
19	19.6	23	170	98	8.2	134	6.1	9.6	54	7.6	11.1	4.5
20	16.8	12.9	50	46	7.6	55	5.6	8.2	11.9	6.6	9.6	3.8
21	14.9	10.4	33	30	7.0	27	5.2	7.0	7.0	5.6	8.2	3.6
22	159	8.9	14.9	27	7.3	18.6	4.5	6.1	5.6	18.6	7.6	3.6
23	51	8.2	10.4	11.1	7.6	14.9	4.5	35	5.2	9.8	7.6	3.2
24	18.6	7.0	8.2	8.2	6.1	12.9	3.8	55	5.6	6.6	9.4	3.1
25	13.9	7.0	7.6	8.2	5.6	12.0	3.6	44	5.6	5.6	20	6.3
26	12.0	6.1	7.0	6.1	5.2	10.4	3.3	32	4.8	67	9.6	4.1
27	11.1	6.1	6.6	207	5.2	9.6	3.1	51	4.2	174	7.6	3.1
28	12.0	5.6	6.1	108	6.1	8.2	3.0	14.9	6.2	55	6.1	2.9
29	11.1	5.2	5.6	177	4.8	7.6	3.0	16.0	8.4	26	5.6	2.5
30	10.4	5.6	5.2	82	4.5	7.6	2.8	-------	5.2	53	5.2	2.3
31	11.1	7.0	-------	23	-------	64	2.7	-------	4.5	-------	4.8	-------

NOTE.—Stilling-well intake did not function below 1.2 feet (discharge, 3.3 million gallons per day) during periods Sept. 8, 10-11, Oct. 11-14, 17-18, Jan. 25-31, Feb. 1-11, June 8-13, and 21-30; daily discharge ascertained by subtracting the flow of Spreckels ditch at Haipuaena Weir from the flow of Puohakamoa intake of Koolau ditch. Gage-height graph partly estimated for Feb. 12.

Monthly discharge of Puohakamoa Stream near Huelo, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	159	6.1	21.4	33.1	665	2,040
August	112	5.2	15.6	24.1	483	1,480
September	170	2.6	19.8	30.6	593	1,820
October	207	2.7	29.7	46.0	921	2,830
November	194	4.5	24.2	37.4	726	2,230
December	214	4.2	56.3	87.1	1,740	5,350
January	40	2.7	10.2	15.8	317	974
February	448	2.1	44.6	69.0	1,290	3,970
March	64	4.2	14.8	22.9	458	1,400
April	174	3.6	24.7	38.2	741	2,270
May	284	4.8	24.5	37.9	760	2,330
June	25	2.3	5.39	8.34	162	496
The year	448	2.1	24.2	37.4	8,860	27,200

EAST BRANCH OF PUOHAKAMOA STREAM AT HAIKU-UKA BOUNDARY, NEAR KAILIILI, MAUI

LOCATION.—On left bank of stream 200 yards downstream from trail crossing and 7 miles by trail southeast of Kailiili.

RECORDS AVAILABLE.—October 9, 1919, to June 30, 1924.

GAGE.—Stevens continuous water-stage recorder. Datum lowered 3.50 feet on April 16, 1920.

DISCHARGE MEASUREMENTS.—Made by wading or from suspension footbridge 5 feet below 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 recorded during year, about 56 million gallons per day or 87 second-feet at 7.15 p. m. December 18 (gage height, 5.93 feet); minimum recorded during year, 0.08 million gallons per day or 0.12 second-foot, for several hours June 28 and 29 (gage height, 3.88 feet).

1919–1924: Maximum, about 102 millon gallons per day or 158 second-feet, March 22, 1920 (gage height, 3.27 feet old datum, estimated by comparison with West and Middle Branches of Puohakamoa Stream); minimum recorded, no flow, several days in December, 1919, and July 14, 1920.

DIVERSIONS.—None.

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 sugar cane.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined between 0.1 and 10 million gallons per day; extended above 10 million gallons per day. Operation of water-stage recorder satisfactory except for one short period. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good for ordinary stages.

Discharge measurements of East Branch of Puohakamoa Stream at Haiku-uka boundary, near Kailiili, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 29	3.98	0.35	0.2	Mar. 11	4.09	0.75	0.5
Oct. 16	3.95	.4	.25	Apr. 25	4.00	.35	.25
Dec. 1	3.95	.3	.2	June 13	3.97	.35	.25
Jan. 22	3.99	.35	.2				

Discharge, in million gallons per day, of East Branch of Puohakamoa Stream at Haiku-uka boundary, near Kailiili, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	0.4	0.4	0.3	0.3	0.8	0.2	1.3	0.2	1.6	0.3	1.0	0.4
2	.4	.4	.3	.3	.6	.3	1.0	.2	2.5	.3	.7	.3
3	.7	.4	.3	.3	.5	1.6	1.6	.2	2.2	.3	.5	.3
4	.6	.8	.3	.3	.4	3.2	.8	.2	1.8	.3	.5	.3
5	.4	.5	.2	.3	7.3	.5	.5	.2	1.0	.3	.5	.3
6	.4	.4	.4	.5	1.6	2.2	.5	2	.8	.3	.5	.3
7	.4	.7	.3	.3	.8	6.4	.5	.2	.6	.9	.4	.3
8	.6	.5	.2	3	.7	1.0	.4	.2	.5	1.5	.4	.3
9	2.1	.4	.2	.2	.6	.7	.4	.2	.5	1.0	.4	.2
10	.9	.4	.2	.2	.6	2.0	.4	.2	.5	1.2	.4	.2
11	1.0	.4	.2	.2	1.4	1.8	.8	.2	.5	.5	.3	.2
12	1.0	1.9	6.6	.2	3.6	2.7	.8	5.5	.5	.8	.3	.2
13	1.4	.6	1.2	.2	2.6	2.3	1.0	23	.6	.4	6.7	.5
14	1.5	.4	.4	.2	.8	1.1	.8	15.6	.5	1.7	11.6	.4
15	1.0	.4	.4	.3	.6	8.6	.5	2.9	.4	2.2	1.1	.3

Discharge, in million gallons per day, of East Branch of Puohakamoa Stream at Haiku-uka boundary, near Kailiili, Maui, for the year ending June 30, 1924—Continued

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
16	0.6	0.4	0.3	0.2	0.5	6.1	0.4	1.0	0.4	0.5	1.2	1.1
17	.6	.7	.3	.2	.5	4.8	.4	.8	.4	.4	1.0	.6
18	.5	3.7	.3	.2	.4	10.6	.4	.6	.4	.4	.6	.3
19	.8	.7	6.8	4.9	.4	14.7	.4	.5	2.5	.4	.5	.2
20	.6	.5	1.8	1.4	.4	2.0	.4	.5	.6	.4	.5	.2
21	.6		1.9	.8	.4	1.1	.3	.4	.4	.3	.5	.2
22	7.1		.6	1.0	.4	.9	.3	.4	.4	.8	.5	.2
23	1.4		.5	.4	.4	.8	.3	2.3	.3	.4	.4	.2
24	.8	.4	.4	.3	.3	.7	.3	2.2	.4	.4	1.2	.1
25	.6		.4	.3	.3	.6	.3	2.0	.4	.3	.9	.2
26	.6		.4	.3	.3	.5	.3	1.2	.3	3.4	.5	.2
27	.5		.3	10.0	.3	.5	.2	1.7	.3	6.4	.4	.1
28	.5	.3	.3	3.6	.3	.5	.2	.8	.4	2.2	.4	.1
29	.5	.3	.3	6.7	.3	.5	.2	1.0	.5	1.2	.4	.1
30	.5	.4	.3	2.3	.2	.5	.2	-------	.4	2.0	.3	.1
31	.5	.4	-------	.8	-------	1.6	.2	-------	.3	-------	.3	-------

NOTE.—Braced figure shows mean discharge for period indicated; estimated, because of lack of gage-height record, by comparison with flow of Middle and West Branches of this stream.

Monthly discharge of East Branch of Puohakamoa Stream at Haiku-uka boundary, near Kailiili, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	7.1	0.4	0.95	1.47	29.5	91
August	3.7	.3	.61	.94	18.8	58
September	6.8	.2	.88	1.36	26.4	81
October	10.0	.2	1.21	1.87	37.5	115
November	7.3	.2	.94	1.45	28.3	87
December	10.6	.2	2.29	3.54	71.0	218
January	1.6	.2	.52	.80	16.1	49
February	23	.2	2.23	3.45	64.6	198
March	2.5	.3	.74	1.14	22.9	70
April	6.4	.3	1.05	1.62	31.5	97
May	11.6	.3	1.13	1.75	34.9	107
June	1.1	.1	.28	.43	8.4	26
The year	23	.1	1.07	1.66	390	1,200

MIDDLE BRANCH OF PUOHAKAMOA STREAM AT HAIKU-UKA BOUNDARY, NEAR KAILIILI, MAUI

LOCATION.—At trail crossing 200 feet above Haiku-Uka boundary and 6¾ miles southeast of Kailiili.

RECORDS AVAILABLE.—March 14, 1919, to June 30, 1924. Records for the period March 14 to June 30, 1919, published in Water-Supply Paper 555.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from suspension bridge just above gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for 25 feet above and below control. Right bank vertical; left bank 1½ on 1 slope. Stream bed composed of gravel and boulders. Control probably shifting.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 135 million gallons per day or 209 second-feet, at 6.45 p. m. December 18 (gage height, 7.66 feet); minimum recorded during year, 0.3 million gallons per day or 0.45 second-foot, from 5 p. m. to midnight February 11 (gage height, 4.15 feet).

1919–1924: Maximum discharge recorded, 207 million gallons per day or 320 second-feet at 5 p. m. March 22, 1920 (gage height, 8.47 feet); minimum recorded, 0.06 million gallons per 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.—None.

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 the irrigation of sugar cane.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined between 0.3 and 25 million gallons per day; extended above 25 million gallons per day. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good for ordinary stages.

Discharge measurements of Middle Branch of Puohakamoa Stream at Haiku-uka boundary, near Kailiili, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 29	4.25	0.75	0.45	Mar. 11	4.39	1.6	1.05
Oct. 17	4.20	.65	.45	Apr. 25	4.29	.95	.65
Dec. 1	4.20	.7	.45	June 13	4.26	.75	.5
Jan. 22	4.24	.8	.5				

Discharge, in million gallons per day, of Middle Branch of Puohakamoa Stream at Haiku-uka boundary, near Kailiili, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	0.7	1.2	0.6	0.5	3.0	0.4	2.6	0.4	2.8	0.6	2.8	0.7
2	.6	.8	.6	.5	1.6	.5	1.7	.4	4.4	.6	1.5	.7
3	1.4	.9	.5	.6	1.1	2.4	4.2	.4	6.4	.7	1.2	.7
4	1.4	1.7	.5	.6	.9	8.9	1.9	.4	4.6	1.0	1.1	.7
5	.7	1.4	.5	.6	24	1.1	1.0	.4	2.2	.6	1.1	.6
6	.7	.8	.6	1.5	5.0	4.2	.9	.4	1.4	.6	1.0	.6
7	.9	1.9	.6	.7	2.4	19.0	.8	.4	1.2	2.6	1.1	.5
8	1.6	1.7	.5	.6	1.5	2.4	.8	.5	1.0	5.1	1.0	.6
9	7.3	.9	.5	.5	1.6	1.3	.7	.4	.9	4.3	.8	.6
10	2.3	.8	.4	.4	1.6	4.8	.7	.3	.9	2.2	1.2	.6
11	1.6	1.3	.5	.4	1.7	6.4	1.0	.3	1.0	1.6	1.1	.8
12	1.7	4.9	21	.4	12.1	7.1	1.5	14.6	1.4	2.2	.8	.5
13	4.5	1.5	3.9	.3	7.0	7.4	2.4	61	1.7	1.2	18.2	1.4
14	2.2	1.2	1.1	.4	1.6	4.4	1.9	47	1.3	5.9	32	1.3
15	2.4	1.5	.8	.8	1.1	24	1.1	6.7	.9	7.0	3.3	.9
16	1.4	1.2	.7	.6	1.0	25	.8	2.3	.8	1.4	2.2	5.0
17	1.8	1.1	.6	.4	.9	13.8	.7	1.7	.7	1.5	1.7	2.8
18	1.9	14.7	.7	.5	.7	29	.7	1.2	.7	1.6	1.3	.9
19	2.4	2.6	23	15.1	.7	12.7	.7	1.0	8.0	.9	1.2	.6
20	1.5	1.3	6.7	4.8	.6	5.9	.6	.9	1.6	.9	1.0	.6
21	1.3	.9	3.5	1.6	.6	2.4	.6	.8	.9	.7	.9	.5
22	26	.9	1.6	3.5	.7	1.7	.6	.7	.8	2.4	.9	.5
23	4.3	.8	1.1	1.2	.8	1.4	.5	7.5	.7	1.3	.9	.5
24	1.6	.7	.9	1.0	.6	1.2	.5	12.5	.9	.8	1.8	.4
25	1.2	.7	.8	1.1	.6	1.1	.5	6.3	.9	.7	2.9	1.4
26	1.0	.6	.7	.8	.5	1.0	.5	4.4	.7	8.7	1.3	.6
27	.9	.6	.7	34	.5	.9	.5	3.6	.6	16.7	1.1	.5
28	.9	.6	.6	14.9	.6	.9	.4	1.6	.9	6.2	.8	.4
29	.9	.6	.6	28	.5	.8	.4	2.0	1.1	3.2	.7	.4
30	.9	.7	.6	8.4	.5	.8	.4	-------	.9	5.8	.6	.4
31	1.9	.9	-------	2.2	-------	3.6	.4	-------	.7	-------	.7	-------

Monthly discharge of Middle Branch of Puohakamoa Stream at Haiku-uka boundary, near Kailiili, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	26	0.6	2.55	3.95	79.0	242
August	14.7	.6	1.66	2.57	51.4	158
September	23	.4	2.51	3.88	75.4	231
October	34	.3	4.09	6.33	127	389
November	24	.5	2.53	3.91	76.0	233
December	29	.4	6.34	9.81	196	603
January	4.2	.4	1.03	1.59	32.0	98
February	61	.3	6.21	9.61	180	553
March	8.0	.6	1.71	2.65	53.0	163
April	16.7	.6	2.97	4.60	89.0	273
May	32	.6	2.85	4.41	88.2	271
June	5.0	.4	.89	1.38	26.7	82
The year	61	.3	2.93	4.53	1,070	3,300

WEST BRANCH OF PUOHAKAMOA 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, 1924. Records for the period March 15 to June 30, 1919, published in Water-Supply Paper 555.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from suspension bridge 200 feet below gage.

CHANNEL AND CONTROL.—One channel at all stages; straight for 30 feet above and 50 feet below gage. Right bank vertical; left bank 1 on 1½ slope. Stream bed, rock and gravel. Control composed of large boulders; shifts occasionally.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 175 million gallons per day or 271 second-feet at 7.10 p. m. December 18 (gage height, 6.83 feet); minimum recorded during year, 0.4 million gallons per day or 0.6 second-feet at 3 p. m. October 14 and for several hours June 28–30 (gage height, 3.47 feet).

1919–1924: Maximum discharge estimated 250 million gallons per day or 387 second-feet at 5.30 p. m. March 22, 1920 (gage height about 8 feet). Minimum discharge recorded, 0.08 million gallons per 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.—Small amount of water diverted by Kula pipe line above station at elevation 4,300 feet.

REGULATION.—None.

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 sugar cane.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined between 0.3 and 10 million gallons per day; extended above 10 million gallons per day on basis of form of old high-water curves. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good for ordinary stages.

Discharge measurements of West Branch of Puohakamoa Stream at Haiku-uka boundary, near Kailiili, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 30	3.55	0.9	0.55	Mar. 11	3.72	2.8	1.8
Oct. 17	3.50	.7	.45	Apr. 25	3.58	1.25	.8
Dec. 1	3.49	.85	.55	June 13	3.59	1.2	.8
Jan. 22	3.55	.8	.5				

Discharge, in million gallons per day, of West Branch of Puohakamoa Stream at Haiku-uka boundary, near Kailiili, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	1.1	1.3	0.7	0.6	2.5	0.5	3.5	0.6	4.2	0.8	2.9	0.8
2	1.0	.9	.6	.5	1.7	.5	2.3	.6	6.2	.8	1.8	.8
3	2.5	1.0	.6	.7	1.2	3.5	5.9	.7	8.4	.9	1.4	.8
4	2.0	2.3	.6	.8	.9	10.3	2.9	.7	5.7	.9	1.2	.7
5	1.1	2.0	.6	.7	25	1.0	1.2	.6	2.7	.8	1.1	.7
6	1.0	1.0	.7	2.0	5.2	5.2	1.0	.6	2.0	.8	1.0	.6
7	1.4	2.3	.7	.8	2.6	22	.9	.7	1.5	3.2	1.0	.6
8	2.3	1.8	.6	.7	1.9	2.5	.9	.7	1.4	6.5	.9	.6
9	9.1	1.0	.6	.5	2.2	1.5	.9	.6	1.1	5.0	.8	.6
10	3.2	1.0	.5	.5	2.0	5.2	.9	.5	1.0	5.6	.8	.6
11	2.6	1.8	.5	.5	2.8	7.4	1.6	.5	1.4	2.0	1.0	.6
12	3.2	5.8	23	.4	13.4	7.2	2.2	21	1.4	2.9	.8	.5
13	5.0	1.8	3.6	.4	8.8	7.8	3.1	91	2.1	1.7	23	1.4
14	3.1	1.4	1.1	.4	2.0	4.6	2.9	75	1.5	8.0	40	.9
15	4.2	1.2	.8	.9	1.3	27	1.4	8.3	1.0	10.5	3.1	.7
16	2.4	1.2	.7	.7	1.0	28	1.0	2.4	1.0	1.8	2.2	4.8
17	3.1	1.1	.7	.5	.8	14.7	.9	2.0	.9	2.0	2.0	2.6
18	1.8	16.7	.8	.6	.8	34	.9	1.5	1.0	1.7	1.3	.7
19	4.0	2.8	26	15.6	.7	15.4	.9	1.2	10.4	1.2	1.1	.6
20	2.6	1.5	6.1	5.0	7	8.1	.8	1.0	1.9	1.0	1.0	.5
21	2.2	1.2	3.7	1.9	.6	2.7	.7	.9	1.2	1.0	.9	.5
22	33	1.0	1.6	11.6	.7	2.4	.7	.9	1.0	3.1	.9	.5
23	6.3	.9	1.1	1.1	.8	1.5	.7	10.6	.9	1.5	.8	.5
24	2.5	.9	.9	.8	.6	1.4	.7	20	1.2	1.1	2.2	.4
25	1.9	.8	.8	.8	.5	1.2	.7	7.5	1.0	.9	3.0	.8
26	1.5	.8	.7	.7	.5	1.0	.7	5.2	.9	8.9	1.2	.5
27	1.3	.7	.7	39	.6	1.0	.6	4.8	.8	19.2	1.0	.5
28	1.3	.7	.7	15.6	.7	.9	.6	2.0	1.3	6.8	.8	.5
29	1.2	.7	.7	28	.5	.8	.7	2.6	1.5	3.5	.8	.4
30	1.2	.9	.6	14.4	.5	.8	.7	-------	1.1	6.1	.7	.4
31	1.6	.9	-------	2.3	-------	5.1	.6	-------	1.0	-------	.7	-------

Monthly discharge of West Branch of Puohakamoa Stream at Haiku-uka boundary, near Kailiili, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	33	1.0	3.57	5.52	111	340
August	16.7	.7	1.92	2.97	59.4	183
September	26	.5	2.70	4.18	81.0	249
October	39	.4	4.81	7.44	149	458
November	25	.5	2.78	4.30	83.5	256
December	34	.5	7.26	11.2	225	691
January	5.9	.6	1.40	2.17	43.5	133
February	91	.5	9.13	14.1	265	813
March	10.4	.8	2.22	3.43	68.7	211
April	19.2	.8	3.67	5.68	110	338
May	40	.7	3.27	5.06	101	311
June	4.8	.4	.84	1.30	25.1	77
The year	91	.4	3.61	5.59	1,320	4,060

PUOHAKAMOA INTAKE OF KOOLAU DITCH NEAR HUELO, MAUI

LOCATION.—20 feet below Puohakamoa Stream intake on short feeder canal to Koolau ditch, 7 miles southeast of Huelo.

RECORDS AVAILABLE.—March 23, 1922, to June 30, 1924. East Maui Irrigation Co. previously obtained records at this location.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made in short channel between Puohakamoa Stream and head gates in Koolau ditch. When all water is being diverted into ditch measurements may be made by wading in stream about 300 feet 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, 48 million gallons per day or 74 second-feet at 7.45 p. m. December 18 (gage height, 2.25 feet); minimum recorded during year, 5.4 million gallons per day or 8.4 second-feet from 7 p. m. February 11 to 12.30 a. m. February 12 (gage height, 0.57 foot).

1922–1924: Maximum discharge recorded, 88 million gallons per day or 136 second-feet at 8 a. m. October 22, 1922 (gage height, 3.04 feet); a higher discharge may have occurred during period of no record September 4–15, 1923. Minimum recorded, 0.5 million gallons per 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.—During high water Spreckels ditch intake 120 feet downstream takes water wasted at this intake.

REGULATION.—Entire flow of Spreckels ditch empties into Puohakamoa Stream about 400 feet above station. During ordinary stages station measures all water carried by this ditch and the stream.

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

UTILIZATION.—Water used for irrigation of sugar cane.

ACCURACY.—Stage-discharge relation permanent during year. Weir rating curve well defined below 39 million gallons per day; above 39 million gallons per day the curve is subject to some uncertainty owing to the fact that the wing walls are overtopped. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records excellent below 39 million gallons per day.

Discharge measurements of Puohakamoa intake of Koolau ditch, near Huelo, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
July 3	1.15	27	17.3	Nov. 22	1.07	20.2	13.1
Aug. 20	1.36	34	22	Nov. 24	1.10	23.8	15.4
Oct. 5	.94	18.1	11.7	June 6	.78	12.2	7.9
Oct. 8	.93	16.5	10.7				

Discharge, in million gallons per day, of Puohakamoa intake of Koolau ditch, near Huelo, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	18.9	18.9	10.6	9.9	26	9.6	24	6.9	29	11.0	31	11.7
2	16.6	15.0	9.2	9.4	25	16.4	23	6.8	31	10.3	28	11.4
3	18.9	16.6	9.2	12.1	23	30	23	6.8	31	15.0	25	11.4
4	24	23	8.3	16.6	22	30	23	7.6	30	18.0	23	10.5
5	18.9	23	8.3	15.4	34	25	20	6.6	26	13.9	22	10.5
6	18.9	17.8	12.3	25	30	30	18.9	6.8	24	11.4	20	9.6
7	23	18.9	12.9	15.4	28	33	17.8	6.8	23	21	18.9	8.5
8	25	22	8.1	12.1	26	26	17.8	9.2	23	30	17.8	8.1
9	30	17.8	14.8	9.7	26	25	22	6.6	18.9	28	15.4	7.9
10	26	17.8	8.3	8.8	25	26	16.6	5.8	17.8	30	15.2	7.4
11	26	22	7.2	8.3	25	28	25	5.5	20	25	17.8	8.7
12	26	25	30	7.8	30	28	24	20	18.9	26	14.7	7.4
13	28	23	28	7.2	31	31	26	40	22	25	25	17.1
14	26	21	23	7.1	26	28	26	36	22	28	36	18.9
15	26	20	16.6	17.2	25	31	23	31	14.7	31	28	14.3
16	25	20	13.9	11.7	25	32	18.9	26	13.9	25	26	22
17	26	18.9	11.9	8.3	23	32	16.6	25	12.3	24	26	25
18	24	28	14.6	10.1	23	32	15.4	23	12.5	25	24	15.2
19	26	24	32	32	18.9	24	15.0	22	30	21	23	11.0
20	26	23	28	30	17.8	22	13.2	17.8	24	18.9	20	9.7
21	25	22	25	28	16.6	20	11.9	14.7	17.8	16.6	17.8	8.8
22	33	18.9	23	28	17.2	20	11.0	13.2	14.3	22	17.8	8.5
23	28	16.6	18.9	24	18.9	18.9	10.3	24	12.5	24	16.6	7.8
24	25	14.7	16.6	20	15.2	18.9	9.7	30	15.4	18.9	16.6	7.4
25	24	13.9	14.7	20	13.0	20	9.2	30	14.7	16.6	25	14.8
26	23	12.8	14.7	15.4	13.0	18.9	8.8	28	12.8	28	22	9.7
27	20	11.4	14.5	28	13.0	17.8	8.3	30	11.4	33	17.8	7.9
28	22	10.8	13.9	31	16.6	17.8	7.9	25	16.2	31	14.1	7.1
29	20	10.3	11.9	34	11.9	16.6	7.8	26	22	30	12.8	6.3
30	18.9	11.0	11.0	31	10.3	16.6	7.6	-------	14.7	32	11.4	6.1
31	20	16.6	-------	26	-------	24	7.2	-------	13.4	-------	11.4	-------

Monthly discharge of Puohakamoa intake of Koolau ditch, near Huelo, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	33	16.6	23.8	36.8	738	2,260
August	28	10.3	18.5	28.6	575	1,760
September	32	7.2	15.7	24.3	472	1,450
October	34	7.1	18.0	27.9	560	1,710
November	34	10.3	21.8	33.7	655	2,010
December	33	9.6	24.1	37.3	748	2,290
January	26	7.2	16.4	25.4	509	1,560
February	40	5.5	18.5	28.6	537	1,650
March	31	11.4	19.7	30.5	609	1,870
April	33	10.3	23.0	35.6	690	2,120
May	36	11.4	20.6	31.9	640	1,960
June	25	6.1	11.0	17.0	331	1,010
The year	40	5.5	19.3	29.9	7,060	21,600

MANUEL LUIS DITCH AT PUOHAKAMOA GULCH, NEAR HUELO, MAUI

LOCATION.—In Puohakamoa Gulch at lower portal of tunnel between Haipuaena and Puohakamoa Streams, 6 miles east of Huelo.

RECORDS AVAILABLE.—December 15, 1917, to June 30, 1924.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by rectangular sharp-crested weir 4.5 feet long set in concrete, with full contractions.

CHANNEL AND CONTROL.—Weir basin 25 feet long, 8.3 feet wide, and 1.9 feet deep below crest of weir; made by enlarging tunnel.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 87 million gallons per day or 135 second-feet at 7.50 p. m. December 18 (gage height, 4.19 feet); minimum recorded during year, 0.18 million gallons per day or 0.28 second-foot at 6 p. m. June 29 (gage height, 0.07 foot).

1919–1924: Maximum discharge recorded, 116 million gallons per day or 179 second-feet at 2.10 p. m. January 14, 1923 (gage height, 4.93 feet); minimum recorded, 0.05 million gallons per day or 0.08 second-foot at 6.30 p. m. March 3, 1920 (gage height, 0.03 foot).

DIVERSIONS.—Ditch is an extension of Center ditch and picks up water not diverted by ditches at higher elevations.

REGULATION.—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 sugar cane.

ACCURACY.—Stage-discharge relation permanent during year. Weir rating curve well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by integrating the gage-height graph with the discharge integrator. Records excellent.

Manuel Luis ditch, at elevation about 500 feet, diverts the flow of Kolea, Haipuaena, and Puohakamoa Streams below Koolau and Spreckels ditches and discharges into Waikamoi Stream. The water is then picked up by Center ditch (see Center ditch at Waikamoi, 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 and development of sugar cane on the plantations 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 per day.

The following discharge measurements were made:

October 1: Gage height, 0.14 foot; discharge, 0.85 second-foot or 0.55 million gallons per day.

November 18: Gage height 0.46 foot; discharge, 4.4 second-feet or 2.8 million gallons per day.

Discharge, in million gallons per day, of Manuel Luis ditch at Puohakamoa Gulch, near Huelo, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	0.6	0.9	0.6	0.6	14.4	0.6	15.0	0.4	23	0.6	26	0.6
2	.6	.7	.5	.6	8.7	3.8	7.8	.4	32	.6	19.4	.6
3	.7	.7	.5	.6	3.0	32	6.4	.4	32	.7	7.5	.5
4	3.0	9.8	.5	.6	2.2	30	5.5	.4	28	.9	3.5	.5
5	.9	6.7	.5	1.1	47	4.7	1.2	.3	15.1	.7	2.6	.5
6	1.1	.9	.7	7.6	34	30	1.0	.3	6.9	.6	2.1	.5
7	2.1	9.2	.7	.7	29	42	1.0	.3	3.2	19.5	2.1	.4
8	5.8	4.4	.5	.6	22	25	.9	.3	2.8	26	1.7	.4
9	29	.7	1.3	.6	17.9	11.5	1.7	.3	2.1	20	1.3	.4
10	22	.6	.5	.5	15.4	17.1	.9	.3	1.7	24	1.3	.4
11	10.3	2.8	.5	.5	16.5	33	4.4	.3	1.9	7.3	1.2	.3
12	11.3	23	37	.5	29	30	4.2	11.1	1.6	22	1.0	.3
13	29	4.7	25	.5	32	37	9.8	63	1.8	9.8	25	5.4
14	24	1.1	2.1	.5	16.1	31	10.7	52	2.1	28	54	1.1
15	22	.7	1.0	.6	11.7	39	3.7	25	1.1	30	25	.5

Discharge, in million gallons per day, of Manuel Luis ditch at Puohakamoa Gulch, near Huelo, Maui, for the year ending June 30, 1924—Continued

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
16	5.0	0.8	0.8	0.5	13.0	45	1.4	6.1	1.0	12.0	22	8.5
17	10.9	4.2	.8	.5	4.5	42	1.1	4.3	.9	5.0	23	11.2
18	2.2	38	3.8	1.3	3.2	45	.9	1.4	1.0	8.7	12.1	.5
19	14.0	14.9	42	33	2.2	37	.8	1.3	26	8.0	6.3	.4
20	9.8	2.4	35	24	1.8	30	.7	1.1	4.6	2.8	3.1	.4
21	7.8	1.3	26	21	1.6	15.8	.6	.9	1.2	2.1	2.1	.3
22	40	1.0	16.2	15.9	1.3	4.8	.6	.9	.9	13.5	1.8	.3
23	29	.9	5.0	3.7	1.3	3.9	.5	14.9	.8	4.6	1.6	.3
24	10.6	.7	2.6	1.4	1.1	3.4	.5	28	.9	2.3	2.1	.3
25	3.3	.7	1.5	1.3	.9	1.2	.5	26	.9	1.8	8.4	.5
26	2.0	.7	1.1	1.0	.9	1.1	.5	22	.8	26	3.7	.3
27	1.4	.6	1.0	34	.9	1.0	.4	25	.7	42	1.2	.3
28	1.4	.6	1.0	35	1.0	.9	.4	9.1	1.1	32	.9	.3
29	1.2	.6	.9	44	.7	.8	.4	9.0	1.6	23	.8	.2
30	1.0	.6	.8	32	.6	1.1	.4	-------	.8	35	.7	.3
31	1.3	.6	-------	15.4	-------	22	.4	-------	.7	-------	.6	-------

Monthly discharge of Manuel Luis ditch at Puohakamoa Gulch, near Huelo, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	40	0.6	9.78	15.1	303	930
August	38	.6	4.37	6.76	136	416
September	42	.5	7.01	10.8	210	645
October	44	.5	9.04	14.0	280	860
November	47	.6	11.1	17.2	334	1,020
December	45	.6	20.1	31.1	622	1,910
January	15.0	.4	2.72	4.21	84.3	259
February	63	.3	10.5	16.2	305	934
March	32	.7	6.43	9.95	199	612
April	42	.6	13.4	20.7	400	1,230
May	54	.6	8.52	13.2	264	811
June	11.2	.2	1.22	1.89	36.5	112
The year	63	.2	8.67	13.4	3,170	9,740

KOOLAU DITCH AT WAHINEPE, NEAR HUELO, MAUI

LOCATION.—Between Puohakamoa and Waikamoi Streams, half a mile below Puohakamoa intake, and 7 miles southeast of Huelo.

RECORDS AVAILABLE.—March 25, 1922, to June 30, 1924. East Maui Irrigation Co. previously obtained records at this location.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from plank across ditch.

CHANNEL AND CONTROL.—Ditch section in rock tunnel; probably permanent.

EXTREMES OF DISCHARGE.—Maximum recorded during year, 114 million gallons per day or 176 second-feet at 9.30 a. m. February 13 (gage height, 5.33 feet); minimum recorded during year, 15.0 million gallons per day or 23 second-feet, at 8.15 p. m. January 10 (gage height, 1.30 feet).

1922–1924: Maximum discharge recorded, about 120 million gallons per day or 186 second-feet at 2 a. m. May 6, 1923 (gage height, about 5.55 feet); minimum, estimated 5 million gallons per day or 7.5 second-feet, January 15, 16, and 20–28, 1923.

DIVERSIONS.—Flood water diverted at gage through a cross-cut channel and at Puohakamoa intake half a mile upstream. Other flood water waste gates along course of ditch.

REGULATION.—Complete regulation by various intake gates and by flood water waste gates.

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

UTILIZATION.—Water used for irrigation of sugar cane.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined between 25 and 80 million gallons per day; extended above and below. Operation of water-stage recorder satisfactory except during part of August. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good.

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

Discharge measurements of Koolau ditch at Wahinepe, near Huelo, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day
Oct. 9	2.15	48	31
Nov. 27	3.11	84	54
June 6	2.42	58	37.5

Discharge, in million gallons per day, of Koolau ditch at Wahinepe, near Huelo, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	56		36	37	107	42	36	29	110	42	110	47
2	54		34	35	104	56	31	28	110	39	110	44
3	62		32	38	93	110	27	27	110	49	104	44
4	80		30	47	85	107	28	28	110	52	93	39
5	62		30	52	110	96	21	26	110	44	85	39
6	67		46	83	107	107	19.4	26	104	42	80	37
7	80		38	44	107	110	18.4	25	96	70	80	35
8	99		29	37	107	104	17.5	27	93	110	72	32
9	110		44	32	107	104	23	24	80	107	64	32
10	110		29	30	107	104	17.5	22	75	110	62	30
11	107	80	27	28	107	110	30	22	80	101	62	31
12	104		101	28	107	107	49	66	77	110	56	29
13	110		107	26	110	110	96	113	83	104	83	61
14	110		80	26	107	107	101	110	83	110	113	53
15	110		59	42	107	110	91	78	64	110	107	42
16	101		49	35	107	110	72	43	59	107	104	59
17	101		42	27	99	110	64	35	59	99	107	80
18	88		48	28	93	71	62	28	62	104	104	42
19	104		110	107	83	30	57	26	108	101	96	35
20	104		110	107	77	26	52	22	94	83	83	31
21	104	75	107	107	72	24	49	38	70	72	75	28
22	110	64	101	104	68	23	47	52	59	85	72	28
23	110	59	75	85	70	20	42	89	54	88	67	27
24	107	52	62	67	62	21	42	110	56	72	70	26
25	99	49	56	59	56	21	38	110	54	64	99	39
26	85	47	52	52	56	19.4	37	110	52	97	85	29
27	75	44	49	84	54	18.4	35	110	47	110	67	26
28	77	42	47	110	59	17.5	34	107	54	110	56	24
29	72	39	42	110	49	16.6	32	104	66	110	52	22
30	67	39	39	110	44	16.6	31	-------	52	110	49	22
31	67	47	-------	107	-------	39	30	-------	47	-----	47	-------

NOTE.—Braced figure shows mean discharge for period indicated; estimated, because of lack of gage-height record, by comparison with flow of this ditch at Nahiku Weir and Keanae and flow of Wailoa ditch at Honopou. Discharge for July 31 estimated similarly.

EAST BRANCH OF WAIKAMOI STREAM AT HAIKU-UKA BOUNDARY, NEAR KAILIILI, MAUI

LOCATION.—200 feet above Haiku-uka boundary trail crossing, at elevation 3,020 feet, 5½ miles east of Kailiili.

RECORDS AVAILABLE.—May 26, 1918, to June 30, 1924.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from suspension footbridge just above control.

CHANNEL AND CONTROL.—Channel has gravel and boulder bed with steep high banks of hardpan. Control is broad-crested concrete weir, completed June 3, 1922; permanent for low stages but drowned out at high stages.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 104 million gallons per day or 161 second-feet at 7.15 p. m. December 18 (gage height, 6.44 feet); minimum recorded during year, 0.25 million gallons per day or 0.4 second-foot at 1 p. m. June 29 (gage height, 3.93 feet).

1918–1924: Maximum discharge recorded, 230 million gallons per day or 356 second-feet at 5.20 p. m. March 22, 1920 (gage height, 7.92 feet); minimum recorded, 0.07 million gallons per day or 0.11 second-foot April 15, 1919 (gage height, 3.77 feet).

DIVERSIONS.—A little water is diverted above station by Kula pipe line.

REGULATION.—None.

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 sugar cane.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined below 15 million gallons per day, extended above that point on basis of form of old curves. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good except for high stages.

Discharge measurements of East Branch of Waikamoi Stream, at Haiku-uka boundary near Kailiili, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day
Aug. 30	4.04	0.75	0.5
Oct. 17	4.00	.55	.35
Mar. 11	4.15	2.1	1.35

Discharge, in million gallons per day, of East Branch of Waikamoi Stream, at Haiku-uka, boundary, near Kailiili, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	0.9	1.1	0.6	0.5	2.4	0.5	3.3	0.4	3.4	0.4	2.3	0.4
2	.8	.7	.6	.4	1.6	.6	2.2	.4	4.8	.4	1.4	.4
3	2.4	.7	.5	.6	1.2	4.1	4.0	.4	5.7	.6	1.1	.4
4	1.9	2.3	.4	.7	1.2	8.4	1.9	.4	3.9	.8	.7	.4
5	.9	1.5	.4	.7	18.2	1.3	.9	.4	1.7	.4	.7	.4
6	.8	.7	.6	2.1	4.4	5.8	.8	.4	1.2	.4	.6	.4
7	1.2	2.3	.6	.8	2.2	16.2	.7	.4	.8	2.4	.8	.3
8	2.3	1.4	.4	.6	1.7	2.4	.7	.6	.8	4.9	.7	.4
9	7.1	.9	.5	.5	2.1	1.6	.7	.4	.6	3.8	.5	.3
10	2.7	.8	.4	.4	1.8	5.9	.7	.4	.6	4.2	.7	.3

Discharge, in million gallons per day, of East Branch of Waikamoi Stream at Haiku-uka boundary, near Kailiili, Maui, for the year ending June 30, 1924—Con.

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
11	2.3	1.8	0.4	0.4	2.9	5.4	1.4	0.3	0.9	1.4	0.8	0.5
12	3.0	5.7	17.2	.4	10.4	6.5	2.0	14.2	.9	2.6	.6	.3
13	4.4	1.6	3.0	.4	6.4	6.3	2.9	52	1.8	1.2	16.8	1.5
14	2.5	1.2	1.0	.4	1.8	3.5	2.1	37	1.2	5.0	24	1.0
15	3.0	1.2	.7	1.1	1.4	19.0	1.2	6.5	.6	6.6	2.3	.6
16	1.7	1.2	.6	.6	1.2	16.1	.7	2.0	.6	1.8	1.8	4.0
17	2.2	1.7	.6	.5	1.0	11.5	.7	1.9	.6	1.2	1.4	2.3
18	1.3	11.8	.7	.5	.9	21	.6	1.2	.5	1.3	.9	.6
19	2.9	2.1	16.7	12.5	.8	10.2	.7	.9	7.4	.8	.8	.4
20	1.8	1.2	4.7	3.7	.8	5.0	.6	.8	1.4	.8	.6	.5
21	1.7	.9	3.5	2.0	.8	2.2	.6	.7	.7	.6	.5	.3
22	21	.8	1.6	3.2	.9	1.7	.5	.7	.5	2.1	.6	.3
23	3.5	.8	.9	1.2	1.1	1.4	.5	6.9	.5	1.2	.5	.3
24	1.6	.7	.8	.9	.8	1.2	.5	7.5	.7	.7	2.5	.3
25	1.2	.6	.7	.9	.7	1.2	.5	5.0	.7	.5	2.4	1.0
26	1.1	.6	.6	.7	.6	1.0	.4	2.8	.5	7.7	.9	.4
27	.9	.6	.6	25	.7	.9	.4	3.7	.4	12.8	.7	.3
28	.9	.6	.6	10.4	.8	.8	.4	1.4	.9	4.0	.5	.3
29	.9	.6	.6	18.6	.6	.7	.4	2.0	1.1	2.8	.4	.3
30	.9	.9	.5	6.5	.6	.7	.4	-------	.7	5.2	.4	.3
31	1.4	1.0	-------	2.0	-------	4.8	.4	-------	.6	-------	.4	-------

Monthly discharge of East Branch of Waikamoi Stream at Haiku-uka boundary, near Kailiili, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	21	0.8	2.62	4.05	81.2	249
August	11.8	.6	1.61	2.49	50.0	153
September	17.2	.4	2.03	3.14	61.0	187
October	25	.4	3.20	4.95	99.2	304
November	18.2	.6	2.40	3.71	72.0	221
December	21	.5	5.42	8.39	168	516
January	4.0	.4	1.09	1.69	33.8	104
February	52	.3	5.23	8.09	152	465
March	7.4	.4	1.51	2.34	46.7	144
April	12.8	.4	2.60	4.02	78.1	239
May	24	.4	2.22	3.43	68.7	211
June	4.0	.3	.64	.99	19.2	59
The year	52	.3	2.54	3.93	930	2,850

WEST BRANCH OF WAIKAMOI STREAM AT HAIKU-UKA BOUNDARY, NEAR KAILIILI, MAUI

LOCATION.—At Haiku-uka boundary trail crossing, at elevation 3,000 feet, 5 miles east of Kailiili.

RECORDS AVAILABLE.—May 28, 1918, to June 30, 1924.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from suspension footbridge 35 feet above gage.

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, about 775 million gallons per day or 1,200 second-feet, at 7.50 p. m. December 18 (gage height, 5.59 feet); minimum recorded during year, 0.3 million gallons per day or 0.5 second-foot, for a few hours February 11 (gage height, 0.42 foot).

1918–1924: Maximum discharge recorded, 2,020 million gallons per day or 3,130 second-feet, at noon December 6, 1918 (gage height, 9.85 feet); minimum recorded, 0.06 million gallons per day or 0.09 second-foot at 8.30 p. m. December 22, 1919 (gage height, 0.33 foot).

DIVERSIONS.—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.

REGULATION.—None.

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 sugar cane.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined below 200 million gallons per day. Operation of water-stage recorder satisfactory except during July and August. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good except those estimated and those for high stages which are fair.

The following discharge measurements were made:

August 30: Gage height, 0.50 foot; discharge, 1.05 second-feet or 0.65 million gallons per day.

October 17: Gage height, 0.46 foot; discharge, 0.65 second-foot or 0.4 million gallons per day.

Discharge, in million gallons per day, of West Branch of Waikamoi Stream at Haiku-uka boundary, near Kailiili, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1			0.7	0.7	6.3	0.7	6.0	0.6	6.0	1.0	7.6	1.2
2			.7	.7	3.3	.7	4.2	.6	9.1	.8	4.0	1.2
3			.7	.8	2.1	4.1	11.9	.5	14.7	1.0	2.3	1.1
4			.6	.8	1.8	26	6.3	.6	12.2	1.0	1.8	1.1
5	2.6		.6	.8	75	2.3	2.0	.5	5.2	.9	1.7	1.1
6		2.2	.7	2.2	14.6	8.4	1.5	.5	3.0	.8	1.6	.9
7			.7	1.1	5.8	68	1.2	.6	1.6	7.6	1.7	.8
8			.6	.8	3.2	6.9	1.1	.6	1.4	19.9	1.6	.8
9			.6	.7	3.5	3.0	1.1	.5	1.2	15.6	1.3	.7
10			.6	.7	2.8	13.3	1.1	.4	1.2	18.8	1.6	.7
11			.6	.6	3.6	27	1.5	.4	1.5	5.2	1.8	.7
12			53	.6	42	17.8	2.2	31	1.6	8.5	1.5	.7
13			9.1	.6	22	24	3.9	222	3.2	4.2	62	1.3
14			2.1	.5	3.8	29	5.9	210	3.0	26	108	1.6
15			1.1	1.2	2.1	91	2.0	19.6	1.5	27	9.3	1.0
16	13	8.5	.9	.8	1.8	112	1.3	4.8	1.2	4.2	4.5	7.0
17			.7	.6	1.5	46	1.1	3.2	1.2	7.1	3.5	6.0
18			1.0	.6	1.4	113	1.0	1.8	1.3	5.5	2.6	1.5
19			76	33	1.1	62	.9	1.4	24	3.0	2.1	.9
20			15.2	14.9	1.0	22	.8	1.3	4.5	2.5	1.8	.7
21			6.9	3.2	.9	6.3	.8	1.1	1.5	1.8	1.5	.7
22			3.2	8.9	1.1	4.0	.8	1.0	1.2	8.2	1.5	.7
23		1.2	1.7	2.7	1.2	2.6	.8	22	1.1	4.0	1.4	.6
24			1.3	1.5	.9	2.1	.7	76	1.3	2.3	3.8	.6
25			1.1	1.6	.8	1.6	.7	25	1.3	1.8	5.4	1.0
26			1.0	1.5	.8	1.5	.7	13.8	1.2	13.7	2.5	.7
27	1.7	.8	.9	144	.7	1.4	.7	9.1	1.1	42	2.1	.7
28		.8	.9	68	.9	1.2	.6	4.0	1.5	15.2	1.5	.6
29		.7	.8	124	.7	1.2	.6	4.2	1.7	8.2	1.2	.4
30		1.0	.7	30	.7	1.1	.6	-------	1.3	13.9	1.2	.5
31		1.2	-------	6.6	-------	8.0	.6	-------	1.1	-------	1.2	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow of adjacent branches of this stream.

Monthly discharge of West Branch of Waikamoi Stream at Haiku-uka boundary, near Kailiili, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July			7.76	12.0	241	739
August		0.7	3.39	5.25	105	322
September	76	.6	6.16	9.53	185	567
October	144	.5	14.7	22.7	455	1,400
November	75	.7	6.91	10.7	207	636
December	113	.7	22.8	35.3	708	2,170
January	11.9	.6	2.08	3.22	64.6	198
February	222	.4	22.7	35.1	657	2,020
March	24	1.1	3.64	5.63	113	346
April	42	.8	9.06	14.0	272	834
May	108	1.2	7.92	12.3	246	754
June	7.0	.4	1.25	1.93	37.5	115
The year	222	.4	8.99	13.9	3,290	10,100

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, 1924.

GAGE.—Stevens continuous water-stage recorder installed April 5, 1920, to replace Friez water-stage recorder installed June 18, 1914. Prior to June 18, 1914, vertical staff at trail bridge 300 feet downstream from present site. Datum lowered 0.05 foot May 19, 1922.

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; probably permanent.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, about 275 million gallons per day or 425 second-feet, at 1.10 p. m. October 27 (gage height, 3.26 feet); minimum recorded during year, 0.5 million gallons per day or 0.8 second-foot, for a few hours February 11 (gage height, 0.49 foot).

1910–1924: Maximum discharge, from extension of curve, 638 million gallons per day or 987 second-feet at 7 p. m. December 9, 1916 (gage-height, 4.35 feet); minimum recorded, 0.06 million gallons per day or 0.1 second-foot, November 4, 1911 (gage height, 1.34 feet, old datum).

DIVERSIONS.—None.

REGULATION.—None.

OBJECT OF STATION.—To furnish data for appraisal of water value under Territorial lease to ditch company.

UTILIZATION.—Ordinary flow diverted by ditches of East Maui Irrigation Co. for irrigation of sugar cane.

ACCURACY.—Stage-discharge relation changed August 18. Two rating curves used are well defined below 15 million gallons per day; extended for high stages on basis of form of old curves. Operation of water-stage recorder satisfactory except for two short periods. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good except for high stages.

Discharge measurements of Alo Stream near Huelo, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 9	0.66	2.3	1.5	Mar. 4	1.23	13.8	8.9
Oct. 6	.74	3.1	2.0	Apr. 19	.77	2.8	1.8
Nov. 27	.62	1.35	.9	June 6	.54	.8	.55
Jan. 14	.78	3.3	2.1				

Discharge, in million gallons per day, of Alo Stream near Huelo, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	1.6	1.4	0.7	0.9	2.8	0.9	10.1	0.6	9.8	1.0	7.2	0.9
2	1.7	1.4	.7	.8	2.4	4.7	5.7	.6	14.4	1.0	6.1	.9
3	2.0		.7	.9	1.9	20	3.1	.6	11.2	1.4	2.9	.8
4	3.1		.7	1.0	4.4	14.1	2.4	.6	7.4	4.6	2.4	.7
5	2.7		.6	1.7	54	2.6	1.8	.6	4.1	1.2	2.0	.7
6	2.7	2.8	1.1	5.6	7.3	9.7	1.7	.5	2.7	1.2	1.8	.7
7	3.6		.9	1.2	4.3	25	1.5	.5	2.4	3.7	1.6	.7
8	4.3		.7	1.0	3.6	5.5	1.6	.6	2.3	7.5	1.5	.6
9	12.6		1.4	.9	3.5	3.0	3.3	.5	1.8	7.0	1.4	.6
10	8.2	2.0	.7	.9	2.5	20	1.5	.5	1.7	5.2	1.3	.6
11	5.4	2.8	.6	.8	2.5	6.8	2.6	.5	1.8	2.6	1.2	.5
12	6.6	12.6	29	.8	17.5	14.5	3.1	13.5	1.5	7.4	1.1	.5
13	14.5	2.8	4.8	.7	9.6	19.4	3.3	107	1.7	4.9	55	2.2
14	7.9	2.5	1.6	.7	2.7	5.1	2.3	36	1.4	8.4	68	1.0
15	8.6	2.3	1.3	1.0	5.6	34	1.8	17.5	1.2	9.8	4.5	.9
16	5.3	2.0	1.2	.9	5.7	36	1.5	4.2	1.2	3.4	16.6	4.6
17	8.4	4.7	1.0	.7	2.4	29	1.5	4.0	1.1	2.5	4.3	5.7
18	5.8	23	2.4	1.2	2.2	57	1.4	2.0	1.2	2.6	2.5	1.0
19	7.6	3.4	42	15.7	1.8	25	1.2	2.3	8.5	1.9	2.0	.8
20	6.6	2.0	12.3	8.5	1.7	7.9	1.2	1.8	1.8	1.7	1.7	.7
21	6.6	1.7	3.3	9.5	1.5	4.8	1.1	1.5	1.4	1.5	1.5	.7
22	24	1.5	2.2	5.5	1.4	3.3	1.0	1.4	1.3	5.1	1.5	.7
23	9.9	1.2	1.7	2.2	1.4	2.6	1.0	2.6	1.2	2.0	1.3	.6
24	5.8	1.2	1.4	1.7	1.2	2.2	.9	3.4	1.4	1.7	1.4	.6
25	4.9	1.1	1.2	1.5	1.0	2.0	.9	4.6	1.2	1.5	1.8	.9
26	4.1	1.0	1.2	1.4	1.1	1.7	.8	5.5	1.1	15.2	1.5	.6
27	3.4	1.0	1.2	44	1.0	1.5	.8	6.4	1.0	39	1.2	.6
28	3.3	.9	1.2	20	1.4	1.4	.7	2.3	2.7	9.6	1.0	
29	2.8	.9	1.0	19.7	1.0	1.3	.7	2.4	1.7	4.9	1.0	.6
30	2.2	.9	.9	11.2	.9	1.5	.7	-------	1.1	17.0	1.0	
31	2.0	1.0	-------	3.5	-------	24	.7	-------	1.1	-------	.9	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage height record, by comparison with flow of adjacent streams.

Monthly discharge of Alo Stream near Huelo, Maui, for year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	24	1.6	6.07	9.39	188	577
August	23	.9	3.06	4.73	94.9	291
September	42	.6	3.99	6.17	120	367
October	44	.7	5.36	8.29	166	510
November	54	.9	5.01	7.75	150	461
December	57	.9	12.5	19.3	386	1,190
January	10.1	.7	2.00	3.09	61.9	190
February	107	.5	7.74	12.0	224	689
March	14.4	1.0	3.05	4.72	94.4	290
April	39	1.0	5.88	9.10	176	541
May	68	.9	6.43	9.95	199	612
June	5.7	.5	1.05	1.62	31.6	97
The year	107	.5	5.17	8.00	1,890	5,820

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 Huelo.

RECORDS AVAILABLE.—December 15, 1917, to June 30, 1924.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from plank at gage.

CHANNEL AND CONTROL.—Ditch section below gage. During heavy rains stage-discharge relation is affected by two small streams which enter ditch a short distance below gage.

EXTREMES OF DISCHARGE.—Maximum recorded during year, 110 million gallons per day or 170 second-feet at 6.40 p. m. May 16 (gage height, 5.45 feet); minimum recorded during year, 0.05 million gallons per day or 0.08 second-foot at 3 a. m. December 29 (gage height, 0.30 foot).

1917–1924: Maximum discharge recorded, 110 million gallons per day or 170 second-feet at 7.30 p. m. January 16, 1921 (gage height, 5.65 feet) and at 6.40 p. m. May 16, 1924 (gage height, 5.45 feet); minimum, no flow, when water is occasionally turned out of ditch.

DIVERSIONS.—Ditch diverts water from a dozen or more streams east of Nailiilihaele.

REGULATION.—By gates 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 sugar cane.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined. Operation of water-stage recorder satisfactory except for two short periods. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good.

For description of this ditch see "Spreckels ditch at Haipuaena Weir, near Huelo, Maui."

Discharge measurements of Spreckels ditch below Kaaiea Gulch, near Huelo, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 21	0.46	0.9	0.6	Apr. 23	0.57	1.8	1.15
Jan. 14	.52	1.05	.65	June 11	.38	.15	.1
Mar. 1	.82	6.2	4.0				

Discharge, in million gallons per day, of Spreckels ditch below Kaaiea Gulch, near Huelo, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	0.3	0.2	0.4	0.4	5.6	0.5	4.3	0.2	3.2	0.5	3.1	0.4
2	.2	.2	.2	.2	4.5	1.7	2.1	.2	3.9	.4	2.5	.4
3	.2	.2	.2	.2	3.4	4.7	1.6	.2	4.1	.5	1.8	.4
4	.4	.4	.2	.3	3.3	5.3	1.4	.2	4.0	.7	1.4	.3
5	.4	.9	.2	1.4	22	.9	.6	.2	2.4	.5	1.1	.2
6	.4	.4	.2	3.6	12.8	3.7	.5	.2	1.7	.5	.9	.2
7	.4	.6	.2	.6	8.3	10.0	.4	.2	1.5	1.8	.8	.2
8	.6	1.2	.2		4.8	4.2	.2	.1	1.4	3.2	.7	.2
9	3.5	.6	.3		2.4	2.3	.7	.1	1.3	4.3	.8	.2
10	1.0	.4	.2	.3	1.8	7.3	.6	.1	1.2	3.3	.8	.2
11	.9	.4	.2		1.4	5.6	.9	.1	1.2	2.0	.7	.8
12	1.1	1.9	16.2		4.6	7.6	.9	1.3	1.0	4.8	1.0	.2
13	5.4	.3	8.4	.1	4.8	14.0	1.1	25	.9	3.6	14.3	.4
14	1.3	.4	1.4	.1	1.8	6.3	.9	13.0	.9	4.9	19.4	.4
15	1.5	.2	.4	.3	4.2	11.7	.7	8.9	.8	8.2	3.4	.2

Discharge, in million gallons per day, of Spreckels ditch below Kaaiea Gulch, near Huelo, Maui, for the year ending June 30, 1924—Continued

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
16	0.9	0.2	0.2	0.2	7.3	11.8	0.6	3.4	0.8	2.5	12.0	1.3
17	1.4	1.1	.2	.1	3.0	16.6	.6	2.4	.6	1.6	4.6	1.4
18	.9	5.2	.2	.2	2.3	25	.6	1.4	.7	3.1	2.4	.2
19	1.3	.9	26	3.8	1.6	14.5	.6	1.2	3.9	1.6	1.7	.2
20	.9	.6	18.2	2.3	1.3	7.3	.5	.9	.9	1.4	1.3	.2
21	.9	.5	4.8	4.3	1.1	3.0	.5	.8	.6	1.3	1.1	.2
22	3.1	.5	1.6	2.4	.9	2.1	.4	.7	.6	3.9	.9	.2
23	4.5	.5	1.1	1.3	.9	1.9	.4	3.2	.6	1.5	.8	.2
24	.6	.5	.9	.9	.9	1.4	.4	2.4	.8	1.2	.8	.2
25	.6	.5	.6	.9	.7	1.1	.4	2.8	.7	.9	.8	.2
26	.4	.4	.6	.6	.7	.6	.4	1.9	.6	2.7	.7	.2
27	.4	.5	.5	15.1	.7	.2	.4	2.0	.6	10.0	.6	.2
28	.4	.4	.6	15.5	.8	.1	.4	.8	1.3	2.8	.6	.1
29	.3	.4	.4	18.3	.6	.1	.4	.9	1.0	2.5	.6	.1
30	.2	.4	.4	15.6	.5	.7	.3	-------	.6	14.0	.5	.1
31	.3	.4	-------	7.0	-------	6.4	.2	-------	.6	-------	.5	-------

NOTE.—Braced figure shows mean discharge for period indicated; estimated, because of lack of gage-height record, by comparison with flow of New Hamakua ditch at Honopou. Gage-height graph partly estimated Aug. 19–21.

Monthly discharge of Spreckels ditch below Kaaiea Gulch, near Huelo, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	5.4	0.2	1.12	1.73	34.7	106
August	5.2	.2	.69	1.07	21.3	65
September	26	.2	2.84	4.39	85.2	262
October	18.3	.1	3.14	4.86	97.2	298
November	22	.5	3.63	5.62	109	334
December	25	.1	5.76	8.91	179	548
January	4.3	.2	.77	1.19	24.0	74
February	25	.1	2.58	3.99	74.8	230
March	4.1	.6	1.43	2.21	44.4	136
April	14.0	.4	3.01	4.66	90.2	277
May	19.4	.5	2.66	4.12	82.6	254
June	1.4	.1	.32	.50	9.7	30
The year	26	.1	2.33	3.61	852	2,610

CENTER DITCH BELOW KOLEA RESERVOIR, NEAR HUELO, MAUI

LOCATION.—200 feet below head gates at spillway crossing of Kolea Reservoir, half a mile below intake in Waikamoi Stream, and 3½ miles by trail east of Huelo.

RECORDS AVAILABLE.—May 1, 1922, to June 30, 1924. For station half a mile upstream at Waikamoi, March 6, 1918, to April 30, 1922; see "Regulation" below.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from plank just above gage or by wading.

CHANNEL AND CONTROL.—Channel slightly curved in immediate vicinity of gage, developing into a sharp curve 75 feet below gage. Bed composed of rock and hardpan. Control formed by excavated ditch section; subject to shift.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 73 million gallons per day or 121 second-feet at 5 p. m. December 18 (gage height, 4.48 feet); minimum recorded during year, 1.2 million gallons per

day or 1.9 second-feet, for several hours February 10 and 11 (gage height, 0.70 foot).

1922–1924: Maximum discharge recorded, 84 million gallons per day or 130 second-feet at 5 a. m. January 12, 1923 (gage height, 5.02 feet); minimum recorded, 0.38 million gallons per day or 0.6 second-foot, at noon February 19, 1923 (gage height, 0.49 foot).

DIVERSIONS.—Ditch diverts water that arises in streams below or passes Spreckels ditch.

REGULATION.—Flow regulated by head gates and by release of water from Kolea Reservoir. The flow at this station is the same as that at the old station at Waikamoi except for the occasional addition of water from Kolea Reservoir.

OBJECT OF STATION.—Record valuable in connection with Territorial water license to ditch company.

UTILIZATION.—Water used for irrigation of sugar cane.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined below 45 million gallons per day; contains a reversal between 3 and 7 million gallons per day. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records excellent.

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 picks up the water from Manuel Luis ditch (see Manuel Luis ditch at Puohakamoa Gulch, near Huelo) at Waikamoi Stream. 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 per day.

Discharge measurements of Center ditch below Kolea Reservoir, near Huelo, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 11	1.90	29	18.8	Feb. 25	2.63	53	34.5
Oct. 1	.86	3.1	2.0	Apr. 14	2.75	56	36.5
Nov. 18	1.38	16.3	10.5	June 2	.89	4.3	2.8
Jan. 6	.90	4.6	3.0				

Discharge, in million gallons per day, of Center ditch below Kolea Reservoir, near Huelo, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	2.4	2.6	1.6	2.6	24	2.5	19.9	1.4	30	1.8	34	2.8
2	2.1	2.0	1.6	2.5	19.6	6.3	13.4	1.4	36	1.8	27	2.7
3	3.1	2.1	1.6	2.4	9.4	38	10.0	1.4	40	1.9	17.1	2.4
4	8.6	13.6	1.6	2.4	6.7	42	10.4	1.4	36	4.3	9.4	2.2
5	2.6	13.2	1.6	3.4	65	13.0	4.0	1.4	26	1.8	7.6	2.0
6	3.2	2.2	1.8	15.4	42	35	3.1	1.4	18.8	1.7	6.7	1.9
7	5.2	11.1	1.9	5.7	28	66	2.9	1.3	10.1	10.4	6.2	1.7
8	16.0	9.6	1.4	6.5	26	31	10.4	1.3	8.8	32	5.7	1.7
9	36	2.0	2.9	2.0	25	23	5.2	1.3	9.7	31	5.5	1.7
10	30	1.8	1.4	1.8	23	32	2.7	1.3	6.9	32	5.5	1.7

Discharge, in million gallons per day, of Center ditch below Kolea Reservoir, near Huelo, Maui, for the year ending June 30, 1924—Continued

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
11	26	7.1	1.3	1.7	23	49	7.4	1.3	5.5	15.1	5.4	1.7
12	20	29	50	1.7	33	48	7.7	12.8	4.3	30	5.4	1.7
13	38	13.3	41	1.7	44	62	14.7	60	5.8	18.9	33	7.6
14	30	2.8	7.8	1.7	24	49	18.8	60	7.3	34	61	3.8
15	30	1.7	2.2	2.2	21	48	9.3	44	2.9	32	32	1.9
16	16.8	2.0	2.0	2.5	30	67	3.1	18.0	2.8	22	32	9.5
17	21	4.3	1.7	1.6	14.7	65	2.7	12.6	2.7	13.1	29	17.5
18	7.6	54	3.3	1.7	10.8	62	2.5	7.4	2.9	17.4	18.8	6.3
19	23	26	52	39	7.7	49	2.2	6.4	38	15.5	13.1	5.6
20	21	8.2	40	38	6.7	26	2.0	5.7	13.7	8.1	8.1	1.7
21	20	5.9	26	31	10.1	13.9	1.9	4.5	2.9	6.9	7.0	1.7
22	50	7.8	19.9	26	8.2	9.4	1.7	3.8	2.4	18.4	7.0	1.6
23	39	2.1	8.8	10.2	5.2	7.5	1.7	23	2.2	10.6	5.9	1.6
24	22	2.1	6.2	4.5	4.3	6.4	1.7	47	2.6	7.0	7.0	1.5
25	9.9	2.0	4.0	4.0	3.6	4.3	1.7	41	2.9	6.2	15.0	1.9
26	6.2	1.8	3.4	3.1	3.6	3.4	1.6	31	2.4	37	12.7	1.6
27	4.0	1.8	2.9	36	3.4	2.8	1.6	32	2.1	60	7.7	1.5
28	11.5	1.7	2.9	51	3.6	2.8	1.6	19.9	2.6	40	3.6	1.5
29	3.4	1.7	2.7	65	2.7	2.7	1.6	17.4	3.8	30	3.1	1.4
30	2.6	1.7	2.6	51	2.6	3.9	1.6	-------	2.1	52	2.9	1.4
31	3.0	1.7	-------	26	-------	24	1.4	-------	1.8	-------	2.8	-------

NOTE.—Nest of mud-dauber wasp hindered operation of recorder float July 22 and 23; gage-height graph partly estimated on basis of readings furnished by ditch foreman for East Maui Irrigation Co.

Monthly discharge of Center ditch below Kolea Reservoir, near Huelo, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	50	2.1	16.6	25.7	514	1,580
August	54	1.7	7.71	11.9	239	733
September	52	1.3	9.94	15.4	298	915
October	65	1.6	14.3	22.1	444	1,360
November	65	2.6	17.7	27.4	531	1,630
December	67	2.5	28.9	44.7	895	2,750
January	19.9	1.4	5.50	8.51	170	523
February	60	1.3	15.9	24.6	461	1,420
March	40	1.8	10.8	16.7	336	1,030
April	60	1.7	19.8	30.6	593	1,820
May	61	2.8	14.1	21.8	437	1,340
June	17.5	1.4	3.13	4.84	93.8	288
The year	67	1.3	13.7	21.2	5,010	15,400

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, 1924. Also at old staff-gage station below New Hamakua ditch from December 9, 1910, to December 31, 1912.

GAGE.—Stevens continuous water-stage recorder installed December 13, 1917, replacing original Barrett and Lawrence water-stage recorder. Datum lowered 0.50 foot March 20, 1922, to eliminate negative gage heights.

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

CHANNEL AND CONTROL.—One channel at all stages; straight for 100 feet above and below gage. Stream bed very rough and steep. Banks steep and high and covered with dense vegetation. Control concrete and large boulders; washed out by flood of February 13, 1924.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year about 530 million gallons per day or 820 second-feet at 10 a. m. February 13 (gage height, 4.19 feet); at this stage the concrete control washed out; had the control remained intact a higher stage might have been recorded. Minimum recorded during year, 2.0 million gallons per day or 3.1 second-feet from 5 to 11 p. m. February 11 (gage height, 0.31 foot).

1913–1924: Maximum discharge from extension of rating curve, 1,800 million gallons per day or 2,790 second-feet at 6.30 p. m. May 1, 1916 (gage height, 6.3 feet); minimum recorded, 0.45 million gallons per day or 0.7 second-foot from 11 a. m. to 7 p. m. July 14, 1920 (gage height, −0.52 foot).

DIVERSIONS.—Low flow of left branch of stream diverted above station by Old Hamakua ditch from about March 1, 1918, to February 28, 1922.

REGULATION.—None.

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 by ditches of East Maui Irrigation Co. for irrigation of sugar cane.

ACCURACY.—Stage-discharge relation permanent until flood of February 13 when concrete control washed out and stage-discharge relation was entirely destroyed. Rating curve used prior to February 13 well defined between 0.5 and 80 million gallons per day. Operation of water-stage recorder satisfactory except that gage-height record after control washed out is valueless. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day; after control washed out estimates of discharge were made as indicated in footnote to table of daily discharge. Records good except for high stages prior to February 13; estimates of discharge subsequent to February 13 subject to error and should be used with caution.

Discharge measurements of Nailiilihaele Stream near Huelo, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Oct. 9	0.46	5.7	3.7	Apr. 22	−0.12	24.8	16.0
Nov. 17	.75	17.0	11.0	June 11		5.3	3.4

Discharge, in million gallons per day, of Nailiilihaele Stream near Huelo, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	6.4	5.8	3.7	4.0	15.4	8.3	41	2.6				
2	5.8	5.3	3.4	3.7	12.5	20	22	2.5				
3	6.4	5.5	3.2	3.8	9.9	54	15.4	2.5				
4	9.9	16.9	3.0	4.0	11.4	50	12.5	2.6				
5	7.0	13.3	2.9	4.8	121	11.6	9.0	2.5				
6	8.0	6.4	3.5	11.3	38	46	8.6	2.4				
7	10.3	21	3.5	3.8	22	88	8.0	2.4				
8	13.9	10.3	2.7	3.5	17.5	25	9.6	2.5				
9	38	7.0	4.5	3.5	16.5	15.4	11.6	2.1				
10	27	6.4	2.6	3.2	12.9	45	7.7	2.1				
11	16.5	10.0	2.5	3.1	14.4	31	9.9	2.1				
12	19.8	46	85	2.9	51	47	11.7	43				
13	37	12.0	24	2.8	48	57	14.7					
14	23	8.3	8.0	2.7	14.9	25	12.4					
15	27	7.4	6.1	4.1	19.1	93	8.6					
16	14.9	6.4	5.0	3.6	21	95	7.4		11	19	18	4.6
17	18.4	10.4	4.3	2.7	11.6	91	7.0					
18	12.0	67	5.9	3.2	9.9	138	6.4					
19	17.9	18.1	72	49	8.3	75	5.5					
20	18.9	10.3	49	33	7.7	41	5.2					
21	16.5	8.3	21	37	7.0	23	4.6	30				
22	79	7.4	12.9	20	6.7	16.0	4.5					
23	32	6.7	9.5	9.9	6.4	12.9	4.1					
24	16.0	5.8	8.0	8.3	5.3	11.6	3.8					
25	12.5	5.3	7.0	6.7	4.8	9.9	3.7					
26	11.2	5.0	6.4	5.5	4.8	9.0	3.6					
27	9.5	4.5	5.8	113	4.8	8.0	3.4					
28	9.5	4.3	5.3	63	7.7	7.4	3.1					
29	9.0	4.1	4.8	94	17.0	6.4	2.9					
30	7.4	4.1	4.3	53	11.2	6.7	2.8					
31	7.0	4.5		19.2		64	2.7					

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow of Alo Stream. These estimates are subject to error and should be used with caution. See under "Accuracy" in station description.

Monthly discharge of Nailiilihaele Stream near Huelo, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	79	5.8	17.7	27.4	548	1,680
August	67	4.1	11.4	17.6	354	1,090
September	85	2.5	12.7	19.6	380	1,170
October	113	2.7	18.8	29.1	582	1,790
November	121	4.8	18.6	28.8	559	1,710
December	138	6.4	39.7	61.4	1,230	3,780
January	41	2.7	8.82	13.6	273	839
February		2.1	20.0	30.9	579	1,780
March			11.0	17.0	341	1,050
April			19.0	29.4	570	1,750
May			18.0	27.9	558	1,710
June			4.6	7.12	138	424
The year			16.7	25.8	6,110	18,800

NOTE.—See footnote to table of daily discharge.

KAILUA STREAM AT HAIKU-UKA BOUNDARY, NEAR KAILIILI, MAUI

LOCATION.—At trail crossing 100 feet above Haiku-uka boundary and 1½ miles by horse trail southeast of Kailiili.

RECORDS AVAILABLE.—July 11, 1918, to June 30, 1924. Revised records for the year ending June 30, 1921, are published in Water-Supply Paper 575.

GAGE.—Stevens continuous water-stage recorder. Datum raised 3.58 feet on February 23, 1923.

DISCHARGE MEASUREMENTS.—Made by wading 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, 292 million gallons per day or 452 second-feet at 7.25 p. m. December 18 (gage height, 6.26 feet); minimum recorded during year, 0.04 million gallons per day or 0.06 second-foot, for several hours October 18 (gage height, 0.62 foot).

1918–1924: Maximum discharge recorded, about 500 million gallons per day or 770 second-feet, January 16, 1921 (gage height, 9.6 feet); minimum recorded, 0.002 million gallons per day or 0.003 second-foot at 1 a. m. and 1.50 p. m. December 22, 1919, and 2.20 p. m. July 13, 1920.

DIVERSIONS.—None.

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 well defined below 80 million gallons per day. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good.

The following discharge measurements were made:

August 30: Gage height, 0.66 foot; discharge, 0.4 second-foot or 0.25 million gallons per day.

October 17: Gage height, 0.62 foot; discharge, 0.1 second-foot or 0.06 million gallons per day.

Discharge, in million gallons per day, of Kailua Stream at Haiku-uka boundary, near Kailiili, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	0.15	0.2	0.1	0.15	5.7	0.1	4.3	0.1	3.5	0.35	3.0	0.1
2	.15	.2	.1	.1	3.5	.1	2.0	.1	6.6	.25	1.4	.1
3	.6	.15	.05	.15	1.6	1.6	5.8	.1	9.1	.25	1.2	.1
4	1.0	.45	.05	.15	.8	16.4	5.6	.1	7.2	.2	.8	.1
5	.25	.8	.05	.15	46	1.6	.6	.1	2.2	.2	.6	.1
6	.15	.25	.1	.25	15.8	6.9	.25	.1	1.2	.2	.6	.1
7	.2	.6	.1	.25	6.3	43	.2	.1	.6	7.7	.8	.1
8	.6	1.0	.05	.2	3.0	7.0	.15	.05	.45	20	.45	.1
9	9.8	.35	.05	.15	2.7	2.2	.15	.05	.25	14.4	.35	.1
10	2.5	.2	.05	.1	2.2	13.6	.15	.05	.25	16.0	.25	.1
11	1.6	.45	.05	.1	2.7	23	.2	.05	.35	3.9	.25	.1
12	1.6	5.7	28	.05	19.5	14.3	.35	21	.35	9.9	.25	.1
13	3.7	1.4	5.8	.05	25	20	1.9	118	.80	2.7	32	.15
14	2.0	.8	1.2	.05	4.0	17.9	3.2	100	1.00	13.3	59	.2
15	2.2	.45	.45	.45	2.0	47	.6	16.5	.60	22	7.2	.15

Discharge, in million gallons per day, of Kailua Stream at Haiku-uka boundary, near Kailiili, Maui, for the year ending June 30, 1924—Continued

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
16	1.2	0.45	0.25	0.1	1.8	61	0.25	5.1	0.35	2.0	1.8	2.1
17	1.6	.7	.15	.05	.8	32	.2	4.3	.25	5.4	1.2	2.2
18	.8	28	.2	.04	.45	59	.2	1.4	.25	4.3	.6	.35
19	2.5	3.7	42	16.4	.25	42	.2	.8	18.3	1.2	.6	.2
20	1.6	1.2	11.4	13.5	.2	18.4	.15	.6	3.2	.8	.35	.15
21	1.0	.6	4.3	1.8	.2	6.3	.1	.35	.8	.45	.25	.15
22	51	.45	2.0	5.4	.2	3.0	.1	.35	.45	4.9	.2	.1
23	12.1	.25	1.0	1.4	.2	2.0	.1	15.9	.25	2.5	.2	.1
24	2.2	.2	.6	.35	.15	1.2	.1	43	.45	1.5	1.4	.05
25	1.2	.2	.45	.25	.15	.8	.1	19.9	.6	.8	2.0	.1
26	.8	.15	.35	.2	.1	.6	.1	11.3	.35	8.2	.45	.1
27	.6	.15	.2	64	.1	.45	.1	7.2	.25	28	.35	.1
28	.6	.1	.2	39	.1	.25	.1	2.0	.45	9.4	.2	.05
29	.45	.1	.15	68	.1	.25	.1	1.8	.8	4.0	.15	.05
30	.35	.15	.15	28	.1	.2	.1	-------	.45	6.4	.15	.05
31	.25	.2	-------	6.9	-------	6.3	.1	-------	.45	-------	.1	-------

Monthly discharge of Kailua Stream at Haiku-uka boundary, near Kailiili, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	51	0.15	3.38	5.23	105	322
August	28	.1	1.60	2.48	49.6	152
September	42	.05	3.32	5.14	99.6	306
October	68	.04	7.99	12.4	248	760
November	46	.1	4.86	7.52	146	447
December	61	.1	14.5	22.4	448	1,380
January	5.8	.1	.889	1.38	27.6	85
February	118	.05	12.8	19.8	370	1,140
March	18.3	.25	2.00	3.09	62.1	190
April	28	.2	6.37	9.86	191	586
May	59	.1	3.81	5.89	118	362
June	2.2	.05	.252	.390	7.6	23
The year	118	.04	5.12	7.92	1,870	5,750

KAILUA STREAM NEAR HUELO, MAUI

LOCATION.—About 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, 1924.

GAGE.—Stevens continuous water-stage recorder installed March 7, 1918, replacing Barrett and Lawrence water-stage recorder installed October 8, 1913, at same location and datum as original staff gage.

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

CHANNEL AND CONTROL.—Channel at gage is a 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, 712 million gallons per day, or 1,100 second-feet, at 8 p. m. December 18 (gage height, 7.26 feet); minimum recorded during year, 1.7 million gallons per day, or 2.6 second-feet, for several hours June 29 and 30 (gage height, 1.20 feet).

1910–1924: Maximum discharge recorded, about 1,500 million gallons per day, or 2,300 second-feet, at about 2 a. m. February 1, 1922 (gage height estimated, 10.5 feet; float washed out of stilling well at gage height about 8.5 feet). Minimum recorded, 0.07 million gallons per day, or 0.11 second-foot, from 3 a. m. to 4 a. m. June 27, 1921 (gage height, 0.57 foot).

DIVERSIONS.—Nearly all low-water flow diverted by Old Hamakua ditch above station from February 5, 1918, to February 28, 1922.

REGULATION.—By diversions only.

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 sugar cane.

ACCURACY.—Stage-discharge relation changed during flood of October 29. Two rating curves used well defined between 1.5 and 350 million gallons per day. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good except those estimated.

Discharge measurements of Kailua Stream near Huelo, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Aug. 21	1.46	8.7	5.6	Mar. 5	1.75	25.5	16.5
Oct. 9	1.24	3.8	2.4	Apr. 22	1.43	8.2	5.3
Nov. 17	1.52	12.3	8.0	June 7	1.26	3.4	2.2
Jan. 16	1.42	8.0	5.2				

Discharge, in million gallons per day, of Kailua Stream near Huelo, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1			3.4	2.8	14.5	3.2	29	2.7	26	4.0	20	2.6
2			3.0	2.7	10.7	4.5	17.4	2.6	42	3.5	14.5	2.5
3			3.0	2.7	7.4	28	13.3	2.5	42	4.0	10.4	2.5
4			2.9	2.7	6.9	56	18.0	2.5	31	3.5	8.4	2.5
5	5.5	5.0	2.8	2.7	143	11.1	8.7	2.4	17.0	3.2	7.4	2.5
6			2.8	4.2	40	31	7.1	2.4	12.2	3.7	6.9	2.3
7			2.9	2.9	18.6	126	6.4	2.3	9.4	16.6	6.6	2.2
8			2.8	2.8	13.4	24	6.1	2.6	9.0	46	5.8	2.0
9		4.2	3.0	2.6	12.2	12.6	6.6	2.3	7.1	31	4.8	2.1
10		3.8	2.4	2.5	10.4	42	5.1	2.3	6.1	34	4.6	2.0
11		4.5	2.4	2.4	11.1	60	6.9	2.2	6.6	15.7	4.6	1.9
12		31	81	2.4	56	42	7.4	55	5.8	25	4.2	1.9
13		7.9	24	2.2	72	54	10.4	397	6.6	15.3	98	2.5
14		5.6	5.6	2.2	15.3	209	12.6	315	7.4	26	220	2.9
15		5.0	4.0	2.4	12.6	130	7.1	84	5.1	58	30	2.3
16	19	4.1	3.5	2.6	14.5	154	5.8	23	4.6	14.5	23	8.5
17		5.0	3.0	2.2	8.4	105	5.3	20	4.2	10.7	13.7	12.5
18		76	3.0	2.2	7.4	166	4.8	11.5	4.5	14.5	8.4	3.5
19		12.3	124	29	6.4	107	4.8	9.0	49	8.4	6.5	2.4
20		6.8	45	28	5.1	48	4.3	7.1	13.4	7.1	5.7	2.1
21		5.3	12.9	14.9	5.1	22	4.2	6.1	7.4	5.8	4.8	2.1
22		4.7	7.7	10.2	5.1	14.9	3.8	5.1	5.6	7.4	4.0	2.0
23		4.4	5.5	6.4	4.8	11.8	3.7	26	4.8	10.4	3.8	1.9
24		4.2	4.5	4.2	4.0	10.4	3.5	72	5.1	10.0	3.8	1.9
25		4.0	4.0	3.8	3.8	9.7	3.2	43	5.3	7.1	10.4	2.1
26		3.8	3.8	3.2	3.7	8.4	3.4	30	4.3	34	4.8	2.0
27		3.6	3.6	179	3.4	7.4	3.0	42	3.8	105	3.8	1.9
28	5.5	3.5	3.5	98	3.4	6.9	3.0	15.3	7.4	30	3.4	1.9
29		3.2	3.1	174	3.4	6.4	2.9	14.1	8.1	19.9	3.0	1.7
30		3.1	2.9	76	3.2	6.1	2.9	-------	4.6	30	3.0	1.7
31		3.6	-------	19.0	-------	45	2.8	-------	4.2	-------	2.6	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow of this stream at Haiku-uka boundary.

Monthly discharge of Kailua Stream near Huelo, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July			12.9	20.0	400	1,230
August	76		8.05	12.5	250	766
September	124	2.4	12.5	19.3	376	1,150
October	179	2.2	22.4	34.7	693	2,130
November	143	3.2	17.5	27.1	526	1,610
December	209	3.2	50.4	78.0	1,560	4,790
January	29	2.8	7.21	11.2	224	686
February	397	2.2	41.4	64.1	1,200	3,680
March	49	3.8	11.9	18.4	370	1,130
April	105	3.2	20.1	31.1	604	1,850
May	220	2.6	17.8	27.5	551	1,690
June	12.5	1.7	2.76	4.27	82.9	254
The year	397	1.7	18.7	28.9	6,840	21,000

HOOLAWALIILII 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, 1924.

GAGE.—Stevens continuous water-stage recorder installed June 19, 1914, at same location and datum as original staff gage. Datum lowered 0.52 foot May 14, 1922.

DISCHARGE MEASUREMENTS.—Made by wading 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, 145 million gallons per day or 224 second-feet at 11.45 a. m. February 13 (gage height, 3.11 feet); minimum recorded during year, 1.0 million gallons per day or 1.6 second-feet, sometime between October 12 and November 23 when recorder clock was stopped but pencil recorded range of stage (gage height, 0.61 foot).

1911–1924: Maximum discharge recorded, about 485 million gallons per day or 750 second-feet at 11 a. m. November 21, 1921 (gage height, 4.82 feet); minimum recorded, 0.5 million gallons per day or 0.8 second-foot at 9 p. m. December 11, 1919 (gage height, 0.02 foot).

DIVERSIONS.—None.

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 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 per day; extended above that point on basis of form of previous curve and subject to error. Operation of water-stage recorder satisfactory except during period August to November. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good except those for high stages and those estimated.

The following discharge measurements were made:

April 22: Gage height 0.77 foot; discharge, 4.2 second-feet or 2.7 million gallons per day.

June 7: Gage height, 0.69 foot; discharge, 2.6 second-feet or 1.65 million gallons per day.

Discharge, in million gallons per day, of Hoolawaliilii Stream near Huelo, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	1.6	1.9				2.1	8.5	1.7	4.7	2.1	6.1	2.1
2	1.6	1.8				2.2	5.3	1.7	7.5	1.9	5.8	2.1
3	1.5	1.8				7.0	4.2	1.6	8.3	1.9	4.5	2.1
4	1.6	2.1				7.5	3.8	1.6	7.2	1.9	4.0	2.1
5	1.5	2.2				3.4	3.2	1.6	5.5	1.9	3.6	1.9
6	1.5	1.8	1.5		7.0	5.9	3.4	1.6	4.7	2.4	3.4	1.8
7	1.4	2.6				14.2	3.1	1.6	4.0	3.2	3.2	1.7
8	1.5	2.2				6.9	2.9	1.5	3.6	6.9	2.9	1.7
9	2.5	1.8				5.1	3.2	1.5	3.2	6.3	2.8	1.7
10	2.5	1.7		1.5		7.0	2.8	1.5	3.1	6.1	2.8	1.7
11	1.9	1.7				7.1	2.6	1.5	2.9	4.5	2.6	1.7
12	2.1	3.6				9.0	2.6	2.6	2.8	7.5	2.5	1.7
13	4.2	2.5				11.7	2.6	57	2.6	4.9	23	1.9
14	2.6	2.1				7.5	2.6	34	2.6	5.3	41	1.7
15	2.8	2.1				18.8	2.4	22	2.5	7.0	10.4	1.7
16	2.4	1.9				20	2.2	8.6	2.4	4.7	15.9	2.1
17	2.5	2.5	3.7			22	2.1	6.1	2.4	4.0	8.6	2.5
18	2.2	7.3			4.8	37	2.2	4.7	2.4	3.8	5.8	1.8
19	2.2	3.4				24	2.1	4.0	5.3	3.4	4.7	1.7
20	2.2	2.8				13.3	2.1	3.4	2.9	3.1	3.8	1.7
21	2.4	2.6				8.0	1.9	3.1	2.5	3.1	3.4	1.7
22	5.8			2.2		6.1	1.9	2.9	2.5	2.8	3.1	1.7
23	5.2					4.9	1.9	3.4	2.4	2.6	2.9	1.7
24	3.1				2.5	4.2	1.8	3.2	2.5	2.6	2.9	1.6
25	2.8				2.4	3.6	1.8	3.8	2.4	2.5	2.8	1.6
26	2.5	2.0			2.4	3.1	1.8	3.8	2.2	3.6	2.5	1.6
27	2.4		2.0		2.2	2.8	1.8	5.6	2.2	13.1	2.5	1.5
28	2.4				2.4	2.6	1.8	3.4	2.6	5.6	2.4	1.5
29	2.2			1.0	2.2	2.5	1.8	3.2	2.5	4.5	2.4	1.5
30	2.1				2.1	2.5	1.8	-------	2.2	10.0	2.2	1.5
31	2.1		-------		-------	10.3	1.8	-------	2.2	-------	2.1	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow of Hoolawanui and Honopou Streams.

Monthly discharge of Hoolawaliilii Stream near Huelo, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	5.8	1.4	2.43	3.76	75.3	231
August	7.3	----------	2.34	3.62	72.4	222
September	----------	----------	2.50	3.87	74.9	230
October	----------	----------	3.05	4.72	94.6	290
November	----------	2.1	5.03	7.78	151	463
December	37	2.1	9.11	14.1	282	866
January	8.5	1.8	2.71	4.19	84.0	258
February	57	1.5	6.63	10.3	192	590
March	8.3	2.2	3.45	5.34	107	328
April	13.1	1.9	4.44	6.87	133	409
May	41	2.1	6.02	9.31	187	573
June	2.5	1.5	1.78	2.75	53.3	164
The year	57	----------	4.12	6.37	1,510	4,620

HOOLAWANUI STREAM NEAR HUELO, MAUI

LOCATION.—200 feet above intake of Wailoa ditch and 5 miles by trail west of Huelo at elevation 1,240 feet.

RECORDS AVAILABLE.—December 12, 1910, to June 30, 1924.

GAGE.—Stevens continuous water-stage recorder installed June 20, 1914, 200 feet upstream from original staff which it replaced.

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

CHANNEL AND CONTROL.—Stream drops over a low waterfall into a large circular pool with gently sloping banks. Control at outlet of pool composed of boulders; shifts during severe floods.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 202 million gallons per day or 313 second-feet at 10.30 a. m. February 13 (gage height, about 4.6 feet); minimum recorded during year, 0.8 million gallons per day or 1.2 second-feet at 2 a. m. June 30 (gage height, 0.13 foot).

1910–1924: Maximum discharge recorded, about 550 million gallons per day or 851 second-feet at 3 a. m. February 1, 1922 (gage height, 8.40 feet); minimum recorded, 0.15 million gallons per day or 0.2 second-foot, at 7 p. m. October 25, 1917 (gage height, −0.19 foot).

DIVERSIONS.—None.

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 by ditches of East Maui Irrigation Co. for irrigation of sugar cane.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined below 100 million gallons per day. Operation of water-stage recorder satisfactory except for one short period. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by integrating gage-height graph with the discharge integrator. Records good.

Discharge measurements of Hoolawanui Stream near Huelo, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Oct. 11	0.26	2.1	1.3	Apr. 21	0.59	6.8	4.4
Jan. 17	.50	5.2	3.4	June 10	.25	1.85	1.2
Mar. 3	1.36	28	18.2				

Discharge, in million gallons per day, of Hoolawanui Stream near Huelo, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	1.9	2.9	1.8		9.9	2.2	14.6	1.4	10.5	2.2	9.3	2.6
2	1.8	2.7	1.8		7.5	2.7	9.5	1.2	16.4	2.0	8.9	2.6
3	1.8	2.7	1.6		6.2	9.1	8.0	1.2	16.4	2.1	6.9	2.1
4	2.1	3.6	1.5		5.6	14.3	7.2	1.2	14.8	1.9	6.1	2.0
5	1.8	4.0	1.4		46	5.4	6.1	1.2	11.2	1.8	5.4	1.8
6	1.8	2.5	1.5	1.9	17.7	11.5	5.4	1.2	8.8	2.9	5.3	1.8
7	2.0	5.0	1.4		13.2	25	4.9	1.2	7.4	6.2	4.9	1.6
8	2.3	4.1	1.2		10.0	11.3	4.9	1.2	7.2	13.2	4.1	1.5
9	6.5	2.8	1.4		8.5	8.3	5.0	1.0	5.9	10.3	3.8	1.4
10	5.3	2.6	1.2		7.2	16.6	4.1	1.0	5.3	10.8	3.5	1.4
11	3.9	2.9	1.2		6.8	15.5	4.3	1.0	5.1	7.1	3.3	1.2
12	3.7	8.8	13.7	1.3	15.8	16.0	4.1	8.7	4.5	12.0	3.1	1.2
13	7.4	4.8	6.4	1.2	22	19.5	4.7	112	4.4	7.4	31	1.6
14	5.3	3.2	2.7	1.2	10.0	13.4	4.7	86	4.2	8.1	74	1.2
15	6.6	2.9	2.1	1.5	9.3	37	3.6	46	3.6	13.9	21	1.2

Discharge, in million gallons per day, of Hoolawanui Stream near Huelo, Maui, for the year ending June 30, 1924—Continued

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
16	4.4	2.6	1.9	1.2	9.5	43	3.3	17.8	3.4	7.7	22	2.3
17	4.8	3.3	1.8	1.1	6.9	45	3.2	13.2	3.1	6.5	14.3	3.4
18	4.0	13.1	1.8	1.2	6.3	57	3.1	9.2	3.0	6.3	10.0	1.4
19	4.4	6.4	33	4.8	5.4	48	2.8	7.7	12.1	5.5	8.0	1.2
20	4.7	4.3	15.3	6.3	4.9	29	2.6	6.3	5.1	4.8	6.6	1.2
21	4.7	3.6	6.5	7.0	4.5	16.5	2.4	5.5	3.9	4.3	5.9	1.0
22	20	3.4	5.4	4.2	4.2	12.1	2.2	4.9	3.3	4.3	5.4	1.0
23	13.4	3.4	4.4	3.1	4.1	9.9	2.1	6.7	3.1	4.0	4.8	1.0
24	8.0	3.1	3.9	2.5	3.8	8.2	2.0	7.7	3.6	4.1	4.7	.9
25	6.2	3.0	3.6	2.2	3.4	7.1	1.9	9.1	3.1	3.6	4.7	1.1
26	5.3	2.6	3.3	2.0	3.2	6.2	1.8	9.6	2.7	9.1	4.0	.9
27	4.7	2.5		40	3.1	5.5	1.8	15.6	2.5	33	3.5	.9
28	4.5	2.3	2.7	23	3.2	4.9	1.6	8.5	3.9	11.6	3.3	.8
29	4.2	2.1		37	2.7	4.5	1.5	7.7	3.5	9.0	3.1	.8
30	3.5	2.1		28	2.5	4.3	1.4	-------	2.6	13.7	2.9	.8
31	3.2	2.1	-------	13.2	-------	21	1.4	-------	2.4	-------	2.7	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow of Hoolawalilii and Honopou Streams.

Monthly discharge of Hoolawanui Stream near Huelo, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	20	1.8	4.97	7.69	154	473
August	13.1	2.1	3.72	5.76	115	354
September	33	1.2	4.42	6.84	133	407
October	40	1.1	6.55	10.1	203	623
November	46	2.5	8.78	13.6	263	808
December	57	2.2	17.1	26.5	530	1,630
January	14.6	1.4	4.07	6.30	126	387
February	112	1.0	13.6	21.0	395	1,210
March	16.4	2.4	6.03	9.33	187	574
April	33	1.8	7.65	11.8	229	704
May	74	2.7	9.56	14.8	296	910
June	3.4	.8	1.46	2.26	43.9	135
The year	112	.8	7.31	11.3	2,670	8,220

HONOPOU STREAM NEAR HUELO, MAUI

LOCATION.—200 feet above New Hamakua ditch crossing and 6 miles west of Huelo, at elevation 1,250 feet.

RECORDS AVAILABLE.—December 12, 1910, to June 30, 1924.

GAGE.—Stevens continuous water-stage recorder installed June 19, 1914, at same site as original staff gage.

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

CHANNEL AND CONTROL.—One channel at all stages; straight for 50 feet above and below gage. Right bank is overflowed during floods; left bank steep and high. Control an old iron weir set in concrete; permanent.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 185 million gallons per day or 286 second-feet at 10 p. m. February 13 (gage height, 3.34 feet); minimum recorded during year, 0.4 million gallons per day or 0.6 second-foot, for several hours June 28–30 (gage height, 0.15 foot).

1910–1924: Maximum discharge recorded, 658 million gallons per day or 1,020 second-feet at 3.25 a. m. February 1, 1922 (gage height, 5.50 feet); minimum recorded, 0.15 million gallons per day or 0.23 second-foot, from 2 to 8 p. m. July 14, 1920 (gage height, 0.05 foot).

DIVERSIONS.—None.

REGULATION.—None.

OBJECT OF STATION.—To furnish data for appraisal of water value under Territorial lease to ditch company.

UTILIZATION.—Ordinary flow is diverted by ditches of East Maui Irrigation Co. for irrigation of sugar cane.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined below 25 million gallons per day; fairly well defined above that point. Operation of water-stage recorder unsatisfactory during period July to October. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records good except those estimated.

Discharge measurements of Honopou Stream near Huelo, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day
Oct. 11	0.20	1.35	0.9
Mar. 3	.68	9.4	6.1
Apr. 21	.36	2.8	1.8

Discharge, in million gallons per day, of Honopou Stream near Huelo, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	1.0				3.7	1.2	7.6	0.8	4.0	0.9	3.2	1.2
2	1.0				3.1	1.3	4.5	.8	5.9	.9	3.4	1.1
3	.9				2.5	5.1	3.8	.7	6.0	.9	2.4	1.0
4	.9				2.4	5.6	3.2	.7	5.0	.8	2.2	.9
5	.9				26	2.1	2.9	.6	4.1	.7	2.0	.9
6			0.6	0.8	7.5	4.2	2.5	.6	3.5	2.2	2.0	.8
7					5.4	10.1	2.3	.6	3.1	2.4	1.9	.7
8					4.2	4.8	2.3	.6	3.0	6.0	1.6	.7
9	1.3	1.3			3.6	3.5	2.4	.6	2.5	4.8	1.5	.7
10					3.2	5.1	2.0	.5	2.4	4.1	1.5	.6
11				.6	2.9	5.3	1.9	.5	2.2	3.3	1.3	.6
12				.6	6.2	7.7	1.9	3.1	1.9	5.5	1.2	.6
13				.6	6.3	9.3	1.9	70	1.9	3.1	20	.9
14				.6	3.7	6.0	1.8	33	1.8	4.1	36	.6
15				.7	5.1	18.3	1.6	24	1.5	4.2	9.5	.6
16				.6	5.8	21	1.5	9.6	1.5	2.8	16.9	.9
17	2.4		2.8	.6	3.2	22	1.4	6.6	1.4	2.5	8.4	1.3
18				.6	2.9	36	1.2	4.7	1.4	2.3	5.4	.6
19				1.6	2.6	24	1.2	4.0	3.4	2.1	4.1	.6
20		2.3		2.4	2.3	16.6	1.1	3.2	1.6	1.9	3.5	.5
21				3.1	2.1	10.2	1.0	2.8	1.4	1.8	2.9	.5
22				1.5	2.0	7.3	1.0	2.5	1.2	1.7	2.5	.5
23		1.3		1.0	1.9	5.7	1.0	2.9	1.2	1.5	2.2	.5
24		1.2		.9	1.7	4.5	1.0	2.5	1.4	1.5	2.2	.5
25		1.1		.8	1.6	3.8	1.0	2.6	1.2	1.4	1.9	.5
26	1.7	1.0	1.4	.8	1.5	3.3	.9	2.5	1.1	1.9	1.8	.5
27		1.0		14.4	1.5	2.9	.9	3.8	1.0	10.2	1.6	.5
28		.9		6.7	1.4	2.5	.9	2.8	1.5	3.3	1.5	.4
29		.9		6.8	1.3	2.3	.8	2.6	1.4	2.5	1.3	.4
30		.8		7.8	1.2	2.1	.8	-------	1.1	6.2	1.2	.4
31		.8	-------	4.7	-------	11.0	.8	-------	1.0	-------	1.2	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow of Hoolawaliiii and Hoolawanui Streams.

Monthly discharge of Honopou Stream near Huelo, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July			1.74	2.69	53.8	165
August		0.8	1.41	2.18	43.6	134
September			1.67	2.58	50.0	153
October	14.4	.6	2.11	3.26	65.4	201
November	26	1.2	3.96	6.13	119	365
December	36	1.2	8.54	13.2	265	813
January	7.6	.8	1.91	2.96	59.1	181
February	70	.5	6.56	10.1	190	584
March	6.0	1.0	2.31	3.57	71.6	220
April	10.2	.7	2.92	4.52	87.5	268
May	36	1.2	4.78	7.40	148	455
June	1.3	.4	.68	1.05	20.5	63
The year	70	.4	3.21	4.97	1,170	3,600

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, 1924.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from plank across ditch at mouth of adit tunnel through which recorder operates or in concrete viaduct at Halehaku Gulch 1 mile below gage.

CHANNEL AND CONTROL.—Concrete-lined ditch in tunnel.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 168 million gallons per day or 260 second-feet at 7.15 a. m. March 19 and at 9.15 a. m. April 8 (gage height, 5.63 feet); minimum recorded during year, 36 million gallons per day or 56 second-feet at 2.30 a. m. June 30 (gage height, 1.97 feet).

1922–1924: Maximum discharge recorded on March 19 and April 8, 1924; minimum recorded, ditch dry, January 23–28, 1923.

DIVERSIONS.—This ditch as a continuation of Koolau ditch diverts the ordinary flow of all streams on windward Haleakala between Hanawi Stream and Halehaku Gulch.

REGULATION.—Flow regulated by 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 sugar cane, development of power, and for domestic use.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined. Operation of water-stage recorder satisfactory except during periods noted in footnote to daily-discharge table. Daily discharge ascertained by integrating the gage-height graph with the discharge integrator. Records excellent for the periods during which recorder operated properly; estimated records fair except those for February which are poor owing to uncertainty as regards regulation during that period.

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 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 145 million gallons per 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 sugar cane, for power, and for domestic purposes on the plantations of Hawaiian Commercial & Sugar Co. and Maui Agricultural Co. The Koolau-Wailoa system is the most important of the East Maui Irrigation Co's ditch lines and is the largest ditch system in the Hawaiian Islands.

The following discharge measurements were made:

October 10: Gage height, 2.49 feet; discharge, 79 second-feet or 51 million gallons per day.

May 31: Gage height, 3.19 feet; discharge, 110 second-feet or 71 million gallons per day.

Discharge, in million gallons per day, of Wailoa ditch at Honopou, near Huelo, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	85	93	58	59	148	66	95	61		64	154	70
2	78	81	53	56	142	80	101	59		59	150	68
3	89	83	53		130	121	103	58		74	139	67
4	115	109	49		125	127	103	57	150	77	129	63
5	92	121	48		154	125	97	56		66	126	61
6	96	89	62	70	148	141	89	55		67	120	56
7	114	103	60		143	149	84	54	136	116	118	53
8	128	116	46		146	147	70	53	133	152	108	51
9	148	89	65		144	127	75	51	119	147	98	50
10	145	86	46		143	124	71	49	109	155	95	46
11	143	113	44	47	144	136	71	48	118	118	94	48
12	137	142	135	46	150	138	72	47	106	148	87	46
13	145	130	140	44	157	146	77		114	122	126	88
14	144	110	111	43	148	147	79		116	141	162	76
15	148	96	85	65	147	148	82		93	155	160	59
16	137		73	54	148	150	83		87	126	156	94
17	141		64	44	139	151	82		85	105	152	111
18	126		69	46	130	152	83		88	119	140	67
19	140	110	153	143	121	156	83		152	102	128	55
20	141		147	148	114	157	83		132	87	116	49
21	136		141	150		150	83	95	105	80	108	46
22	154		136	142	110	134	82		91	112	101	46
23	153	87	109	123		125	80		82	118	97	43
24	146	81	97	99	95	116	78		91	112	100	42
25	135	76	90	91	86	109	75		83	99	140	59
26	124	72	83	79	85	100	73		76	140	115	46
27	114	67	78	126	83	95	70		68	162	94	43
28	115	64	76	153	90	88	69		91	156	82	41
29	109	62	68	155	77	84	66		106	148	78	38
30	100	61	64	155	70	81	65	-------	80	161	74	38
31	100	72	-------	153	-------	87	63	-------	69	-------	71	-------

NOTE.—Braced figures show mean discharge for periods indicated; estimated, because of lack of gage-height record, by comparison with flow at three stations on Koolau ditch. Gage-height graph partly estimated January 4 and 5.

Monthly discharge of Wailoa ditch at Honopou, near Huelo, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	154	78	125	193	3,880	11,900
August	-------	61	95.9	148	2,970	9,120
September	153	44	83.4	129	2,500	7,680
October	155	43	89.7	139	2,780	8,530
November	157	70	125	193	3,740	11,500
December	157	66	124	192	3,860	11,800
January	103	63	80.2	124	2,490	7,630
February	-------	-------	78.0	121	2,260	6,940
March	-------	68	111	172	3,430	10,500
April	162	59	116	179	3,490	10,700
May	162	71	117	181	3,620	11,100
June	111	38	57.3	88.7	1,720	5,280
The year	162	38	100	155	36,700	113,000

NEW HAMAKUA DITCH AT HONOPOU, NEAR HUELO, MAUI

LOCATION.—600 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, 1924. January 25, 1918, to May 13, 1921, from station 300 feet upstream. Records comparable.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from lehua logs across ditch just above 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 recorded during year, 113 million gallons per day or 175 second-feet at 7.30 p. m. May 16 (gage height, 5.26 feet); minimum recorded, 0.07 million gallons per day or 1.1 second-feet from 6 to 10 a. m. August 7 (gage height, −0.23 foot).

1918–1924: Maximum recorded, 124 million gallons per day or 192 second-feet at 2.40 a. m. February 1, 1922 (gage height, 6.15 feet); minimum recorded on August 7, 1923.

DIVERSIONS.—Ditch receives small amount of seepage and, during floods, the waste water from Wailoa ditch intakes.

REGULATION.—Flow regulated by gates.

OBJECT OF STATION.—To determine amount of water diverted from Territorial lands above to fee-simple lands below.

UTILIZATION.—Water used for irrigation of sugar cane.

ACCURACY.—Stage-discharge relation changed September 18. Two rating curves used well defined. Operation of water-stage recorder hindered at times by mud-dauber wasps' nests built on float mechanism. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection or, for days of considerable fluctuation in stage, by averaging discharge for intervals of the day. Records fair.

New Hamakua ditch, at elevation about 500 feet, diverts from all streams on the windward side of Haleakala, below Wailoa ditch, between Waikamoi and Halehaku Streams inclusive. The water is carried to a point near Paia where it is distributed for the irrigation of sugar cane. The system comprises about 14 miles of main ditch and has a carrying capacity of 75 million gallons per day. Upon completion of Wailoa ditch New Hamakua ditch was abandoned west of Halehaku and became a storm-water ditch east of Halehaku.

Discharge measurements of New Hamakua ditch at Honopou, near Huelo, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Oct. 11	−0.05	0.95	0.6	Mar. 6	1.84	36	23.1
Jan. 17	.08	1.85	1.2	Apr. 21	.46	6.1	3.9
Mar. 3	3.80	105	68	June 10	−.05	.75	.5

Discharge, in million gallons per day, of New Hamakua ditch at Honopou, near Huelo, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	0.4	0.1	0.4	0.8	25	1.0	29	0.7	48	3.2	47	1.1
2	.4	.1	.3	.8	16.1	1.9	16.8	.7	70	3.0	38	1.2
3	.4	.1	.3	.8	10.2	49	9.8	.7	73	3.2	16.1	1.1
4	4.5	3.7	.3	.8	4.9	38	12.3	.7	64	2.3	9.6	1.0
5	.3	10.4	.3	.9	83	9.2	5.9	.6	37	.8	3.6	.9
6	.9	.1	.3	15.7	47	17.8	5.5	.6	23	1.8	2.2	.8
7	.7	5.7	.9	.8	28	20	2.9	.6	16.1	12.2	2.1	.7
8	9.5	8.1	.6	.6	24	15.0	1.7	.6	15.3	53	1.8	.7
9	40	.4	.3	.6	24	6.8	3.5	.6	8.1	44	1.5	.6
10	33	.3	.2	.6	17.0	18.0	1.7	.6	5.5	40	1.5	.6
11	14.0	3.2	.2	.6	15.7	28	1.6	.6	5.5	14.5	1.4	.5
12	15.5	35	49	.6	35	31	5.7	9.7	4.8	42	1.2	.5
13	41	9.4	38	.6	60	40	12.5	102	5.4	16.5	46	4.5
14	20	1.6	4.9	.6	25	28	19.7	93	9.0	27	99	3.0
15	30	.4	.5	.6	21	39	9.2	64	4.0	44	60	.6
16	8.7	.3	.4	.7	41	52	1.3	24	3.9	7.6	46	9.0
17	17.2	.6	.4	.7	13.8	54	1.2	18.1	3.6	5.4	57	21
18	5.4	61	.3	.7	10.8	61	1.2	9.1	3.5	7.0	28	1.7
19	16.3	25	68	28	4.5	48	1.1	7.6	44	4.8	16.1	1.2
20	13.3	8.6	51	42	2.4	35	1.0	6.9	12.9	4.2	12.2	1.0
21	9.8	4.2	26	57	2.3	12.2	1.0	5.9	4.2	3.8	8.1	.8
22	56	4.6	13.3	31	2.0	8.1	1.0	5.3	3.9	9.1	7.6	.4
23	44	2.9	8.1	10.4	1.8	5.9	.9	24	3.6	3.6	6.8	.3
24	16.2	.8	2.8	1.4	1.7	4.6	.9	35	4.0	1.7	7.3	.3
25	7.7	1.4	1.4	1.2	1.5	3.8	.8	48	3.7	1.5	21	.3
26	4.9	.6	1.2	1.1	1.5	3.0	.8	42	3.6	44	8.3	.3
27	.8	1.0	1.2	46	1.4	2.3	.8	60	3.4	81	5.3	.3
28	1.1	.6	1.2	60	1.4	2.1	.8	23	6.5	57	4.8	.2
29	.2	.6	1.0	81	1.2	1.8	.8	18.8	10.2	34	3.6	.2
30	.1	.5	1.0	67	1.1	2.5	.8	-------	3.7	75	1.2	.2
31	.1	.4	-------	25	-------	32	.7	-------	3.4	-------	1.1	-------

Monthly discharge of New Hamakua ditch at Honopou, near Huelo, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	56	0.1	13.3	20.6	412	1,270
August	61	.1	6.18	9.56	192	588
September	68	.2	9.13	14.1	274	840
October	81	.6	15.4	23.8	479	1,470
November	83	1.1	17.5	27.1	524	1,610
December	61	1.0	21.6	33.4	671	2,060
January	29	.7	4.93	7.63	153	469
February	102	.6	20.8	32.2	603	1,850
March	73	3.4	16.3	25.2	507	1,560
April	81	.8	21.6	33.4	647	1,990
May	99	1.1	18.2	28.2	565	1,740
June	21	.2	1.83	2.83	55.0	169
The year	102	.1	13.9	21.5	5,080	15,600

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, 1924.

GAGE.—Friez water-stage recorder.

DISCHARGE MEASURMENTS.—By 25-foot sharp-crested weir, and by current meter from plank across ditch 100 feet below gage.

CHANNEL AND CONTROL.—Large pool at weir.

EXTREMES OF DISCHARGE.—See monthly-discharge table.
DIVERSIONS.—None.
REGULATION.—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 sugar cane.
ACCURACY.—Records good.
COOPERATION.—Daily-discharge record copied from records of East Maui Irrigation Co.

Kauhikoa ditch at elevation about 900 feet diverts from all streams on the windward side of the crater of Haleakala between Halehaku and Maliko Streams inclusive, above Lowrie and Haiku ditches. The water is carried to the vicinity of 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 per day. Kauhikoa ditch replaced Old Hamakua ditch west of Halehaku.

Discharge measurements of Kauhikoa ditch at Opana Weir, near Huelo, Maui, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day
Oct. 20	0.70	51	33
Oct. 23	.37	19.7	12.7
Do	.37	18.0	11.6

Daily discharge, in million gallons per day, of Kauhikoa ditch at Opana Weir, near Huelo, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	1.8	2.0	1.2	1.7	31	10.1	59	14.0	37	4 0	52	2.9
2	1.8	1.8	1.2	1.6	23	19.6	58	12.5	36	4.0	40	3.0
3	1.7	1.9	1.2	1.5	15.2	75	60	13.2	36	4.4	22	2.6
4	6.6	5.6	1.3	1.6	8.4	80	63	11.3	36	3.6	13.4	2.6
5	2.0	16.1	1.4	1.8	84	34	38	8.6	37	2.2	6.7	2.4
6	1.8	2.0	1.4	18.1	59	22	24	7.6	36	8.8	6.5	2.2
7	2.9	11.1	2.3	2.2	34	39	9.7	7.2	26	31	6.4	2.1
8	11.2	10.1	1.6	1.4	34	33	7.2	7.6	19.9	61	5.2	1.7
9	37	1.4	1.5	1.4	32	32	43	6.9	10.8	59	4.8	1.6
10	32	1.6	1.3	1.2	24	33	9.8	7.3	8.7	35	4.5	1.6
11	15.9	4.4	1.1	1.2	30	39	36	6.8	8.5	37	4.4	1.6
12	14.8	29	46	1.2	65	37	49	37	7.4	36	4.0	1.4
13	51	10.6	42	1.4	84	35	33	100	9.6	36	57	5.6
14	28	3.2	6.7	1.3	68	34	26	54	10.6	37	93	2.7
15	25	1.6	1.4	1.4	39	37	11.7	49	5.8	35	60	1.3
16	14.4	1.8	1.2	1.5	50	33	4.6	34	5.6	31	57	17.4
17	23	1.8	1.0	1.1	21	29	4.6	24	5.0	28	56	10.5
18	9.9	64	1.3	1.1	17.0	33	4.2	15.4	7.4	30	34	1.9
19	22	31	68	26	9.2	35	8.5	13.2	47	19.6	25	1.6
20	18.6	11.6	54	45	5.5	31	15.3	11.8	15.7	9.3	17.7	1.8
21	15.2	6.2	30	58	5.1	28	9.6	10.4	4.6	7.6	13.2	1.4
22	61	7.4	17.5	31	4.8	26	2.6	9.6	4.6	13.7	11.9	1.0
23	58	4.5	10.5	13.8	4.6	26	2.6	34	5.1	8.4	10.2	1.0
24	25	2.1	4.0	2.6	4.1	25	2.4	57	6.4	6.6	13.2	1.0
25	12.8	1.9	2.1	2.2	3.9	25	2.3	71	5.4	5.6	22	1.2
26	9.1	2.9	1.9	1.8	3.4	24	2.2	79	4.7	35	11.0	1.1
27	3.9	2.3	1.8	37	3.4	24	2.2	38	4.2	36	7.5	1.0
28	3.2	2.1	1.8	64	3.8	24	6.0	24	12.0	36	6.8	.9
29	2.7	1.4	1.8	89	12.6	15.1	13.5	25	10.8	37	5.4	.8
30	2.1	1.2	1.8	27	10.2	9.0	12.8	-------	4.7	46	3.2	.8
31	2.0	1.2	-------	32	-------	30	12.1	-------	4.4	-------	3.1	-------

Monthly discharge of Kauhikoa ditch at Opana Weir, near Huelo, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	61	1.7	16.7	25.8	516	1,590
August	64	1.2	7.93	12.3	246	754
September	68	1.0	10.3	15.9	310	952
October	89	1.1	15.2	23.5	472	1,450
November	84	3.4	26.3	40.7	789	2,420
December	80	9.0	31.5	48.7	977	3,000
January	63	2.2	20.4	31.6	633	1,940
February	100	6.8	27.2	42.1	789	2,420
March	47	4.2	15.3	23.7	473	1,450
April	61	2.2	24.8	38.4	744	2,280
May	93	3.1	21.8	33.7	677	2,080
June	17.4	.8	2.62	4.05	78.7	241
The year	100	.8	18.3	28.3	6,700	20,600

LOWRIE DITCH AT OPANA WEIR, NEAR HUELO, MAUI

LOCATION.—A short distance west of Halehaku Gulch and 8 miles by road northwest of Huelo post office.

RECORDS AVAILABLE.—January 1, 1910, to June 30, 1924.

GAGE.—Friez water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by sharp-crested weir 16⅛ feet long, with bottom and end contractions, and by current meter from plank across ditch 100 feet below gage.

CHANNEL AND CONTROL.—Large pool back of weir.

EXTREMES OF DISCHARGE.—See monthly-discharge table.

DIVERSIONS.—None.

REGULATION.—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 sugar cane.

ACCURACY.—Records good.

COOPERATION.—Daily-discharge record copied from records of East Maui Irrigation Co.

Lowrie ditch at elevation about 500 feet, a continuation of Manuel Luis and Center ditches, diverts from streams on the windward side of the crater of Haleakala between Kailua and Halehaku Streams, inclusive, below Wailoa and New Hamakua ditches, and above Haiku ditch. At Kailua Stream it receives the combined flow of Manuel Luis and Center ditches. The water is carried to the vicinity of Paia and distributed for the irrigation of sugar cane. The ditch comprises about 15 miles of main channel and has a carrying capacity of 65 million gallons per day. With the completion of Wailoa ditch, Lowrie ditch became mainly a storm-water ditch or reservoir feeder.

The following measurement was made:

October 18: Gage height, 0.70 foot; discharge, 34 second-feet or 22 million gallons per day.

Discharge, in million gallons per day, of Lowrie ditch at Opana Weir, near Huelo, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	45	46	30	36	54	31	56	5.4	35	4.8	56	9.0
2	42	43	27	30	54	11.8	52	5.4	50	4.8	55	8.0
3	46	46	27	31	54	14.0	39	5.2	48	5.3	56	7.7
4	53	50	25	39	55	30	42	5.1	45	5.1	55	7.3
5	49	53	25	41	55	48	28	4.9	37	4.4	56	6.8
6	47	45	29	53	54	62	21	4.7	16.0	11.3	56	6.8
7	53	41	35	37	54	58	7.0	4.6	9.3	43	54	6.5
8	54	52	24	30	54	52	19.1	4.4	11.3	64	51	6.4
9	54	43	36	21	54	59	14.3	4.2	11.3	56	46	6.0
10	54	35	22	27	54	55	12.1	4.0	10.9	59	50	5.9
11	53	51	22	28	54	62	12.3	4.0	10.0	56	51	5.9
12	52	54	49	25	54	57	21	10.8	7.9	28	43	5.4
13	53	52	54	23	55	60	48	45	8.4	30	57	7.3
14	53	46	37	22	53	61	52	38	8.2	38	50	5.4
15	54	40	35	37	53	49	59	33	7.4	33	41	5.0
16	53	49	37	30	55	31	60	16.6	8.1	33	55	6.7
17	51	46	25	22	55	48	59	3.5	7.0	34	53	6.4
18	50	54	34	20	54	46	59	10.0	7.4	35	57	4.5
19	51	54	54	52	54	41	19.2	9.4	13.4	41	54	4.6
20	51	53	54	54	54	39	8.8	7.6	8.4	58	55	4.4
21	50	46	54	53	53	37	8.6	9.0	6.8	59	55	4.4
22	50	42	53	54	48	41	7.8	11.0	6.2	58	50	4.3
23	53	38	52	53	53	54	7.6	27	5.8	57	24	4.0
24	54	40	45	53	52	52	7.1	35	7.3	57	15.6	4.1
25	54	36	35	45	51	44	6.9	32	6.4	56	13.7	4.4
26	54	38	35	37	50	39	6.6	29	5.8	61	11.5	3.6
27	50	34	41	46	49	37	6.2	37	5.4	61	10.8	3.6
28	50	34	39	54	51	35	6.0	16.8	9.9	62	10.2	3.2
29	48	31	35	55	41	32	6.0	13.8	8.0	62	10.2	3.3
30	49	31	35	55	39	40	5.8	-------	5.8	63	9.6	3.3
31	50	38	-------	54	-------	45	5.5	-------	5.2	-------	9.4	-------

Monthly discharge of Lowrie ditch at Opana Weir, near Huelo, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	54	42	51.0	78.9	1,580	4,850
August	54	31	43.9	67.9	1,360	4,180
September	54	22	36.8	56.9	1,100	3,390
October	55	20	39.3	60.8	1,220	3,740
November	55	39	52.3	80.9	1,570	4,820
December	62	11.8	44.2	68.4	1,370	4,210
January	60	5.5	24.6	38.1	763	2,340
February	45	3.5	15.0	23.2	436	1,340
March	50	5.2	14.0	21.7	433	1,330
April	64	4.4	41.3	63.9	1,240	3,800
May	57	9.4	41.0	63.4	1,270	3,900
June	9.0	3.2	5.47	8.46	164	504
The year	64	3.2	34.2	52.9	12,500	38,400

HAIKU DITCH AT MANAWAI GULCH, NEAR PEAHI, MAUI

LOCATION.—In 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, 1924, at present site. January 1, 1910, to October 7, 1914, at Peahi Weir, on old Haiku ditch.

GAGE.—Friez water-stage recorder installed about October 21, 1914. Daily staff gage readings prior to that date.

DISCHARGE MEASUREMENTS.—Made from concrete footbridge across ditch.

CHANNEL AND CONTROL.—Control is submerged concrete weir across ditch, installed between October 21 and November 18, 1914; rated by engineers of East Maui Irrigation Co. Shifts slightly on account of gradual accumulation of tunnel débris on upstream side of control.

EXTREMES OF DISCHARGE.—See monthly-discharge table.

DIVERSIONS.—None.

REGULATION.—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 sugar cane.

ACCURACY.—Records good.

COOPERATION.—Daily-discharge record copied from records of East Maui Irrigation Co.

Haiku ditch, at elevation about 250 feet, diverts from all streams on the windward side of the crater of Haleakala, below all other main ditches, between Kailua Stream and Maliko Gulch. The water is carried to the vicinity of 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 per day. Haiku ditch replaced Spreckels ditch west of Kailua Stream.

The following discharge measurement was made:

October 23: Gage height, 2.5 feet; discharge, 37.5 second-feet or 24.2 million gallons per day.

Discharge, in million gallons per day, of Haiku ditch at Manawai Gulch, near Peahi, Maui, for the year ending June 30, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	6.9	11.0	4.8	8.2	86	7.6	74	5.1	64	6.9	81	9.2
2	6.2	8.6	4.4	6.9	80	12.0	50	4.8	101	6.8	82	8.2
3	7.6	10.5	4.4	6.2	60	83	29	4.7	67	7.3	73	7.8
4	22	19.8	4.4	5.1	46	89	38	4.8	61	10.3	58	7.6
5	8.1	37	4.3	10.4	87	53	23	4.8	47	6.6	40	6.8
6	8.3	24	5.3	47	90	82	19.9	4.5	38	13.9	29	6.2
7	13.6	25	6.6	15.8	90	86	19.3	4.4	40	31	38	5.9
8	37	37	3.8	28	90	83	24	4.4	39	85	36	5.8
9	78	23	6.6	21	86	77	23	3.9	34	80	27	5.6
10	84	20	3.5	6.3	80	63	15.9	3.8	26	76	13.4	5.5
11	66	17.8	3.2	4.9	76	92	14.6	3.6	20	74	13.8	5.4
12	72	69	64	4.9	82	83	19.0	28	13.1	77	11.6	5.3
13	90	63	89	4.8	89	102	27	89	14.7	78	65	13.2
14	80	53	35	4.4	66	97	26	79	14.3	80	87	8.2
15	30	18.4	33	6.2	68	70	17.3	74	10.7	77	79	6.5
16	60	10.4	36	5.7	89	49	13.0	41	11.0	74	91	21
17	74	9.7	20	5.0	82	58	12.4	41	9.6	75	87	33
18	49	88	7.1	4.2	70	57	11.4	28	11.7	76	75	19.9
19	29	82	74	55	58	39	14.3	26	57	68	56	19.1
20	21	49	90	87	52	35	13.5	24	29	53	38	18.4
21	52	39	89	89	52	36	11.9	19.5	25	26	33	5.5
22	85	41	67	73	38	36	15.7	15.5	22	47	39	4.8
23	90	19.2	32	41	26	50	7.4	53	22	44	35	4.6
24	79	12.1	46	25	16.8	52	6.8	65	18.6	26	24	5.6
25	52	6.9	41	22	14.6	40	6.6	42	11.0	14.6	32	4.7
26	45	7.2	23	17.4	14.3	38	6.0	57	8.8	85	26	4.1
27	41	7.6	11.0	48	12.9	32	5.8	70	7.6	79	19.0	3.9
28	46	7.0	11.4	90	16.0	27	5.8	33	12.0	84	14.2	3.6
29	23	6.5	10.1	90	10.8	23	5.6	31	13.3	83	13.3	3.6
30	11.3	6.2	9.2	90	9.9	23	5.4	-------	8.2	81	12.2	3.5
31	12.6	5.9	-------	86	-------	35	5.2	-------	7.3	-------	12.8	-------

Monthly discharge of Haiku ditch at Manawai Gulch, near Peahi, Maui, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
July	90	6.2	44.5	68.9	1,380	4,230
August	88	5.9	26.9	41.6	835	2,560
September	90	3.2	28.0	43.3	839	2,580
October	90	4.2	32.5	50.3	1,010	3,090
November	90	9.9	57.9	89.6	1,740	5,330
December	102	7.6	55.1	85.3	1,710	5,250
January	74	5.2	18.3	28.3	567	1,740
February	89	3.6	29.8	46.1	865	2,650
March	101	7.3	27.9	43.2	864	2,650
April	85	6.6	54.2	83.9	1,630	4,990
May	91	11.6	43.3	67.0	1,340	4,120
June	33	3.5	8.75	13.5	262	806
The year	102	3.2	35.6	55.1	13,000	40,000

MISCELLANEOUS MEASUREMENTS

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

Miscellaneous measurements in Maui, during the year ending June 30, 1926

Date	Stream	Tributary to—	Locality	Gage height	Discharge	
					Second-feet	Million gallons per day
				Feet		
Oct. 18	Wailoa ditch	Cane fields	At Opana Gulch, near Peahi.	1.05	28.5	18.5
19	Lowrie ditch	do	At Maliko	1.24	79	51
19	do	do	Near Hamakuapoko	1.25	9.3	6.0
19	Kauhikoa ditch	do	At Maliko	1.86	38	24.7
19	do	do	At Lilikoi Gulch, near Haiku.	1.84	37	23.9
19	Haiku ditch	do	At weir, near Hamakuapoko.	.97	82	53
20	Wailoa ditch	do	At Opana Gulch, near Peahi.	2.20	89	57
20	do	do	do	2.19	88	57
20	do	do	do	2.18	88	57
Jan. 9	Old Hamakua ditch		Near Lahaina	1.70	22.8	14.7
24	Development tunnel	Honokahau Stream.	Near Honokahau		2.1	1.35
24	do	do	do		3.8	2.4
24	Flow through gate of crosscut No. 15.	Honokahau ditch	do		2.1	1.4
Mar. 1	Overflow from crosscut of Koolau ditch.		At Wahinepe		5.2	4.7
13	Development tunnel	Honokahau Stream.	do		3.7	2.4
13	do	do	do		2.9	1.9
Feb. 29	Nuaailua		Near Keanae		1.2	.8
29	Second Branch to Right Honomanu.		At ditch trail crossing, near Keanae.		6.8	4.4
Mar. 17	Haiku ditch		At west end of Kailua pipe.		36.5	23.6
17	do		At flume 30 feet above bridge crossing of old Makawao trail.		35.5	23
17	do		East side of Reservoir No. 7.		34.5	22.2
17	do		At entrance to pipe		30	19.5
18	do		At tunnel outlet above gulch, near Reservoir No. 7		34	22
18	do		At west end of Paia flume.		33	21.4
18	do		Above flume which crosses gulch, near Reservoir No. 7.		32	20.8
18	do		Near stable, about 20 feet above railroad bridge.		32	20.6
18	do		At west end of Kailua pipe.		32.5	20.9
18	do		do		35.5	22.9

ISLAND OF HAWAII

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 to June 30, 1924. About 1,000 feet downstream from Pohakupaa Stream and about 2 miles below present location, June 1, 1911, to March 24, 1913.

GAGE.—Stevens continuous water-stage recorder installed November 27, 1923.

DISCHARGE MEASUREMENTS.—Made by wading at or below control or from cable 1,000 feet downstream. Cable is below Hilo Sugar Co.'s upper ditch so the flow of ditch is 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 with short low concrete walls on either side, probably permanent.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during period, 1,430 million gallons per day or 2,210 second-feet at 3.20 a. m. April 15 (gage height, 11.08 feet); minimum recorded, 0.7 million gallons per day or 1.1 second-feet from 10 to 11 p. m. February 22 (gage height, 4.27 feet).

DIVERSIONS.—None above stations.

REGULATION.—None.

OBJECT OF STATION.—To furnish a standard by which other stations in the locality may be compared.

UTILIZATION.—All of low flow used for irrigation of sugar cane. Most of flow wastes into sea.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 50 million gallons per day, is based on logarithmic extension above. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage heights obtained from recorder graph by inspection or, for days of considerable range in stage, by averaging discharge for intervals of day. Records good for low and medium stages, high-stage records subject to error.

Discharge measurements of Honolii Stream near Hilo, Hawaii, during the year ending June 30, 1924

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Sept. 30		40	26	Mar. 30	4.72	17.2	11.1
Feb. 20	4.33	1.95	1.25	May 18	4.68	14.0	9.0

Discharge, in million gallons per day, of Honolii Stream near Hilo, Hawaii, for the period February 21 to June 30, 1924

Day	Feb.	Mar.	Apr.	May	June	Day	Feb.	Mar.	Apr.	May	June
1		42	4.7	29	4.2	16		6.3	194	16.8	12.5
2		39	3.5	26	4.4	17		6.9	114	12.0	11.6
3		35	3.2	46	5.8	18		8.6	100	30	13.3
4		76	3.2	31	5.5	19		5.8	76	16.4	8.6
5		33	54	28	4.2	20		5.0	31	12.0	7.3
6		26	28	93	3.4	21	1.0	4.2	28	10.0	5.5
7		65	9.7	51	3.2	22	.8	3.7	17.7	7.6	4.4
8		21	18.8	21	3.7	23	3.8	43	13.7	7.6	3.9
9		14.6	121	18.6	3.2	24	261	21	10.8	5.8	3.4
10		12.5	115	21	3.2	25	165	13.8	8.6	7.6	2.8
11		14.1	92	22	8.3	26	115	10.0	7.6	41	2.5
12		13.3	42	20	6.1	27	99	9.4	112	22	2.1
13		15.0	26	13.7	4.4	28	66	27	44	11.2	1.9
14		9.0	270	15.9	9.7	29	57	19.1	27	8.0	1.6
15		6.3	602	26	9.3	30		10.4	35	6.1	1.4
						31		6.6		5.0	

NOTE.—Station established Nov. 27, but owing to stoppage of the clock no record was obtained until Feb. 21.

Monthly discharge of Honolii Stream near Hilo, Hawaii, for the year ending June 30, 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
February 21–29					769	2,360
March	76	3.7	20.1	31.1	623	1,910
April	602	3.2	73.8	114	2,210	6,790
May	93	5.0	22.0	34.0	681	2,090
June	13.3	1.4	5.38	8.32	161	495
The period					4,450	13,600

WAILUKA RIVER AT PUKAMAUI, NEAR HILO, HAWAII

LOCATION.—At Pukamaui three-quarters of a mile above Hilo Boarding School ditch intake and 4 miles west of Hilo.

RECORDS AVAILABLE.—April 24, 1923, to June 30, 1924. Records at station above Hilo Electric Co. power house near Hilo, from March 21, 1911, to July 21, 1913, and January 2 to June 30, 1918; not comparable.

GAGE.—Gurley seven-day graph water-stage recorder inspected by the Hawaii County engineer.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—One channel at all stages. Banks high, sloping about 1 on 4. Stream bed composed of solid lava rock. Control formed by lava flow and is probably permanent.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during the period April 24, 1923, to June 30, 1924, 428 million gallons per day or 662 second-feet at 6.30 p. m. December 18 (gage-height, 11.48 feet); minimum, 2.6 million gallons per day or 4.0 second-feet from 4 a. m. to 2 p. m. February 12 (gage-height, 1.08 feet).

DIVERSIONS.—None.

REGULATION.—None.

OBJECT OF STATION.—To determine the amount of water available for proposed Hilo waterworks intake.

UTILIZATION.—For power and irrigation.

ACCURACY.—Stage-discharge relation permanent during the period. Rating curve used fairly well defined below 40 million gallons per day and extended above. 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 obtained for gage-height graph by inspection, or, for days of considerable range in stage, by averaging discharge for intervals of the day. Records good for medium and low stages, fair for periods of estimate, and subject to considerable error for high stages.

Discharge measurements of Wailuku River at Pukamaui, near Hilo, Hawaii, during the year ending June 30, 1923

Date	Gage height (feet)	Discharge		Date	Gage height (feet)	Discharge	
		Second-feet	Million gallons per day			Second-feet	Million gallons per day
Apr. 9	3.01	51	32.5	Apr. 10	2.59	33.5	21.6
Apr. 10	2.99	48.5	31.5	Do	2.58	33	21.5

Discharge, in million gallons per day, of Wailuku River at Pukamaui, near Hilo, Hawaii, for the years ending June 30, 1923 and 1924

Day	Apr.	May	June	Day	Apr.	May	June	Day	Apr.	May	June
1923											
1		84	37	11		23	15.8	21		22	26
2		64	30	12		19.1	17.2	22		42	23
3		55	26	13		16.6	39	23		61	19.1
4		50	28	14		15.0	70	24	50	42	17.4
5		45	28	15		14.2	61	25	37	74	16.6
6		37	24	16		14.2	47	26	165	64	15.8
7		32	21	17		20	42	27	145	44	15.8
8		30	19.1	18		29	32	29	93	58	16.6
9		28	16.6	19		35	28	29	112	44	17.4
10		25	15.8	20		23	28	30	163	50	22
								31		44	

Day	July	Aug.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1923-24											
1	16.6	15.0	13.4	64		21	3.8	28	9.1	30	
2	14.2	15.0	12.9	39		23	3.8	28	9.8	32	
3	15.8	14.2	11.9	30		17.4	3.8	26	8.7	37	
4	15.8	12.6	15.0	24		15.8	3.6	42	8.8	34	
5	21	12.6	11.9	32	26	14.2	3.5	30	7.8	32	6.0
6	25	11.9	11.2	28	58	13.4	3.3	24	8.1	34	
7	26	11.9	11.9	23	72	13.4	3.2	35	7.2	34	
8	23	11.2	11.9	25	37	11.9	3.2	30	7.8	26	
9	23	10.5	11.2	26	25	11.2	3.0	22	26	25	4.8
10	34	9.8	9.8		20	11.2	2.9	18.2	32	23	4.9
11	22	10.5	9.8		17.4	10.5	2.7	15.8	26	23	7.6
12	24	15.8	8.6		15.0	10.5	2.7	15.0	24	26	5.5
13	33	16.6	7.8		21	9.8	8.0	15.0	16.6	20	7.2
14	39	13.4	7.8		23	9.8	11.2	13.4	62	18.2	8.2
15	34	11.9	7.8		17.4	9.1	10.7	11.9	215	18.2	7.2
16	28	11.2	7.9		120	8.7	8.8	10.5	120	18.2	9.8
17	25	12.7	7.6		97	8.4	5.7	10.5	93	16.6	8.8
18	24		6.7		193	7.7	5.2	10.5	109	16.6	8.3
19	30		11.0		111	6.6	4.8	9.8	78	37	6.8
20	26		15.8		61	6.4	4.2	9.1	42	28	6.6
21	20		15.8		42	6.0	3.8	8.7	37	21	6.0
22	89		21			5.8	3.6	8.3	28		5.6
23	77		17.5			5.6	4.8	7.9	24		5.4
24	42		15.3			5.4	46	7.4	21		5.0
25	30		25			5.1	64	7.7	18.2		4.6
26	26		14.2			4.7	50	10.2	18.2	17	4.3
27	23		13.4			4.5	41	12.0	54		4.0
28	20		62			4.5	34	19.8	34		3.7
29	19.1		116		24	4.2	32	15.8	30		3.5
30	18.2		97		21	4.0		11.2	34		3.2
31	17.4		78		21	3.9		9.8			

NOTE.—Discharge July 6, Oct. 19, Mar. 6-8, 14, May 10, 11, and May 22 to June 8 estimated from incomplete gage height record or comparison with Honolii Stream near Hilo; gage-height record either faulty or missing. Insufficient data for estimate Aug. 18 to Sept. 30, Nov. 10 to Dec. 4, and Dec. 22-28; water-stage recorder not operating.

Monthly discharge of Wailuku River at Pukamaui, near Hilo, Hawaii, for the years ending June 30, 1923 and 1924

Month	Discharge				Total run-off	
	Million gallons per day			Second-feet (mean)	Million gallons	Acre-feet
	Maximum	Minimum	Mean			
1923						
April 24–30					765	2,350
May	84	14.2	38.8	60.0	1,200	3,700
June	70	15.8	27.2	42.1	815	2,500
1923–24						
July	89	14.2	28.4	43.9	881	2,700
October	116	6.7	22.2	34.3	687	2,110
January	23	3.9	9.47	14.7	294	901
February	64	2.7	13.0	20.1	377	1,160
March	42	7.4	16.9	26.1	524	1,610
April	215	7.2	40.3	62.4	1,210	3,710
May	37		23.2	35.9	720	2,210
June			5.97	9.24	179	549

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