

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

MAY 24 9:00

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PETITION TO AMEND INTERIM INSTREAM FLOW STANDARDS

HONOMANU 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

16524000, 16527000

Data to follow.

USGS stream gaging station 16526000, 16525000

Period of Record 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 TABLES 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

Alan Murakami

May 24, 2001

Signature

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

For Official Use

Date Received
 Date Accepted

Honomanu Stream

Honomanu Stream is one of the longest streams in the study area (8.7 mi) and headed at one of the highest altitudes (7,800 ft) (plate 1). The stream also has the most deeply incised valley in the study area (excluding Keanae Valley), nearly 1,000 ft below the upland surface at 600 ft altitude. Accordingly, the stream gradient near the coast is low compared with adjacent streams, about 470 ft/mi. Honomanu Basalt is well exposed along the valley walls and floor for 2.5 mi from the coast but upstream of this point (1,600 ft altitude) only Kula Volcanics are present (Stearns and Macdonald, 1942). Unconsolidated alluvial deposits are found as far as 3,000 to 4,000 ft upstream from the coast. Streamflow is captured by three of the surface-water diversion systems (table 4).

Honomanu Stream has never been dry at gaging station 5270 immediately upstream of the Spreckels Ditch at 1,733 ft altitude nor at gaging stations 5240, 5260, and 5250 at 2,900 ft altitude on three stream branches (table 2, plate 1). Base-flow estimates from the two long-term streamflow records on the main branch indicate that the average annual gains from ground water are about 0.6 Mgal/d between gaging station 5240 at 2,900 ft altitude and gaging station 5270 at 1,733 ft altitude (table 2, fig. 15K). Independent sets of streamflow measurements were made three times (table 14). Measurements were made some time in the 1920's between 3,030 ft and 1,733 ft altitude that show a gain of about 1.6 Mgal/d (written commun. from J.H. Hofmann to J.H. Foss, November 17, 1932 in USGS Hawaii District files). Streamflow data from August 19, 1920 confirm this pattern (table 14). A set of measurements along a 3,000-ft section between 2,900 ft and 2,500 ft altitude on October 7, 1932 shows gains of about 0.10 Mgal/d (Hofmann, 1934). As part of this study, streamflow measurements were made on June 20, 1995 between 3,050 ft altitude and the coast. These measurements show a total gain of about 1 Mgal/d upstream of 1,733 ft altitude and a minor gain downstream to about 360 ft altitude. EMI records indicate that the stream was dry in March 1928 at about 500 ft altitude (table 10). Because several waterfalls make access to the stream at 500 ft altitude difficult, this measurement was likely made at the base of the falls near 360 ft altitude. Downstream of 360 ft altitude (Honomanu 10a, plate 1, at the

base of a large waterfall), base flow decreased and the stream was dry between 90 ft and 2 ft altitude. During low-flow conditions no total gain downstream of about 1,733 ft altitude probably exists until close to sea level. Near sea level, about 1.4 Mgal/d of flow issues from several springs in the Honomanu Basalt. These springs are likely issuing from the top of the freshwater lens. The stream valley downstream of the waterfall is floored by alluvial deposits all the way to the coast so the springs could also represent streamflow which had been lost to interbed flow reemerging near sea level.

A water budget was calculated for the 2.55-mi² area upstream of gaging station 5240 (Shade, 1999). In the water budget, 19.63 Mgal/d of rainfall and 6.05 Mgal/d of fog drip is apportioned into 7.05 Mgal/d of runoff, 3.65 Mgal/d of evapotranspiration, and 14.98 Mgal/d of recharge (table 1, fig. 6). The amount of base flow in this subbasin is only about 5 percent of the estimated recharge to the subbasin. Therefore, it appears likely that most of the recharge follows deeper groundwater flow paths and eventually discharges further downgradient offshore or at the shoreline.

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 14. Streamflow, temperature, and specific conductance in Honomanu Stream, northeast Maui, Hawaii
 (ft, feet; Mg/d, million gallons per day; °C, degrees Celsius; µS/cm, microsiemens per centimeter; --, not determined; altitudes estimated from U.S. Geological Survey topographic maps, Keanae, Kīlohana, and Nabiku quadrangles; 1920 flow data from Hofmann; written common. to Foss, 11/17/32, in U.S. Geological Survey Hawaii District files and daily-discharge data from Grover and Stewart (1924); 1932 flow data from Hofmann (1934) and daily-discharge data from Grover and Carson (1935); all other data is unpublished in files of U.S. Geological Survey, Hawaii District office unless otherwise noted; gaging-station number is preceded by 16 and ends in 00)

Station number (plate 1)	Stream name	Altitude (ft)	Date	Streamflow (Mgal/d)	Cumulative streamflow without diversion, June 20, 1995 ^a (Mgal/d)	Water temperature (°C)	Water specific conductance (µS/cm)	Comments
Honomanu 2	Honomanu (east branch)	2	6/20/95	0.59	--	20.6	184	
Honomanu 2a	Honomanu (west branch)	2	6/20/95	0.78	--	20.6	264	
Honomanu 4	Honomanu	30	6/20/95	0.0	0.00	--	--	
Honomanu 5	Honomanu	35	6/20/95	0.0	0.00	--	--	
Honomanu 6	Honomanu	50	6/20/95	0.0	0.00	--	--	
Honomanu 7	Honomanu	90	6/20/95	0.0	0.00	--	--	
Honomanu 8a	Honomanu	240	6/20/95	0.06	0.06	24.6	110	
Honomanu 9	Uluini	310	6/20/95	0.01	--	24.9	50	
Honomanu 10a	Honomanu	360	6/20/95	0.08	1.01	22.3	36	
Honomanu 11a	Honomanu (east unnamed tributary)	1,750	6/20/95	0.0	--	--	--	Downstream of Spreckels Ditch diversion
Honomanu 11	Honomanu (east unnamed tributary)	1,770	6/20/95	0.67	--	20.6	32.5	Upstream of Spreckels Ditch diversion
Honomanu 12	Spring	1,810	6/20/95	0.01	--	21.6	67	Daily mean at gaging station; upstream of Spreckels Ditch diversion
5270	Honomanu	1,733	1920 8/19/20	1.90 ^b 1.90	--	--	--	
Honomanu 13a	Honomanu	1,670	6/20/95	0.0	0.93 ^c	--	--	Downstream of Spreckels Ditch diversion
Honomanu 14a	Honomanu (west unnamed tributary)	1,720	6/20/95	0.0	--	--	--	Downstream of Spreckels Ditch diversion
Honomanu 18a	Honomanu	1,950	1920	1.57	--	--	--	
Honomanu 18b	Honomanu	2,250	1920	1.08	--	--	--	
Honomanu 18c	Honomanu	2,350	1920	0.99	--	--	--	
Honomanu 18d	Honomanu	2,500	1920	0.66	--	--	--	
Honomanu 18e	Honomanu	2,600	10/7/32	0.19	--	--	--	
Honomanu 18f	Honomanu	2,740	10/7/32	0.17	--	--	--	
5240	Honomanu	2,900	1920 8/19/20 10/7/32	0.14 0.36 ^b 0.35 0.10	--	--	--	Daily mean at gaging station
Honomanu 20	Honomanu	3,030	1920	0.28	--	--	--	Downstream of diversion
Honomanu 23	Honomanu	3,050	6/20/95	0.20	0.34	19.2	34	
			6/20/95	0.14	0.14	20.0	27	Upstream of diversion

^a Assumes negligible unmeasured leakage past diversion structures

^b Instantaneous measurement

^c Estimated using base-flow record from gaging stations 5240 and 5270

HONOMANU

DURATION CURVE STATISTICAL CHARACTERISTICS FOR ...
 STATION ID: 16524000 HONOMANU STR AP HAIKU-OKA BDRY NR KAILIILI, MAUI
 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	0.37	-0.43442)
90.0	0.50	(LOG = -0.30105)
85.0	0.65	(LOG = -0.18982)
80.0	0.81	(LOG = -0.08972)
75.0	1.00	(LOG = 0.00037)
70.0	1.19	(LOG = 0.07570)
65.0	1.37	(LOG = 0.13799)
60.0	1.58	(LOG = 0.19888)
55.0	1.84	(LOG = 0.26444)
50.0	2.12	(LOG = 0.32614)
45.0	2.41	(LOG = 0.38259)
40.0	2.96	(LOG = 0.47129)
35.0	3.62	(LOG = 0.55861)
30.0	4.69	(LOG = 0.67096)
25.0	6.47	(LOG = 0.81120)
20.0	9.00	(LOG = 0.95402)
15.0	15.0	(LOG = 1.17721)
10.0	27.6	(LOG = 1.44014)
5.0	63.3	(LOG = 1.80166)

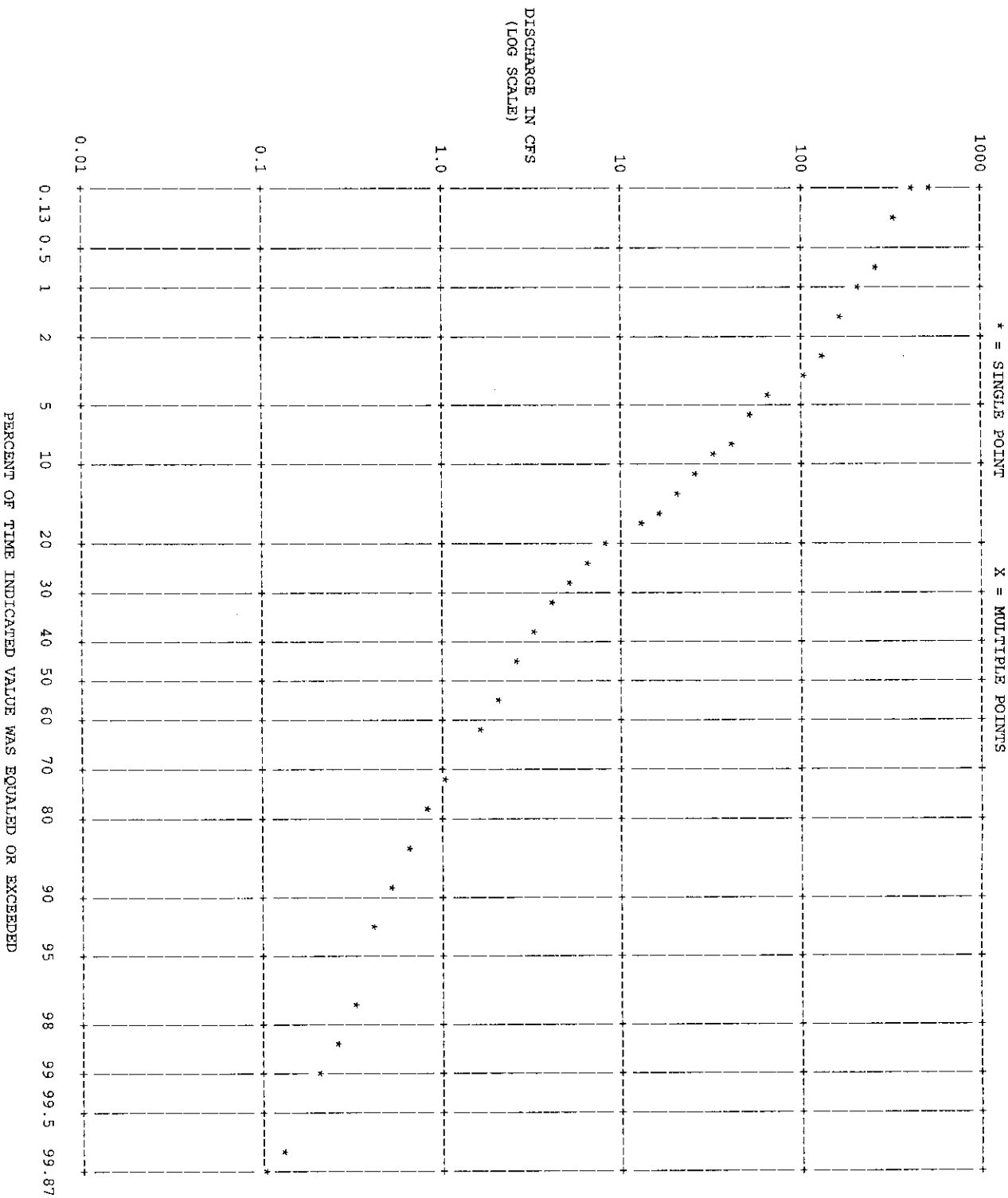
MEAN OF LOGS = 0.43454

STANDARD DEVIATION OF LOGS = 0.59541 (VARIABILITY INDEX - SEE USGS WSP 1542-A)

COEFFICIENT OF VARIATION = 1.37021

COEFFICIENT OF SKEW = 0.75758

LOG-NORMAL DURATION PLOT FOR PERIOD OCT TO SEP
 STATION ID: 16524000 HONOMANU STR AT HAIKU-UKA BDRY NR KAILIILLI MAUI (YEARS 1920 - 1969)
 PARAMETER CODE - 00060 DISCHARGE
 STATISTIC CODE - 00003 MEAN



DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16524000
 HONOMANU STR AT HAIKU-UKA BDRY NR KAILIILI, MAUI
 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 RANGE	1	3	7	14	30	60	90	120	183
1921 1921	.11 1	.13 2	.13 2	.19 2	.22 1	.82 2	1.55 3	3.80 7	7.04 9
1922 1922	.31 9	.31 8	.31 6	.31 5	.40 3	.73 1	1.45 2	2.31 2	4.96 5
1923 1923	.31 10	.31 9	.33 7	.41 7	.66 8	3.18 13	3.70 9	5.48 11	6.35 6
1924 1924	.31 11	.31 10	.33 8	.40 6	.58 6	1.85 7	5.19 11	4.65 9	7.19 11
1925 1925	.46 13	.46 13	.66 14	.83 14	1.33 12	3.21 14	8.07 14	8.70 14	15.3 14
1926 1926	.31 12	.34 12	.38 9	.43 8	.82 11	1.50 5	1.74 4	2.52 3	2.94 2
1933 1933	.15 3	.15 3	.17 4	.24 4	.41 4	.98 3	1.43 1	1.88 1	2.82 1
1934 1934	.15 4	.15 4	.15 3	.23 3	.48 5	2.36 11	5.68 12	5.25 10	6.59 7
1963 1963	.11 2	.11 1	.13 1	.14 1	.24 2	1.48 4	2.79 7	3.69 6	3.66 3
1964 1964	.56 14	.61 14	.64 13	.79 13	1.36 13	2.37 12	3.37 8	4.26 8	7.06 10
1965 1965	.26 7	.26 6	.38 10	.60 12	.79 9	2.02 9	6.11 13	6.44 13	9.60 13
1966 1966	.25 6	.26 7	.40 11	.49 11	.81 10	2.08 10	2.69 6	3.19 5	3.74 4
1967 1967	.30 8	.32 11	.41 12	.46 10	1.49 14	1.81 6	3.87 10	5.55 12	7.68 12
1968 1968	.18 5	.19 5	.23 5	.44 9	.62 7	1.88 8	2.18 5	2.55 4	6.82 8

DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16524000
 HONOMANU STR AT HAIKU-UKA BDRY NR KAILILILI MAUI
 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 RANGE	1	3	7	15	30	60	90	120	183
1921 1921	334	201	114	91.3	60.6	45.5	37.2	30.0	24.7
1922 1922	551	376	275	154	117	72.5	72.3	71.6	50.4
1923 1923	498	346	260	143	73.6	47.3	35.7	28.1	22.5
1924 1924	408	274	122	71.9	39.1	35.9	26.0	26.6	20.5
1925 1925	377	275	171	112	83.1	47.0	34.6	28.7	25.4
1926 1926	170	77.7	36.4	21.6	17.4	10.4	9.83	7.90	5.96
1933 1933	455	236	121	57.9	37.4	23.6	19.3	17.1	13.0
1934 1934	554	209	105	88.3	55.5	37.4	30.6	25.5	19.6
1963 1963	210	105	71.1	60.3	45.5	27.8	22.0	18.9	14.1
1964 1964	227	132	70.0	52.8	40.1	23.7	19.4	18.3	13.8
1965 1965	370	235	212	118	69.1	36.9	25.7	22.1	20.6
1966 1966	169	122	78.8	48.9	46.5	28.3	22.5	20.4	14.9
1967 1967	248	149	76.9	50.0	35.4	20.2	18.6	18.3	15.7
1968 1968	174	140	76.7	53.7	38.3	25.6	19.3	15.2	18.2

DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16524000
 HONOMANU STR AT HAIKU-UKA BDRY NR KAILIILI, MAUI
 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		
1921 1921	14.2	10	1921 1921	14.2	5
1922 1922	27.3	14	1922 1922	27.3	1
1923 1923	14.6	12	1923 1923	14.6	3
1924 1924	14.6	11	1924 1924	14.6	4
1925 1925	18.8	13	1925 1925	18.8	2
1926 1926	5.25	1	1926 1926	5.25	14
1933 1933	7.23	2	1933 1933	7.23	13
1934 1934	12.7	8	1934 1934	12.7	7
1963 1963	8.61	3	1963 1963	8.61	12
1964 1964	10.1	5	1964 1964	10.1	10
1965 1965	14.0	9	1965 1965	14.0	6
1966 1966	9.37	4	1966 1966	9.37	11
1967 1967	10.9	7	1967 1967	10.9	8
1968 1968	10.5	6	1968 1968	10.5	9

DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16524000
HONOMANU STR AT HAIKU-UKA BDRY NR KAILIILI, MAUI
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)	WATER YEAR RANGE	MEAN VALUE AND RANKING FOR PERIOD INCLUDED IN HIGH-VALUE ANALYSIS (OCT-SEP)	WATER YEAR RANGE
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DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16527000
 HONOHANU STREAM NEAR KEANAE, 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																																							
1915 1915	2	1	6	6	25	34	37	46	20	30	24	29	18	19	14	14	14	12	3	4	7	5	5	2	1	1													
1916 1916																																							
1917 1917	7	8	7	5	14	50	21	55	37	34	30	28	12	10	9	12	5	7	3	3	2	2	1	1	1	1	1												
1918 1918	5	7	7	3	4	16	7	23	31	34	33	38	20	21	23	11	12	14	19	4	9	6	6	3	4	3	2												
1919 1919	2	6	6	5	7	15	21	24	35	76	29	15	34	17	9	7	13	10	8	3	12	2	2	2	3	1	1												
1920 1920	12	39	57	26	46	20	36	25	26	10	15	5	8	6	12	5	3	2	1	1	2	2	2	3	3	2	2												
1921 1921	2	10	8	2	5	12	27	49	32	39	28	18	32	10	9	11	7	6	17	9	5	5	8	2	5	8	2	5											
1922 1922	13	5	19	11	29	11	29	22	20	32	22	17	21	15	15	14	11	11	20	9	7	7	7	6	4	9	2												
1923 1923	2	4	5	5	4	8	28	33	27	62	44	24	20	21	15	9	11	17	9	3	3	4	5	5	3	3	1	3											
1924 1924	2	2	2	2	2	8	28	33	27	62	44	24	20	21	15	9	11	17	9	3	3	4	5	5	3	3	1	3											
1925 1925	3	21	21	22	20	28	40	27	32	31	17	17	22	14	17	6	10	7	7	7	4	5	8	2	1	1	1												
1926 1926	2	11	27	69	17	28	32	49	25	33	19	5	6	19	4	2	11	1	1	2	2	2	2	1	1	1	1												
1927 1927	1	2	2	17	37	22	34	40	44	17	43	17	24	14	10	9	16	5	13	2	2	5	1	2	1	1	1												
1928 1928	4	1	2	3	7	9	17	39	64	21	45	25	13	34	14	15	6	14	8	11	4	2	4	4	3	3													
1929 1929	3	1	4	2	5	17	28	49	41	27	19	24	13	14	11	13	14	11	13	7	7	5	8	4	4	2	2												
1930 1930	1	8	1	2	4	1	2	12	12	17	27	24	38	36	25	18	23	25	16	9	12	8	14	6	6	3	2												
1931 1931	1	6	7	15	16	21	40	36	31	29	24	26	26	12	15	13	15	13	15	14	3	8	2	1	1	1	3												
1932 1932	8	26	35	55	40	32	41	19	26	10	18	8	7	13	9	8	7	13	9	8	7	1	1	1	1	1													
1933 1933	5	4	8	12	22	22	26	44	41	29	41	12	21	7	9	10	7	7	5	5	2	2	3	3	2	2													
1934 1934	14	6	13	27	16	39	23	19	17	21	30	16	31	15	8	8	16	10	11	11	7	4	7	5	1	1	1												
1935 1935	10	13	15	31	32	59	56	20	38	18	10	13	10	9	6	5	5	7	7	4	4	4	4	2	2	1	2												
1936 1936	1	20	10	26	20	13	15	17	27	39	25	37	24	21	20	15	11	12	9	2	2	2	7	5	4	1	2												
1937 1937	5	10	19	26	41	33	37	30	28	32	30	7	14	16	12	7	14	16	12	5	3	5	3	3	2	3	1												
1938 1938	8	13	13	42	40	39	31	23	24	14	28	17	19	8	11	12	8	11	12	5	3	5	3	3	2	3	1												
1939 1939	1	7	21	22	31	39	28	30	43	26	17	24	22	13	12	12	12	12	8	4	4	2	4	3	3	2													
1940 1940	5	6	11	18	31	35	34	39	34	26	20	13	15	11	8	4	4	4	4	4	2	4	2	4	3	3	2												
1941 1941	4	3	4	15	26	23	28	42	26	27	23	27	13	16	17	16	11	8	15	7	4	5	1	2	1	1	1												
1942 1942	5	7	9	15	16	21	21	44	30	24	28	22	17	11	15	18	15	11	12	3	10	11	10	9	9	2	1	2											
1943 1943	4	14	22	26	33	33	32	32	32	32	21	22	15	8	8	11	10	12	6	4	4	4	8	3	3	2													
1944 1944	6	7	11	9	20	12	23	44	32	35	44	22	17	11	14	8	12	3	10	5	5	5	5	2	2	2													
1945 1945	5	21	10	18	21	25	29	34	29	27	19	19	17	13	13	10	12	7	13	10	7	1	4	1	1	1													
1946 1946	1	4	11	22	27	40	40	44	24	17	9	15	11	16	13	18	14	14	3	15	6	8	3	1	1	2													
1947 1947	1	7	3	8	14	30	42	55	30	31	18	19	13	12	13	15	10	9	5	10	7	4	2	3	3	2													
1948 1948	2	2	23	32	28	37	37	42	39	32	28	25	19	14	13	10	12	8	12	16	7	7	4	7	7	1	1												
1949 1949	2	2	23	32	28	37	37	42	39	32	28	25	19	14	13	10	12	8	12	16	7	7	4	7	7	1	1												

DURATION CURVE STATISTICAL CHARACTERISTICS FOR ...
 STATION ID: 16527000 HONOMANU STREAM NEAR KEANAE, 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	1.16	0.06566)
90.0	1.74	(LOG = 0.23948)
85.0	2.17	(LOG = 0.33590)
80.0	2.59	(LOG = 0.41363)
75.0	3.06	(LOG = 0.48634)
70.0	3.56	(LOG = 0.55164)
65.0	4.13	(LOG = 0.61587)
60.0	4.72	(LOG = 0.67390)
55.0	5.42	(LOG = 0.73399)
50.0	6.19	(LOG = 0.79149)
45.0	7.28	(LOG = 0.86204)
40.0	8.61	(LOG = 0.93501)
35.0	10.5	(LOG = 1.01974)
30.0	13.4	(LOG = 1.12762)
25.0	17.5	(LOG = 1.24244)
20.0	23.6	(LOG = 1.37243)
15.0	34.6	(LOG = 1.53891)
10.0	53.3	(LOG = 1.72676)
5.0	99.9	(LOG = 1.99974)

MEAN OF LOGS = 0.88066

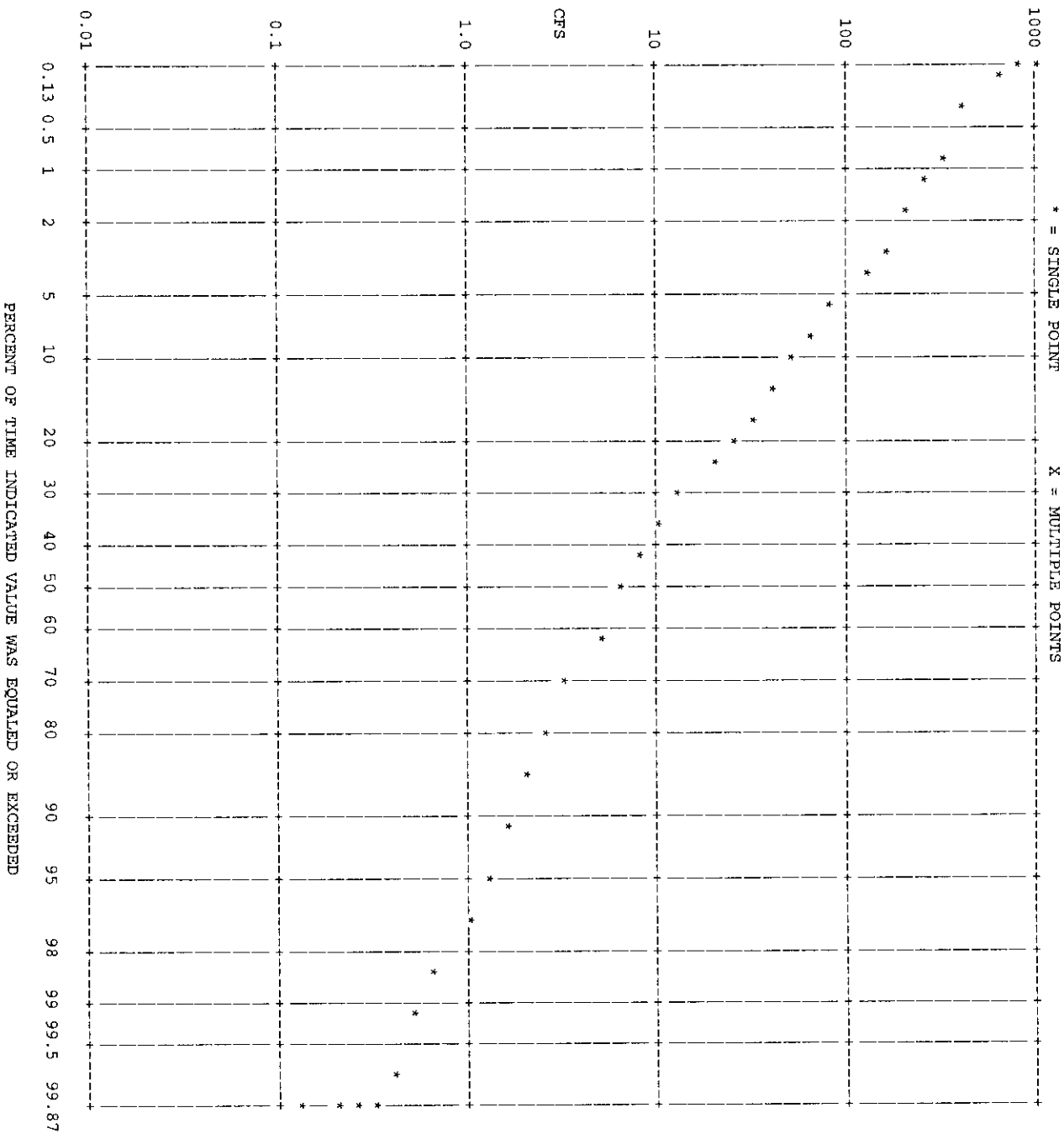
STANDARD DEVIATION OF LOGS = 0.51930 (VARIABILITY INDEX - SEE USGS WSP 1542-A)

COEFFICIENT OF VARIATION = 0.58967

COEFFICIENT OF SKEW = 0.56745

LOG-NORMAL DURATION PLOT FOR PERIOD OCT TO SEP
 STATION ID: 16527000 HONOHANU STREAM NEAR KEANAE, MAUI, HI
 PARAMETER CODE - 00060 DISCHARGE
 STATISTIC CODE - 00003 MEAN

(YEARS 1914 - 1964)



DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16527000
 HONOKAMU STREAM NEAR KEANAE, 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
1915 1915	.39	.47	.93	1.24	2.64	6.89	11.2	11.0	13.8
1916 1916	2.00	2.00	2.14	2.43	4.69	17.7	14.8	20.9	38.9
1917 1917	.62	.62	.62	.97	1.13	3.15	3.56	4.66	9.62
1918 1918	.62	.62	.75	1.40	1.70	7.90	10.8	11.1	30.3
1919 1919	.31	.36	.53	.83	1.36	4.61	7.42	8.11	10.5
1920 1920	.62	.62	.62	.73	.81	1.24	1.65	3.57	6.70
1921 1921	.31	.41	.46	.48	.69	1.94	3.36	6.43	13.2
1922 1922	.62	.62	.64	.71	.85	1.77	3.54	4.80	9.80
1923 1923	.46	.51	.66	.76	1.29	7.36	8.71	10.7	12.7
1924 1924	1.10	1.13	1.23	1.64	2.54	5.00	11.2	10.1	14.6
1925 1925	1.10	1.13	1.31	1.78	2.78	5.62	10.9	14.9	24.7
1926 1926	.77	.82	.93	1.50	1.95	3.40	3.96	5.37	5.81
1927 1927	.77	.93	1.70	2.10	2.55	8.70	9.62	16.8	16.1
1928 1928	.46	.57	.66	1.13	2.31	11.1	17.1	19.9	20.9
1929 1929	.31	.31	.46	1.18	2.75	5.67	7.23	9.55	12.6
1930 1930	.15	.26	.29	.47	1.27	16.8	20.9	21.5	33.1
1931 1931	.77	.88	1.16	1.24	3.18	8.01	8.94	11.2	16.2
1932 1932	2.00	2.17	2.84	4.14	5.96	10.6	16.2	15.2	21.4
1933 1933	.31	.36	.58	.77	.99	2.67	3.78	4.67	6.05
1934 1934	.46	.46	.46	.57	1.02	4.34	8.30	8.11	9.69
1935 1935	1.20	1.20	1.33	1.96	3.33	7.48	8.33	9.09	14.3
1936 1936	.68	.76	.83	.89	1.56	3.15	4.39	5.88	9.48
1937 1937	2.20	2.50	2.96	3.99	9.94	13.1	24.2	24.2	26.6
1938 1938	1.20	1.20	1.30	1.77	4.31	7.97	10.2	12.7	25.3
1939 1939	1.30	1.53	2.23	3.89	7.27	10.2	12.2	18.6	21.0
1940 1940	.59	.59	.64	.78	1.67	5.09	5.81	6.52	11.3
1941 1941	.59	.62	.72	1.21	2.87	4.07	10.5	10.8	17.5
1942 1942	.70	.80	.96	1.01	1.67	3.49	14.2	15.1	21.7
1943 1943	.76	.78	.91	1.15	2.53	8.19	14.9	14.1	16.8
1944 1944	.25	.26	.32	.48	.77	2.36	5.67	8.94	9.02
1945 1945	.45	.48	.54	.58	1.06	3.62	5.13	6.64	12.1
1946 1946	.65	.69	1.00	1.25	1.54	2.64	11.5	13.0	17.3
1947 1947	.65	.68	.74	.94	1.50	8.11	12.7	14.6	18.9
1948 1948	1.90	2.13	2.33	3.04	4.59	13.3	18.0	16.6	24.4
1949 1949	.82	.90	1.11	1.47	2.58	4.82	6.36	9.04	10.2
1950 1950	.93	1.01	1.30	1.46	2.34	6.07	10.3	12.1	17.9

DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16527000
 HONOMANU STREAM NEAR KEANAE, 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 RANGE	1	3	7	14	30	60	90	120	183
1951 1951	.93 37	1.08 38	1.19 34	1.52 34	3.21 38	4.30 18	5.67 13	6.79 13	9.42 8
1952 1952	.67 25	.78 26	1.32 41	1.79 41	5.05 45	7.92 36	11.5 38	12.1 33	13.9 24
1953 1953	.39 10	.41 9	.46 7	.49 5	.73 3	2.02 4	5.78 14	6.01 9	7.98 6
1954 1954	.32 8	.39 7	.53 8	.66 8	1.20 12	6.47 30	6.90 19	7.95 15	10.6 15
1955 1955	.59 17	.64 22	.67 18	.83 15	3.94 41	4.56 20	14.3 42	13.6 37	17.1 33
1956 1956	.73 28	.79 28	.88 24	1.18 24	2.31 26	4.18 17	6.44 18	8.96 20	20.0 38
1957 1957	.73 29	.82 31	.91 26	1.48 32	1.88 22	3.62 15	5.39 11	8.23 18	11.4 18
1958 1958	1.20 44	1.43 44	1.60 43	1.93 42	6.55 47	10.7 44	10.2 30	12.9 35	13.9 25
1959 1959	1.10 41	1.13 41	1.30 39	1.76 38	3.35 40	5.87 28	8.52 24	9.53 23	14.5 27
1960 1960	1.00 38	1.07 37	1.29 36	1.73 37	1.99 24	6.81 31	9.02 27	9.99 25	15.9 29
1961 1961	.85 35	.85 32	1.00 30	1.54 35	2.56 31	5.66 26	5.86 16	7.51 14	11.3 17
1962 1962	.59 18	.61 16	.67 19	.79 14	1.10 10	2.69 8	4.52 9	5.02 5	5.69 2
1963 1963	.14 1	.14 1	.19 1	.23 1	.52 1	2.84 9	4.39 8	5.43 7	5.65 1

DVSTPAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16527000
 HONOLULU STREAM NEAR KEANAE, 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 RANGE	1	3	7	15	30	60	90	120	183
1915 1915	541 24	253 28	134 30	78.4 35	48.4 38	36.0 38	30.6 37	24.7 40	22.5 37
1916 1916	1070 1	673 1	603 1	336 1	180 3	102 4	76.0 4	66.9 4	58.5 4
1917 1917	611 15	482 9	245 17	159 14	92.9 17	63.6 15	46.9 18	37.0 25	28.8 30
1918 1918	673 13	458 13	276 15	217 5	131 6	108 3	85.5 3	72.1 3	66.0 2
1919 1919	897 4	476 11	372 7	194 9	116 8	70.8 12	50.3 13	43.7 14	34.5 17
1920 1920	729 11	373 18	347 8	180 12	97.3 16	50.7 23	36.7 31	30.6 32	21.1 40
1921 1921	558 21	352 19	202 20	156 15	106 12	75.6 9	62.7 10	51.6 10	43.9 10
1922 1922	800 6	595 4	452 2	253 3	196 1	132 1	126 1	126 1	88.8 1
1923 1923	657 14	463 12	376 6	218 4	114 9	74.3 10	57.8 12	46.2 12	38.3 12
1924 1924	582 17	390 16	188 21	116 22	65.9 27	55.0 21	42.7 23	41.9 17	33.4 20
1925 1925	744 10	345 20	204 19	136 19	105 14	61.2 16	46.7 20	38.7 23	34.4 18
1926 1926	212 47	118 48	57.5 48	34.7 49	29.1 48	18.5 49	17.0 49	14.4 49	11.2 49
1927 1927	582 18	277 26	137 29	76.2 36	45.3 41	31.0 44	27.2 41	27.2 38	22.8 36
1928 1928	300 38	201 34	112 37	67.8 40	45.2 42	38.0 37	35.4 33	28.1 35	29.0 28
1929 1929	532 25	327 21	226 18	129 20	86.9 18	56.9 17	47.6 16	43.3 15	36.2 13
1930 1930	588 16	382 17	296 12	165 13	97.8 15	84.2 5	64.4 8	61.5 7	52.1 6
1931 1931	407 30	264 27	152 28	85.5 31	51.6 33	40.4 35	37.9 29	31.1 30	30.4 26
1932 1932	394 31	182 36	133 31	105 25	72.4 24	46.5 28	43.8 22	39.4 20	33.2 21
1933 1933	511 26	299 23	163 24	80.2 34	54.8 32	33.1 42	28.8 40	25.5 39	20.3 44
1934 1934	767 9	311 22	161 25	124 21	82.7 20	56.1 19	46.9 19	40.0 18	30.7 25
1935 1935	546 23	477 10	278 14	139 18	77.9 23	55.9 20	42.6 24	39.2 22	33.2 22
1936 1936	139 49	71.0 49	46.3 49	42.1 48	33.2 47	26.6 46	25.7 45	22.7 43	21.3 39
1937 1937	481 27	453 14	268 16	191 10	125 7	84.0 6	73.2 5	63.2 5	52.3 5
1938 1938	959 3	597 3	408 5	207 7	135 4	81.6 7	68.2 7	55.8 8	47.3 8
1939 1939	412 29	184 35	121 33	70.4 39	48.7 37	41.1 32	34.7 34	35.0 26	31.4 23
1940 1940	387 32	289 24	187 22	114 23	78.9 22	48.2 25	36.1 32	30.6 33	26.3 32
1941 1941	574 19	278 25	172 23	105 26	58.7 29	48.0 27	38.2 28	39.9 19	35.1 16
1942 1942	678 12	546 7	446 3	272 2	194 2	129 2	96.0 2	74.1 2	63.3 3
1943 1943	244 42	130 43	74.7 44	63.0 42	43.7 43	35.5 39	30.3 39	27.8 36	24.3 34
1944 1944	235 44	129 45	71.3 46	42.7 47	29.1 49	34.4 48	18.7 48	17.4 47	14.9 48
1945 1945	221 46	162 39	113 36	91.9 27	58.6 30	43.8 40	24.4 46	21.5 46	20.6 43
1946 1946	555 22	225 32	128 32	84.8 32	63.5 28	50.5 24	46.0 21	42.7 16	34.3 19
1947 1947	783 8	579 5	408 4	212 6	134 5	80.3 8	59.3 11	47.4 11	41.3 11
1948 1948	1000 2	662 2	301 9	144 17	111 10	72.4 11	72.2 6	62.6 6	51.8 7
1949 1949	387 33	246 30	153 27	113 24	86.5 19	56.5 18	48.7 15	38.5 24	31.3 24
1950 1950	364 34	157 40	91.1 42	72.0 38	48.8 36	48.2 26	38.5 26	34.0 27	29.0 29

DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16527000
 HONOMANU STREAM NEAR KEANAE, 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 RANGE	1	3	7	15	30	60	90	120	183
1951 1951	330 35	218 33	99.1 40	73.0 37	48.2 39	44.0 31	38.8 25	32.0 29	24.0 35
1952 1952	159 48	120 46	91.9 41	62.3 43	43.0 44	27.8 45	26.1 44	22.7 44	21.1 41
1953 1953	252 41	118 47	87.7 43	58.1 44	50.7 35	40.7 33	30.4 38	23.2 42	18.8 46
1954 1954	241 43	134 42	73.6 45	53.7 46	40.9 45	34.3 41	30.8 36	30.4 34	27.0 31
1955 1955	572 20	422 15	296 13	180 11	111 11	65.0 13	63.1 9	54.6 9	44.0 9
1956 1956	804 5	578 6	297 11	196 8	106 13	63.8 14	49.7 14	44.3 13	35.8 14
1957 1957	319 37	179 37	121 34	63.4 41	51.6 34	32.6 43	26.7 43	22.4 45	20.2 45
1958 1958	328 36	178 38	107 38	88.2 29	70.4 25	45.8 30	37.7 30	30.9 31	25.5 33
1959 1959	283 40	239 31	155 26	91.8 28	58.1 31	46.4 29	38.3 27	32.7 28	30.0 27
1960 1960	789 7	526 8	300 10	149 16	81.4 21	52.3 22	47.0 17	39.3 21	35.5 15
1961 1961	447 28	252 29	117 35	87.9 30	47.7 40	39.1 36	27.1 42	24.6 41	22.0 38
1962 1962	224 45	130 44	66.3 47	54.9 45	35.8 46	26.0 47	19.5 47	16.0 48	16.5 47
1963 1963	295 39	139 41	99.4 39	83.3 33	66.0 26	40.6 34	31.3 35	27.5 37	21.0 42

DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16527000
 HONOMANU STREAM NEAR KEANAE, 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	
1915 1915	19.9	1915 1915	19.9
1916 1916	44.3	1916 1916	44.3
1917 1917	18.0	1917 1917	18.0
1918 1918	41.2	1918 1918	41.2
1919 1919	22.0	1919 1919	22.0
1920 1920	13.7	1920 1920	13.7
1921 1921	25.2	1921 1921	25.2
1922 1922	48.6	1922 1922	48.6
1923 1923	25.6	1923 1923	25.6
1924 1924	25.0	1924 1924	25.0
1925 1925	27.5	1925 1925	27.5
1926 1926	10.0	1926 1926	10.0
1927 1927	19.4	1927 1927	19.4
1928 1928	23.2	1928 1928	23.2
1929 1929	22.6	1929 1929	22.6
1930 1930	35.2	1930 1930	35.2
1931 1931	24.5	1931 1931	24.5
1932 1932	25.1	1932 1932	25.1
1933 1933	12.0	1933 1933	12.0
1934 1934	19.7	1934 1934	19.7
1935 1935	21.4	1935 1935	21.4
1936 1936	14.9	1936 1936	14.9
1937 1937	36.3	1937 1937	36.3
1938 1938	29.6	1938 1938	29.6
1939 1939	22.8	1939 1939	22.8
1940 1940	19.3	1940 1940	19.3
1941 1941	23.9	1941 1941	23.9
1942 1942	42.5	1942 1942	42.5
1943 1943	18.6	1943 1943	18.6
1944 1944	11.1	1944 1944	11.1
1945 1945	15.8	1945 1945	15.8
1946 1946	22.6	1946 1946	22.6
1947 1947	28.1	1947 1947	28.1
1948 1948	34.8	1948 1948	34.8
1949 1949	20.2	1949 1949	20.2
1950 1950	19.7	1950 1950	19.7
1951 1951	16.5	1951 1951	16.5
1952 1952	15.5	1952 1952	15.5
1953 1953	13.5	1953 1953	13.5
1954 1954	18.1	1954 1954	18.1
1955 1955	27.3	1955 1955	27.3

DVSTAT - DAILY VALUES STATISTICAL PROGRAM

STATION ID - 16527000
 HONOMANU STREAM NEAR KEANAE, 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	
1956 1956	22.3 28	1956 1956	22.3 22
1957 1957	16.0 12	1957 1957	16.0 38
1958 1958	22.2 27	1958 1958	22.2 23
1959 1959	20.1 22	1959 1959	20.1 28
1960 1960	22.0 25	1960 1960	22.0 25
1961 1961	14.5 8	1961 1961	14.5 42
1962 1962	11.1 3	1962 1962	11.1 47
1963 1963	12.9 5	1963 1963	12.9 45