

**State of Hawaii  
COMMISSION ON WATER RESOURCE MANAGEMENT  
Department of Land and Natural Resources**

01100 P3:12

01 MAY 24 P3:00

**PETITION TO AMEND INTERIM INSTREAM FLOW STANDARDS**

KAPAULA STREAM, EAST MAUI

**Instructions:** Please print in ink or type and send completed petition with attachments to the Commission on Water Resource Management, P.O. Box 621, Honolulu, Hawaii 96809. Petition must be accompanied by a non-refundable filing fee of \$25.00 payable to the Dept. of Land and Natural Resources. The Commission may not accept incomplete applications. For assistance, call the Regulation Branch at 587-0225.

**1. PETITIONER**

Firm/Name Na Moku 'Aupuni o Ko'olau Hui c/o Native Hawaiian Legal Corporation  
 Contact Person Alan Murakami, Attorney Ph. 521-2302  
 Address 1164 Bishop Street, Honolulu, Hawai'i 96813

**2. STREAMFLOW DATA**

USGS stream gaging station 16511000 Period of Record Data to follow.  
Gages Inactive  
 Location/Reach SEE ATTACHED  
 (Attach a USGS map, scale 1"=2000', and a property tax map showing diversion location referenced to established property boundaries.)

**TABLE 1. PERIOD OF RECORD AVERAGE MONTHLY STREAMFLOW WITHIN THE AFFECTED STREAM REACH, IN CFS**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	--------

STREAMFLOW DATA TO FOLLOW.

Annual Median flow in cfs =

**TABLE 2. PROPOSED AVERAGE MONTHLY STREAMFLOW DIVERSION FROM AFFECTED STREAM REACH, IN CFS**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
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UNDETERMINED; SUFFICIENT FOR TARO FARMING AND/OR GATHERING.

Annual Median flow in cfs =

RESTORATION

**TABLE 3. AVERAGE MONTHLY STREAMFLOW IN AFFECTED STREAM REACH AFTER RESTORATION (min release flow), IN CFS**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	--------

NATURAL STREAMFLOW EXCEPT FOR EXERCISE OF APPURTENANT WATER RIGHTS.

Annual Median flow in cfs =

**3. EXISTING INSTREAM AND OFFSTREAM WATER USES FOR ENTIRE STREAM REACH**

TMK	OWNER	USE
		RESEARCH IN PROGRESS.

(If more space is necessary, attach an extended list following above format)

**4. ANTICIPATED IMPACTS ON STREAM AND BASIS FOR SUCH IMPACTS:**

RESTORATION OF INSTREAM NATURAL HABITAT AND BIOTA, AND BENEFICIAL APPURTENANT AND GATHERING USES.

(Attach supporting documentation, plans, letters, etc.)

NATIVE HAWAIIAN LEGAL CORPORATION

May 24, 2001

Signature

Alan Murakami Petitioner  
 Attorney for Na Moku 'Aupuni o Ko'olau Hui

For Official Use

Date Received \_\_\_\_\_  
 Date Accepted \_\_\_\_\_

## Kapaula Stream

Kapaula Stream is headed at 2,400 ft altitude 1.7 mi inland from the coast (plate 1). This stream has a similar gradient (1,320 ft/mi) and stream-valley incision depth (260 ft) as Paakea and Waiaaka Streams to the west and lies entirely on lava flows of the Hana Volcanics (Stearns and Macdonald, 1942). Streamflow is diverted by the Koolau Ditch at about 1,300 ft altitude (table 4).

Two gaging stations were operated on Kapaula Stream, gaging station 5100 upstream of the Koolau Ditch and gaging station 5110 downstream at 540 ft altitude (plate 1). The estimated average annual base flow at the upstream gaging station is 2.34 Mgal/d and the lowest daily flow measured was 0.19 Mgal/d (table 2, fig. 15Q). At the downstream gaging station, the average annual base flow is estimated to be 1.68 Mgal/d and the lowest daily flow measured was 1.10 Mgal/d. All of this flow is gained in the 4,000 ft downstream of the Koolau Ditch. A regression plot of the estimated base flow, obtained the same way that was discussed earlier for Honopou Stream, also shows a linear relation (fig. 19). Because the regression line has a slope greater than 1.0 the stream has a net gain of water between each gaging station. The scatter of the data points around the regression line shows that the base-flow distribution along the stream is variable. Concurrent streamflow records on two different days show the expected pattern of gains between the two gaging stations but the actual values vary somewhat (table 18). A water budget was not calculated for this stream subbasin.

## Streamflow

Estimates of streamflow and base flow are based on streamflow records of varying length and from different times. The error associated with comparing these records is not considered significant because the average annual values used in the comparisons are expected to be within about 10 percent of the true value in most cases. A statistical analysis of five streamflow records, each with more than 60 years of record, shows that the average annual discharge for any 10-year period within that record has a standard error of 12 percent when compared with the whole record (Fontaine, 1996). When the length of the subset is increased to a 50-year period, the standard error only improves to 5 percent. Thirty nine of the streamflow records for the study area are equal to or greater than 10 years long.

For this study, the length of the period of record at each gaging station was determined to be unimportant by comparing each record to three reference records from the study area. The three longest streamflow records, 5080 (73 years), 5180 (76 years), and 5870 (85 years) were chosen as reference records. For each other individual record, a time period equal to the length of that record was chosen. A subset of a reference record was then selected from this same time period and the average flow during that time period was compared with the total reference record to estimate the ratio of flow during the subset period to the reference period. This analysis was made for all three reference records and the result was averaged to obtain a period-of-record scale factor for each of the other records. The scale factor ranged from 0.88 to 1.13 (table 2). This variability is consistent with the statistical analysis reported by Fontaine (1996). This range of accuracy is considered sufficient for the type of comparisons made in this study, and therefore, no corrections were made to any of the records to account for differences in length or period of record.

**Table 18. Streamflow in Kapaula Stream, northeast Maui, Hawaii**

[ft, feet; Mgal/d, million gallons per day; all data from Paulsen (1950); gaging-station number is preceded by 16 and ends in 00]

Gaging-station number	Stream name	Altitude (ft)	Date	Streamflow (Mgal/d)	Cumulative streamflow without diversion (Mgal/d)	Comments
5100	Kapaula	540	9/11/46	1.20	2.17	Daily mean
			2/24/47	1.20	1.97	
5110	Kapaula	1,346	9/11/46	0.97	0.97	Daily mean; upstream of
			2/24/47	0.77	0.77	Koolau Ditch diversion

*KAPULA*

DVSTRT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16511000  
 KAPAHUA GULCH BL GOVET RD NR NAHIKU, MAUI, HI  
 PARAMETER CODE - 00060 DISCHARGE  
 STATISTIC CODE - 00003 MEAN

DURATION TABLE OF DAILY VALUES  
 FOR PERIOD OCT TO SEP

CLASS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35				
WATER YEAR																																							
RANGE																																							
1933 1933	15161	42	51	21	13	6	4	4	4	7	4	1	4	5	4	5	2	4	4	4	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
1934 1934	43136	26	49	16	14	1	4	6	4	4	6	2	2	3	2	1	9	4	7	4	4	9	3	5	2	3	3	1	1	1	1	1	1	1	1	1	1	1	
1935 1935	27108	51	62	12	14	14	7	6	6	5	5	2	6	3	2	2	4	9	2	2	3	6	6	3	3	2	1	2	1	1	1	1	1	1	1	1	1	1	
1936 1936	27120	33	45	11	18	12	8	7	7	5	5	7	7	6	6	7	6	8	8	6	7	8	4	1	1	6	7	7	1	1	2	3	1	1	1	1	1	1	
1937 1937	37	37	66	16	19	11	2	12	9	9	9	10	5	12	10	8	12	13	12	12	10	10	3	13	6	7	7	1	1	2	3	1	1	1	1	1	1	1	
1938 1938	4	89	48	74	15	9	11	5	3	6	4	10	4	9	4	6	5	5	6	10	7	10	5	1	1	4	2	4	3	2	2	1	1	1	1	1	1	1	
1939 1939	4	97	48	70	10	12	6	10	5	4	4	4	4	7	7	8	9	9	6	10	12	7	4	2	2	1	1	3	1	1	1	1	1	1	1	1	1	1	
1940 1940	71152	17	42	10	14	4	5	6	4	4	4	2	2	5	2	1	2	4	4	6	5	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
1941 1941	45107	30	60	14	16	5	7	6	6	3	6	7	7	9	9	3	5	6	11	3	1	1	3	3	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1
1942 1942	4105	40	67	16	9	7	9	4	4	4	4	3	4	3	8	9	2	2	3	9	4	8	9	8	6	6	6	5	4	1	1	2	2	1	2	2	1	1	1
1943 1943	18140	28	67	19	11	7	3	4	4	7	5	5	5	5	5	2	6	9	4	3	3	1	2	5	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1
1944 1944	70119	36	60	16	8	8	5	7	7	2	2	3	3	3	3	5	5	5	2	1	1	3	1	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1945 1945	103	94	29	24	6	13	15	9	4	1	7	6	6	9	5	4	4	4	7	3	4	6	1	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1946 1946	66116	24	27	10	7	9	7	5	5	2	9	3	3	5	7	6	7	4	4	10	9	7	4	4	3	6	6	2	2	2	2	2	2	2	2	2	2	2	2
CLASS	VALUE	TOTAL	ACCUM	PERCT	CLASS	VALUE	TOTAL	ACCUM	PERCT	CLASS	VALUE	TOTAL	ACCUM	PERCT	CLASS	VALUE	TOTAL	ACCUM	PERCT	CLASS	VALUE	TOTAL	ACCUM	PERCT	CLASS	VALUE	TOTAL	ACCUM	PERCT	CLASS	VALUE	TOTAL	ACCUM	PERCT	CLASS	VALUE	TOTAL	ACCUM	PERCT
1	0.00	0	5113	100.00	13	11.00	70	993	19.42	25	79.00	28	139	2.72	26	94.00	35	111	2.17	27	111.00	26	76	1.49	28	131.00	15	50	0.98	29	155.00	8	35	0.68	30	183.00	9	27	0.53
2	1.70	497	5113	100.00	14	13.00	69	923	18.05	26	94.00	35	111	2.17	27	111.00	26	76	1.49	28	131.00	15	50	0.98	29	155.00	8	35	0.68	30	183.00	9	27	0.53	31	216.00	9	18	0.35
3	2.00	1581	4616	90.28	15	15.00	82	854	16.70	27	111.00	26	76	1.49	28	131.00	15	50	0.98	29	155.00	8	35	0.68	30	183.00	9	27	0.53	31	216.00	9	18	0.35	32	256.00	4	9	0.18
4	2.40	489	3035	59.36	16	18.00	67	772	15.10	28	131.00	15	50	0.98	29	155.00	8	35	0.68	30	183.00	9	27	0.53	31	216.00	9	18	0.35	32	256.00	4	9	0.18	33	302.00	0	5	0.10
5	2.80	764	2546	49.79	17	21.00	76	705	13.79	29	155.00	8	35	0.68	30	183.00	9	27	0.53	31	216.00	9	18	0.35	32	256.00	4	9	0.18	33	302.00	0	5	0.10	34	357.00	3	5	0.10
6	3.30	192	1782	34.85	18	25.00	79	629	12.30	30	183.00	9	27	0.53	31	216.00	9	18	0.35	32	256.00	4	9	0.18	33	302.00	0	5	0.10	34	357.00	3	5	0.10	35	422.00	2	2	0.04
7	3.90	177	1590	31.10	19	29.00	77	550	10.76	31	216.00	9	18	0.35	32	256.00	4	9	0.18	33	302.00	0	5	0.10	34	357.00	3	5	0.10	35	422.00	2	2	0.04	36	480.00	80	48	4.69
8	4.60	116	1413	27.64	20	34.00	82	473	9.25	32	256.00	4	9	0.18	33	302.00	0	5	0.10	34	357.00	3	5	0.10	35	422.00	2	2	0.04	36	480.00	80	48	4.69	37	57.00	48	48	4.69
9	5.50	85	1297	25.37	21	41.00	71	391	7.65	33	302.00	0	5	0.10	34	357.00	3	5	0.10	35	422.00	2	2	0.04	36	480.00	80	48	4.69	37	57.00	48	48	4.69	38	57.00	48	48	4.69
10	6.50	79	1212	23.70	22	48.00	80	320	6.26	34	357.00	3	5	0.10	35	422.00	2	2	0.04	36	480.00	80	48	4.69	37	57.00	48	48	4.69	38	57.00	48	48	4.69	39	57.00	48	48	4.69
11	7.70	63	1133	22.16	23	57.00	80	240	4.69	35	422.00	2	2	0.04	36	480.00	80	48	4.69	37	57.00	48	48	4.69	38	57.00	48	48	4.69	39	57.00	48	48	4.69	40	57.00	48	48	4.69
12	9.00	77	1070	20.93	24	67.00	53	192	3.76	36	480.00	80	48	4.69	37	57.00	48	48	4.69	38	57.00	48	48	4.69	39	57.00	48	48	4.69	40	57.00	48	48	4.69	41	57.00	48	48	4.69

DURATION CURVE STATISTICAL CHARACTERISTICS FOR ...  
 STATION ID: 16511000 KAPAUOLA GULCH BL GOV'T RD NR NAHIKU, MAUI, HI  
 PARAMETER CODE = 00060  
 STATISTIC CODE - 00003 MEAN

DURATION DATA VALUES ARE INTERPOLATED FROM DURATION TABLE.  
 DATA ARE NOT ANALYTICALLY FITTED TO A PARTICULAR STATISTICAL DISTRIBUTION,  
 AND THE USER IS RESPONSIBLE FOR ASSESSMENT AND INTERPRETATION.

ADDITIONAL CONDITIONS FOR THIS RUN ARE:  
 STATISTICS ARE BASED ON LOGARITHMS (BASE 10).  
 NUMBER OF VALUES IS REDUCED FOR EACH NEAR-ZERO OR ZERO VALUE.

NUMBER OF VALUES = 19 (NUMBER OF NEAR-ZERO VALUES = 0)  
 LISTING OF DATA FOLLOWS:

PERCENT OF TIME VALUE EQUALED OR EXCEEDED	DATA VALUE	(LOG =
95.0	1.85	0.26818)
90.0	2.00	0.30181)
85.0	2.07	0.31561)
80.0	2.13	0.32899)
75.0	2.20	0.34196)
70.0	2.26	0.35456)
65.0	2.33	0.36680)
60.0	2.39	0.37871)
55.0	2.58	0.41201)
50.0	2.79	0.44582)
45.0	2.96	0.47136)
40.0	3.13	0.49523)
35.0	3.30	0.51786)
30.0	4.12	0.61509)
25.0	5.72	0.75744)
20.0	10.2	1.00993)
15.0	18.2	1.26069)
10.0	31.5	1.49849)
5.0	55.2	1.74225)

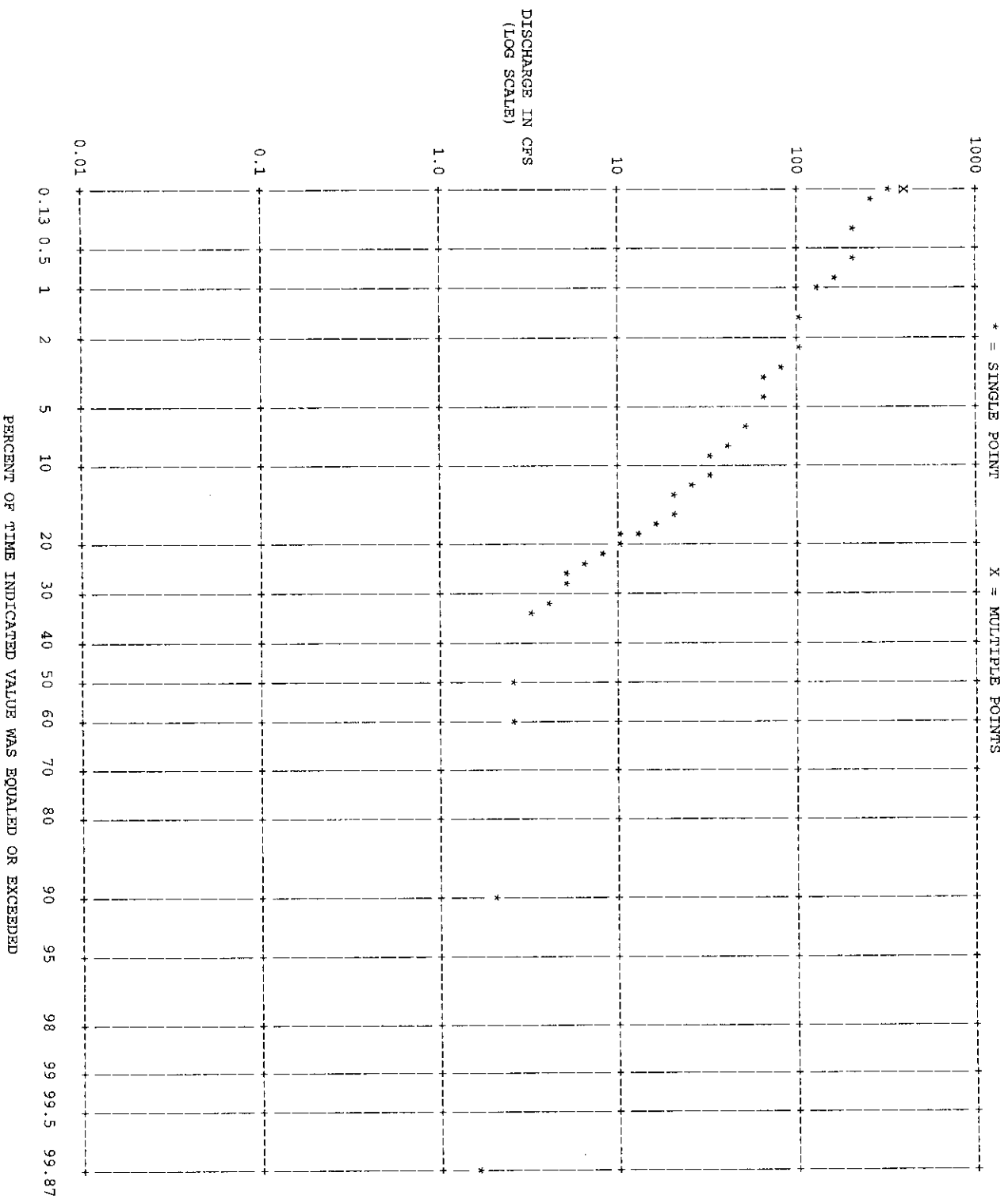
MEAN OF LOGS = 0.62541

STANDARD DEVIATION OF LOGS = 0.43501 (VARIABILITY INDEX - SEE USGS WSP 1542-A)

COEFFICIENT OF VARIATION = 0.69556

COEFFICIENT OF SKEW = 1.61514

LOG-NORMAL DURATION PLOT FOR PERIOD OCT TO SEP (YEARS 1932 - 1947)  
 STATION ID: 16511000 KAPAUHA GULCH BL GOV'T RD NR NAHIKU, MAUI, HI  
 PARAMETER CODE - 00060 DISCHARGE  
 STATISTIC CODE - 00003 MEAN





DVSTART - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16511000  
 KAPALUA GULCH BL GOV'T RD NR NAHIKU, MAUI, HI  
 PARAMETER CODE - 00060 DISCHARGE  
 STATISTIC CODE - 00003 MEAN

LOWEST MEAN VALUE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS  
 FOR PERIOD OCT TO SEP

WATER YEAR	1	3	7	14	30	60	90	120	183
1933	1.90	1.90	1.93	1.94	1.99	2.22	2.35	2.41	3.22
1934	1.90	1.90	1.90	1.90	1.94	3.02	4.74	4.61	5.39
1935	1.70	1.70	1.81	1.88	2.12	3.36	3.37	3.69	6.80
1936	1.90	1.90	1.90	1.91	1.95	2.95	2.70	4.34	5.38
1937	2.00	2.07	2.14	2.28	3.98	5.98	13.5	13.4	15.2
1938	1.90	1.90	1.94	2.28	2.60	3.21	4.38	5.98	16.0
1939	1.90	1.90	2.05	2.15	3.23	5.21	5.81	6.12	10.3
1940	1.90	1.90	1.90	1.91	1.93	2.05	2.38	3.16	3.50
1941	1.90	1.90	1.90	1.91	1.98	2.25	5.01	5.00	7.30
1942	1.90	1.93	1.96	1.97	2.04	2.28	4.64	4.86	8.75
1943	1.90	1.90	1.91	1.94	2.04	4.46	7.63	6.60	8.38
1944	1.90	1.90	1.90	1.90	1.90	2.33	3.96	4.11	5.18
1945	1.90	1.90	1.90	1.90	1.90	2.06	2.21	3.43	5.84
1946	1.90	1.90	1.90	1.90	1.93	2.11	5.42	5.72	9.19

DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16511000  
 KAPAHUA GULCH BL GOV'T RD NR NAHIKU, MAUI, HI  
 PARAMETER CODE - 00060 DISCHARGE  
 STATISTIC CODE - 00003 MEAN

HIGHEST MEAN VALUE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS  
 FOR PERIOD OCT TO SEP

WATER YEAR	1	3	7	15	30	60	90	120	183
1933 1933	235 7	136 8	72.8 8	36.4 11	24.3 11	17.1 11	16.6 9	14.1 9	10.9 12
1934 1934	404 3	159 5	84.6 6	68.0 5	48.1 4	31.0 5	25.7 5	21.6 6	16.1 7
1935 1935	364 4	262 3	143 3	69.8 4	42.5 6	30.6 6	22.7 7	21.5 7	18.5 5
1936 1936	131 12	69.0 13	38.0 12	30.6 12	24.9 10	20.2 8	16.9 8	14.1 10	12.6 9
1937 1937	282 5	228 4	141 4	111 3	79.7 2	57.1 2	50.6 2	42.8 1	34.3 1
1938 1938	422 2	269 2	206 2	113 2	72.8 3	45.9 3	39.6 3	33.3 3	28.8 3
1939 1939	255 6	154 6	113 5	64.9 6	35.6 7	30.3 7	24.2 6	23.0 5	18.5 6
1940 1940	229 8	145 7	83.4 7	49.5 8	34.1 8	19.2 9	13.8 10	10.8 12	8.83 13
1941 1941	207 10	105 9	58.4 11	36.5 10	21.5 12	16.5 12	13.8 11	14.3 8	12.8 8
1942 1942	436 1	368 1	289 1	172 1	113 1	71.7 1	53.2 1	40.7 2	33.6 2
1943 1943	181 11	71.8 12	37.2 13	29.9 13	19.8 13	14.7 13	12.2 13	11.7 11	11.0 11
1944 1944	102 14	47.2 14	25.3 14	15.2 14	11.0 14	9.44 14	9.04 14	7.85 14	7.09 14
1945 1945	125 13	84.3 11	61.0 10	43.9 9	26.3 9	18.5 10	13.0 12	10.8 13	11.5 10
1946 1946	223 9	91.6 10	68.3 9	58.4 7	44.7 5	33.3 4	30.8 4	27.5 4	21.2 4

DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16511000  
 KAPAPUA GULCH BL GOVT RD NR NAHIKU, MAUI, HI  
 PARAMETER CODE - 00060 DISCHARGE  
 STATISTIC CODE - 00003 MEAN

ANNUAL AND/OR SEMI-ANNUAL VALUES

MEAN VALUE AND RANKING FOR PERIOD INCLUDED IN LOW-VALUE ANALYSIS (OCT-SEP)			MEAN VALUE AND RANKING FOR PERIOD INCLUDED IN HIGH-VALUE ANALYSIS (OCT-SEP)				
WATER YEAR	RANGE		WATER YEAR	RANGE			
1933	1933	6.62	2	1933	1933	6.62	13
1934	1934	10.6	8	1934	1934	10.6	7
1935	1935	11.1	9	1935	1935	11.1	6
1936	1936	8.92	6	1936	1936	8.92	9
1937	1937	22.7	14	1937	1937	22.7	1
1938	1938	17.3	12	1938	1938	17.3	3
1939	1939	12.6	10	1939	1939	12.6	5
1940	1940	7.19	3	1940	1940	7.19	12
1941	1941	9.06	7	1941	1941	9.06	8
1942	1942	21.2	13	1942	1942	21.2	2
1943	1943	8.51	5	1943	1943	8.51	10
1944	1944	5.30	1	1944	1944	5.30	14
1945	1945	8.00	4	1945	1945	8.00	11
1946	1946	12.9	11	1946	1946	12.9	4

DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16510000  
 KAPAULA GULCH NEAR NAHIKU, MAUI, HI  
 PARAMETER CODE - 00060 DISCHARGE  
 STATISTIC CODE - 00003 MEAN

DURATION TABLE OF DAILY VALUES  
 FOR PERIOD OCT TO SEP

CLASS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35						
WATER YEAR																																									
RANGE																																									
1923 1923										13	43	48	56	35	36	20	20	12	15	17	11	4	4	5	4	5	4	5	7	5											
1924 1924										60	45	53	41	22	19	14	36	11	7	8	9	3	6	8	5	4	5	3	3	2	5	4	1	1							
1925 1925										36	50	48	37	30	29	29	13	12	10	10	5	9	8	11	7	4	8	3	3	1	4										
1926 1926						9	15	55	47	55	55	29	26	20	12	6	2	2	3	4	8	2	4	4	4	1	2	1	2	1	2	1									
1927 1927									20	49	42	31	42	36	44	15	10	10	8	4	13	6	3	17	3	5	3	3	2	7	2	1					1				
1928 1928										16	74	37	34	28	31	22	13	23	15	14	7	12	5	6	6	6	3	3	2	7	1										
1929 1929										31	60	39	46	19	22	13	13	23	11	12	6	8	10	16	7	2	3	2	6	1	1										
1930 1930										14	31	60	39	46	19	22	13	23	11	12	6	8	10	16	7	2	3	2	6	1	1										
1931 1931										13	6	24	12	8	31	34	25	32	21	26	27	24	19	9	9	7	7	7	11	4	3	3	2	1							
1932 1932										3	34	48	40	33	30	32	26	21	21	10	16	10	7	1	3	6	3	1	1	1	1	1									
1933 1933										6	15	19	38	50	29	42	17	31	18	23	13	11	12	9	10	8	7	3	3	1	3	1	1								
1934 1934			6	28						26	44	50	40	35	34	19	21	18	16	12	7	12	5	1	4	3	1	2	1	2	1	1						1			
1935 1935										3	23	24	18	10	19	18	11	19	17	18	7	12	13	4	4	12	8	5	1	3	2	2	1					1			
1936 1936						18	13			3	18	33	22	12	16	37	20	24	21	11	26	15	22	13	12	14	5	7	3	3	1										
1937 1937										12	13	5	25	18	23	26	34	30	35	29	26	13	11	15	12	11	12	11	10	5	6	3	2	1							
1938 1938			2							1	3	4	29	33	46	35	32	27	18	15	21	23	14	7	10	11	10	3	2	2	8	3					1				
1939 1939			2							1	3	3	5	9	25	42	43	29	42	24	25	13	23	17	13	12	12	10	3	1	3	1	1					1			
1940 1940										3	39	43	55	43	31	28	24	16	16	16	8	11	4	3	9	3	4	2	1	4	2								1		
1941 1941										3	21	46	42	38	38	35	30	11	18	16	16	8	14	12	3	3	3	4	1	3	1	1	1								
1942 1942										3	12	15	48	26	37	25	38	25	26	12	12	15	10	5	11	9	10	13	2	2	1	1							1		
1943 1943										3	21	44	40	44	28	30	20	23	17	14	13	13	16	12	7	6	4	1	5	3											
1944 1944										3	10	35	50	35	36	25	20	23	9	8	12	12	7	11	4	5	3	4	2	1	1	1									
1945 1945										19	48	40	30	41	29	32	15	13	13	19	10	10	17	5	6	8	3	3	1	2	4										
1946 1946										15	47	53	29	43	23	11	12	7	11	21	17	9	11	13	11	6	3	3	5	4	1	1	1								
1947 1947										5	24	29	46	47	26	38	13	22	8	15	17	12	7	7	7	5	5	6	1	8	3	2									
1948 1948										2	21	35	38	38	35	29	32	16	8	14	17	10	7	13	5	8	9	7	3	1	4										
1949 1949										2	30	36	39	28	35	22	18	16	12	15	18	7	13	5	5	5	5	8	1	1											
1950 1950										2	4	8	20	34	30	23	25	23	7	19	9	19	23	14	7	7	8	4	4	2	2	4									
1951 1951										1	12	18	39	31	28	34	23	23	22	16	12	9	8	14	4	8	8	2	5	4	4	1									
1952 1952										5	6	7	15	14	26	40	26	23	15	24	18	8	11	10	14	7	6	8	6	2	2	1									
1953 1953										8	5	25	16	27	40	33	24	22	16	16	9	16	5	8	6	3	7	7	3	2	1										
1954 1954										4	10	8	19	12	23	22	14	18	17	31	22	24	18	16	13	8	13	3	4	2	7										
1955 1955										3	7	6	10	20	28	26	42	31	29	27	20	14	6	7	12	14	8	4	6	4	7	2	2	1							
1956 1956										1	1	8	13	15	32	12	17	27	35	26	28	25	11	17	13	16	12	12	13	7	6	4	3	3	3	1					
1957 1957										1	17	19	51	35	24	38	16	31	19	15	8	18	11	12	7	5	5	5	3	3	4	1	1								

DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16510000  
 KAPULUA GULCH NEAR NAHIKU, MAUI, HI  
 PARAMETER CODE - 00060 DISCHARGE  
 STATISTIC CODE - 00003 MEAN

DURATION TABLE OF DAILY VALUES

CLASS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35			
WATER YEAR																																						
1958 1958								2	16	31	26	36	33	35	26	21	9	15	20	14	12	16	15	10	6	3	8	8	1	1								
1959 1959								4	26	33	23	50	46	31	31	17	14	11	4	10	10	6	9	8	6	6	4	4	4	7	2							
1960 1960							11	9	10	41	26	30	41	30	21	18	15	6	12	9	21	12	10	9	7	9	7	5	1	1	1							
1961 1961								7	28	20	62	43	32	31	26	15	16	11	4	13	7	13	6	4	5	3	2	4	4	4	2							
1962 1962							1	16	11	16	16	33	51	21	20	13	13	7	8	11	14	15	5	4	5	2	4	4	2	2	1							
CLASS																																						
VALUE																																						
TOTAL	0	8	8	14610	100.00	100.00	13	1366	9004	61.63	25	25	61.00	236	917	6.28																						
ACCUM	0	8	14610	100.00	100.00	13	1366	9004	61.63	25	25	61.00	236	917	6.28																							
PERCT	0	8	14610	100.00	100.00	13	1366	9004	61.63	25	25	61.00	236	917	6.28																							
CLASS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35			
VALUE	0.00	0.31	0.39	0.49	0.62	0.78	0.98	1.20	1.50	1.90	2.50	3.10	3.90	4.90	6.10	7.70	9.70	12.00	15.00	19.00	24.00	31.00	38.00	48.00	61.00	76.00	96.00	121.00	152.00	191.00	241.00	303.00	381.00	479.00	603.00			
TOTAL	0	8	38	35	98	134	183	409	878	1160	1316	1347	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35			
ACCUM	0	8	14602	14564	14529	14431	14297	14114	13705	12827	11667	10351	9004	7638	6523	5580	4731	4139	3480	2941	2382	1901	1301	603.00	603.00	603.00	603.00	603.00	603.00	603.00	603.00	603.00	603.00	603.00	603.00	603.00	603.00	
PERCT	0	8	99.95	99.69	99.45	98.77	97.86	96.61	93.81	87.80	79.86	70.85	61.63	52.28	44.65	38.19	32.38	28.33	23.82	20.13	16.30	13.01	10.64	8.45	6.28	5.28	4.66	4.27	3.32	2.27	1.38	0.77	0.40	0.23	0.09	0.04	0.01	

DURATION CURVE STATISTICAL CHARACTERISTICS FOR ...  
 STATION ID: 16510000 KAPAVIA GULCH NEAR NAHIKU, MAUI, HI  
 PARAMETER CODE = 00060  
 STATISTIC CODE - 00003 MEAN

DURATION DATA VALUES ARE INTERPOLATED FROM DURATION TABLE:  
 DATA ARE NOT ANALYTICALLY FITTED TO A PARTICULAR STATISTICAL DISTRIBUTION,  
 AND THE USER IS RESPONSIBLE FOR ASSESSMENT AND INTERPRETATION.

ADDITIONAL CONDITIONS FOR THIS RUN ARE:  
 STATISTICS ARE BASED ON LOGARITHMS (BASE 10).  
 NUMBER OF VALUES IS REDUCED FOR EACH NEAR-ZERO OR ZERO VALUE.

NUMBER OF VALUES = 19 (NUMBER OF NEAR-ZERO VALUES = 0)  
 LISTING OF DATA FOLLOWS:

PERCENT OF TIME VALUE EQUALED OR EXCEEDED	DATA VALUE	(LOG =
95.0	1.37	0.13736)
90.0	1.75	0.24386)
85.0	2.11	0.32455)
80.0	2.49	0.39605)
75.0	2.82	0.45078)
70.0	3.17	0.50156)
65.0	3.61	0.55721)
60.0	4.07	0.61005)
55.0	4.61	0.66361)
50.0	5.26	0.72085)
45.0	6.04	0.78137)
40.0	7.25	0.86046)
35.0	8.80	0.94443)
30.0	11.1	1.04344)
25.0	14.2	1.15274)
20.0	19.2	1.28262)
15.0	26.8	1.42769)
10.0	40.9	1.61212)
5.0	72.9	1.86245)

MEAN OF LOGS = 0.81964

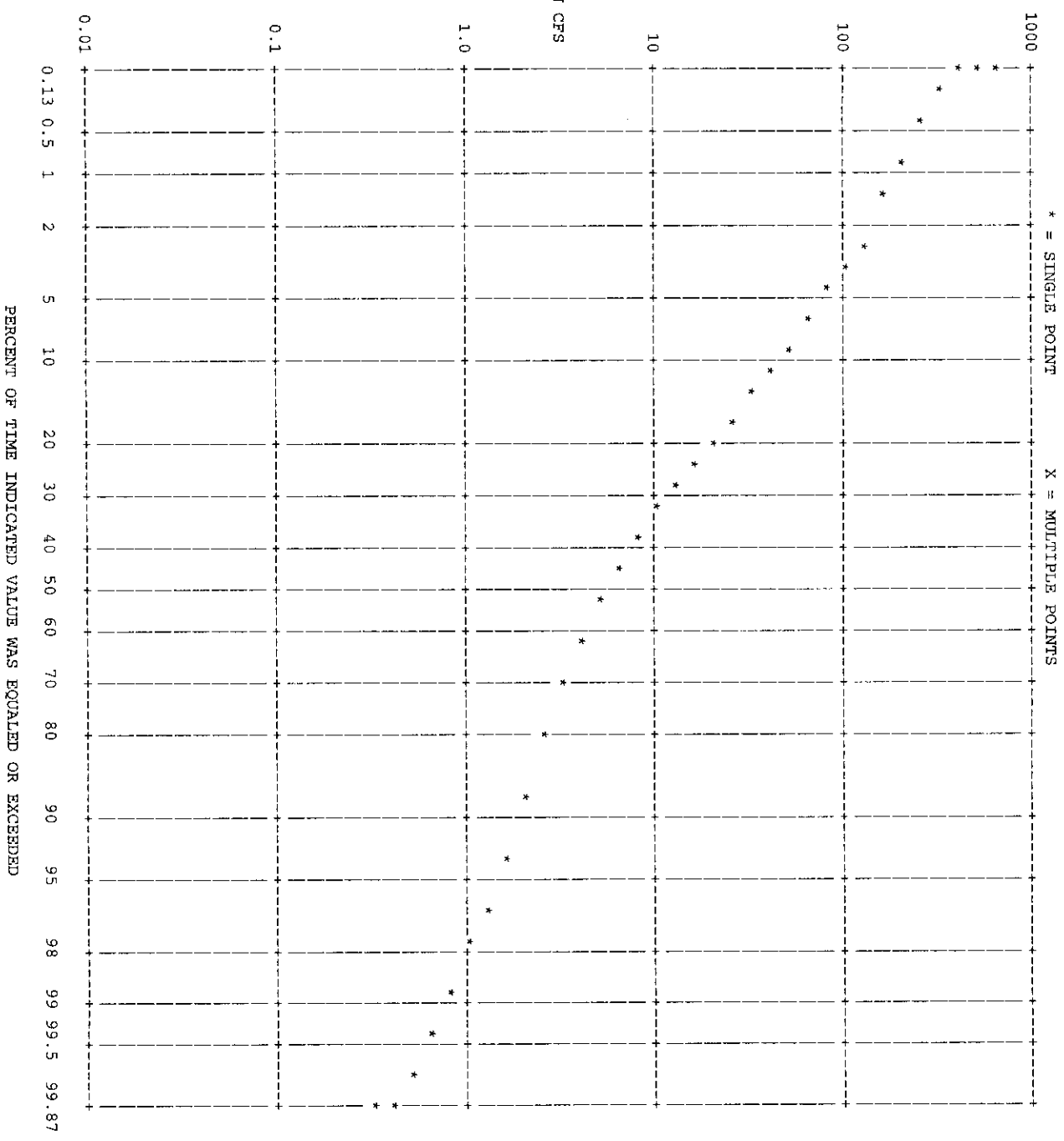
STANDARD DEVIATION OF LOGS = 0.47639 (VARIABILITY INDEX - SEE USGS WSP 1542-A)

COEFFICIENT OF VARIATION = 0.58122

COEFFICIENT OF SKEW = 0.68091

LOG-NORMAL DURATION PLOT FOR PERIOD OCT TO SEP  
 STATION ID: 16510000 KAPAUILA GULCH NEAR NAHIKU, MAUI, HI  
 PARAMETER CODE - 00060 DISCHARGE  
 STATISTIC CODE - 00003 MEAN

(YEARS 1922 - 1963)



DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16510000  
 KAPAUOLA GULCH NEAR NAHIKU, MAUI, HI  
 PARAMETER CODE - 00060 DISCHARGE  
 STATISTIC CODE - 00003 MEAN

LOWEST MEAN VALUE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS  
 FOR PERIOD OCT '90 SEP

WATER YEAR	1	3	7	14	30	60	90	120	183
1923 1923	2.00 39	2.20 40	2.30 38	2.35 36	3.13 31	6.68 31	8.04 25	8.08 20	11.7 21
1924 1924	1.90 35	1.93 35	2.03 35	2.14 30	2.39 22	3.22 12	6.43 18	5.71 12	10.2 15
1925 1925	1.90 36	2.00 37	2.11 37	2.23 32	2.48 25	4.15 20	6.96 21	10.3 29	18.2 37
1926 1926	.93 15	.93 12	.98 10	1.09 8	1.22 7	1.54 1	1.74 1	2.87 1	3.71 1
1927 1927	1.60 28	1.60 28	1.63 27	1.67 24	1.97 17	5.86 27	6.93 20	12.0 35	12.6 24
1928 1928	1.90 37	1.90 34	1.99 34	2.17 31	2.56 27	8.32 34	10.8 34	12.9 38	13.6 29
1929 1929	1.60 29	1.63 29	1.67 28	1.79 27	2.13 19	3.64 16	4.70 10	5.69 11	7.94 11
1930 1930	1.20 19	1.20 19	1.26 15	1.37 16	1.68 14	9.95 38	13.5 39	13.8 39	22.8 40
1931 1931	1.70 31	1.70 30	1.84 30	2.11 28	2.79 29	5.57 26	5.84 15	6.92 17	10.6 16
1932 1932	1.90 38	2.03 39	2.46 40	2.63 37	4.62 37	5.51 25	10.6 33	9.58 27	15.3 32
1933 1933	1.20 20	1.20 20	1.40 22	1.49 18	1.66 12	2.56 5	3.36 3	3.80 3	5.04 3
1934 1934	.31 1	.31 1	.40 1	.45 1	.72 1	2.61 6	5.40 13	4.81 6	6.20 6
1935 1935	1.60 30	1.97 36	2.41 39	2.68 38	3.74 33	5.90 28	6.56 19	6.87 16	10.7 17
1936 1936	.62 8	.62 8	.66 5	.74 5	.97 4	2.64 8	2.48 2	4.88 7	6.82 7
1937 1937	2.00 40	2.00 38	2.03 36	2.33 35	8.56 40	9.99 39	19.1 40	19.7 40	21.9 39
1938 1938	.46 6	.51 5	1.32 19	3.21 39	4.20 34	7.28 32	7.11 22	9.44 25	21.7 38
1939 1939	.31 2	.36 2	1.73 29	3.42 40	7.61 39	9.80 36	11.0 36	11.3 34	16.3 34
1940 1940	1.40 25	1.40 25	1.47 24	1.58 20	1.96 16	3.54 14	4.38 9	4.53 5	6.00 5
1941 1941	1.80 33	1.87 32	1.96 32	2.11 29	2.63 28	3.70 17	8.34 28	8.38 21	11.5 19
1942 1942	1.80 34	1.87 33	1.97 33	2.26 33	2.55 26	4.56 22	8.96 29	9.45 26	13.8 30
1943 1943	1.40 26	1.40 26	1.47 25	1.64 21	2.47 24	6.59 30	11.8 38	10.7 30	12.4 23
1944 1944	.93 16	.95 14	1.09 14	1.13 11	1.21 6	2.97 10	5.76 14	6.19 14	7.30 9
1945 1945	1.20 21	1.23 21	1.34 20	1.47 17	1.67 13	2.61 7	3.69 6	5.36 10	9.12 12
1946 1946	1.20 22	1.23 22	1.27 16	1.31 15	1.68 15	2.94 9	8.32 27	7.68 19	11.5 20
1947 1947	1.20 23	1.30 23	1.39 21	1.52 19	2.30 21	7.63 33	9.16 30	11.0 33	13.0 26
1948 1948	1.70 32	1.77 31	1.87 31	2.32 34	4.32 35	9.88 37	11.7 37	10.9 32	16.3 35
1949 1949	1.20 24	1.33 24	1.46 23	1.73 26	1.98 18	3.92 18	5.08 11	6.74 15	7.64 10
1950 1950	.93 17	.95 15	1.31 18	1.66 22	3.44 32	8.38 35	9.50 31	9.12 23	16.2 33
1951 1951	.91 12	.97 16	1.00 12	1.11 9	2.28 20	3.01 11	3.81 7	4.92 8	7.26 8
1952 1952	.80 9	.84 10	1.02 13	1.17 13	4.49 36	6.27 29	8.24 26	9.93 28	12.2 22
1953 1953	.51 7	.56 7	.58 4	.65 3	.92 3	2.27 3	4.26 8	4.41 4	5.89 4
1954 1954	.45 3	.45 3	.53 2	.71 4	1.20 5	4.64 23	5.21 12	5.95 13	9.45 14
1955 1955	.91 13	.94 13	.98 9	1.12 10	2.42 23	3.99 19	9.76 32	9.25 24	13.0 27
1956 1956	.45 4	.55 6	.95 8	1.08 7	1.54 11	4.49 21	7.91 23	12.1 36	17.0 36
1957 1957	.91 14	.97 17	.99 11	1.04 6	1.34 8	2.54 4	6.01 16	10.7 31	11.2 18
1958 1958	1.40 27	1.43 27	1.51 26	1.71 25	5.27 38	11.0 40	10.8 35	12.1 37	12.6 25
1959 1959	1.10 18	1.13 18	1.27 17	1.66 23	3.04 30	5.07 24	7.98 24	8.78 22	13.0 28



DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16510000  
 KAPAUHA GULCH NEAR NAHIKU, MAUI, HI  
 PARAMETER CODE - 00060 DISCHARGE  
 STATISTIC CODE - 00003 MEAN

LOWEST MEAN VALUE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS  
 FOR PERIOD OCT TO SEP

WATER YEAR	1	3	7	14	30	60	90	120	183
RANGE									
1960 1960	.80 10	.84 11	.89 6	1.15 12	1.35 9	3.39 13	6.30 17	7.31 18	15.1 31
1961 1961	.80 11	.80 9	.90 7	1.22 14	1.44 10	3.63 15	3.67 5	4.92 9	9.22 13
1962 1962	.45 5	.51 4	.54 3	.60 2	.83 2	2.25 2	3.57 4	3.35 2	4.33 2

DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16510000  
 KAPAUOLA GULCH NEAR NAHIKU, MAUI, HI  
 PARAMETER CODE - 00060 DISCHARGE  
 STATISTIC CODE - 00003 MEAN

HIGHEST MEAN VALUE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS  
 FOR PERIOD OCT TO SEP

WATER YEAR	1	3	7	15	30	60	90	120	183
RANGE									
1923 1923	367 13	256 10	234 3	137 2	76.6 5	45.4 11	37.0 12	32.4 12	26.3 13
1924 1924	353 15	227 13	136 16	85.5 17	51.4 22	40.3 19	31.1 23	30.1 18	24.1 20
1925 1925	419 10	206 15	115 20	81.0 19	71.4 8	43.0 17	32.7 20	27.0 25	23.9 21
1926 1926	155 36	75.0 38	36.2 39	29.5 39	19.9 39	12.7 40	10.8 40	9.78 40	7.36 40
1927 1927	427 8	186 19	95.4 26	54.9 30	34.4 32	26.9 31	22.9 32	22.0 28	18.1 32
1928 1928	241 30	165 26	77.9 32	44.9 35	37.4 31	32.4 26	29.5 24	23.0 26	22.3 25
1929 1929	254 28	170 25	153 13	103 11	75.2 7	47.3 7	39.5 7	34.8 8	28.3 10
1930 1930	359 14	229 12	185 9	107 9	67.1 11	56.7 3	44.2 6	43.7 4	36.7 4
1931 1931	340 16	181 22	91.7 29	51.2 32	30.8 36	23.0 37	21.3 35	17.4 36	18.8 29
1932 1932	274 26	191 18	132 17	93.0 14	65.5 13	45.0 12	38.4 8	34.9 7	30.4 7
1933 1933	306 22	180 23	93.6 27	48.8 34	34.2 33	25.1 33	23.5 29	20.3 31	16.2 35
1934 1934	500 4	194 17	102 23	81.8 18	57.1 19	38.8 21	33.1 19	29.3 20	22.3 26
1935 1935	552 2	393 2	214 4	107 8	64.2 14	44.9 14	34.1 18	31.8 14	26.9 12
1936 1936	145 39	70.7 40	41.8 38	32.7 38	27.6 37	23.3 36	21.5 34	18.8 32	18.1 33
1937 1937	331 17	275 8	169 11	133 3	96.4 2	70.7 2	61.5 1	53.7 1	43.5 1
1938 1938	548 3	364 4	246 2	125 4	87.4 3	55.0 4	47.0 4	40.6 5	35.3 5
1939 1939	418 11	197 16	137 15	79.8 20	45.3 26	39.5 20	32.2 21	31.1 16	25.9 15
1940 1940	309 20	183 21	119 19	77.5 22	51.4 23	31.3 27	23.4 31	18.3 34	15.3 37
1941 1941	255 27	144 29	78.6 31	49.4 33	31.1 35	24.0 35	20.9 36	21.2 30	19.3 28
1942 1942	470 6	379 3	298 1	183 1	122 1	80.7 1	61.0 2	47.5 2	40.7 2
1943 1943	234 31	92.6 37	45.1 37	39.6 37	27.1 38	21.7 38	18.2 38	17.4 37	16.1 36
1944 1944	149 37	71.7 39	35.0 40	24.2 40	18.1 40	15.6 39	14.2 39	12.5 39	11.2 39
1945 1945	144 40	112 34	79.3 30	61.1 28	39.5 30	26.7 32	18.7 37	15.6 38	14.7 38
1946 1946	316 19	127 33	77.1 33	68.8 25	47.2 25	37.2 23	35.3 15	32.0 13	25.2 17
1947 1947	373 12	286 7	205 6	109 7	76.4 6	46.2 8	35.7 14	29.2 21	25.5 16
1948 1948	715 1	457 1	206 5	98.7 12	67.6 10	45.0 13	46.4 5	40.4 6	34.3 6
1949 1949	275 25	177 24	102 22	77.3 23	59.4 16	41.0 18	34.9 16	28.4 22	23.5 22
1950 1950	232 32	162 27	125 18	91.0 16	60.1 15	48.1 6	38.3 9	32.6 11	26.3 14
1951 1951	232 33	139 31	96.7 25	68.5 26	52.6 21	34.1 24	31.4 22	31.3 15	23.4 23
1952 1952	297 24	136 32	103 21	75.5 24	50.3 24	30.8 28	28.1 26	28.1 23	24.5 19
1953 1953	192 35	92.7 36	63.9 36	43.6 36	40.0 29	33.4 25	24.3 27	18.6 33	16.4 34
1954 1954	149 38	107 35	67.1 35	55.1 29	33.3 34	24.5 34	23.5 30	22.7 27	21.8 27
1955 1955	326 18	249 11	200 7	122 5	82.1 4	51.6 5	52.3 3	47.0 3	37.8 3
1956 1956	446 7	306 5	172 10	120 6	65.9 12	46.1 9	38.1 10	34.3 9	29.7 9
1957 1957	244 29	141 30	92.0 28	62.8 27	44.4 27	28.1 30	24.3 28	21.6 29	18.4 30
1958 1958	309 21	185 20	100 24	78.6 21	69.3 9	45.6 10	34.9 17	29.4 19	24.8 18
1959 1959	305 23	222 14	153 12	91.2 15	57.3 17	44.9 15	36.6 13	30.9 17	28.1 11

DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16510000  
 KAPAUHA GULCH NEAR NAHIKU, MAUI, HI  
 PARAMETER CODE - 00060 DISCHARGE  
 STATISTIC CODE - 00003 MEAN

HIGHEST MEAN VALUE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS  
 FOR PERIOD OCT TO SEP

WATER YEAR	1	3	7	15	30	60	90	120	183
RANGE	425	293	187	95.5	54.1	38.7	37.8	32.7	30.1
1960 1960	9	6	8	13	20	22	11	10	8
1961 1961	487	267	139	105	57.2	43.3	29.4	27.1	23.4
1962 1962	220	148	74.0	53.4	41.1	30.0	22.0	18.0	18.3
	34	28	34	31	28	29	33	35	31

DVSTRT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16510000  
 KAPALUA GULCH NEAR NAHIKU, MAUI, HI  
 PARAMETER CODE - 00060 DISCHARGE  
 STATISTIC CODE - 00003 MEAN

ANNUAL AND/OR SEMI-ANNUAL VALUES

MEAN VALUE AND RANKING FOR PERIOD INCLUDED IN LOW-VALUE ANALYSIS (OCT-SEP)			MEAN VALUE AND RANKING FOR PERIOD INCLUDED IN HIGH-VALUE ANALYSIS (OCT-SEP)		
WATER YEAR RANGE			WATER YEAR RANGE		
1923 1923	18.0	26	1923 1923	18.0	15
1924 1924	17.2	23	1924 1924	17.2	18
1925 1925	18.2	29	1925 1925	18.2	12
1926 1926	6.87	1	1926 1926	6.87	40
1927 1927	14.3	12	1927 1927	14.3	29
1928 1928	16.3	20	1928 1928	16.3	21
1929 1929	17.1	22	1929 1929	17.1	19
1930 1930	24.2	38	1930 1930	24.2	3
1931 1931	14.7	15	1931 1931	14.7	26
1932 1932	21.2	34	1932 1932	21.2	7
1933 1933	9.71	3	1933 1933	9.71	38
1934 1934	14.0	10	1934 1934	14.0	31
1935 1935	17.2	24	1935 1935	17.2	17
1936 1936	12.2	8	1936 1936	12.2	33
1937 1937	30.2	40	1937 1937	30.2	1
1938 1938	22.5	36	1938 1938	22.5	5
1939 1939	18.1	28	1939 1939	18.1	13
1940 1940	11.6	7	1940 1940	11.6	34
1941 1941	14.3	13	1941 1941	14.3	28
1942 1942	27.3	39	1942 1942	27.3	2
1943 1943	13.0	9	1943 1943	13.0	32
1944 1944	8.16	2	1944 1944	8.16	39
1945 1945	11.1	4	1945 1945	11.1	37
1946 1946	16.1	19	1946 1946	16.1	22
1947 1947	18.3	30	1947 1947	18.3	11
1948 1948	23.3	37	1948 1948	23.3	4
1949 1949	15.2	18	1949 1949	15.2	23
1950 1950	17.6	25	1950 1950	17.6	16
1951 1951	15.1	16	1951 1951	15.1	25
1952 1952	16.6	21	1952 1952	16.6	20
1953 1953	11.2	5	1953 1953	11.2	36
1954 1954	14.3	14	1954 1954	14.3	27
1955 1955	22.5	35	1955 1955	22.5	6
1956 1956	18.8	32	1956 1956	18.8	9
1957 1957	15.2	17	1957 1957	15.2	24
1958 1958	19.7	33	1958 1958	19.7	8
1959 1959	18.6	31	1959 1959	18.6	10
1960 1960	18.1	27	1960 1960	18.1	14
1961 1961	14.2	11	1961 1961	14.2	30
1962 1962	11.3	6	1962 1962	11.3	35

DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16510000  
KAPAUIA GULCH NEAR NAHIKU, MAUI, HI  
PARAMETER CODE - 00060 DISCHARGE  
STATISTIC CODE - 00003 MEAN

ANNUAL AND/OR SEMI-ANNUAL VALUES

MEAN VALUE AND RANKING FOR PERIOD INCLUDED IN LOW-VALUE ANALYSIS (OCT-SEP)	MEAN VALUE AND RANKING FOR PERIOD INCLUDED IN HIGH-VALUE ANALYSIS (OCT-SEP)
WATER YEAR RANGE	WATER YEAR RANGE