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STREAM FLOW DATA  
FOR NORTH WAIEHU

EXHIBIT 10

DEPARTMENT OF THE INTERIOR  
UNITED STATES GEOLOGICAL SURVEY  
GEORGE OTIS SMITH, DIRECTOR

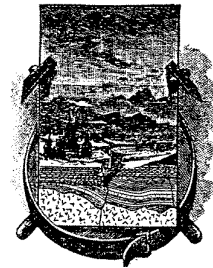
WATER-SUPPLY PAPER 336

WATER RESOURCES OF HAWAII

1912

BY

C. H. PIERCE AND G. K. LARRISON



WASHINGTON  
GOVERNMENT PRINTING OFFICE  
1914

000081

Daily discharge, in million gallons, of Waiee canal at weir near Waituku, Maui, for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16.....	13.20	11.00	17.00	38.10	14.60	19.30	16.30	18.60	9.87	11.40	39.40	23.30
17.....	12.70	11.30	20.10	34.00	14.30	13.80	14.10	14.10	9.60	11.90	39.00	13.70
18.....	12.30	11.30	25.30	33.70	14.20	13.90	13.70	11.90	11.30	11.00	31.60	21.50
19.....	12.30	11.30	22.30	30.30	16.30	12.80	14.70	12.30	10.70	10.10	18.10	12.60
20.....	12.30	11.30	23.30	28.30	14.30	13.50	13.90	11.30	11.50	12.70	27.40	19.10
21.....	13.00	10.90	22.90	26.00	15.10	17.10	17.90	9.33	10.30	12.90	28.60	27.20
22.....	10.40	10.90	9.50	18.90	26.40	13.60	14.40	13.00	10.00	14.50	24.10	34.10
23.....	11.50	11.50	15.40	17.60	22.10	13.20	14.60	13.30	10.10	13.30	25.20	22.20
24.....	11.50	11.50	15.40	17.30	21.40	18.90	13.50	9.86	9.86	11.30	35.20	16.30
25.....	11.50	11.50	17.20	18.30	16.60	13.20	11.10	9.63	9.07	10.10	32.40	26.00
26.....	10.40	10.40	22.00	24.50	23.20	14.40	11.20	19.70	10.20	12.30	12.00	17.60
27.....	10.10	22.00	21.60	17.50	30.50	16.00	11.70	16.60	10.70	16.60	8.03	15.90
28.....	9.75	15.50	22.30	19.10	20.43	13.60	12.60	10.30	10.70	16.30	9.33	17.30
29.....	9.82	12.30	22.20	16.60	23.20	13.50	11.60	11.60	12.00	11.30	9.20	15.50
30.....	11.80	11.80	26.60	16.40	16.20	13.50	12.10	10.50	20.00	12.70	18.20	16.10
31.....	11.60	11.60	28.40	15.00	15.00	11.80	11.80	11.80	13.20	13.20	.....	21.70

Monthly discharge of Waiee canal at weir near Waituku, Maui, for 1912.

Month.	Discharge in million gallons.			Run-off (total in million gallons).
	Maximum.	Minimum.	Mean.	
January.....	19.30	9.75	13.4	415
February.....	45.40	17.0	17.0	492
March.....	29.40	13.40	20.3	629
April.....	56.40	16.40	28.8	924
May.....	30.30	13.10	17.8	554
June.....	24.80	11.80	15.9	477
July.....	32.30	11.10	16.6	514
August.....	21.10	9.33	13.0	390
September.....	20.00	8.50	10.9	328
October.....	22.90	10.16	14.0	433
November.....	39.40	8.03	16.2	485
December.....	35.80	12.60	20.1	622
The year.....	56.40	8.66	17.0	6,200

SPRECKELS DITCH NEAR WAIHEE, MAUI.

Location.—About 2 miles west of Waiee and about 500 feet below intake. Records available.—November 17, 1910, to December 31, 1912.

Gage.—Vertical staff read twice daily, at about 4 a. m. and 3.30 p. m. September 7, 1912, gage was removed to a point a short distance upstream and placed at new datum.

Channel.—Probably permanent.

Discharge measurements.—Made by wading.

Cooperation.—Station maintained in cooperation with East Maui Ditch Co.

Discharge measurements of Spreckels ditch near Waiee, Maui, in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
July 3	J. B. Stewart.....	Feet 0.24	.....	Oct. 29	J. E. Stewart.....	Feet 0.21	1.67
Aug. 6	.....	.15	.....	Dec. 1	C. T. Bailey.....	1.66	58.7
Sept. 7	.....	.30	.....				

Daily gage height, in feet, of Spreckels ditch near Waiee, Maui, for 1912.

[Joquin Santos, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	0.40	0.10	1.30	1.95	0.30	0.75	0.10	0.20	0.15	0.12	0.20	1.7
2.....	.....	.....	1.20	1.20	1.25	.50	.10	.20	.15	.20	.20	1.1
3.....	.60	.10	1.80	1.80	.00	.20	.10	.20	.15	.50	.20	1.1
4.....	.50	.10	1.20	1.70	.00	.15	.15	.20	.15	1.00	.20	1.1
5.....	.30	.10	1.50	1.60	.30	.15	1.00	.20	.15	1.18	.20	1.1
6.....	.20	.10	1.20	1.50	.40	.10	.62	.18	.15	.15	.20	1.1
7.....	.20	.10	1.00	1.70	.50	.15	.70	.15	.20	.15	.20	1.1
8.....	.20	.10	1.20	1.50	.70	.10	.50	.60	.20	.15	.20	1.1
9.....	.20	.10	1.20	1.95	.60	.10	.75	.40	.20	.20	.20	1.1
10.....	.20	.10	1.20	.80	.50	.05	1.45	.25	.15	.25	.25	1.1
11.....	.15	.10	1.20	.83	.40	1.50	1.40	.60	.15	.90	.....	.....
12.....	.10	.10	1.10	.70	.35	1.00	1.70	.70	.15	.90	.....	.....
13.....	.10	.10	1.10	.70	.30	.50	1.60	.65	.15	.55	.....	.....
14.....	.10	.60	1.10	.80	.25	.55	1.35	.90	.15	.65	.25	.....
15.....	.00	.60	1.10	.80	.20	.83	.20	1.05	.15	1.00	1.00	.....
16.....	.00	.40	1.25	1.90	.30	.45	.85	1.09	.15	.20	1.80	1.4
17.....	.00	.40	1.20	1.70	.20	.50	.20	.15	.15	.20	1.40	1.1
18.....	.00	.60	1.30	1.25	.20	.30	.20	.15	.15	.20	1.80	1.1
19.....	.10	1.00	1.10	1.10	.20	.30	.20	.15	.15	.15	.18	1.1
20.....	.10	.70	1.15	1.20	.25	.20	.20	.15	.15	.20	1.40	1.1
21.....	.00	.80	.80	.70	.15	.50	.60	1.20	.15	1.35	1.75	1.1
22.....	.00	1.20	.70	.60	.20	.40	.20	1.45	.15	1.30	.35	1.1
23.....	.00	1.00	.60	.70	.15	.15	.20	.15	.15	.20	.70	1.1
24.....	.00	1.30	.40	.90	.15	.30	.45	.15	.15	.20	1.40	1.1
25.....	.06	.95	.40	.70	.15	.20	.20	.15	.15	.20	1.40	1.1
26.....	.10	1.40	.40	.50	.20	.20	.20	.92	.15	.20	.80	1.1
27.....	.10	1.40	.80	.40	1.50	.15	.15	.00	.20	.50	.80	1.1
28.....	.10	1.20	.60	.70	1.70	.15	.20	.00	.20	1.00	.80	1.1
29.....	.10	1.20	.70	.50	1.70	.10	.20	.00	.20	1.00	.80	1.1
30.....	.10	1.20	.50	.40	1.80	.10	.20	.00	.15	.55	.80	1.1
31.....	.10	1.00	.50	.50	1.50	.....	.20	.15	.15	1.00	1.05	1.0

WAIHEU STREAM BASIN.

NORTH WAIHEU STREAM NEAR WAILUKU, MAUI.<sup>1</sup>

Location.—About 2½ miles northwest of Wailuku, 1 mile above Waiee Canal crossing, and 50 feet above the intake of the North Waiee ditch. Records available.—July 9 to December 31, 1912.

Gage.—Vertical staff, read twice daily, at 6 a. m. and 4 p. m.; datum unchanged. Channel.—Probably shifting; bed of stream of gravel and small bowlders.

Discharge measurements.—Made by wading. Accuracy.—Good.

Cooperation.—Station is maintained in cooperation with Wailuku Sugar Co.

Discharge measurements of North Waiee Stream near Waituku, Maui, in 1912.

[Hydrographer, J. B. Stewart.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
July 5.....	Feet 1.10	Sec-ft. 2.06	July 16.....	Feet 0.63	Sec-ft. 5.09
8.....	.65	5.51	Sept. 6.....	.62	4.13
13.....	.65	5.52	Oct. 28.....	.77	8.82

<sup>a</sup> Old gage.

<sup>1</sup>This station replaces the two stations formerly maintained on North Waiee Stream and North Waiehu ditch.

U. S. GEOLOGICAL SURVEY

SET # 1

DEPARTMENT OF THE INTERIOR  
UNITED STATES GEOLOGICAL SURVEY

GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 373

# WATER RESOURCES OF HAWAII

1913

BY

G. K. LARRISON



WASHINGTON  
GOVERNMENT PRINTING OFFICE

1915

000063

Daily discharge, in second-feet, of South Waiehu ditch near Waikuku, Maui, for 1913.

Table with 12 columns: Day, Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec. Rows 1-31 showing daily discharge values.

Monthly discharge of South Waiehu ditch near Waikuku, Maui, for 1913.

Table with 5 columns: Month, Discharge in second-feet (Maximum, Minimum, Mean), Run-off (total in acre-feet), Accuracy. Rows for months and total year.

NORTH WAIEHU STREAM NEAR WAILUKU, MAUI.

Location.—One mile above Waihee canal crossing and about 2 1/2 miles northwest of Wailuku; 50 feet above uppermost diversion.

Records available.—July 9, 1912, to December 31, 1913.

Gage.—Vertical staff.

Control.—Probably shifting.

Discharge measurements.—Made by wading.

Diversion.—None above station.

Accuracy.—Records doubtful.

Cooperation.—Station is maintained in cooperation with Wailuku Sugar Co.

Discharge measurements of North Waiehu Stream near Waikuku, Maui, in 1913.

[C. T. Bailey, hydrographer.]

Summary table with 4 columns: Date, Gage height, Discharge, Date. Rows for Mar. 14, Apr. 10, July 3, Aug. 14.

Daily discharge, in second-feet, of North Waiehu Stream near Waikuku, Maui, for 1913.

Table with 12 columns: Day, Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec. Rows 1-31 showing daily discharge values.

DEPARTMENT OF THE INTERIOR  
FRANLIN K. LANE, Secretary

UNITED STATES GEOLOGICAL SURVEY  
GEORGE OTIS SMITH, Director

Water-Supply Paper 430

# SURFACE WATER SUPPLY OF HAWAII

JULY 1, 1913, TO JUNE 30, 1915

NATHAN C. GROVER, Chief Hydraulic Engineer  
G. K. LARRISON, District Engineer

Prepared in cooperation with the  
Territory of Hawaii



WASHINGTON  
GOVERNMENT PRINTING OFFICE  
1917

000065

Discharge, in million gallons per day, of North Waialeale Stream near Waialeale, Maui, for the years ending June 30, 1914 and 1915—Continued.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914-15.												
1.	9.6	9.6	11	9.7	16	9.0	6.1	4.5	2.8	4.7	4.7	4.7
2.	11	11	13	13	7.1	7.1	7.1	4.5	2.8	4.7	4.7	4.7
3.	11	11	13	13	3.8	9.5	6.1	4.5	4.1	4.7	4.7	4.7
4.	11	11	12	12	3.8	9.5	7.4	4.5	4.1	4.7	4.7	4.7
5.	11	11	11	12	3.8	9.5	10	8.7	4.1	4.7	4.7	4.7
6.	11	11	245	12	3.8	9.5	10	6.3	4.1	3.1	4.7	6.7
7.	11	11	11	11	3.8	9.5	10	5.3	4.1	3.1	4.7	4.7
8.	11	11	11	11	3.8	9.5	10	5.3	4.1	3.1	4.7	4.7
9.	11	11	11	22	3.8	9.5	10	5.3	4.1	5.7	4.7	4.7
10.	11	11	10	16	3.8	17	10	5.3	4.1	8.1	6.7	4.7
11.	11	11	10	10	3.8	11	10	5.3	4.1	11	8.1	4.7
12.	11	11	10	10	3.8	11	10	6.2	3.6	11	9.5	4.7
13.	11	11	10	10	3.8	11	10	5.2	3.1	4.7	13	4.7
14.	11	11	10	10	3.8	11	10	5.2	3.1	4.7	13	4.7
15.	11	11	9.6	9.4	11	9.5	5.4	5.2	4.7	4.7	13	4.7
16.	11	11	11	11	9.1	9.5	5.4	5.2	2.1	11	13	4.7
17.	11	11	11	11	8.9	9.5	5.4	5.2	2.1	9.5	13	4.7
18.	11	11	9.6	11	8.7	7.8	5.4	5.2	2.1	9.5	13	4.7
19.	11	11	8.9	8.4	11	8.5	5.4	5.2	2.1	9.5	13	4.7
20.	11	11	8.8	8.1	11	11	5.4	6.2	2.1	5.7	13	4.5
21.	11	11	8.6	11	7.8	11	4.5	2.1	2.1	4.7	13	4.7
22.	11	11	8.4	11	5.4	8.5	4.5	6.2	2.1	4.7	6.7	4.7
23.	11	11	32	7.4	5.4	8.5	4.5	5.2	2.1	4.7	6.7	4.7
24.	11	11	8.3	7.1	7.8	11	4.5	4.1	2.1	4.7	6.7	4.7
25.	11	11	8.1	6.9	11	11	4.5	4.1	1.6	4.7	6.7	4.7
26.	11	11	7.9	6.6	29	15	4.5	4.1	1.6	11	6.7	4.7
27.	11	11	7.7	6.3	7.8	15	4.5	4.1	1.6	13	6.7	4.7
28.	11	11	7.5	6.1	12	15	4.5	4.1	1.6	13	6.7	4.7
29.	15	11	7.3	5.8	13	15	4.5	4.1	1.6	6.7	6.7	4.7
30.	11	11	7.1	5.8	13	15	4.5	4.1	1.6	4.7	6.7	4.7
31.	11	11	5.8	5.8	15	15	4.5	4.1	1.6	4.7	6.7	4.7

NOTE.—Discharge July 1, 1913, to Sept. 5, 1914 and Mar. 14 to June 30, 1915, based on poorly defined rating curves; discharge Sept. 6, 1914, to Mar. 13, 1915, computed by method for shifting channels.

Monthly discharge of North Waialeale Stream near Waialeale, Maui, for the years ending June 30, 1914 and 1915.

Month.	Discharge.				Total run-off.	
	Million gallons per day.		Second-foot (mean).	Million gallons.	Acre-foot.	
	Maximum.	Minimum.				
1913-14.	3.9	2.6	2.78	4.30	86	264
July.	5.8	2.6	2.85	4.41	88	271
August.	7.0	2.6	2.81	4.35	84	259
September.	4.8	2.6	2.90	4.40	90	276
October.	13	2.6	4.28	6.62	128	394
November.	15	3.9	4.92	7.64	152	468
December.	7.0	3.9	4.93	7.63	153	469
January.	4.8	3.9	3.93	6.08	110	338
February.	8.1	3.9	4.59	7.90	142	437
March.	8.1	3.9	5.38	8.32	161	495
April.	11	4.8	7.05	10.9	219	671
May.	32	8.1	11.6	17.0	328	1,010
June.	32	2.6	4.78	7.40	1740	5,350
The year.	245	1.6	8.83	13.7	3,220	9,900
1914-15.	15	9.6	11.1	17.2	343	1,000
July.	13	11.1	18.2	28.2	547	1,680
August.	245	5.8	9.81	15.2	304	933
September.	27	7.4	11.26	17.8	278	853
October.	17	7.5	10.4	16.4	344	1,030
November.	10	4.1	5.93	9.18	168	517
December.	21	1.6	2.81	4.35	87	267
January.	4.7	3.1	6.51	10.1	195	590
February.	13	4.7	8.08	12.5	251	769
March.	13	4.7	8.15	12.5	251	769
April.	13	4.7	8.15	12.5	251	769
May.	13	4.7	8.15	12.5	251	769
June.	9.5	4.7	8.15	12.5	158	483
The year.	245	1.6	8.83	13.7	3,220	9,900

000066

WAIHEE STREAM NEAR WAIHEE, MAUI.

LOCATION.—About 300 feet above intake of Waiehe Canal, 3 miles west of Waiehe, and 7 miles northwest of Wailuku.

RECORDS AVAILABLE.—April 1, 1913, to June 30, 1915.

GAGE.—Baret and Lawrence water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge 250 feet below gage.

CHANNEL AND CONTROL.—Channel at gage is a pool at foot of low waterfall; banks mostly of solid rock, steep and high. Control is composed of boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 8.35 feet at 4 a. m. September 6 1914 (discharge, computed from extensior of rating curve, approximately 1,400 million gallons per day, or 2,160 second-foot); minimum stage recorded, 2.59 feet August 5, 1913 (discharge, 2. million gallons per day, or 32 second-foot).

DIVERSIONS.—None above station.

REGULATION.—Normal flow of stream is increased by development tunnels near headwaters.

UTILIZATION.—Irrigation of sugar cane and taro.

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

Discharge measurements of Waiehe Stream near Waiehe, Maui, during the years ending June 30, 1914 and 1915.

Date.	Made by—	Discharge.	
		Second-foot.	Million gallons per day.
1913—July 31	C. T. Bailey	46	30
Aug. 13	do.	56	43
Dec. 4	do.	359	232
1914—Feb. 28	do.	44	29
Apr. 23	do.	386	237
June 23	do.	3.90	124
July 1	do.	4.87	131
Nov. 20	do.	577	371
1915—Feb. 15	do.	3.34	102
June 12	H. A. R. Austin	3.10	60
		4.40	357
		2.90	47
		2.98	36

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

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

Table with columns: Date, July, Aug., Sept., Oct., Nov., Dec., Jan., Feb., Mar., Apr., May, June. Rows 1-31 for 1913-14 and 1914-15.

Table with columns: Date, July, Aug., Sept., Oct., Nov., Dec., Jan., Feb., Mar., Apr. Rows 1-31 for 1914-15.

Note.—Discharge determined from well-defined rating curves applicable as follows: July 1 to Dec. 31, 1913; Jan. 1 to May 18, 1914; May 19, 1914, to Apr. 19, 1915. Gage-height record Apr. 20 to June 30, 1915, fragmentary and unreliable owing to clogging of well intake and unsatisfactory operation of water-stage recorder.

Monthly discharge of Waiehe Stream near Waiehe, Maui, for the years ending June 30, 1914 and 1915.

Table with columns: Month, Discharge (Maximum, Minimum, Mean), Second-foot (mean), Million gallons, Acre-feet. Rows for 1913-14 and 1914-15.

KAHAKULOA STREAM NEAR HONOKAHAU, MAUI.

LOCATION.—Three miles above mouth of stream, about 12 miles by trail southeast of Honokahau.

RECORDS AVAILABLE.—Fragmentary record January 22, 1913, to December 16, 1914. Station discontinued.

GAGE.—Stevens water-stage recorder.

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

CHANNEL AND CONTROL.—One channel at all stages; straight for 100 feet above and below gage; both banks high and nearly vertical to above high water. Control composed of large boulders; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record; 3.25 feet May 18, 1914 (discharge, 92 million gallons per day, or 142 second-foot); minimum stage recorded, 0.99 foot January 30, 1913 (discharge, 0.95 million gallons per day, or 1.5 second-foot).

DIVERSIONS.—None above station.

REGULATOR.—None.

UTILIZATION.—Irrigation of taro and domestic supply.

ACCURACY.—Record very fragmentary owing to faulty working of water-stage recorder, but estimates given are based on a well-defined rating curve and continuous gage-height record and are good for all stages.