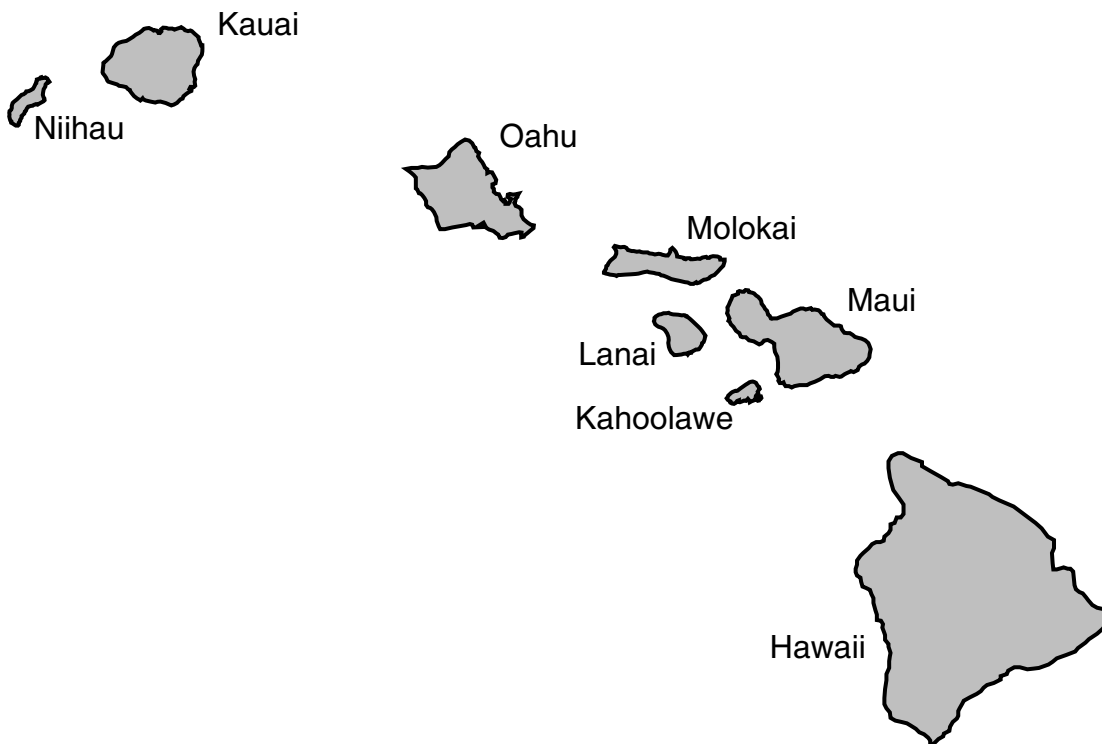


Water Resources Data Hawaii and other Pacific Areas Water Year 1999

Volume 1. Hawaii

Water-Data Report HI-99-1



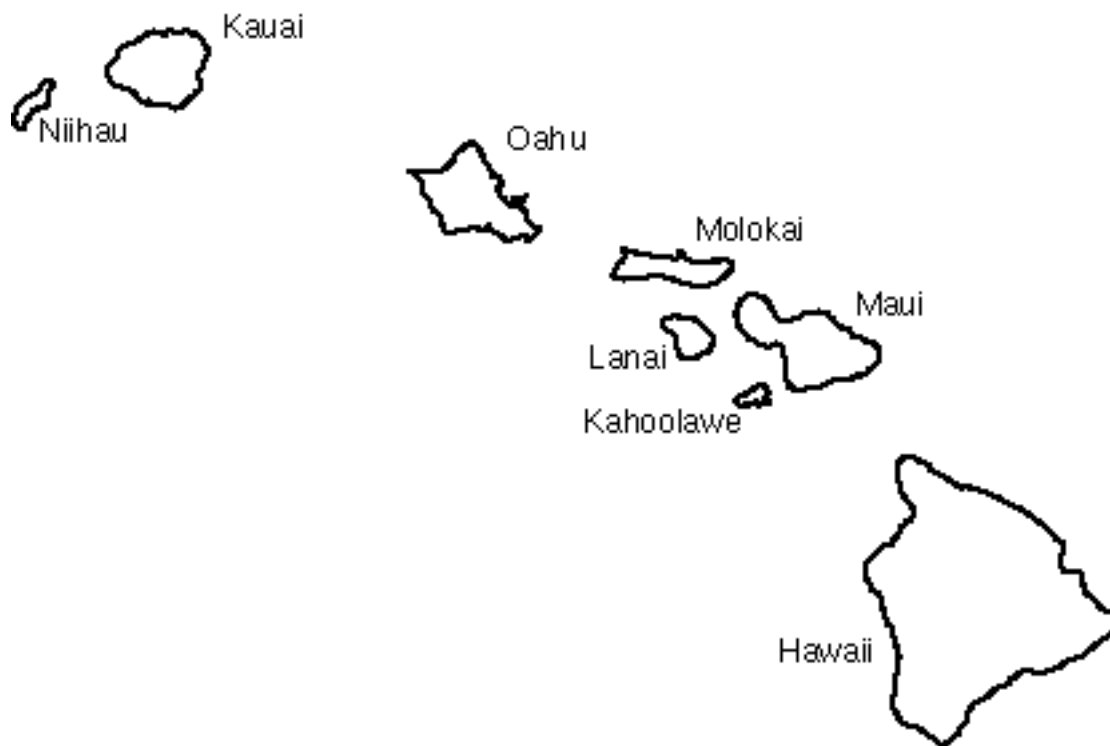
U.S. Department of the Interior
U.S. Geological Survey

Water Resources Data Hawaii and other Pacific Areas Water Year 1999

Volume 1. Hawaii

By B.R. Hill, R.I. Taogoshi, R.A. Fontaine and P.C. Teeters

Water-Data Report HI-99-1



Prepared in cooperation with the State of Hawaii Department of Land and Natural Resources, Commission on Water Resource Management and with other agencies

UNITED STATES DEPARTMENT OF THE INTERIOR

BRUCE BABBITT, Secretary

U.S. GEOLOGICAL SURVEY

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Prepared in cooperation with the
State of Hawaii
and with other agencies as listed
under cooperation

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PREFACE

This annual hydrologic data report of Hawaii is one of a series of annual reports that document hydrologic data gathered from the U.S. Geological Survey's surface and ground-water data collection networks in each State, Puerto Rico, American Virgin Islands, selected islands in the Caribbean, Commonwealth of the Northern Mariana Islands, Guam, American Samoa, Republic of Palau, and selected islands in the Pacific. These records of streamflow, ground-water levels, and quality of water provide the hydrologic information needed by State, local, and Federal agencies, and the private sector for developing and managing our Nation's land and water resources.

This report contains hydrologic data for Hawaii. It is the culmination of a concerted effort by personnel of the U.S. Geological Survey who collected, compiled, analyzed, verified, and organized the data, and who typed, edited, and assembled the report. In addition to the authors, who had primary responsibility for assuring that the information contained herein is accurate, complete, and adheres to U.S. Geological Survey policy and established guidelines, the Hawaii District discipline specialists, Stephen Anthony and Stephen Gingerich, reviewed and verified the data, and the following individuals contributed significantly to the collection, processing, and tabulation of the data:

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13. ABSTRACT (*Maximum 200 words*)

Water resources data for the 1999 water year for Hawaii consist of records of stage, discharge, and water quality of streams and springs; and water levels and quality of water wells.

- Water discharge for 73 gaging stations on streams, springs, and ditches.
- Discharge data for 90 crest-stage partial-record stations and 52 miscellaneous sites.
- Water-quality data for 6 streams, 28 partial-record stations, and 122 wells.
- Water levels for 84 observation wells.
- Rainfall data for 37 rainfall stations.

These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating Federal, State, and other local agencies in Hawaii.

14. SUBJECT TERMS *Hawaii, *Hydrologic data, *Surface water, *Water quality, *Ground water, Gaging stations, Flow rate, Chemical analyses, Sediment, Water temperature, Sampling sites, Water analyses, Water levels, Rainfall accumulation.	15. NUMBER OF PAGES 418
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SURFACE-WATER STATIONS, IN DOWNSTREAM ORDER, FOR WHICH
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NOTE.--Data for partial-record and miscellaneous sites are published in separate sections of the data report. See references at the end of this list of page numbers for these sections.

Letters after station name designate type of data: (d) discharge, (c) chemical, (m) microbiological, (t) water temperature, and (s) sediment.

	Station number	Page
ISLAND OF KAUAI		
Kawaikoi Stream (head of Waimea River) near Waimea (d)	16010000	36
Waimea River:		
Waialae Stream at altitude 3,820 ft, near Waimea (d)	16019000	38
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Hanapepe River below Manuahi Stream, near Eleele (d)	16049000	42
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South Fork Wailua River near Lihue (d)	16060000	44
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North Wailua ditch below Waikoko Stream, near Lihue (d)	16061200	46
Stable storm ditch near Lihue (d)	16062000	48
East Branch of North Fork Wailua River near Lihue (d)	16068000	50
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Kapahi ditch near Kealia (d)	16079000	58
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RECORDS ARE PUBLISHED IN THIS VOLUME

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Kamooalii Stream below Luluku Stream, near Kaneohe (d)	16272200	138
Haiku Stream near Heeia (d)	16275000	140
Kahaluu Stream near Ahuimanu (d)	16283200	142
Waihee Stream near Kahaluu (dcmt)	16284200	144
Waikane Stream at altitude 75 ft, at Waikane (d)	16294900	152
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Punaluu ditch near Punaluu (d)	16302000	156
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Letters after well number designate type of data: (c) chemical, (t) water temperature, (w) water level

HAWAII

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ISLAND OF KAUAI

(2-0021-01)	220057159210301	(w)	282
(2-0022-01)	220013159224001	(w)	283
(2-0023-01)	220051159231801	(w)	283
(2-0044-14)	220019159444801	(w)	284
(2-0120-01)	220136159205501	(ct)	338
(2-0120-02)	220134159205401	(w)	285
(2-0121-01)	220131159214701	(w)	285
(2-0124-01)	220133159242001	(w)	286
(2-0126-01)	220126159261501	(w)	287
(2-0320-01)	220354159205601	(ctw)	288, 338
(2-0320-03)	220354159205602	(ctw)	288, 338
(2-0545-01)	220530159450401	(ct)	338
(2-0623-04)	220621159232101	(ct)	338
(2-0818-01)	220827159185401	(ct)	338
(2-0818-02)	220826159185401	(ct)	338
(2-0818-03)	220825159185301	(w)	289
(2-1020-03)	221038159203801	(ctw)	289, 339
(2-1125-01)	221141159252501	(ct)	339
(2-1125-02)	221141159252502	(ct)	339
(2-1126-01)	221150159264501	(ctw)	290, 339
(2-1126-02)	221151159265001	(ct)	339
(2-1229-03)	221201159293401	(ct)	339
(2-1232-01)	221247159324801	(ctw)	290, 339
(2-1333-01)	221318159335901	(ctw)	291, 340
(2-5426-03)	215434159263301	(ctw)	291
(2-5427-01)	215454159274201	(ctw)	292, 340
(2-5427-02)	215455159274201	(ct)	340
(2-5526-01)	215536159263501	(ctw)	292
(2-5530-03)	215535159302601	(ct)	340
(2-5534-03)	215522159342601	(ctw)	293, 340
(2-5626-01)	215630159265101	(w)	293
(2-5634-01)	215607159344301	(w)	294
(2-5840-01)	215803159401201	(ctw)	295, 340
(2-5843-01)	215857159430101	(ctw)	295, 340
(2-5921-01)	215958159214301	(ctw)	296, 341
(2-5923-01)	215901159235301	(ct)	341
(2-5923-07)	215901159235201	(ctw)	296, 341
(2-5923-08)	215950159231601	(w)	297
(2-5939-01)	215906159395601	(ctw)	298, 341

ISLAND OF OAHU

(3-1646-01)	211646157465201	(ct)	342
(3-1646-02)	211646157465202	(w)	300
(3-1851-19A)	211832157515501	(ctw)	300, 342
(3-1851-19B)	211832157515502	(ctw)	301, 342
(3-1851-22)	211828157515801	(w)	301
(3-1959-05)	211907157594701	(w)	302
(3-2006-12)	212038158061501	(w)	303
(3-2101-03)	212154158015201	(w)	303
(3-2103-01)	212132158035701	(w)	304
(3-2103-03)	212133158035501	(ctw)	304, 342
(3-2153-02)	212106157533701	(ctw)	305, 342

GROUND-WATER WELLS, BY COUNTY, FOR WHICH RECORDS
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ISLAND OF OAHU--Continued

(3-2153-08)	212117157534601	(w)	305
(3-2256-10)	212238157561101	(w)	306
(3-2256-12)	212238157561102	(ctw)	307, 342
(3-2300-11)	212343158001001	(ct)	343
(3-2300-18)	212340158001901	(w)	307
(3-2301-09,10)	212358158010901	(ct)	343
(3-2358-02)	212332157582201	(ct)	342
(3-2358-19)	212318157583401	(w)	308
(3-2358-22)	212342157584301	(ct)	343
(3-2358-29)	212343157584701	(ct)	343
(3-2359-05)	212336157591801	(ct)	342
(3-2448-01)	212422157485601	(ct)	343
(3-2550-01)	212556157500301	(ct)	343
(3-2558-10)	212506157582301	(ct)	343
(3-2603-01)	212617158033801	(ct)	343
(3-2607-01)	212656158071801	(ct)	344
(3-2659-01)	212614157594301	(w)	308
(3-2800-01)	212803158000701	(ct)	344
(3-2808-01)	212813158080201	(w)	309
(3-2809-06)	212828158092001	(ct)	344
(3-2812-01)	212859158124301	(ct)	344
(3-2901-07)	212927158014801	(ctw)	310, 344
(3-2901-09)	212945158014301	(ct)	344
(3-3213-06)	213224158135901	(ctw)	311, 344
(3-3352-01)	213327157524401	(ctw)	311, 344
(3-3405-01)	213429158055501	(ct)	345
(3-3407-25)	213411158074501	(ct)	345
(3-3409-16)	213438158091101	(w)	312
(3-3410-08)	213446158104901	(ctw)	312, 345
(3-3506-03,04)	213512158061601	(ct)	345
(3-3655-01)	213656157550401	(ct)	345
(3-4057-05)	214053157570401	(w)	313
(3-4100-01)	214157158000101	(ct)	345
(3-4101-03)	214125158013401	(w)	313
(3-4101-08)	214131158011601	(ct)	345
(3-4258-04)	214233157583501	(ct)	345

ISLAND OF MOLOKAI

(4-0448-02)	210425156483001	(ctw)	315, 346
(4-0449-01)	210402156495801	(ctw)	315, 346
(4-0456-04)	210414156565601	(c)	346
(4-0456-06)	210429156565106	(c)	347
(4-0456-08)	210419156562108	(c)	346
(4-0456-09)	210426156563509	(c)	346
(4-0457-01)	210419156570501	(ctw)	316, 346
(4-0457-04)	210433156574201	(c)	347
(4-0601-01)	210605157012001	(ctw)	316, 347
(4-0801-01)	210856157011201	(c)	347
(4-0801-02)	210857156010701	(c)	347
(4-0901-01)	210903157013001	(c)	347

ISLAND OF MAUI

(6-3806-01)	203835156065001	(ct)	348
(6-3925-01)	203912156255901	(w)	318
(6-3926-03)	203947156261201	(ct)	348

GROUND-WATER WELLS, BY COUNTY, FOR WHICH RECORDS
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ISLAND OF MAUI--Continued

(6-4627-14)	204635156270101	(ct)	348
(6-4824-01)	204827156242201	(w)	318
(6-4825-01)	204845156255001	(ct)	348
(6-4831-01)	204818156310301	(w)	319
(6-4928-02)	204909156281401	(w)	319
(6-5021-01)	205014156212701	(ct)	348
(6-5128-02)	205102156282501	(ct)	348
(6-5130-01)	205140156304501	(w)	320
(6-5130-02)	205154156303801	(w)	320
(6-5224-02)	205243156243201	(ct)	348
(6-5330-05)	205305156304401	(w)	321
(6-5330-09)	205329156305502	(w)	322
(6-5330-10)	205329156305501	(ct)	349
(6-5330-11)	205330156305401	(ct)	349
(6-5332-04)	205312156321402	(w)	322
(6-5339-01)	205322156394501	(ct)	349
(6-5339-02)	205320156394501	(ct)	349
(6-5340-01)	205343156401101	(ct)	349
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DISCONTINUED SURFACE-WATER OR STAGE-ONLY STATIONS

The following continuous record streamflow or stage-only stations in Hawaii have been discontinued or converted to partial-record stations. Daily records were collected and are stored in NWIS for the period of record shown for each station.

Station number	Station name	Drainage area (mi ²)	Period of record
ISLAND OF KAUAI			
16011000	Waikoali Str nr Waimea	1.58	1909-13, 1919-25
16012000	Kauaikinana Str nr Waimea	0.84	1919-25
16013000	Mohihi Str at alt 3,420 ft nr Waimea	1.68	1920-26, 1936-71
16014000	Kokee Ditch nr Waimea	--	1926-82
16015000	Mohihi Str nr Waimea	2.20	1909-17
16016000	Waimea River at alt 840 ft nr Waimea	20.0	1916-18, 1925-68
16017000	Koaie Str at alt 3,770 ft nr Waimea	1.68	1919-32, 1954-68
16018000	Koaie Str nr Waimea	9.97	1916-18
16020000	Waialae Str nr Waimea	2.81	1910-16
16021000	Waialae Str at alt 800 ft nr Waimea	7.87	1917-21
16022000	Kekaha Ditch at Camp 1 nr Waimea	--	1908-68
16024000	Kekaha Ditch at siphon nr Waimea	--	1910-12
16025000	Kekaha Ditch at flume 2 nr Waimea	--	1910-12
16027000	Kekaha Ditch below tunnel 12 nr Waimea	--	1908-34
16028000	Waimea River below Kekaha Ditch intake near Waimea	44.2	1921-55
16029000	Waimea Ditch nr Waimea	--	1912-14 1916-21
16029100	Waimea Ditch below wasteway nr Waimea	--	1960-72
16031000	Waimea River nr Waimea	57.8	1910-18, 1919, 1943-68, 1969-72, 1975-96
16033000	Olokele Ditch at weir nr Makaweli	--	1912-17
16034000	Olokele River nr Waimea	4.85	1915-16
16035000	Halekua Str nr Waimea	0.56	1912-14
16037000	Poowaiomahaihai Ditch nr Waimea	--	1911-13
16037100	Makaweli R bl Poowaiomahaihai Ditch nr Waimea	25.0	1911-17
16039000	Hilola Ditch nr Eleele	--	1911-15
16042000	Hanapepe Ditch at Hanapepe Falls nr Eleele	--	1911-15
16043000	Hanapepe Ditch below intake	--	1930-38
16044000	Hanapepe Ditch at Koula nr Eleele	--	1910-21, 1927-49
16045000	Hanapepe Ditch below makai siphon nr Eleele	--	1929-32
16046000	Hanapepe Ditch at weir nr Hanapepe	--	1912-13, 1915-17
16047000	Koula River at Koula nr Eleele	12.6	1910-16
16048000	Manuahi Str at Koula nr Eleele	5.44	1917-20
16050000	G Ditch at makai siphon nr Eleele	--	1929-32
16051000	Hanapepe River at makai siphon nr Eleele	20.5	1929-32
16053000	Kamoolao Str nr Koloa	1.30	1939-41
16053400	Upper Haiku Ditch nr Puhī	--	1963-71
16053600	Lower Haiku Ditch nr Puhī	--	1963-71
16053800	Kamooloa Str nr Puhī	5.79	1963-70
16054000	Kuia Str nr Puhī	0.40	1939-41
16054200	Koloa Ditch nr Koloa	--	1964-71
16054400	Koloa tunnel nr Koloa	--	1966-71
16054500	Kuia Str nr Puhī	5.09	1963-66
16056000	Hanamaulu Str at Kapaia nr Lihue	6.41	1911-13
16056800	Waiahi-Kuia aqueduct nr Puhī	--	1964-71
16057000	Lihue Ditch nr Lihue	--	1910-19
16058000	Hanamaulu Ditch nr Lihue	--	1910-20
16058500	S F Wailua River nr rock quarry nr Lihue	20.2	1974-83
16061000	North Wailua Ditch nr Lihue	--	1932-85
16063000	N F Wailua River at alt. 650 ft nr Lihue	5.29	1914-85
16064000	Kanaha Ditch nr Lihue	--	1910-55
16068700	North Fork Wailua River nr Lihue	14.6	1910-14
16070000	Aahoaka Ditch nr Kapaa	--	1966-72
16072000	Konohiki Str at Makakualele mka weir nr Kapaa	0.65	1911-13

WATER RESOURCES DATA FOR HAWAII, 1999
DISCONTINUED SURFACE-WATER OR STAGE-ONLY STATIONS--Continued

Station number	Station name	Drainage area (mi ²)	Period of record
ISLAND OF KAUAI--Continued			
16073000	Konohiki Str at Makakualele mki weir nr Kapaa	0.89	1912
16074000	N F Kaehulua Str at Kainahola weir nr Kapaa	1.39	1911-13
16075000	S F Kaehulua Str at Wainamuamu weir nr Kapaa	0.04	1911-13
16076000	Kaehulua Str at Kuhinoa weir nr Kapaa	1.90	1911-13
16077000	Makaleha ditch near Kealia	--	1936-98
16078000	Kapaa Str nr Kealia	3.05	1910-20
16079200	Tunnel Ditch at Kapahi nr Kapaa	--	1909-11
16079400	Pipe Ditch at Kapahi nr Kapaa	--	1909-11
16079600	Kapaa Ditch at Kapahi nr Kapaa	--	1909-11
16082000	Kaneha Ditch nr Kealia	--	1909-13
16086000	Anahola Ditch above wasteway nr Kealia	--	1915-21
16087000	Anahola Ditch wasteway nr Kealia	--	1936-85
16089000	Anahola Str nr Kealia	4.27	1910, 1913-85
16090000	Lower Anahola Ditch at Kiokala nr Kealia	--	1909-14
16091000	Lower Anahola Ditch nr Kealia	--	1937-83, 1985-95
16092000	Lower Anahola Ditch at makai weir nr Kealia	--	1909-10
16093000	Anahola Str at Kiokala Dam nr Kealia	4.27	1910-12
16093200	Anahola Str at Anahola	9.24	1962-65
16094200	Ka Loko Ditch nr Kilauea	--	1932-68
16095000	Puu Ka Ele Ditch nr Kilauea	--	1932-67
16095200	Ross Ditch nr Kilauea	--	1955-67
16095900	Kalihiwai Ditch above wasteway nr Kilauea	--	1960-68
16096000	Kalihiwai Ditch nr Kilauea	--	1934-67
16097000	Pohakuhonu Str nr Kilauea	1.73	1957-72
16097300	Halaulani Str nr Kilauea	0.12	1922-25
16098000	Kalihiwai River nr Hanalei	3.64	1914-23
16099000	Kalihiwai River nr Kilauea	4.12	1912-13
16099500	Hanalei Ditch nr Kilauea	--	1956-62
16100000	Hanalei tunnel outlet nr Lihue	--	1932-85
16101000	Hanalei River at alt. 625 ft. nr Hanalei	7.17	1914-55
16102000	China Ditch nr Hanalei	--	1911-19
16104000	Kuna Ditch nr Hanalei	--	1912-14, 1917-20
16105000	Waioli Str nr Hanalei	1.81	1914-32
16106000	Lumahai River nr Hanalei	6.95	1914-33
16109000	Wainiha River above intake nr Hanalei	11.6	1914-16
16110000	Wainiha Canal at intake nr Wainiha	--	1910-16
16111000	Wainiha Canal at tunnel 18 nr Wainiha	--	1911
16113000	Wainiha River nr Wainiha	20.6	1912-16
16115000	Hanakapiai Str nr Hanalei	2.73	1931-52
16116000	Hanakoia Str nr Hanalei	0.50	1931-52
16117000	Kalalau Str nr Hanalei	1.55	1931-55
ISLAND OF OAHU			
16201000	RB of NF Kaukonahua Str nr Wahiawa	1.17	1913-53
16203000	Mauka Ditch nr Wahiawa	--	1947-68
16204000	North Fork Kaukonahua Str nr Wahiawa	4.86	1946-68
16206000	South Fork Kaukonahua Str nr Wahiawa	1.93	1913-14, 1915-16, 1944-50
16206500	Koolau Ditch at reservoir nr Wahiawa	4.00	1914-15
16207000	SF Kaukonahua Str bl U.S. Army res nr Wahiawa	0.86	1914-17
16208500	RB of South Fork Kaukonahua Str nr Wahiawa	5.26	1957-72
16209000	SF Kaukonahua Str ab Wahiawa res nr Wahiawa	--	1946-58
16210900	Poamoho Tunnel nr Wahiawa	1.79	1958-79
16211000	Poamoho Str nr Wahiawa	--	1947-73
16211850	Puea Mauka Ditch nr Waianae	4.39	1960-67
16211900	Kaupuni Str nr Waianae	0.60	1957-60
16212000	Puhawai Str at Lualualei nr Waianae	1.16	1930-44
16212400	Awanui Gulch nr Barbers Point NAS	13.80	1957-58
16212900	Kipapa Str nr Waipahu	--	1966-68
16217000	Pearl Harbor Spr at Puukapu nr Pearl City	--	1931-35

DISCONTINUED SURFACE-WATER OR STAGE-ONLY STATIONS--Continued

Station number	Station name	Drainage area (mi ²)	Period of record
ISLAND OF OAHU--Continued			
16218000	Pearl Harbor Springs at Loko Kukona	--	1931-35, 1936-45
16218500	Pearl Harbor Spr at Kaluaoopu nr Pearl City	--	1931-37
16219000	Hawn Elec. Co. tunnel at Waiiau nr Pearl City	--	1939-42
16220000	Hawn Elec. Co. wasteway at Waiiau nr Pearl City	--	1953-59
16222000	Pearl Harbor Springs at Waiiau	--	1913-39, 1942-47
16224000	Pearl Harbor Springs at Kalauao	--	1931-62, 1964-65, 1966-68, 1970-88
16224500	Kalauao Str at Moanalua Road at Aiea	2.59	1957-82
16225000	Kalauao Str at Aiea	2.61	1953-57
16227500	Moanalua Str nr Kaneohe	0.94	1968-78
16227700	Moanalua Str tributary nr Kaneohe	0.62	1968-78
16227900	Moanalua Str tributary nr Aiea	0.03	1972-78
16228900	Kalihi Str nr Kaneohe	0.60	1966-71
16230000	Lulumahu Dit at upper Nuuanu Res nr Honolulu	--	1911-13
16231000	Luakaha weir in upper Nuuanu Valley nr Hon	--	1910-13
16231500	Moole Ditch mauka station nr Honolulu	--	1917-20
16231700	Moole Ditch makai station nr Honolulu	--	1918-23
16232000	Nuuanu Stream below res 2 wasteway, nr Honolulu	3.35	1913-96
16235000	Nuuanu Str at Kuakini Street nr Honolulu	4.39	1911-12
16236000	Kahuawai Spring nr Honolulu	--	1912-14
16237000	Pauoa Str at upper Pauoa Valley nr Honolulu	0.79	1911-13
16238500	Waihi Str at Honolulu	1.14	1913-21, 1925-83
16239500	East Manoa Ditch nr Honolulu	--	1915-16, 1918-20, 1926-39
16241000	Manoa Str at upper Manoa Valley nr Honolulu	2.62	1910-13
16242000	Manoa Str at College of Hawaii nr Honolulu	4.99	1909-10, 1912-18
16243000	Manoa Str at Waiialae Road nr Honolulu	5.38	1910-12
16244000	Pukele Str nr Honolulu	1.18	1926-82
16245000	Waiomao Str at upper Palolo Valley nr Hon	0.35	1911-13
16246000	Waiomao Str nr Honolulu	1.04	1911, 1912, 1926-71
16247000	Palolo Str nr Honolulu	3.63	1952-79
16248900	Waimanalo Ditch below main res nr Waimanalo	--	1912-13
16249000	Waimanalo Str at Waimanalo	2.16	1967-70
16249200	Maunawili Str nr Waimanalo	1.28	1912-16
16249400	Main Spring nr Kailua	--	1914-16
16249600	Makawao Spring nr Kailua	--	1914-16
16249800	Makawao Ditch nr Kailua	--	1912-15
16250000	Maunawili Ditch nr Waimanalo	--	1954-68
16256000	Kamakalepo Str nr Kailua	0.82	1912, 1913-16
16257000	Pohakea Str nr Kailua	0.21	1912-14
16258000	Maunawili Str ab Wong Leongs Ditch nr Kailua	4.60	1922-23
16260000	Maunawili Str nr Kailua	4.60	1912, 1913-16
16260500	Maunawili Str at highway 61 nr Kailua	5.34	1922, 1956-67, 1971-96
16261000	North Branch Kahanaiki Str nr Kailua	0.34	1913-14
16262000	South Branch Kahanaiki Str nr Kailua	0.21	1913-14
16263000	Kahanaiki Str nr Kailua	0.58	1912, 1914-16
16264400	Kawainui Swamp drain canal at Kailua Rd at Kailua	--	1961-65
16264500	Kawainui Swamp canal at Wanaao Rd at Kailua	--	1961-64
16265600	Right Branch Kamooalii Stream	1.11	1983-97
16266000	Kamooalii Str nr Kaneohe	1.48	1914-16
16267000	Hooleinaiwa Str nr Kaneohe	0.61	1914-16
16268000	Piho Str nr Kaneohe	0.43	1914-16
16269000	Kuou Ditch nr Kaneohe	--	1914-16
16270000	Kuou Str nr Kaneohe	0.37	1914-16
16270500	Kamooalii Str below Kuou Str nr Kaneohe	3.21	1967-70, 1971, 1972-76
16270900	Luluku Str at alt. 220 ft nr Kaneohe	0.44	1960-63, 1965-98
16271000	North Luluku Ditch nr Kaneohe	--	1914-16
16272000	Luluku Str nr Kaneohe	0.46	1914-16
16273000	Young Mau Ditch nr Kaneohe	--	1914-16

WATER RESOURCES DATA FOR HAWAII, 1999
DISCONTINUED SURFACE-WATER OR STAGE-ONLY STATIONS--Continued

Station number	Station name	Drainage area (mi ²)	Period of record
ISLAND OF OAHU--Continued			
16273900	Kamooalii Str at Kaneohe	4.38	1959-63, 1965-80
16273950	SF Kapunahala Str at Kaneohe	0.40	1983-98
16274000	Ahlo Ditch nr Kaneohe	--	1914-16
16276000	Reservoir Ditch nr Heeia	--	1914-16
16277000	Waipio Ditch nr Heeia	--	1914-16
16278000	Iolekaa Str mauka nr Heeia	0.29	1940-70
16279000	Iolekaa Str nr Heeia	0.52	1914-16
16280000	Wing Wo Tai Ditch nr Heeia	--	1914-16
16281000	Hop Tuck Ditch nr Heeia	--	1914-16
16282000	Lee Ditch nr Heeia	--	1914-16
16283000	Kahaluu Str nr Heeia	0.28	1935-71
16283600	South Fork Waihee Stream near Heeia	0.03	1962-96
16283700	North Fork Waihee Stream near Heeia	0.03	1962-96
16283800	Waihee Str at alt. 260 ft nr Heeia	0.31	1961-66
16284000	Waihee Str nr Heeia	0.93	1935-82
16284500	Waihee Str at Kahaluu	2.26	1966-71
16285000	Waiahole tunnel at Waianu nr Waiahole	--	1950-69
16286000	Waiahole tunl wasteway at intk 31 nr Waiahole	--	1951-69
16287000	Waiahole tunnel at north portal nr Waiahole	--	1951-69
16287200	Waiahole tunnel at adit 8 nr Waipahu	--	1956-69
16288000	Halona Str nr Waikane	0.08	1911
16289000	Waihi Str nr Waikane	0.11	1911
16290000	Waiahole Str below powerhouse nr Waiahole	0.46	1915
16291000	Waiahole Str at alt. 250 ft. nr Waiahole	0.99	1955-68
16292000	Waiahole Str nr Waiahole	1.22	1911-16
16293000	Waianu Str nr Waikane	1.28	1911
16294000	Waiahole Str at Waiahole nr Waikane	3.60	1911-12
16295000	Waikane Str nr Waikane	2.35	1912
16296000	Kahana Str nr Kahana	3.20	1914-17
16297000	Kawa Str nr Kahana	2.09	1914-17
16299000	Punaluu Str at alt. 539 ft. nr Punaluu	0.98	1915-18
16300000	Waihoi Str nr Punaluu	0.50	1915-17
16301000	Punaluu Str at alt. 250 ft. nr Punaluu	2.78	1914-18
16304000	Kaluanui Str nr Hauula	0.50	1915-17
16305000	Kaipapau Str nr Hauula	0.21	1906-07
16306000	Koloa Gulch nr Laie	0.90	1914-18
16307000	Wailele Gulch nr Laie	0.50	1914-15, 1916-18
16308000	East Branch Kahawainui Str nr Laie	0.53	1914-18
16308990	Malaekahana Str nr Laie	0.64	1963-71
16309000	Malaekahana Str nr Kahuku	1.66	1914-18
16310000	Middle Branch Malaekahana Str nr Kahuku	0.69	1914-18
16329000	Kaiwikoele Str tributary nr Maunawai	0.97	1967-71
16340500	Anahulu River tributary nr Haleiwa	0.83	1967-71
16343000	Helemano Str at Haleiwa	14.20	1967-82
ISLAND OF MOLOKAI			
16401000	Papalaua Str nr Pukoo	2.00	1919-29
16402000	Pulena Str nr Wailau	4.38	1919-28, 1937-57
16403000	Waiakeakua Str nr Wailau	1.41	1919-29, 1937-57
16403900	Kawainui Stream near Pelekunu	1.17	1968-79, 1980-96
16404000	Pelekunu Str nr Pelekunu	2.59	1919-29, 1937-47, 1948-57, 1971-82
16404200	Pilipililau Str nr Pelekunu	0.49	1968-97
16405000	Lanipuni Str nr Pelekunu	1.09	1919-29, 1937-57
16406000	Waikolu Str at alt. 650 ft nr Kalaupapa	2.99	1920-23
16408000	Waikolu Str bl pipeline crossing nr Kalaupapa	3.68	1919-32, 1937-96
16409000	Waihanau Str nr Kalaupapa	1.18	1930-32
16410000	Keolewa Str nr Kalae	0.18	1940-44
16411000	Waialala Spring nr Kalae	--	1940-60
16412000	Mokomoko Gulch nr Kalae	0.23	1940-45

DISCONTINUED SURFACE-WATER OR STAGE-ONLY STATIONS--Continued

Station number	Station name	Drainage area (mi ²)	Period of record
ISLAND OF MOLOKAI--Continued			
16411300	Kakaako Gulch at Hwy 46 nr Mauna Loa	0.18	1964-85
16415000	EF Kawela Gulch	0.45	1946-71
ISLAND OF MAUI			
16416000	Punaula Gulch nr Pukoo	0.24	1947-72
16501000	Palikea Str bl diversion dam nr Kipahulu	6.29	1927-29, 1931-35, 1935-38, 1939-83
16501200	Oheo Gulch at dam nr Kipahulu	8.06	1988-97
16502000	Hahalawe Gulch nr Kipahulu	0.43	1927-37, 1938-69
16503000	Kaeluku flume nr Kaeleku	--	1940-45
16504000	Hana flume nr Hana	--	1940-45
16506000	Makapipi Ditch nr Nahiku	--	1948-66
16506500	West Makapipi Spring nr Nahiku	--	1932-45
16507000	Makapipi Str nr Nahiku	1.93	1932-45
16509000	Hanawi Str below government road, nr Nahiku	5.03	1932-47, 1992-95
16510000	Kapaula Gulch nr Nahiku	0.69	1921-63
16511000	Kapaula Gulch below government road nr Nahiku	0.93	1932-47
16512000	Koolau Ditch at Nahiku weir nr Nahiku	--	1919-85
16513000	Waiaaka Str nr Nahiku	0.10	1932-47
16514000	Paakea Gulch nr Nahiku	0.34	1932-47
16515000	Waiohue Gulch nr Nahiku	0.32	1921-63
16516000	Kopiliula Str nr Keanae	4.31	1914-17, 1921-58
16517000	East Wailuaiki Str nr Keanae	3.11	1913-17, 1922-58
16519000	West Wailuanui Str nr Keanae	1.93	1913-17, 1922-58
16520000	East Wailuanui Str nr Keanae	0.51	1914-17, 1921-58
16521000	Wailuanui Str nr Keanae	2.51	1932-36, 1938-47
16522000	Taro patch feeder ditch at Keanae	--	1934-68
16523000	Koolau Ditch nr Keanae	--	1910-12, 1917-85
16524000	Honomanu Str at Haiku-uka boundry nr Kaili	2.54	1919-27, 1932-34, 1962-68
16525000	Sevth Br Honomanu Str at Haiku-uka nr Kailiili	0.30	1932-33
16526000	Fourth Br Honomanu Str at Haiku-uka nr Kailiili	0.10	1932-33
16527000	Honomanu Str nr Keanae	3.17	1913-64
16528000	Spreckels Ditch at station 1 nr Huelo	--	1910-13
16529000	Spreckels Ditch at station 2 nr Huelo	--	1911-13
16530000	Spreckels Ditch at station 3 nr Huelo	--	1910-13
16531000	Kula diversion from Haipuaena Str nr Olinda	--	1945-85
16531100	Haipuaena Str at Kula pipeline intake nr Olinda	0.27	1946-68
16532000	Haipuaena Str at Haiku-uka bdy nr Kailiili	0.63	1919-26, 1932-34
16533000	Third Br Haipuaena Str at Haiku-uka nr Kailiili	0.06	1932-33
16534000	First Br Haipuaena Str at Haiku-uka nr Kailiili	0.05	1932-33
16535000	Haipuaena div ditch at Kolea Gulch nr Keanae	--	1938-60
16536000	Haipuaena Str above Spreckels Ditch nr Huelo	1.16	1913-67
16537000	Haipuaena Str nr Huelo	1.10	1910-13
16538000	Spreckels Ditch at Haipuaena weir nr Huelo	--	1922-85
16539000	Spreckels Ditch at station 4 nr Huelo	--	1910-13
16541000	Koolau Ditch at Haipuaena nr Huelo	--	1932-87
16541500	Manuel Luis Ditch at Puohokamoa Gulch nr Huelo	--	1917-24
16542000	E Br Puohokamoa Str at Haiku-uka bdry nr Kailiili	0.14	1919-27, 1932-33
16543000	M Br Puohokamoa Str at Haiku-uka bdry nr Kailiili	0.48	1919-27, 1932-34, 1962-69
16544000	W Br Puohokamoa Str at Haiku-uka bdry nr Kailiili	0.45	1919-28, 1932-34
16545000	Puohokamoa Str above Spreckels Ditch nr Huelo	2.35	1913-71
16546000	Puohokamoa Str nr Huelo	2.60	1910-13
16547000	Puohokamoa intake of Koolau Ditch nr Huelo	--	1922-30
16551000	Koolau Ditch at Wahinepee nr Huelo	--	1922-29
16552000	Spreckels Ditch at Wahinepee nr Huelo	--	1929-30, 1931-38
16552200	Spreckels Ditch at station 5 nr Huelo	--	1911-13
16552500	Manuel Luis Ditch W of Puohokamoa Str nr Huelo	--	1930-35
16552600	Waikamoi Str at Puuluau nr Olinda	2.10	1949-66
16552800	Waikamoi Str ab res at Kula pl intake nr Olinda	2.50	1953-68
16553000	Waikamoi Str bl res at Kula pl intake nr Olinda	2.52	1945-49

WATER RESOURCES DATA FOR HAWAII, 1999
DISCONTINUED SURFACE-WATER OR STAGE-ONLY STATIONS--Continued

Station number	Station name	Drainage area (mi ²)	Period of record
ISLAND OF MAUI--Continued			
16554000	Waikamoi Str at Haiku-uka boundary nr Kailiili	3.46	1918,19-28, 1932-34
16554500	E Br Waikamoi Str at Haiku-uka bdry nr Kailiili	0.07	1918-28, 1932-33
16555000	Waikamoi Str above Wailoa Ditch nr Huelo	3.93	1922-57
16556000	Waikamoi Str nr Huelo	3.98	1910-22
16557000	Alo Str nr Huelo	0.47	1910-57
16558000	Koolau Ditch at Alo diversion weir nr Huelo	--	1908-11
16560000	Spreckels Ditch at station 6 nr Huelo	--	1911-13
16561000	Center Ditch below Kolea reservoir nr Huelo	--	1918, 1919, 1920-24,1925-30
16562000	Center Ditch nr Huelo	--	1910-12
16565000	Kaaiea Gulch nr Huelo	0.58	1921-62
16565500	Spreckels Ditch below Kaaiea Gulch nr Huelo	--	1917-30
16566000	Oopuola Str nr Huelo	0.20	1930-57
16567000	Oopuola Str ab Spreckels Dt crossing nr Huelo	0.58	1910-15
16567500	Spreckels Ditch at station 7 nr Huelo	--	1911-12
16568000	Spreckels Ditch at station 8 nr Huelo	--	1911-13
16569000	Second Branch Nailiilihaele Str at Haiku-uka	0.20	1932-33
16570000	Nailiilihaele Str nr Huelo	3.49	1910-11, 1913-18,1919-24, 1925-75
16571000	Nailiilihaele Str bl new Hamakua Dt nr Huelo	3.60	1912
16572000	New Hamakua Ditch at Nailiilihaele weir nr Huelo	--	1910-12
16573000	New Hamakua Ditch at station 1 nr Kailiili	--	1912-13
16574000	Kailua Str at Haiku-uka boundary nr Kailiili	0.80	1918-28, 1932-34
16574500	Kailua Str nr Kailiili	1.10	1963-71
16575000	Tenth Br Kailua Str at Haiku-uka nr Kailiili	0.10	1932-33
16576000	Ninth Br Kailua Str at Haiku-uka nr Kailiili	0.20	1932-33
16577000	Kailua Str nr Huelo	2.41	1910-11, 1912-18,1919-58
16578000	New Hamakua Ditch at station 2 nr Huelo	--	1912-13
16579000	New Hamakua Ditch at station 3 nr Huelo	--	1912-13
16579500	New Hamakua Ditch at station 4 nr Huelo	--	1912-13
16580000	Oanui Str nr Huelo	0.90	1910-11, 1913-16
16582000	New Hamakua Ditch at station 5 nr Huelo	--	1912-13
16583000	Old Hamakua Ditch at Kailua nr Huelo	--	1919-22
16584000	Kailua Str nr Huelo	3.69	1912-13
16585000	Hoolawanui Str nr Huelo	1.34	1910-71
16586000	Hoolawaliilii Str nr Huelo	0.55	1911-57
16588000	Wailoa Ditch at Honopou nr Huelo	--	1922-87
16589000	New Hamakua Ditch at Honopou nr Huelo	--	1918-85
16590000	Old Hamakua Ditch at Honopou nr Huelo	--	1918-22, 1936-65
16591000	Honopou Str at Lowrie Ditch siphon nr Huelo	2.00	1932-47
16592000	Lowrie Ditch at Honopou Gulch nr Huelo	--	1910-27
16593000	Honopou Str above Haiku Ditch nr Huelo	2.20	1930-85
16594000	Haiku Ditch at Honopou Gulch nr Kailua	--	1910-28, 1930-85
16595000	Honopou Str below Haiku Ditch nr Huelo	2.30	1932-47
16596000	New Hamakua Ditch at Halehaku weir nr Huelo	--	1910-14, 1915-23
16596200	Halehaku Gulch nr Kailiili	0.13	1965-71
16597000	Halehaku Gulch weir at New Hamakua Dt nr Huelo	--	1910-12
16598000	Halehaku Gulch nr Huelo	1.40	1910-12
16599000	E Br Opana Gulch at Haiku-uka bdry nr Kailiili	0.60	1932-33
16600000	Opana Ditch nr Huelo	--	1910-12
16601000	Opana Str nr Huelo	3.30	1910-12
16602000	Kauhikoa Ditch at Opana weir nr Huelo	--	1910-13, 1913-15, 1916-28
16602400	Awalau Gulch nr Kailiili	0.23	1965-71
16603000	Kaluanui Ditch at Puomalei nr Hamakuapoko	--	1910-12
16604000	Iao Str nr Wailuku	--	1910-15
16605000	Maniania Ditch nr Wailuku	--	1910-13
16608000	North Waiehu Str nr Wailuku	0.90	1912-15
16609000	North Waiehu Ditch nr Wailuku	--	1910-11, 1916-17
16609500	North Waiehu Str bl N Waiehu Ditch nr Wailuku	0.90	1910-11
16610000	South Waiehu Str nr Wailuku	0.70	1910-17

DISCONTINUED SURFACE-WATER OR STAGE-ONLY STATIONS--Continued

Station number	Station name	Drainage area (mi ²)	Period of record
ISLAND OF MAUI--Continued			
16611000	South Waiehu Ditch nr Wailuku	--	1913
16612000	Waihee River nr Waihee	3.90	1913-17
16613000	Waihee Canal nr Waihee	--	1910-12
16613500	Waihee Canal at Waiale weir nr Wailulu	--	1911-12
16615000	Spreckels Ditch nr Waihee	--	1910-13
16616000	Spreckels Ditch at Waiale weir nr Wailuku	--	1910-11
16617000	Left Branch Makamakaole Str nr Waihee	0.40	1939-52
16617700	Kahakuloa Str at alt. 1,380 ft. nr Honokohau	1.50	1913-14
16619000	Kahakuloa Str at Kahalulua nr Waihee	4.00	1912-13
16621000	Honokohau Ditch intake nr Honokohau	--	1907-13
16622000	Honokohau Ditch above Honolulu Str nr Honolohau	--	1910-11
16623000	Honolua Str nr Honokohau	2.90	1913-17
16624000	Honokohau Ditch at Honokowai weir nr Lahaina	--	1910-12
16625000	Honolua Ditch nr Honokohau	--	1911-12
16626000	Honolua Str at Honolulu Ranch nr Honokahau	3.96	1911
16627000	Kapaloa Str at weir 1 nr Lahaina	1.00	1901
16628000	Kapaloa Str nr Lahaina	1.00	1911-12
16629000	Honokowai Ditch nr Lahaina	--	1912-17, 1918-67
16630000	Honokowai Str nr Lahaina	1.10	1913-17
16633000	Kahoma development tunnel nr Lahaina	--	1911-17
16634000	Kahoma Str nr Lahaina	1.19	1911-12, 1913-17
16635000	Lahainaluna Str at weir 1 nr Lahaina	0.54	1901
16635500	Lahainaluna Str at weir 2 nr Lahaina	0.19	1901
16636000	Kahana Str above pipeline intake nr Lahaina	1.51	1916-25, 1926-32
16637000	Lahainaluna Ditch nr Lahaina	--	1913-14
16638000	Kahana Str nr Lahaina	1.83	1911-16
16638500	Kahoma Str at Lahaina	5.22	1962-89
16639000	North Fork Kauaula Str nr Lahaina	0.52	1901
16640000	South Fork Kauaula Str nr Lahaina	0.18	1901
16641000	Kauaula Str nr Lahaina	1.84	1912, 1914-17
16643000	Kauaula Ditch nr Lahaina	--	1911-17
16644000	Launiupoko Str nr Lahaina	1.13	1911-18
16645000	Olowalu Ditch nr Olowalu	--	1911-16, 1916-20, 1920-58, 1958-67
16646000	Olowalu Str nr Olowalu	4.00	1913-16
16647000	Ukumehame Gulch nr Olowalu	3.75	1911-12, 1913-19
16647100	Ukumehame Gulch at mouth nr Olowalu	4.03	1964-71
16648000	South side Waikapu Ditch nr Waikapu	--	1910-17
16649000	Palolo Ditch nr Waikapu	--	1910-17
16650000	Waikapu Str nr Waikapu	2.76	1910-17
ISLAND OF HAWAII			
16700000	Waiakea Stream nr Mountain View	17.4	1930-95
16700950	Lyman Springs no. 2 nr Piihonua	--	1981-95
16701000	Olaa Flume at Kaumana nr Hilo	--	1917-20
16701200	Waiakea Str nr Hilo	33.60	1957-67
16701700	Wailuku River nr Pua Akala	10.20	1964-65
16701750	Wailuku River nr Humuula	34.80	1965-82
16701800	Wailuku River nr Kaumana	43.40	1966-82
16703000	Wailuku River at Pukamaui nr Hilo	97.20	1923-28, 1929-40
16705000	Hilo Boarding School Ditch at intake nr Hilo	--	1931-40
16706000	Hilo Boarding School Ditch nr Hilo	--	1918-19
16707000	Kapehu Ditch diversion nr Hilo	--	1954-62
16708000	Kapehu Ditch nr Hilo	--	1938-41, 1942-48, 1948-51, 1951-62
16709000	Kapehu Str at Piihonua nr Hilo	4.84	1928-37
16710000	Wailuku River nr Hilo	150.00	1911-13, 1918-19
16713000	Wailuku River at Hilo	256	1977-79, 1980-95
16716000	Honolii Str nr Hilo	8.00	1924-32
16717500	Kawainui Str nr Pepeokeo	9.20	1912
16717820	Manowaiopae Str nr Laupahoehoe	1.04	1965-71

WATER RESOURCES DATA FOR HAWAII, 1999
DISCONTINUED SURFACE-WATER OR STAGE-ONLY STATIONS--Continued

Station number	Station name	Drainage area (mi ²)	Period of record
ISLAND OF HAWAII--Continued			
16718000	Upper Hamakua Ditch at Puualala nr Kukuihaele	--	1913-20
16720300	Kawaiki Stream near Kamuela	0.45	1968-99
16721000	Kawainui Str at alt. 2,120 ft nr Waipio	3.48	1901-02
16721500	Br 3 Kawainui Str at alt. 1,700 ft nr Waipio	3.90	1901-02
16722000	Kawainui Str at alt. 1,435 ft nr Waipio	4.43	1901-02
16722300	Br 3 Kawainui Str at alt. 1,405 ft nr Waipio	0.47	1901-02
16722600	Br 1 Kawainui Str at alt. 1,380 ft nr Waipio	5.19	1901-02
16723000	Kawainui Str nr Waipio	5.55	1901-02
16724000	Kawainui Str at alt. 775 ft nr Waipio	6.00	1901-02
16728000	Alakahi Str at alt. 1,200 ft nr Waipio	1.49	1901-02
16729000	Alakahi Str at alt. 730 ft. nr Waipio	3.14	1901-02
16730000	Koiawe Str at alt. 1,120 ft. nr Waipio	1.65	1901-02
16731000	Koiawe Str at alt. 610 ft. nr Waipio	2.23	1901-02
16732000	Waipio Str below Koiawe Str nr Waipio	11.70	1901-02
16732100	Waima Str at alt. 790 ft. nr Waipio	0.51	1901-02
16732150	Waima Str at alt. 385 ft nr Waipio	0.77	1901-02
16732200	Wailoa Str nr Waipio	14.30	1901-02, 1911-12, 1964-69
16732300	Upper Hamakua Ditch at Puualala and Res No. 3	--	1913-20
16732600	Lower Hamakua Ditch at Waima flume nr Kukuihaele	--	1910-13
16732900	Lower Hamakua Ditch at main weir nr Kukuihaele	--	1910-20
16733000	Lower Hamakua Ditch wasteway nr Kukuihaele	--	1964-73
16733100	Lower Hamakua Ditch bl main weir nr Kukuihaele	--	1964-73
16733200	Honokaa diversion at Honokaa	--	1964-73
16733300	Lower Hamakua Ditch bl Honokaa div at Honokaa	--	1964-73
16737000	Waiilikahi Str nr Waimanu	0.76	1939-60
16738000	Kaimu Str nr Waimanu	0.90	1939-47, 1950-52
16739000	Punalulu Str nr Waimanu	0.66	1939-52
16740000	Waiaalala Str nr Waimanu	0.12	1939-52
16741000	Paopao Str nr Waimanu	0.32	1939-52
16742000	Kukui Str nr Waimanu	0.22	1939-52, 1959-66
16743000	Awini Ditch at E Honokane iki Gulch nr Niulii	--	1927-38, 1938-49, 1950-72
16744000	E Honokane iki intake to Awini Ditch nr Niulii	--	1927-36, 1937-38, 1939-40, 1940-49, 1951-72
16745000	Awini Ditch above Honokane Gulch nr Kohala	--	1918
16745500	Awini Ditch at Awini Weir nr Kohala	--	1907-17, 1963-72
16747000	E Br Honokane nui Str at alt 1,300 ft nr Honokane	4.53	1901
16747500	East Branch Honokane nui Str nr Niulii	4.96	1963-69
16748000	E Br Honokane nui Str at alt 770 ft nr Honokane	5.41	1901
16749000	W Br Honokane nui Str at alt 1,370 ft nr Honokane	1.81	1901
16749500	W Br Honokane nui Str at alt 775 ft nr Honokane	2.40	1901
16750000	Kohala Ditch at Honokane weir nr Kohala	--	1907-12
16750900	Kohala Ditch at Honokane nr Niulii	--	1963-72
16751000	Kohala Ditch at Pololu nr Niulii	--	1927-38, 1938-72
16752000	Kohala Ditch at Niulii weir nr Kohala	--	1907-17
16755000	Kehena Ditch nr Kohala	--	1917-19, 1928-66
16757000	Waikoloa Str nr Kamuela	0.78	1947-71
16759200	Right Branch Waiaha Str nr Holualoa	1.89	1960-82
16759500	Waiaha Str nr Holualoa	9.35	1957-68
16759800	Kiilae Str nr Honaunau	0.67	1958-82
16761200	Kahilipali nui Gulch at Waiohinu	0.47	1962-65
16764000	Hilea Gulch tributary nr Honuapo	9.17	1966-97
16765000	Hilea Gulch tributary 2 nr Honuapo	1.86	1966-82
16767000	Ninole Gulch nr Punaluu	15.5	1966-82

WATER RESOURCES DATA FOR HAWAII, 1999
DISCONTINUED SURFACE-WATER-QUALITY STATIONS

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The following continuous water-quality stations in Hawaii have been discontinued. Daily records were collected and are stored in NWIS for the period of record shown for each station.

[Type of record: C (specific conductance), S (sediment), T (temperature).]

Station number	Station name	Drainage area (mi ²)	Type of record	Period of record
ISLAND OF OAHU				
16212800	Kipapa Str nr Wahiawa	4.29	S	1973-82
16213000	Waikele Str nr Waipahu	45.70	C,T	1973-81
			S	1972-93
16227500	Moanalua Str nr Kaneohe	0.94	S	1971-78
16270500	Kamooalii Str blw Kuou Str nr Kaneohe	3.21	S	1972-76
ISLAND OF HAWAII				
16704000	Wailuku River at Piihonua, Hawaii, HI	125.00	C	1975-78
			T	1975-79
16713000	Wailuku River at Hilo, Hawaii, HI	256.00	S	1977-79, 1980-83
			C,T	1982-84, 1984-85

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INTRODUCTION

The U.S. Geological Survey (USGS), in cooperation with State, local, and other Federal agencies, obtains a large amount of data pertaining to the water resources of Hawaii each water year. These data, accumulated during many water years, constitute a valuable data base for developing an improved understanding of the water resources of the State. To make these data readily available to interested parties outside the U.S. Geological Survey, the data are published annually in this report series entitled "Water Resources Data - Hawaii."

This report includes records on both surface and ground water in the State. Specifically, it contains: (1) Discharge records for 74 stream-gaging stations, 71 miscellaneous streamflow stations, and 88 crest-stage partial-record streamflow stations; (2) water-quality records for 6 streamflow-gaging stations, and 28 partial-record streamflow stations; (3) water-level records for 84 observation wells; (4) water-quality records for 122 observation wells; and (5) accumulated rainfall records for 40 rainfall stations.

This series of annual reports for Hawaii began with the 1961 fiscal year (State of Hawaii) with a report that contained only data relating to the quantities of surface water. For the 1964 fiscal year, a similar report was introduced that contained only data relating to water quality. Beginning with the 1975 water year, the report format was changed to include, in one volume, data on quantities of surface water, quality of surface and ground water, and ground-water levels. Beginning with the 1993 water year, accumulated rainfall data were included in the report.

Prior to introduction of this series (through June 30, 1960, for Hawaii) and for several water years concurrent with it, water-resources data for Hawaii were published in U.S. Geological Survey Water-Supply Papers. Data on stream discharge and stage and on lake or reservoir contents and stage, through September 1960, were published annually under the title "Surface-Water Supply of the United States." The records in Hawaii were contained in the series as "Surface Water Supply of Hawaii." Records for other Pacific areas were contained in one volume entitled, "Surface Water Supply of Mariana, Caroline, and Samoa Islands." For the 1961 through 1970 water years, the data were published in two 5-year reports. Data on chemical quality, temperature, and suspended sediment for the 1941 through 1970 water years were published annually under the title "Quality of Surface Waters of the United States," and water levels for the 1935 through 1974 water years were published under the title "Ground-Water Levels in the United States." These Water-Supply Papers may be consulted in the libraries of the principal cities in the United States, or if not out of print, may be purchased from the U.S. Geological Survey, Branch of Information Services, Box 25286, Denver, Colorado 80225-0286. For further ordering information, telephone (303) 202-4700.

Publications similar to this report are published annually by the U.S. Geological Survey for all states. These official Survey reports have an identification number consisting of the two-letter State abbreviation, the last two digits of the water year, and the volume number. For example, this report is identified as "U.S. Geological Survey Water-Data Report HI-99-1." For archiving and general distribution, the reports for 1971-74 water years also are identified as water-data reports. These water-data reports are for sale, in paper copy or in microfiche by the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161. For further ordering information, the Customer Inquires telephone number is (703) 487-4650.

Additional information, including current prices, for ordering specific reports may be obtained from the District office at the address given on the back of the title page or by telephone at (808) 587-2400.

COOPERATION

The U.S. Geological Survey and organizations of the State of Hawaii (and formerly the Territory of Hawaii) have had cooperative agreements for the systematic collection of streamflow and ground water-level records since 1909, and for water-quality records since 1967. Organizations that supplied data are acknowledged in station descriptions. Organizations that assisted in collecting data through cooperative agreement with the USGS are:

Hawaii Department of Land and Natural Resources, Commission on Water Resource Management, Linnel Nishioka, Deputy Director.

Hawaii Board of Land and Natural Resources, Land Division, Dean Uchida, Administrator.

Hawaii Department of Transportation, Kazu Hayashida, Director.

Hawaii Department of Agriculture, Paul Matsuo, Administrator.

City and County of Honolulu, Board of Water Supply, Clifford Jamile, Manager and Chief Engineer.

City and County of Honolulu, Department of Planning and Permitting, Randall Fujiki, Director and Chief Engineer.

National Tropical Botanical Garden, Charles Wichman Jr., Assistant Director.

Maui County Board of Water Supply, Dave Craddick, Director.

Kauai County Department of Water, Ernest Lau, Director.

Hawaii County Department of Water Supply, Milton Pavao, P.E., Manager.

Assistance in the form of funds or services was given by the U.S. Army Corps of Engineers, Hawaii Garrison, National Weather Service, and Hawaii County Department of Public Works.

The following organizations aided in collecting records:

East Kauai Water Co., Ltd. and East Maui Irrigation Co., Ltd.

SUMMARY OF HYDROLOGIC CONDITIONS

The 1999 water year was not as dry as the 1998 water year, which was affected by El Nino conditions. Although drought conditions persisted in areas of the islands of Maui and Hawaii, in general conditions were not unusual. No unusually large storms affected the Hawaiian Islands during the water year.

Surface Water

The moderate rainfall throughout Hawaii during the year was reflected in the streamflow recorded at four index stations (figure 1, table 1). These stations are all on streams that are undiverted and unregulated, so that increases or decreases in streamflow can be considered to be primarily the result of rainfall fluctuations. Annual mean discharges at stations 16068000, 16229000, and 16587000 were 103 percent, 125 percent, and 121 percent of the 1961–90 median annual mean discharges at those stations, respectively (figure 1). Annual mean discharge at station 16717000 was 104 percent of the 1967–90 median annual mean discharge at that station (figure 1). Monthly mean flows at the four index stations were generally normal or above normal for the first six months of the water year and normal or below normal for the last six months of the water year. Instantaneous peak flows at all four stations were low in relation to peak flows for the periods of record at these stations (table 1).

Table 1.--Comparison of peak discharge for 1999 water year with the peak discharge for the period of record at four representative stations

Station Number	Station name	Water year 1999		Period of record	
		Date	Peak discharge (ft ³ /s)	Date	Peak discharge (ft ³ /s)
16068000	East Branch of North Fork Wailua River near Lihue, Kauai	Jan. 7	1,830	Nov. 12, 1955	18,400
16229000	Kalihi Stream near Honolulu, Oahu	Jan. 7	576	Nov. 18, 1930	12,400
16587000	Honopou Stream near Huelo, Maui	Jan. 22	1,180	Nov. 18, 1930	5,710
16717000	Honolii Stream near Papaikou, Hawaii	Dec. 5	4,030	May 23, 1978	22,600

Ground Water

Ground-water levels are affected by several factors, including rainfall, pumping, evapotranspiration, and, in coastal areas, tides. Ground-water levels at three continuously-monitored observation wells in Hawaii exhibited both increases and decreases relative to the 1998 water year. At Well 2-0021-01 (station number 220057159210301) in the Lihue Basin on Kauai, water levels were generally higher than those measured in 1998. At Well 3-2256-10 (station number 212238157561101) near Pearl Harbor on Oahu, mean monthly water levels increased in the first 3 months of the year, reversing a declining trend in 1998, and remained nearly constant for the rest of the year. At Well 6-5431-01 (station number 205437156310501) near Wailuku, Maui, water levels reached a record low level in September.

Rainfall

The Hawaiian Islands have extreme variability in annual rainfall amounts owing to strong orographic effects. The wettest location is considered to be Mount Waialeale on Kauai, with an average rainfall of approximately 433 inches per year (Giambelluca and others, 1986). Areas of very low rainfall are found on the leeward side of the larger islands, particularly Maui and Hawaii.

In water year 1999, rainfall amounts remained below long-term normal amounts. Rainfall at the USGS-National Weather Service gage on Mount Waialeale totalled 363 inches, or about 84 percent of the mean annual rainfall. The Kepuni Gulch raingage on the leeward side of Haleakala on Maui recorded only 7.2 inches, or about 24 percent of the mean annual rainfall of roughly 30 inches (Giambelluca and others, 1986).

References

Giambelluca, T.W., Nullet, M.A., and Schroeder, T.A., 1986, Rainfall atlas of Hawaii: State of Hawaii, Department of Land and Natural Resources, Division of Water and Land Development Report R76, 267 p.

WATER RESOURCES DATA FOR HAWAII, 1999

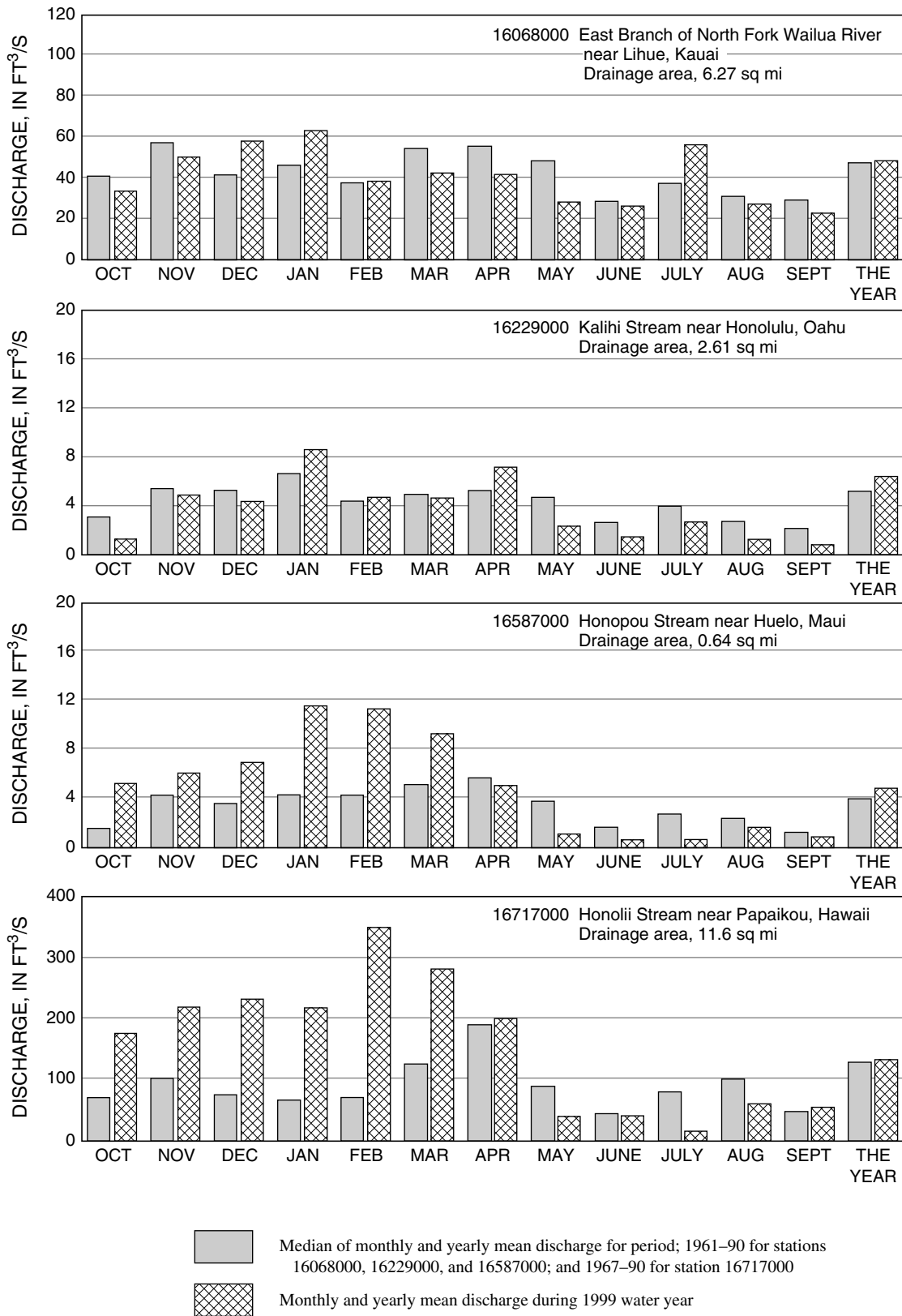


Figure 1. Discharge during 1999 water year compared with median discharge for four representative gaging stations.

SPECIAL NETWORKS AND PROGRAMS

Hydrologic Benchmark Network is a network of 50 sites in small drainage basins around the country whose purpose is to provide consistent data on the hydrology, including water quality, and related factors in representative undeveloped watersheds nationwide, and to provide analyses on a continuing basis to compare and contrast conditions observed in basins more obviously affected by human activities.

National Stream-Quality Accounting Network (NASQAN) monitors the water quality of large rivers within four of the Nation's largest river basins--the Mississippi, Columbia, Colorado, and Rio Grande. The network consists of 39 stations. Samples are collected with sufficient frequency that the flux of a wide range of constituents can be estimated. The objective of NASQAN is to characterize the water quality of these large rivers by measuring concentration and mass transport of a wide range of dissolved and suspended constituents, including nutrients, major ions, dissolved and sediment-bound heavy metals, common pesticides, and inorganic and organic forms of carbon. This information will be used (1) to describe the long-term trends and changes in concentration and transport of these constituents; (2) to test findings of the National Water-Quality Assessment Program (NAWQA); (3) to characterize processes unique to large-river systems such as storage and re-mobilization of sediments and associated contaminants; and (4) to refine existing estimates of off-continent transport of water, sediment, and chemicals for assessing human effects on the world's oceans and for determining global cycles of carbon, nutrients, and other chemicals.

The National Atmospheric Deposition Program/National Trends Network (NADP/NTN) provides continuous measurement and assessment of the chemical climate of precipitation throughout the United States. As the lead federal agency, the USGS works together with over 100 organizations to accomplish the following objectives; (1) Provide a long-term, spatial and temporal record of atmospheric deposition generated from a network of 191 precipitation chemistry monitoring sites. (2) Provide the mechanism to evaluate the effectiveness of the significant reduction in SO₂ emissions that began in 1995 as implementation of the Clean Air Act Amendments (CAAA) occurred. (3) Provide the scientific basis and nationwide evaluation mechanism for implementation of the Phase II CAAA emission reductions for SO₂ and NO_x scheduled to begin in 2000.

Data from the network, as well as information about individual sites, are available through the world wide web at:

<http://nadp.nrel.colostate.edu/NADP>

The National Water-Quality Assessment (NAWQA) Program of the U.S. Geological Survey is a long-term program with goals to describe the status and trends of water-quality conditions for a large, representative part of the Nation's ground- and surface-water resources; provide an improved understanding of the primary natural and human factors affecting these observed conditions and trends; and provide information that supports development and evaluation of management, regulatory, and monitoring decisions by other agencies.

Assessment activities are being conducted in 53 study units (major watersheds and aquifer systems) that represent a wide range of environmental settings nationwide and that account for a large percentage of the Nation's water use. A wide array of chemical constituents will be measured in ground water, surface water, streambed sediments, and fish tissues. The coordinated application of comparative hydrologic studies at a wide range of spatial and temporal scales will provide information for decision making by water-resources managers and a foundation for aggregation and comparison of findings to address water-quality issues of regional and national interest.

Communication and coordination between USGS personnel and other local, State, and federal interests are critical components of the NAWQA Program. Each study unit has a local liaison committee consisting of representatives from key federal, State, and local water resources agencies, Indian nations, and universities in the study unit. Liaison committees typically meet semiannually to discuss their information needs, monitoring plans and progress, desired information products, and opportunities to collaborate efforts among the agencies.

Additional information about the NAWQA Program is available through the world wide web at:

http://wwwrvares.er.usgs.gov/nawqa/nawqa_home.html

Additional information about the island of Oahu NAWQA Program is available through the world wide web at:

<http://hi.usgs.gov/nawqa>

EXPLANATION OF THE RECORDS

The surface-water and ground-water records published in this report are for the 1999 water year that began October 1, 1998 and ended September 30, 1999. A calendar of the water year is provided on the inside of the front cover. The records contain streamflow data, water-quality data for surface water, ground-water, and reservoirs, ground-water level data, and rainfall accumulation data. The locations of the stations and wells where the data were collected are shown in figures 5–25. The following sections of the introductory text are presented to provide users with a more detailed explanation of how the hydrologic data published in this report were collected, analyzed, computed, and arranged for presentation.

Station Identification Numbers

Each data station, whether a streamgage, well, or rain gage, in this report is assigned a unique identification number. This number is unique in that it applies specifically to a given station and to no other. The number usually is assigned when a station is first established and is retained for that station indefinitely. The systems used by the U.S. Geological Survey to assign identification numbers for surface-water stations and for ground-water wells differ, but both are based on geographic location. The "downstream order" system is used for regular surface-water stations and the "latitude-longitude" system is used for wells and, in Hawaii and other Pacific areas, for surface-water stations where only miscellaneous measurements are made, and for rainfall stations.

Downstream Order System

Since October 1, 1950, the order of listing hydrologic-station records in U.S. Geological Survey reports is in a downstream direction along the main stream. All stations on a tributary entering upstream from a mainstream station are listed before that station. A station on a tributary that enters between two mainstream stations is listed between them. A similar order is followed in listing stations on first rank, second rank, and other ranks of tributaries. The rank of any tributary with respect to the stream to which it is immediately tributary is indicated by an indentation in the "List of Stations" in the front of this report. Each indentation represents one rank. This downstream order and system of indentation show which stations are on tributaries between any two stations and the rank of the tributary on which each station is situated.

The station-identification number is assigned according to downstream order. In assigning station numbers, no distinction is made between partial-record stations and other stations; therefore, the station number for a partial-record station indicates downstream-order position in a list made up of both types of stations. Gaps are left in the series of numbers to allow for new stations that may be established; hence, the numbers are not consecutive. The complete 8-digit number for each station, such as 16200000, which appears just to the left of the station name, includes the two-digit number "16" plus the six-digit downstream order number "200000."

Latitude-Longitude System

The identification numbers for wells, miscellaneous surface-water sites, and rainfall stations are assigned according to the grid system of latitude and longitude. The number consists of 15 digits. The first six digits denote the degrees, minutes, and seconds of latitude, the next seven digits denote degrees, minutes, and seconds of longitude, and the last two digits (assigned sequentially) identify the wells or other sites within a one-second grid. This site-identification number, once assigned, is a pure number, and has no locational significance. In the rare instance where the initial determination of latitude and longitude are found to be in error, the station will retain its initial identification number; however, its true latitude and longitude will be listed in the LOCATION paragraph of the station description (see figure 2).

Local Identifier Well-Numbering System

In addition to the latitude-longitude based site identification number, wells in the State of Hawaii are assigned local well numbers. Beginning in 1971, the local well-numbering system was restructured to contain seven digits based on a non-arbitrary, unique one-minute grid system. One-minute parallel lines for both latitude and longitude are drawn on the map resulting in one-minute grids. Each grid is designated by a four-digit number. The first two digits represent minutes of latitude for the grid and the second two digits represent minutes of longitude for that grid. This establishes unique minute-grid numbers within each of the islands in the state except for the island of Hawaii where it encompasses an area more than one degree (60 minutes) of latitude and longitude. To establish unique minute-grid numbers for this island, 30 was added to the minutes of latitude in areas less than 19°00" of latitude, and 60 was added to the minutes of latitude in areas more than 20°00" of latitude. For the same reason, 30 was added to the minutes of longitude in areas less than 155°00" of longitude, and 60 was added to the minutes of longitudes more than 156°00" longitude (see figures 3 and 4).

To distinguish wells within a minute grid, two digits are added following the 4-digit minute-grid numbers with a dash separator. These two-digit numbers are assigned with the oldest well constructed within the grid as 01 and increase chronologically, with few exceptions, to the latest.

Since it is possible for wells on different islands to have the same 6-digit number, another digit distinguishing each of the islands is added in front of the 6-digit number with a dash separator.

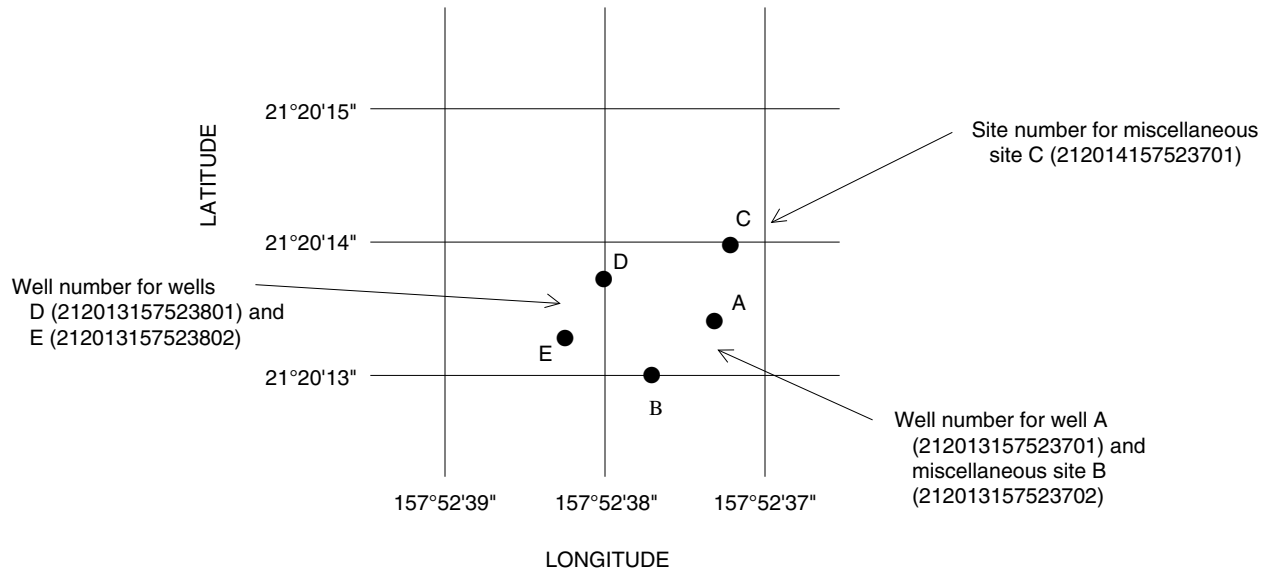


Figure 2. Sketch showing system for numbering wells and miscellaneous sites.

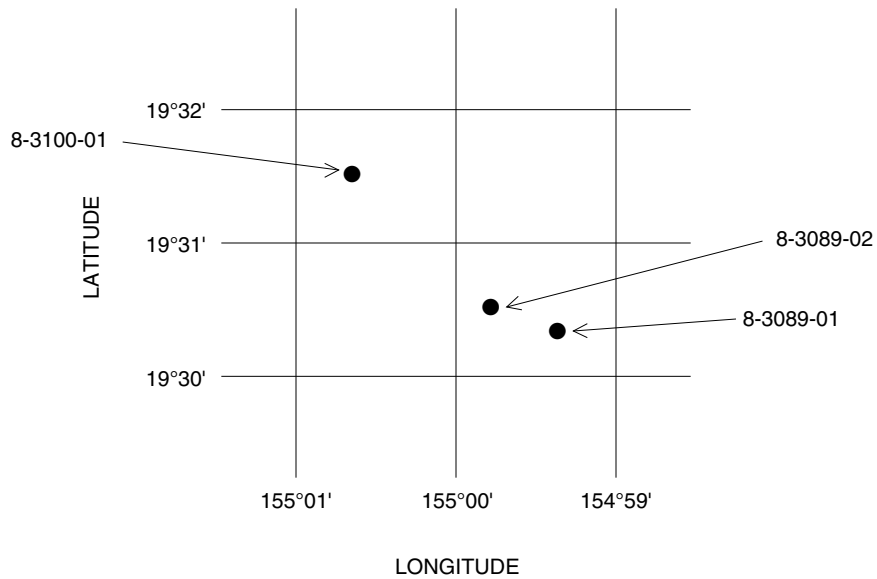


Figure 3. Sketch showing local well-numbering system.

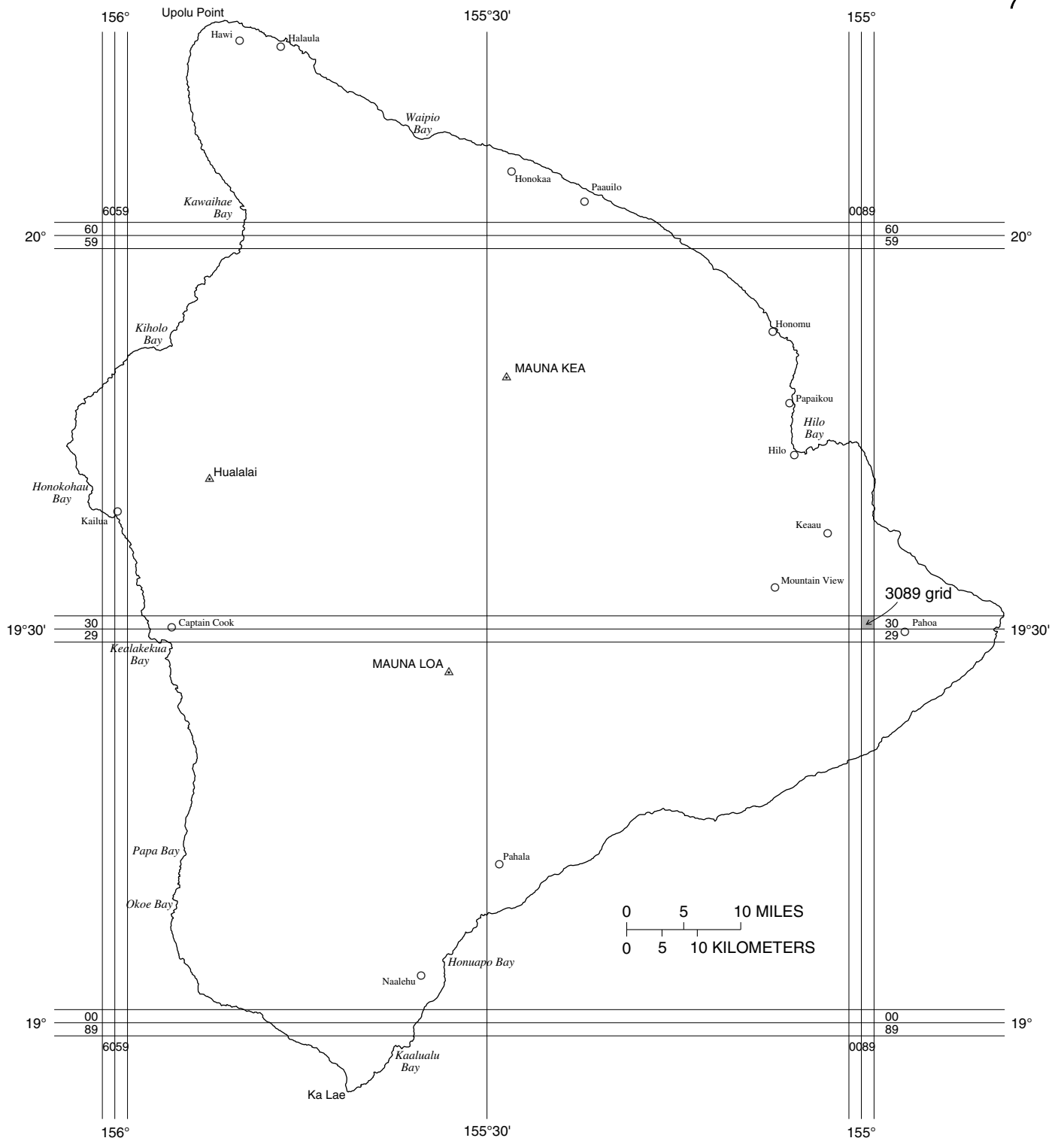


Figure 4. Map of island of Hawaii showing system for determining local well numbers.

Local State Key Numbering System

In addition to the latitude-longitude based site identification number, rainfall stations in the State of Hawaii are assigned State key numbers. The numbering system was devised in 1948 by the authors of "A Key to Rain Gages in Hawaii." The numbers run from 1 to 1145, proceeding from south to north up the island chain. However, within each five-minute latitude band, numbers proceed from west to east. Following are the blocks of numbers assigned to each island.

<u>Island</u>	<u>State Key Number</u>
Hawaii	1-223
Maui	248-497
Molokai	500-563
Lanai	650-696
Oahu	700-912
Kauai	925-1145

Records of Stage and Water Discharge

Records of stage and water discharge may be complete or partial. Complete records of discharge are those obtained using a continuous stage-recording device through which either instantaneous or mean discharges may be computed for any time, or any period of time, during the period of record. Complete records of lake or reservoir content, similarly, are those for which stage or content may be computed or estimated with reasonable accuracy for any time, or period of time. They may be obtained using a continuous stage-recording device, but need not be. Because daily mean discharges and end-of-day contents commonly are published for such stations, they are referred to as "daily stations."

By contrast, partial records are obtained through discrete measurements without using a continuous stage-recording device and pertain only to a few flow characteristics, or perhaps only one. The nature of the partial record is indicated by table titles such as "Crest-stage partial records," or "Low-flow partial records." Records of miscellaneous discharge measurements or of measurements from special studies, such as low-flow seepage studies, may be considered as partial records, but they are presented separately in this report. Location of all complete-record and crest-stage partial-record stations for which data are given in this report are shown in figures 5-14.

Data Collection and Computation

The data obtained at a complete-record gaging station on a stream or canal consist of a continuous record of stage, individual measurements of discharge throughout a range of stages, and notations regarding factors that may affect the relations between stage and discharge. These data, together with supplemental information, such as weather records, are used to compute daily discharges. The data obtained at a complete-record gaging station on a lake or reservoir consist of a record of stage and of notations regarding factors that may affect the relations between stage and lake content. These data are used with stage-area and stage-capacity curves or tables to compute water-surface areas and lake storage.

Continuous records of stage are obtained with electronic data loggers, with digital recorders that punch stage values on paper tapes at selected time intervals, or with analog recorders that trace continuous graphs of stage. Measurements of discharge are made with current meters, using methods adapted by the U.S. Geological Survey as a result of experience accumulated since 1880. These methods are described in standard textbooks, Water-Supply Paper 2175, and the U.S. Geological Survey Techniques of Water-Resources Investigations (TWRI), Book 3, Chapter A1 to A19 and Book 8, Chapters A2 and B2. The methods are consistent with the American Society for Testing and Materials (ASTM) standards and generally follow the standards of the International Organization for Standards (ISO).

In computing discharge records, results of individual measurements are plotted against corresponding stages, and stage-discharge relation curves are then constructed. From these curves, rating tables indicating the approximate discharge for any stage within the range of the measurements are prepared. If it is necessary to define extremes of discharge outside the range of the current-meter measurements, the curves are extended using: (1) logarithmic plotting; (2) velocity-area studies; (3) results of indirect measurements of peak discharge, such as slope-area or contracted-opening measurements, and computations of flow-over-dams or weirs; or (4) step-backwater techniques.

Daily mean discharges are computed by applying the stages (gage heights) to the stage-discharge curves or tables. If the stage-discharge relation is subject to change because of frequent or continual change in the physical features that form the control, the daily mean discharge is determined by the shifting-control method, in which correction factors based on individual discharge measurements and notes of the personnel making the measurements are applied to the gage heights before the discharges are determined from the curves or tables. This shifting-control method also is used if the stage-discharge relation is changed temporarily because of aquatic growth or debris on the control.

At some stream-gaging stations, the stage-discharge relation is affected by the backwater from reservoirs, tributary streams, or other sources. This necessitates the use of the slope method in which the slope or fall in a reach of the stream is a factor in computing discharge. The slope or fall is obtained by means of an auxiliary gage set at some distance from the base gage. At some stations the stage-discharge relation is affected by changing stage; at these stations the rate of change in stage is used as a factor in computing discharge.

In computing records of lake or reservoir contents, it is necessary to have information available from surveys, curves, or tables that define the relation of stage and content. The application of stage to the stage-content curves or tables gives the contents from which daily, monthly, or yearly changes then are determined. If the stage-content relation changes because of deposition of sediment in a lake or reservoir, periodic resurveys may be necessary to redefine the relation. Discharges over lake or reservoir spillways are computed from stage-discharge relations much as other stream discharges are computed.

For some gaging stations there are periods when no gage-height record is obtained, or the validity of the recorded gage height is so questionable that it cannot be used to compute daily discharge or contents. This happens when the recorder stops or otherwise fails to operate properly, intakes are plugged, or for various other reasons. For such periods, the daily discharges are estimated from the recorded range in stage, previous and following record, discharge measurements, weather records, and comparison with other station records from the same or nearby basins. Likewise, daily contents may be estimated from operator's logs, previous and following record, inflow-outflow studies, and other information. Information explaining how estimated daily-discharge values are identified in station records is included in the next two sections, "Data Presentation" (REMARKS paragraph) and "Identifying Estimated Daily Discharge."

Data Presentation

Streamflow data in this report are presented in a new format that is considerably different from the format in data reports prior to the 1992 water year. The major changes are that statistical characteristics of discharge now appear in tabular summaries following the water-year data table and less information is provided in the text or station manuscript above the table. These changes represent the results of a pilot program to reformat the annual water-data report to meet current user needs and data preferences. In addition, beginning with the 1992 water year, a graphical hydrograph is included for surface-water discharge stations.

The records published for each continuous-record surface-water discharge station (gaging station) now consist of five parts, the station manuscript; the data table of daily mean values of discharge for the current water year with summary data; a tabular statistical summary of monthly mean flow data for a designated period, by water year; a summary statistics table that includes statistical data of annual and daily flows as well as data pertaining to annual runoff, 7-day low-flow minimums, and flow duration; and a hydrograph of the daily mean values of discharge for the current water year. Summary statistics were not included for certain sites where these data would be misleading. Contact the U.S. Geological Survey Hawaii District office for information concerning summary statistics for these sites.

Station Manuscript

The manuscript provides, under various headings, descriptive information, such as station location; period of record; historical extremes outside the period of record; record accuracy; and other remarks pertinent to station operation and regulation. The following information, as appropriate, is provided with each continuous record of discharge or lake content.

LOCATION.--Information on locations is obtained from the most accurate maps available. The location of the gage with respect to the cultural and physical features in the vicinity and with respect to the reference place mentioned in the station name is given.

DRAINAGE AREA.--Drainage areas are measured using the most accurate maps available. Because the type of maps available varies from one drainage basin to another, the accuracy of drainage areas likewise varies. Drainage areas are updated as better maps become available.

PERIOD OF RECORD.--This indicates the period for which there are published records for the station or for an equivalent station. An equivalent station is one that was in operation at a time that the present station was not, and whose location was such that records from it can reasonably be considered equivalent with records from the present station.

REVISED RECORDS.--Published records, because of new information, occasionally are found to be incorrect, and revisions are printed in later reports. Listed under this heading are all the reports in which revisions have been published for the station and the water years to which the revisions apply. If a revision did not include daily, monthly, or annual figures of discharge, that fact is noted after the year dates as follows: "(M)" means the instantaneous maximum discharge was revised; "(m)" the instantaneous minimum was revised; and "(P)" the peak discharges were revised. If the drainage area has been revised, the report in which the most recently revised figure was first published is given.

GAGE.--The type of gage in current use, the datum of the current gage referred to mean sea level, and a condensed history of the types, locations, and datums of previous gages are given under this heading. In references to datum of gage, the phrase "mean sea level" denotes "Sea Level Datum of 1929" as used by the National Mapping Division of the U.S. Geological Survey unless otherwise qualified.

REMARKS.--All periods of estimated daily-discharge record will either be identified by date in this paragraph of the station manuscript for water-discharge stations or flagged in the daily-discharge table. (See next section, "Identifying Estimated Daily Discharge.") If a remark statement is used to identify estimated record, the paragraph will begin with this information presented as the first entry. The paragraph is also used to present information relative to the accuracy of the records, special methods of computation, conditions that affect natural flow at the station, and possibly other pertinent items. For reservoir stations, information is given on the dam forming the reservoir, the capacity, outlet works and spillway, and purpose and use of the reservoir.

COOPERATION.--Records provided by a cooperating organization or obtained for the U.S. Geological Survey by a cooperating organization are identified here.

AVERAGE DISCHARGE.--The discharge value given is the arithmetic average of the water-year mean discharges. Average discharge is computed only for stations having at least 5 water years of complete record; water years with incomplete record are not included in the computation. The mean-discharge value that uses all published data may differ from that given in the summary statistics data, which is based only on computer-stored data. The summary data do not include values of monthly or yearly data that were determined by various methods for the series of Water-Supply Papers entitled "Compilation of Records of Surface Water of the United States." The average-discharge value is not computed for stations where diversions, storage or other water-use practices cause the value to be meaningless. If water projects that significantly alter flow at a station are put into use after the station has been in operation for a period of years, the new average is computed as soon as 5 water years of record have accumulated after the project began.

EXTREMES FOR PERIOD OF RECORD.--Extremes may include maximum and minimum stages and maximum and minimum discharges or content. Unless otherwise qualified, the maximum discharge or content is the instantaneous maximum corresponding to the highest stage that occurred. The highest stage may have been obtained from a graphic or digital recorder, a crest-stage gage, or by direct observation of a nonrecording gage. If the maximum stage did not occur on the same day as the maximum discharge or content, it is given separately. Similarly, the minimum is the instantaneous minimum discharge, unless otherwise qualified, and was determined and is reported in the same manner as the maximum.

EXTREMES OUTSIDE PERIOD OF RECORD.--Included here is information concerning major floods or unusually low flows that occurred outside the stated period of record. The information may or may not have been obtained by the U.S. Geological Survey.

EXTREMES FOR CURRENT YEAR.--Extremes given here are similar to those for the period of record, except the peak discharge listing may include secondary peaks. For stations meeting certain criteria, all peak discharges and stages occurring during the water year and greater than a selected base discharge are presented under this heading. The peaks greater than the base discharge, excluding the highest one, are referred to as secondary peaks. Peak discharges are not published for any canals, ditches, drains, or streams for which the peaks are subject to substantial artificial control. The time of occurrence for peaks is expressed in 24-hour local standard time. For example, 12:30 a.m. is 0030, 1:30 p.m. is 1330. The minimum for the current water year appears below the table of peak data.

REVISIONS.--If a critical error in published records is discovered, a revision is included in the first report published following discovery of the error.

Although rare, occasionally the records of a discontinued gaging station may need revision. Because, for these stations, there would be no current or, possibly, future station manuscript published to document the revision in a "Revised Records" entry, users of data for these stations who obtained the record from previously published data reports may wish to contact the District Office (address given on the back of the title page of this report) to determine if the published records were ever revised after the station was discontinued. Of course, if the data were obtained by computer retrieval, the data would be current and there would be no need to check because any published revision of data is always accompanied by revision of the corresponding data in computer storage.

Manuscript information for lake or reservoir stations differs from that for stream stations in the nature of the "Remarks" and in the inclusion of a skeleton stage-capacity table when daily contents are given.

Data Table of Daily Mean Values

The daily table of discharge records for stream-gaging stations gives mean discharge for each day of the water year. In the monthly summary for the table, the line headed "TOTAL" gives the sum of the daily figures for each month. The line headed "MEAN" gives the average flow in cubic feet per second during the month, and the lines headed "MAX" and "MIN" give the maximum and minimum daily mean discharges, respectively, for the month. Discharge for the month also is usually expressed in acre-feet (line headed "AC-FT").

Statistics of Monthly Mean Data

A tabular summary of the mean (line headed "MEAN"), maximum (line headed "MAX"), and minimum (line headed "MIN") of monthly mean flows for each month for a designated period is provided below the mean values table. The water years of the first occurrence of the maximum and minimum monthly flows are provided immediately below those figures. The designated period will be expressed as "FOR WATER YEAR ___-___, BY WATER YEAR (WY)," and will list the first and last water years of the range of years selected from the PERIOD OF RECORD paragraph in the station manuscript. It will consist of all of the station record within the specified water years, inclusive, including complete months of record for partial water years, if any, and may coincide with the period of record for the station. The water years for which the statistics are computed will be consecutive, unless a break in the station record is indicated in the manuscript.

Summary Statistics

A table titled "SUMMARY STATISTICS" follows the statistics of monthly mean data tabulation. This table consists of four columns, with the first column containing the line headings of the statistics being reported. The table provides a statistical summary of yearly, daily, and instantaneous flows, not only for the current water year but also for the previous calendar year and for a designated period, as appropriate. The designated period selected, "WATER YEARS ___-___," will consist of all of the station record within the specified water years, inclusive, including months of record for partial water years, if any, and may coincide with the period of record for the station. The water years for which the statistics are computed will be consecutive, unless a break in the station record is indicated in the manuscript. All of the calculations for the statistical characteristics designated ANNUAL (See line headings below), except for the "ANNUAL 7-DAY MINIMUM" statistic, are calculated for the designated period using complete water years. The other statistical characteristics may be calculated using partial water years.

The date or water year, as appropriate, of the first occurrence of each statistic reporting extreme values of discharge is provided adjacent to the statistic. Repeated occurrences may be noted in the REMARKS paragraph of the manuscript or in footnotes. Because the designated period may not be the same as the station period of record published in the manuscript, occasionally the dates of occurrence listed for the daily and instantaneous extremes in the designated-period column may not be within the selected water years listed in the headings. When this occurs, it will be noted in the REMARKS paragraph or in footnotes. Selected streamflow duration curve statistics and runoff are also given. Runoff data may be omitted if there is extensive regulation or diversion of flow in the drainage basin.

The following summary statistics data, as appropriate, are provided with each continuous record of discharge. Comments to follow clarify information presented under the various line headings of the summary statistics table.

ANNUAL TOTAL.--The sum of the daily mean values of discharge for the year.

ANNUAL MEAN.--The arithmetic mean of the individual daily mean discharges for the year noted or for the designated period.

HIGHEST ANNUAL MEAN.--The maximum annual mean discharge occurring for the designated period.

LOWEST ANNUAL MEAN.--The minimum annual mean discharge occurring for the designated period.

HIGHEST DAILY MEAN.--The maximum daily mean discharge for the year or for the designated period.

LOWEST DAILY MEAN.--The minimum daily mean discharge for the year or for the designated period.

ANNUAL 7-DAY MINIMUM.--The lowest mean discharge for 7 consecutive days for a calendar year or a water year. Note that most low-flow frequency analyses of annual 7-day minimum flows use a climatic year (April 1 - March 31). The date shown in the summary statistics table is the initial date of the 7-day period. (This value should not be confused with the 7-day 10-year low-flow statistic.)

INSTANTANEOUS PEAK FLOW.--The maximum instantaneous discharge occurring for the water year or for the designated period. Note that secondary instantaneous peak discharges above a selected base discharge are stored in District computer files for stations meeting certain criteria. Those discharge values may be obtained by writing to the District office (see address on back title page of this report).

INSTANTANEOUS PEAK STAGE.--The maximum instantaneous stage occurring for the water year or for the designated period. If the dates of occurrence for the instantaneous peak flow and instantaneous peak stage differ, the REMARKS paragraph in the manuscript or a footnote may be used to provide further information.

INSTANTANEOUS LOW FLOW.--The minimum instantaneous discharge occurring for the water year or for the designated period.

ANNUAL RUNOFF.--Indicates the total quantity of water in runoff for a drainage area for the year. Data reports may use any of the following units of measurement in presenting annual runoff data:

Acre-foot (AC-FT) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 43,560 cubic feet or about 326,000 gallons or 1,233 cubic meters.

Cubic feet per second per square mile (CFSM) is the average number of cubic feet of water flowing per second from each square mile area drained, assuming the runoff is distributed uniformly in time and area.

Inches (INCHES) indicates the depth to which the drainage area would be covered if all of the runoff for a given time period were uniformly distributed on it.

10 PERCENT EXCEEDS.--The discharge that has been exceeded 10 percent of the time for the designated period.

50 PERCENT EXCEEDS.--The discharge that has been exceeded 50 percent of the time for the designated period.

90 PERCENT EXCEEDS.--The discharge that has been exceeded 90 percent of the time for the designated period.

HYDROGRAPH.--The hydrograph gives a graphical presentation of the mean discharge for each day of the water year.

Where possible, the same scale is used in order to facilitate visual comparison between gaging stations.

Data collected at miscellaneous sites are presented in a table following the information for continuous sites. This table summarizes discharge measurements made at sites other than continuous-record sites.

Identifying Estimated Daily Discharge

Estimated daily-discharge values published in the water-discharge tables of annual State data reports are identified either by flagging individual daily values with the letter symbol "e" and printing a table footnote, "e Estimated," or by listing the dates of the estimated record in the REMARKS paragraph of the station manuscript.

Accuracy of the Records

The accuracy of streamflow records depends primarily on: (1) the stability of the stage-discharge relation or, if the control is unstable, the frequency of discharge measurements, and (2) the accuracy of measurements of stage, measurements of discharge, and interpretations of records.

The accuracy attributed to the records is indicated under "REMARKS." "Excellent" means that about 95 percent of the published daily discharges are within 5 percent of their true values; "good," within 10 percent; and "fair" within 15 percent. Records that do not meet the criteria mentioned are rated "poor." Different accuracies may be attributed to different parts of a given record.

Daily mean discharges in this report are given to the nearest hundredth of a cubic foot per second for values less than 1 ft³/s; the nearest tenths between 1.0 and 10 ft³/s; to whole numbers between 10 and 1,000 ft³/s; and to three significant figures for more than 1,000 ft³/s. The number of significant figures used is based solely on the magnitude of the discharge figure. The same rounding rules apply to discharges listed for partial-record stations and miscellaneous sites.

Discharge at many stations, as indicated by the monthly mean, may not reflect natural runoff because of the effects of diversion, consumption, regulation by storage, increase or decrease in evaporation due to artificial causes, or to other factors. For such stations, figures of cubic feet per second per square mile and of runoff, in inches, are not published unless satisfactory adjustments can be made for diversions, for changes in contents to reservoirs, or for other changes incident to use and control. Evaporation from a reservoir is not included in the adjustments for changes in reservoir contents, unless it is so stated. Even at those stations where adjustments are made, large errors in computed runoff may occur if adjustments or losses are large in comparison with the observed discharge.

Other Records Available

Information used in the preparation of the records in this publication, such as discharge-measurement notes, gage-height records, temperature measurements, and rating tables are on file in the U.S. Geological Survey Hawaii District office. Also, most of the daily mean discharges are in computer readable form and have been analyzed statistically. Information on the availability of the unpublished information or on the results of statistical analyses of the unpublished records may be obtained from the U.S. Geological Survey Hawaii District office.

Records of Surface-Water Quality

Records of surface-water quality ordinarily are obtained at or near stream-gaging stations because interpretation of records of surface-water quality nearly always requires corresponding discharge data. Records of surface-water quality in this report may involve a variety of types of data and measurement frequencies.

Classification of Records

Water-quality data for surface-water sites are grouped into one of three classifications. A continuing-record station is a site where data are collected on a regularly scheduled basis. Frequency may be one or more times daily, weekly, monthly, or quarterly. A partial-record station is a site where limited water-quality data are collected systematically over a period of years. Frequency of sampling is usually less than quarterly. A miscellaneous sampling site is a location other than a continuing or partial-record station, where random samples are collected to give better areal coverage to define water-quality conditions in the river basin.

A careful distinction needs to be made between "continuing records" as used in this report and "continuous recordings," which refers to a continuous graph or a series of discrete values punched at short intervals on a paper tape or obtained via data collection platform. Some records of water quality, such as temperature and specific conductance, may be obtained through continuous recordings; however, because of costs, most data are obtained only monthly or less frequently. Locations of stations for which records on the quality of surface water appear in this report are shown in figures 5–9 and 15.

Arrangement of Records

Water-quality records collected at a surface-water daily record station are published immediately following that record, regardless of the frequency of sample collection. Station number and name are the same for both records. Where a surface-water daily record station is not available or where the water quality differs significantly from that at the nearby surface-water station, the continuing water-quality record is published with its own station number and name in the regular downstream-order sequence. Water-quality data for partial-record stations and for miscellaneous sampling sites appear in separate tables following the table of discharge measurements at miscellaneous sites.

On-Site Measurements and Sample Collection

In obtaining water-quality data, it is important that the data obtained represent the in situ quality of the water. To assure this, certain measurements, such as water temperature, pH, and dissolved oxygen, need to be made on site when the samples are taken. To assure that measurements made in the laboratory also represent the in situ water, carefully prescribed procedures need to be followed in collecting the samples, treating the samples to prevent changes in quality pending analysis, and shipping the samples to the laboratory. Procedures for on site measurements and for collecting, treating, and shipping samples are detailed in the TWRI Book 1, Chapter D2; Book 3, Chapter C2; and Book 5, Chapters A1, A3, and A4. These references are listed in the PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS section of this report. These methods are consistent with ASTM standards and generally follow ISO standards. Also, detailed information on collecting, treating, and shipping samples may be obtained from the U.S. Geological Survey Hawaii District office.

One sample can define adequately the water quality at a given time if the mixture of solutes throughout the stream cross section is homogeneous. However, the concentration of solutes at different locations in the cross section may vary widely with different rates of water discharge, depending on the source of material and the turbulence and mixing of the stream. Some streams must be sampled through several vertical sections to obtain a representative sample needed for an accurate mean concentration and for use in calculating load. All samples obtained for the National Stream-Quality Accounting Network (see "DEFINITION OF TERMS") are obtained from at least five verticals. Whether samples are obtained from the centroid of flow or from several verticals, depends on flow conditions and other factors which must be evaluated by the collector.

Chemical-quality data published in this report are considered to be the most representative values available for the stations listed. The values reported represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. In the rare case where an apparent inconsistency exists between a reported pH value and the relative abundance of carbon dioxide species (carbonate and bicarbonate), the inconsistency is the result of a slight uptake of carbon dioxide from the air by the sample between measurements of pH in the field and determination of carbonate and bicarbonate in the laboratory.

For chemical-quality stations equipped with digital monitors, the records consist of daily maximum, minimum, and mean values for each constituent measured and are based upon hourly punches beginning at 0100 hours and ending at 2400 hours for the day of record. More detailed records (hourly values) may be obtained from the U.S. Geological Survey office whose address is given on the back of the title page in this report.

Water Temperature

Water temperatures are measured at most of the water-quality stations. In addition, water temperatures are frequently taken at the time discharge measurements are made for water-discharge stations. For stations where water temperatures are taken manually once or twice daily, the water temperatures are taken at about the same time each day. Large streams have a small diurnal temperature change; shallow streams may have a daily range of several degrees and may follow closely the changes in air temperature. Some streams may be affected by waste-heat discharges.

At stations where recording instruments are used, maximum, minimum, and mean temperatures for each day are published. Water temperatures measured at the time of water-discharge measurements are on file in the U.S. Geological Survey Hawaii District office.

Sediment

Suspended-sediment concentrations are determined from samples collected by one of the standard techniques discussed in TWRI, Book 3, Chapter C2, "Field methods for measurement of fluvial sediment," 1985 revision. Samples are obtained using standard depth- or point-integrating samplers, or by means of an approved pumping sampler. Mean concentrations for the sampled cross section are in turn determined from these samples.

For stations with daily suspended-sediment records, mean daily suspended-sediment concentrations and loads are computed and published for each day of the water year. During periods of unchanging flow and sediment concentration, daily suspended-sediment loads are computed as the product of daily mean streamflow, daily mean suspended-sediment concentrations, and 0.0027, a conversion factor. During periods of rapidly changing flow or rapidly changing suspended-sediment concentration, samples may have been collected more frequently (twice daily or, in some instances, hourly). The published sediment discharges for days of rapidly changing flow or concentration were computed by the subdivided-day method (time-discharge weighted average). Therefore, for those days when the published sediment discharge value differs from the value computed as the product of discharge times mean concentration times 0.0027, the reader can assume that the sediment discharge for that day was computed by the subdivided-day method. For periods when no samples were collected, daily discharges of suspended sediment were estimated on the basis of water discharge, sediment concentrations observed immediately before and after the periods, and suspended-sediment loads for other periods of similar discharge. Methods used in the computation of sediment records are described in the TWRI Book 3, Chapters C1 and C3. These methods are consistent with ASTM standards and generally follow ISO standards.

At other stations, suspended-sediment samples were collected periodically. Although data collected periodically may represent conditions only at the time of observations, such data are useful in establishing seasonal relations between quality and streamflow in predicting long-term sediment-discharge characteristics of the stream.

In addition to the records of suspended-sediment discharge, periodic measurements of the particle-size distributions for the suspended-sediment, bed-load, and bed-material samples are included for stations where samples were obtained to measure this parameter.

Laboratory Measurements

Sediment samples, samples for indicator bacteria, and daily samples for specific conductance and chloride are analyzed locally. All other samples are analyzed in the U.S. Geological Survey National Water-Quality Laboratory in Arvada, Colorado. The USGS National Water-Quality Laboratory collects quality-control data on a continuing basis to evaluate selected analytical methods to determine long-term method detection levels (LT-MDL's) and laboratory reporting levels (LRL's). These values are re-evaluated each year on the basis of the most recent quality-control data and, consequently, may change from year to year.

This reporting procedure limits the occurrence of false positive error. The chance of falsely reporting a concentration greater than the LT-MDL for a sample in which the analyte is not present is 1 percent or less. Application of the LRL limits the occurrence of false negative error. The chance of falsely reporting a non-detection for a sample in which the analyte is present at a concentration equal to or greater than the LRL is 1 percent or less.

Accordingly, concentrations are reported as <LRL for samples in which the analyte was either not detected or did not pass identification. Analytes that are detected at concentrations between the LT-MDL and LRL and that pass identification criteria are estimated. Estimated concentrations will be noted with a remark code of "E." These data should be used with the understanding that their uncertainty is greater than that of data reported without the "E" remark code.

Methods used to analyze sediment samples and to compute sediment records are described in the TWRI Book 5, Chapter C1. Methods used by the U.S. Geological Survey laboratories are given in TWRI Book 1, Chapter D2; Book 3, Chapter C2; and Book 5, Chapter A1, A3, A4, and A5. These methods are consistent with ASTM standards and generally follow ISO standards.

In March 1989, the National Water-Quality Laboratory discovered a bias in the turbidimetric method for sulfate analysis, indicating that values below 75 mg/L have a median positive bias of 2 mg/L above the true value for the period between 1982 and 1989. Sulfate values in this report have not been corrected for this bias.

Data Presentation

For continuing-record stations, information pertinent to the history of station operation is provided in descriptive headings preceding the tabular data. These descriptive headings give details regarding location, drainage area, period of record, type of data available, instrumentation, general remarks, cooperation, and extremes for parameters currently measured daily. Tables of chemical, physical, biological, radiochemical data, and so forth, obtained at a frequency less than daily are presented first. Tables of "daily values" of specific conductance, pH, water temperature, dissolved oxygen, and suspended sediment then follow in sequence.

In the descriptive headings, if the location is identical to that of the discharge gaging station, neither the LOCATION nor the DRAINAGE AREA statements are repeated. The following information, as appropriate, is provided with each continuous-record station. Comments that follow clarify information presented under the various headings of the station description.

LOCATION.--See Data Presentation under "Records of Stage and Water Discharge;" same comments apply.

DRAINAGE AREA.--See Data Presentation under "Records of Stage and Water Discharge;" same comments apply.

PERIOD OF RECORD.--This indicates the periods for which there are published water-quality records for the station. The periods are shown separately for records of parameters measured daily or continuously and those measured less than daily. For those measured daily or continuously, periods of record are given for the parameters individually.

INSTRUMENTATION.--Information on instrumentation is given only if a water-quality monitor, sediment pumping sampler, or other sampling device is in operation at a station.

REMARKS.--Remarks provide added information pertinent to the collection, analysis, or computation of the records.

COOPERATION.--Records provided by a cooperating organization or obtained for the Geological Survey by a cooperating organization are identified here.

EXTREMES FOR PERIOD OF RECORD.--Maximums and minimums are given only for parameters measured daily or more frequently. None are given for parameters measured weekly or less frequently, because the true maximums and minimums may not have been sampled. Extremes, when given, are provided for both the period of record and for the current water year.

REVISIONS.--If errors in published water-quality records are discovered after publication, appropriate updates are made to the Water-Quality File in the U.S. Geological Survey's computerized data system, NWIS, and subsequently by monthly transfer of update transactions to the U.S. Environmental Protection Agency's STORET system. Because the usual volume of updates makes it impractical to document individual changes in the State data-report series or elsewhere, potential users of U.S. Geological Survey water-quality data are encouraged to obtain all required data from the appropriate computer file.

The surface-water-quality records for partial-record stations and miscellaneous sampling sites are published in separate tables following the table of discharge measurements at miscellaneous sites. No descriptive statements are given to these records. Each station is published with its own station number and name in the regular downstream-order sequence.

Remark Codes

The following remark codes may appear with the surface-water-quality data in this report:

<u>PRINTED OUTPUT</u>	<u>REMARK</u>
E	Estimated value.
>	Actual value is known to be greater than the value shown.
<	Actual value is known to be less than the value shown.
K	Results based on colony count outside the acceptance range (non-ideal colony count).
L	Biological organism count less than 0.5 percent (organism may be observed rather than counted).
D	Biological organism count equal to or greater than 15 percent (dominant).
V	Analyte was detected in both the environmental sample and the associated blanks
&	Biological organism estimated as dominant.

Dissolved Trace-Element Concentrations

*NOTE.--Traditionally, dissolved trace-element concentrations have been reported at the microgram per liter ($\mu\text{g/L}$) level. Recent evidence, mostly from large rivers, indicates that actual dissolved-phase concentrations for a number of trace elements are within the range of 10's and 100's of nanograms per liter (ng/L). Data above the $\mu\text{g/L}$ level should be viewed with caution. Such data may actually represent elevated environmental concentrations from natural or human causes; however, these data could reflect contamination introduced during sampling, processing, or analysis. To confidently produce dissolved trace-element data with insignificant contamination, the U.S. Geological Survey began using new trace-element protocols at some stations in water year 1994.

Change in National Trends Network Procedures

*NOTE.--Sample handling procedures at all National Trends Network stations were changed substantially on January 11, 1994, in order to reduce contamination from the sample shipping container. The data for samples before and after that date are different and not directly comparable. A tabular summary of the differences based on a special intercomparison study, is available from the NADP/NTN Coordination Office, Colorado State University, Fort Collins, CO 80532 (Telephone: 303-491-5643).

Records of Ground-Water Levels

Only water-level data from a basic network of observation wells are given in this report. This basic network contains observation wells so located that the most significant data are obtained from the fewest wells in the most important aquifers. Locations of the observation wells in Hawaii listed in this report are shown in figures 16-20.

Although, in this report, records of water levels are presented for fewer than 100 wells, records are obtained through cooperative efforts of many Federal, State, and local agencies for several thousand observation wells throughout Hawaii and are placed in computer storage, published in reports, or kept in files. Information about the availability of ground-water data may be obtained from the District Chief, Hawaii District, U.S. Geological Survey, 677 Ala Moana Blvd., Suite 415, Honolulu, Hawaii, 96813.

Data Collection and Computation

Measurements of water levels are made in many types of wells, under varying conditions, but the method of measurement are standardized to the extent possible. The equipment and measuring techniques used at each observation well ensure that measurements at each well are of consistent accuracy and reliability.

Most methods for collecting and analyzing water samples are described in the U.S. Geological Survey TWRI publications referred to in the "On-site Measurements and Sample Collection" and the "Laboratory Measurements" sections in this data report. In addition, the TWRI Book 1, Chapter D2, describes guidelines for the collection and field analysis of ground-water samples for selected constituents. The values reported in this report represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. These methods are consistent with ASTM standards and generally follow ISO standards. All samples were obtained by trained personnel. The wells sampled were pumped long enough to assure that the water collected came directly from the aquifer and had not stood for a long time in the well casing where it would have been exposed to the atmosphere and to the material, possibly metal, comprising the casings.

Tables of water-level data are presented by islands. The prime identification number for a given well is the 15-digit number that appears in the upper left corner of the table. The secondary identification number is the local well number, a 7-digit number based on the local identifier well-numbering system (page 5).

Water-level records are obtained from direct measurements with a steel or electrical tape or from the graph, digital record, or electronic record of a water-stage recorder. The water-level measurements in this report are given in feet with reference to either mean sea level (msl) or land-surface datum (lsd). Mean sea level is the datum plane on which the national network of precise levels is based; land-surface datum is a datum plane that is approximately at land surface at each well. If known, the altitude of the land-surface datum above mean sea level is given in the well description. The height of the measuring point (MP) above or below land-surface datum is given in each well description. Water levels in wells equipped with recording gages are reported every day. When complete water-level data for a day is not available, the day is noted with three dashes (---).

Water levels are reported to as many significant figures as can be justified by the local conditions. For example, in a measurement of a depth to water of several hundred feet, the error in determining the absolute value of the total depth to water may be a few tenths of a foot, whereas the error in determining the net change of water level between successive measurements may be only a hundredth or a few hundredths of a foot. For lesser depths to water, the accuracy is greater. Accordingly, most measurements are reported to a hundredth of a foot, but some are given only to a tenth of a foot or a larger unit.

Data Presentation

Each well record consists of three parts, the station description, the data table of mean daily water levels observed during the current water year, and a hydrograph of water levels observed during the past 5 years. The description of the well is presented first through use of descriptive headings preceding the tabular data. The comments to follow clarify information presented under the various headings.

LOCATION.--This paragraph follows the well-identification number and reports the latitude and longitude (given in degrees, minutes, and seconds); a landline location designation; the hydrologic unit number; the distance and direction from a geographic point of reference; and the owner's name.

AQUIFER.--This entry designates by name (if a name exists) and geologic age the aquifer(s) open to the well.

WELL CHARACTERISTICS.--This entry describes the well in terms of depth, diameter, casing depth and (or) screened interval, method of construction, use, and additional information such as casing breaks, collapsed screen, and other changes since construction.

INSTRUMENTATION.--This paragraph provides information on both the frequency of measurement and the collection method used, allowing the user to better evaluate the reported water-level extremes by knowing whether they are based on weekly, monthly, or some other frequency of measurement.

DATUM.--This entry describes the land-surface elevation at the well. The elevation of the land-surface datum is described in feet above (or below) mean sea level; it is reported with a precision depending on the method of determination.

REMARKS.--This entry describes factors that may influence the water level in a well or the measurement of the water level. It should identify wells that also are water-quality observation wells, and may be used to acknowledge the assistance of local (non-U.S. Geological Survey) observers.

PERIOD OF RECORD.--This entry indicates the period for which there are published records for the well. It reports the month and year of the start of publication of water-level records by the U.S. Geological Survey and the words "to current year" if the records are to be continued into the following year. Periods for which water-level records are available, but are not published by the U.S. Geological Survey, may be noted.

EXTREMES FOR PERIOD OF RECORD.--This entry contains the highest and lowest water levels of the period of published record, with respect to land-surface datum, and the dates of their occurrence.

A table of water levels follows the station description for each well. Water levels are reported in feet above mean sea level and all taped measurements of water levels are listed. For wells equipped with a recorder, only abbreviated tables are published; generally, only water-level lows are listed for every fifth day and at the end of the month (eom). Because all values are not published for wells with recorders, the extremes may be values that are not listed in the table. Missing records are indicated by dashes in place of the water level.

ACCESS TO USGS WATER DATA

The USGS provides near real-time stage and discharge data for many of the gaging stations equipped with the necessary telemetry and historic daily-mean and peak-flow discharge data for most current or discontinued gaging stations through the world wide web (WWW). These data may be accessed at:

<http://www.water.usgs.gov>

Some water-quality and ground-water data also are available through the WWW. In addition, data can be provided in various machine-readable formats on magnetic tape or 3-1/2 inch floppy disk. Information about the availability of specific types of data or products, and user charges, can be obtained locally from each of the Water Resources Division district offices (see address on the back of the title page).

DEFINITION OF TERMS

Terms related to streamflow, water-quality, and other hydrologic data, as used in this report, are defined below. See also table for converting English units to International System (SI) Units on the inside of the back cover.

Acid neutralizing capacity (ANC) is the equivalent sum of all bases or base-producing materials, solutes plus particulates, in an aqueous system that can be titrated with acid to an equivalence point. This term designates titration of an "unfiltered" sample (formerly reported as alkalinity).

Acre-foot (AC-FT, acre-ft) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 43,560 cubic feet, 325,851 gallons, or 1,233 cubic meters.

Adenosine triphosphate (ATP) is an organic, phosphate-rich, compound important in the transfer of energy in organisms. Its central role in living cells makes it an excellent indicator of the presence of living material in water. A measurement of ATP therefore provides a sensitive and rapid estimate of biomass. ATP is reported in micrograms per liter.

Algae are mostly aquatic single-celled, colonial, or multicelled plants containing chlorophyll and lacking roots, stems, and leaves.

Algal growth potential (AGP) is the maximum algal dry weight biomass that can be produced in a natural water sample under standardized laboratory conditions. The growth potential is the algal biomass present at stationary phase and is expressed as milligrams dry weight of algae produced per liter of sample.

Alkalinity is the capacity of solutes in an aqueous system to neutralize acid. This term designates titration of a "filtered" sample.

Annual runoff is the total quantity of water in runoff for a drainage area for the year. Data reports may use any of the following units of measurement in presenting annual runoff data:

Acre-foot (AC-FT, acre-ft) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equal to 43,560 cubic feet, 325,851 gallons, or 1,233 cubic meters.

Cubic foot per second per square mile [CFSM, (ft³/s)/mi²] is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming the runoff is distributed uniformly in time and area.

Inch (IN., in.) as used in this report, refers to the depth to which the drainage area would be covered with water if all of the runoff for a given time period were uniformly distributed on it.

Bacteria are microscopic unicellular organisms, typically spherical, rodlike, or spiral and threadlike in shape, often clumped into colonies. Some bacteria cause disease, while others perform an essential role in nature in the recycling of materials; for example, by decomposing organic matter into a form available for reuse by plants.

Total coliform bacteria are a particular group of bacteria that are used as indicators of possible sewage pollution. This group includes coliforms that inhabit the intestine of warm-blooded animals and those that inhabit soils. They are characterized as aerobic or facultative anaerobic, gram-negative, nonspore-forming, rod-shaped bacteria that ferment lactose with gas formation within 48 hours at 35°C. In the laboratory, these bacteria are defined as all the organisms that produce colonies with a golden-green metallic sheen within 24 hours when incubated at 35°C plus or minus 1.0°C on M-Endo medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal coliform bacteria are bacteria that are present in the intestine or feces of warm-blooded animals. They are often used as indicators of the sanitary quality of the water. In the laboratory, they are defined as all organisms that produce blue colonies within 24 hours when incubated at 44.5°C plus or minus 0.2°C on M-FC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal streptococcal bacteria are bacteria found in the intestine of warm-blooded animals. Their presence in water is considered to verify fecal pollution. They are characterized as gram-positive, cocci bacteria that are capable of growth in brain-heart infusion broth. In the laboratory, they are defined as all the organisms that produce red or pink colonies within 48 hours at 35°C plus or minus 1.0°C on KF-streptococcus medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Enterococcus bacteria are commonly found in the feces of humans and other warm-blooded animals. Although some strains are ubiquitous and not related to fecal pollution, the presence of enterococci in water is an indication of fecal pollution and the possible presence of enteric pathogens. Enterococcus bacteria are those bacteria that produce pink to red colonies with black or reddish-brown precipitate after incubation at 41°C on mE agar and subsequent transfer to EIA medium. Enterococci include *Streptococcus faecalis*, *Streptococcus faecium*, *Streptococcus avium*, and their variants.

Escherichia coli (*E. coli*) are bacteria present in the intestine and feces of warm-blooded animals. *E. coli* are a member species of the fecal coliform group of indicator bacteria. In the laboratory, they are defined as those bacteria that produce yellow or yellow-brown colonies on a filter pad saturated with urea substrate broth after primary culturing for 22 to 24 hours at 44.5°C on mTEC medium. Their concentrations are expressed as number of colonies per 100 mL of sample.

Base flow is flow in a channel sustained by ground-water discharge in the absence of direct runoff.

Bed material is the sediment mixture of which a streambed, lake, pond, reservoir, or estuary bottom is composed.

Benthic organisms (invertebrates) are the group of animals inhabiting the bottom of an aquatic environment. They include a number of types of organisms, such as bacteria, fungi, insect larvae and nymphs, snails, clams, and crayfish. They are useful as indicators of water quality.

Biochemical oxygen demand (BOD) is a measure of the quantity of dissolved oxygen, in milligrams per liter, necessary for the decomposition of organic matter by microorganisms, such as bacteria.

Biomass is the amount of living matter present at any given time, expressed as mass per unit area or volume of habitat.

Ash mass is the mass or amount of residue present after the residue from the dry mass determination has been ashed in a muffle furnace at a temperature of 500°C for 1 hour. Ash mass of zooplankton and phytoplankton is expressed in grams per cubic meter (g/m³), and periphyton and benthic organisms in grams per square meter (g/m²).

Dry mass refers to the mass of residue present after drying in an oven at 105°C for zooplankton and periphyton, until the mass remains unchanged. This mass represents the total organic matter, ash, and sediment in the sample. Dry mass is expressed in the same units as ash mass.

Organic mass or volatile mass of the living substance is the difference between the dry mass and ash mass and represents the actual mass of the living matter. Organic mass is expressed in the same units as for ash mass and dry mass.

Wet mass is the mass of living matter plus contained water.

Biomass pigment ratio is an indicator of the total proportion of periphyton which are autotrophic (plants). This is also called the Autotrophic Index.

Bottom material: See "Bed material."

Chlorophyll refers to the green pigments of plants. Chlorophyll *a* and *b* are the two most common green pigments in plants.

Confined aquifer is a term used to describe an aquifer containing water between two relatively impermeable boundaries. The water level in a well tapping a confined aquifer stands above the top of the confined aquifer and can be higher or lower than the water table that may be present in the material above it. In some cases the water level can rise above the ground surface, yielding a flowing well.

Contents is the volume of water in a reservoir or lake. Unless otherwise indicated, volume is computed on the basis of a level pool and does not include bank storage.

Continuous-record station is a site that meets either of the following conditions:

1. Stage or streamflow are recorded at some interval on a continuous basis. The recording interval is usually 15 minutes, but may be less or more frequent.
2. Water-quality, sediment, or other hydrologic measurements are recorded at least daily.

Control designates a feature in the channel downstream from a gaging station that physically influences the water-surface elevation and thereby determines the stage-discharge relation at the station. This feature may be a constriction of the channel, a bedrock outcrop, a gravel bar, an artificial structure, or a uniform cross section over a long reach of the channel.

Control structure as used in this report is a structure on a stream or canal that is used to regulate the flow or stage of the stream or to prevent the intrusion of saltwater.

Cubic foot per second (CFS, ft³/s) is the rate of discharge representing a volume of 1 cubic foot passing a given point in 1 second. It is equivalent to approximately 7.48 gallons per second, 448.8 gallons per minute, or 0.02832 cubic meters per second.

Cubic foot per second-day (CFS-DAY, Cfs-day, [(ft³/s)/d]) is the volume of water represented by a flow of 1 cubic foot per second for 24 hours. It is equivalent to 86,400 cubic feet, 1.9835 acre-feet, 646,317 gallons, or 2,447 cubic meters.

Daily record is a summary of streamflow, sediment, or water-quality values computed from data collected with sufficient frequency to obtain reliable estimates of daily mean values.

Daily record station is a site for which daily records of streamflow, sediment, or water-quality values are computed.

Datum, as used in this report, is an elevation above mean sea level to which all gage height readings are referenced.

Discharge, or flow, is the volume of water (or more broadly, volume of fluid including solid- and dissolved-phase material), that passes a given point in a given period of time.

Annual 7-day minimum is the lowest mean discharge for 7 consecutive days in a year. Note that most low-frequency analyses of annual 7-day minimum flows use a climatic year (April 1-March 31). The date shown in the summary statistics table is the initial date of the 7-day period. (This value should not be confused with the 7-day 10-year low-flow statistic.)

Instantaneous discharge is the discharge at a particular instant of time.

Mean discharge (MEAN) is the arithmetic mean of individual daily mean discharges during a specific period.

Dissolved refers to that material in a representative water sample that passes through a 0.45-micrometer membrane filter. This is a convenient operational definition used by Federal agencies that collect water data. Determinations of "dissolved" constituents are made on subsamples of the filtrate.

Dissolved oxygen (DO) content of water in equilibrium with air is a function of atmospheric pressure, temperature, and dissolved-solids concentration of the water. The ability of water to retain oxygen decreases with increasing temperature or dissolved solids, with small temperature changes having the more significant offset. Photosynthesis and respiration may cause diurnal variations in dissolved-oxygen concentration in water from some streams.

Dissolved-solids concentration of water is determined either analytically by the "residue-on-evaporation" method, or mathematically by totaling the concentrations of individual constituents reported in a comprehensive chemical analysis. During that analytical determination of dissolved solids, the bicarbonate (generally a major dissolved component of water) is converted to carbonate. Therefore, in the mathematical calculation of dissolved-solids concentration, the bicarbonate value, in milligrams per liter, is multiplied by 0.4926 to reflect the change. Alternatively, alkalinity concentration (as mg/L CaCO₃) can be converted to carbonate concentration by multiplying by 0.60.

Drainage area of a site on a stream is that area, measured in a horizontal plane, that has a common outlet at the site for its surface runoff. Figures of drainage area given herein include all closed basins, or noncontributing areas, within the area unless otherwise specified.

Drainage basin is a part of the Earth's surface that is occupied by a drainage system with a common outlet for its surface runoff (see "Drainage area").

Dry weight refers to the weight of animal tissue after it has been dried in an oven at 65 °C until a constant weight is achieved. Dry weight represents total organic and inorganic matter in the tissue.

Flow-duration percentiles are values on a scale of 100 that indicate the percentage of time for which a flow is not exceeded. For example, the 90th percentile of river flow is greater than or equal to 90 percent of all recorded flow rates.

Gage datum is the elevation of the zero point of the reference gage from which gage height is determined as compared to sea level (see "Datum"). This elevation is established by a system of levels from known benchmarks, by approximation from topographic maps, or by geographical positioning system.

Gage height (G.H.) is the water-surface elevation referenced to the gage datum. Gage height is often used interchangeably with the more general term "stage," although gage height is more appropriate when used with a reading on a gage.

Gaging station is a site on a stream, canal, lake, or reservoir where systematic observations of stage, discharge, or other hydrologic data are obtained. When used in connection with a discharge record, the term is applied only to those gaging stations where a continuous record of discharge is computed.

Gas chromatography/flame ionization detector (GC/FID) is a laboratory analytical method used as a screening technique for semivolatile organic compounds that are extractable from water in methylene chloride.

Ground-water level is the elevation of the water table or another potentiometric surface at a particular location.

Hardness of water is a physical-chemical characteristic that is commonly recognized by the increased quantity of soap required to produce lather. It is attributable to the presence of alkaline earths (principally calcium and magnesium) and is expressed as the equivalent concentration of calcium carbonate (CaCO_3).

High tide is the maximum height reached by each rising tide. The high-high and low-high tides are the higher and lower of the two high tides, respectively, of each tidal day. *See NOAA web site:*

<http://www.co-ops.nos.noaa.gov/tideglos.html>

Hydrologic benchmark station is one that provides hydrologic data for a basin in which the hydrologic regimen will likely be governed solely by natural conditions. Data collected at a benchmark station may be used to separate effects of natural from human-induced changes in other basins that have been developed and in which the physiography, climate, and geology are similar to those in the undeveloped benchmark basin.

Hydrologic unit is a geographic area representing part or all of a surface drainage basin or distinct hydrologic feature as defined by the former Office of Water Data Coordination and delineated on the State Hydrologic Unit Maps by the U.S. Geological Survey. Each hydrologic unit is identified by an 8-digit number.

Land-surface datum (lsd) is a datum plane that is approximately at land surface at each ground-water observation well.

Low tide is the minimum height reached by each falling tide. The high-low and low-low tides are the higher and lower of the two low tides, respectively, of each tidal day. *See NOAA web site:*

<http://www.co-ops.nos.noaa.gov/tideglos.html>

Measuring point (MP) is an arbitrary permanent reference point from which the distance to water surface in a well is measured to obtain water level.

Membrane filter is a thin microporous material of specific pore size used to filter bacteria, algae, and other very small particles from water.

Micrograms per gram (UG/G, $\mu\text{g/g}$) is a unit expressing the concentration of a chemical constituent as the mass (micrograms) of the element per unit mass (gram) of material analyzed.

Micrograms per kilogram (UG/KG, $\mu\text{g/kg}$) is a unit expressing the concentration of a chemical constituent as the mass (micrograms) of the constituent per unit mass (kilogram) of the material analyzed. One microgram per kilogram is equivalent to 1 part per billion.

Micrograms per liter (UG/L, $\mu\text{g/L}$) is a unit expressing the concentration of chemical constituents in water as mass (micrograms) of constituent per unit volume (liter) of water. One thousand micrograms per liter is equivalent to 1 milligram per liter.

Microsiemens per centimeter (US/CM, $\mu\text{S}/\text{cm}$) is a unit expressing the amount of electrical conductivity of a solution as measured between opposite faces of a centimeter cube of solution at a specified temperature. Siemens is the International System of Units nomenclature. It is synonymous with mhos and is the reciprocal of resistance in ohms.

Milligrams per liter (MG/L, mg/L) is a unit for expressing the concentration of chemical constituents in water as the mass (milligrams) of constituent per unit volume (liter) of water. Concentration of suspended sediment also is expressed in mg/L and is based on the mass of dry sediment per liter of water-sediment mixture.

Miscellaneous site, or miscellaneous station, is a site where streamflow, sediment, and/or water-quality data are collected once, or more often on a random or discontinuous basis.

National Geodetic Vertical Datum of 1929 (NGVD of 1929) is a geodetic datum derived from a general adjustment of the first order level nets of the United States and Canada. It was formerly called "Sea Level Datum of 1929" or "mean sea level" in this series of reports. Although the datum was derived from the average sea level over a period of many years at 26 tide stations along the Atlantic, Gulf of Mexico, and Pacific Coasts, it does not necessarily represent local mean sea level at any particular place. *See NOAA web site:*

<http://www.ngs.noaa.gov/faq.shtml#WhatVD29VD88>

Nephelometric turbidity unit (NTU) is the measurement for reporting turbidity that is based on use of a standard suspension of Formazin. Turbidity measured in NTU uses nephelometric methods that depend on passing specific light of a specific wavelength through the sample.

Open or screened interval is the length of unscreened opening or of well screen through which water enters a well, in feet below land surface.

Organic carbon (OC) is a measure of organic matter present in aqueous solution, suspension, or bottom sediments. May be reported as dissolved organic carbon (DOC), suspended organic carbon (SOC), or total organic carbon (TOC).

Organism is any living entity.

Organism count/area refers to the number of organisms collected and enumerated in a sample and adjusted to the number per area habitat, usually square meter (m^2), acre, or hectare. Periphyton, benthic organisms, and macrophytes are expressed in these terms.

Organism count/volume refers to the number of organisms collected and enumerated in a sample and adjusted to the number per sample volume, usually milliliter (mL) or liter (L). Numbers of planktonic organisms can be expressed in these terms.

Total organism count is the total number of organisms collected and enumerated in any particular sample.

Organochlorine compounds are any chemicals that contain carbon and chlorine. Organochlorine compounds that are important in investigations of water, sediment, and biological quality include certain pesticides and industrial compounds.

Parameter Code is a 5-digit number used in the U.S. Geological Survey computerized data system, National Water Information System (NWIS), to uniquely identify a specific constituent or property.

Partial-record station is a site where discrete measurements of one or more hydrologic parameters are obtained over a period of time without continuous data being recorded or computed. A common example is a crest-stage gage partial-record station at which only peak stages and flows are recorded.

Particle size is the diameter, in millimeters (mm), of a particle determined by sieve or sedimentation methods. The sedimentation method utilizes the principle of Stokes Law to calculate sediment particle sizes. Sedimentation methods (pipet, bottom-withdrawal tube, visual-accumulation tube, Sedigraph) determine fall diameter of particles in either distilled water (chemically dispersed) or in native water (the river water at the time and point of sampling).

Particle-size classification used in this report agrees with the recommendation made by the American Geophysical Union Subcommittee on Sediment Terminology. The classification is as follows:

<u>Classification</u>	<u>Size (mm)</u>	<u>Method of analysis</u>
Clay	0.00024-0.004	Sedimentation
Silt	0.004-0.062	Sedimentation
Sand	0.062-2.0	Sedimentation or sieve
Gravel	2.0-64.0	Sieve

The particle-size distributions given in this report are not necessarily representative of all particles in transport in the stream. Most of the organic matter is removed, and the sample is subjected to mechanical and chemical dispersion before analysis in distilled water. Chemical dispersion is not used for native water analysis.

Percent composition or **percent of total** is a unit for expressing the ratio of a particular part of a sample or population to the total sample or population, in terms of types, numbers, weight, or volume.

Periodic station is a site where stage, discharge, sediment, chemical, or other hydrologic measurements are made one or more times during a year, but at a frequency insufficient to develop a daily record.

Periphyton is the assemblage of microorganisms attached to and living upon submerged solid surfaces. While primarily consisting of algae, they also include bacteria, fungi, protozoa, rotifers, and other small organisms. Periphyton are useful indicators of water quality.

Pesticides are chemical compounds used to control undesirable organisms. Major categories of pesticides include insecticides, miticides, fungicides, herbicides, and rodenticides.

pH of water is the negative logarithm of the hydrogen-ion activity. Solutions with pH less than 7 are termed "acidic," and solutions with a pH greater than 7 are termed "basic." Solutions with a pH of 7 are neutral. The presence and concentration of many dissolved chemical constituents found in water are, in part, influenced by the hydrogen-ion activity of water. Biological processes including growth, distribution of organisms, and toxicity of the water to organisms are also influenced, in part, by the hydrogen-ion activity of water.

Picocurie (PC, pCi) is one trillionth (1×10^{-12}) of the amount of radioactivity represented by a curie (Ci). A curie is the amount of radioactivity that yields 3.7×10^{10} radioactive disintegrations per second. A picocurie yields 2.22 dpm (disintegrations per minute).

Plankton is the community of suspended, floating, or weakly swimming organisms that live in the open water of lakes and rivers. Concentrations are expressed as a number of cells per milliliter (cells/mL of sample).

Phytoplankton is the plant part of the plankton. They are usually microscopic, and their movement is subject to the water currents. Phytoplankton growth is dependent upon solar radiation and nutrient substances. Because they are able to incorporate as well as release materials to the surrounding water, the phytoplankton have a profound effect upon the quality of the water. They are the primary food producers in the aquatic environment and are commonly known as algae.

Blue-green algae (*Cyanophyta*) are a group of phytoplankton organisms having a blue pigment, in addition to the green pigment called chlorophyll. Blue-green algae often cause nuisance conditions in water.

Diatoms are the unicellular or colonial algae having a siliceous shell. Their concentrations are expressed as number of cells per milliliter (cells/mL) of sample.

Green algae have chlorophyll pigments similar in color to those of higher green plants. Some forms produce algae mats or floating "moss" in lakes. Their concentrations are expressed as number of cells per milliliter (cells/mL) of sample.

Zooplankton is the animal part of the plankton. Zooplankton are capable of extensive movements within the water column and are often large enough to be seen with the unaided eye. Zooplankton are secondary consumers feeding upon bacteria, phytoplankton, and detritus. Because they are the grazers in the aquatic environment, the zooplankton are a vital part of the aquatic food web. The zooplankton community is dominated by small crustaceans and rotifers.

Polychlorinated biphenyls (PCB's) are industrial chemicals that are mixtures of chlorinated biphenyl compounds having various percentages of chlorine. They are similar in structure to organochlorine insecticides.

Recoverable from bottom material is the amount of a given constituent that is in solution after a representative sample of bottom material has been digested by a method (usually using an acid or mixture of acids) that results in dissolution of readily soluble substances. Complete dissolution of all bottom material is not achieved by the digestion treatment and thus the determination represents less than the total amount (that is, less than 95 percent) of the constituent in the sample. To achieve comparability of analytical data, equivalent digestion procedures would be required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results.

Recurrence interval, also referred to as return period, is the average time, usually expressed in years, between occurrences of hydrologic events of a specified type (such as exceedances of a specified high flow or non-exceedance of a specified low flow). The terms "return period" and "recurrence interval" do not imply regular cyclic occurrence. The actual times between occurrences vary randomly, with most of the times being less than the average and a few being substantially greater than the average. For example, the 100-year flood is the flow rate that is exceeded by the annual maximum peak flow at intervals whose average length is 100 years (that is, once in 100 years, on average); almost two-thirds of all exceedances of the 100-year flood occur less than 100 years after the previous exceedance, half occur less than 70 years after the previous exceedance, and about one-eighth occur more than 200 years after the previous exceedance. Similarly, the 7-day 10-year low flow ($7Q_{10}$) is the flow rate below which the annual minimum 7-day-mean flow dips at intervals whose average length is 10 years (that is, once in 10 years, on average); almost two-thirds of the non-exceedances of the $7Q_{10}$ occur less than 10 years after the previous non-exceedance, half occur less than 7 years after, and about one-eighth occur more than 20 years after the previous non-exceedance. The recurrence interval for annual events is the reciprocal of the annual probability of occurrence. Thus, the 100-year flood has a 1-percent chance of being exceeded by the maximum peak flow in any year, and there is a 10-percent chance in any year that the annual minimum 7-day-mean flow will be less than the $7Q_{10}$.

Replicate samples are a group of samples collected in a manner such that the samples are thought to be essentially identical in composition.

Runoff in inches (IN., in.) is the depth, in inches, to which the drainage area would be covered if all the runoff for a given time period were uniformly distributed on it.

Sea level refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)—a geodetic datum derived from a general adjustment of the first-order level nets of the United States and Canada, formerly called Sea Level Datum of 1929. See: http://www.co-ops.nos.noaa.gov/glossary/gloss_n.html#NGVD

Sediment is solid material that is transported by, suspended in, or deposited from water. It originates mostly from disintegrated rocks; it also includes chemical and biochemical precipitates and decomposed organic material, such as humus. The quantity, characteristics, and cause of the occurrence of sediment in streams are influenced by environmental factors. Some major factors are degree of slope, length of slope, soil characteristics, land usage, and quantity and intensity of precipitation.

Bed load is the sediment that is transported in a stream by rolling, sliding, or skipping along or very close to the bed. In this report, bed load is considered to consist of particles in transit from the bed to an elevation equal to the top of the bed-load sampler nozzle (usually within 0.25 ft of the streambed).

Bed-load discharge (tons per day) is the quantity of sediment moving as bed load, reported as dry weight, that passes a cross section in a given time.

Suspended sediment is the sediment that is maintained in suspension by the upward components of turbulent currents or that exists in suspension as a colloid.

Suspended-sediment concentration is the velocity-weighted concentration of suspended sediment in the sampled zone (from the water surface to a point approximately 0.3 ft above the bed) expressed as milligrams of dry sediment per liter of water-sediment mixture (mg/L). The entire sample is used for the analysis.

Mean concentration of suspended sediment is the time-weighted concentration of suspended sediment passing a stream section during a 24-hour day.

Suspended-sediment discharge (tons/day) is the quantity of sediment moving in suspension, reported as dry weight, that passes a cross section in a given time. It is calculated in units of tons per day as follows: concentration (mg/L) \times discharge (ft³/s) \times 0.0027.

Suspended-sediment load is a term that refers to material in suspension. The term needs to be qualified, such as "annual suspended-sediment load" or "sand-size suspended-sediment load," and so on. It is not synonymous with either suspended-sediment discharge or concentration.

Total sediment discharge (tons/day) is the sum of the suspended-sediment discharge and the bed-load discharge. It is the total quantity of sediment, reported as dry weight, that passes a cross section in a given time.

Total sediment load or total load is a term that refers to the total sediment (bed load plus suspended-sediment load) that is in transport. The term needs to be qualified, such as "annual suspended-sediment load" or "sand-size suspended-sediment load," and so on. It is not synonymous with total sediment discharge.

Solute is any substance that is dissolved in water.

Specific conductance is a measure of the ability of a water to conduct an electrical current. It is expressed in microsiemens per centimeter at 25°C. Specific conductance is related to the type and concentration of ions in solution and can be used for approximating the dissolved-solids content of the water. Commonly, the concentration of dissolved solids (in milligrams per liter) is from 55 to 75 percent of the specific conductance (in microsiemens). This relation is not constant from stream to stream, and it may vary in the same source with changes in the composition of the water.

Stage: See "Gage height."

Stage-discharge relation is the relation between the water-surface elevation, termed stage (gage height), and the volume of water flowing in a channel per unit time.

Streamflow is the discharge that occurs in a natural channel. Although the term "discharge" can be applied to the flow of a canal, the word "streamflow" uniquely describes the discharge in a surface stream course. The term "streamflow" is more general than "runoff" as streamflow may be applied to discharge whether or not it is affected by diversion or regulation.

Substrate is the physical surface upon which an organism lives.

Artificial substrate is a device which is purposely placed in a stream or lake for colonization of organisms. The artificial substrate simplifies the community structure by standardizing the substrate from which each sample is taken. Examples of artificial substrates are basket samplers (made of wire cages filled with clean streamside rocks) and multiplate samplers (made of hardboard) for benthic organism collection, and plexiglass strips for periphyton collection.

Natural substrate refers to any naturally occurring immersed or submersed solid surface, such as a rock or tree, upon which an organism lives.

Surface area of a lake or impoundment is that area encompassed by the boundary of the lake or impoundment as shown on USGS topographic maps, or on other available maps or photographs. The computed surface areas reflect the water levels of the lakes or impoundments at the times when the information for the maps or photographs was obtained.

Surficial bed material is the top 0.1 to 0.2 ft of the bed material that is sampled using U.S. Series Bed-Material Samplers.

Suspended (as used in tables of chemical analyses) refers to the amount (concentration) of undissolved material in a water-sediment mixture. It is associated with the material retained on a 0.45-micrometer filter.

Suspended, recoverable is the amount of a given constituent that is in solution after the part of a representative suspended-sediment sample that is retained on a 0.45-micrometer membrane filter has been digested by a method (usually using a dilute acid solution) that results in dissolution of only readily soluble substances. Complete dissolution of all the particulate matter is not achieved by the digestion treatment and thus the determination represents something less than the "total" amount (that is, less than 95 percent) of the constituent present in the sample. To achieve comparability of analytical data, equivalent digestion procedures are required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results.

Determinations of “suspended, recoverable” constituents are made either by analyzing portions of the material collected on the filter or, more commonly, by difference, based on determinations of (1) dissolved and (2) total recoverable concentrations of the constituent.

Suspended, total is the total amount of a given constituent in the part of a representative suspended-sediment sample that is retained on a 0.45-micrometer membrane filter. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent determined. Knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to determine when the results should be reported as “suspended, total.”

Determinations of “suspended, total” constituents are made either by analyzing portions of the material collected on the filter or, more commonly, by difference, based on determinations of (1) dissolved and (2) total concentrations of the constituent.

Synoptic Studies are short-term investigations of specific water-quality conditions during selected seasonal or hydrologic periods to provide improved spatial resolution for critical water-quality conditions. For the period and conditions sampled, they assess the spatial distribution of selected water-quality conditions in relation to causative factors, such as land use and contaminant sources.

Taxonomy is the division of biology concerned with the classification and naming of organisms. The classification of organisms is based upon a hierarchical scheme beginning with Kingdom and ending with Species at the base. The higher the classification level, the fewer features the organisms have in common. For example, the taxonomy of a particular mayfly, *Hexagenia limbata*, is the following:

Kingdom	Animal
Phylum	Arthropoda
Class	Insecta
Order	Ephemeroptera
Family	Ephemeridae
Genus	<i>Hexagenia</i>
Species	<i>Hexagenia limbata</i>

Time-weighted average is computed by multiplying the number of days in the sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the total number of days. A time-weighted average represents the composition of water that would be contained in a vessel or reservoir that had received equal quantities of water from the stream each day for the year.

Tons per acre-foot is the dry mass of dissolved solids in 1 acre-foot of water. It is computed by multiplying the concentration of the constituent, in milligrams per liter, by 0.00136.

Tons per day (T/DAY, tons/d) is the rate representing a mass of 1 ton of a constituent in streamflow passing a cross section in 1 day. It is equivalent to 2,000 pounds per day, or 0.9072 metric tons per day.

Total is the total amount of a given constituent in a representative suspended-sediment sample, regardless of the constituent’s physical or chemical form. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent present in both the dissolved and suspended phases of the sample. A knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to judge when the results should be reported as “total.” (Note that the word “total” does double duty here, indicating both that the sample consists of a suspended-sediment mixture and that the analytical method determined all of the constituent in the sample.)

Total discharge is the quantity of a given constituent, measured as dry mass or volume, that passes a stream cross section per unit of time. When referring to constituents other than water, this term needs to be qualified, such as “total sediment discharge,” “total chloride discharge,” and so on.

Total in bottom material is the total amount of a given constituent in a representative sample of bottom material. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent determined. A knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to judge when the results should be reported as “total in bottom material.”

Total load refers to all of a constituent in transport. When referring to sediment, it includes suspended load plus bed load.

Total recoverable is the amount of a given constituent that is in solution after a representative suspended-sediment sample has been digested by a method (usually using a dilute acid solution) that results in dissolution of only readily soluble substances. Complete dissolution of all particulate matter is not achieved by the digestion treatment, and thus the determination represents something less than the “total” amount (that is, less than 95 percent) of the constituent present in the dissolved and suspended phases of the sample. To achieve comparability of analytical data, equivalent digestion procedures are required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results.

Turbidity is a measurement of the collective optical properties of a water sample that cause light to be scattered and absorbed rather than transmitted in straight lines; the higher the intensity of scattered light, the higher the turbidity. Turbidity is expressed in nephelometric turbidity units (NTU) or Formazin turbidity units (FTU) depending on the method and equipment used.

Volatile organic compounds (VOC's) are organic compounds that can be isolated from the water phase of a sample by purging the water sample with inert gas, such as helium, and subsequently analyzed by gas chromatography. Many VOC's are manmade chemicals that are used and produced in the manufacture of paints, adhesives, petroleum products, pharmaceuticals, and refrigerants. They are often components of fuels, solvents, hydraulic fluids, paint thinners, and dry cleaning agents commonly used in urban settings. VOC contamination of drinking-water supplies is a human health concern because many are toxic and are known or suspected human carcinogens (U.S. Environmental Protection Agency, 1996).

Water level is the water-surface elevation or stage of the free surface of a body of water above or below any datum (see “Gage height”), or the surface of water standing in a well, usually indicative of the position of the water table or other potentiometric surface.

Water table is the surface of a ground-water body at which the water is at atmospheric pressure.

Water-table aquifer is an unconfined aquifer within which is found the water table.

Water year in U.S. Geological Survey reports dealing with surface-water supply is the 12-month period October 1 through September 30. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months. Thus, the year ending September 30, 1999, is called the “1999 water year.”

WDR is used as an abbreviation for “Water-Data Report” in the REVISED RECORDS paragraph to refer to State annual hydrologic-data reports. (WRD was used as an abbreviation for “Water-Resources Data” in reports published prior to 1976.)

Weighted average is used in this report to indicate discharge-weighted average. It is computed by multiplying the discharge for a sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the sum of the discharges. A discharge-weighted average approximates the composition of water that would be found in a reservoir containing all the water passing a given location during the water year after thorough mixing in the reservoir.

Well is an excavation (pit, hole, tunnel), generally cylindrical in form and often walled in, drilled, dug, driven, bored, or jetted into the ground to such a depth as to penetrate water-yielding geologic material and allow the water to flow or to be pumped to the surface.

WSP is used as an abbreviation for “Water-Supply Paper” in reference to previously published reports.

PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS

The U.S. Geological Survey publishes a series of manuals describing procedures for planning and conducting specialized work in water-resources investigations. The material is grouped under major subject headings called books and is further divided into sections and chapters. For example, Section A of Book 3 (Applications of Hydraulics) pertains to surface water. The chapter, the unit of publication, is limited to a narrow field of subject matter. This format permits flexibility in revision and publication as the need arises.

The reports listed below are for sale by the U.S. Geological Survey, Branch of Information Services, Box 25286, Federal Center, Denver, Colorado 80225 (authorized agent of the Superintendent of Documents, Government Printing Office). Prepayment is required. Remittance should be sent by check or money order payable to the U.S. Geological Survey. Prices are not included because they are subject to change. Current prices can be obtained by writing to the above address or calling (888) ASK-USGS. When ordering or inquiring about prices for any of these publications, please give the title, book number, chapter number, and "U.S. Geological Survey Techniques of Water-Resources Investigations."

Book 1. Collection of Water Data by Direct Measurement***Section D. Water Quality***

- 1-D1. *Water temperature--influential factors, field measurement, and data presentation*, by H.H. Stevens, Jr., J.F. Ficke, and G.F. Smoot: USGS--TWRI Book 1, Chapter D1. 1975. 65 pages.
- 1-D2. *Guidelines for collection and field analysis of ground-water samples for selected unstable constituents*, by W.W. Wood: USGS--TWRI Book 1, Chapter D2. 1976. 24 pages.

Book 2. Collection of Environmental Data***Section D. Surface Geophysical Methods***

- 2-D1. *Application of surface geophysics to ground-water investigations*, by A.A.R. Zohdy, G.P. Eaton, and D.R. Mabey: USGS--TWRI Book 2, Chapter D1. 1974. 116 pages.
- 2-D2. *Application of seismic-refraction techniques to hydrologic studies*, by F.P. Haeni: USGS--TWRI Book 2, Chapter D2. 1988. 86 pages.

Section E. Subsurface Geophysical Methods

- 2-E1. *Application of borehole geophysics to water-resources investigations*, by W.S. Keys and L.M. MacCary: USGS--TWRI Book 2, Chapter E1. 1971. 126 pages.
- 2-E2. *Borehole geophysics applied to ground-water investigations*, by W.S. Keys: USGS--TWRI Book 2, Chapter E2. 1990. 150 pages.

Section F. Drilling and Sampling Methods

- 2-F1. *Application of drilling, coring, and sampling techniques to test holes and wells*, by Eugene Shuter and W.E. Teasdale: USGS--TWRI Book 2, Chapter F1. 1989. 97 pages.

Book 3. Applications of Hydraulics***Section A. Surface-Water Techniques***

- 3-A1. *General field and office procedures for indirect discharge measurements*, by M.A. Benson and Tate Dalrymple: USGS--TWRI Book 3, Chapter A1. 1967. 30 pages.
- 3-A2. *Measurement of peak discharge by the slope-area method*, by Tate Dalrymple and M.A. Benson: USGS--TWRI Book 3, Chapter A2. 1967. 12 pages.

PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS--Continued

- 3-A3. *Measurement of peak discharge at culverts by indirect methods*, by G.L. Bodhaine: USGS--TWRI Book 3, Chapter A3. 1968. 60 pages.
- 3-A4. *Measurement of peak discharge at width contractions by indirect methods*, by H.F. Matthai: USGS-TWRI Book 3, Chapter A4. 1967. 44 pages.
- 3-A5. *Measurement of peak discharge at dams by indirect methods*, by Harry Hulsing: USGS--TWRI Book 3, Chapter A5. 1967. 29 pages.
- 3-A6. *General procedure for gaging streams*, by R.W. Carter and Jacob Davidian: USGS--TWRI Book 3, Chapter A6. 1968. 13 pages.
- 3-A7. *Stage measurement at gaging stations*, by T.J. Buchanan and W.P. Somers: USGS--TWRI Book 3, Chapter A7. 1968. 28 pages.
- 3-A8. *Discharge measurements at gaging stations*, by T.J. Buchanan and W.P. Somers: USGS--TWRI Book 3, Chapter A8. 1969. 65 pages.
- 3-A9. *Measurement of time of travel in streams by dye tracing*, by F.A. Kilpatrick and J.F. Wilson, Jr.: USGS--TWRI Book 3, Chapter A9. 1989. 27 pages.
- 3-A10. *Discharge ratings at gaging stations*, by E.J. Kennedy: USGS--TWRI Book 3, Chapter A10. 1984. 59 pages.
- 3-A11. *Measurement of discharge by the moving-boat method*, by G.F. Smoot and C.E. Novak: USGS--TWRI Book 3, Chapter A11. 1969. 22 pages.
- 3-A12. *Fluorometric procedures for dye tracing*, Revised, by J.F. Wilson, Jr., E.D. Cobb, and F.A. Kilpatrick: USGS- -TWRI Book 3, Chapter A12. 1986. 34 pages.
- 3-A13. *Computation of continuous records of streamflow*, by E. J. Kennedy: USGS--TWRI Book 3, Chapter A13. 1983. 53 pages.
- 3-A14. *Use of flumes in measuring discharge*, by F.A. Kilpatrick and V.R. Schneider: USGS--TWRI Book 3, Chapter A14. 1983. 46 pages.
- 3-A15. *Computation of water-surface profiles in open channels*, by Jacob Davidian: USGS--TWRI Book 3, Chapter A15. 1984. 48 pages.
- 3-A16. *Measurement of discharge using tracers*, by F.A. Kilpatrick and E.D. Cobb: USGS--TWRI Book 3, Chapter A16. 1985. 52 pages.
- 3-A17. *Acoustic velocity meter systems*, by Antonius Laenen: USGS--TWRI Book 3, Chapter A17. 1985. 38 pages.
- 3-A18. *Determination of stream reaeration coefficients by use of tracers*, by F.A. Kilpatrick, R.E. Rathbun, Nobuhiro Yotsukura, G.W. Parker, and L.L. DeLong: USGS--TWRI Book 3, Chapter A18. 1989. 52 pages.
- 3-A19. *Levels at streamflow gaging stations*, by E.J. Kennedy: USGS--TWRI Book 3, Chapter A19. 1990. 31 pages.
- 3-A20. *Simulation of soluble waste transport and buildup in surface waters using tracers*, by F.A. Kilpatrick: USGS--TWRI Book 3, Chapter A20. 1993. 38 pages.
- 3-A21. *Stream-gaging cableways*, by C. Russell Wagner: USGS--TWRI Book 3, Chapter A21. 1995. 56 pages.

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Section B. Ground-Water Techniques

- 3-B1. *Aquifer-test design, observation, and data analysis*, by R.W. Stallman: USGS--TWRI Book 3, Chapter B1. 1971. 26 pages.
- 3-B2. *Introduction to ground-water hydraulics, a programed text for self-instruction*, by G.D. Bennett: USGS--TWRI Book 3, Chapter B2. 1976. 172 pages.
- 3-B3. *Type curves for selected problems of flow to wells in confined aquifers*, by J.E. Reed: USGS--TWRI Book 3, Chapter B3. 1980. 106 pages.
- 3-B4. *Regression modeling of ground-water flow*, by R.L. Cooley and R.L. Naff: USGS--TWRI Book 3, Chapter B4. 1990. 232 pages.
- 3-B4. *Supplement 1. Regression modeling of ground-water flow - Modifications to the computer code for nonlinear regression solution of steady-state ground-water flow problems*, by R.L. Cooley: USGS--TWRI Book 3, Chapter B4. 1993. 8 pages.
- 3-B5. *Definition of boundary and initial conditions in the analysis of saturated ground-water flow systems--An introduction*, by O.L. Franke, T.E. Reilly, and G.D. Bennett: USGS--TWRI Book 3, Chapter B5. 1987. 15 pages.
- 3-B6. *The principle of superposition and its application in ground-water hydraulics*, by T.E. Reilly, O.L. Franke, and G.D. Bennett: USGS--TWRI Book 3, Chapter B6. 1987. 28 pages.
- 3-B7. *Analytical solutions for one-, two-, and three-dimensional solute transport in ground-water systems with uniform flow*, by E.J. Wexler: USGS--TWRI Book 3, Chapter B7. 1992. 190 pages.

Section C. Sedimentation and Erosion Techniques

- 3-C1. *Fluvial sediment concepts*, by H.P. Guy: USGS--TWRI Book 3, Chapter C1. 1970. 55 pages.
- 3-C2. *Field methods for measurement of fluvial sediment*, by H.P. Guy and V.W. Norman: USGS--TWRI Book 3, Chapter C2. 1970. 59 pages.
- 3-C3. *Computation of fluvial-sediment discharge*, by George Porterfield: USGS--TWRI Book 3, Chapter C3. 1972. 66 pages.

Book 4. Hydrologic Analysis and Interpretation**Section A. Statistical Analysis**

- 4-A1. *Some statistical tools in hydrology*, by H.C. Riggs: USGS--TWRI Book 4, Chapter A1. 1968. 39 pages.
- 4-A2. *Frequency curves*, by H.C. Riggs: USGS--TWRI Book 4, Chapter A2. 1968. 15 pages.

Section B. Surface Water

- 4-B1. *Low-flow investigations*, by H.C. Riggs: USGS--TWRI Book 4, Chapter B1. 1972. 18 pages.
- 4-B2. *Storage analyses for water supply*, by H.C. Riggs and C.H. Hardison: USGS--TWRI Book 4, Chapter B2. 1973. 20 pages.
- 4-B3. *Regional analyses of streamflow characteristics*, by H.C. Riggs: USGS--TWRI Book 4, Chapter B3. 1973. 15 pages.

Section D. Interrelated Phases of the Hydrologic Cycle

- 4-D1. *Computation of rate and volume of stream depletion by wells*, by C.T. Jenkins: USGS--TWRI Book 4, Chapter D1. 1970. 17 pages.

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Book 5. Laboratory Analysis**Section A. Water Analysis**

- 5-A1. *Methods for determination of inorganic substances in water and fluvial sediments*, by M.J. Fishman and L.C. Friedman, editors: USGS--TWRI Book 5, Chapter A1. 1989. 545 pages.
- 5-A2. *Determination of minor elements in water by emission spectroscopy*, by P.R. Barnett and E.C. Mallory, Jr.: USGS--TWRI Book 5, Chapter A2. 1971. 31 pages.
- 5-A3. *Methods for the determination of organic substances in water and fluvial sediments*, edited by R.L. Wershaw, M.J. Fishman, R.R. Grabbe, and L.E. Lowe: USGS--TWRI Book 5, Chapter A3. 1987. 80 pages.
- 5-A4. *Methods for collection and analysis of aquatic biological and microbiological samples*, by L.J. Britton and P.E. Greeson, editors: USGS--TWRI Book 5, Chapter A4. 1989. 363 pages.
- 5-A5. *Methods for determination of radioactive substances in water and fluvial sediments*, by L.L. Thatcher, V.J. Janzer, and K.W. Edwards: USGS--TWRI Book 5, Chapter A5. 1977. 95 pages.
- 5-A6. *Quality assurance practices for the chemical and biological analyses of water and fluvial sediments*, by L.C. Friedman and D.E. Erdmann: USGS--TWRI Book 5, Chapter A6. 1982. 181 pages.

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- 5-C1. *Laboratory theory and methods for sediment analysis*, by H.P. Guy: USGS--TWRI Book 5, Chapter C1. 1969. 58 pages.

Book 6. Modeling Techniques**Section A. Ground Water**

- 6-A1. *A modular three-dimensional finite-difference ground-water flow model*, by M.G. McDonald and A.W. Harbaugh: USGS--TWRI Book 6, Chapter A1. 1988. 586 pages.
- 6-A2. *Documentation of a computer program to simulate aquifer-system compaction using the modular finite-difference ground-water flow model*, by S.A. Leake and D.E. Prudic: USGS--TWRI Book 6, Chapter A2. 1991. 68 pages.
- 6-A3. *A modular finite-element model (MODFE) for areal and axisymmetric ground-water-flow problems, Part 1: Model Description and User's Manual*, by L.J. Torak: USGS--TWRI Book 6, Chapter A3. 1993. 136 pages.
- 6-A4. *A modular finite-element model (MODFE) for areal and axisymmetric ground-water-flow problems, Part 2: Derivation of finite-element equations and comparisons with analytical solutions*, by R.L. Cooley: USGS--TWRI Book 6, Chapter A4. 1992. 108 pages.
- 6-A5. *A modular finite-element model (MODFE) for areal and axisymmetric ground-water-flow problems, Part 3: Design philosophy and programming details*, by L.J. Torak: USGS--TWRI Book 6, Chapter A5. 1993. 243 pages.
- 6-A6. *A coupled surface-water and ground-water flow model (MODBRANCH) for simulation of stream-aquifer interaction*, by Eric D. Swain and Eliezer J. Wexler: USGS--TWRI Book 6, Chapter A6. 1995. 125 pages.

PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS--Continued

Book 7. Automated Data Processing and Computations**Section C. Computer Programs**

- 7-C1. *Finite difference model for aquifer simulation in two dimensions with results of numerical experiments*, by P.C. Trescott, G.F. Pinder, and S.P. Larson: USGS--TWRI Book 7, Chapter C1. 1976. 116 pages.
- 7-C2. *Computer model of two-dimensional solute transport and dispersion in ground water*, by L.F. Konikow and J.D. Bredehoeft: USGS--TWRI Book 7, Chapter C2. 1978. 90 pages.
- 7-C3. *A model for simulation of flow in singular and interconnected channels*, by R.W. Schaffranek, R.A. Baltzer, and D.E. Goldberg: USGS--TWRI Book 7, Chapter C3. 1981. 110 pages.

Book 8. Instrumentation**Section A. Instruments for Measurement of Water Level**

- 8-A1. *Methods of measuring water levels in deep wells*, by M.S. Garber and F.C. Koopman: USGS--TWRI Book 8, Chapter A1. 1968. 23 pages.
- 8-A2. *Installation and service manual for U.S. Geological Survey manometers*, by J.D. Craig: USGS--TWRI Book 8, Chapter A2. 1983. 57 pages.

Section B. Instruments for Measurement of Discharge

- 8-B2. *Calibration and maintenance of vertical-axis type current meters*, by G.F. Smoot and C.E. Novak: USGS--TWRI Book 8, Chapter B2. 1968. 15 pages.

Book 9. Handbooks for Water-Resources Investigations**Section A. National Field Manual for the Collection of Water-Quality Data**

- 9-A6. *National Field Manual for the Collection of Water-Quality Data: Field Measurements*, edited by F.D. Wilde and D.B. Radtke: USGS--TWRI Book 9, Chapter A6. 1998. Variously paginated.
- 9-A7. *National Field Manual for the Collection of Water-Quality Data: Biological Indicators*, by D.N. Myers and F.D. Wilde: USGS--TWRI Book 9, Chapter A7. 1997. 49 pages.
- 9-A8. *National Field Manual for the Collection of Water-Quality Data: Bottom-material samples*, by D.B. Radtke: USGS--TWRI Book 9, Chapter A8. 1998. 48 pages.
- 9-A9. *National Field Manual for the Collection of Water-Quality Data: Safety in Field Activities*, by S.L. Lane and R.G. Fay: USGS--TWRI Book 9, Chapter A9. 1998. 60 pages.

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Surface-Water Station Records
for Kauai

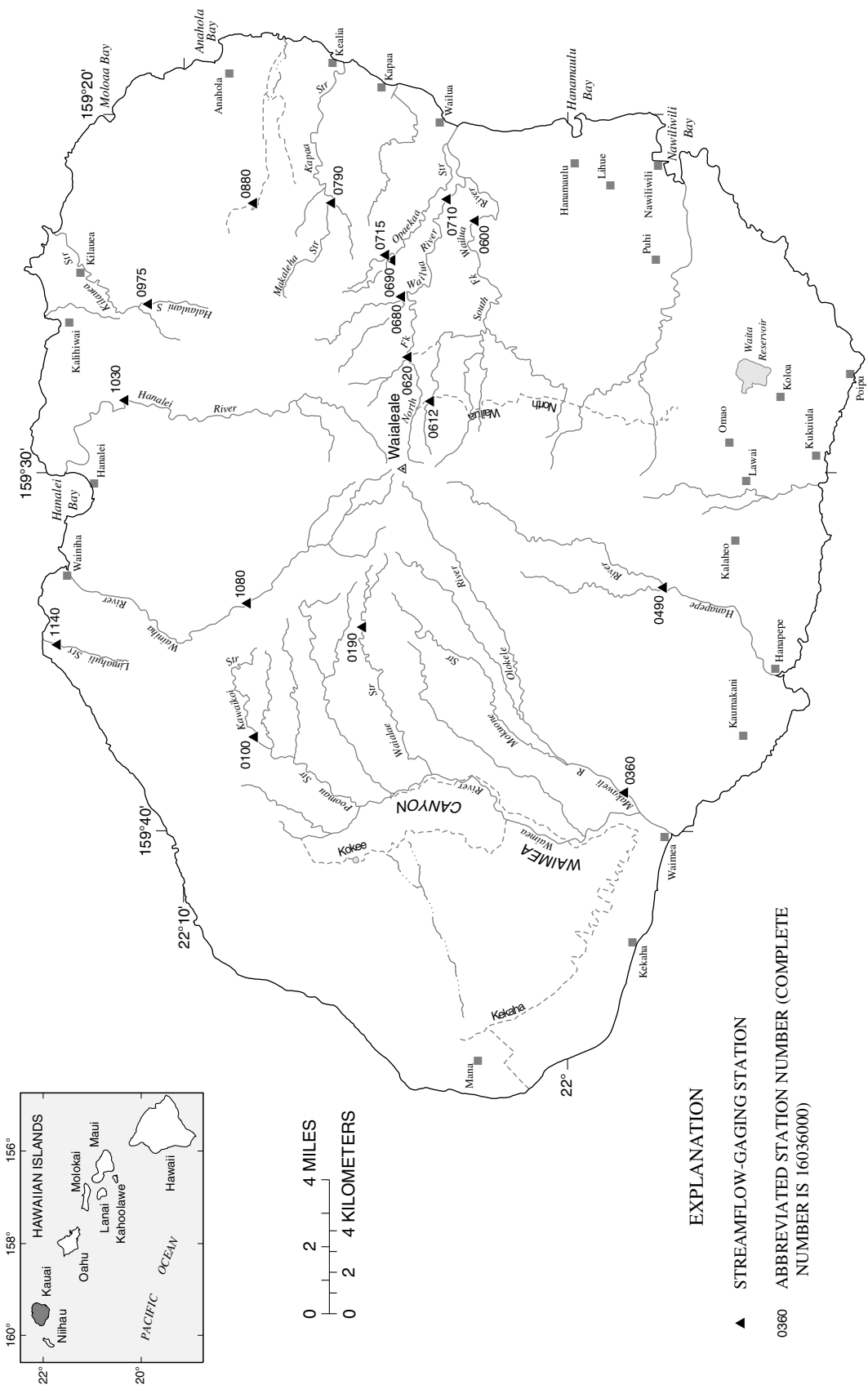


Figure 5. Locations of gaging, water-quality, and partial-record stations on Kauai.

HAWAII, ISLAND OF KAUAI
16010000 KAWAIKOI STREAM NEAR WAIMEA

LOCATION.--Lat 22°08'09 " , long 159°37'22 " , Hydrologic Unit 20070000, on left bank 0.2 mi upstream from Kokee-Mohihi Road crossing, 2.5 mi east of Kokee Lodge, and 12.5 mi north of Waimea.

DRAINAGE AREA.--3.95 mi².

PERIOD OF RECORD.--April 1909 to October 1912, December 1912 to March 1913, May 1913 to June 1915, August 1915 to May 1916, July to December 1916, July 1919 to current year. Monthly discharge only for some periods, published in WSP 1319.

REVISED RECORDS.--WSP 555: 1920-21. WSP 1185: 1914-17(M), 1920-38(M), 1940-43(M), 1947(M). WSP 1719: 1912, 1921-25, 1927-32, 1936. WSP 2137: Drainage area.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 3,420 ft above mean sea level, by barometer. Prior to May 26, 1910, nonrecording gage at site 300 ft downstream at different datum.

REMARKS.--Records computed by Roy Taogoshi. Records good. No diversion upstream.

AVERAGE DISCHARGE.--82 years (water years 1912, 1914, 1920-99), 34.3 ft³/s (24,870 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,300 ft³/s, January 13, 1967, gage height, 15.33 ft, from rating curve extended above 470 ft³/s on basis of slope-area measurements at gage heights 12.12 ft and 13.43 ft; minimum, 1.14 ft³/s, September 21, 22, 1953.

EXTREMES FOR CURRENT YEAR.--Peak discharge greater than base discharge of 2,100 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 22	1115	*2,830	*8.69	No other peak greater than base discharge.			

Minimum discharge, 3.1 ft³/s, November 8, 9, 11, June 4-6.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

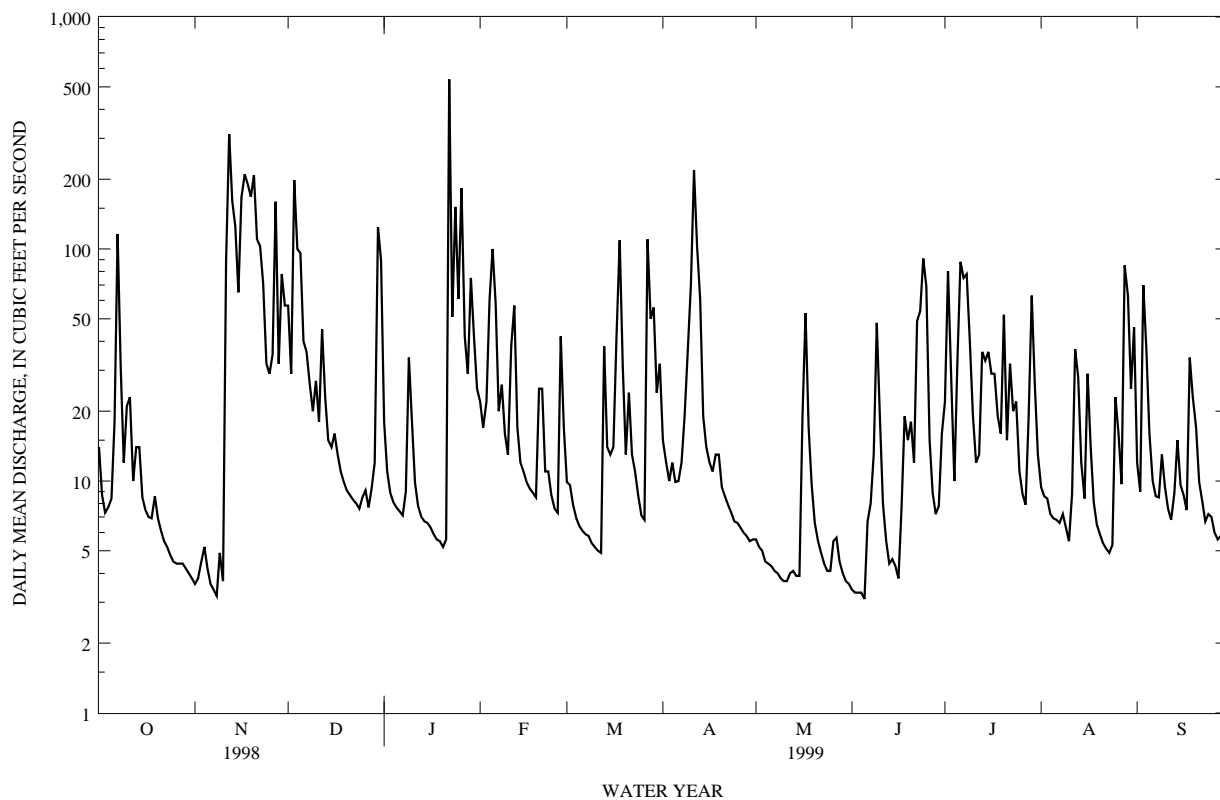
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14	3.6	57	18	22	9.9	15	5.6	3.4	22	9.4	12
2	8.7	3.8	29	11	17	9.6	12	5.2	3.3	80	8.6	9.0
3	7.3	4.5	198	8.9	22	7.9	10	5.0	3.3	27	8.4	70
4	7.7	5.2	100	8.1	60	6.9	12	4.5	3.3	10	7.2	37
5	8.4	4.2	96	7.7	100	6.4	9.9	4.4	3.1	33	6.9	16
6	18	3.6	40	7.4	58	6.1	10	4.3	6.7	88	6.8	10
7	116	3.4	36	7.1	20	5.9	12	4.1	8.0	75	6.6	8.6
8	31	3.2	26	9.0	26	5.8	19	4.0	13	78	7.2	8.5
9	12	4.9	20	34	16	5.4	37	3.8	48	41	6.3	13
10	21	3.7	27	18	13	5.2	71	3.7	19	19	5.5	9.4
11	23	89	18	9.8	38	5.0	218	3.7	8.0	12	8.8	7.6
12	10	313	45	7.8	57	4.9	103	4.0	5.5	13	37	6.8
13	14	161	23	7.0	17	38	61	4.1	4.4	36	28	8.9
14	14	125	15	6.7	12	14	19	3.9	4.6	33	12	15
15	8.5	65	14	6.6	11	13	14	3.9	4.3	36	8.4	9.6
16	7.5	167	16	6.3	9.9	14	12	19	3.8	29	29	8.7
17	7.0	210	13	5.9	9.3	41	11	53	7.7	29	14	7.5
18	6.9	190	11	5.6	8.9	109	13	17	19	19	8.1	34
19	8.6	168	9.9	5.5	8.5	31	13	9.6	15	16	6.5	23
20	6.9	208	9.1	5.2	25	13	9.4	6.6	18	52	5.9	17
21	6.1	110	8.7	5.6	25	24	8.6	5.5	12	15	5.4	9.9
22	5.5	103	8.3	538	11	13	7.9	4.9	49	32	5.1	8.2
23	5.2	71	8.0	51	11	11	7.3	4.4	54	20	4.9	6.7
24	4.8	32	7.6	152	8.7	8.7	6.7	4.1	91	22	5.3	7.2
25	4.5	29	8.5	61	7.6	7.1	6.6	4.1	69	11	23	7.0
26	4.4	35	9.1	183	7.3	6.8	6.3	5.5	15	8.8	16	6.0
27	4.4	160	7.7	42	42	110	6.0	5.7	8.9	7.9	9.7	5.6
28	4.4	32	9.3	29	17	50	5.8	4.5	7.2	19	85	5.8
29	4.2	78	12	75	---	56	5.5	4.0	7.8	63	63	5.3
30	4.0	57	124	42	---	24	5.6	3.7	16	26	25	4.8
31	3.8	---	89	25	---	32	---	3.6	---	13	46	---
TOTAL	401.8	2443.1	1095.2	1399.2	680.2	694.6	747.6	219.4	531.3	985.7	519.0	398.1
MEAN	13.0	81.4	35.3	45.1	24.3	22.4	24.9	7.08	17.7	31.8	16.7	13.3
MAX	116	313	198	538	100	110	218	53	91	88	85	70
MIN	3.8	3.2	7.6	5.2	7.3	4.9	5.5	3.6	3.1	7.9	4.9	4.8
AC-FT	797	4850	2170	2780	1350	1380	1480	435	1050	1960	1030	790

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1911 - 1999, BY WATER YEAR (WY)

MEAN	21.6	44.6	53.1	53.7	41.5	49.1	45.4	27.4	17.1	23.6	21.6	14.6
MAX	60.3	170	176	343	165	152	115	86.2	68.7	94.7	195	58.1
(WY)	1917	1929	1968	1921	1956	1951	1980	1927	1978	1989	1950	1992
MIN	3.34	4.16	11.9	3.23	4.26	6.15	5.74	3.38	3.58	5.18	2.54	1.86
(WY)	1985	1964	1923	1945	1945	1926	1992	1966	1951	1922	1984	1953

HAWAII, ISLAND OF KAUAI
1601000 KAWAIKOI STREAM NEAR WAIMEA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1911 - 1999
ANNUAL TOTAL	13729.8	10115.2	
ANNUAL MEAN	37.6	27.7	34.3
HIGHEST ANNUAL MEAN			60.7 1982
LOWEST ANNUAL MEAN			15.3 1945
HIGHEST DAILY MEAN	464 Apr 9	538 Jan 22	2620 Jan 15 1921
LOWEST DAILY MEAN	3.2 Nov 8	3.1 Jun 5	1.1 Sep 21 1953
ANNUAL SEVEN-DAY MINIMUM	4.0 Nov 2	3.4 May 30	1.2 Sep 17 1953
ANNUAL RUNOFF (AC-FT)	27230	20060	24870
10 PERCENT EXCEEDS	109	70	74
50 PERCENT EXCEEDS	15	10	13
90 PERCENT EXCEEDS	5.6	4.4	4.4



HAWAII, ISLAND OF KAUAI

16019000 WAIALAE STREAM AT ALTITUDE 3,820 FT, NEAR WAIMEA

LOCATION.--Lat 22°05'20" ; long 159°34'18" ; Hydrologic Unit 20070000, on left bank 5.0 mi northeast of mouth, 6.4 mi southeast of Kokee Lodge, and 11 mi northeast of Waimea.

DRAINAGE AREA.--1.79 mi².

PERIOD OF RECORD.--January 1920 to July 1932, June 1952 to current year. Prior to July 1954, published as Waialae River at altitude 3,700 ft near Waimea.

REVISED RECORDS.--WSP 1937: 1921, 1922-32(M), 1953(M), 1954. WSP 2137: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 3,820 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Roy Taogoshi. Records good. No diversion upstream.

AVERAGE DISCHARGE.--58 years (water years 1921-31, 1953-99), 21.4 ft³/s (15,490 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,530 ft³/s, January 16, 1921, gage height, 8.44 ft, from rating curve extended above 1,100 ft³/s on basis of slope-area measurement at gage height 4.60 ft; minimum, 0.99 ft³/s, May 17, 18, May 30 to June 2, 1966.

EXTREMES FOR CURRENT YEAR.--Peak discharge greater than base discharge of 1,300 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 22	0500	*1,980	*5.56	Feb. 20	1730	1,330	4.58

Minimum discharge, 2.5 ft³/s, November 11.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.1	2.7	49	10	126	7.4	16	3.5	3.0	7.8	e7.0	8.6
2	3.9	2.7	21	6.7	25	6.4	11	3.5	3.0	38	e6.0	6.0
3	26	13	185	5.2	18	5.3	11	3.3	3.0	13	e4.9	12
4	6.0	5.6	276	4.7	26	4.7	11	3.3	3.0	5.7	4.1	14
5	8.5	3.4	198	4.6	44	4.4	9.1	3.2	3.2	19	5.9	8.2
6	10	2.9	68	4.7	37	4.9	47	3.2	5.1	67	6.0	5.7
7	69	2.8	57	4.3	14	5.1	13	3.2	8.1	56	4.6	4.6
8	11	2.7	35	11	14	4.3	80	3.2	9.3	69	4.4	4.4
9	10	2.7	17	16	10	3.9	54	3.2	10	32	3.9	4.6
10	15	2.7	17	8.8	8.0	3.8	71	3.2	4.6	19	3.5	4.9
11	8.6	2.9	12	5.8	7.4	3.9	128	3.2	3.3	16	3.5	4.4
12	5.4	51	18	4.7	16	3.8	86	5.1	3.2	11	19	3.7
13	26	31	14	4.2	8.2	37	47	4.1	3.0	13	21	4.4
14	13	29	11	4.0	6.0	11	15	3.3	2.8	11	9.2	5.7
15	7.4	18	8.6	4.6	5.1	14	12	3.5	2.7	20	5.4	6.3
16	14	37	7.9	4.5	4.6	9.5	8.6	59	2.8	23	33	6.3
17	12	43	6.7	4.0	4.2	19	7.5	36	3.2	29	16	5.1
18	6.3	32	5.9	3.8	4.0	44	14	33	7.5	30	6.7	17
19	6.3	50	5.3	3.5	3.8	12	10	10	8.6	13	4.9	22
20	4.4	61	4.9	3.3	268	7.2	8.6	5.4	11	67	4.1	25
21	3.5	33	4.6	3.0	65	8.2	9.5	4.4	12	e12	3.9	10
22	3.3	29	4.4	366	55	7.1	7.0	3.7	21	e20	3.5	8.2
23	3.0	23	4.5	84	23	5.1	5.4	3.3	38	e17	3.5	5.7
24	2.9	9.8	4.4	193	9.4	4.2	4.6	3.2	57	e18	3.8	7.4
25	2.8	7.4	18	70	6.7	3.7	4.4	3.3	31	e8.0	25	8.2
26	2.8	6.7	9.2	133	5.6	11	4.1	3.3	8.3	e6.6	8.6	9.5
27	2.8	133	5.5	33	12	172	3.9	3.3	5.1	e5.0	5.4	6.0
28	2.8	20	4.6	36	13	93	3.9	3.2	4.1	e17	21	4.6
29	2.8	56	4.2	28	---	56	3.9	3.2	4.9	e45	14	3.9
30	2.8	25	69	24	---	19	3.7	3.0	7.0	e20	11	3.7
31	2.8	---	48	67	---	45	---	3.0	---	e9.0	30	---
TOTAL	299.2	739.0	1193.7	1155.4	839.0	635.9	712.2	232.3	288.8	737.1	302.8	240.1
MEAN	9.65	24.6	38.5	37.3	30.0	20.5	23.7	7.49	9.63	23.8	9.77	8.00
MAX	69	133	276	366	268	172	128	59	57	69	33	25
MIN	2.8	2.7	4.2	3.0	3.8	3.7	3.7	3.0	2.7	5.0	3.5	3.7
AC-FT	593	1470	2370	2290	1660	1260	1410	461	573	1460	601	476

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1920 - 1999, BY WATER YEAR (WY)

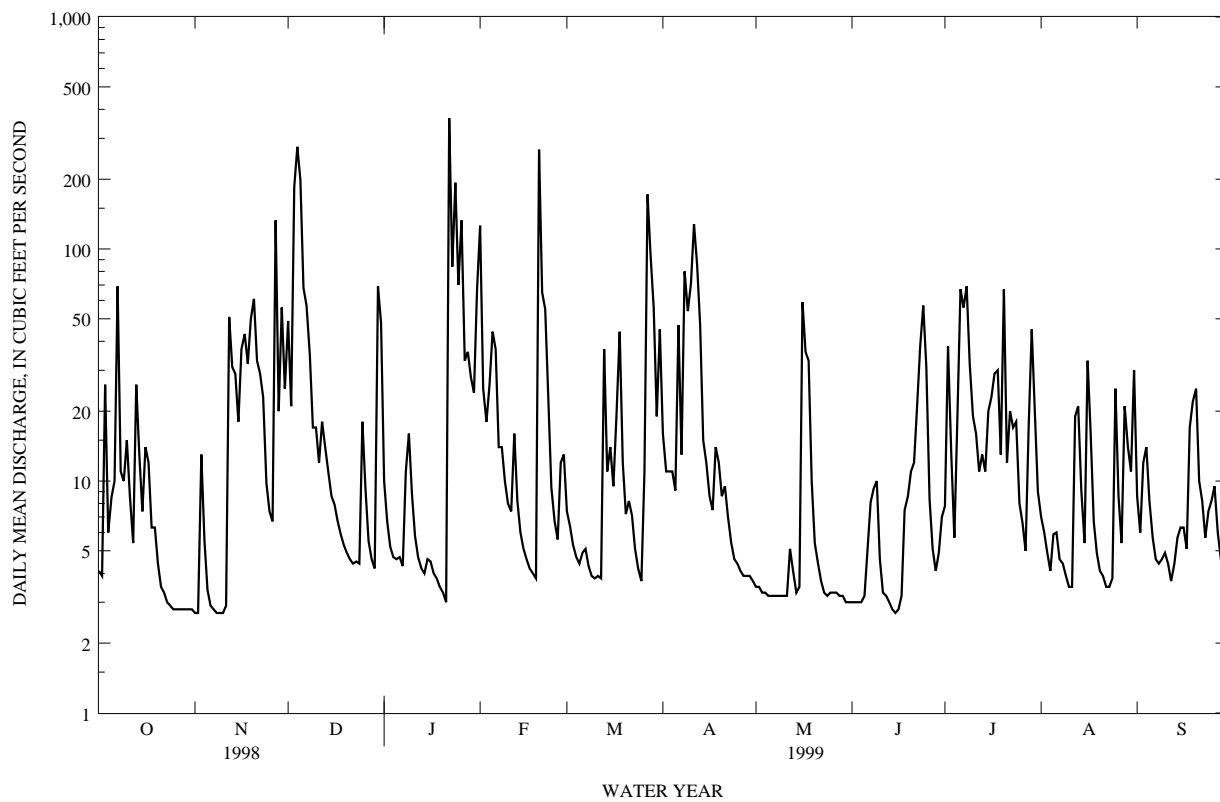
	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
MEAN	15.7	32.7	33.8	33.3	27.0	28.0	24.2	13.2	10.1	15.4	12.4	11.0																																																																				
MAX	52.1	99.2	106	166	155	106	92.4	44.1	39.4	58.0	44.9	56.0																																																																				
(WY)	1995	1968	1968	1921	1956	1982	1974	1927	1978	1989	1959	1922																																																																				
MIN	2.49	5.58	4.16	4.48	2.44	2.15	1.87	1.81	1.89	2.56	2.86	1.67																																																																				
(WY)	1927	1927	1923	1966	1983	1926	1966	1966	1975	1984	1952	1975																																																																				

e Estimated

HAWAII, ISLAND OF KAUAI

16019000 WAIALAE STREAM AT ALTITUDE 3,820 FT, NEAR WAIMEA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1920 - 1999	
ANNUAL TOTAL	5847.3		7375.5		21.4	
ANNUAL MEAN	16.0		20.2		40.9	
HIGHEST ANNUAL MEAN					8.94	
LOWEST ANNUAL MEAN					1926	
HIGHEST DAILY MEAN	276	Dec 4	366	Jan 22	1440	Dec 1 1957
LOWEST DAILY MEAN	2.1	Mar 17	2.7	Nov 1	.99	May 17 1966
ANNUAL SEVEN-DAY MINIMUM	2.1	Mar 16	2.8	Oct 27	1.1	May 26 1966
ANNUAL RUNOFF (AC-FT)	11600		14630		15490	
10 PERCENT EXCEEDS	38		49		45	
50 PERCENT EXCEEDS	6.1		7.5		6.6	
90 PERCENT EXCEEDS	2.7		3.2		2.6	



HAWAII, ISLAND OF KAUAI
16036000 MAKAWELI RIVER NEAR WAIMEA

LOCATION.--Lat 21°58'31 " , long 159°38'55 " , Hydrologic Unit 20070000, on left bank 0.7 mi upstream from confluence to Waimea River, and 1.9 mi northeast of Waimea.

DRAINAGE AREA.--26.0 mi².

PERIOD OF RECORD.--July 1943 to current year. Records for October 1911 to June 1917 at site 0.2 mi downstream not equivalent owing to intervening diversion.

REVISED RECORDS.--WSP 2137: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 18.2 ft above mean sea level (by stadia survey). Prior to June 16, 1959, at datum 1.00 ft higher.

REMARKS.--Records computed by Roy Taogoshi. Records good. Olokele ditch diverts all low flow from the headwaters of the Olokele River 9 mi upstream for irrigation in vicinity of Makaweli. A 5 ft³/s capacity ditch diverts water 0.1 mi upstream of station for irrigation of taro in the vicinity of the station.

AVERAGE DISCHARGE.--56 years (water years 1944-99), 85.9 ft³/s (62,240 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 26,000 ft³/s, January 31, 1975, gage height, 15.51 ft, from rating curve extended above 3,200 ft³/s on basis of slope-area measurement at gage height 10.65 ft; minimum, 3.2 ft³/s, July 19, 1951.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 4,700 ft³/s: and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 22	0600	*2,590	*7.34				

Minimum discharge, 10 ft³/s, December 29.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

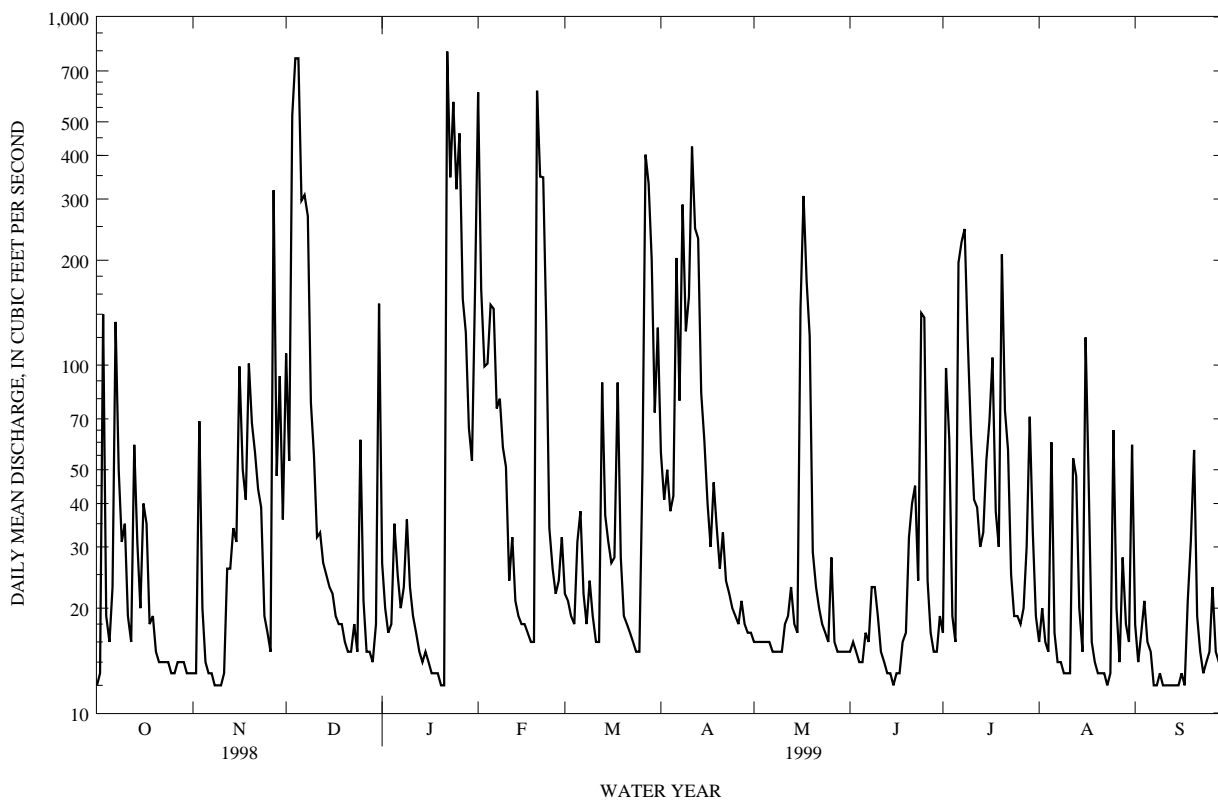
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	13	108	27	608	22	56	16	15	17	16	18
2	13	13	53	20	165	21	41	16	16	98	20	14
3	140	69	521	17	99	19	50	16	15	61	16	17
4	19	20	761	18	101	18	38	16	14	19	15	21
5	16	14	761	35	149	31	42	16	14	16	60	16
6	23	13	297	25	145	38	203	16	17	197	17	15
7	133	13	308	20	75	22	79	15	16	226	14	12
8	50	12	268	23	80	18	289	15	23	246	14	12
9	31	12	78	36	58	24	125	15	23	119	13	13
10	35	12	55	23	51	19	157	15	19	63	13	12
11	19	13	32	19	24	16	424	18	15	41	13	12
12	16	26	33	17	32	16	247	19	14	39	54	12
13	59	26	27	15	21	89	231	23	13	30	48	12
14	31	34	25	14	19	37	83	18	13	33	20	12
15	20	31	23	15	18	31	61	17	12	53	15	12
16	40	99	22	14	18	27	40	145	13	69	120	13
17	35	50	19	13	17	28	30	306	13	105	46	12
18	18	41	18	13	16	89	46	174	16	38	16	21
19	19	101	18	13	16	28	34	121	17	30	14	31
20	15	68	16	12	614	19	26	29	32	208	13	57
21	14	56	15	12	348	18	33	23	40	74	13	19
22	14	44	15	796	346	17	24	20	45	57	13	15
23	14	39	18	346	130	16	22	18	24	25	12	13
24	14	19	15	570	34	15	20	17	141	19	13	14
25	13	17	61	320	26	15	19	16	137	19	65	15
26	13	15	21	463	22	50	18	28	24	18	20	23
27	14	318	15	155	24	402	21	16	17	20	14	15
28	14	48	15	124	32	332	18	15	15	30	28	14
29	14	93	14	66	---	201	17	15	15	71	18	13
30	13	36	18	53	---	73	17	15	19	33	16	12
31	13	---	150	165	---	128	---	15	---	19	59	---
TOTAL	894	1365	3800	3459	3288	1879	2511	1224	807	2093	828	497
MEAN	28.8	45.5	123	112	117	60.6	83.7	39.5	26.9	67.5	26.7	16.6
MAX	140	318	761	796	614	402	424	306	141	246	120	57
MIN	12	12	14	12	16	15	17	15	12	16	12	12
AC-FT	1770	2710	7540	6860	6520	3730	4980	2430	1600	4150	1640	986

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1943 - 1999, BY WATER YEAR (WY)

MEAN	59.8	126	141	130	115	129	95.9	56.4	38.7	52.9	51.3	36.8
MAX	311	491	577	441	774	609	419	283	106	222	328	204
(WY)	1995	1991	1993	1989	1956	1982	1963	1965	1996	1989	1950	1994
MIN	11.7	15.2	18.0	9.49	12.0	10.6	11.6	15.1	9.56	10.0	14.2	9.54
(WY)	1960	1951	1977	1945	1978	1959	1992	1996	1951	1984	1944	1962

HAWAII, ISLAND OF KAUAI
16036000 MAKAWELI RIVER NEAR WAIMEA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1943 - 1999	
ANNUAL TOTAL	14998.1		22645		85.9	
ANNUAL MEAN	41.1		62.0		31.1	
HIGHEST ANNUAL MEAN					204	1982
LOWEST ANNUAL MEAN					31.1	1984
HIGHEST DAILY MEAN	761	Dec 4	796	Jan 22	5170	Dec 1 1957
LOWEST DAILY MEAN	9.8	Mar 15	12	Oct 1	4.3	Jul 19 1951
ANNUAL SEVEN-DAY MINIMUM	9.9	Mar 15	12	Sep 7	5.7	Oct 21 1944
ANNUAL RUNOFF (AC-FT)	29750		44920		62240	
10 PERCENT EXCEEDS	80		147		170	
50 PERCENT EXCEEDS	17		20		27	
90 PERCENT EXCEEDS	12		13		12	



HAWAII, ISLAND OF KAUAI

16049000 HANAPEPE RIVER BELOW MANUAHI STREAM, NEAR ELEELE

LOCATION.--Lat 21°57'29" ; long 159°33'13" ; Hydrologic Unit 20070000, on left bank 200 ft downstream from Manuahi Stream and 4.0 mi northeast of Eleele.

DRAINAGE AREA.--18.5 mi².

PERIOD OF RECORD.--July 1917 to January 1921, December 1926 to current year. Prior to July 1952, published as "at Koula, near Eleele." Records for August 1910 to December 1916 at site 0.5 mi upstream not equivalent owing to intervening inflow.

REVISED RECORDS.--WSP 740: 1931. WSP 1719: 1929-31(M). WSP 1937: 1918, 1919(M), 1920, 1921(M), 1927-28(M), 1930, 1936-37(M), 1941(P), 1943-46(P), 1947(M), 1948-52(P), 1955(M), 1956-57(P), 1958(M), 1960(M). WSP 2137: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 222 ft above mean sea level (by stadia survey). July 1, 1917 to January 22, 1921, nonrecording gage and December 16, 1926, to June 30, 1951, water-stage recorder, at same site at datum 1.00 ft higher.

REMARKS.--Records computed by Roy Taogoshi. Records good. Koula ditch diverts water 3.0 mi upstream of station for irrigation in vicinity of Makaweli.

AVERAGE DISCHARGE.--75 years (water years 1918-20, 1928-99), 84.0 ft³/s (60,870 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 39,000 ft³/s, April 15, 1963, gage height, 14.87 ft, from rating curve extended above 7,600 ft³/s on basis of slope-area measurement of peak flow; minimum, 5.1 ft³/s, May 21, 1954.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 3,600 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Feb. 1	0700	*2,850	*5.63				

Minimum discharge, 14 ft³/s, for many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

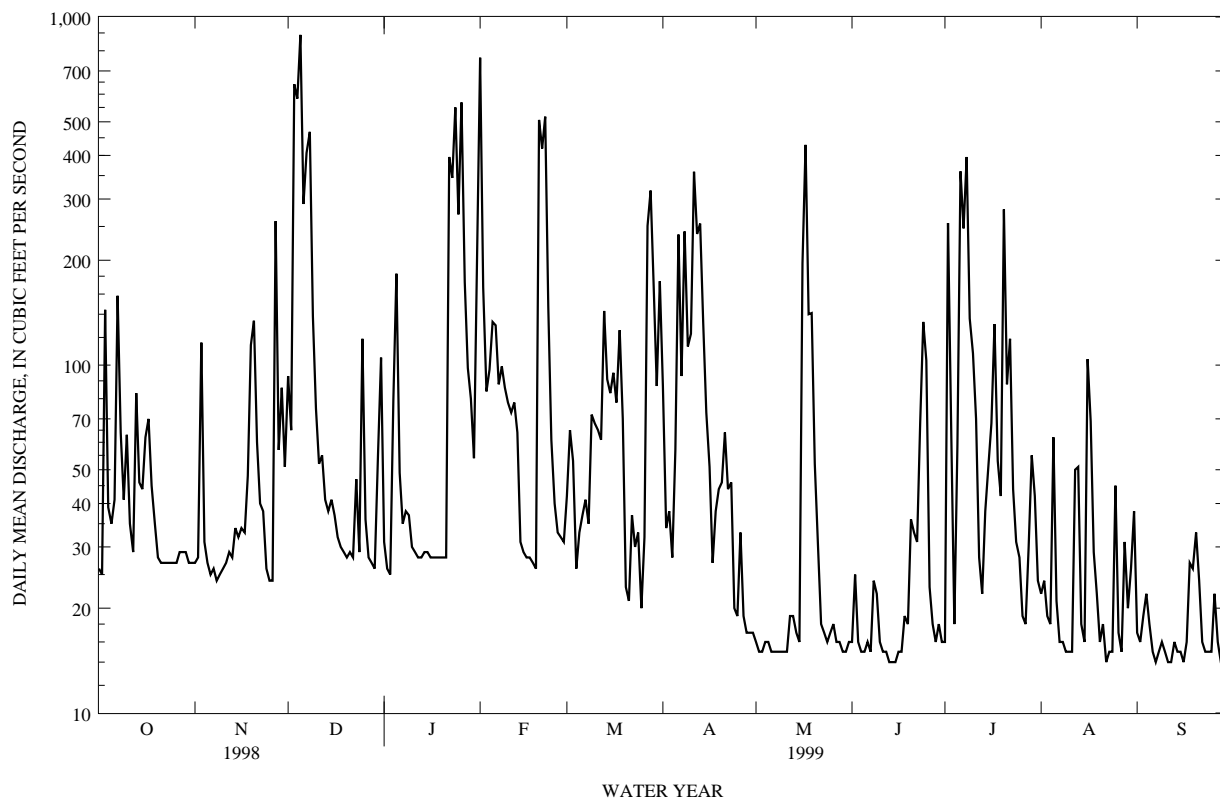
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	26	27	93	31	764	42	87	16	16	16	22	17
2	25	28	65	26	167	65	34	15	25	256	24	16
3	144	116	641	25	84	53	38	15	16	63	19	19
4	39	31	583	79	97	26	28	16	15	18	18	22
5	35	27	889	183	133	33	57	16	15	59	62	18
6	41	25	290	49	130	37	237	15	16	360	21	15
7	158	26	407	35	88	41	93	15	15	247	16	14
8	64	24	468	38	99	35	242	15	24	396	16	15
9	41	25	138	37	86	72	113	15	22	136	15	16
10	63	26	75	30	78	68	123	15	16	108	15	15
11	35	27	52	29	73	65	359	15	15	70	15	14
12	29	29	55	28	78	61	238	19	15	28	50	14
13	83	28	41	28	64	143	255	19	14	22	51	16
14	46	34	38	29	31	91	132	17	14	38	18	15
15	44	32	41	29	29	83	73	16	14	51	16	15
16	62	34	37	28	28	95	51	196	15	68	104	14
17	70	33	32	28	28	78	27	429	15	131	69	16
18	45	48	30	28	27	126	38	140	19	53	29	27
19	35	114	29	28	26	70	44	141	18	42	22	26
20	28	134	28	28	506	23	46	52	36	280	16	33
21	27	60	29	28	419	21	64	30	33	88	18	24
22	27	40	28	396	517	37	44	18	31	119	14	16
23	27	38	47	345	147	30	46	17	68	44	15	15
24	27	26	29	550	61	33	20	16	133	31	15	15
25	27	24	119	271	40	20	19	17	103	28	45	15
26	27	24	36	568	33	32	33	18	23	19	17	22
27	29	259	28	173	32	251	19	16	18	18	15	16
28	29	57	27	98	31	317	17	16	16	30	31	14
29	29	86	26	80	---	168	17	15	18	55	20	14
30	27	51	55	54	---	87	17	15	16	42	26	14
31	27	---	105	203	---	174	---	16	---	24	38	---
TOTAL	1416	1533	4561	3582	3896	2477	2611	1391	814	2940	872	522
MEAN	45.7	51.1	147	116	139	79.9	87.0	44.9	27.1	94.8	28.1	17.4
MAX	158	259	889	568	764	317	359	429	133	396	104	33
MIN	25	24	26	25	26	20	17	15	14	16	14	14
AC-FT	2810	3040	9050	7100	7730	4910	5180	2760	1610	5830	1730	1040

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1917 - 1999, BY WATER YEAR (WY)

MEAN	61.7	106	115	109	98.7	114	91.4	65.7	52.8	72.6	71.6	53.1
MAX	240	430	720	578	657	803	470	201	175	202	222	190
(WY)	1995	1991	1920	1920	1932	1918	1963	1965	1978	1989	1931	1994
MIN	11.5	15.3	13.0	11.7	15.0	8.84	13.2	12.9	12.1	13.6	18.4	11.7
(WY)	1954	1977	1986	1986	1986	1959	1941	1958	1959	1953	1953	1953

HAWAII, ISLAND OF KAUAI
16049000 HANAPEPE RIVER BELOW MANUAHI STREAM, NEAR ELEELE--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1917 - 1999	
ANNUAL TOTAL	20577		26615		84.0	
ANNUAL MEAN	56.4		72.9		30.6	
HIGHEST ANNUAL MEAN					182	1918
LOWEST ANNUAL MEAN					30.6	1953
HIGHEST DAILY MEAN	889	Dec 5	889	Dec 5	10900	Dec 3 1919
LOWEST DAILY MEAN	18	Aug 26	14	Jun 13	5.3	May 21 1954
ANNUAL SEVEN-DAY MINIMUM	19	Feb 26	15	Jun 11	6.4	May 10 1954
ANNUAL RUNOFF (AC-FT)	40810		52790		60870	
10 PERCENT EXCEEDS	101		162		172	
50 PERCENT EXCEEDS	28		31		30	
90 PERCENT EXCEEDS	21		15		15	



HAWAII, ISLAND OF KAUAI
16060000 SOUTH FORK WAILUA RIVER NEAR LIHUE

LOCATION.--Lat 22°02'24 " , long 159°22'58 " , Hydrologic Unit 20070000, on right bank 0.2 mi upstream from Wailua Falls and 4.3 mi north of Lihue.

DRAINAGE AREA.--22.4 mi².

PERIOD OF RECORD.--December 1911 to April 1919, June 1919 to March 1921, May 1921 to June 1957, August, September 1957, November 1957 to February 1958, June 1958 to current year. Monthly discharge only for some periods, published in WSP 1319. Published as "above Waiehu Falls, near Lihue" 1912-13.

REVISED RECORDS.--WSP 1249: 1941-47(M), 1948-51(P). WSP 1719: 1943-49. WSP 1937: 1958-60.

GAGE.--Water-stage recorder. Elevation of gage is 240 ft (from topographic map). Prior to November 18, 1918, at site 0.3 mi upstream at different datum. November 18, 1918 to June 30, 1957, at site 10 ft downstream from present site at datum 2.50 ft higher and July 1, 1957 to June 23, 1958, at present datum.

REMARKS.--Records computed by Roy Taogoshi. Records good. Lihue and Hanamaulu ditches divert water upstream of station for irrigation of sugarcane in vicinity of Lihue.

AVERAGE DISCHARGE.--82 years (water years 1913-18, 1920, 1922-24, 1926-56, 1959-99), 116 ft³/s (84,240 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 87,300 ft³/s, April 15, 1963, gage height, 22.90 ft, from rating curve extended above 13,000 ft³/s on basis of slope-area measurement of peak flow; minimum, 1.5 ft³/s, August 21, 1984.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 5,800 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 7	2145	*3,180	*12.56				

Minimum discharge, 5.1 ft³/s, September 15.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

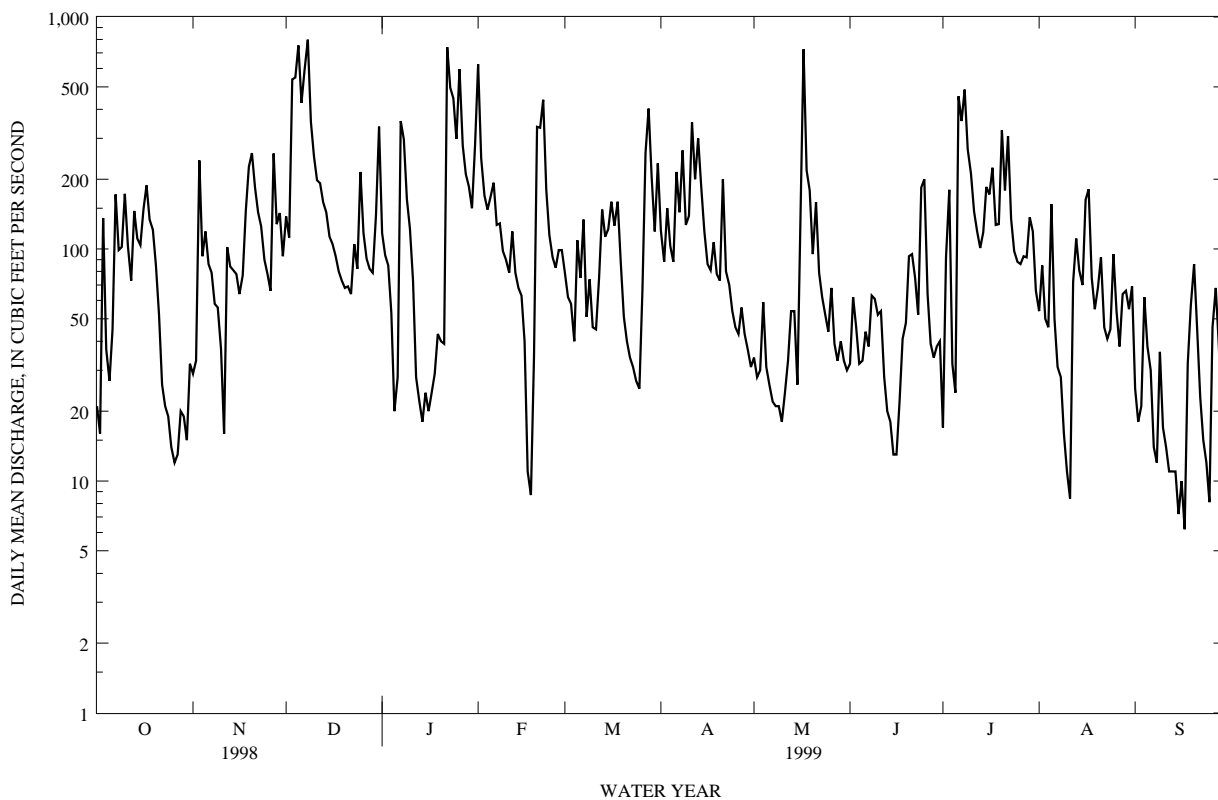
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	29	138	117	626	79	120	34	32	17	54	25
2	16	33	112	94	246	62	88	28	62	92	85	18
3	136	241	538	85	170	58	150	30	46	180	50	21
4	37	93	549	53	148	40	103	59	32	32	46	62
5	27	119	754	20	168	109	88	31	33	24	156	38
6	45	86	427	28	193	75	215	26	44	455	50	30
7	172	79	590	356	127	134	144	22	38	356	31	14
8	99	58	799	297	129	51	266	21	63	487	28	12
9	102	56	353	164	98	74	127	21	61	269	16	36
10	173	37	251	122	90	46	139	18	52	211	11	17
11	103	16	198	73	79	45	351	24	54	145	8.4	14
12	73	102	192	28	119	75	200	33	28	119	72	11
13	146	84	159	22	79	148	300	54	20	101	111	11
14	111	81	144	18	68	113	186	54	18	118	81	11
15	104	78	113	24	63	122	120	26	13	185	70	7.2
16	148	64	105	20	40	160	86	137	13	172	163	10
17	188	77	93	24	11	126	81	726	22	224	181	6.2
18	134	146	80	29	8.7	160	107	218	41	127	75	32
19	121	226	73	43	34	87	78	179	48	128	55	57
20	85	259	68	40	336	51	73	95	93	325	68	86
21	52	184	69	39	333	40	200	159	95	179	92	45
22	26	144	64	742	440	34	80	79	75	307	46	23
23	21	125	105	495	180	31	70	62	52	135	41	15
24	19	90	82	447	115	27	54	52	184	98	45	12
25	14	78	215	298	92	25	46	44	200	88	95	8.1
26	12	66	117	596	83	67	43	68	64	86	54	46
27	13	258	91	279	99	260	56	39	39	93	38	68
28	20	128	82	210	99	403	43	33	34	92	64	38
29	19	143	79	186	---	203	37	40	38	137	66	15
30	15	93	140	150	---	119	31	33	40	119	55	8.7
31	32	---	337	280	---	234	---	30	---	66	69	---
TOTAL	2284	3273	7117	5379	4273.7	3258	3682	2475	1634	5167	2076.4	797.2
MEAN	73.7	109	230	174	153	105	123	79.8	54.5	167	67.0	26.6
MAX	188	259	799	742	626	403	351	726	200	487	181	86
MIN	12	16	64	18	8.7	25	31	18	13	17	8.4	6.2
AC-FT	4530	6490	14120	10670	8480	6460	7300	4910	3240	10250	4120	1580

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1912 - 1999, BY WATER YEAR (WY)

MEAN	92.8	174	172	174	126	148	133	98.3	56.8	76.6	83.6	75.8
MAX	339	866	696	1485	716	830	673	467	271	281	321	650
(WY)	1983	1991	1917	1921	1932	1982	1963	1927	1914	1989	1948	1914
MIN	2.58	3.13	6.61	4.66	3.15	3.46	3.84	3.29	2.82	3.27	4.76	2.59
(WY)	1954	1934	1977	1986	1947	1934	1931	1926	1957	1953	1973	1953

HAWAII, ISLAND OF KAUAI
16060000 SOUTH FORK WAILUA RIVER NEAR LIHUE--Continued

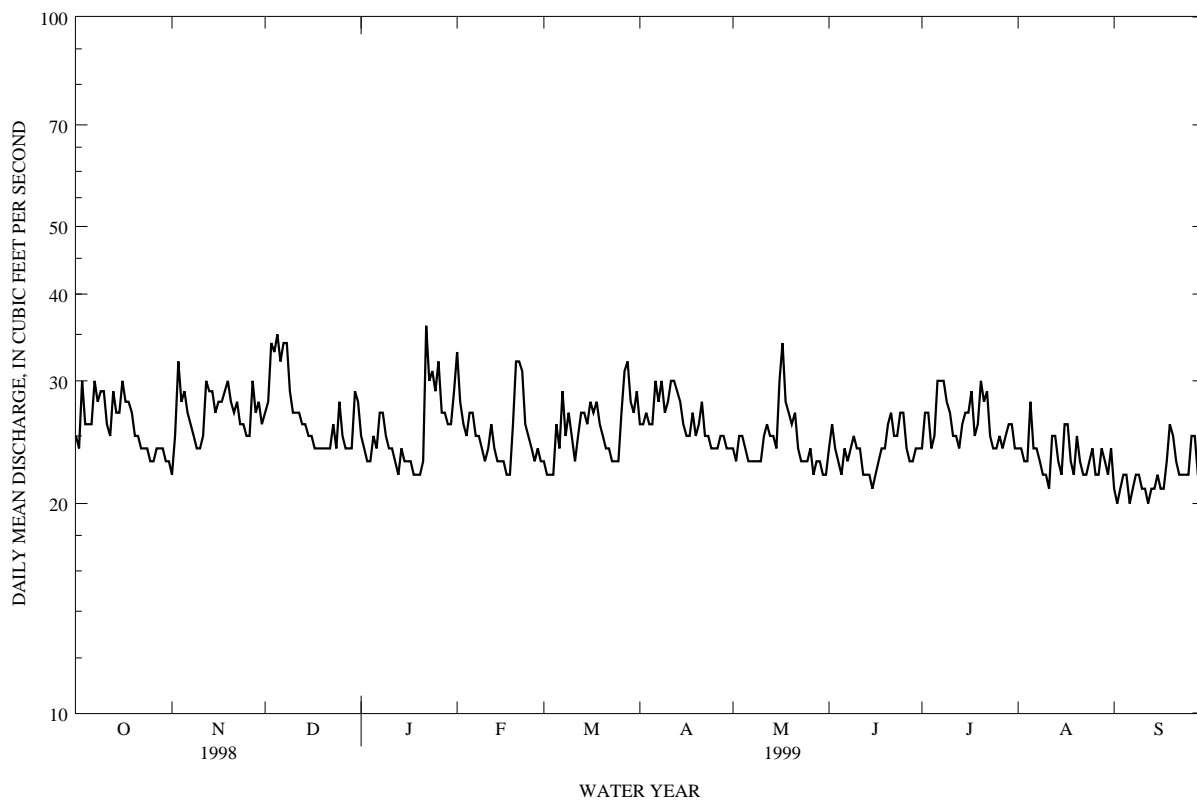
SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1912 - 1999	
ANNUAL TOTAL	29857.5		41416.3			
ANNUAL MEAN	81.8		113		116	
HIGHEST ANNUAL MEAN					284	
LOWEST ANNUAL MEAN					17.3	
HIGHEST DAILY MEAN	799	Dec 8	799	Dec 8	13800	Jan 16 1921
LOWEST DAILY MEAN	2.9	Mar 23	6.2	Sep 17	1.8	Sep 17 1953
ANNUAL SEVEN-DAY MINIMUM	3.8	Mar 19	10	Sep 11	1.8	Sep 16 1953
ANNUAL RUNOFF (AC-FT)	59220		82150		84240	
10 PERCENT EXCEEDS	183		248		264	
50 PERCENT EXCEEDS	54		78		39	
90 PERCENT EXCEEDS	6.6		20		4.8	



HAWAII, ISLAND OF KAUAI

16061200 NORTH WAILUA DITCH BELOW WAIKOKO STREAM, NEAR LIHUE--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1965 - 1999	
ANNUAL TOTAL	7787.5		9242		21.9	
ANNUAL MEAN	21.3		25.3		30.3	
HIGHEST ANNUAL MEAN					6.64 1969	
LOWEST ANNUAL MEAN					.00 Jan 1 1965	
HIGHEST DAILY MEAN	35	Dec 5	36	Jan 22	58	Oct 11 1966
LOWEST DAILY MEAN	6.0	Sep 18	20	Sep 2	.00	Jan 1 1965
ANNUAL SEVEN-DAY MINIMUM	9.1	Sep 15	21	Sep 1	.00	Jan 1 1965
ANNUAL RUNOFF (AC-FT)	15450		18330		15900	
10 PERCENT EXCEEDS	28		29		29	
50 PERCENT EXCEEDS	20		25		22	
90 PERCENT EXCEEDS	17		22		16	



HAWAII, ISLAND OF KAUAI
16062000 STABLE STORM DITCH NEAR LIHUE

LOCATION.--Lat 22°04'09 " , long 159°26'46 " , Hydrologic Unit 20070000, on left bank 100 ft downstream from intake, 7.8 mi northwest of Lihue, and 7.9 mi west of Kapaa.

PERIOD OF RECORD.--December 1936 to current year.

GAGE.--Water-stage recorder and sharp-crested weir. Elevation of gage is 710 ft above mean sea level, by barometer.

REMARKS.--Records computed by Roy Taogoshi. Records fair. Ditch diverts water from North Fork Wailua River for irrigation of sugarcane in vicinity of Lihue.

AVERAGE DISCHARGE.--62 years (water years 1938-99), 9.33 ft³/s (6,760 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 71 ft³/s, April 3, 1948; no flow on many days.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 8.0 ft³/s, December 5, no flow on many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	3.1	1.6	2.6	.65	2.7	1.4	1.8	1.9	2.0	1.3
2	.00	.01	3.4	1.3	1.9	.57	2.3	1.2	2.8	4.6	1.8	1.2
3	.00	.06	7.9	1.3	1.6	.51	4.0	1.4	1.6	4.1	1.9	1.3
4	.00	.05	6.7	1.1	1.5	.51	2.5	1.4	1.4	2.0	1.4	1.4
5	.00	.07	8.0	1.4	1.7	1.4	2.5	1.2	1.2	2.2	4.8	1.4
6	.00	.06	5.2	1.1	1.6	.88	4.5	1.2	1.8	5.1	1.6	1.1
7	.00	.06	7.3	3.4	1.4	1.5	3.6	1.1	1.2	5.5	1.5	.99
8	.00	.05	7.8	2.4	1.4	.98	4.7	1.1	2.0	5.7	1.3	.94
9	.00	.03	4.3	1.5	1.1	1.2	2.9	1.1	2.2	4.2	1.1	.93
10	.00	.01	3.5	1.2	1.1	.81	3.4	.92	1.8	3.3	1.1	.77
11	.00	.01	3.0	.98	1.0	.71	5.4	1.4	1.8	2.4	1.0	.77
12	.00	.05	2.7	.92	1.5	.56	4.6	1.6	1.2	2.1	2.4	.61
13	.00	.02	2.4	.88	.93	.76	4.3	1.4	1.2	1.8	2.2	.38
14	.00	.02	2.1	.77	.77	3.1	3.7	1.4	.92	3.0	1.1	.24
15	.00	.01	1.9	.77	.72	2.7	2.8	1.1	.12	4.2	1.1	.23
16	.00	1.7	1.8	.84	.65	4.7	2.5	3.0	e.06	4.1	4.1	.17
17	.00	4.9	1.7	.72	.63	3.1	2.3	5.6	e.02	5.3	3.2	.16
18	.00	4.8	1.5	.77	.63	4.6	3.0	3.4	e.02	2.6	1.6	.50
19	.00	6.1	1.4	.78	1.1	2.8	2.2	2.7	e.02	2.8	1.3	1.4
20	.00	4.7	1.3	.77	2.1	2.1	2.3	2.2	e.02	6.8	3.1	.94
21	.00	4.1	1.3	.80	2.7	1.9	3.4	2.7	e.02	5.1	1.9	.60
22	.00	4.3	1.2	5.2	2.3	1.7	2.1	1.8	.07	6.2	1.3	.85
23	.00	3.7	1.9	2.3	1.6	1.6	2.1	2.0	.09	3.2	1.4	.77
24	.00	3.2	1.2	2.4	1.3	1.5	1.8	1.8	.12	2.4	1.4	.77
25	.00	2.8	2.5	2.1	1.1	1.4	1.7	1.8	.12	2.1	2.0	.81
26	.00	2.6	1.3	2.6	.98	2.9	1.6	2.5	.07	2.6	1.3	1.2
27	.00	5.6	1.2	1.9	1.1	4.6	1.7	1.6	.06	2.1	1.1	1.4
28	.00	2.8	1.1	1.9	.80	4.3	1.5	1.6	.44	2.6	1.6	.92
29	.00	3.7	1.3	1.7	---	3.7	1.4	1.8	1.9	3.0	1.2	.77
30	.00	2.7	3.7	1.7	---	3.8	1.2	1.6	2.2	2.5	1.1	.75
31	.00	---	3.0	2.0	---	4.7	---	1.4	---	1.7	1.9	---
TOTAL	0.00	58.21	96.7	49.10	37.71	66.24	84.7	56.42	28.27	107.2	55.8	25.57
MEAN	.000	1.94	3.12	1.58	1.35	2.14	2.82	1.82	.94	3.46	1.80	.85
MAX	.00	6.1	8.0	5.2	2.7	4.7	5.4	5.6	2.8	6.8	4.8	1.4
MIN	.00	.00	1.1	.72	.63	.51	1.2	.92	.02	1.7	1.0	.16
AC-FT	.00	115	192	97	75	131	168	112	56	213	111	51

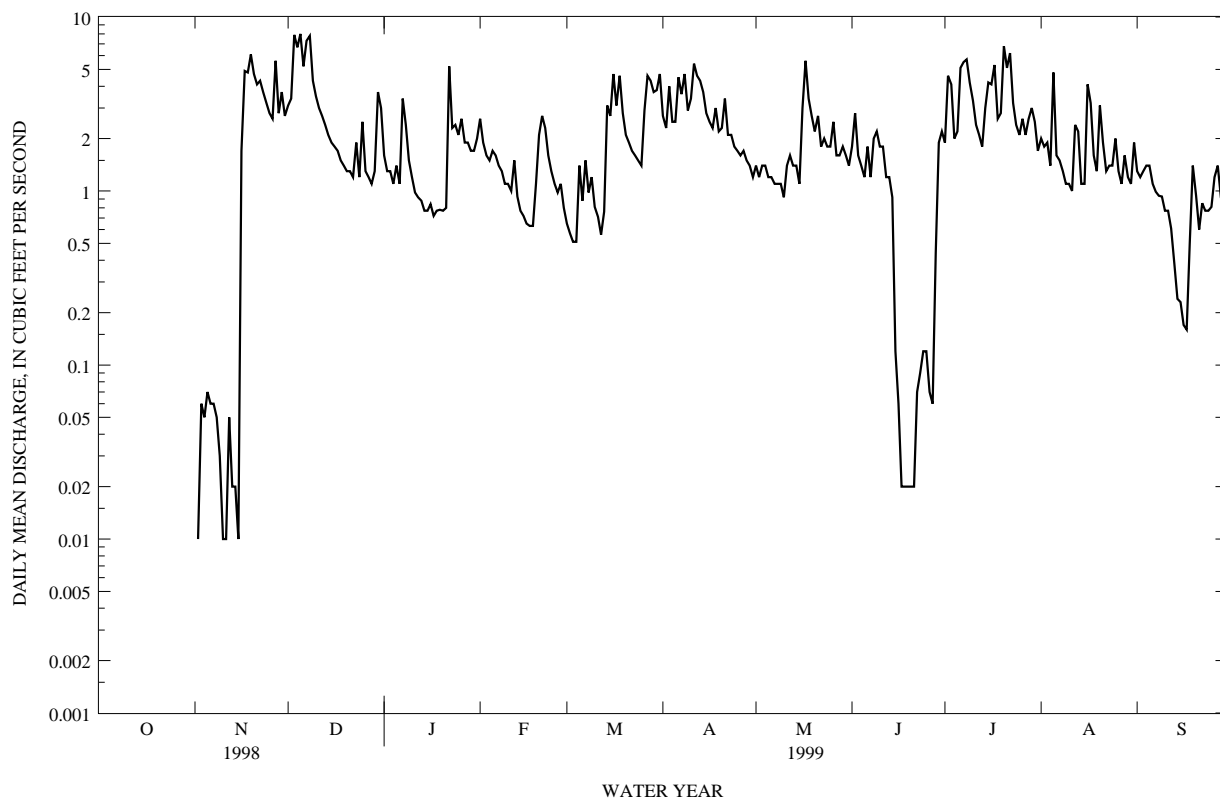
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1938 - 1999, BY WATER YEAR (WY)

MEAN	12.0	5.82	4.29	6.06	8.36	7.32	8.37	9.27	14.7	11.0	11.0	13.9
MAX	37.3	35.7	24.8	31.4	32.3	36.0	34.7	34.4	38.7	36.8	37.0	36.1
(WY)	1951	1951	1984	1946	1991	1947	1954	1954	1953	1953	1970	1950
MIN	.000	.000	.000	.000	.000	.000	.000	.000	.000	.014	.000	.000
(WY)	1999	1938	1991	1939	1938	1939	1939	1963	1938	1980	1964	1989

e Estimated

HAWAII, ISLAND OF KAUAI
16062000 STABLE STORM DITCH NEAR LIHUE--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1938 - 1999	
ANNUAL TOTAL	571.53	665.92		
ANNUAL MEAN	1.57	1.82	9.33	
HIGHEST ANNUAL MEAN			22.1	1984
LOWEST ANNUAL MEAN			.15	1994
HIGHEST DAILY MEAN	11 Apr 2	8.0 Dec 5	71	Apr 3 1948
LOWEST DAILY MEAN	.00 Jan 4	.00 Oct 1	.00	Oct 1 1937
ANNUAL SEVEN-DAY MINIMUM	.00 Jan 9	.00 Oct 1	.00	Oct 1 1937
ANNUAL RUNOFF (AC-FT)	1130	1320	6760	
10 PERCENT EXCEEDS	4.3	4.1	33	
50 PERCENT EXCEEDS	.70	1.4	.29	
90 PERCENT EXCEEDS	.00	.02	.00	



HAWAII, ISLAND OF KAUAI

16068000 EAST BRANCH OF NORTH FORK WAILUA RIVER NEAR LIHUE

LOCATION.--Lat 22°04'19 " , long 159°25'05 " , Hydrologic Unit 20070000, on right bank 1,200 ft upstream from mouth and 7.2 mi northwest of Lihue.

DRAINAGE AREA.--6.27 mi².

PERIOD OF RECORD.--July 1912 to September 1914, December 1914 to March 1915, May 1915 to March 1919, June 1919 to current year. Monthly discharge only for some periods, published in WSP 1319.

REVISED RECORDS.--WSP 770: 1932-33. WSP 1719: 1916. WSP 1937: 1918. WSP 2137: Drainage area.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 500 ft (from topographic map). Prior to December 31, 1914, nonrecording gage at site 725 ft downstream at different datum. December 31, 1914 to May 10, 1934, water-stage recorder at site 75 ft upstream at present datum.

REMARKS.--Records computed by Clayton Yoshida. Records good. No diversion upstream.

AVERAGE DISCHARGE.--84 years (water years 1913-14, 1916-17, 1920-99), 48.3 ft³/s (34,990 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 18,400 ft³/s, November 12, 1955, gage height, 14.7 ft, from floodmarks, from rating curve extended above 2,700 ft³/s; minimum, 6.8 ft³/s, July 3, 13, 1926.

EXTREMES FOR CURRENT YEAR.--Peak discharge greater than base discharge of 1,900 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 7	2100	*1,830	*5.22				

Minimum discharge, 15 ft³/s, May 10, June 15.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

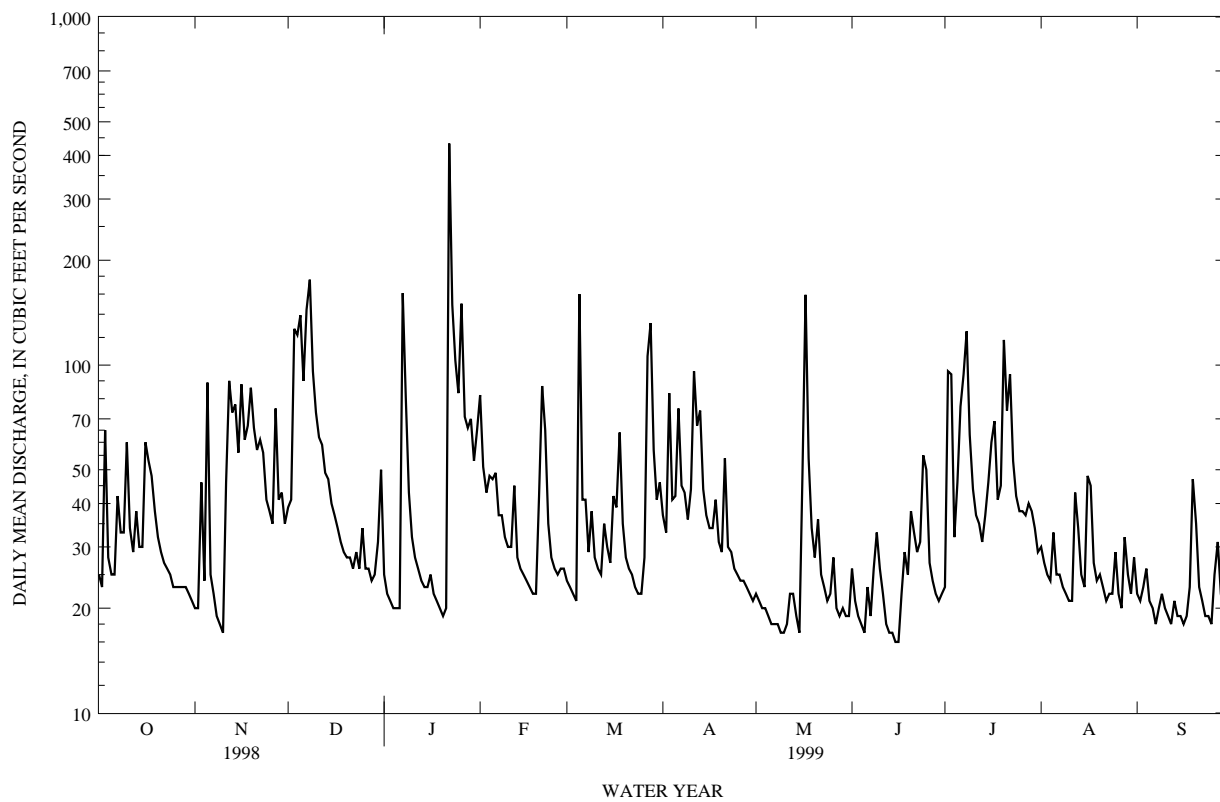
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	25	20	39	25	82	24	37	22	26	23	30	22
2	23	20	41	22	51	23	33	21	21	96	27	21
3	65	46	127	21	43	22	83	20	19	94	25	23
4	28	24	122	20	48	21	41	20	18	32	24	26
5	25	89	139	20	47	160	42	19	17	46	33	21
6	25	25	90	20	49	41	75	18	23	76	25	20
7	42	22	144	161	37	41	45	18	19	94	25	18
8	33	19	176	80	37	29	43	18	26	125	23	20
9	33	18	96	43	32	38	36	17	33	63	22	22
10	60	17	73	32	30	28	44	17	26	44	21	20
11	34	46	62	28	30	26	96	18	22	37	21	19
12	29	90	59	26	45	25	67	22	18	35	43	18
13	38	73	49	24	28	35	74	22	17	31	34	21
14	30	77	47	23	26	30	44	19	17	37	25	19
15	30	56	40	23	25	27	37	17	16	46	23	19
16	60	88	37	25	24	42	34	49	16	60	48	18
17	53	61	34	22	23	39	34	159	22	69	45	19
18	48	67	31	21	22	64	41	54	29	41	27	23
19	38	86	29	20	22	35	31	34	25	45	24	47
20	32	66	28	19	42	28	29	28	38	118	25	35
21	29	57	28	20	87	26	54	36	33	74	23	23
22	27	61	26	433	65	25	30	25	29	94	21	21
23	26	56	29	149	35	23	29	23	31	53	22	19
24	25	41	26	103	28	22	26	21	55	42	22	19
25	23	38	34	83	26	22	25	22	50	38	29	18
26	23	35	26	150	25	28	24	28	27	38	22	25
27	23	75	26	71	26	106	24	20	24	37	20	31
28	23	41	24	66	26	132	23	19	22	40	32	22
29	23	43	25	70	---	57	22	20	21	38	25	19
30	22	35	31	53	---	41	21	19	22	34	22	18
31	21	---	50	65	---	46	---	19	---	29	28	---
TOTAL	1016	1492	1788	1938	1061	1306	1244	864	762	1729	836	666
MEAN	32.8	49.7	57.7	62.5	37.9	42.1	41.5	27.9	25.4	55.8	27.0	22.2
MAX	65	90	176	433	87	160	96	159	55	125	48	47
MIN	21	17	24	19	22	21	21	17	16	23	20	18
AC-FT	2020	2960	3550	3840	2100	2590	2470	1710	1510	3430	1660	1320

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1912 - 1999, BY WATER YEAR (WY)

MEAN	41.6	61.1	60.1	59.3	48.1	56.1	56.6	47.0	33.1	38.7	39.8	36.9
MAX	94.6	226	157	392	197	270	173	144	84.9	78.4	111	112
(WY)	1983	1991	1988	1921	1994	1982	1927	1967	1978	1980	1948	1994
MIN	12.4	16.8	12.3	11.0	8.88	11.0	10.6	9.81	13.0	12.3	11.5	11.9
(WY)	1954	1934	1964	1986	1986	1970	1926	1926	1969	1926	1984	1953

HAWAII, ISLAND OF KAUAI
16068000 EAST BRANCH OF NORTH FORK WAILUA RIVER NEAR LIHUE--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1912 - 1999	
ANNUAL TOTAL	12644		14702			
ANNUAL MEAN	34.6		40.3		48.3	
HIGHEST ANNUAL MEAN					95.5	1982
LOWEST ANNUAL MEAN					21.3	1984
HIGHEST DAILY MEAN	176	Dec 8	433	Jan 22	2570	Feb 13 1994
LOWEST DAILY MEAN	11	Mar 20	16	Jun 15	7.0	Jul 8 1926
ANNUAL SEVEN-DAY MINIMUM	12	Mar 19	18	May 5	8.2	Mar 5 1986
ANNUAL RUNOFF (AC-FT)	25080		29160		34990	
10 PERCENT EXCEEDS	62		74		84	
50 PERCENT EXCEEDS	27		29		31	
90 PERCENT EXCEEDS	15		19		16	



HAWAII, ISLAND OF KAUAI
16069000 WAILUA DITCH NEAR KAPAA

LOCATION.--Lat 22°04'34 " , long 159°24'04 " , Hydrologic Unit 20070000, on right bank 2,000 ft downstream from Wailua Reservoir, 5.2 mi west of Kapaa, and 7.0 mi north of Lihue.

PERIOD OF RECORD.--November 1936 to current year.

GAGE.--Water-stage recorder. Sharp-crested weir since February 4, 1965. Datum of gage is 462.3 ft above mean sea level (by stadia survey).

REMARKS.--Records computed by Roy Taogoshi. Records good. Ditch diverts water from North Fork Wailua River to reservoir, 2,000 ft upstream and thence to fields for irrigation of sugarcane in vicinity of Kapaa.

AVERAGE DISCHARGE.--62 years (water years 1938-99), 15.8 ft³/s (11,480 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 63 ft³/s, June 4, 1937; no flow on many days.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 26 ft³/s, August 17-21, August 28 to September 5; minimum daily, 0.29 ft³/s, December 2.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

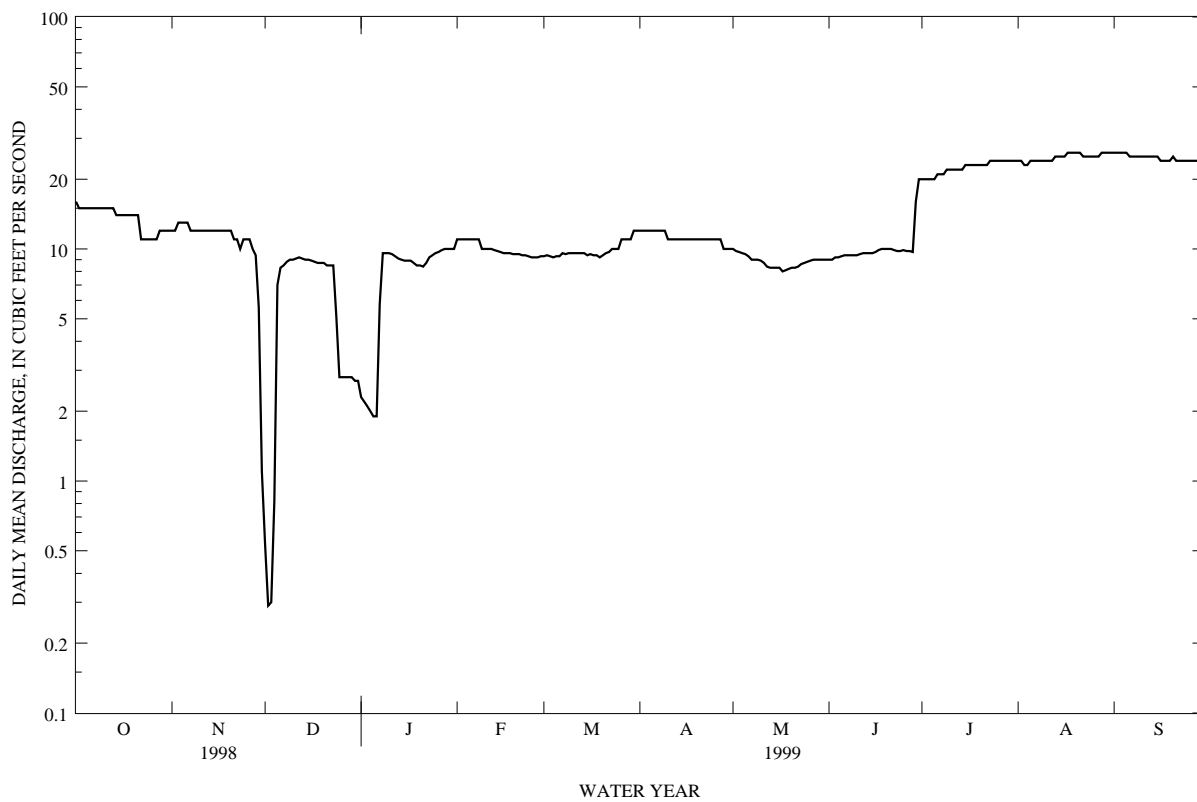
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	12	.53	2.3	11	9.3	12	10	9.0	20	24	26
2	15	12	.29	2.2	11	9.4	12	9.8	9.0	20	24	26
3	15	13	.30	2.1	11	9.3	12	9.7	9.2	20	23	26
4	15	13	.82	2.0	11	9.2	12	9.6	9.2	20	23	26
5	15	13	7.0	1.9	11	9.3	12	9.5	9.3	20	24	26
6	15	13	8.3	1.9	11	9.3	12	9.3	9.4	21	24	25
7	15	12	8.5	5.8	11	9.6	12	9.0	9.4	21	24	25
8	15	12	8.8	9.6	11	9.5	12	9.0	9.4	21	24	25
9	15	12	9.0	9.6	10	9.6	12	9.0	9.4	22	24	25
10	15	12	9.0	9.6	10	9.6	11	8.9	9.4	22	24	25
11	15	12	9.1	9.5	10	9.6	11	8.7	9.5	22	24	25
12	15	12	9.2	9.3	10	9.6	11	8.4	9.6	22	24	25
13	15	12	9.1	9.1	9.9	9.6	11	8.3	9.6	22	25	25
14	14	12	9.0	9.0	9.8	9.6	11	8.3	9.6	22	25	25
15	14	12	9.0	8.9	9.7	9.4	11	8.3	9.6	23	25	25
16	14	12	8.9	8.9	9.6	9.5	11	8.3	9.7	23	25	24
17	14	12	8.8	8.9	9.6	9.4	11	8.0	9.9	23	26	24
18	14	12	8.7	8.7	9.6	9.4	11	8.1	10	23	26	24
19	14	12	8.7	8.5	9.5	9.2	11	8.2	10	23	26	24
20	14	12	8.7	8.5	9.5	9.4	11	8.3	10	23	26	25
21	14	11	8.5	8.4	9.5	9.6	11	8.3	10	23	26	24
22	11	11	8.5	8.7	9.4	9.7	11	8.4	9.9	23	25	24
23	11	10	8.5	9.2	9.4	10	11	8.6	9.8	24	25	24
24	11	11	5.1	9.4	9.3	10	11	8.7	9.8	24	25	24
25	11	11	2.8	9.6	9.2	10	11	8.8	9.9	24	25	24
26	11	11	2.8	9.7	9.2	11	11	8.9	9.8	24	25	24
27	11	10	2.8	9.9	9.2	11	11	9.0	9.8	24	25	24
28	12	9.4	2.8	10	9.3	11	10	9.0	9.7	24	26	24
29	12	5.6	2.8	10	---	11	10	9.0	16	24	26	24
30	12	1.1	2.7	10	---	12	10	9.0	20	24	26	23
31	12	---	2.7	10	---	12	---	9.0	---	24	26	---
TOTAL	422	335.1	191.74	241.2	279.7	306.1	336	273.4	304.9	695	770	740
MEAN	13.6	11.2	6.19	7.78	9.99	9.87	11.2	8.82	10.2	22.4	24.8	24.7
MAX	16	13	9.2	10	11	12	12	10	20	24	26	26
MIN	11	1.1	.29	1.9	9.2	9.2	10	8.0	9.0	20	23	23
AC-FT	837	665	380	478	555	607	666	542	605	1380	1530	1470

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1937 - 1999, BY WATER YEAR (WY)

MEAN	18.6	12.1	9.04	10.5	11.7	12.4	13.3	16.3	20.8	21.8	21.8	22.5
MAX	35.2	28.5	33.3	35.3	37.8	27.3	28.8	40.5	40.0	46.5	48.6	53.5
(WY)	1958	1984	1938	1938	1940	1980	1938	1938	1937	1938	1939	1938
MIN	2.80	.19	.009	.20	.071	.41	.90	1.08	2.29	7.09	5.72	3.89
(WY)	1969	1965	1955	1968	1969	1956	1963	1965	1997	1997	1954	1946

HAWAII, ISLAND OF KAUAI
16069000 WAILUA DITCH NEAR KAPAA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1937 - 1999	
ANNUAL TOTAL	3796.31	4895.14		
ANNUAL MEAN	10.4	13.4	15.8	
HIGHEST ANNUAL MEAN			32.9	1938
LOWEST ANNUAL MEAN			5.95	1997
HIGHEST DAILY MEAN	27 Sep 4	26 Aug 17	63	Jun 4 1937
LOWEST DAILY MEAN	.06 Jul 8	.29 Dec 2	.00	May 15 1940
ANNUAL SEVEN-DAY MINIMUM	.27 Jul 3	2.2 Dec 31	.00	May 15 1940
ANNUAL RUNOFF (AC-FT)	7530	9710	11480	
10 PERCENT EXCEEDS	19	24	30	
50 PERCENT EXCEEDS	7.6	11	15	
90 PERCENT EXCEEDS	5.3	8.5	.93	



HAWAII, ISLAND OF KAUAI
16071000 NORTH FORK WAILUA RIVER NEAR KAPAA

LOCATION.--Lat 22°03'08", long 159°22'22", Hydrologic Unit 20070000, on right bank 1.1 mi upstream from confluence with South Fork, 3.7 mi southwest of Kapaa, and 5.0 mi north of Lihue.

DRAINAGE AREA.--17.9 mi².

PERIOD OF RECORD.--July 1952 to current year.

REVISED RECORDS.--WSP 2137: Drainage area. WDR HI-75-1: 1974.

GAGE.--Water-stage recorder. Elevation of gage is 18 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Clayton Yoshida. Records good. Wailua ditch (station 16069000) diverts water upstream for irrigation of sugarcane in vicinities of Kapaa and Wailua.

AVERAGE DISCHARGE.--47 years (water years 1953-99), 120 ft³/s (86,740 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 53,200 ft³/s, November 12, 1955, gage height, 19.88 ft in gage well, 20.8 ft, from floodmarks, from rating curve extended above 3,700 ft³/s on basis of slope-area measurement of peak flow; minimum, 2.1 ft³/s, October 28, 1953.

EXTREMES FOR CURRENT YEAR.--Peak discharge greater than base discharge of 4,100 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 22	0515	*3,970	*7.23				

Minimum discharge, 9.4 ft³/s, September 30.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

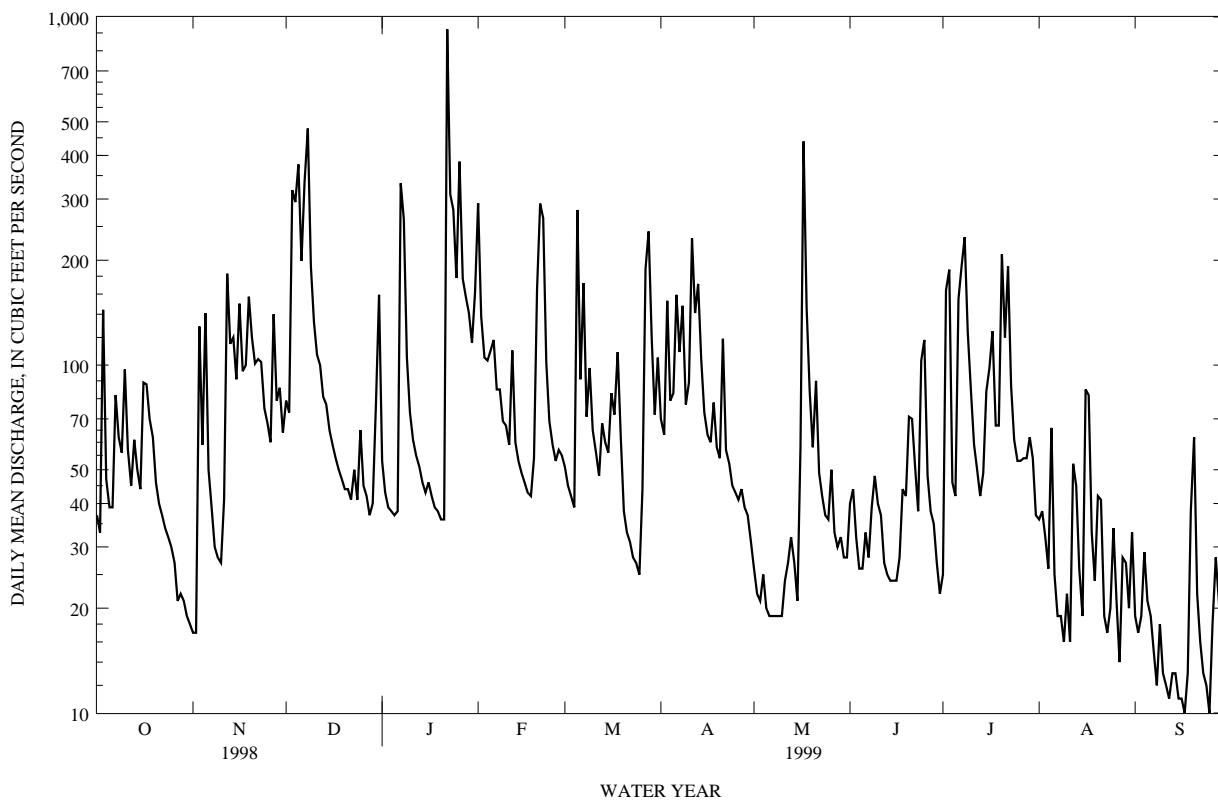
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	37	17	79	53	292	51	70	26	40	25	36	19
2	33	17	73	43	138	45	63	22	44	164	38	17
3	144	129	318	39	105	42	153	21	32	188	32	19
4	47	59	294	38	103	39	79	25	26	46	26	29
5	39	141	377	37	110	279	83	20	26	42	66	21
6	39	50	199	38	118	91	159	19	33	155	25	19
7	82	39	335	333	85	172	109	19	28	192	19	15
8	62	30	478	262	85	71	148	19	39	233	19	12
9	56	28	192	105	69	98	77	19	48	125	16	18
10	97	27	133	73	67	65	89	19	40	84	22	13
11	57	41	107	61	59	56	231	24	37	59	16	12
12	45	183	100	55	110	48	141	27	27	50	52	11
13	61	115	81	51	60	68	171	32	25	42	45	13
14	50	120	77	46	53	60	104	27	24	49	26	13
15	44	91	65	43	49	56	73	21	24	84	19	11
16	89	150	59	46	46	83	63	58	24	98	85	11
17	88	96	54	42	43	72	60	439	28	125	82	10
18	70	100	50	39	42	109	78	146	44	67	33	13
19	62	157	47	38	54	62	58	84	42	67	24	38
20	46	120	44	36	165	38	54	58	71	208	42	62
21	40	101	44	36	291	33	119	90	70	120	41	22
22	37	104	41	922	264	31	57	49	51	192	19	16
23	34	102	50	309	102	28	52	42	38	87	17	13
24	32	75	41	279	69	27	45	37	103	61	20	12
25	30	68	65	178	59	25	43	36	118	53	34	10
26	27	60	45	384	53	44	41	50	48	53	21	18
27	21	140	42	177	57	189	44	33	38	54	14	28
28	22	79	37	157	55	242	39	30	35	54	28	21
29	21	86	40	141	---	120	37	32	27	62	27	13
30	19	64	78	116	---	72	31	28	22	54	20	10
31	18	---	159	162	---	105	---	28	---	37	33	---
TOTAL	1549	2589	3804	4339	2803	2521	2571	1580	1252	2930	997	539
MEAN	50.0	86.3	123	140	100	81.3	85.7	51.0	41.7	94.5	32.2	18.0
MAX	144	183	478	922	292	279	231	439	118	233	85	62
MIN	18	17	37	36	42	25	31	19	22	25	14	10
AC-FT	3070	5140	7550	8610	5560	5000	5100	3130	2480	5810	1980	1070

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1999, BY WATER YEAR (WY)

MEAN	98.7	186	166	147	129	142	149	116	63.0	89.4	85.2	63.1
MAX	255	591	459	529	522	730	474	418	247	230	223	273
(WY)	1983	1991	1993	1956	1979	1982	1971	1967	1980	1980	1958	1994
MIN	2.54	19.1	7.74	6.90	4.43	4.76	15.0	11.8	5.78	5.22	5.80	3.17
(WY)	1954	1977	1984	1986	1978	1978	1966	1992	1957	1953	1984	1953

HAWAII, ISLAND OF KAUAI
16071000 NORTH FORK WAILUA RIVER NEAR KAPAA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1952 - 1999	
ANNUAL TOTAL	22681.5		27474			
ANNUAL MEAN	62.1		75.3		120	
HIGHEST ANNUAL MEAN					262	
LOWEST ANNUAL MEAN					25.7	
HIGHEST DAILY MEAN	478	Dec 8	922	Jan 22	7350	Jan 25 1956
LOWEST DAILY MEAN	9.5	Aug 20	10	Sep 17	2.2	Oct 21 1953
ANNUAL SEVEN-DAY MINIMUM	13	Mar 18	12	Sep 11	2.4	Oct 20 1953
ANNUAL RUNOFF (AC-FT)	44990		54490		86740	
10 PERCENT EXCEEDS	122		158		251	
50 PERCENT EXCEEDS	44		50		66	
90 PERCENT EXCEEDS	17		19		8.6	



HAWAII, ISLAND OF KAUAI

16071500 LEFT BRANCH OPAEKAA STREAM NEAR KAPAA

LOCATION.--Lat 22°04'44 " , long 159°23'55 " , Hydrologic Unit 20070000, on left bank 0.4 mi upstream from mouth, 0.6 mi northeast of Wailua Reservoir, and 4.9 mi west of Kapaa.

DRAINAGE AREA.--0.65 mi².

PERIOD OF RECORD.--May 1960 to current year. Prior to July 1960, published as Left Branch Opaikaa Stream near Kapaa.

REVISED RECORDS.--WSP 2137: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 458.4 ft above mean sea level (by stadia survey).

REMARKS.--Records computed by Roy Taogoshi. Records good. Recording rain gage located at station.

AVERAGE DISCHARGE.--39 years (water years 1961-99), 2.61 ft³/s (1,890 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,060 ft³/s, December 14, 1991, gage height, 6.60 ft, from rating curve extended above 415 ft³/s on basis of slope-area measurement at gage height 5.01 ft; minimum, 0.09 ft³/s, September 27-30, 1968.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 70 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 07	2045	*142	*2.96	Jan. 22	1000	84	2.45

Minimum discharge, 0.72 ft³/s October 1-7.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

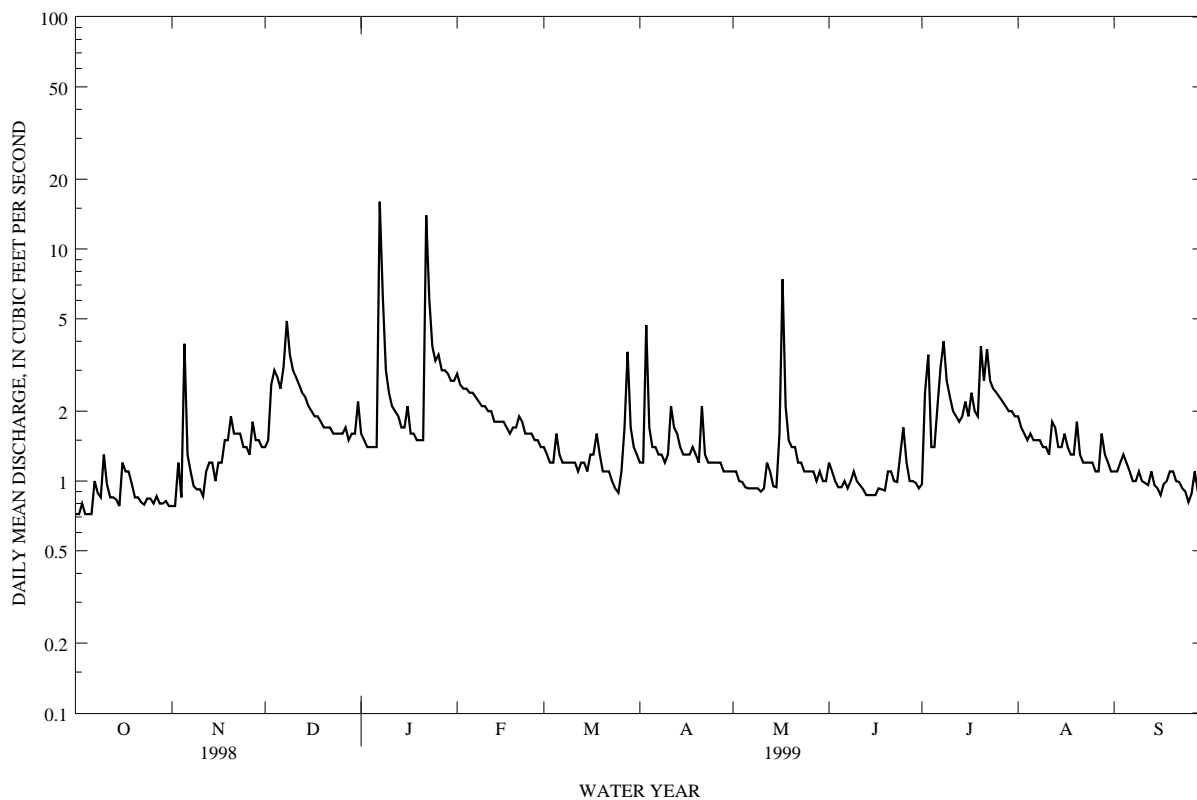
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.72	.78	1.4	1.6	2.9	1.4	1.2	1.1	1.2	.97	1.9	1.1
2	.72	.78	1.5	1.5	2.6	1.3	1.2	1.1	1.1	2.4	1.7	1.1
3	.80	1.2	2.6	1.4	2.5	1.2	4.7	1.0	1.0	3.5	1.6	1.2
4	.72	.85	3.0	1.4	2.5	1.2	1.7	.99	.94	1.4	1.5	1.3
5	.72	3.9	2.8	1.4	2.4	1.6	1.4	.94	.94	1.4	1.6	1.2
6	.72	1.3	2.5	1.4	2.4	1.3	1.4	.93	1.0	2.1	1.5	1.1
7	1.0	1.1	3.1	1.6	2.3	1.2	1.3	.93	.93	3.1	1.5	1.0
8	.89	.95	4.9	6.2	2.2	1.2	1.3	.93	1.0	4.0	1.5	1.0
9	.85	.92	3.5	3.0	2.1	1.2	1.2	.93	1.1	2.7	1.4	1.1
10	1.3	.92	3.0	2.4	2.1	1.2	1.3	.90	1.0	2.3	1.4	1.0
11	.97	.86	2.8	2.1	2.0	1.2	2.1	.93	.96	2.0	1.3	.98
12	.85	1.1	2.6	2.0	2.0	1.1	1.7	1.2	.92	1.9	1.8	.96
13	.85	1.2	2.4	1.9	1.8	1.2	1.6	1.1	.87	1.8	1.7	1.1
14	.83	1.2	2.3	1.7	1.8	1.2	1.4	.95	.87	1.9	1.4	.96
15	.78	1.0	2.1	1.7	1.8	1.1	1.3	.94	.87	2.2	1.4	.93
16	1.2	1.2	2.0	2.1	1.8	1.3	1.3	1.6	.87	1.9	1.6	.87
17	1.1	1.2	1.9	1.6	1.7	1.3	1.3	7.4	.93	2.4	1.4	.97
18	1.1	1.5	1.9	1.6	1.6	1.6	1.4	2.1	.92	2.0	1.3	1.0
19	.97	1.5	1.8	1.5	1.7	1.3	1.3	1.5	.91	1.9	1.3	1.1
20	.85	1.9	1.7	1.5	1.7	1.1	1.2	1.4	1.1	3.8	1.8	1.1
21	.85	1.6	1.7	1.5	1.9	1.1	2.1	1.4	1.1	2.7	1.3	1.0
22	.81	1.6	1.7	1.4	1.8	1.1	1.3	1.2	1.0	3.7	1.2	.99
23	.79	1.6	1.6	6.1	1.6	1.0	1.2	1.2	.99	2.7	1.2	.93
24	.84	1.4	1.6	3.8	1.6	.93	1.2	1.1	1.3	2.5	1.2	.90
25	.84	1.4	1.6	3.3	1.6	.89	1.2	1.1	1.7	2.4	1.2	.81
26	.80	1.3	1.6	3.5	1.5	1.1	1.2	1.1	1.2	2.3	1.1	.88
27	.86	1.8	1.7	3.0	1.5	1.7	1.2	1.1	1.0	2.2	1.1	1.1
28	.80	1.5	1.5	3.0	1.4	3.6	1.1	1.0	1.0	2.1	1.6	.90
29	.80	1.5	1.6	2.9	---	1.7	1.1	1.1	.98	2.0	1.3	.81
30	.82	1.4	1.6	2.7	---	1.4	1.1	1.0	.93	2.0	1.2	.81
31	.78	---	2.2	2.7	---	1.3	---	1.0	---	1.9	1.1	---
TOTAL	26.93	40.46	68.2	100.5	54.8	41.02	44.0	41.17	30.63	72.17	44.1	30.20
MEAN	.87	1.35	2.20	3.24	1.96	1.32	1.47	1.33	1.02	2.33	1.42	1.01
MAX	1.3	3.9	4.9	16	2.9	3.6	4.7	7.4	1.7	4.0	1.9	1.3
MIN	.72	.78	1.4	1.4	1.4	.89	1.1	.90	.87	.97	1.1	.81
AC-FT	53	80	135	199	109	81	87	82	61	143	87	60

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1960 - 1999, BY WATER YEAR (WY)

	1961	1966	1992	1989	1994	1982	1965	1980	1989	1982	1980	
MEAN	2.23	3.95	3.81	3.23	2.59	2.82	3.18	2.78	1.82	1.71	1.65	1.57
MAX	8.29	14.3	11.0	12.4	10.8	14.7	11.8	9.66	5.68	3.80	4.24	4.67
(WY)	1961	1966	1992	1989	1994	1982	1965	1980	1989	1982	1980	1980
MIN	.42	.59	.56	.58	.50	.50	.73	.62	.29	.59	.36	.38
(WY)	1985	1964	1963	1977	1986	1978	1998	1966	1968	1968	1984	1975

HAWAII, ISLAND OF KAUAI
16071500 LEFT BRANCH OPAEKAA STREAM NEAR KAPAA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1960 - 1999	
ANNUAL TOTAL	428.10	594.18		
ANNUAL MEAN	1.17	1.63	2.61	
HIGHEST ANNUAL MEAN			5.72	1982
LOWEST ANNUAL MEAN			.92	1984
HIGHEST DAILY MEAN	5.4 Jan 1	16 Jan 7	218	Dec 14 1991
LOWEST DAILY MEAN	.61 Mar 24	.72 Oct 1	.09	Sep 28 1968
ANNUAL SEVEN-DAY MINIMUM	.62 May 2	.77 Oct 1	.10	Jun 6 1968
ANNUAL RUNOFF (AC-FT)	849	1180	1890	
10 PERCENT EXCEEDS	1.8	2.5	4.4	
50 PERCENT EXCEEDS	.96	1.3	1.7	
90 PERCENT EXCEEDS	.71	.89	.69	



HAWAII, ISLAND OF KAUAI
16079000 KAPAHI DITCH NEAR KEALIA

LOCATION.--Lat 22°06'09 " , long 159°22'28 " , Hydrologic Unit 20070000, on right bank 500 ft downstream from intake, and 4.0 mi west of Kealia.

PERIOD OF RECORD.--April 1909 to February 1911, May 1911, July 1911 to May 1914, July 1915 to April 1917, June 1917 to current year.
Published as "at Kapahi, near Kapaa" prior to January 1914 and as "at Kapahi, near Kealia" January to December 1913.

GAGE.--Water-stage recorder and Parshall flume. Datum of gage is 377.1 ft above mean sea level (by stadia survey). Prior to November 26, 1936, at site 61 ft upstream at datum 2.52 ft higher.

REMARKS.--Records computed by Clayton Yoshida. Records good. Ditch diverts water from Kapaa Stream for irrigation of sugarcane in vicinity of Kapaa.

AVERAGE DISCHARGE.--81 years (water years 1918-20, 1922-99), 6.22 ft³/s (4,500 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 138 ft³/s, February 6, 1913; no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 17 ft³/s, May 17; minimum daily, 0.55 ft³/s, November 20.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

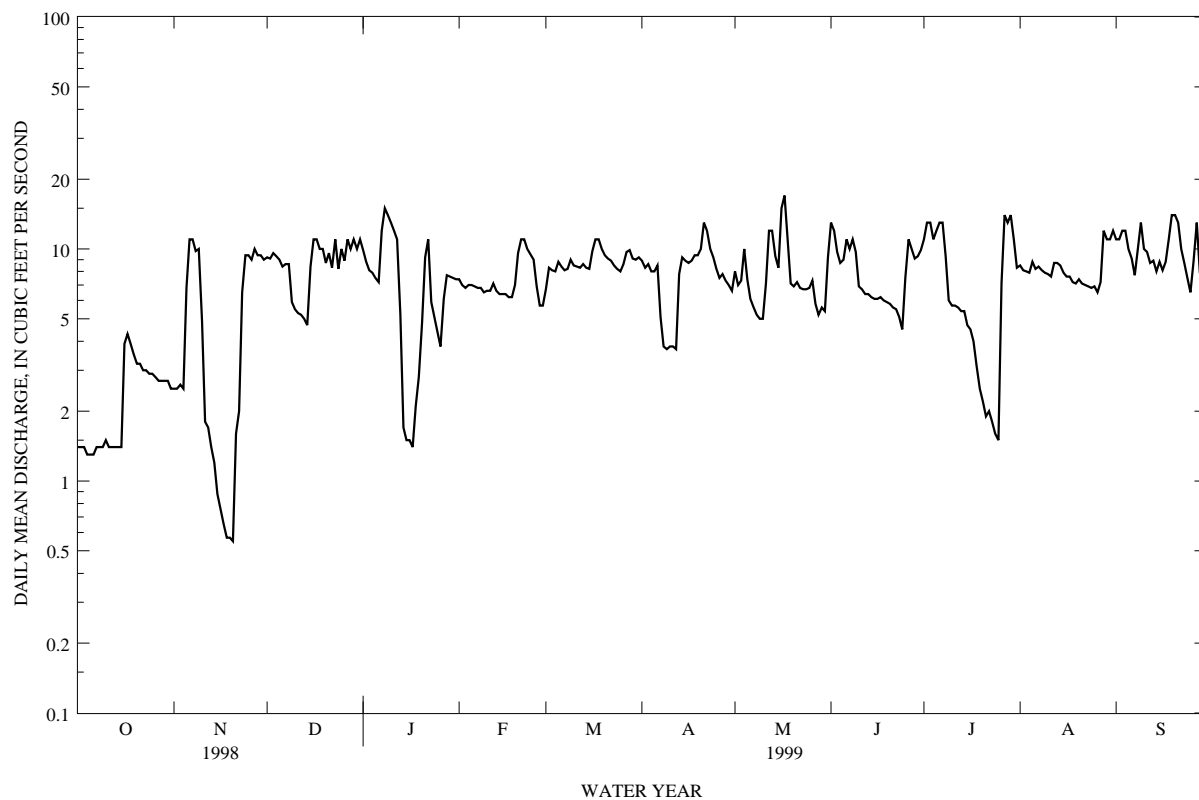
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.4	2.5	9.2	9.9	7.4	6.7	8.9	8.0	13	11	8.5	11
2	1.4	2.5	9.1	8.8	7.0	8.3	8.3	7.0	12	13	8.1	11
3	1.4	2.6	9.6	8.1	6.8	8.1	8.6	7.3	9.7	13	8.0	12
4	1.3	2.5	9.3	7.9	7.0	8.0	8.0	10	8.7	11	7.9	12
5	1.3	6.8	9.0	7.5	7.0	8.8	8.0	7.4	9.0	12	8.8	10
6	1.3	11	8.4	7.2	6.9	8.4	8.5	6.1	11	13	8.2	9.1
7	1.4	11	8.6	12	6.8	8.1	5.1	5.6	10	13	8.4	7.7
8	1.4	9.8	8.6	15	6.8	8.2	3.8	5.2	11	9.3	8.1	10
9	1.4	10	5.9	14	6.5	9.0	3.7	5.0	9.7	6.0	7.9	13
10	1.5	4.9	5.5	13	6.6	8.5	3.8	5.0	6.9	5.7	7.8	10
11	1.4	1.8	5.3	12	6.6	8.4	3.8	7.1	6.7	5.7	7.6	9.7
12	1.4	1.7	5.2	11	7.1	8.3	3.7	12	6.4	5.6	8.7	8.7
13	1.4	1.4	5.0	5.2	6.6	8.6	7.8	12	6.4	5.4	8.7	8.9
14	1.4	1.2	4.7	1.7	6.4	8.3	9.2	9.3	6.2	5.4	8.5	8.0
15	1.4	.88	8.4	1.5	6.4	8.2	8.9	8.3	6.1	4.7	7.9	8.8
16	3.9	.76	11	1.5	6.4	9.8	8.7	15	6.1	4.5	7.6	8.1
17	4.3	.65	11	1.4	6.2	11	8.9	17	6.2	4.0	7.6	8.8
18	3.9	.57	10	2.1	6.2	11	9.4	11	6.0	3.1	7.2	11
19	3.5	.57	10	2.8	7.0	10	9.4	7.1	5.9	2.5	7.1	14
20	3.2	.55	8.7	4.8	9.6	9.4	10	6.9	5.8	2.2	7.4	14
21	3.2	1.6	9.6	9.2	11	9.1	13	7.2	5.6	1.9	7.1	13
22	3.0	2.0	8.3	11	11	8.9	12	6.8	5.5	2.0	7.0	10
23	3.0	6.5	11	5.9	10	8.5	10	6.7	5.1	1.8	6.9	8.7
24	2.9	9.4	8.2	5.1	9.5	8.2	9.2	6.7	4.5	1.6	6.8	7.5
25	2.9	9.4	10	4.4	9.0	8.0	8.2	6.8	7.5	1.5	6.9	6.5
26	2.8	9.0	8.9	3.8	6.9	8.6	7.5	7.3	11	7.1	6.5	8.8
27	2.7	10	11	6.1	5.7	9.7	7.8	5.8	10	14	7.2	13
28	2.7	9.4	10	7.7	5.7	9.9	7.3	5.2	9.1	13	12	7.9
29	2.7	9.4	11	7.6	---	9.1	7.0	5.6	9.3	14	11	7.6
30	2.7	9.0	10	7.5	---	9.0	6.6	5.4	9.9	11	11	7.1
31	2.5	---	11	7.4	---	9.2	---	9.2	---	8.3	12	---
TOTAL	70.7	149.38	271.5	223.1	206.1	273.3	235.1	245.0	240.3	226.3	254.4	295.9
MEAN	2.28	4.98	8.76	7.20	7.36	8.82	7.84	7.90	8.01	7.30	8.21	9.86
MAX	4.3	11	11	15	11	11	13	17	13	14	12	14
MIN	1.3	.55	4.7	1.4	5.7	6.7	3.7	5.0	4.5	1.5	6.5	6.5
AC-FT	140	296	539	443	409	542	466	486	477	449	505	587

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1918 - 1999, BY WATER YEAR (WY)

MEAN	5.96	5.12	4.66	4.48	4.91	5.67	6.52	7.70	7.58	8.13	8.42	7.00
MAX	26.0	21.8	27.5	22.9	19.4	22.6	21.2	28.0	26.1	33.6	30.0	25.8
(WY)	1919	1919	1922	1918	1919	1919	1922	1918	1918	1918	1918	1920
MIN	.27	.044	.073	.012	.042	.22	.27	.32	1.57	1.66	1.88	.72
(WY)	1961	1952	1949	1943	1956	1968	1945	1965	1962	1987	1995	1946

HAWAII, ISLAND OF KAUAI
16079000 KAPAHI DITCH NEAR KEALIA--Continued

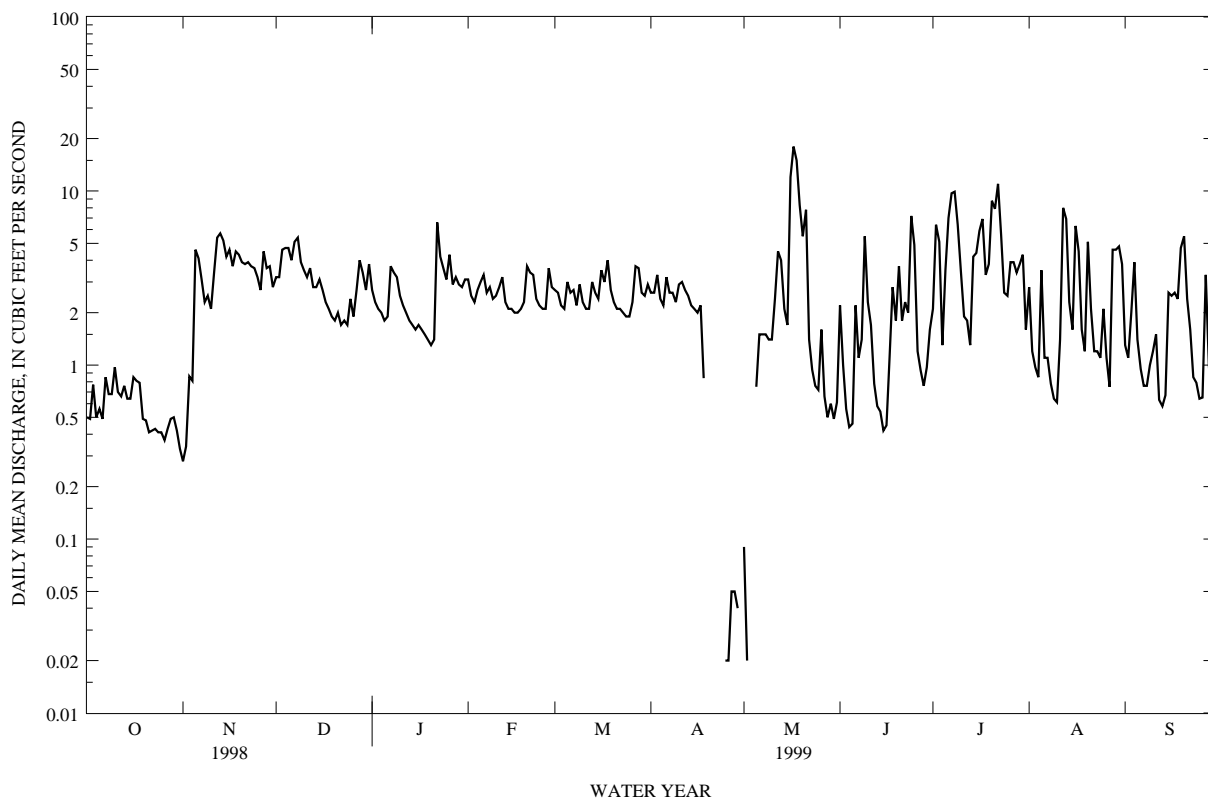
SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1918 - 1999	
ANNUAL TOTAL	2360.12	2691.08		
ANNUAL MEAN	6.47	7.37	6.22	
HIGHEST ANNUAL MEAN			21.0	1918
LOWEST ANNUAL MEAN			2.23	1965
HIGHEST DAILY MEAN	17	17	94	Oct 25 1926
LOWEST DAILY MEAN	.55	.55	.00	Jun 4 1922
ANNUAL SEVEN-DAY MINIMUM	.74	.74	.00	Nov 13 1925
ANNUAL RUNOFF (AC-FT)	4680	5340	4500	
10 PERCENT EXCEEDS	11	11	15	
50 PERCENT EXCEEDS	6.9	7.8	4.6	
90 PERCENT EXCEEDS	1.4	2.1	.25	



HAWAII, ISLAND OF KAUAI

16088000 ANAHOLA DITCH ABOVE KANEHA RESERVOIR, NEAR KEALIA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	FOR 1998 WATER YEAR	FOR 1999 WATER YEAR	FOR 1998 WATER YEAR	FOR 1999 WATER YEAR	FOR 1998 WATER YEAR	FOR 1999 WATER YEAR	FOR 1998 WATER YEAR	FOR 1999 WATER YEAR
ANNUAL TOTAL	723.66		925.46							
ANNUAL MEAN	1.98		2.54		4.11					
HIGHEST ANNUAL MEAN					8.00				1987	
LOWEST ANNUAL MEAN					.13				1992	
HIGHEST DAILY MEAN	5.9	Jan 1	18	May 17	62				Nov 12	1947
LOWEST DAILY MEAN	.28	Nov 1	.00	Apr 19	.00				Dec 11	1923
ANNUAL SEVEN-DAY MINIMUM	.40	Oct 27	.02	Apr 19	.00				Dec 15	1923
ANNUAL RUNOFF (AC-FT)	1440		1840		2980					
10 PERCENT EXCEEDS	3.4		4.6		10					
50 PERCENT EXCEEDS	1.7		2.2		2.8					
90 PERCENT EXCEEDS	.83		.49		.03					



HAWAII, ISLAND OF KAUAI

16097500 HALAULANI STREAM AT ALTITUDE 400 FT, NEAR KILAUEA

LOCATION.--Lat 22°10'54 " , long 159°25'17 " , Hydrologic Unit 20070000, on left bank 0.5 mi upstream from confluence with Pohakuhono Stream, and 2.3 mi south of Kilauea.

DRAINAGE AREA.--1.19 mi², revised (Drainage area of 1.9 mi² published in the data report for water years 1977-94 was in error; the correct figure is 1.19 mi²).

PERIOD OF RECORD.--November 1957 to current year.

REVISED RECORDS.--WSP 2137: Drainage area. WDR HI-95-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 391.8 ft above mean sea level (by stadia survey).

REMARKS.--Records computed by Clayton Yoshida. Records good.

AVERAGE DISCHARGE.--41 years (water years 1959-99), 11.9 ft³/s (8,640 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,140 ft³/s, February 13, 1994, gage height, 9.76 ft; minimum, 1.8 ft³/s, September 6-8, 1968.

EXTREMES FOR CURRENT YEAR.--Peak discharge greater than base discharge of 580 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Nov. 5	0745	*871	*5.20	No other peak greater than base discharge.			

Minimum discharge, 4.1 ft³/s, June 15, 16.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.7	4.9	7.6	9.1	19	8.8	7.3	5.0	4.9	4.8	6.4	5.4
2	5.7	5.2	7.8	7.1	9.8	7.2	6.9	4.9	4.6	12	5.6	5.2
3	8.8	11	18	6.6	7.9	6.3	18	4.9	4.6	9.2	5.3	5.9
4	6.0	14	20	6.3	7.3	6.0	7.5	4.8	4.5	5.5	5.2	7.2
5	5.8	71	18	6.0	9.6	6.3	6.6	4.7	4.6	13	5.8	6.4
6	6.0	8.7	16	5.8	10	6.1	11	4.7	4.9	12	5.3	5.5
7	10	6.7	28	17	8.2	6.2	7.3	4.6	4.6	15	5.2	5.4
8	7.5	6.1	32	12	8.4	5.7	6.9	4.6	4.9	21	4.9	5.1
9	8.6	7.2	15	11	6.9	6.5	6.4	4.6	6.8	14	4.8	5.0
10	12	5.8	11	7.1	6.6	5.8	11	4.5	6.0	9.1	4.8	5.3
11	7.3	8.1	9.0	6.3	8.3	5.6	17	4.7	5.3	7.0	4.8	4.8
12	6.5	9.3	8.6	6.0	10	5.9	18	4.6	4.6	6.4	16	4.7
13	8.4	16	7.6	5.9	6.7	7.9	13	4.6	4.4	6.1	17	5.0
14	6.6	12	7.2	5.7	6.2	6.4	8.1	4.4	4.4	6.3	7.0	4.9
15	6.4	7.7	7.9	5.6	6.0	6.4	7.0	4.7	4.2	7.3	6.1	5.3
16	10	9.9	7.0	5.5	5.9	7.8	6.6	15	4.2	7.5	13	5.5
17	20	7.5	6.4	5.4	5.7	7.1	6.7	18	4.5	11	9.9	5.6
18	13	17	6.2	5.3	5.7	11	8.8	25	4.8	7.0	6.8	5.4
19	9.2	14	5.9	5.2	5.7	7.2	6.5	8.6	4.8	7.7	6.1	6.0
20	7.3	11	5.8	5.1	21	6.1	6.2	6.5	6.0	24	6.1	8.7
21	6.6	9.4	5.8	5.1	20	5.7	8.1	8.1	5.2	13	5.5	6.1
22	6.3	9.8	5.6	89	18	5.6	6.1	6.0	5.3	19	5.2	6.0
23	6.0	8.2	5.5	28	8.5	5.4	5.9	5.5	5.5	9.1	5.0	5.2
24	5.8	7.3	5.4	19	7.0	5.3	5.6	5.2	11	7.7	5.2	5.0
25	5.6	6.8	6.2	14	6.5	5.2	5.5	5.3	9.7	7.0	5.8	4.8
26	5.5	6.6	5.5	28	6.2	6.1	5.4	5.6	5.8	6.8	5.2	4.7
27	5.7	17	6.0	13	14	17	5.3	5.0	5.2	7.0	5.0	6.9
28	5.6	8.8	59	11	8.2	22	5.1	4.8	4.8	7.0	6.1	5.3
29	5.3	8.0	12	9.9	---	9.5	5.1	4.9	5.0	9.1	7.1	4.8
30	5.2	7.4	12	10	---	8.0	5.0	4.7	4.8	7.7	6.4	4.6
31	5.0	---	22	13	---	9.5	---	4.7	---	6.3	6.5	---
TOTAL	233.4	342.4	390.0	384.0	263.3	235.6	243.9	203.2	159.9	305.6	209.1	165.7
MEAN	7.53	11.4	12.6	12.4	9.40	7.60	8.13	6.55	5.33	9.86	6.75	5.52
MAX	20	71	59	89	21	22	18	25	11	24	17	8.7
MIN	5.0	4.9	5.4	5.1	5.7	5.2	5.0	4.4	4.2	4.8	4.8	4.6
AC-FT	463	679	774	762	522	467	484	403	317	606	415	329

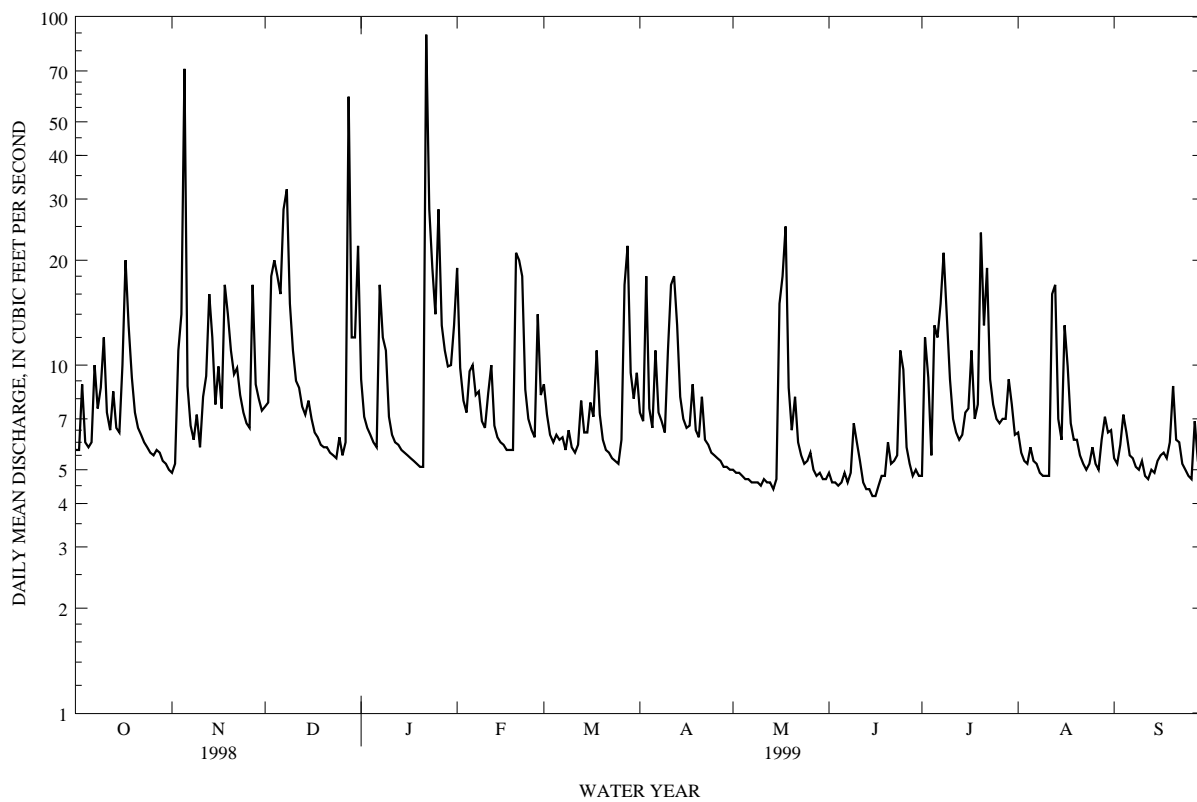
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1958 - 1999, BY WATER YEAR (WY)

MEAN	10.3	16.6	14.0	11.8	11.4	13.5	15.0	12.1	8.58	11.3	10.2	8.41
MAX	24.6	49.7	43.1	28.4	54.8	42.7	35.1	22.5	29.1	27.1	23.7	15.7
(WY)	1983	1996	1988	1989	1994	1982	1971	1965	1978	1989	1991	1994
MIN	4.40	5.73	3.79	3.45	3.20	4.15	5.06	5.62	4.27	5.05	3.95	3.93
(WY)	1985	1977	1986	1986	1986	1995	1992	1995	1959	1975	1973	1975

HAWAII, ISLAND OF KAUAI

16097500 HALAULANI STREAM AT ALTITUDE 400 FT, NEAR KILAUEA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1958 - 1999	
ANNUAL TOTAL	3415.2	3136.1		
ANNUAL MEAN	9.36	8.59	11.9	
HIGHEST ANNUAL MEAN			19.6	1982
LOWEST ANNUAL MEAN			7.01	1984
HIGHEST DAILY MEAN	71	89	879	Feb 13 1994
LOWEST DAILY MEAN	3.8	4.2	1.9	Sep 5 1968
ANNUAL SEVEN-DAY MINIMUM	3.8	4.4	2.4	Sep 2 1968
ANNUAL RUNOFF (AC-FT)	6770	6220	8640	
10 PERCENT EXCEEDS	16	15	21	
50 PERCENT EXCEEDS	6.9	6.4	7.5	
90 PERCENT EXCEEDS	4.7	4.8	4.6	



HAWAII, ISLAND OF KAUAI
16103000 HANAIEI RIVER NEAR HANAIEI

LOCATION.--Lat 22°11'31 " , long 159°27'57 " , Hydrologic Unit 20070000, on right bank 2.6 mi southeast of Hanalei School, and 4.9 mi upstream from mouth.

DRAINAGE AREA.--19.1 mi².

PERIOD OF RECORD.--January 1912 to November 1919, water years 1962-63 (annual maximum), December 1962 to current year.

REVISED RECORDS.--WSP 1937: Drainage area. WSP 2137: 1962(M), 1963-65(P). WDR HI-77-1: 1970-76(M), 1975-76.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 35.8 ft above mean sea level (by stadia survey). January 1, 1912 to November 20, 1919, nonrecording gage at site 0.2 mi upstream at different datum. January 26 to December 26, 1962, crest-stage gage at present site and datum.

REMARKS.--Records computed by Clayton Yoshida. Records fair except for flows greater than 300 ft³/s, which are poor. No diversion upstream. Hanalei Tunnel diverted water upstream between 1925 and 1992.

AVERAGE DISCHARGE (since diversion to Hanalei tunnel)--36 years (water years 1964-99), 214 ft³/s (155,200 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 44,600 ft³/s, November 3, 1995, gage height, 15.81 ft, from rating curve extended above 9,600 ft³/s on basis of slope-area measurements at gage height 14.66 ft and two-section slope-area estimate at gage height 15.81 ft; minimum, 31 ft³/s, September 30, October 1, 2, 5, 12, 13, November 3, 1975.

EXTREMES FOR CURRENT YEAR.--Peak discharge greater than base discharge of 9,200 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 22	0445	*16,100	*12.11	No other peak greater than base discharge.			
Minimum discharge, 71 ft ³ /s, February 9.							

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

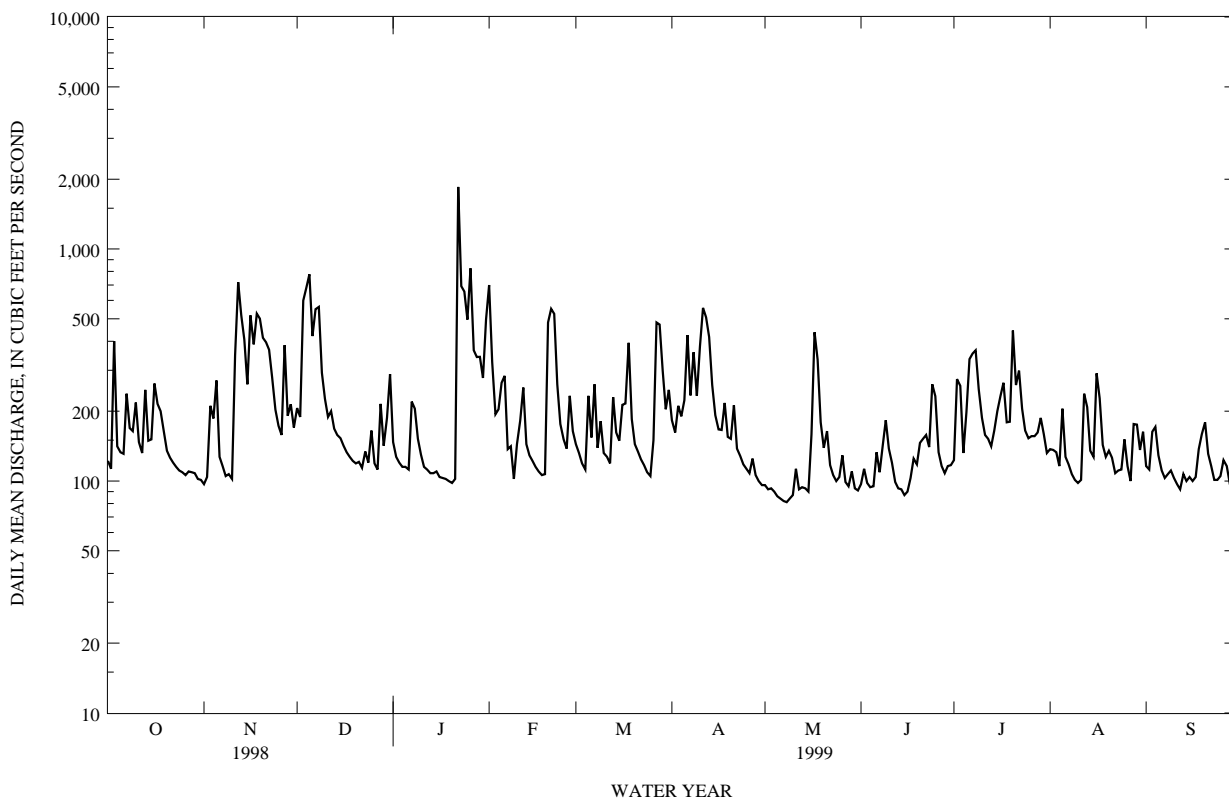
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	122	97	206	147	700	144	183	96	97	123	137	116
2	113	104	189	127	326	132	162	92	113	275	136	112
3	401	211	599	120	194	119	211	93	98	257	133	163
4	141	186	681	115	204	112	190	90	94	132	116	171
5	133	271	778	115	265	233	223	86	95	198	205	129
6	131	127	421	112	284	154	425	84	133	335	127	111
7	238	116	550	220	137	261	234	82	109	354	118	103
8	169	105	563	205	141	139	359	81	142	366	107	107
9	164	107	293	152	102	181	233	84	183	249	101	111
10	218	102	226	130	144	132	380	87	138	187	98	103
11	147	348	189	115	182	127	557	113	120	158	101	97
12	132	719	200	112	253	119	508	92	99	152	238	92
13	247	519	168	108	144	230	417	94	93	141	208	107
14	149	407	158	108	129	162	259	93	92	165	135	100
15	151	261	153	110	122	149	192	90	87	200	127	104
16	263	518	142	104	115	213	167	159	90	232	291	100
17	215	388	133	103	110	216	166	438	103	265	227	104
18	200	526	127	102	106	394	217	333	125	179	143	137
19	163	501	122	100	107	185	155	179	118	180	127	159
20	135	414	119	98	482	144	152	139	146	445	135	179
21	126	396	121	102	552	134	212	164	152	259	126	131
22	120	368	114	1850	525	124	138	117	158	299	108	116
23	115	279	134	691	261	117	128	106	140	205	111	101
24	111	203	120	655	176	109	118	100	261	165	112	101
25	109	173	165	496	151	105	113	104	232	153	151	105
26	106	158	119	825	138	150	108	129	133	156	116	123
27	110	385	112	366	233	482	125	99	116	156	100	116
28	109	191	215	342	164	472	106	95	108	162	176	97
29	108	214	142	343	---	299	100	110	116	187	175	88
30	102	170	187	278	---	204	96	93	117	159	136	86
31	101	---	289	497	---	247	---	91	---	132	163	---
TOTAL	4849	8564	7735	8948	6447	5989	6634	3813	3808	6626	4484	3469
MEAN	156	285	250	289	230	193	221	123	127	214	145	116
MAX	401	719	778	1850	700	482	557	438	261	445	291	179
MIN	101	97	112	98	102	105	96	81	87	123	98	86
AC-FT	9620	16990	15340	17750	12790	11880	13160	7560	7550	13140	8890	6880

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1962 - 1999, BY WATER YEAR (WY)

	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999																	
MEAN	182	309	244	220	221	268	290	216	147	187	158	143	466	793	596	614	616	1096	781	626	568	418	413	523	1983	1991	1968	1989	1989	1982	1994	44.0	72.8	59.6	49.5	42.8	56.4	76.3	73.5	57.5	62.6	42.1	35.7	1985	1964	1984	1986	1978	1970	1966	1984	1975	1984	1973	1975

HAWAII, ISLAND OF KAUAI
16103000 HANAIEI RIVER NEAR HANAIEI--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1962 - 1999	
ANNUAL TOTAL	69256		71366			
ANNUAL MEAN	190		196		214	
HIGHEST ANNUAL MEAN					408	1982
LOWEST ANNUAL MEAN					92.7	1984
HIGHEST DAILY MEAN	778	Dec 5	1850	Jan 22	8340	May 22 1967
LOWEST DAILY MEAN	72	Mar 20	81	May 8	31	Nov 3 1975
ANNUAL SEVEN-DAY MINIMUM	75	Mar 14	85	May 4	33	Sep 19 1975
ANNUAL RUNOFF (AC-FT)	137400		141600		155200	
10 PERCENT EXCEEDS	355		382		415	
50 PERCENT EXCEEDS	146		141		122	
90 PERCENT EXCEEDS	91		100		60	



HAWAII, ISLAND OF KAUAI
 16108000 WAINIHA RIVER NEAR HANAIEI

LOCATION.--Lat 22°08'20 ", long 159°33'38 ", Hydrologic Unit 20070000, on left bank at Puwainui Falls, 1.5 mi upstream from Wainiha power plant intake, and 6.0 mi southwest of Hanalei.

DRAINAGE AREA.--10.2 mi².

PERIOD OF RECORD.--August 1952 to February 1956, October 1957 to current year.

REVISED RECORDS.--WSP 770: 1932-33. WSP 1719: 1916. WSP 1937: 1918. WSP 2137: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 960 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Roy Taogoshi. Records fair. No diversion upstream.

AVERAGE DISCHARGE.--44 years (water years 1953-55, 1959-99), 138 ft³/s (100,100 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 28,100 ft³/s, April 19, 1974, gage height, 9.47 ft, from rating curve extended above 1,100 ft³/s on basis of slope-area measurement at gage height 7.72 ft; minimum, 31 ft³/s, September 29, 1965.

EXTREMES FOR CURRENT YEAR.--Peak discharge greater than base discharge of 3,600 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 22	0500	*5,590	*5.87	No other peak greater than base discharge.			

Minimum discharge, 48 ft³/s, January 19, 21.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
 DAILY MEAN VALUES

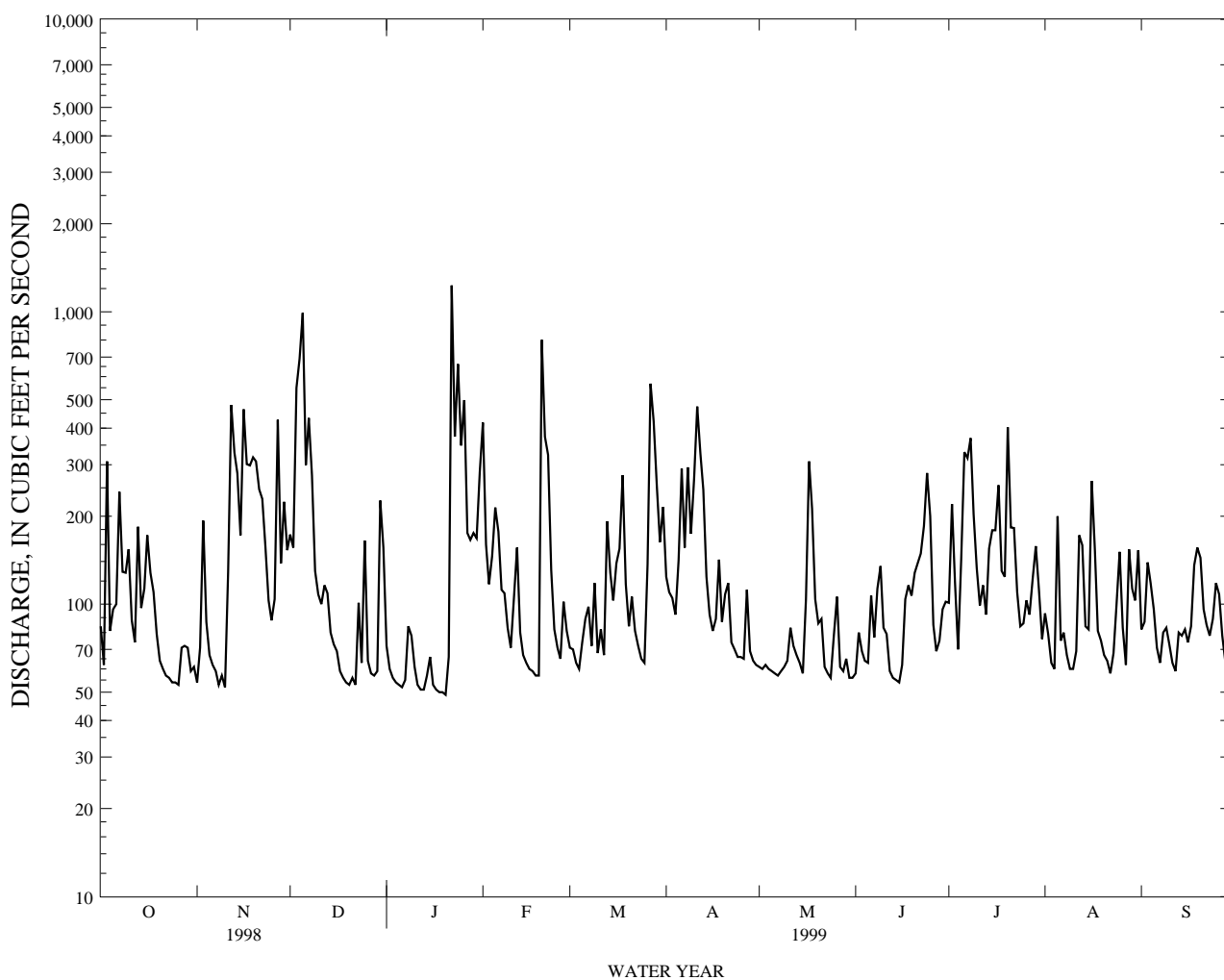
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	84	54	173	72	418	71	124	61	58	101	93	82
2	62	71	156	60	160	70	110	60	80	220	79	87
3	308	193	549	56	117	63	105	62	69	120	63	139
4	81	87	691	54	146	60	92	60	64	70	60	118
5	96	67	991	53	214	74	141	59	63	143	200	96
6	100	62	299	52	177	89	291	58	107	331	75	71
7	242	59	433	55	112	98	156	57	77	316	80	63
8	129	53	276	84	109	72	294	59	113	370	67	80
9	128	57	130	78	83	118	174	61	135	203	60	83
10	154	52	108	61	71	68	269	64	83	133	60	73
11	88	129	100	53	105	82	474	83	79	99	69	63
12	74	480	116	51	156	67	328	72	59	116	172	59
13	184	330	109	51	80	192	246	67	56	92	159	80
14	97	280	80	57	67	128	124	63	55	155	84	78
15	113	172	73	66	63	103	92	58	54	179	82	82
16	172	464	69	53	60	138	81	104	62	179	264	74
17	128	301	59	51	59	155	89	308	104	255	153	84
18	110	298	56	50	57	276	142	212	116	130	81	136
19	79	318	54	50	57	117	87	104	107	124	75	156
20	64	308	53	49	801	84	108	86	128	403	67	144
21	60	247	56	66	374	106	118	89	138	183	64	96
22	57	229	53	1230	324	81	74	61	149	182	58	85
23	56	157	101	374	131	72	70	58	185	110	68	78
24	54	103	63	662	82	65	66	56	281	84	99	89
25	54	88	165	349	71	63	66	78	200	86	151	118
26	53	104	64	499	65	137	65	106	85	103	83	108
27	71	427	58	175	102	568	112	61	69	92	62	78
28	72	138	57	166	81	422	69	59	75	122	154	64
29	71	224	59	175	---	255	64	65	96	158	113	59
30	59	153	226	168	---	163	62	56	102	112	103	57
31	61	---	156	283	---	215	---	56	---	76	153	---
TOTAL	3161	5705	5633	5303	4342	4272	4293	2503	3049	5047	3151	2680
MEAN	102	190	182	171	155	138	143	80.7	102	163	102	89.3
MAX	308	480	991	1230	801	568	474	308	281	403	264	156
MIN	53	52	53	49	57	60	62	56	54	70	58	57
AC-FT	6270	11320	11170	10520	8610	8470	8520	4960	6050	10010	6250	5320

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1999, BY WATER YEAR (WY)

MEAN	113	187	166	144	142	169	174	123	102	132	114	95.7
MAX	228	414	384	371	492	611	504	238	187	315	272	249
(WY)	1983	1991	1968	1989	1969	1982	1971	1967	1978	1989	1982	1994
MIN	42.8	72.7	54.1	44.6	36.5	52.2	52.8	51.9	53.1	50.4	54.6	42.3
(WY)	1985	1964	1984	1986	1978	1970	1992	1966	1993	1984	1965	1965

HAWAII, ISLAND OF KAUAI
16108000 WAINIHA RIVER NEAR HANALEI--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1952 - 1999	
ANNUAL TOTAL	46489		49139		138	
ANNUAL MEAN	127		135		84.8	
HIGHEST ANNUAL MEAN					243	
LOWEST ANNUAL MEAN					84.8	
HIGHEST DAILY MEAN	991	Dec 5	1230	Jan 22	3650	Nov 21 1974
LOWEST DAILY MEAN	44	Mar 18	49	Jan 20	31	Sep 29 1965
ANNUAL SEVEN-DAY MINIMUM	45	Mar 14	54	Jan 14	33	Sep 24 1965
ANNUAL RUNOFF (AC-FT)	92210		97470		100100	
10 PERCENT EXCEEDS	249		280		263	
50 PERCENT EXCEEDS	89		88		79	
90 PERCENT EXCEEDS	52		57		49	



HAWAII, ISLAND OF KAUAI
16114000 LIMAHULI STREAM NEAR WAINIHA

LOCATION.--Lat 22°13'15 " , long 159°34'48 " , Hydrologic Unit 20070000, on left bank 0.2 mi upstream from intersection with Kuhio Highway, and entrance to Haena State Park.

DRAINAGE AREA.--1.36 mi².

PERIOD OF RECORD.--October 1994 to current year.

GAGE.--Water-stage recorders and natural control. Elevation of gage is 160 ft above mean sea level, by altimeter.

REMARKS.--Records computed by Clayton Yoshida. Records good. Limahuli Gardens diverts water through a 4-inch pipe, upstream of station.

AVERAGE DISCHARGE.--5 years (water years 1995-99), 9.8 ft³/s (7,100 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 760 ft³/s, January 4, 1997, gage height, 4.60 ft; minimum, 3.5 ft³/s, June 30, July 1, 2, 1995.

EXTREMES FOR CURRENT YEAR.--Peak discharge greater than base discharge of 300 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Dec. 28	1330	*201	*2.74				

Minimum discharge, 5.1 ft³/s, September 29, 30.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

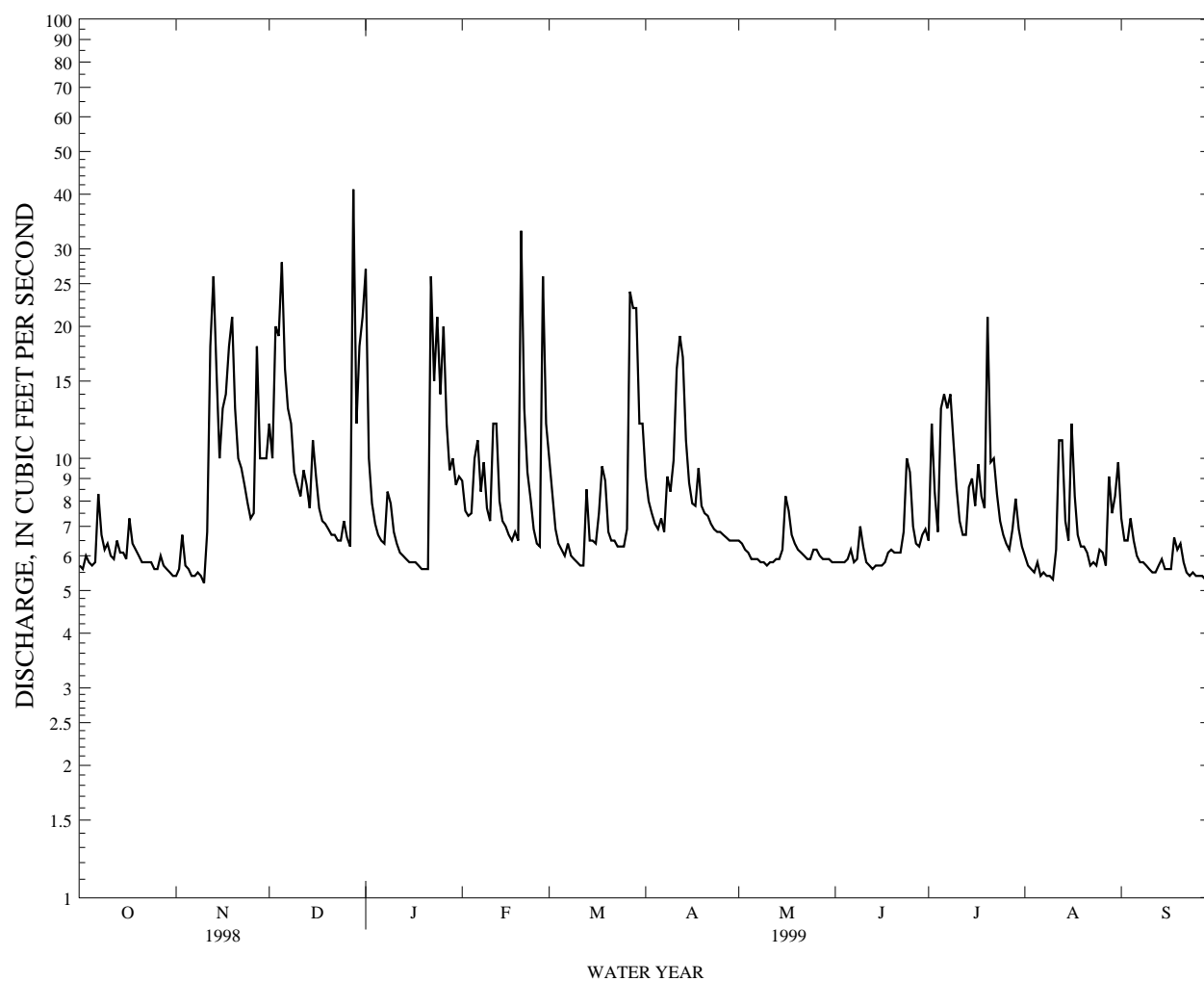
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.7	5.4	12	27	8.9	10	9.1	6.5	5.8	6.5	6.0	7.3
2	5.6	5.6	10	10	7.6	8.3	8.0	6.4	5.8	12	5.7	6.5
3	6.0	6.7	20	7.9	7.4	6.9	7.5	6.2	5.8	8.4	5.6	6.5
4	5.8	5.7	19	7.1	7.5	6.4	7.1	6.1	5.8	6.8	5.5	7.3
5	5.7	5.6	28	6.7	10	6.2	6.9	5.9	5.9	13	5.8	6.5
6	5.8	5.4	16	6.5	11	6.0	7.3	5.9	6.2	14	5.4	6.0
7	8.3	5.4	13	6.4	8.4	6.4	6.8	5.9	5.8	13	5.5	5.8
8	6.7	5.5	12	8.4	9.8	6.0	9.1	5.8	5.9	14	5.4	5.8
9	6.2	5.4	9.3	7.9	7.7	5.9	8.4	5.8	7.0	11	5.4	5.7
10	6.4	5.2	8.7	6.8	7.2	5.8	9.9	5.7	6.3	8.6	5.3	5.6
11	6.0	6.8	8.2	6.4	12	5.7	16	5.8	5.8	7.2	6.2	5.5
12	5.9	18	9.4	6.1	12	5.7	19	5.8	5.7	6.7	11	5.5
13	6.5	26	8.7	6.0	8.0	8.5	17	5.9	5.6	6.7	11	5.7
14	6.1	16	7.7	5.9	7.2	6.5	11	5.9	5.7	8.6	7.2	5.9
15	6.1	10	11	5.8	7.0	6.5	8.8	6.2	5.7	9.0	6.5	5.6
16	5.9	13	9.1	5.8	6.7	6.4	7.9	8.2	5.7	7.8	12	5.6
17	7.3	14	7.7	5.8	6.5	7.5	7.8	7.6	5.8	9.7	8.2	5.6
18	6.4	18	7.2	5.7	6.8	9.6	9.5	6.7	6.1	8.2	6.7	6.6
19	6.2	21	7.1	5.6	6.5	8.9	7.8	6.4	6.2	7.7	6.3	6.2
20	6.0	13	6.9	5.6	33	6.8	7.5	6.2	6.1	21	6.3	6.4
21	5.8	10	6.7	5.6	13	6.5	7.4	6.1	6.1	9.8	6.1	5.8
22	5.8	9.5	6.7	26	9.3	6.5	7.1	6.0	6.1	10	5.7	5.5
23	5.8	8.7	6.5	15	8.1	6.3	6.9	5.9	6.8	8.3	5.8	5.4
24	5.8	7.9	6.5	21	6.9	6.3	6.8	5.9	10	7.2	5.7	5.5
25	5.6	7.3	7.2	14	6.4	6.3	6.8	6.2	9.3	6.7	6.2	5.4
26	5.6	7.5	6.6	20	6.3	6.9	6.7	6.2	7.0	6.4	6.1	5.4
27	6.0	18	6.3	12	26	24	6.6	6.0	6.4	6.2	5.7	5.4
28	5.7	10	41	9.4	12	22	6.5	5.9	6.3	6.9	9.1	5.3
29	5.6	10	12	10	---	22	6.5	5.9	6.7	8.1	7.5	5.2
30	5.5	10	18	8.7	---	12	6.5	5.9	6.9	6.9	8.2	5.1
31	5.4	---	21	9.1	---	12	---	5.8	---	6.3	---	---
TOTAL	187.2	310.6	369.5	304.2	279.2	270.8	260.2	190.7	190.3	282.7	212.9	175.6
MEAN	6.04	10.4	11.9	9.81	9.97	8.74	8.67	6.15	6.34	9.12	6.87	5.85
MAX	8.3	26	41	27	33	24	19	8.2	10	21	12	7.3
MIN	5.4	5.2	6.3	5.6	6.3	5.7	6.5	5.7	5.6	6.2	5.3	5.1
AC-FT	371	616	733	603	554	537	516	378	377	561	422	348

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1995 - 1999, BY WATER YEAR (WY)

MEAN	7.81	10.2	11.3	11.4	8.69	9.05	14.7	11.8	8.44	8.87	7.73	7.70
MAX	9.62	12.5	12.6	23.8	12.0	15.7	32.6	22.4	12.2	9.28	9.84	9.32
(WY)	1996	1996	1997	1997	1996	1997	1997	1997	1996	1998	1995	1996
MIN	6.04	7.66	7.43	6.04	6.27	5.63	8.67	6.15	5.20	8.51	5.96	5.85
(WY)	1999	1995	1995	1995	1995	1995	1999	1999	1995	1996	1996	1999

HAWAII, ISLAND OF KAUAI
16114000 LIMAHLI STREAM NEAR WAINIHA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1995 - 1999	
ANNUAL TOTAL	3446.3		3033.9			
ANNUAL MEAN	9.44		8.31		9.81	
HIGHEST ANNUAL MEAN					13.5	
LOWEST ANNUAL MEAN					7.72	
HIGHEST DAILY MEAN	41	Dec 28	41	Dec 28	238	Jan 4 1997
LOWEST DAILY MEAN	5.2	Nov 10	5.1	Sep 30	3.7	Jul 1 1995
ANNUAL SEVEN-DAY MINIMUM	5.5	Nov 4	5.3	Sep 24	3.9	Jun 26 1995
ANNUAL RUNOFF (AC-FT)	6840		6020		7100	
10 PERCENT EXCEEDS	15		13		15	
50 PERCENT EXCEEDS	7.5		6.6		7.0	
90 PERCENT EXCEEDS	6.0		5.6		5.4	



Surface-Water Station Records
for Oahu

HAWAII, ISLAND OF OAHU

16200000 NORTH FORK KAUKONAHUA STREAM ABOVE RIGHT BRANCH, NEAR WAHIAWA

LOCATION.--Lat 21°31'09", long 157°56'53", Hydrologic Unit 20060000, on left bank 140 ft upstream from mauka ditch intake and Right Branch, and 4.5 mi northeast of Wahiawa.

DRAINAGE AREA.--1.38 mi².

PERIOD OF RECORD.--May 1913 to July 1953, April 1960 to current year. Monthly discharge only for some periods, published in WSP 1319. Prior to August 1953, published as Left Branch of North Fork Kaukonahua Stream near Wahiawa.

REVISED RECORDS.--WSP 1219: 1931-33(M), 1935(M), 1937-38(M). WSP 1319: 1914, 1917-18(M), 1920-23(M), 1925(M), 1927-30(M). WSP 1719: Drainage area.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 1,150 ft above mean sea level (from topographic map).

REMARKS.--Records computed by A.H.M. Okihara. Records good except for discharges above 200 ft³/s, which are fair.

AVERAGE DISCHARGE.--76 years (water years 1914-24, 1927-52, 1961-99), 16.3 ft³/s (11,780 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,640 ft³/s, October 28, 1981, gage height, 13.2 ft, from rating curve extended above 110 ft³/s on basis of slope-area measurement at gage height, 12.46 ft; minimum, 0.12 ft³/s, March 2, 13, 1941.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,300 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 22	1345	*1,210	*6.02				

Minimum discharge, 1.80 ft³/s, September 30.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.2	4.7	18	8.0	27	5.6	11	4.8	5.2	6.4	5.6	3.8
2	14	39	23	5.8	12	5.1	11	4.3	14	7.5	5.6	3.6
3	12	24	65	5.2	9.5	4.7	17	4.0	4.5	3.7	5.9	5.9
4	5.2	42	47	4.8	8.9	4.4	29	3.8	5.9	3.4	9.5	5.9
5	5.6	28	69	4.5	8.1	5.7	10	3.5	3.0	3.5	29	3.4
6	4.7	28	30	4.3	18	12	52	3.3	2.8	26	8.3	2.9
7	4.2	24	41	20	8.1	15	10	3.3	4.4	11	5.2	2.5
8	25	48	29	22	10	5.1	40	3.2	14	7.9	4.6	2.4
9	29	25	40	7.0	6.1	9.6	10	3.2	15	17	4.2	2.3
0	30	9.8	15	4.5	6.5	17	26	8.6	9.0	6.8	5.2	6.3
11	8.0	8.1	12	3.9	5.3	26	28	8.5	3.7	22	5.4	3.2
12	19	7.1	11	3.5	22	9.2	39	4.7	3.0	6.6	14	2.5
13	56	66	13	3.3	5.4	25	55	3.6	2.7	5.8	22	2.3
14	11	34	9.9	3.4	4.9	13	18	3.0	2.5	10	7.2	2.0
15	9.3	12	8.7	3.2	11	65	11	2.7	9.0	19	4.8	1.9
16	29	10	8.8	5.5	11	45	9.4	19	18	31	59	2.4
17	19	34	7.4	3.2	4.5	25	9.0	13	3.8	36	14	3.2
18	39	40	6.8	2.7	5.4	12	67	12	3.8	9.4	6.8	3.1
19	10	24	6.2	2.6	11	8.6	11	3.9	8.9	7.6	15	21
20	8.3	25	5.9	2.5	183	17	9.0	5.1	6.8	56	8.7	7.0
21	7.1	14	8.8	2.6	69	14	15	11	3.4	9.8	5.2	10
22	6.4	10	22	93	62	8.1	7.7	3.5	12	18	4.5	11
23	5.6	8.8	27	7.5	17	6.5	6.7	3.0	7.2	9.9	4.8	3.0
24	5.1	7.8	11	26	11	5.9	6.2	2.7	34	15	4.0	2.5
25	8.9	7.2	25	53	9.1	5.4	5.7	5.6	16	13	3.7	2.3
26	5.0	6.6	8.5	85	7.7	13	6.5	14	5.0	9.7	10	26
27	5.3	72	7.5	14	6.8	68	27	3.9	9.7	15	3.9	4.4
28	5.3	15	8.6	20	6.2	41	5.8	3.1	7.0	22	3.9	2.9
29	15	27	8.5	8.9	---	71	5.0	2.9	4.4	9.3	3.7	2.4
30	8.0	16	6.0	21	---	17	7.7	4.3	7.2	7.5	3.6	2.0
31	9.7	---	46	88	---	20	---	2.9	---	6.2	16	---
TOTAL	424.9	717.1	645.6	538.9	566.5	599.9	565.7	174.4	245.9	432.0	303.3	154.1
MEAN	13.7	23.9	20.8	17.4	20.2	19.4	18.9	5.63	8.20	13.9	9.78	5.14
MAX	56	72	69	93	183	71	67	19	34	56	59	26
MIN	4.2	4.7	5.9	2.5	4.5	4.4	5.0	2.7	2.5	3.4	3.6	1.9
AC-FT	843	1420	1280	1070	1120	1190	1120	346	488	857	602	306

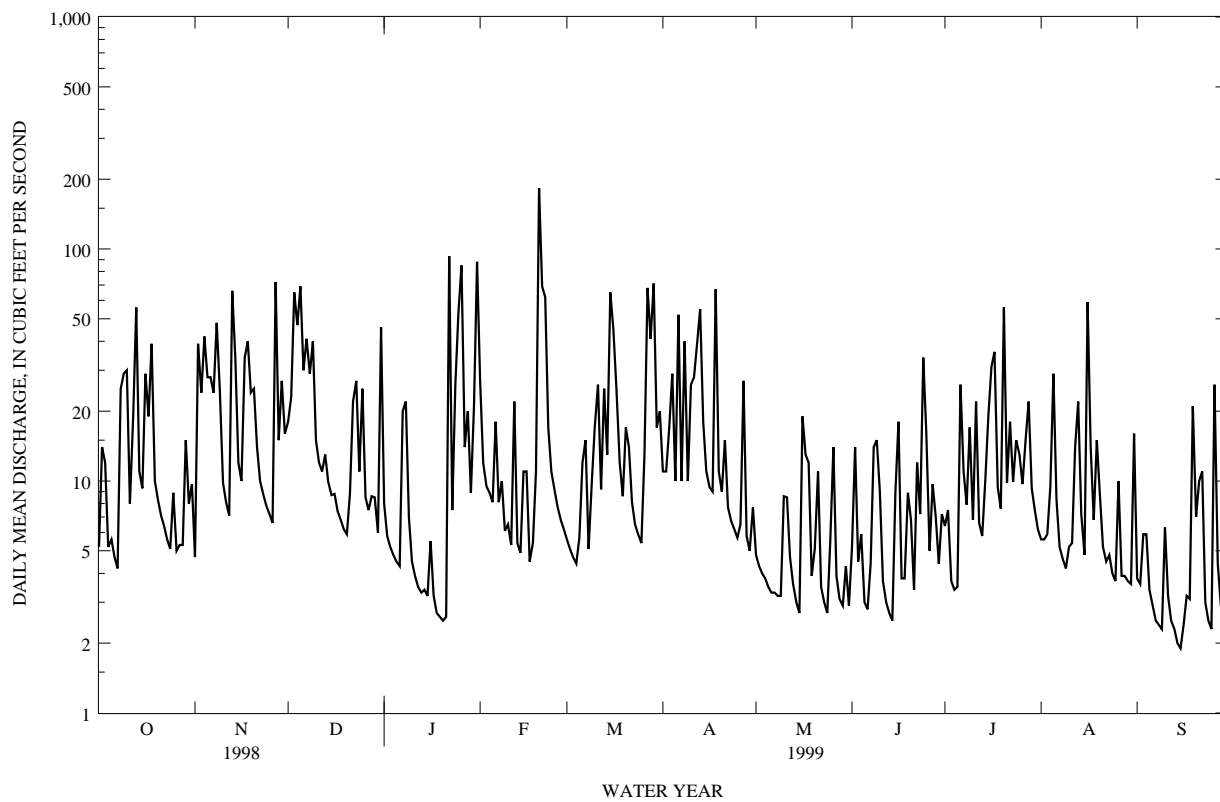
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1913 - 1999, BY WATER YEAR (WY)

	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
MEAN	13.2	17.5	15.0	14.4	12.7	18.9	19.8	16.1	13.5	18.5	18.1	15.1																																																																											
MAX	32.7	76.5	48.9	126	117	74.4	58.6	53.3	31.3	48.0	50.1	79.1																																																																											
(WY)	1942	1966	1988	1921	1932	1982	1963	1927	1963	1930	1931	1914																																																																											
MIN	2.21	1.31	1.57	.36	.40	.28	1.38	.67	2.63	4.22	1.81	1.95																																																																											
(WY)	1985	1934	1990	1986	1986	1983	1966	1992	1951	1951	1971	1975																																																																											

HAWAII, ISLAND OF OAHU

16200000 NORTH FORK KAUKONAHUA STREAM ABOVE RIGHT BRANCH, NEAR WAHIWA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1913 - 1999	
ANNUAL TOTAL	4455.04	5368.3		
ANNUAL MEAN	12.2	14.7	16.3	
HIGHEST ANNUAL MEAN			29.5	1932
LOWEST ANNUAL MEAN			9.11	1984
HIGHEST DAILY MEAN	129 Jun 24	183 Feb 20	975	Feb 27 1935
LOWEST DAILY MEAN	.23 Mar 19	1.9 Sep 15	.12	Mar 13 1941
ANNUAL SEVEN-DAY MINIMUM	.24 Mar 16	2.5 Sep 12	.13	Mar 5 1986
ANNUAL RUNOFF (AC-FT)	8840	10650	11780	
10 PERCENT EXCEEDS	30	34	36	
50 PERCENT EXCEEDS	7.1	8.6	7.1	
90 PERCENT EXCEEDS	.75	3.2	1.6	



HAWAII, ISLAND OF OAHU

16208000 SOUTH FORK KAUKONAHUA STREAM AT EAST PUMP RESERVOIR, NEAR WAHIAWA

LOCATION.--Lat 21°29'32", long 157°59'54", Hydrologic Unit 20060000, on right bank on upstream side of dam at East Pump Reservoir, 2.3 mi east of Wahiawa Post Office, and 7.1 mi north of Waipahu.

DRAINAGE AREA.--4.04 mi².

PERIOD OF RECORD.--July 1957 to June 1963, water years 1963-64 (annual maximum), July 1964 to current year.

GAGE.--Water-stage recorder and Ogee-type dam control. Datum of gage is 860.35 ft above mean sea level (from U.S. Coast and Geodetic Survey trig station).

REMARKS.--Records computed by A.H.M. Okihara. Records fair except for periods of no gage height record which are poor. Prior to 1960, water was diverted from reservoirs upstream of station for use at Schofield Barracks.

AVERAGE DISCHARGE.--37 years (water years 1961-62, 1965-99), 21.3 ft³/s (15,430 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,460 ft³/s, April 15, 1963, gage height, 11.33 ft, from rating curve extended above 1,100 ft³/s on basis of computation of peak flow over dam; no flow at times.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,100 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jul. 20	0245	*479	*3.71				

Minimum discharge, 2.2 ft³/s, June 14, 15.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e5.0	6.8	32	16	e18	7.6	25	9.7	3.7	16	14	8.8
2	e5.0	e50	21	9.2	e14	7.1	18	8.2	4.3	10	13	6.1
3	8.2	e35	89	7.7	e14	6.5	24	7.6	4.1	6.8	12	13
4	5.2	e52	64	7.1	e15	5.8	53	7.2	3.2	5.4	11	18
5	4.5	e16	69	6.6	e14	5.5	17	6.8	2.8	8.4	14	8.0
6	5.7	35	37	6.4	e26	5.5	63	6.3	2.5	41	15	5.4
7	4.6	11	33	e25	13	6.3	19	6.1	3.2	21	11	4.8
8	7.6	22	38	e20	13	4.9	44	6.0	20	12	9.3	4.6
9	e43	19	71	15	10	4.2	18	5.7	11	37	8.2	4.6
10	e45	10	28	6.2	9.9	4.3	55	5.3	22	17	11	6.1
11	11	7.1	22	5.1	9.3	e30	96	6.8	5.1	26	14	5.1
12	6.7	6.1	21	4.4	e32	12	e115	8.7	3.3	19	28	4.5
13	e64	e90	25	4.0	8.5	e29	e140	7.3	2.7	20	28	5.8
14	e20	e37	17	3.8	6.7	9.5	52	5.4	2.3	27	13	4.6
15	13	e18	16	3.8	9.9	69	32	4.9	2.2	41	10	4.1
16	e35	14	15	12	e15	142	26	26	32	81	40	3.7
17	e28	43	13	7.3	6.4	44	23	39	6.4	110	16	3.5
18	e45	72	12	4.1	6.2	20	90	12	5.0	36	10	4.4
19	e13	48	11	3.5	e13	13	28	6.4	10	28	8.3	9.8
20	e12	83	11	3.3	e215	30	21	5.1	15	117	14	12
21	7.9	40	11	3.2	e75	31	35	4.6	8.1	28	7.4	12
22	6.9	23	9.7	e100	e65	18	18	4.5	16	48	6.4	13
23	6.4	17	19	e17	e22	12	15	3.8	8.4	30	6.6	5.2
24	6.0	14	10	e39	15	11	14	3.5	105	31	6.4	3.4
25	12	12	18	e81	12	9.4	14	6.0	51	23	5.4	3.4
26	7.4	11	11	e130	11	11	13	18	14	17	18	18
27	7.6	68	8.8	e14	9.5	100	20	8.4	24	33	8.6	12
28	7.6	24	7.6	e16	8.4	56	12	4.5	11	79	6.7	4.4
29	e22	50	8.9	e14	---	106	10	3.9	7.7	24	7.3	3.5
30	e7.0	32	8.0	12	---	34	9.6	3.1	9.8	18	5.7	2.8
31	8.6	---	73	e92	---	38	---	3.5	---	16	23	---
TOTAL	480.9	966.0	830.0	688.7	686.8	882.6	1119.6	254.3	415.8	1026.6	401.3	214.6
MEAN	15.5	32.2	26.8	22.2	24.5	28.5	37.3	8.20	13.9	33.1	12.9	7.15
MAX	64	90	89	130	215	142	140	39	105	117	40	18
MIN	4.5	6.1	7.6	3.2	6.2	4.2	9.6	3.1	2.2	5.4	5.4	2.8
AC-FT	954	1920	1650	1370	1360	1750	2220	504	825	2040	796	426

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1961 - 1999, BY WATER YEAR (WY)

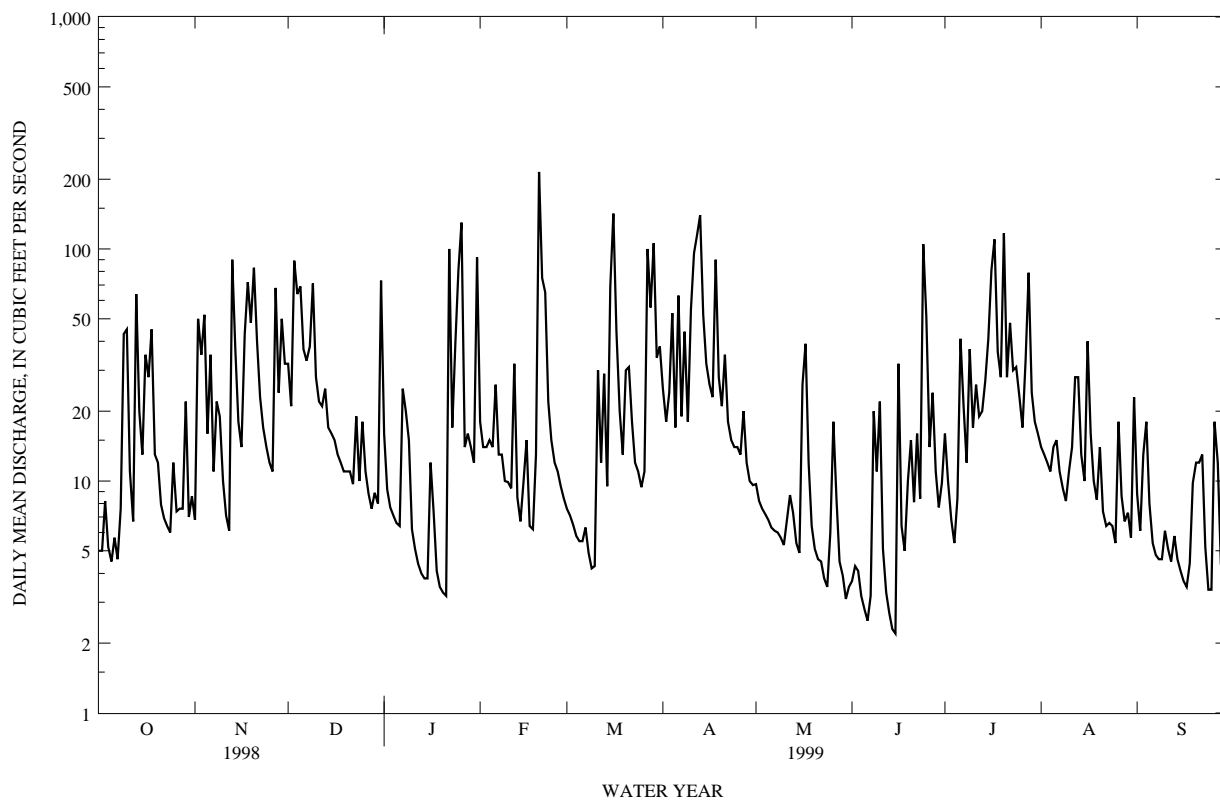
	1967	1966	1988	1989	1969	1980	1963	1963	1987	1989	1967	1990
MEAN	17.2	28.1	21.9	19.6	16.6	26.5	30.3	20.6	17.3	26.4	18.2	14.5
MAX	38.0	107	61.7	55.2	99.7	104	90.1	64.9	46.2	60.9	53.7	35.7
(WY)	1967	1966	1988	1989	1969	1980	1963	1963	1987	1989	1967	1990
MIN	.32	3.54	2.07	.38	.11	.66	2.45	.51	3.40	4.25	3.04	1.43
(WY)	1985	1963	1990	1986	1986	1983	1992	1992	1968	1968	1971	1975

e Estimated

HAWAII, ISLAND OF OAHU

16208000 SOUTH FORK KAUKONAHUA STREAM AT EAST PUMP RESERVOIR, NEAR WAHIWA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1961 - 1999	
ANNUAL TOTAL	5572.23	7967.2		
ANNUAL MEAN	15.3	21.8	21.3	
HIGHEST ANNUAL MEAN			37.2	1982
LOWEST ANNUAL MEAN			11.1	1984
HIGHEST DAILY MEAN	180 Jun 24	215 Feb 20	1050	Feb 1 1969
LOWEST DAILY MEAN	.00 Mar 23	2.2 Jun 15	.00	Dec 24 1960
ANNUAL SEVEN-DAY MINIMUM	.04 Mar 19	3.4 Jun 1	.00	Jan 19 1977
ANNUAL RUNOFF (AC-FT)	11050	15800	15430	
10 PERCENT EXCEEDS	36	51	49	
50 PERCENT EXCEEDS	8.9	12	9.0	
90 PERCENT EXCEEDS	.59	4.5	1.8	



HAWAII, ISLAND OF OAHU
16211600 MAKAHA STREAM NEAR MAKAHA

LOCATION.--Lat 21°30'16", long 158°10'59", Hydrologic Unit 20060000, on right bank, 1.5 mi northeast of Kaneaki Heiau, and 3.4 mi northeast of Makaha.

DRAINAGE AREA.--2.31 mi².

PERIOD OF RECORD.--July 1959 to current year.

REVISED RECORDS.--WSP 1937: Drainage area.

GAGE.--Water-stage recorder and concrete-masonry control. Datum of gage is 938.64 ft above mean sea level (Waianae Plantation benchmark).

REMARKS.--Records computed by Vaughn Kunishige. Records fair except for periods of no gage height record which are poor. Honolulu Board of Water Supply wells upstream of station may influence flows at gage. Recording rain gage located at station.

AVERAGE DISCHARGE.--40 years (water years 1960-99), 1.82 ft³/s (1,320 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,680 ft³/s, November 14, 1996, gage height, 9.54 ft, from high-water profile of slope-area measurement; no flow at times.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
May 16	1930	*29	*1.82				

Minimum discharge, no flow on many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	e.00	.21	.05	.51	.00	.02	e.09	.28	.00
2	.00	.00	.00	e.00	.37	.02	.47	.00	.01	e.34	.51	.00
3	.00	.00	.00	e.00	.34	.01	.40	.00	.00	.53	.49	.00
4	.00	.00	.00	e.00	.24	.00	.28	.00	.00	.45	.41	.00
5	.00	.00	.00	e.00	.14	.00	.17	.00	.00	.41	.32	.00
6	.00	.00	.00	e.00	.08	.00	.11	.00	.00	.30	.19	.00
7	.00	.00	.00	e.00	.28	.00	.20	.00	.00	.15	.09	.00
8	.00	.00	.00	e.11	.41	.00	.37	.00	.00	.39	.05	.00
9	.00	.00	.02	e.22	.31	.00	.31	.00	.00	.47	.04	.00
10	.00	.00	.03	e.01	.27	.00	.26	.00	.00	.38	.02	.00
11	.00	.00	.01	e.01	.22	.00	.44	.00	.00	.25	.00	.00
12	.00	.00	.00	e.01	.14	.00	.59	.00	.00	.22	.00	.00
13	.00	.00	.00	e.01	.14	.00	.55	.00	.00	.15	.00	.00
14	.00	.00	.00	e.01	.32	.00	.56	.00	.00	.06	.00	.00
15	.00	.01	.64	e.01	.29	.00	.47	.00	.00	.10	.00	.00
16	.00	.13	.43	e.01	.19	.00	.34	4.5	.00	.41	.00	.00
17	.00	.13	.01	e.00	.08	.00	.24	5.3	.00	.53	.00	.00
18	.00	.84	.01	e.01	.03	.40	.15	1.1	.00	.49	.00	.00
19	.00	.70	.00	e.02	.02	.52	.08	.68	.00	.50	.00	.00
20	.00	.69	.00	e.02	.01	2.8	.04	.55	.00	.45	.00	.00
21	.00	.17	.00	e.02	.00	1.4	.04	.47	.00	.61	.00	.00
22	.00	.05	.00	e.03	.95	.71	.11	.41	.00	.53	.00	.00
23	.00	.02	.00	e.04	.47	.56	.09	.36	.00	.69	.00	.00
24	.00	.00	.00	e.04	.40	.43	.09	.28	.00	.62	.00	.00
25	.00	.00	.00	e.06	.31	.33	.06	.18	.00	.48	.00	.00
26	.00	.00	.00	e.11	.24	.23	.04	.11	.00	.35	.00	.00
27	.00	.00	.00	e.24	.14	.14	.03	.06	e.14	.27	.00	.00
28	.00	.00	e.00	e.31	.08	.44	.02	.03	e.28	.13	.00	.00
29	.00	.00	e.00	.24	---	.66	.00	.03	e.24	.05	.00	.00
30	.00	.00	e.00	.16	---	.60	.00	.03	e.15	.02	.00	.00
31	.00	---	e.06	.11	---	.52	---	.03	---	.00	.00	---
TOTAL	0.00	2.74	1.21	1.81	6.68	9.82	7.02	14.12	0.84	10.42	2.40	0.00
MEAN	.000	.091	.039	.058	.24	.32	.23	.46	.028	.34	.077	.000
MAX	.00	.84	.64	.31	.95	2.8	.59	5.3	.28	.69	.51	.00
MIN	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
AC-FT	.00	5.4	2.4	3.6	13	19	14	28	1.7	21	4.8	.00

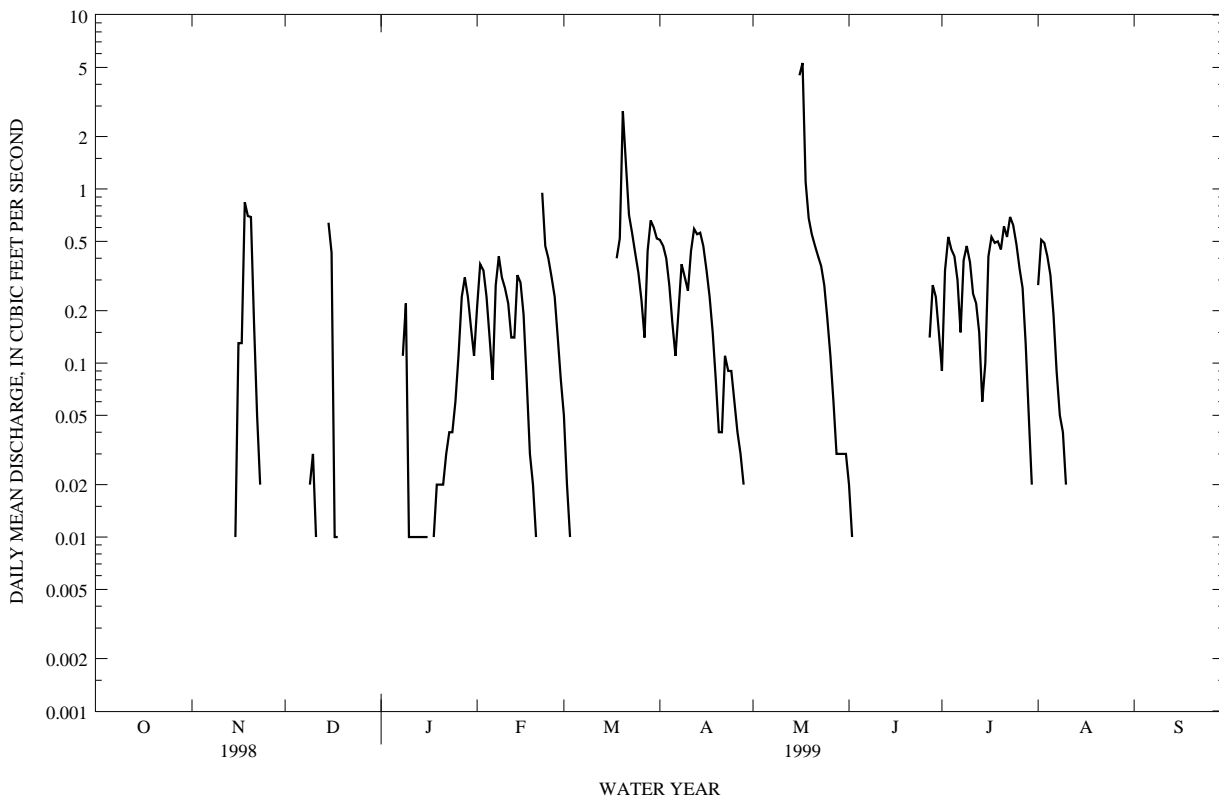
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1959 - 1999, BY WATER YEAR (WY)

MEAN	.70	1.97	2.89	4.23	3.26	3.09	2.52	1.44	.61	.48	.36	.36
MAX	3.66	20.6	15.0	22.7	16.3	11.5	15.7	5.33	1.72	1.31	1.44	2.19
(WY)	1983	1997	1965	1982	1976	1962	1963	1965	1978	1986	1983	1974
MIN	.000	.000	.038	.058	.24	.18	.13	.13	.013	.005	.000	.000
(WY)	1976	1995	1995	1999	1999	1995	1993	1996	1995	1995	1995	1961

e Estimated

HAWAII, ISLAND OF OAHU
 16211600 MAKAHA STREAM NEAR MAKAHA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1959 - 1999
ANNUAL TOTAL	145.62	57.06	
ANNUAL MEAN	.40	.16	1.82
HIGHEST ANNUAL MEAN			4.58
LOWEST ANNUAL MEAN			.16
HIGHEST DAILY MEAN	6.8 Jan 17	5.3 May 17	283 Feb 7 1976
LOWEST DAILY MEAN	.00 Jul 30	.00 Oct 1	.00 Sep 25 1960
ANNUAL SEVEN-DAY MINIMUM	.00 Aug 3	.00 Oct 1	.00 Aug 28 1961
ANNUAL RUNOFF (AC-FT)	289	113	1320
10 PERCENT EXCEEDS	.97	.47	3.4
50 PERCENT EXCEEDS	.18	.00	.55
90 PERCENT EXCEEDS	.00	.00	.03



HAWAII, ISLAND OF OAHU
16212800 KIPAPA STREAM NEAR WAHIAWA

LOCATION.--Lat 21°28'13", long 157°57'40", Hydrologic Unit 20060000, on left bank 1,700 ft downstream from forest-reserve boundary, 4.9 mi southeast of Wahiawa Post Office, and 6.3 mi northeast of Waipahu.

DRAINAGE AREA.--4.29 mi².

PERIOD OF RECORD.--January 1957 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 690 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Ben Shimizu. Records poor. At times, a small amount of water is diverted from the gage pool for domestic use. Recording rain gage located at station.

AVERAGE DISCHARGE.--42 years (water years 1958-99), 10.7 ft³/s (7,780 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,370 ft³/s, March 21, 1991, gage height, 12.67 ft, from rating curve extended above 5,680 ft³/s on basis of the shape of the rating; no flow at times.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 930 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Dec. 31	0230	*1,710	*8.41	Jan. 22	1445	980	7.00

Minimum discharge, 0.30 ft³/s (estimated daily mean) October 11.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e.50	1.1	14	15	23	3.0	8.6	e1.8	e.82	e9.9	e4.3	e3.1
2	e.60	6.8	11	7.6	12	2.5	5.8	e1.6	e.82	e13	e4.6	e1.5
3	e.48	31	50	5.7	8.5	2.3	11	e1.5	e.90	e6.1	e4.8	e1.4
4	e.90	27	44	4.7	7.3	2.1	40	e1.4	e1.2	e3.9	e4.3	e2.5
5	e.70	13	50	4.2	9.6	2.1	8.9	e1.3	e.90	e3.3	e15	e1.6
6	e.50	26	22	3.7	11	2.1	53	e1.2	e.85	e5.4	e9.6	e.99
7	e.40	8.2	26	19	6.6	2.8	12	e1.1	e.85	e13	e4.3	e.69
8	e.37	26	44	35	8.0	2.8	14	e1.1	e.83	e5.2	e3.0	e.65
9	e.33	7.7	31	12	4.7	2.0	8.3	e1.0	e.81	e7.9	e2.4	e.56
10	e.35	6.5	17	5.6	3.8	2.2	20	e1.3	e.80	e7.2	e3.6	e.62
11	e.30	4.2	12	3.9	4.7	6.2	35	e2.5	e.80	e7.9	e4.9	e.95
12	e.40	3.4	10	3.4	13	2.9	26	e1.7	e.80	e8.4	e7.1	e2.3
13	e1.2	50	9.7	3.0	4.8	3.8	24	e1.3	e.80	e8.2	e9.3	e2.2
14	e4.0	46	8.3	2.5	3.4	2.6	11	e1.2	e.80	e6.7	e4.3	e1.0
15	e1.8	18	7.1	2.5	9.6	24	7.7	e1.2	e1.4	e19	e3.4	e.59
16	e1.4	28	6.4	26	32	28	5.9	e20	e1.3	e24	e18	.48
17	e1.0	36	5.6	6.0	4.1	20	5.1	e50	e1.0	e22	e8.2	.53
18	e.80	38	5.1	3.4	4.1	8.0	23	e5.0	e.85	e12	e4.0	.57
19	e3.5	42	4.7	2.5	10	4.9	9.0	e2.3	e.80	e7.5	e3.5	.63
20	e1.8	45	4.2	2.2	45	15	5.8	e1.6	e.80	e48	e8.9	1.2
21	e1.3	23	4.2	2.1	37	12	34	e1.3	e.95	e14	e3.2	2.4
22	e1.0	17	4.2	68	48	7.4	7.3	e1.3	e1.0	e20	e2.0	1.7
23	e.85	10	8.8	13	16	4.4	5.0	e1.2	e1.5	e14	e1.7	1.5
24	e.77	8.0	5.4	25	8.3	3.4	4.1	e1.3	e34	e14	e1.5	.85
25	e1.3	6.9	11	23	5.6	2.6	e2.9	e1.5	e16	e8.8	e1.4	1.3
26	e2.0	6.1	5.8	91	4.6	3.1	e2.3	e1.3	e5.7	e9.0	e2.7	3.3
27	1.3	42	4.4	21	3.8	29	e5.9	e1.2	e11	e15	e3.6	3.4
28	1.2	13	3.4	14	3.3	30	e3.0	e1.1	e6.4	e28	e1.8	1.8
29	1.7	19	13	10	---	40	e2.2	e1.0	e4.5	e11	e1.4	1.6
30	2.5	12	6.5	7.7	---	13	e1.9	e.90	e6.6	e7.1	e1.4	.91
31	1.5	---	108	57	---	17	---	e.88	---	e5.4	e3.5	---
TOTAL	36.75	620.9	556.8	499.7	351.8	301.2	402.7	113.08	105.78	384.9	151.7	42.82
MEAN	1.19	20.7	18.0	16.1	12.6	9.72	13.4	3.65	3.53	12.4	4.89	1.43
MAX	4.0	50	108	91	48	40	53	50	34	48	18	3.4
MIN	.30	1.1	3.4	2.1	3.3	2.0	1.9	.88	.80	3.3	1.4	.48
AC-FT	73	1230	1100	991	698	597	799	224	210	763	301	85

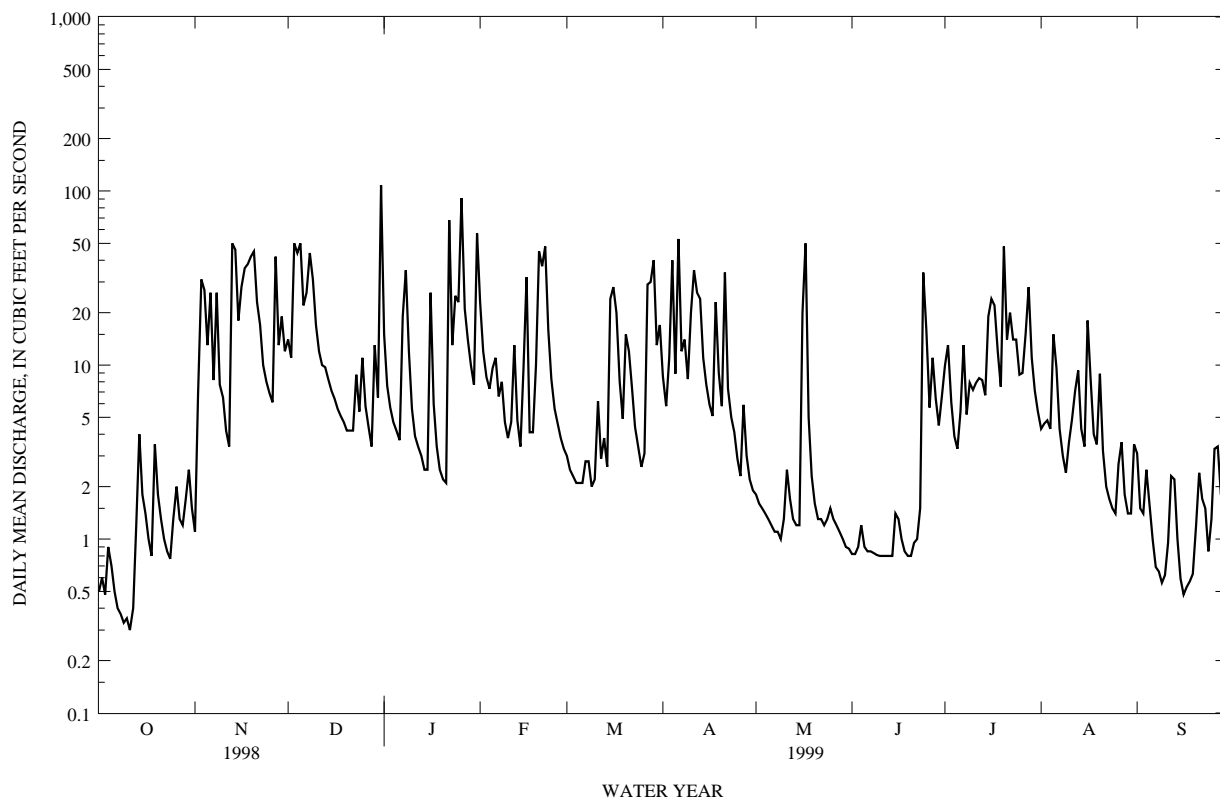
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1957 - 1999, BY WATER YEAR (WY)

MEAN	9.86	15.1	12.4	11.1	9.98	16.0	14.9	9.04	5.79	9.94	8.13	5.99
MAX	49.6	61.8	42.2	32.1	54.4	98.4	60.9	34.0	21.9	28.1	37.5	23.6
(WY)	1982	1966	1988	1989	1969	1991	1963	1965	1978	1989	1958	1994
MIN	.84	.23	.83	.17	.19	.021	.33	.39	.16	.47	.30	.49
(WY)	1958	1963	1990	1977	1978	1983	1966	1992	1959	1968	1971	1998

e Estimated

HAWAII, ISLAND OF OAHU
16212800 KIPAPA STREAM NEAR WAHIAWA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1957 - 1999	
ANNUAL TOTAL	2087.09	3568.13		
ANNUAL MEAN	5.72	9.78	10.7	
HIGHEST ANNUAL MEAN			25.2	1982
LOWEST ANNUAL MEAN			3.85	1998
HIGHEST DAILY MEAN	108 Dec 31	108 Dec 31	852	Apr 15 1963
LOWEST DAILY MEAN	.00 Mar 12	.30 Oct 11	.00	Jun 18 1959
ANNUAL SEVEN-DAY MINIMUM	.00 Mar 12	.38 Oct 6	.00	Jun 18 1959
ANNUAL RUNOFF (AC-FT)	4140	7080	7780	
10 PERCENT EXCEEDS	17	26	24	
50 PERCENT EXCEEDS	1.3	4.4	2.9	
90 PERCENT EXCEEDS	.32	.85	.36	



HAWAII, ISLAND OF OAHU
16213000 WAIKELE STREAM AT WAIPAHU

LOCATION.--Lat 21°23'11", long 158°00'49", Hydrologic Unit 20060000, on left bank 300 ft upstream from bridge on Highway 90, and 0.3 mi southwest of former sugar refinery at Waipahu.

DRAINAGE AREA.--45.7 mi².

PERIOD OF RECORD.--June to October 1951, December 1951 to October 1959, July 1960 to current year.

REVISED RECORDS.--WSP 1639: 1955(M). WSP 1937: Drainage area. WSP 2137: 1965.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1.37 ft above mean sea level (by stadia survey). Prior to July 1, 1960, at site 300 ft downstream at datum 1.30 ft higher.

REMARKS.--Records computed by Vaughn Kunishige. Records good.

AVERAGE DISCHARGE.--46 years (water years 1953-59, 1961-99), 40.4 ft³/s (29,270 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,600 ft³/s, November 28, 1954, gage height, 14.82 ft, site and datum then in use, from rating curve extended above 730 ft³/s on basis of slope-area measurement of peak flow; no flow for part of February 25, 1978.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,300 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Dec. 31	0445	*1,350	*4.80	No other peak greater than base discharge.			

Minimum discharge, 14 ft³/s, October 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

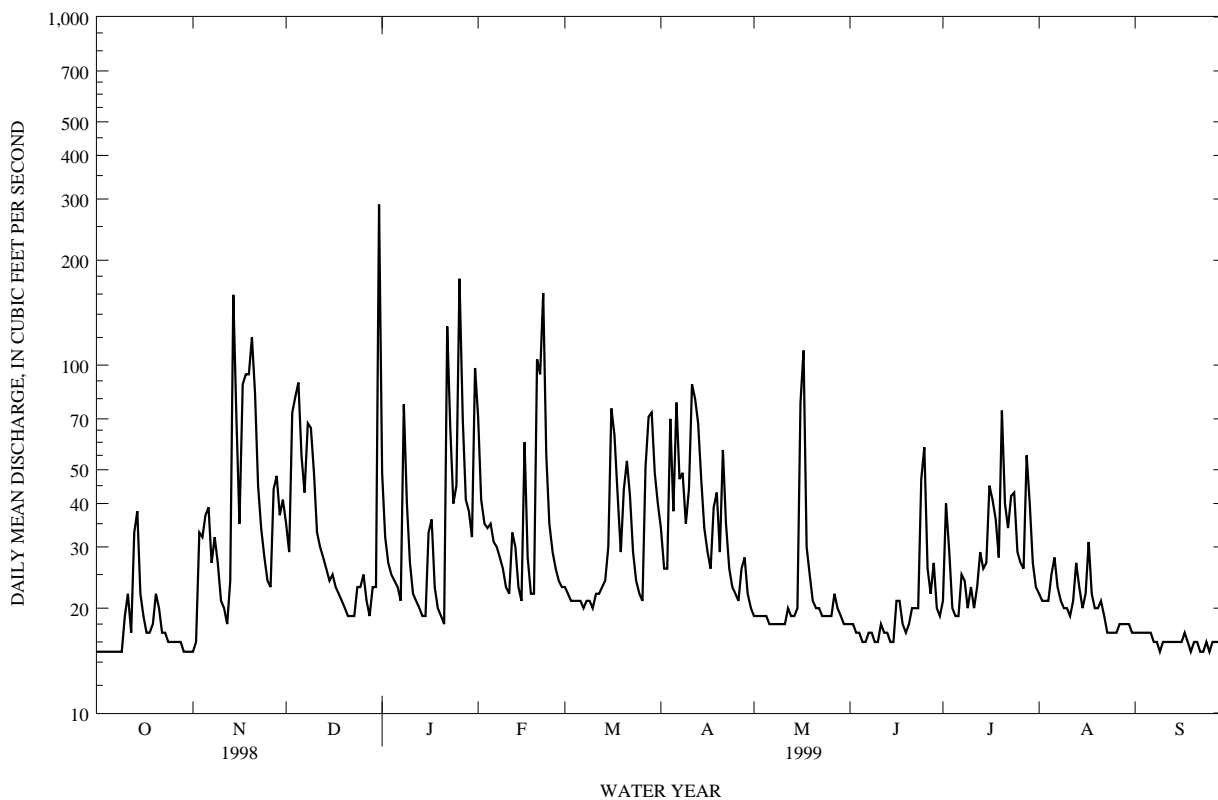
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15	15	35	49	71	23	34	19	18	21	22	17
2	15	16	29	32	41	22	26	19	18	40	21	17
3	15	33	73	27	35	21	26	19	17	29	21	17
4	15	32	81	25	34	21	70	19	17	20	21	17
5	15	37	89	24	35	21	38	19	16	19	25	17
6	15	39	55	23	31	21	78	18	16	19	28	17
7	15	27	43	21	30	20	47	18	17	25	23	16
8	15	32	68	77	28	21	49	18	17	24	21	16
9	15	27	66	40	26	21	35	18	16	20	20	15
10	19	21	49	27	23	20	44	18	16	23	20	16
11	22	20	33	22	22	22	88	18	18	20	19	16
12	17	18	30	21	33	22	80	20	17	23	21	16
13	33	24	28	20	30	23	68	19	17	29	27	16
14	38	159	26	19	23	24	47	19	16	26	23	16
15	22	71	24	19	21	30	34	20	16	27	20	16
16	19	35	25	33	60	75	29	78	21	45	22	16
17	17	88	23	36	28	63	26	110	21	41	31	17
18	17	94	22	23	22	42	39	30	18	36	22	16
19	18	94	21	20	22	29	43	25	17	28	20	15
20	22	120	20	19	104	44	29	21	18	74	20	16
21	20	83	19	18	94	53	57	20	20	40	21	16
22	17	45	19	129	161	42	35	20	20	34	19	15
23	17	34	19	66	55	29	26	19	20	42	17	15
24	16	28	23	40	35	24	23	19	47	43	17	16
25	16	24	23	45	29	22	22	19	58	29	17	15
26	16	23	25	177	26	21	21	19	26	27	17	16
27	16	44	21	70	24	51	26	22	22	26	18	16
28	16	48	19	41	23	71	28	20	27	55	18	16
29	15	37	23	38	---	73	22	19	20	40	18	17
30	15	41	23	32	---	49	20	18	19	27	18	16
31	15	---	289	98	---	40	---	18	---	23	17	---
TOTAL	558	1409	1343	1331	1166	1060	1210	758	626	975	644	483
MEAN	18.0	47.0	43.3	42.9	41.6	34.2	40.3	24.5	20.9	31.5	20.8	16.1
MAX	38	159	289	177	161	75	88	110	58	74	31	17
MIN	15	15	19	18	21	20	20	18	16	19	17	15
AC-FT	1110	2790	2660	2640	2310	2100	2400	1500	1240	1930	1280	958

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1953 - 1999, BY WATER YEAR (WY)

MEAN	32.6	50.4	49.3	60.3	54.1	54.0	49.5	32.6	24.2	29.6	25.9	22.5
MAX	97.8	198	146	222	179	195	235	99.3	51.5	76.8	90.0	68.1
(WY)	1992	1966	1966	1969	1955	1991	1963	1965	1980	1989	1958	1994
MIN	7.22	12.2	13.3	14.7	7.72	6.13	18.4	14.9	10.6	9.08	7.50	6.28
(WY)	1978	1954	1954	1986	1978	1978	1961	1954	1981	1985	1984	1975

HAWAII, ISLAND OF OAHU
16213000 WAIKELE STREAM AT WAIPAHO--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1953 - 1999	
ANNUAL TOTAL	9628		11563		40.4	
ANNUAL MEAN	26.4		31.7		77.3	
HIGHEST ANNUAL MEAN					18.5	
LOWEST ANNUAL MEAN					1969	
HIGHEST DAILY MEAN	289	Dec 31	289	Dec 31	2590	Mar 21 1991
LOWEST DAILY MEAN	15	Aug 16	15	Oct 1	.61	Feb 25 1978
ANNUAL SEVEN-DAY MINIMUM	15	Sep 30	15	Oct 1	2.5	Feb 24 1978
ANNUAL RUNOFF (AC-FT)	19100		22940		29270	
10 PERCENT EXCEEDS	41		59		63	
50 PERCENT EXCEEDS	19		22		24	
90 PERCENT EXCEEDS	16		16		12	



HAWAII, ISLAND OF OAHU
16213000 WAIKELE STREAM AT WAIPAHO--Continued
WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967-95, January to September 1999.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: April 1973 to September 1981. January to September 1999.

WATER TEMPERATURE: April 1973 to September 1981. January to September 1999.

SUSPENDED-SEDIMENT DISCHARGE: July 1972 to August 1993.

INSTRUMENTATION.--Specific conductance and temperature monitor from April 1973 to September 1981, and January to September 1999. Automatic water-quality (point) sampler from March to September 1999.

REMARKS.--Water-quality samples were collected monthly beginning in March 1999. Monthly samples were collected near the centroid of flow using the open-bottle sampling method. Additional samples were collected during storm events (May 16 and June 25) using an automatic (point) sampler located on the left bank of the stream. Missing daily record from Jan. 18 to Mar. 2 was caused by vandalism.

EXTREMES FOR THE PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum recorded (water years 1974, 1976-81), 796 microsiemens per centimeter, Dec. 1, 1980; minimum (water years 1974, 1976-80), 30 microsiemens per centimeter, Apr. 19, 1974.

WATER TEMPERATURE: Maximum recorded (water years 1973-74, 1976-81), 30.0°C, May 6, 1973; minimum (water years 1974, 1976-81), 16.0°C, Mar. 16, 1976.

SEDIMENT CONCENTRATION: Maximum daily mean, 3,420 mg/L, Feb. 7, 1976; minimum daily mean, 1 mg/L, Mar. 16, 20-22, 1989, July 10, 1990.

SEDIMENT DISCHARGE: Maximum daily, 32,200 tons, Apr. 19, 1974; minimum daily, less than 0.01 ton, Aug. 29, 30, 1992.

EXTREMES FOR THE CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum, 723 microsiemens per centimeter, May 26; minimum, 93 microsiemens per centimeter, May 16.

WATER TEMPERATURE: Maximum, 24.5°C on several days; minimum, 19.5°C, Mar. 21.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	OXYGEN, DIS- SOLVED (MG/L) (00300)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)
MAR									
15...	1250	30	96	8.3	412	22.5	12	11	2.2
APR									
19...	1350	37	--	--	271	21.5	6.8	6.6	1.5
MAY									
12...	1300	20	90	7.7	455	23.0	13	11	2.2
16...	2200	308	--	--	93	22.5	4.2	2.5	2.4
JUN									
08...	1030	16	93	7.9	503	22.5	14	12	2.4
25...	0640	68	--	--	159	21.5	5.1	3.8	1.2
JUL									
16...	1050	36	90	7.7	278	23.0	8.3	7.1	1.7
AUG									
10...	1120	22	83	7.2	443	22.5	13	12	2.1
31...	1300	17	91	7.7	498	23.5	--	--	--
SEP									
09...	1000	16	80	7.0	521	22.0	14	14	2.3

HAWAII, ISLAND OF OAHU
16213000 WAIKELE STREAM AT WAIPAHU--Continued
WATER-QUALITY RECORDS

DATE	SODIUM, DIS- SOLVED AS NA) (00930)	ALKA- LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	BICAR- BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	CHLO- RIDE, DIS- SOLVED AS CL) (00940)	FLUO- RIDE, DIS- SOLVED AS F) (00950)	SILICA, DIS- SOLVED AS SIO2) (00955)	SULFATE DIS- SOLVED AS SO4) (00945)	NITRO- GEN, AMMONIA DIS- SOLVED AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS. AS N) (00623)
MAR									
15...	48	54	66	80	.1	47	15	<.02	<.1
APR									
19...	28	31	38	48	<.1	27	8.9	.03	<.1
MAY									
12...	50	58	71	83	.1	49	16	.02	.1
16...	8.4	20	24	11	<.1	7.3	4.5	<.02	E.08
JUN									
08...	58	59	72	98	.1	55	19	.06	E.07
25...	18	20	--	27	<.1	15	6.2	.07	.3
JUL									
16...	32	36	44	51	.2	31	9.1	<.02	.2
AUG									
10...	54	55	67	85	.1	55	18	.02	.1
31...	--	62	75	--	--	--	--	--	--
SEP									
09...	64	61	74	100	.1	61	21	.04	E.08

DATE	NITRO- GEN,AM- MONIA + ORGANIC TOTAL AS N) (00625)	NITRO- GEN, NO2+NO3 DIS- SOLVED AS N) (00631)	NITRO- GEN, NITRITE DIS- SOLVED AS N) (00613)	PHOS- PHORUS DIS- SOLVED AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED AS P) (00671)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED AS FE) (70300)	IRON, DIS- SOLVED AS FE) (01046)	MANGA- NESE, DIS- SOLVED AS MN) (01056)	
MAR									
15...	E.08	1.2	<.01	.14	.15	.16	271	10	40
APR									
19...	.1	.51	<.01	.073	.06	.096	160	23	22
MAY									
12...	.2	1.3	<.01	.15	.14	.17	284	13	38
16...	1.7	.25	<.01	.046	.04	.58	62	240	<3
JUN									
08...	<.1	1.6	<.01	.17	.19	.18	336	E7	45
25...	.5	.36	<.01	.043	.04	.11	96	100	12
JUL									
16...	.2	.74	<.01	.083	.08	.12	172	13	24
AUG									
10...	.1	1.3	<.01	.16	.14	.17	278	<10	34
31...	--	--	--	--	--	--	--	--	--
SEP									
09...	.1	1.7	<.01	.19	.20	.19	314	E7	38

DATE	CARBON, ORGANIC DIS- SOLVED AS C) (00681)	CARBON, ORGANIC SUS- PENDED TOTAL AS C) (00689)	PH WATER FILTERED FIELD (STAND- ARD UNITS) (99900)	
MAR				
15...	.7	.3	7	7.6
APR				
19...	1.4	.5	12.0	7.5
MAY				
12...	1.5	--	5	7.6
16...	3.4	>4.3	1180	7.8
JUN				
08...	.4	.3	3	7.4
25...	4.5	2.3	45	8.2
JUL				
16...	1.9	.6	17	7.3
AUG				
10...	.7	.3	7	7.5
31...	--	--	6	7.7
SEP				
09...	.4	.3	4	7.4

E Estimated

HAWAII, ISLAND OF OAHU
16213000 WAIKELE STREAM AT WAIPAHU--Continued
WATER-QUALITY RECORDS

DATE	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)	ANTI- MONY, DIS- SOLVED (UG/L AS SB) (01095)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR) (01030)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)
JUN 25...	28	<1	<1	3	<1	<1	<1.0	<1
JUL 16...	6	<1	<1	4	<1	<1	<1.0	<1
AUG 10...	2	<1	<1	6	<1	<1	<1.0	<1
SEP 09...	2	<1	<1	7	<1	<1	<1.0	<1

DATE	COPPER, DIS- SOLVED (UG/L AS CU) (01040)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	URANIUM NATURAL DIS- SOLVED (UG/L AS U) (22703)
JUN 25...	2	<1	<1	<1	<1	<1	<1	<1
JUL 16...	<1	<1	<1	<1	<1	<1	1	<1
AUG 10...	4	<1	<1	<1	<1	<1	3	<1
SEP 09...	1	<1	<1	<1	<1	<1	<1	<1

DATE	2,6-DI- ETHYL ANILINE WAT FLT 0.7 U GF, REC (UG/L) (82660)	ACETO- CHLOR, WATER FLTRD REC (UG/L) (49260)	ALA- CHLOR, WATER, DISS, REC, (UG/L) (46342)	ALPHA BHC DIS- SOLVED (UG/L) (34253)	ATRA- ZINE, WATER, DISS, REC (UG/L) (39632)	BEN- FLUR- ALIN WAT FLD 0.7 U GF, REC (UG/L) (82673)	BUTYL- ATE, WATER, DISS, REC (UG/L) (04028)	CAR- BARYL WATER FLTRD 0.7 U GF, REC (UG/L) (82680)	CARBO- FURAN WATER FLTRD 0.7 U GF, REC (UG/L) (82674)	CHLOR- PYRIFOS DIS- SOLVED (UG/L) (38933)
JUN 25...	<.003	<.002	<.002	<.002	<.004	<.002	<.002	E.0124	<.003	<.004
JUL 16...	<.003	<.002	<.002	<.002	<.001	<.002	<.002	<.003	<.003	<.004
AUG 10...	<.003	<.002	<.002	<.002	.0062	<.002	<.002	<.003	<.003	<.004
SEP 09...	<.003	<.002	<.002	<.002	.0058	<.002	<.002	<.003	<.003	<.004

DATE	CYANA- ZINE, WATER, DISS, REC (UG/L) (04041)	DCPA WATER FLTRD 0.7 U GF, REC (UG/L) (82682)	DEETHYL ATRA- ZINE, WATER, DISS, REC (UG/L) (04040)	DI- AZINON, DIS- SOLVED (UG/L) (39572)	DI- ELDRIN DIS- SOLVED (UG/L) (39381)	DISUL- FOTON WATER FLTRD 0.7 U GF, REC (UG/L) (82677)	EPTC WATER FLTRD 0.7 U GF, REC (UG/L) (82668)	ETHAL- FLUR- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82663)	ETHO- PROP WATER FLTRD 0.7 U GF, REC (UG/L) (82672)	FONOFOS WATER DISS REC (UG/L) (04095)
JUN 25...	<.004	<.002	<.002	.0083	<.001	<.017	<.002	<.004	<.003	<.003
JUL 16...	<.004	<.002	<.002	<.002	<.001	<.017	<.002	<.004	<.003	<.003
AUG 10...	<.004	<.002	E.0029	<.002	<.001	<.017	<.002	<.004	<.003	<.003
SEP 09...	<.004	<.002	E.0040	<.002	<.001	<.017	<.002	<.004	<.003	<.003

E Estimated

HAWAII, ISLAND OF OAHU
16213000 WAIKELE STREAM AT WAIPAHU--Continued
WATER-QUALITY RECORDS

DATE	LINDANE DIS- SOLVED (UG/L) (39341)	LIN- URON WATER FLTRD 0.7 U GF, REC (UG/L) (82666)	MALA- THION, DIS- SOLVED (UG/L) (39532)	METHYL AZIN- PHOS WAT FLT 0.7 U GF, REC (UG/L) (82686)	METHYL PARA- THION WAT FLT 0.7 U GF, REC (UG/L) (82667)	METO- LACHLOR WATER DISSOLV (UG/L) (39415)	METRI- BUZIN WATER DISSOLV (UG/L) (82630)	MOL- INATE WATER FLTRD 0.7 U GF, REC (UG/L) (82671)	NAPROP- AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82684)	P,P' DDE DISSOLV (UG/L) (34653)
	JUN 25...	<.004	<.002	<.005	<.001	<.006	<.002	<.004	<.004	<.003
JUL 16...	<.004	<.002	<.005	<.001	<.006	<.002	<.004	<.004	<.003	<.006
AUG 10...	<.004	<.002	<.005	<.001	<.006	<.002	<.004	<.004	<.003	<.006
SEP 09...	<.004	<.002	<.005	<.001	<.006	<.002	<.004	<.004	<.003	<.006
DATE	PARA- THION, DIS- SOLVED (UG/L) (39542)	PENDE- METH- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82683)	PEB- ULATE WATER FILTRD 0.7 U GF, REC (UG/L) (82669)	PER- METHRIN CIS WAT FLT 0.7 U GF, REC (UG/L) (82687)	PHORATE WATER FLTRD 0.7 U GF, REC (UG/L) (82664)	PRO- METON, WATER, DISS, REC (UG/L) (04037)	PRON- AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82676)	PROP- CHLOR, WATER, DISS, REC (UG/L) (04024)		
JUN 25...	<.004	<.004	<.004	<.005	<.002	<.018	<.003	<.007		
JUL 16...	<.004	<.004	<.004	<.005	<.002	<.018	<.003	<.007		
AUG 10...	<.004	<.004	<.004	<.005	<.002	<.018	<.003	<.007		
SEP 09...	<.004	<.004	<.004	<.005	<.002	<.018	<.003	<.007		
DATE	PRO- PANIL WATER FLTRD 0.7 U GF, REC (UG/L) (82679)	PRO- PARGITE WATER FLTRD 0.7 U GF, REC (UG/L) (82685)	SI- MAZINE, WATER, DISS, REC (UG/L) (04035)	TEBU- THIURON WATER FLTRD 0.7 U GF, REC (UG/L) (82670)	TER- BACIL WATER FLTRD 0.7 U GF, REC (UG/L) (82665)	TER- BUFOS WATER FLTRD 0.7 U GF, REC (UG/L) (82675)	THIO- BENCARB WATER FLTRD 0.7 U GF, REC (UG/L) (82681)	TRI- FLUR- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82661)		
JUN 25...	<.004	<.013	.0160	<.010	<.007	<.013	<.002	<.002		
JUL 16...	<.004	<.013	<.005	<.010	<.007	<.013	<.002	<.002		
AUG 10...	<.004	<.013	<.005	<.010	<.007	<.013	<.002	<.002		
SEP 09...	<.004	<.013	<.005	<.010	<.007	<.013	<.002	<.002		

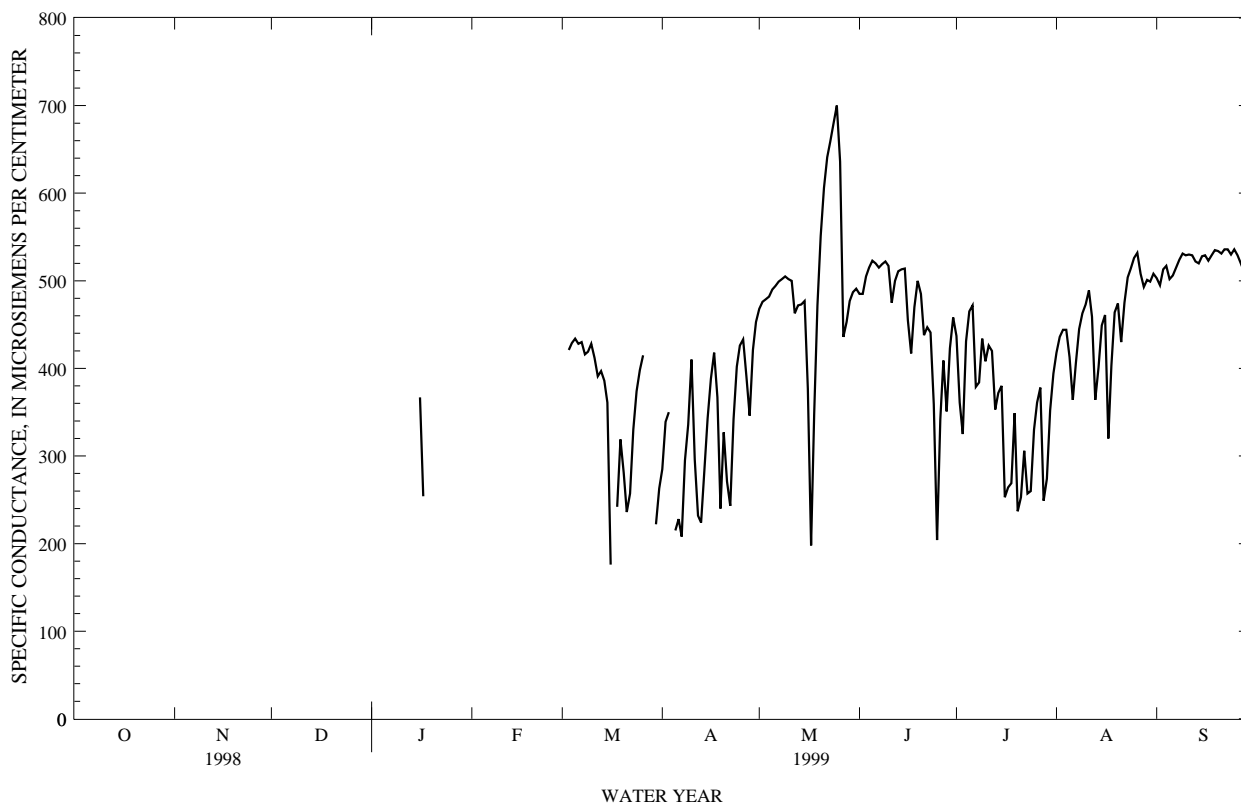
HAWAII, ISLAND OF OAHU
16213000 WAIKELE STREAM AT WAIPAHO--Continued
WATER-QUALITY RECORDS

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999												
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	---	---	---	---	---	---	---	---	---	---	---	---
2	---	---	---	---	---	---	---	---	---	---	---	---
3	---	---	---	---	---	---	---	---	---	---	---	---
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9	---	---	---	---	---	---	---	---	---	---	---	---
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12	---	---	---	---	---	---	---	---	---	---	---	---
13	---	---	---	---	---	---	---	---	---	---	---	---
14	---	---	---	---	---	---	---	---	---	---	---	---
15	---	---	---	---	---	---	---	---	---	---	---	---
16	---	---	---	---	---	---	---	---	---	434	170	367
17	---	---	---	---	---	---	---	---	---	321	170	254
18	---	---	---	---	---	---	---	---	---	---	---	---
19	---	---	---	---	---	---	---	---	---	---	---	---
20	---	---	---	---	---	---	---	---	---	---	---	---
21	---	---	---	---	---	---	---	---	---	---	---	---
22	---	---	---	---	---	---	---	---	---	---	---	---
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28	---	---	---	---	---	---	---	---	---	---	---	---
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30	---	---	---	---	---	---	---	---	---	---	---	---
31	---	---	---	---	---	---	---	---	---	---	---	---
MONTH	---	---	---	---	---	---	---	---	---	---	---	---
	FEBRUARY			MARCH			APRIL			MAY		
1	---	---	---	---	---	---	312	258	285	474	464	468
2	---	---	---	---	---	---	360	312	339	479	473	476
3	---	---	---	425	418	421	383	289	350	481	475	479
4	---	---	---	435	425	429	---	---	---	497	467	482
5	---	---	---	436	432	434	258	173	215	500	480	490
6	---	---	---	432	426	428	328	104	228	502	488	494
7	---	---	---	431	428	430	282	134	208	504	496	499
8	---	---	---	430	404	416	308	282	295	506	500	502
9	---	---	---	422	406	419	383	305	336	508	501	505
10	---	---	---	438	420	428	425	383	410	507	494	502
11	---	---	---	439	359	412	411	196	296	521	469	500
12	---	---	---	408	369	391	256	210	232	497	443	463
13	---	---	---	408	386	397	240	210	224	487	455	472
14	---	---	---	397	374	386	337	225	283	486	461	473
15	---	---	---	415	221	361	360	336	343	483	444	477
16	---	---	---	232	146	176	408	360	388	484	96	377
17	---	---	---	---	---	---	440	404	418	271	113	198
18	---	---	---	295	175	242	439	202	367	420	271	348
19	---	---	---	343	295	319	298	204	240	519	420	472
20	---	---	---	361	209	281	352	298	327	578	519	551
21	---	---	---	253	193	236	373	181	271	627	578	606
22	---	---	---	299	227	257	298	188	243	650	627	641
23	---	---	---	359	299	330	384	298	342	668	647	659
24	---	---	---	389	359	374	421	377	402	690	668	680
25	---	---	---	408	387	398	431	421	426	714	682	700
26	---	---	---	434	403	415	439	428	433	723	480	636
27	---	---	---	---	---	---	449	296	391	484	414	436
28	---	---	---	212	155	182	395	303	346	468	434	453
29	---	---	---	---	---	---	443	395	421	484	468	477
30	---	---	---	272	171	222	469	435	453	493	484	487
31	---	---	---	286	228	263	---	---	---	496	488	491
MONTH	---	---	---	---	---	---	---	---	---	723	96	500

HAWAII, ISLAND OF OAHU
16213000 WAIKELE STREAM AT WAIPAHO--Continued
WATER-QUALITY RECORDS

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAY	JUNE			JULY			AUGUST			SEPTEMBER		
	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
1	496	480	485	475	379	437	429	406	418	513	466	503
2	491	481	485	424	136	361	451	419	436	505	470	495
3	510	491	505	402	174	325	449	430	444	535	495	513
4	523	509	515	454	402	431	453	433	444	535	507	517
5	526	519	523	475	454	465	454	327	413	523	486	502
6	522	518	520	479	445	472	394	332	364	515	493	506
7	519	511	515	445	319	379	434	366	406	534	494	515
8	525	516	519	404	355	384	461	426	445	532	497	524
9	528	512	522	450	404	434	470	460	463	532	530	531
10	523	514	517	452	370	408	493	455	473	538	507	529
11	516	452	475	450	400	426	493	472	489	533	528	530
12	509	490	500	455	376	420	476	418	459	532	521	529
13	514	509	511	410	319	353	418	343	364	532	504	522
14	515	511	513	393	347	372	431	369	401	534	497	520
15	516	513	514	417	318	380	465	431	449	538	504	528
16	518	337	455	318	188	253	475	292	461	539	509	529
17	447	371	417	308	173	264	366	275	320	532	502	523
18	490	447	470	329	189	269	439	366	403	536	512	529
19	508	490	500	375	323	349	491	439	464	538	531	535
20	510	430	485	385	133	237	496	399	474	545	526	534
21	451	426	438	306	196	253	451	399	430	549	509	531
22	472	417	447	335	256	306	493	451	475	539	531	536
23	464	414	441	311	210	257	513	493	504	542	529	536
24	485	126	359	318	195	260	535	495	514	544	505	530
25	282	126	204	355	292	330	541	504	526	545	531	536
26	391	282	342	369	348	361	541	512	532	539	518	529
27	423	391	409	393	354	378	535	486	508	532	491	520
28	406	320	351	354	163	249	503	483	493	528	498	511
29	447	389	423	326	197	274	506	495	501	521	490	504
30	473	443	458	376	326	352	513	476	499	527	492	513
31	---	---	---	406	376	394	513	500	508	---	---	---
MONTH	528	126	461	479	133	349	541	275	454	549	466	522



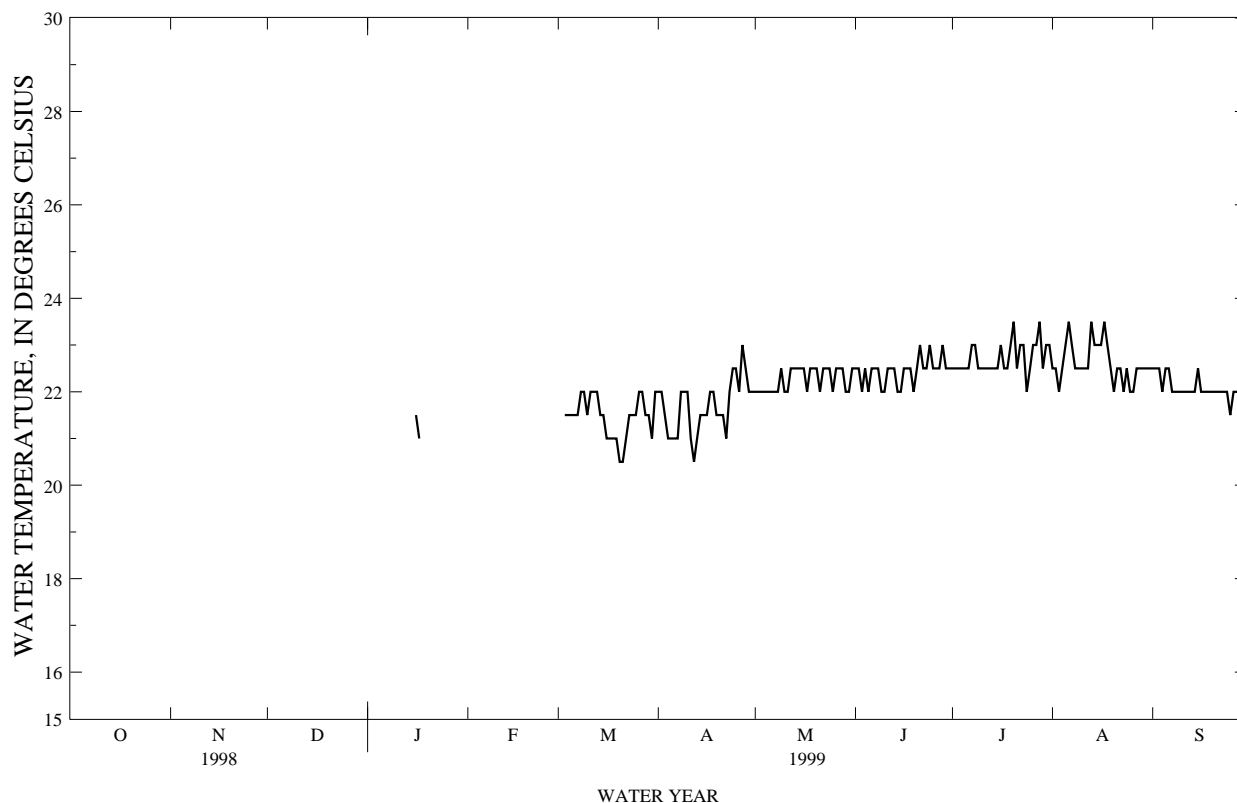
HAWAII, ISLAND OF OAHU
16213000 WAIKELE STREAM AT WAIPAHO--Continued
WATER-QUALITY RECORDS

WATER TEMPERATURE, (DEG. C), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999												
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	---	---	---	---	---	---	---	---	---	---	---	---
2	---	---	---	---	---	---	---	---	---	---	---	---
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13	---	---	---	---	---	---	---	---	---	---	---	---
14	---	---	---	---	---	---	---	---	---	---	---	---
15	---	---	---	---	---	---	---	---	---	---	---	---
16	---	---	---	---	---	---	---	---	---	23.0	20.5	21.5
17	---	---	---	---	---	---	---	---	---	21.5	20.0	21.0
18	---	---	---	---	---	---	---	---	---	---	---	---
19	---	---	---	---	---	---	---	---	---	---	---	---
20	---	---	---	---	---	---	---	---	---	---	---	---
21	---	---	---	---	---	---	---	---	---	---	---	---
22	---	---	---	---	---	---	---	---	---	---	---	---
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24	---	---	---	---	---	---	---	---	---	---	---	---
25	---	---	---	---	---	---	---	---	---	---	---	---
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27	---	---	---	---	---	---	---	---	---	---	---	---
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30	---	---	---	---	---	---	---	---	---	---	---	---
31	---	---	---	---	---	---	---	---	---	---	---	---
MONTH	---	---	---	---	---	---	---	---	---	---	---	---
	FEBRUARY			MARCH			APRIL			MAY		
1	---	---	---	---	---	---	23.0	21.0	22.0	23.0	21.5	22.0
2	---	---	---	---	---	---	23.0	21.0	22.0	23.5	21.5	22.0
3	---	---	---	22.5	20.5	21.5	23.0	21.0	21.5	23.0	21.0	22.0
4	---	---	---	22.5	20.5	21.5	21.5	20.0	21.0	23.5	21.0	22.0
5	---	---	---	23.0	21.0	21.5	23.0	20.0	21.0	23.5	21.0	22.0
6	---	---	---	22.0	21.0	21.5	21.5	20.5	21.0	23.5	21.0	22.0
7	---	---	---	23.0	21.0	21.5	23.0	20.0	21.0	23.5	21.0	22.0
8	---	---	---	23.0	21.0	22.0	23.0	21.0	22.0	23.5	21.0	22.0
9	---	---	---	23.0	21.5	22.0	23.5	20.5	22.0	24.0	21.5	22.5
10	---	---	---	22.5	21.0	21.5	23.0	21.0	22.0	23.5	21.5	22.0
11	---	---	---	23.5	21.0	22.0	22.0	20.5	21.0	23.0	21.5	22.0
12	---	---	---	23.0	21.5	22.0	22.0	20.0	20.5	23.0	21.5	22.5
13	---	---	---	23.0	21.5	22.0	22.5	20.0	21.0	23.5	21.5	22.5
14	---	---	---	22.5	21.0	21.5	22.5	20.0	21.5	24.0	21.5	22.5
15	---	---	---	22.5	21.0	21.5	23.0	20.5	21.5	23.5	21.5	22.5
16	---	---	---	22.0	20.5	21.0	23.0	20.5	21.5	24.0	21.5	22.5
17	---	---	---	23.0	20.5	21.0	23.5	21.0	22.0	22.5	21.0	22.0
18	---	---	---	22.0	20.5	21.0	23.0	21.5	22.0	24.0	21.0	22.5
19	---	---	---	21.5	20.5	21.0	23.0	20.5	21.5	24.0	22.0	22.5
20	---	---	---	21.0	20.0	20.5	22.5	21.0	21.5	23.5	21.5	22.5
21	---	---	---	21.5	19.5	20.5	22.0	21.0	21.5	23.0	21.5	22.0
22	---	---	---	22.0	20.0	21.0	22.5	20.0	21.0	23.5	21.5	22.5
23	---	---	---	22.5	20.5	21.5	23.5	21.0	22.0	24.0	21.5	22.5
24	---	---	---	23.0	21.0	21.5	24.0	21.0	22.5	24.0	21.5	22.5
25	---	---	---	23.0	20.5	21.5	24.0	21.5	22.5	23.0	21.5	22.0
26	---	---	---	23.0	21.0	22.0	23.5	21.5	22.0	23.5	21.5	22.5
27	---	---	---	23.0	21.0	22.0	24.0	21.5	23.0	23.5	22.0	22.5
28	---	---	---	22.0	20.5	21.5	23.5	21.5	22.5	23.5	21.5	22.5
29	---	---	---	22.5	20.5	21.5	23.0	21.5	22.0	23.0	21.5	22.0
30	---	---	---	22.5	20.5	21.0	23.0	21.0	22.0	23.0	21.5	22.0
31	---	---	---	23.0	21.0	22.0	---	---	---	23.5	21.5	22.5
MONTH	---	---	---	---	---	---	24.0	20.0	21.7	24.0	21.0	22.3

HAWAII, ISLAND OF OAHU
16213000 WAIKELE STREAM AT WAIPAHO--Continued
WATER-QUALITY RECORDS

WATER TEMPERATURE, (DEG. C), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
1	24.0	21.5	22.5	24.5	21.5	22.5	22.5	22.0	22.5	24.0	21.5	22.5
2	23.5	21.5	22.5	23.5	22.0	22.5	24.0	21.5	22.5	23.5	21.5	22.5
3	23.5	21.5	22.0	24.0	21.5	22.5	22.5	21.5	22.0	23.5	21.5	22.5
4	24.0	21.5	22.5	23.5	21.5	22.5	23.0	22.0	22.5	23.5	21.5	22.0
5	23.5	21.5	22.0	23.5	21.5	22.5	24.0	22.0	23.0	24.0	21.5	22.5
6	24.0	21.5	22.5	23.5	21.5	22.5	24.5	22.5	23.5	23.5	21.5	22.5
7	24.0	21.5	22.5	24.5	22.0	23.0	24.5	22.0	23.0	23.5	21.5	22.0
8	24.0	21.5	22.5	24.0	22.5	23.0	24.0	22.0	22.5	23.0	21.5	22.0
9	23.0	21.5	22.0	23.5	22.0	22.5	24.0	21.5	22.5	23.5	21.5	22.0
10	23.5	21.5	22.0	24.0	21.5	22.5	24.0	21.5	22.5	23.5	21.5	22.0
11	23.5	21.5	22.5	24.0	22.0	22.5	23.5	21.5	22.5	23.0	21.5	22.0
12	24.0	21.5	22.5	23.5	22.0	22.5	24.0	21.5	22.5	23.5	21.5	22.0
13	24.0	21.0	22.5	23.5	22.0	22.5	24.5	22.5	23.5	23.5	21.5	22.0
14	23.5	21.5	22.0	23.0	22.0	22.5	24.5	22.5	23.0	23.5	21.5	22.0
15	23.0	21.5	22.0	23.5	22.0	22.5	24.5	22.0	23.0	23.5	21.5	22.5
16	24.5	21.5	22.5	24.5	22.0	23.0	24.0	22.0	23.0	23.0	21.5	22.0
17	23.0	22.0	22.5	23.5	22.0	22.5	24.0	23.0	23.5	23.0	21.5	22.0
18	24.0	21.5	22.5	24.0	22.0	22.5	24.0	22.0	23.0	23.5	21.5	22.0
19	23.0	21.5	22.0	23.5	22.0	23.0	23.5	21.5	22.5	23.5	21.5	22.0
20	24.0	21.5	22.5	24.5	22.5	23.5	22.5	21.5	22.0	23.0	21.5	22.0
21	24.5	22.0	23.0	23.0	22.0	22.5	24.5	21.5	22.5	23.5	21.5	22.0
22	24.0	21.5	22.5	24.0	22.0	23.0	24.0	21.5	22.5	23.5	21.5	22.0
23	24.0	21.5	22.5	23.5	22.0	23.0	23.0	21.5	22.0	23.0	21.5	22.0
24	24.5	21.5	23.0	23.0	21.5	22.0	24.0	21.5	22.5	23.5	21.5	22.0
25	23.5	21.5	22.5	24.0	21.5	22.5	23.5	21.5	22.0	22.5	21.0	21.5
26	23.5	22.0	22.5	24.5	22.5	23.0	23.5	21.5	22.0	23.5	21.0	22.0
27	24.0	21.5	22.5	24.5	22.5	23.0	24.0	21.5	22.5	23.0	21.0	22.0
28	24.5	22.0	23.0	24.5	22.5	23.5	23.5	21.5	22.5	22.5	21.5	22.0
29	23.5	22.0	22.5	23.0	22.0	22.5	24.0	21.5	22.5	23.0	21.0	22.0
30	23.5	22.0	22.5	24.0	22.0	23.0	23.5	21.5	22.5	23.5	21.5	22.0
31	---	---	---	24.5	22.0	23.0	23.5	21.5	22.5	---	---	---
MONTH	24.5	21.0	22.4	24.5	21.5	22.7	24.5	21.5	22.6	24.0	21.0	22.1



HAWAII, ISLAND OF OAHU
16216000 WAIAWA STREAM NEAR PEARL CITY

LOCATION.--Lat 21°23'57", long 157°58'51", Hydrologic Unit 20060000, on left bank 100 ft upstream from lower bridge on Highway 90, 0.6 mi northwest of Pearl City, and 2.0 mi northeast of Waipahu.

DRAINAGE AREA.--26.4 mi².

PERIOD OF RECORD.--June 1952 to current year.

REVISED RECORDS.--WSP 1569: Drainage area, WDR HI-90-1: 1982-89 (M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1.81 ft above mean sea level (State of Hawaii benchmark).

REMARKS.--Records computed by J.R. Mullen. Records poor. Occasional small irrigation diversion and return flow upstream.

AVERAGE DISCHARGE.--47 years (water years 1953-99), 33.7 ft³/s (24,410 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 27,900 ft³/s, October 28, 1981, gage height, 22.46 ft, from rating curve extended above 1,100 ft³/s on basis of slope-area measurements at gage heights 17.1 ft and 20.56 ft; minimum, 1.1 ft³/s on several days in 1984, 1985, and 1999.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 2,300 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan 7	2145	*3,080	*9.82	No other peak greater than base discharge.			

Minimum discharge, 1.1 ft³/s, October 10-12.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.6	1.5	6.5	20	102	2.8	25	3.2	1.6	4.1	4.8	1.4
2	1.5	1.7	5.2	7.1	30	2.3	13	3.0	1.6	6.3	3.6	1.3
3	1.5	1.6	46	4.0	16	2.0	7.3	2.9	1.6	5.3	2.4	1.4
4	1.5	3.3	55	3.0	11	1.8	132	2.8	1.6	2.7	2.2	1.3
5	1.5	23	136	2.5	13	1.7	35	2.8	1.6	1.9	2.9	1.4
6	1.4	63	31	2.3	11	1.7	93	2.7	1.5	1.7	5.7	1.4
7	1.4	6.2	20	220	9.3	1.5	28	2.6	1.5	3.9	3.4	1.4
8	1.3	10	50	92	6.5	1.5	38	2.6	1.5	3.8	2.4	1.5
9	1.2	6.6	34	15	5.2	1.5	23	2.5	1.5	3.5	1.8	1.4
10	1.2	3.8	20	6.7	3.8	1.5	102	2.5	1.5	7.9	1.5	1.4
11	1.1	2.5	10	e4.5	3.3	1.6	314	4.4	1.6	5.2	1.4	1.4
12	1.2	1.7	6.8	e4.0	5.7	2.4	94	3.1	1.6	6.2	1.4	1.4
13	2.2	120	5.8	e3.5	5.9	2.2	105	1.9	1.5	7.3	1.5	1.4
14	8.2	227	4.8	e3.0	3.4	2.6	33	1.8	1.6	6.0	1.7	1.4
15	4.1	27	3.5	e2.8	2.5	84	19	2.0	1.6	15	1.6	1.4
16	3.4	57	2.9	e6.0	36	161	12	34	1.6	24	3.2	1.3
17	2.9	80	2.4	e7.0	5.2	53	8.3	84	1.6	52	6.4	1.3
18	2.9	199	1.9	e3.0	3.1	22	28	11	1.6	17	2.7	1.4
19	5.4	60	1.6	e2.0	3.7	11	20	5.1	1.6	9.3	1.8	1.3
20	2.2	85	1.4	e1.9	54	13	10	3.2	1.6	144	1.5	1.3
21	1.6	57	1.3	1.9	105	29	60	2.6	1.5	23	1.3	1.3
22	1.5	32	1.2	127	225	18	13	2.8	2.1	19	1.3	1.3
23	1.5	12	1.2	31	46	9.0	6.8	2.2	2.3	17	1.3	1.3
24	1.5	6.3	2.2	39	18	5.1	5.1	2.0	39	25	1.5	1.3
25	1.5	4.2	4.8	27	10	3.6	4.5	2.0	47	12	1.8	1.4
26	1.5	3.4	6.1	341	6.1	2.8	3.8	2.0	8.1	9.4	1.8	1.3
27	1.6	21	3.2	67	4.4	18	8.4	1.9	15	8.8	1.7	1.3
28	1.5	15	4.9	24	3.2	47	6.3	1.9	9.5	26	1.6	1.3
29	1.6	8.4	6.0	15	---	76	4.0	1.9	3.9	13	1.5	1.3
30	1.6	6.6	6.3	11	---	32	3.6	1.8	2.7	7.3	1.4	1.2
31	1.6	---	186	379	---	32	---	1.6	---	5.9	1.4	---
TOTAL	64.7	1145.8	668.0	1473.2	748.3	643.6	1255.1	200.8	162.5	493.5	70.5	40.5
MEAN	2.09	38.2	21.5	47.5	26.7	20.8	41.8	6.48	5.42	15.9	2.27	1.35
MAX	8.2	227	186	379	225	161	314	84	47	144	6.4	1.5
MIN	1.1	1.5	1.2	1.9	2.5	1.5	3.6	1.6	1.5	1.7	1.3	1.2
AC-FT	128	2270	1320	2920	1480	1280	2490	398	322	979	140	80

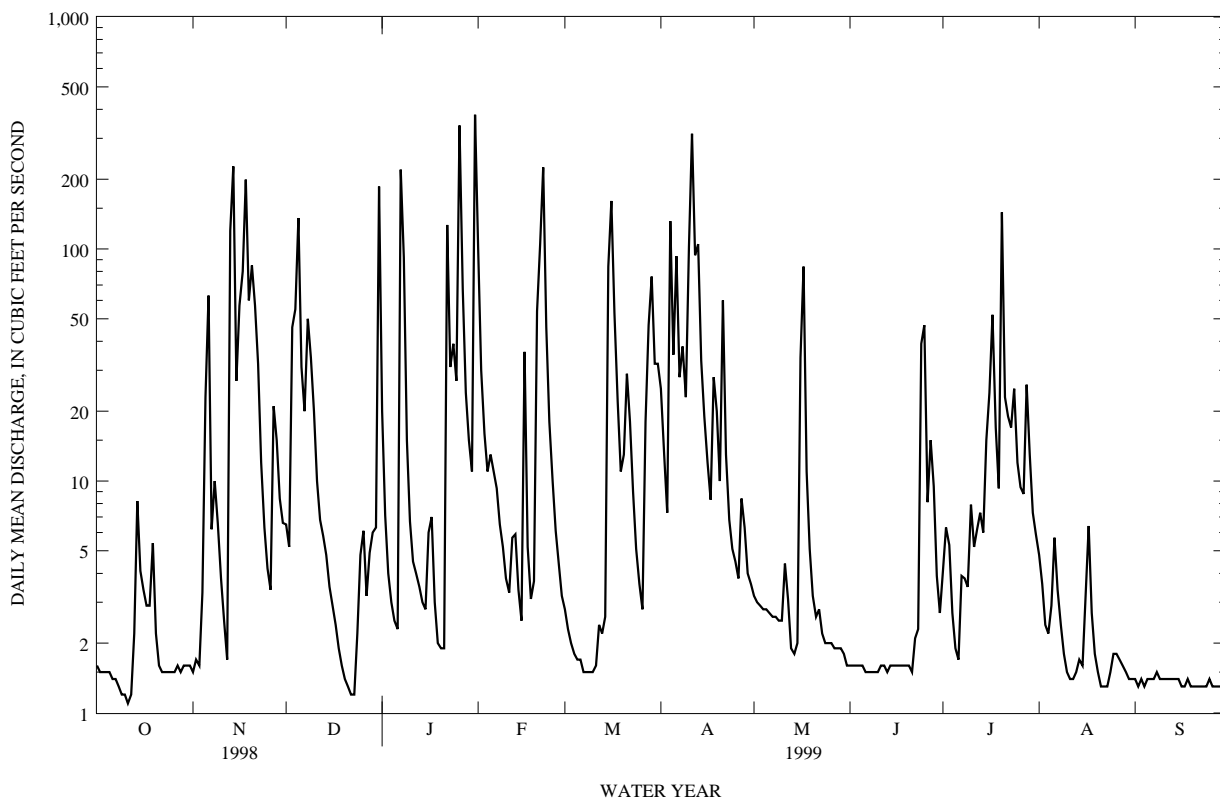
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1999, BY WATER YEAR (WY)

MEAN	28.8	54.6	43.5	45.0	37.7	52.6	41.1	23.3	15.5	26.8	20.9	14.3
MAX	131	295	351	199	208	336	241	131	72.9	149	128	104
(WY)	1967	1997	1988	1969	1955	1980	1974	1965	1987	1970	1982	1992
MIN	1.55	2.54	1.92	1.65	1.66	1.56	1.75	1.55	1.43	1.40	1.28	1.28
(WY)	1985	1990	1984	1986	1986	1993	1992	1996	1984	1984	1984	1984

e Estimated

HAWAII, ISLAND OF OAHU
 16216000 WAIAWA STREAM NEAR PEARL CITY

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1952 - 1999	
ANNUAL TOTAL	5137.8		6966.5		33.7	
ANNUAL MEAN	14.1		19.1		80.8	
HIGHEST ANNUAL MEAN					7.56	1982
LOWEST ANNUAL MEAN						1984
HIGHEST DAILY MEAN	373	Jun 21	379	Jan 31	5150	Mar 24 1994
LOWEST DAILY MEAN	1.1	Oct 11	1.1	Oct 11	1.1	May 18 1993
ANNUAL SEVEN-DAY MINIMUM	1.3	Oct 6	1.3	Oct 6	1.1	May 25 1993
ANNUAL RUNOFF (AC-FT)	10190		13820		24410	
10 PERCENT EXCEEDS	26		51		47	
50 PERCENT EXCEEDS	2.1		3.4		6.4	
90 PERCENT EXCEEDS	1.6		1.4		2.1	



HAWAII, ISLAND OF OAHU
16225800 NORTH HALAWA STREAM NEAR KANEOHE

LOCATION.--Lat 21°24'33", long 157°52'06", Hydrologic Unit 2006000 (Kaneohe quadrangle, 1968, 1:24,000), on right bank, 4.1 mi west of Kaneohe Post Office, and 4.4 mi east of Aiea High School.

DRAINAGE AREA.--1.64 mi².

PERIOD OF RECORD.--April 1991 to September 30, 1999 (discontinued).

REVISED RECORDS.--WDR HI-95-1: 1992-94 (M).

GAGE.--Water-stage recorder. Gage datum is 646.52 ft above mean sea level (by stadia survey).

REMARKS.--Records computed by S.T.M. Young. Records good. Suspended sediment data are collected at this site.

AVERAGE DISCHARGE.--8 years (water years 1992-99), 2.46 ft³/s (1,780 acre ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 470 ft³/s, October 16, 1991, gage height, 6.94 ft, no flow at times each year.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 250 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 7	1845	*335	*5.63	No other peak greater than base discharge.			

Minimum discharge, no flow on many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

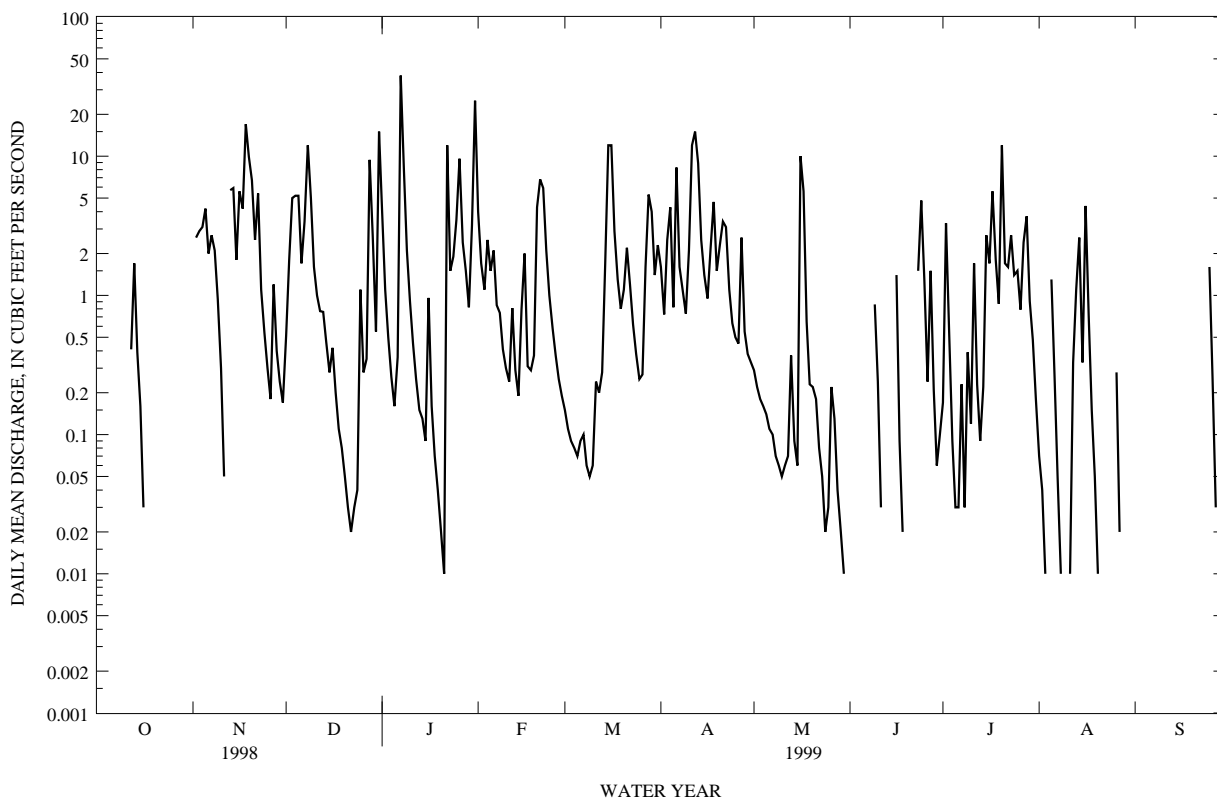
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.51	4.0	4.0	.15	1.6	.29	.00	.17	.07	.00
2	.00	2.6	1.8	1.1	1.7	.11	.73	.22	.00	3.3	.04	.00
3	.00	2.9	5.0	.50	1.1	.09	2.5	.18	.00	.50	.01	.00
4	.00	3.1	5.2	.26	2.5	.08	4.3	.16	.00	.09	.00	.00
5	.00	4.2	5.2	.16	1.5	.07	.82	.14	.00	.03	1.3	.00
6	.00	2.0	1.7	.36	2.1	.09	8.3	.11	.00	.03	.27	.00
7	.00	2.7	3.4	38	.85	.10	1.6	.10	.00	.23	.05	.00
8	.00	2.1	12	8.3	.75	.06	1.1	.07	.00	.03	.01	.00
9	.00	.94	5.0	2.1	.41	.05	.74	.06	.86	.39	.00	.00
10	.00	.30	1.6	.91	.30	.06	2.1	.05	.24	.12	.00	.00
11	.00	.05	1.0	.45	.24	.24	12	.06	.03	1.7	.01	.00
12	.41	.00	.77	.25	.81	.20	15	.07	.00	.23	.33	.00
13	1.7	5.7	.76	.15	.29	.28	8.9	.37	.00	.09	1.1	.00
14	.39	5.9	.46	.13	.19	1.7	2.5	.09	.00	.22	2.6	.00
15	.16	1.8	.28	.09	.79	12	1.4	.06	.00	2.7	.33	.00
16	.03	5.6	.42	.96	2.0	12	.95	10	1.4	1.7	4.4	.00
17	.00	4.2	.20	.16	.31	2.9	2.2	5.6	.09	5.6	.72	.00
18	.00	17	.11	.07	.29	1.3	4.7	.65	.02	1.8	.15	.00
19	.00	9.9	.08	.04	.37	.80	1.5	.23	.00	.87	.05	.06
20	.00	6.7	.05	.02	4.3	1.1	2.3	.22	.00	12	.01	.00
21	.00	2.5	.03	.01	6.8	2.2	3.4	.18	.00	1.7	.00	.00
22	.00	5.4	.02	12	5.9	1.2	3.1	.08	.00	1.6	.00	.10
23	.00	1.1	.03	1.5	2.1	.62	1.1	.05	1.5	2.7	.00	.00
24	.00	.54	.04	1.9	1.0	.38	.63	.02	4.8	1.4	.00	.00
25	.00	.30	1.1	3.5	.58	.25	.50	.03	1.3	1.5	.00	1.6
26	.00	.18	.28	9.6	.37	.27	.45	.22	.24	.79	.28	.26
27	.00	1.2	.35	2.4	.25	1.6	2.6	.13	1.5	2.4	.02	.03
28	.00	.40	9.4	1.5	.19	5.3	.55	.04	.21	3.7	.00	.00
29	.00	.24	2.7	.82	---	4.0	.38	.02	.06	.91	.00	.00
30	.00	.17	.55	3.2	---	1.4	.33	.01	.10	.48	.00	.00
31	.00	---	15	25	---	2.3	---	.00	---	.18	.00	---
TOTAL	2.69	89.72	75.04	119.44	41.99	52.90	88.28	19.51	12.35	49.16	11.75	2.05
MEAN	.087	2.99	2.42	3.85	1.50	1.71	2.94	.63	.41	1.59	.38	.068
MAX	1.7	17	15	38	6.8	12	15	10	4.8	12	4.4	1.6
MIN	.00	.00	.02	.01	.19	.05	.33	.00	.00	.03	.00	.00
AC-FT	5.3	178	149	237	83	105	175	39	24	98	23	4.1

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1991 - 1999, BY WATER YEAR (WY)

	1991	1992	1993	1994	1995	1996	1997	1998	1999
MEAN	2.54	4.28	2.67	3.21	1.66	3.00	2.59	.98	1.45
MAX	4.48	9.63	6.89	8.09	7.87	12.0	5.82	4.53	2.85
(WY)	1992	1997	1993	1994	1994	1994	1997	1997	1993
MIN	.087	.56	1.28	.81	.034	.001	.002	.001	.11
(WY)	1999	1992	1994	1992	1998	1998	1998	1998	1998

HAWAII, ISLAND OF OAHU
 16225800 NORTH HALAWA STREAM NEAR KANEOHE--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1991 - 1999	
ANNUAL TOTAL	340.64		564.88			
ANNUAL MEAN	.93		1.55		2.46	
HIGHEST ANNUAL MEAN					4.28 1994	
LOWEST ANNUAL MEAN					1.39 1998	
HIGHEST DAILY MEAN	33	Jan 1	38	Jan 7	213	Mar 24 1994
LOWEST DAILY MEAN	.00	Feb 12	.00	Oct 1	.00	Nov 28 1991
ANNUAL SEVEN-DAY MINIMUM	.00	Feb 12	.00	Oct 1	.00	Jan 24 1992
ANNUAL RUNOFF (AC-FT)	676		1120		1780	
10 PERCENT EXCEEDS	2.8		4.3		5.7	
50 PERCENT EXCEEDS	.01		.27		.41	
90 PERCENT EXCEEDS	.00		.00		.00	



HAWAII, ISLAND OF OAHU
16225800 NORTH HALAWA STREAM NEAR KANEOHE--Continued

PERIOD OF RECORD.--April 1991 to September 1999 (discontinued).

PERIOD OF DAILY RECORD.--

SUSPENDED SEDIMENT DISCHARGE: April 1991 to September 1999 (discontinued).

INSTRUMENTATION.--Automatic pumping sediment sampler since September 1991.

REMARKS.--Sediment records computed by S.T.M. Young. Records good.

EXTREMES FOR PERIOD OF RECORD.--Sediment concentrations: maximum daily mean 5,620 mg/L (estimated), September 3, 1992; no flow on many days in 1992-99. Sediment discharge: maximum daily, 979 tons (estimated), September 3, 1992; no flow on many days in 1992-99.

EXTREMES FOR CURRENT YEAR.--Sediment concentrations: maximum daily mean, 159 mg/L, January 7; minimum daily mean, 0 mg/L on many days. Sediment discharge: maximum daily, 90 tons, January 7; minimum daily, 0.0 tons on many days.

HAWAII, ISLAND OF OAHU
16225800 NORTH HALAWA STREAM NEAR KANEOHE--Continued

SEDIMENT DISCHARGE, SUSPENDED (TONS/DAY), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999									
DAY	MEAN	MEAN	SEDIMENT	MEAN	MEAN	SEDIMENT	MEAN	MEAN	SEDIMENT
	DISCHARGE	CONCEN-	DISCHARGE	DISCHARGE	CONCEN-	DISCHARGE	DISCHARGE	CONCEN-	DISCHARGE
	(CFS)	TRATION	(TONS/DAY)	(CFS)	TRATION	(TONS/DAY)	(CFS)	TRATION	(TONS/DAY)
		(MG/L)			(MG/L)			(MG/L)	
	OCTOBER			NOVEMBER			DECEMBER		
1	.00	0	.00	.00	0	.00	.51	e2	.00
2	.00	0	.00	2.6	e12	.62	1.8	e8	.09
3	.00	0	.00	2.9	e11	.22	5.0	e12	.21
4	.00	0	.00	3.1	10	.16	5.2	e13	.36
5	.00	0	.00	4.2	11	.44	5.2	e17	.57
6	.00	0	.00	2.0	e4	.03	1.7	e2	.01
7	.00	0	.00	2.7	e14	.55	3.4	e9	.14
8	.00	0	.00	2.1	e5	.05	12	e48	2.8
9	.00	0	.00	.94	e2	.01	5.0	e22	.52
10	.00	0	.00	.30	e2	.00	1.6	e3	.02
11	.00	0	.00	.05	e1	.00	1.0	e2	.01
12	.41	e5	.05	.00	4	.00	.77	e2	.00
13	1.7	e6	.05	5.7	23	1.3	.76	e1	.00
14	.39	2	.00	5.9	e20	.37	.46	e1	.00
15	.16	e2	.00	1.8	e3	.02	.28	1	.00
16	.03	e1	.00	5.6	33	2.2	.42	2	.00
17	.00	0	.00	4.2	8	.10	.20	2	.00
18	.00	0	.00	17	76	4.9	.11	e1	.00
19	.00	0	.00	9.9	24	1.3	.08	e1	.00
20	.00	0	.00	6.7	e22	.50	.05	e1	.00
21	.00	0	.00	2.5	e4	.03	.03	e1	.00
22	.00	0	.00	5.4	41	2.1	.02	e1	.00
23	.00	0	.00	1.1	3	.01	.03	e1	.00
24	.00	0	.00	.54	e2	.00	.04	e1	.00
25	.00	0	.00	.30	1	.00	1.1	e5	.02
26	.00	0	.00	.18	e1	.00	.28	e2	.00
27	.00	0	.00	1.2	e3	.02	.35	e2	.00
28	.00	0	.00	.40	e2	.00	9.4	16	2.4
29	.00	0	.00	.24	e1	.00	2.7	e6	.08
30	.00	0	.00	.17	e1	.00	.55	e2	.00
31	.00	0	.00	---	---	---	15	97	15
TOTAL	2.69	---	0.10	89.72	---	14.93	75.04	---	22.23
	JANUARY			FEBRUARY			MARCH		
1	4.0	e24	.31	4.0	e11	.15	.15	e1	.00
2	1.1	e7	.02	1.7	e2	.01	.11	e2	.00
3	.50	e2	.00	1.1	e2	.01	.09	2	.00
4	.26	e1	.00	2.5	e8	.18	.08	e2	.00
5	.16	2	.00	1.5	e2	.01	.07	e2	.00
6	.36	e2	.00	2.1	e5	.04	.09	e2	.00
7	38	159	90	.85	e2	.01	.10	e2	.00
8	8.3	10	.33	.75	e2	.00	.06	e2	.00
9	2.1	e3	.02	.41	1	.00	.05	e2	.00
10	.91	e2	.01	.30	e1	.00	.06	e2	.00
11	.45	e2	.00	.24	e1	.00	.24	e2	.00
12	.25	e2	.00	.81	e2	.00	.20	e2	.00
13	.15	e2	.00	.29	e1	.00	.28	e2	.00
14	.13	e2	.00	.19	e1	.00	1.7	e7	.27
15	.09	e2	.00	.79	e3	.06	12	23	.99
16	.96	e4	.02	2.0	e12	.12	12	e26	1.1
17	.16	e2	.00	.31	e2	.00	2.9	e5	.04
18	.07	e2	.00	.29	e2	.00	1.3	e2	.01
19	.04	e2	.00	.37	e2	.00	.80	e2	.00
20	.02	e2	.00	4.3	e10	.17	1.1	e2	.01
21	.01	6	.00	6.8	20	1.2	2.2	e3	.02
22	12	25	2.7	5.9	e14	.27	1.2	e2	.01
23	1.5	e4	.02	2.1	e2	.02	.62	2	.00
24	1.9	e6	.05	1.0	e1	.00	.38	e1	.00
25	3.5	15	.65	.58	1	.00	.25	e1	.00
26	9.6	e24	.69	.37	3	.00	.27	e1	.00
27	2.4	e5	.04	.25	e1	.00	1.6	e5	.04
28	1.5	e2	.01	.19	e1	.00	5.3	e17	.52
29	.82	e2	.00	---	---	---	4.0	e7	.09
30	3.2	16	1.9	---	---	---	1.4	e2	.01
31	25	79	6.7	---	---	---	2.3	e3	.02
TOTAL	119.44	---	103.47	41.99	---	2.25	52.90	---	3.13

e Estimated

HAWAII, ISLAND OF OAHU
16225800 NORTH HALAWA STREAM NEAR KANEOHE--Continued

SEDIMENT DISCHARGE, SUSPENDED (TONS/DAY), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999									
DAY	MEAN	MEAN	SEDIMENT	MEAN	MEAN	SEDIMENT	MEAN	MEAN	SEDIMENT
	DISCHARGE	CONCEN- TRATION	DISCHARGE	DISCHARGE	CONCEN- TRATION	DISCHARGE	DISCHARGE	CONCEN- TRATION	DISCHARGE
	(CFS)	(MG/L)	(TONS/DAY)	(CFS)	(MG/L)	(TONS/DAY)	(CFS)	(MG/L)	(TONS/DAY)
	APRIL			MAY			JUNE		
1	1.6	e3	.01	.29	e1	.00	.00	0	.00
2	.73	e2	.00	.22	e1	.00	.00	0	.00
3	2.5	e14	.29	.18	e1	.00	.00	0	.00
4	4.3	e18	.61	.16	e1	.00	.00	0	.00
5	.82	6	.01	.14	1	.00	.00	0	.00
6	8.3	e27	1.0	.11	e1	.00	.00	0	.00
7	1.6	e2	.01	.10	e1	.00	.00	0	.00
8	1.1	2	.01	.07	e1	.00	.00	0	.00
9	.74	e2	.00	.06	e1	.00	.86	e5	.04
10	2.1	e4	.02	.05	e1	.00	.24	e2	.00
11	12	44	3.1	.06	e1	.00	.03	e2	.00
12	15	77	10	.07	e1	.00	.00	0	.00
13	8.9	e21	.68	.37	e1	.00	.00	0	.00
14	2.5	e5	.03	.09	e1	.00	.00	0	.00
15	1.4	e3	.01	.06	e1	.00	.00	0	.00
16	.95	e2	.01	10	e70	12	1.4	e4	.03
17	2.2	e8	.23	5.6	7	.21	.09	e2	.00
18	4.7	e15	.24	.65	e2	.00	.02	e2	.00
19	1.5	e2	.01	.23	1	.00	.00	e2	.00
20	2.3	5	.10	.22	e1	.00	.00	0	.00
21	3.4	e7	.12	.18	e1	.00	.00	0	.00
22	3.1	11	.43	.08	e1	.00	.00	0	.00
23	1.1	e2	.01	.05	e1	.00	1.5	e7	.28
24	.63	e2	.00	.02	e2	.00	4.8	e14	.26
25	.50	e2	.00	.03	e2	.00	1.3	e3	.01
26	.45	e4	.01	.22	e2	.00	.24	e1	.00
27	2.6	e11	.16	.13	e2	.00	1.5	e5	.05
28	.55	e2	.00	.04	e2	.00	.21	e1	.00
29	.38	e2	.00	.02	e2	.00	.06	e1	.00
30	.33	e2	.00	.01	e2	.00	.10	e1	.00
31	---	---	---	.00	0	.00	---	---	---
TOTAL	88.28	---	17.10	19.51	---	12.21	12.35	---	0.67
	JULY			AUGUST			SEPTEMBER		
1	.17	e1	.00	.07	e1	.00	.00	0	.00
2	3.3	e21	.61	.04	e1	.00	.00	0	.00
3	.50	e2	.00	.01	e1	.00	.00	0	.00
4	.09	e1	.00	.00	0	.00	.00	0	.00
5	.03	e1	.00	1.3	e3	.02	.00	0	.00
6	.03	1	.00	.27	2	.00	.00	0	.00
7	.23	e1	.00	.05	e1	.00	.00	0	.00
8	.03	e1	.00	.01	e1	.00	.00	0	.00
9	.39	e2	.00	.00	0	.00	.00	0	.00
10	.12	e1	.00	.00	0	.00	.00	0	.00
11	1.7	e7	.06	.01	e1	.00	.00	0	.00
12	.23	e2	.00	.33	1	.00	.00	0	.00
13	.09	e2	.00	1.1	e5	.04	.00	0	.00
14	.22	e2	.00	2.6	e11	.16	.00	0	.00
15	2.7	e10	.15	.33	e2	.00	.00	0	.00
16	1.7	e5	.03	4.4	e14	.29	.00	0	.00
17	5.6	9	.26	.72	e3	.01	.00	0	.00
18	1.8	e2	.01	.15	e1	.00	.00	0	.00
19	.87	e2	.01	.05	e1	.00	.06	e1	.00
20	12	21	.95	.01	e1	.00	.00	0	.00
21	1.7	e3	.02	.00	0	.00	.00	0	.00
22	1.6	e2	.01	.00	0	.00	.10	1	.00
23	2.7	e8	.14	.00	0	.00	.00	0	.00
24	1.4	e4	.02	.00	0	.00	.00	0	.00
25	1.5	e4	.03	.00	0	.00	1.6	e9	.12
26	.79	e2	.00	.28	e1	.00	.26	e2	.00
27	2.4	e8	.08	.02	e1	.00	.03	e2	.00
28	3.7	e10	.15	.00	0	.00	.00	0	.00
29	.91	e2	.01	.00	0	.00	.00	0	.00
30	.48	e2	.00	.00	0	.00	.00	0	.00
31	.18	e2	.00	.00	0	.00	---	---	---
TOTAL	49.16	---	2.54	11.75	---	0.52	2.05	---	0.12
YEAR	564.88		179.27						

e Estimated

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HAWAII, ISLAND OF OAHU
16226000 NORTH HALAWA STREAM NEAR AIEA

LOCATION.--Lat 21°23'46", long 157°53'37", Hydrologic Unit 20060000, on left bank 2.7 mi upstream from confluence with South Halawa Stream, and 2.7 mi northeast of Aiea Post Office.

DRAINAGE AREA.--3.45 mi².

PERIOD OF RECORD.--August 1929 to June 1933, July 1953 to current year. Monthly discharge only May, June 1931, published in WSP 1319.

REVISED RECORDS.--WSP 1319: Drainage area. WSP 1719: 1954-55(P), 1956, 1957(P), 1958-59.

GAGE.--Water-stage recorder. Elevation of gage is 320 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Clayton Yoshida. Records good. Recording rain gage located at station.

AVERAGE DISCHARGE.--49 years (water years 1930-32, 1954-99), 5.29 ft³/s (3,830 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,650 ft³/s, February 28, 1932, gage height, 13.36 ft, from rating curve extended above 420 ft³/s; maximum gage height, 13.46 ft, May 14, 1963; no flow at times each year.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 570 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 7	1930	*665	*9.08	No other peak greater than base discharge.			

Minimum discharge, no flow on many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.61	17	15	.19	3.3	e.10	.00	.29	.17	.12
2	.10	.73	2.4	6.0	4.6	.13	1.5	e.01	.02	2.5	.08	.00
3	.17	1.3	11	3.4	2.4	.07	e3.2	e.02	.00	.59	.00	.15
4	.01	1.6	13	2.3	5.4	.12	55	e.00	.00	.04	.26	.20
5	.09	2.9	15	2.2	3.9	.00	9.7	e.00	.00	.15	.76	.00
6	.00	2.4	5.0	2.2	3.6	.25	18	e.00	.04	.43	.15	.00
7	.00	1.5	7.3	52	1.8	.07	5.6	e.03	.17	.04	.07	.00
8	.43	2.2	21	16	1.4	.00	4.2	e.00	.18	.04	.00	.12
9	.30	.66	12	3.0	.73	.17	2.8	e.00	.29	.31	.00	.09
10	.23	.32	3.7	1.4	.50	.35	7.0	e.00	.00	.04	.15	.49
11	.00	.12	2.0	.66	.46	.28	39	e.00	.00	.88	.49	.17
12	.46	.04	1.5	.31	2.1	.15	40	e.00	.00	.28	.54	.09
13	.34	6.3	1.2	.19	.68	.40	26	e.00	.00	.23	.54	.00
14	.25	8.3	.80	.30	.52	.54	7.3	e.00	.00	.21	2.1	.00
15	.04	2.8	.53	.27	.40	21	3.6	e.00	.70	2.0	.52	.00
16	.22	5.4	.40	.41	1.7	30	2.1	e.00	.17	2.1	4.1	.11
17	.02	4.7	.34	.17	.39	5.8	2.6	e10	.08	6.9	1.2	.03
18	.06	30	.25	.08	.28	2.3	7.9	e.60	.00	3.0	.20	.00
19	.00	22	.17	.00	.32	1.5	3.1	e.23	.12	1.8	.20	.29
20	.00	16	.02	.00	6.2	3.5	2.4	e.26	.12	20	.00	.23
21	.00	6.6	.00	.00	13	12	3.8	.01	.03	3.4	.00	.23
22	.00	11	.25	25	16	3.9	2.5	.00	.38	2.6	.00	.24
23	.00	2.5	.31	4.1	5.2	1.7	1.4	.00	.64	4.2	.00	.00
24	.00	1.2	.23	5.4	2.0	.87	.59	.00	3.4	3.3	.00	.00
25	.12	.63	.99	6.6	1.1	.52	e.30	.38	1.8	2.4	.00	1.3
26	.18	.46	.48	36	.64	.64	e.50	.16	.38	1.6	.48	.08
27	.19	1.2	.26	7.7	.39	2.5	e3.0	.00	1.4	3.1	.03	.00
28	.08	.71	8.3	4.1	.25	10	e.37	.02	.43	5.0	.09	.00
29	.03	.78	4.3	2.3	---	8.1	e.28	.00	.22	2.0	.15	.03
30	.02	.68	.88	4.0	---	3.1	e.18	.02	.30	1.1	.18	.00
31	.00	---	31	70	---	4.6	---	.00	---	.47	.47	---
TOTAL	3.34	135.03	145.22	273.09	90.96	114.75	257.22	11.84	10.87	71.00	12.93	3.97
MEAN	.11	4.50	4.68	8.81	3.25	3.70	8.57	.38	.36	2.29	.42	.13
MAX	.46	30	31	70	16	30	55	10	3.4	20	4.1	1.3
MIN	.00	.00	.00	.00	.25	.00	.18	.00	.00	.04	.00	.00
AC-FT	6.6	268	288	542	180	228	510	23	22	141	26	7.9

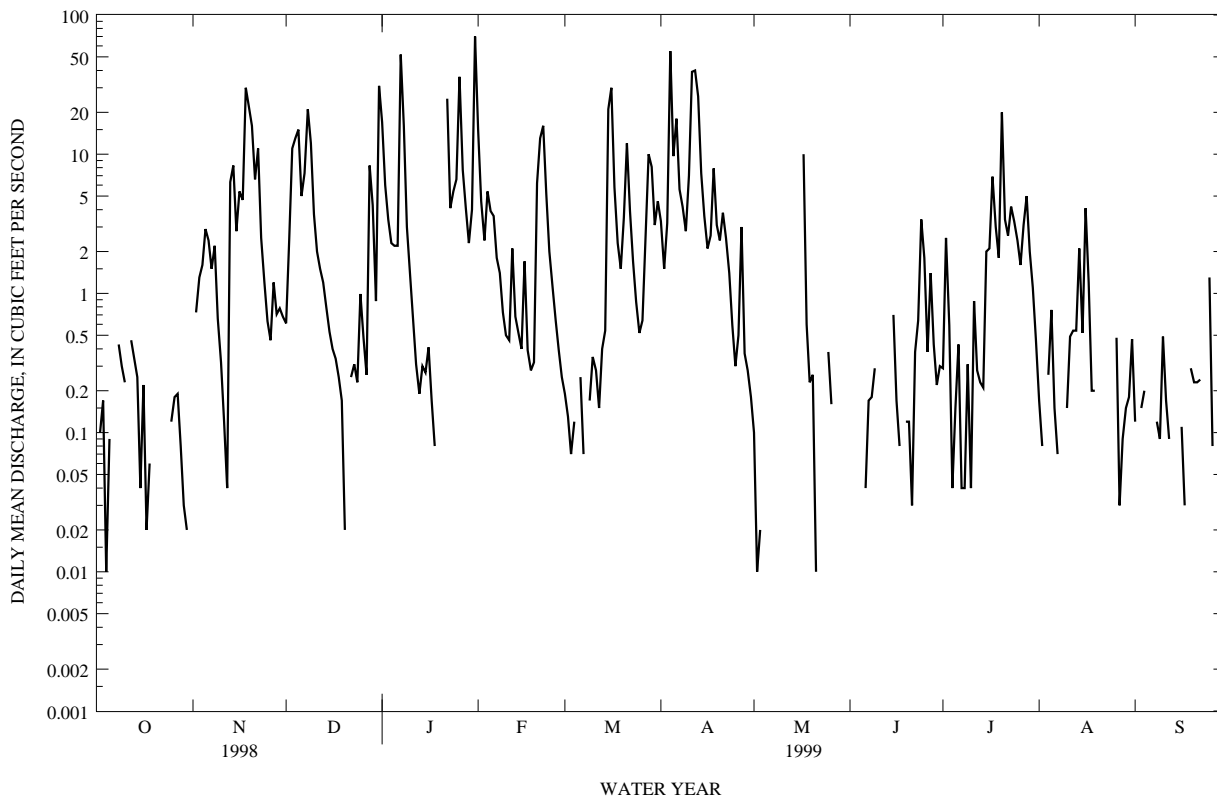
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1929 - 1999, BY WATER YEAR (WY)

MEAN	3.44	7.91	7.55	6.52	7.70	8.04	7.05	4.65	1.85	3.66	3.57	2.13
MAX	16.3	50.6	35.0	26.0	76.3	37.8	33.2	30.1	7.86	23.0	21.6	17.1
(WY)	1959	1966	1930	1988	1932	1968	1932	1965	1932	1954	1982	1931
MIN	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
(WY)	1933	1954	1990	1977	1931	1931	1931	1931	1931	1953	1962	1953

e Estimated

HAWAII, ISLAND OF OAHU
 16226000 NORTH HALAWA STREAM NEAR AIEA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1929 - 1999	
ANNUAL TOTAL	497.23	1130.22		
ANNUAL MEAN	1.36	3.10	5.29	
HIGHEST ANNUAL MEAN			15.7	1932
LOWEST ANNUAL MEAN			1.41	1984
HIGHEST DAILY MEAN	31 Dec 31	70 Jan 31	956	Nov 18 1930
LOWEST DAILY MEAN	.00 Jan 12	.00 Oct 1	.00	Sep 14 1929
ANNUAL SEVEN-DAY MINIMUM	.00 Jan 28	.00 May 8	.00	Sep 14 1929
ANNUAL RUNOFF (AC-FT)	986	2240	3830	
10 PERCENT EXCEEDS	3.9	7.5	11	
50 PERCENT EXCEEDS	.07	.39	.39	
90 PERCENT EXCEEDS	.00	.00	.00	



HAWAII, ISLAND OF OAHU

212353157533001 NORTH HALAWA VALLEY HIGHWAY STORM DRAIN C NEAR AIEA

LOCATION.--Lat 21°23'53", long 157°53'30", Hydrologic Unit 2006000, on manhole 6.1 mi west of Kaneohe Elementary School, 1.65 mi northeast of Halawa Prison, and 1.05 mi east of Keaiwa Heiau.

PERIOD OF RECORD.--September 1998 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 336.22 ft from Hawaii State Department of Transportation levels.

REMARKS.--Records computed by M.F. Wong. Records fair except for discharges greater than 15 ft³/s and estimated days which are poor.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 36 ft³/s, November 18, 1998, gage height, 4.56 ft, no flow at times during the year.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 30 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Nov. 18	2245	*36	*4.56	Mar. 27	0225	35	4.47
Jan. 30	2220	33	4.32	Apr. 4	0855	32	4.26
Feb. 21	1715	30	4.10				

Minimum discharge, no flow on many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.01	.03	.06	.00	.13	.00	.17	.03	.01	.22	.00	.07
2	.05	.99	.92	.00	.24	.00	.00	.01	.08	.20	.01	.00
3	.06	.27	.78	.00	.19	.00	.14	.01	.04	.00	.00	.14
4	.02	e.25	.41	.00	.55	.08	2.2	.00	.05	.00	.20	.16
5	.04	e.30	.75	.25	.20	.01	.21	.00	.04	.11	.43	.00
6	.00	e.01	.36	.18	.28	.27	.69	.00	.09	.29	.09	.00
7	.01	e.90	1.0	1.2	.17	.04	.04	.11	.27	.04	.04	.00
8	.27	e.02	.79	.16	.04	.00	.20	.00	.14	.05	.00	.16
9	.14	e.18	.10	.04	.00	.19	.16	.00	.28	.26	.01	.12
10	.08	e.00	.03	.03	.02	.37	.58	.15	.03	.08	.12	.27
11	.00	e.00	.18	.00	.17	.22	.90	.11	.00	.41	.30	.12
12	.53	e.00	.28	.00	.38	.14	1.4	.20	.00	.14	.28	.11
13	.21	e1.5	.12	.00	.00	.30	.50	.00	.00	.13	.27	.01
14	.18	e.16	.00	.14	.18	.56	.19	.00	.00	.20	.18	.00
15	.01	e.00	.04	.15	.16	1.1	.00	.03	.64	.39	.18	.02
16	.16	e.82	.00	.18	.00	.73	.00	1.2	.16	.26	.50	.13
17	.02	.57	.00	.00	.00	.26	.56	.26	.13	.54	.01	.06
18	.04	1.8	.00	.00	.12	.09	.50	.01	.00	.11	.00	.05
19	.00	e.50	.00	.01	.16	.29	.04	.01	.21	.43	.11	.20
20	.00	e.44	.00	.01	.96	.83	.28	.20	.14	.63	.00	.17
21	.00	.48	.01	.00	.71	.58	.04	.00	.03	.10	.00	.17
22	.00	.34	.28	1.6	.62	.04	.12	.00	.27	.22	.00	.13
23	.00	.00	.17	.00	.11	.00	.00	.00	.39	.42	.03	.03
24	.00	.00	.19	.63	.00	.00	.00	.02	.50	.12	.00	.01
25	.09	.00	.67	.82	.00	.00	.03	.40	.01	.15	.02	.56
26	.40	.14	.27	1.1	.00	.29	.39	.15	.05	.06	.34	.06
27	.10	.50	.01	.07	.00	.70	.19	.01	.24	.31	.04	.03
28	.18	.03	.63	.37	.00	.69	.00	.06	.06	.43	.09	.00
29	.01	.42	.00	.05	---	.42	.06	.00	.08	.04	.11	.06
30	.05	.38	.04	.74	---	.14	.04	.09	.19	.06	.18	.00
31	.07	---	1.4	1.9	---	.40	---	.00	---	.00	.29	---
TOTAL	2.73	11.03	9.49	9.63	5.39	8.74	9.63	3.06	4.13	6.40	3.83	2.84
MEAN	.088	.37	.31	.31	.19	.28	.32	.099	.14	.21	.12	.095
MAX	.53	1.8	1.4	1.9	.96	1.1	2.2	1.2	.64	.63	.50	.56
MIN	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
AC-FT	5.4	22	19	19	11	17	19	6.1	8.2	13	7.6	5.6

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1998 - 1999, BY WATER YEAR (WY)

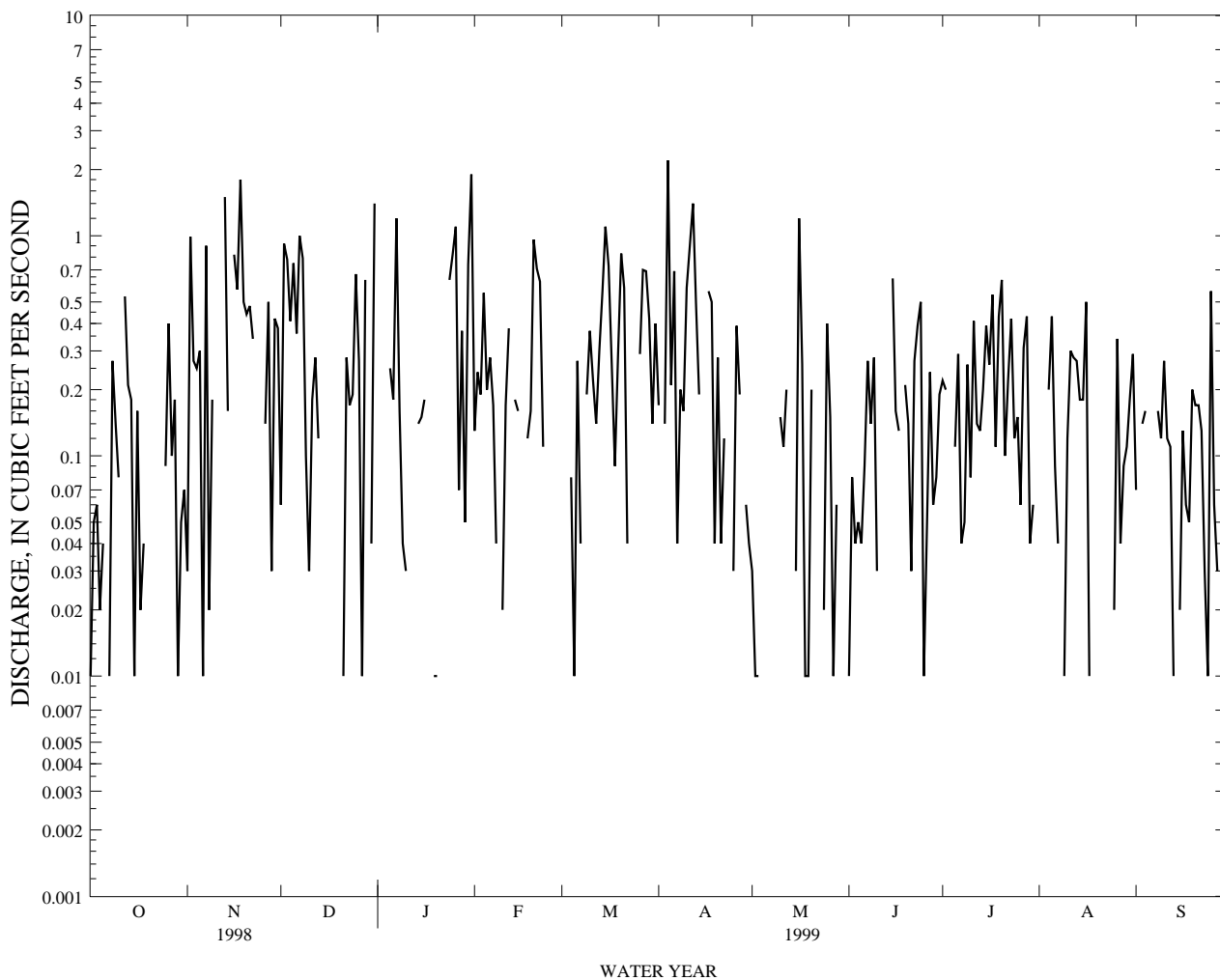
MEAN	.088	.37	.31	.31	.19	.28	.32	.099	.14	.21	.12	.095
MAX	.088	.37	.31	.31	.19	.28	.32	.099	.14	.21	.12	.095
(WY)	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999
MIN	.088	.37	.31	.31	.19	.28	.32	.099	.14	.21	.12	.095
(WY)	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999

e Estimated

HAWAII, ISLAND OF OAHU

212353157533001 NORTH HALAWA VALLEY HIGHWAY STORM DRAIN C NEAR AIEA--Continued

SUMMARY STATISTICS	FOR 1999 WATER YEAR		WATER YEARS 1998 - 1999	
ANNUAL TOTAL	76.90			
ANNUAL MEAN	.21		.21	
HIGHEST ANNUAL MEAN			.21	1999
LOWEST ANNUAL MEAN			.21	1999
HIGHEST DAILY MEAN	2.2	Apr 4	2.2	Apr 4 1999
LOWEST DAILY MEAN	.00	Oct 6	.00	Sep 23 1998
ANNUAL SEVEN-DAY MINIMUM	.00	Feb 24	.00	Feb 24 1999
ANNUAL RUNOFF (AC-FT)	153		153	
10 PERCENT EXCEEDS	.58		.58	
50 PERCENT EXCEEDS	.10		.09	
90 PERCENT EXCEEDS	.00		.00	



HAWAII, ISLAND OF OAHU

212353157533001 NORTH HALAWA VALLEY HIGHWAY STORM DRAIN C NEAR AIEA--Continued

DATE	BENZENE			BENZ (A)			BIS(2-	BIS(2-	BIS(2-		
	BENZENE NITRO- WATER UNFLTRD RECOVER (UG/L) (34447)	O-DI- CHLORO- WATER UNFLTRD REC (UG/L) (34536)	BENZO- A- PYRENE TOTAL (UG/L) (34247)	BENZO B FLUOR- AN- THENE TOTAL (UG/L) (34230)	BENZO K FLUOR- AN- THENE TOTAL (UG/L) (34242)	ANTHRA- CENE WATER UNFLTRD REC (UG/L) (34526)	BENZO- [GHI]- PERY- LENE TOTAL (UG/L) (34521)	BIS(2- CHLORO- ETHOXY) METHANE TOTAL (UG/L) (34278)	CHLORO- ETHYL) ETHER UNFLTRD RECOVER (UG/L) (34273)	CHLORO- ISO- PROPYL) ETHER TOTAL (UG/L) (34283)	ETHYL HEXYL) PHTHAL- ATE TOTAL (UG/L) (39100)
NOV 1998	--	--	--	--	--	--	--	--	--	--	--
18...	--	--	--	--	--	--	--	--	--	--	--
JUN 1999	--	--	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--	--
15...	<5	<5	<10	<10	<10	<10	<10	<5	<5	<5	15

DATE	CYCLOPE NTADIEN			ETHANE			HEXA-			FLUOR-	
	CHRY- SENE TOTAL (UG/L) (34320)	CHLORO- HEXA- UNFLTRD RECOVER (UG/L) (34386)	DIETHYL PHTHAL- ATE TOTAL (UG/L) (34336)	DI- METHYL PHTHAL- ATE TOTAL (UG/L) (34341)	DI-N- OCTYL PHTHAL- ATE TOTAL (UG/L) (34596)	DI-N- BUTYL PHTHAL- ATE TOTAL (UG/L) (39110)	ETHANE HEXA- CHLORO- WATER UNFLTRD RECOVER (UG/L) (34396)	HEXA- CHLORO- BENZENE TOTAL (UG/L) (39700)	HEXA- CHLORO- BUT- ADIENE TOTAL (UG/L) (39702)	FLUOR- ANTHENE TOTAL (UG/L) (34376)	FLUOR- ENE TOTAL (UG/L) (34381)
NOV 1998	--	--	--	--	--	--	--	--	--	--	--
18...	--	--	--	--	--	--	--	--	--	--	--
JUN 1999	--	--	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--	--
15...	<10	<5	<5	<5	<10	<5	<5	<5	<5	<5	<5

DATE	INDENO (1,2,3- CD)			N-BUTYL BENZYL			N-NITRO -SODI- SODI-N- PROPYL- AMINE			N-NITRO -SODI- SODI-N- PHENYL- AMINE			OIL AND GREASE, TOTAL RECOV. METRIC		PHENAN- GRAVI- THRENE PYRENE	
	PYRENE TOTAL (UG/L) (34403)	ISO- PHORONE TOTAL (UG/L) (34408)	NAPHTH- ALENE TOTAL (UG/L) (34696)	PHTHAL- ATE TOTAL (UG/L) (34292)	METHYL- AMINE TOTAL (UG/L) (34438)	AMINE TOTAL (UG/L) (34428)	AMINE TOTAL (UG/L) (34428)	AMINE TOTAL (UG/L) (34433)	AMINE TOTAL (UG/L) (34433)	AMINE TOTAL (UG/L) (34433)	AMINE TOTAL (UG/L) (34433)	AMINE TOTAL (UG/L) (34433)	AMINE TOTAL (UG/L) (34433)	AMINE TOTAL (UG/L) (34433)	AMINE TOTAL (UG/L) (34433)	AMINE TOTAL (UG/L) (34433)
NOV 1998	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
18...	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUN 1999	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15...	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	3	<5	<5	<5	<5

HAWAII, ISLAND OF OAHU
 16226200 NORTH HALAWA STREAM NEAR HONOLULU

LOCATION.--Lat 21°23'04", long 157°54'22", Hydrologic Unit 20060000, on right bank, 0.5 mi north of Halawa quarry, 1.7 mi east of Aiea High School, and 1.9 mi east of Aiea.

DRAINAGE AREA.--4.01 mi².

PERIOD OF RECORD.--February 1983 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 160 ft above mean sea level (from topographic map).

REMARKS.--Records computed by S.T.M. Young. Records good.

AVERAGE DISCHARGE.--16 years (water years 1984-99), 5.13 ft³/s (3,720 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,780 ft³/s, December 18, 1990, gage height, 12.02 ft; no flow at times each year.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 600 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 7	1845	*496	*9.74				

Minimum discharge, no flow on several days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
 DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.01	.01	2.2	12	21	.12	4.3	.19	.02	.24	.12	.02
2	.01	.08	3.9	3.0	7.5	.08	2.0	.12	.04	2.7	.09	.01
3	.03	1.2	17	1.2	3.7	.06	3.5	.08	.03	.70	.05	.08
4	.01	1.3	19	.46	5.3	.05	51	.05	.03	.12	.05	.05
5	.01	2.8	21	.41	5.0	.04	11	.04	.02	.14	.49	.01
6	.02	2.6	8.8	.60	4.5	.10	17	.02	.02	.26	.13	.01
7	.01	.83	11	e38	2.1	.05	5.7	.04	.09	.12	.10	.01
8	.06	2.0	26	e19	1.7	.03	4.7	.02	.07	.08	.04	.03
9	.03	.25	17	3.6	.65	.04	3.1	.02	.06	.13	.03	.02
10	.16	.14	6.2	1.5	.40	.13	8.3	.03	.02	e.03	.03	.09
11	.02	.04	3.5	.56	.32	.18	41	.05	.01	.22	.09	.02
12	.26	.04	2.4	.24	2.8	.15	44	.16	.01	e.13	.34	.06
13	.35	6.8	1.9	.14	.76	.50	35	.04	.01	.16	.23	.02
14	.14	15	.93	.16	.35	.52	15	.02	.01	e.03	1.7	.01
15	.04	4.8	.37	.13	.34	16	7.7	.02	.09	1.2	.24	.01
16	.05	6.7	.17	.18	2.1	24	3.9	10	.32	1.4	4.6	.01
17	.03	7.6	.11	.07	.36	7.3	3.5	12	.02	6.2	1.0	.01
18	.02	33	.07	.07	.21	3.3	15	1.6	.02	2.8	.16	.01
19	.01	24	.04	.06	.21	2.0	5.4	.34	.03	1.1	e.06	.01
20	.01	19	.03	.04	6.9	4.0	4.0	.30	.05	19	.04	.01
21	.01	8.6	.02	.03	11	13	6.6	.11	.05	3.9	.03	.03
22	.01	14	.04	20	16	5.5	3.9	.06	.26	2.6	.03	.07
23	.01	3.5	.09	5.3	6.5	2.5	2.5	.04	.64	4.4	.04	.02
24	.01	1.2	.03	6.2	2.7	1.2	.89	.02	4.0	3.8	.03	.02
25	.00	1.7	.82	6.0	1.3	.48	.41	.08	2.1	2.1	.04	.89
26	.02	1.9	.07	31	.62	.60	.42	.18	.31	1.2	.33	.07
27	.04	4.3	.22	9.4	.29	3.2	4.3	.05	1.2	2.9	.02	.02
28	.01	3.2	6.2	5.1	.16	9.6	.86	.03	.42	6.2	.02	.02
29	.02	2.2	4.8	3.0	---	9.0	.32	.02	.15	2.1	.05	.02
30	.01	2.5	.56	3.2	---	3.9	.32	.02	.19	.74	.03	.01
31	.02	---	23	59	---	5.5	---	.02	---	.24	.07	---
TOTAL	1.44	171.29	177.47	229.65	104.77	113.13	305.62	25.77	10.29	66.94	10.28	1.67
MEAN	.046	5.71	5.72	7.41	3.74	3.65	10.2	.83	.34	2.16	.33	.056
MAX	.35	33	26	59	21	24	51	12	4.0	19	4.6	.89
MIN	.00	.01	.02	.03	.16	.03	.32	.02	.01	.03	.02	.01
AC-FT	2.9	340	352	456	208	224	606	51	20	133	20	3.3

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1983 - 1999, BY WATER YEAR (WY)

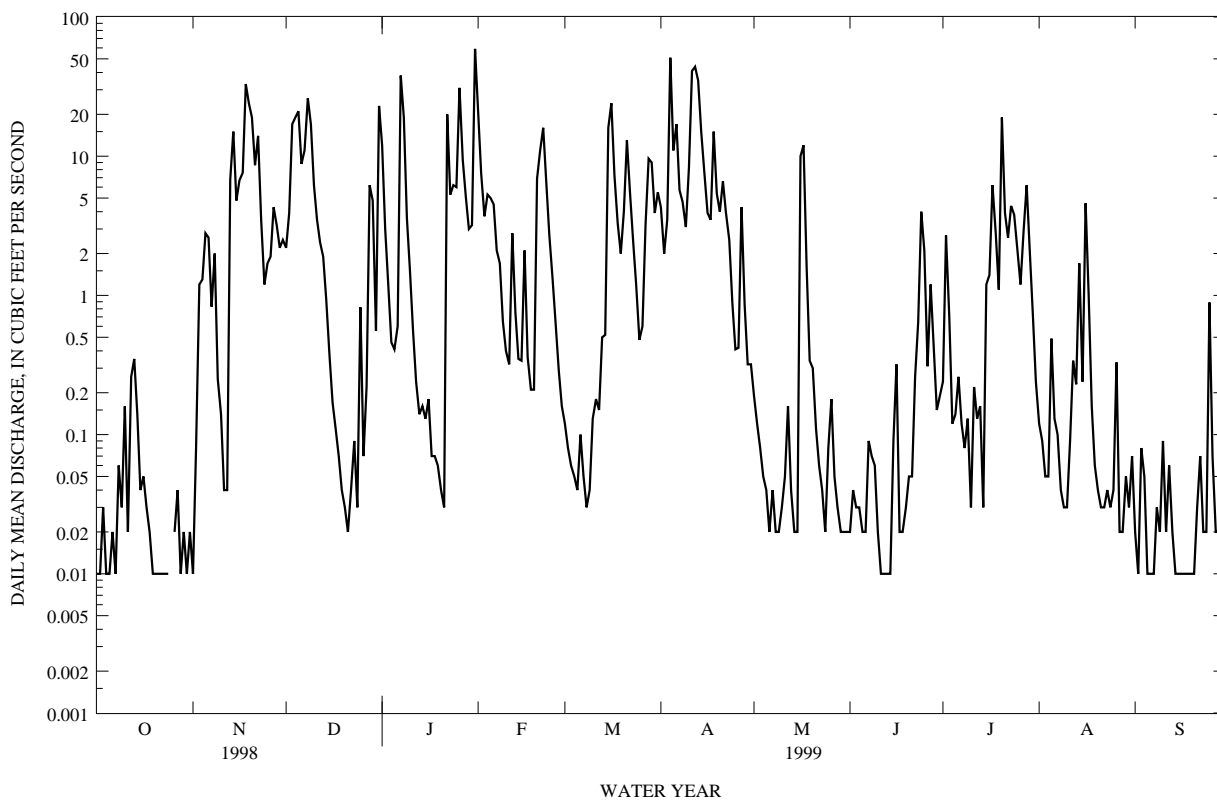
MEAN	3.70	8.12	7.90	6.66	4.14	8.08	6.51	2.75	2.05	4.31	2.69	2.90
MAX	9.71	29.1	40.6	29.6	17.4	31.0	35.3	15.5	7.84	15.0	10.0	12.6
(WY)	1992	1997	1988	1988	1989	1991	1989	1988	1987	1989	1991	1992
MIN	.000	.059	.008	.001	.000	.000	.000	.000	.000	.000	.000	.000
(WY)	1985	1990	1990	1986	1983	1983	1983	1992	1984	1984	1984	1984

e Estimated

HAWAII, ISLAND OF OAHU

16226200 NORTH HALAWA STREAM NEAR HONOLULU--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1983 - 1999	
ANNUAL TOTAL	650.03		1218.32		5.13	
ANNUAL MEAN	1.78		3.34		10.1	
HIGHEST ANNUAL MEAN					1988	
LOWEST ANNUAL MEAN					1.43	
HIGHEST DAILY MEAN	39	Jan 1	59	Jan 31	476	Mar 24 1994
LOWEST DAILY MEAN	.00	Feb 12	.00	Oct 25	.00	Feb 1 1983
ANNUAL SEVEN-DAY MINIMUM	.00	Feb 12	.01	Oct 19	.00	Feb 1 1983
ANNUAL RUNOFF (AC-FT)	1290		2420		3720	
10 PERCENT EXCEEDS	5.7		9.5		11	
50 PERCENT EXCEEDS	.04		.24		.50	
90 PERCENT EXCEEDS	.00		.02		.00	



HAWAII, ISLAND OF OAHU
 16226200 NORTH HALAWA STREAM NEAR HONOLULU--Continued
 WATER-QUALITY RECORDS

PERIOD OF RECORD.--February 1983 to current year.

PERIOD OF DAILY RECORD.--

SUSPENDED SEDIMENT DISCHARGE: February 1983 to September 30, 1999 (discontinued).

INSTRUMENTATION.--Automatic pumping sediment sampler since February 1983.

REMARKS.--Water-quality samples were collected at this site. Sediment records computed by M.F. Wong. Records good.

EXTREMES FOR PERIOD OF RECORD.--Sediment concentrations: maximum daily mean 5,360 mg/L (estimated), November 14, 1996; 0 mg/L on many days in 1983-86, 1988, 1990, 1992-95, 1997-98.

Sediment discharge: maximum daily, 5,310 tons, March 24, 1994; 0.0 tons on many days in 1983-88, 1990, 1992-99.

EXTREMES FOR CURRENT YEAR.--Sediment concentrations: maximum daily mean, 340 mg/L, April 11; 0 mg/L on October 25.

Sediment discharge: maximum daily, 156 tons (estimated), January 7; minimum, 0.0 tons on many days.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)			TEMPER-ATURE (DEG C) (00010)	GAGE HEIGHT (FEET) (00065)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	TUR-BID-ITY (NTU) (00076)	SEDI-MENT, SUS-PENDED (MG/L) (80154)		
NOV 1998											
17...	1045	7.3	21.5	6.62	--	--	4				
17...	1050	7.3	21.5	6.61	--	--	3				
18...	0238	29	--	7.06	78	21	--				
18...	0332	35	--	7.21	59	16	--				
18...	0432	44	--	7.41	1030	390	--				
18...	1025	29	22.0	7.12	--	--	40				
18...	1036	30	22.0	7.12	--	--	36				
18...	1145	37	22.0	7.36	--	--	100				
19...	1417	19	22.0	6.91	--	--	8				
JAN 1999											
08...	1110	10	--	6.70	--	--	6				
MAR											
15...	1520	29	--	7.10	--	--	34				
15...	1530	29	--	7.10	--	--	31				
31...	1050	10	20.0	6.71	--	--	6				
APR											
06...	1146	34	20.5	7.23	--	--	22				
06...	1158	35	20.5	7.28	--	--	26				
06...	1425	24	20.5	7.01	--	--	13				

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	OXYGEN, DIS-SOLVED (MG/L) (00300)	PH WATER FIELD (STAND-ARDS) (MG/L) (00400)	PH WATER LAB (STAND-ARDS) (MG/L) (00403)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (90095)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	CHLO-RIDE, DIS-SOLVED (MG/L) (00940)	SULFATE DIS-SOLVED (MG/L) (00945)
NOV 1998											
17...	1105	8.2	8.4	7.9	8.1	159	153	23.5	21.5	15	4.2
18...	1110	35	8.6	7.8	7.8	149	144	23.0	22.0	17	3.9
MAR 1999											
02...	0945	.120	8.7	7.5	8.1	352	359	21.0	20.0	40	9.8

DATE	TIME	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L) (00608)	NITRO-GEN, AM-MONIA + DIS-ORGANIC TOTAL (MG/L) (00625)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L) (00631)	PHOS-PHORUS TOTAL (MG/L) (00665)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L) (00340)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	GAGE HEIGHT (FEET) (00065)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	TUR-BID-ITY (NTU) (00076)	CHRO-MIUM, DIS-SOLVED (UG/L) (01030)
NOV 1998												
17...	.03	.1	<.05	<.05	--	96	160	6.55	3	2.5	<1.0	
18...	<.02	.9	.07	.11	<10	99	160	7.21	52	20	<1.0	
MAR 1999												
02...	<.02	E.05	<.05	<.05	<10	96	160	5.97	28	.6	<1.0	

E Estimated

HAWAII, ISLAND OF OAHU
 16226200 NORTH HALAWA STREAM NEAR HONOLULU--Continued
 WATER-QUALITY RECORDS

DATE	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI) (01067)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	1,2,5,6-DIBENZ-ANTHRA-CENE TOTAL (UG/L) (34556)
NOV 1998 17...	--	1	--	<1	--	<1	--	<20	--	2.1	<10
NOV 1998 18...	--	1	--	<1	--	<1	--	<20	--	10	<10
MAR 1999 02...	<1.0	<1	<1	<1	<1	<1	<1	E10	<10	1.4	<10

DATE	2,4-DI-NITRO-TOLUENE TOTAL (UG/L) (34611)	2,6-DI-NITRO-TOLUENE TOTAL (UG/L) (34626)	2-CHLORO-NAPHTHALENE TOTAL (UG/L) (34581)	4-BROMOPHENYL ETHER TOTAL (UG/L) (34636)	4-CHLOROPHENYL ETHER TOTAL (UG/L) (34641)	ACE-NAPHTHENE TOTAL (UG/L) (34205)	ACE-NAPHTHENE TOTAL (UG/L) (34200)	ANTHRA-CENE TOTAL (UG/L) (34220)	BENZENE 1,2,4-TRICHLORO-WAT UNF REC (UG/L) (34551)	BENZENE 1,3-DI-CHLORO-WATER UNFLTRD REC (UG/L) (34566)	BENZENE 1,4-DI-CHLORO-WATER UNFLTRD REC (UG/L) (34571)
NOV 1998 17...	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
NOV 1998 18...	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
MAR 1999 02...	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

DATE	BENZENE NITRO-WATER UNFLTRD RECOVER (UG/L) (34447)	BENZENE O-DI-CHLORO-WATER UNFLTRD REC (UG/L) (34536)	BENZO-A-PYRENE TOTAL (UG/L) (34247)	BENZO B FLUOR-AN-THENE TOTAL (UG/L) (34230)	BENZO K FLUOR-AN-THENE TOTAL (UG/L) (34242)	BENZ(A) ANTHRA-CENE WATER UNFLTRD REC (UG/L) (34526)	BENZO-[GHI]-PERY-LENE TOTAL (UG/L) (34521)	BIS(2-CHLORO-ETHOXY) METHANE TOTAL (UG/L) (34278)	BIS(2-CHLORO-ETHYL) ETHER UNFLTRD RECOVER (UG/L) (34273)	BIS(2-CHLORO-ISO-PROPYL) ETHER TOTAL (UG/L) (34283)	BIS(2-ETHYL-HEXYL) PHTHAL-ATE TOTAL (UG/L) (39100)
NOV 1998 17...	<5	<5	<10	<10	<10	<10	<10	<5	<5	<5	<5
NOV 1998 18...	<5	<5	<10	<10	<10	<10	<10	<5	<5	<5	<5
MAR 1999 02...	<5	<5	<10	<10	<10	<10	<10	<5	<5	<5	<5

DATE	CHRYSENE TOTAL (UG/L) (34320)	CYCLOPENTADIEN HEXA-CHLORO-UNFLTRD RECOVER (UG/L) (34386)	DIETHYL PHTHAL-ATE TOTAL (UG/L) (34336)	DI-METHYL PHTHAL-ATE TOTAL (UG/L) (34341)	DI-N-OCTYL PHTHAL-ATE TOTAL (UG/L) (34596)	DI-N-BUTYL PHTHAL-ATE TOTAL (UG/L) (39110)	ETHANE HEXA-CHLORO-WATER UNFLTRD RECOVER (UG/L) (34396)	HEXA-CHLORO-BENZENE TOTAL (UG/L) (39700)	HEXA-CHLORO-BUT-ADIENE TOTAL (UG/L) (39702)	FLUOR-ANTHENE TOTAL (UG/L) (34376)	FLUOR-ENE TOTAL (UG/L) (34381)
NOV 1998 17...	<10	<5	<5	<5	<10	<5	<5	<5	<5	<5	<5
NOV 1998 18...	<10	<5	<5	<5	<10	<5	<5	<5	<5	<5	<5
MAR 1999 02...	<10	<5	<5	<5	<10	<5	<5	<5	<5	<5	<5

DATE	INDENO (1,2,3-CD) PYRENE TOTAL (UG/L) (34403)	ISO-PHORONE TOTAL (UG/L) (34408)	NAPHTH-ALENE TOTAL (UG/L) (34696)	N-BUTYL BENZYL PHTHAL-ATE TOTAL (UG/L) (34292)	N-NITRO-SODI-METHYL-AMINE TOTAL (UG/L) (34438)	N-NITRO-SODI-N-PROPYL-AMINE TOTAL (UG/L) (34428)	N-NITRO-SODI-PHENYL-AMINE TOTAL (UG/L) (34433)	OIL AND GREASE, TOTAL RECOVER. METRIC (MG/L) (00556)	PHENAN-THRENE TOTAL (UG/L) (34461)	PYRENE TOTAL (UG/L) (34469)
NOV 1998 17...	<10	<5	<5	<5	<5	<5	<5	<1	<5	<5
NOV 1998 18...	<10	<5	<5	<5	<5	<5	<5	<1	<5	<5
MAR 1999 02...	<10	<5	<5	<5	<5	<5	<5	<1	<5	<5

E Estimated

HAWAII, ISLAND OF OAHU
16226200 NORTH HALAWA STREAM NEAR HONOLULU--Continued
WATER-QUALITY RECORDS

SEDIMENT DISCHARGE, SUSPENDED (TONS/DAY), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAY	MEAN	MEAN	SEDIMENT	MEAN	MEAN	SEDIMENT	MEAN	MEAN	SEDIMENT
	DISCHARGE (CFS)	CONCEN- TRATION (MG/L)	DISCHARGE (TONS/DAY)	DISCHARGE (CFS)	CONCEN- TRATION (MG/L)	DISCHARGE (TONS/DAY)	DISCHARGE (CFS)	CONCEN- TRATION (MG/L)	DISCHARGE (TONS/DAY)
	OCTOBER			NOVEMBER			DECEMBER		
1	.01	e3	.00	.01	2	.00	2.2	4	.02
2	.01	e3	.00	.08	2	.00	3.9	e6	.15
3	.03	e3	.00	1.2	e3	.02	17	e9	.44
4	.01	e3	.00	1.3	e3	.02	19	13	.85
5	.01	e3	.00	2.8	e6	.12	21	15	1.2
6	.02	e3	.00	2.6	4	.03	8.8	3	.07
7	.01	e3	.00	.83	e3	.02	11	e6	.27
8	.06	e3	.00	2.0	4	.03	26	16	1.4
9	.03	e3	.00	.25	2	.00	17	10	.70
10	.16	e3	.00	.14	1	.00	6.2	2	.03
11	.02	e3	.00	.04	2	.00	3.5	e2	.02
12	.26	e3	.00	.04	2	.00	2.4	2	.01
13	.35	e3	.00	6.8	17	1.2	1.9	3	.02
14	.14	e3	.00	15	28	1.2	.93	2	.00
15	.04	5	.00	4.8	6	.07	.37	3	.00
16	.05	e4	.00	6.7	30	1.9	.17	2	.00
17	.03	8	.00	7.6	11	.28	.11	2	.00
18	.02	11	.00	33	99	11	.07	2	.00
19	.01	6	.00	24	21	2.0	.04	1	.00
20	.01	2	.00	19	12	.67	.03	1	.00
21	.01	2	.00	8.6	e5	.13	.02	1	.00
22	.01	2	.00	14	24	.99	.04	2	.00
23	.01	3	.00	3.5	2	.03	.09	2	.00
24	.01	e5	.00	1.2	e1	.00	.03	4	.00
25	.00	0	.00	1.7	e1	.00	.82	e3	.01
26	.02	3	.00	1.9	<1	.01	.07	3	.00
27	.04	3	.00	4.3	e4	.05	.22	2	.00
28	.01	2	.00	3.2	1	.01	6.2	21	2.5
29	.02	2	.00	2.2	e2	.02	4.8	9	.21
30	.01	2	.00	2.5	e3	.02	.56	3	.01
31	.02	2	.00	---	---	---	23	191	23
TOTAL	1.44	---	0.00	171.29	---	19.82	177.47	---	30.91
	JANUARY			FEBRUARY			MARCH		
1	12	10	.42	21	43	2.9	.12	3	.00
2	3.0	3	.02	7.5	e12	.27	.08	2	.00
3	1.2	2	.01	3.7	e4	.04	.06	1	.00
4	.46	1	.00	5.3	e12	.44	.05	2	.00
5	.41	2	.00	5.0	e6	.10	.04	2	.00
6	.60	3	.01	4.5	e5	.06	.10	1	.00
7	e38	e262	156	2.1	e3	.02	.05	1	.00
8	e19	e65	7.5	1.7	e3	.01	.03	2	.00
9	3.6	5	.05	.65	e3	.01	.04	1	.00
10	1.5	7	.03	.40	4	.01	.13	3	.00
11	.56	6	.01	.32	6	.01	.18	3	.00
12	.24	3	.00	2.8	e5	.04	.15	1	.00
13	.14	3	.00	.76	5	.01	.50	e3	.01
14	.16	5	.00	.35	4	.00	.52	4	.01
15	.13	3	.00	.34	2	.00	16	27	1.2
16	.18	3	.00	2.1	e4	.03	24	14	1.0
17	.07	4	.00	.36	3	.00	7.3	13	.25
18	.07	4	.00	.21	4	.00	3.3	9	.08
19	.06	2	.00	.21	8	.01	2.0	e4	.03
20	.04	3	.00	6.9	e12	.32	4.0	7	.14
21	.03	4	.00	11	26	2.4	13	21	.77
22	20	138	22	16	17	.74	5.5	5	.09
23	5.3	25	.58	6.5	5	.09	2.5	3	.02
24	6.2	18	.31	2.7	3	.02	1.2	3	.01
25	6.0	107	3.3	1.3	2	.01	.48	3	.00
26	31	98	9.5	.62	1	.00	.60	4	.01
27	9.4	5	.12	.29	3	.00	3.2	e6	.05
28	5.1	e5	.08	.16	3	.00	9.6	e21	.91
29	3.0	4	.03	---	---	---	9.0	e13	.33
30	3.2	10	.34	---	---	---	3.9	5	.06
31	59	213	42	---	---	---	5.5	6	.09
TOTAL	229.65	---	242.31	104.77	---	7.54	113.13	---	5.06

e Estimated

HAWAII, ISLAND OF OAHU
16226200 NORTH HALAWA STREAM NEAR HONOLULU--Continued
WATER-QUALITY RECORDS

SEDIMENT DISCHARGE, SUSPENDED (TONS/DAY), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAY	MEAN	MEAN	SEDIMENT	MEAN	MEAN	SEDIMENT	MEAN	MEAN	SEDIMENT
	DISCHARGE (CFS)	CONCEN- TRATION (MG/L)	DISCHARGE (TONS/DAY)	DISCHARGE (CFS)	CONCEN- TRATION (MG/L)	DISCHARGE (TONS/DAY)	DISCHARGE (CFS)	CONCEN- TRATION (MG/L)	DISCHARGE (TONS/DAY)
	APRIL			MAY			JUNE		
1	4.3	e10	.11	.19	2	.00	.02	10	.00
2	2.0	21	.12	.12	3	.00	.04	e3	.00
3	3.5	7	.09	.08	3	.00	.03	e3	.00
4	51	330	131	.05	e3	.00	.03	e3	.00
5	11	59	2.3	.04	e3	.00	.02	e3	.00
6	17	12	.68	.02	e3	.00	.02	e3	.00
7	5.7	5	.08	.04	e3	.00	.09	e3	.00
8	4.7	16	.20	.02	e3	.00	.07	e3	.00
9	3.1	15	.13	.02	e3	.00	.06	e3	.00
10	8.3	e14	.35	.03	e3	.00	.02	e3	.00
11	41	340	50	.05	e3	.00	.01	e3	.00
12	44	301	45	.16	e3	.00	.01	e3	.00
13	35	213	20	.04	e3	.00	.01	e3	.00
14	15	e45	2.0	.02	e3	.00	.01	5	.00
15	7.7	e14	.30	.02	e3	.00	.09	3	.00
16	3.9	e7	.08	10	e48	6.4	.32	2	.00
17	3.5	e5	.07	12	10	.31	.02	2	.00
18	15	e27	1.2	1.6	7	.03	.02	2	.00
19	5.4	e6	.10	.34	8	.01	.03	2	.00
20	4.0	e4	.05	.30	5	.00	.05	2	.00
21	6.6	e12	.27	.11	2	.00	.05	2	.00
22	3.9	e7	.14	.06	3	.00	.26	3	.00
23	2.5	e5	.04	.04	3	.00	.64	e4	.01
24	.89	e2	.01	.02	5	.00	4.0	e6	.08
25	.41	e1	.00	.08	9	.00	2.1	3	.02
26	.42	e1	.00	.18	3	.00	.31	4	.00
27	4.3	e21	.28	.05	4	.00	1.2	e3	.01
28	.86	8	.02	.03	6	.00	.42	e3	.00
29	.32	3	.00	.02	9	.00	.15	e3	.00
30	.32	e2	.00	.02	9	.00	.19	e3	.00
31	---	---	---	.02	4	.00	---	---	---
TOTAL	305.62	---	254.62	25.77	---	6.75	10.29	---	0.12
	JULY			AUGUST			SEPTEMBER		
1	.24	e3	.00	.12	e3	.00	.02	e1	.00
2	2.7	e7	.12	.09	e3	.00	.01	1	.00
3	.70	e3	.01	.05	e3	.00	.08	<1	.00
4	.12	e2	.00	.05	e3	.00	.05	e1	.00
5	.14	e1	.00	.49	e2	.00	.01	e1	.00
6	.26	6	.01	.13	<1	.00	.01	e1	.00
7	.12	9	.00	.10	e1	.00	.01	e1	.00
8	.08	6	.00	.04	e1	.00	.03	e1	.00
9	.13	e4	.00	.03	e1	.00	.02	e1	.00
10	e.03	e3	.00	.03	e1	.00	.09	e1	.00
11	.22	e3	.00	.09	e1	.00	.02	e1	.00
12	e.13	e3	.00	.34	3	.00	.06	e1	.00
13	.16	e3	.00	.23	4	.00	.02	e1	.00
14	e.03	e3	.00	1.7	e6	.03	.01	e1	.00
15	1.2	e4	.02	.24	6	.00	.01	e1	.00
16	1.4	e4	.02	4.6	e8	.14	.01	e1	.00
17	6.2	e27	.82	1.0	e2	.01	.01	e1	.00
18	2.8	e5	.04	.16	e2	.00	.01	e1	.00
19	1.1	e3	.02	e.06	e1	.00	.01	e1	.00
20	19	e52	4.3	.04	e1	.00	.01	3	.00
21	3.9	e5	.06	.03	e1	.00	.03	2	.00
22	2.6	e3	.02	.03	e1	.00	.07	1	.00
23	4.4	e9	.24	.04	e1	.00	.02	1	.00
24	3.8	e6	.08	.03	e1	.00	.02	1	.00
25	2.1	e4	.02	.04	e1	.00	.89	e3	.03
26	1.2	e3	.01	.33	e2	.00	.07	1	.00
27	2.9	e6	.06	.02	e2	.00	.02	<1	.00
28	6.2	e11	.26	.02	e2	.00	.02	<1	.00
29	2.1	e3	.02	.05	e1	.00	.02	<1	.00
30	.74	e3	.01	.03	e1	.00	.01	1	.00
31	.24	e3	.00	.07	e1	.00	---	---	---
TOTAL	66.94	---	6.14	10.28	---	0.18	1.67	---	0.03
YEAR	1218.32		573.48						

e Estimated

HAWAII, ISLAND OF OAHU
16229000 KALIHI STREAM NEAR HONOLULU

LOCATION.--Lat 21°22'00", long 157°50'49", Hydrologic Unit 20060000, on right bank 1.9 mi upstream from Kamaikai Stream, and 4.1 mi north of Honolulu Post Office.

DRAINAGE AREA.--2.61 mi².

PERIOD OF RECORD.--September 1913 to April 1914, July 1914 to current year. Monthly discharge only for some periods, published in WSP 1319.

CHEMICAL ANALYSES: Water years 1972, 1974-93, 1996, quarterly.

REVISED RECORDS.--WSP 1569: Drainage area. WSP 1719: 1921-22(M), 1923-24, 1925-26(M), 1927-28, 1929-32(M), 1935, 1937, 1938-39(M), 1943(M), 1948-52(P), 1955-56, 1957-58(M), 1959.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 464.40 ft above mean sea level (by stadia survey). Prior to October 12, 1923, at datum 2.00 ft lower.

REMARKS.--Records computed by C.W. Yeung. Records fair.

AVERAGE DISCHARGE.--85 years (water years 1915-99), 6.44 ft³/s (4,660 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 12,400 ft³/s, November 18, 1930, gage height, 13.81 ft, from rating curve extended above 280 ft³/s on basis of indirect measurements at gage heights 8.9 ft, 10.96 ft, and 11.27 ft; minimum, 0.09 ft³/s, October 22, 1933, July 29, 1966.

EXTREMES FOR CURRENT YEAR.--Peak discharge greater than base discharge of 700 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 7	1945	*576	*6.96				

Minimum discharge, 0.46 ft³/s, August 22, September 14, 27, and 30.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

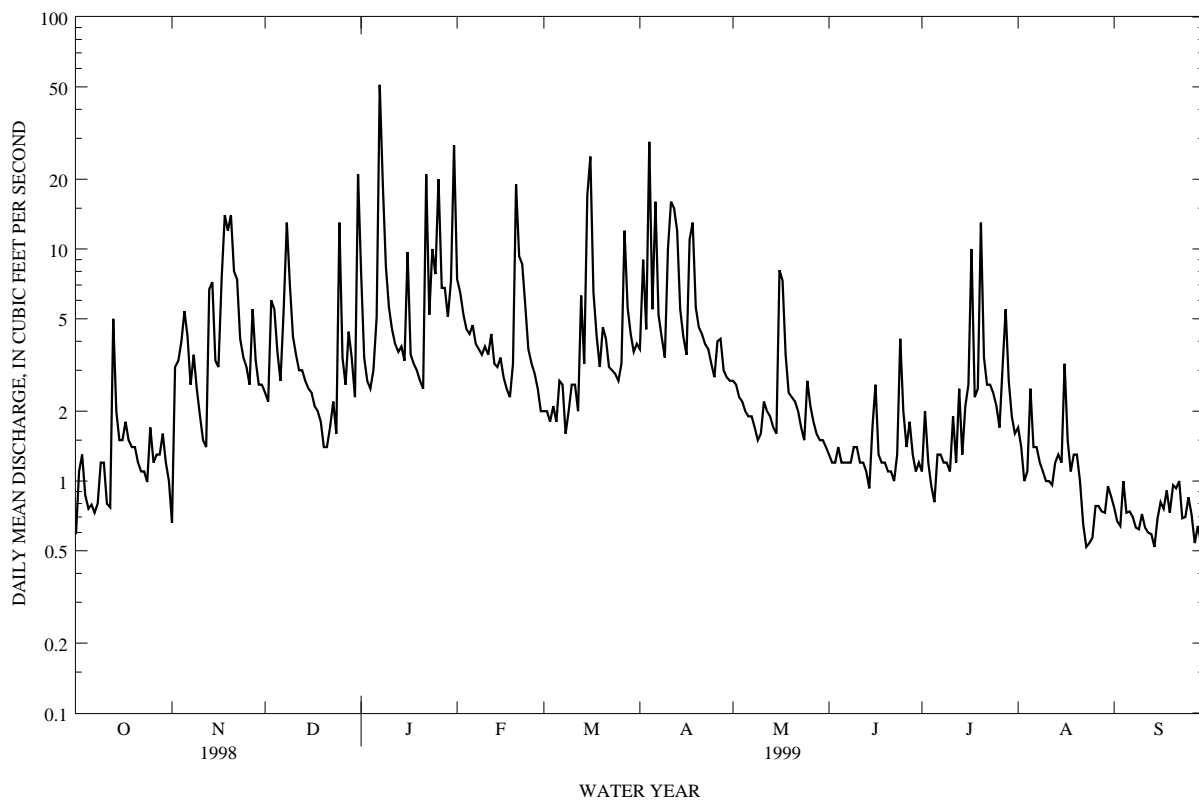
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.59	.66	2.4	7.9	7.4	2.0	3.7	2.7	1.3	1.1	1.7	.77
2	1.1	3.1	2.2	3.4	6.5	2.0	9.0	2.6	1.2	2.0	1.4	.67
3	1.3	3.3	6.0	2.7	5.2	1.8	4.5	2.3	1.2	1.2	1.0	.64
4	.87	4.0	5.5	2.5	4.5	2.1	29	2.2	1.4	.95	1.1	1.0
5	.76	5.4	3.6	3.0	4.3	1.8	5.5	2.0	1.2	.81	2.5	.73
6	.79	4.2	2.7	5.1	4.7	2.7	16	1.9	1.2	1.3	1.4	.74
7	.73	2.6	5.3	51	3.9	2.6	5.2	1.9	1.2	1.3	1.4	.70
8	.80	3.5	13	19	3.7	1.6	4.2	1.7	1.2	1.2	1.2	.63
9	1.2	2.5	7.0	8.4	3.5	2.0	3.4	1.5	1.4	1.2	1.1	.62
10	1.2	1.9	4.2	5.6	3.8	2.6	10	1.6	1.4	1.1	1.0	.72
11	.80	1.5	3.5	4.5	3.5	2.6	16	2.2	1.2	1.9	1.0	.63
12	.77	1.4	3.0	3.9	4.3	2.0	15	2.0	1.2	1.2	.96	.60
13	5.0	6.7	3.0	3.6	3.2	6.3	12	1.9	1.1	2.5	1.2	.59
14	2.0	7.2	2.7	3.8	3.1	3.2	5.5	1.7	.93	1.3	1.3	.52
15	1.5	3.3	2.5	3.3	3.4	17	4.2	1.6	1.7	2.1	1.2	.69
16	1.5	3.1	2.4	9.7	2.8	25	3.5	8.1	2.6	2.6	3.2	.81
17	1.8	7.6	2.1	3.5	2.5	6.5	11	7.3	1.3	10	1.5	.76
18	1.5	14	2.0	3.2	2.3	4.2	13	3.5	1.2	2.3	1.1	.91
19	1.4	12	1.8	3.0	3.2	3.1	5.6	2.4	1.2	2.5	1.3	.73
20	1.4	14	1.4	2.7	19	4.6	4.6	2.3	1.1	13	1.3	.96
21	1.2	8.0	1.4	2.5	9.3	4.1	4.3	2.2	1.1	3.4	1.0	.93
22	1.1	7.4	1.7	21	8.6	3.1	3.9	2.0	1.0	2.6	.65	1.0
23	1.1	4.1	2.2	5.2	5.7	3.0	3.7	1.7	1.3	2.6	.52	.69
24	.99	3.4	1.6	10	3.7	2.9	3.2	1.5	4.1	2.4	.54	.70
25	1.7	3.1	13	7.8	3.2	2.7	2.8	2.7	2.0	2.1	.57	.85
26	1.2	2.6	3.4	20	2.9	3.2	4.0	2.1	1.4	1.7	.78	.72
27	1.3	5.5	2.6	6.8	2.5	12	4.1	1.8	1.8	3.1	.78	.54
28	1.3	3.3	4.4	6.8	2.0	5.6	3.0	1.6	1.3	5.5	.74	.64
29	1.6	2.6	3.4	5.1	---	4.3	2.8	1.5	1.1	2.7	.73	.54
30	1.2	2.6	2.3	7.3	---	3.6	2.7	1.5	1.2	1.9	.95	.49
31	1.0	---	21	28	---	3.9	---	1.4	---	1.6	.86	---
TOTAL	40.70	144.56	133.3	270.3	132.7	144.1	215.4	73.4	42.53	81.16	35.98	21.52
MEAN	1.31	4.82	4.30	8.72	4.74	4.65	7.18	2.37	1.42	2.62	1.16	.72
MAX	5.0	14	21	51	19	25	29	8.1	4.1	13	3.2	1.0
MIN	.59	.66	1.4	2.5	2.0	1.6	2.7	1.4	.93	.81	.52	.49
AC-FT	81	287	264	536	263	286	427	146	84	161	71	43

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1914 - 1999, BY WATER YEAR (WY)

MEAN	4.59	7.33	8.35	8.99	7.15	8.52	8.37	6.43	3.71	4.54	5.03	4.49
MAX	18.9	35.0	35.0	65.7	48.6	40.6	36.0	37.5	12.9	16.6	26.7	31.3
(WY)	1937	1928	1930	1923	1932	1951	1989	1927	1934	1954	1958	1914
MIN	.29	.46	.74	.50	.34	.74	.63	.27	.32	.60	.43	.30
(WY)	1985	1954	1977	1977	1978	1926	1926	1926	1966	1984	1984	1984

HAWAII, ISLAND OF OAHU
 16229000 KALIHI STREAM NEAR HONOLULU--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1914 - 1999
ANNUAL TOTAL	903.41	1335.65	
ANNUAL MEAN	2.48	3.66	6.44
HIGHEST ANNUAL MEAN			13.5 1923
LOWEST ANNUAL MEAN			2.04 1984
HIGHEST DAILY MEAN	33 Jan 1	51 Jan 7	951 Jan 19 1923
LOWEST DAILY MEAN	.58 Mar 24	.49 Sep 30	.11 Jul 29 1966
ANNUAL SEVEN-DAY MINIMUM	.74 Mar 19	.62 Sep 8	.15 May 15 1926
ANNUAL RUNOFF (AC-FT)	1790	2650	4660
10 PERCENT EXCEEDS	5.3	7.5	12
50 PERCENT EXCEEDS	1.5	2.3	2.9
90 PERCENT EXCEEDS	.84	.79	1.0



HAWAII, ISLAND OF OAHU
16229300 KALIHI STREAM AT KALIHI

LOCATION.--Lat 21°20'29", long 157°52'36", Hydrologic Unit 20060000, on right bank at Kalihi, 0.4 mi northwest of Bishop Museum, and 2.4 mi northwest of Honolulu Post Office.

DRAINAGE AREA.--5.18 mi².

PERIOD OF RECORD.--Water year 1962 (annual maximum), July 1962 to current year.

CHEMICAL ANALYSES: Water years 1970-74, 1975-93, quarterly.

SUSPENDED-SEDIMENT DISCHARGE: Water years 1969-74, 1975-93, quarterly.

REVISED RECORDS.--WSP 1569: Drainage area. WSP 1719: 1921-22(M), 1923-24, 1925-26(M), 1927-28, 1929-32(M), 1935, 1937, 1938-39(M), 1943(M), 1948-52(P), 1955-56, 1957-58(M), 1959.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 70 ft above mean sea level (from topographic map). August 28, 1961, to June 30, 1962, crest-stage gage at site 600 ft downstream at different datum.

REMARKS.--Records computed by J.R. Mullen. Records fair.

AVERAGE DISCHARGE.--37 years (water years 1963-99), 10.1 ft³/s (7,290 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,110 ft³/s, April 19, 1974, gage height, 9.98 ft from rating curve extended above 180 ft³/s on basis of slope-area measurement at gage height 9.98 ft; minimum, 0.15 ft³/s, September 20, 1999.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of May 14, 1960, reached a stage of 8.0 ft from floodmarks, present site and datum, discharge, 6,350 ft³/s, from slope-area measurement of peak flow.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 980 ft³/s (revised) and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 7	2015	*960	*3.96				

Minimum discharge, 0.15 ft³/s, September 20.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

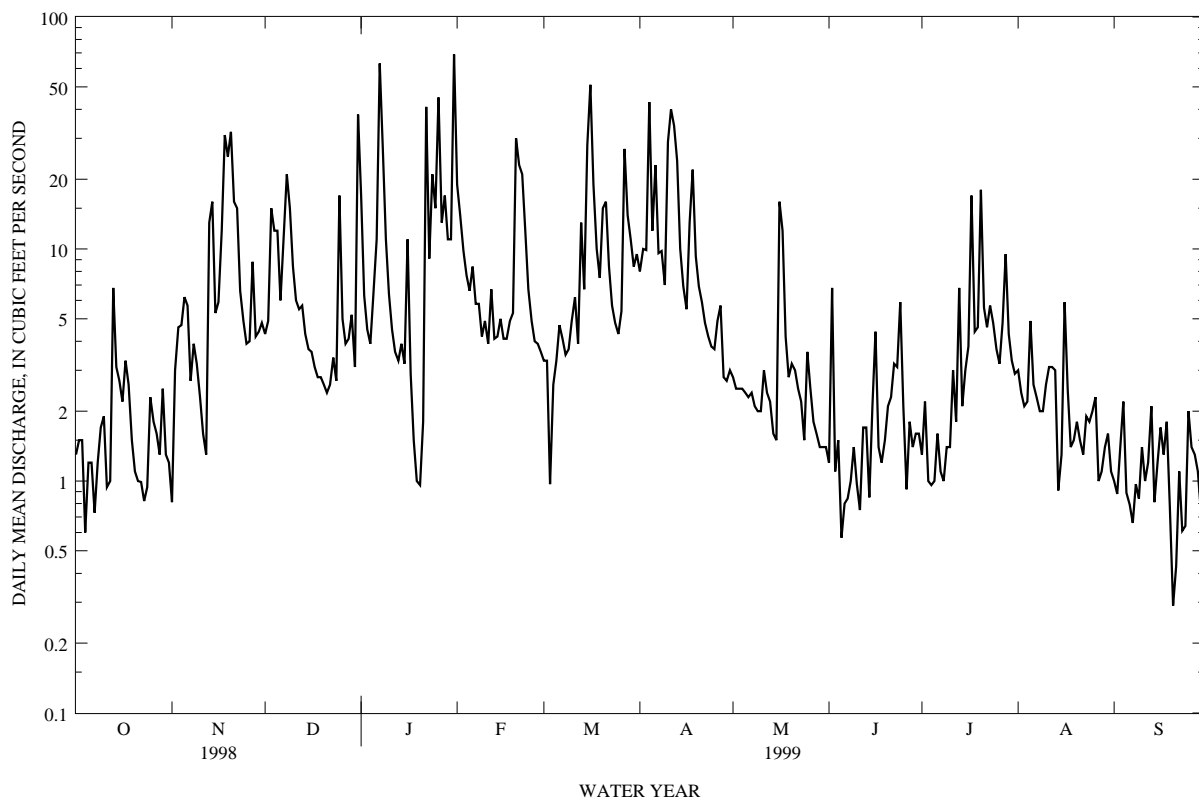
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.3	.81	4.3	17	19	3.3	8.0	2.8	1.2	1.3	3.0	1.0
2	1.5	3.0	4.9	6.3	14	3.3	10	2.5	6.8	2.2	2.4	.88
3	1.5	4.6	15	4.5	9.8	.97	9.9	2.5	1.1	1.0	2.1	1.4
4	.60	4.7	12	3.9	7.7	2.6	43	2.5	1.5	.96	2.2	2.2
5	1.2	6.2	12	6.4	6.6	3.3	12	2.4	.57	1.0	4.9	.89
6	1.2	5.7	6.0	11	8.4	4.7	23	2.3	.80	1.6	2.6	.79
7	.73	2.7	11	63	5.8	4.1	9.6	2.4	.84	1.1	2.3	.66
8	1.2	3.9	21	27	5.8	3.5	9.8	2.1	1.0	1.0	2.0	.97
9	1.7	3.2	15	11	4.2	3.7	7.0	2.0	1.4	1.4	2.0	.84
10	1.9	2.3	8.4	6.4	4.9	4.9	29	2.0	.97	1.4	2.6	1.4
11	.94	1.6	6.0	4.5	3.9	6.2	40	3.0	.75	3.0	3.1	1.0
12	1.0	1.3	5.5	3.6	6.7	3.9	34	2.4	1.7	1.8	3.1	1.2
13	6.8	13	5.7	3.3	4.1	13	24	2.2	1.7	6.8	3.0	2.1
14	3.1	16	4.3	3.9	4.2	6.7	10	1.6	.85	2.1	.91	.81
15	2.7	5.3	3.7	3.2	5.0	28	6.9	1.5	2.1	3.0	1.3	1.2
16	2.2	5.9	3.6	11	4.1	51	5.5	16	4.4	3.8	5.9	1.7
17	3.3	12	3.1	2.9	4.1	19	13	12	1.4	17	2.5	1.3
18	2.6	31	2.8	1.5	4.9	10	22	4.2	1.2	4.4	1.4	1.8
19	1.5	25	2.8	1.0	5.3	7.5	9.3	2.8	1.5	4.6	1.5	.78
20	1.1	32	2.6	.96	30	15	6.9	3.2	2.1	18	1.8	.29
21	1.0	16	2.4	1.8	23	16	5.9	3.0	2.3	5.6	1.5	.43
22	.99	15	2.6	41	21	8.4	4.8	2.5	3.2	4.6	1.3	1.1
23	.82	6.6	3.4	9.1	12	5.7	4.2	2.2	3.1	5.7	1.9	.61
24	.94	4.9	2.7	21	6.7	4.8	3.8	1.5	5.9	4.8	1.8	.64
25	2.3	3.9	17	15	4.9	4.3	3.7	3.6	2.1	3.7	2.0	2.0
26	1.8	4.0	5.0	45	4.0	5.4	4.9	2.5	.92	3.2	2.3	1.4
27	1.6	8.8	3.9	13	3.9	27	5.7	1.8	1.8	4.8	1.0	1.3
28	1.3	4.2	4.1	17	3.6	14	2.8	1.6	1.4	9.5	1.1	1.1
29	2.5	4.4	5.2	11	---	11	2.7	1.4	1.6	4.3	1.4	.73
30	1.3	4.8	3.1	11	---	8.4	3.0	1.4	1.6	3.3	1.6	.55
31	1.2	---	38	69	---	9.5	---	1.4	---	2.9	1.1	---
TOTAL	53.82	252.81	237.1	446.26	237.6	309.17	374.4	95.3	57.80	129.86	67.61	33.07
MEAN	1.74	8.43	7.65	14.4	8.49	9.97	12.5	3.07	1.93	4.19	2.18	1.10
MAX	6.8	32	38	69	30	51	43	16	6.8	18	5.9	2.2
MIN	.60	.81	2.4	.96	3.6	.97	2.7	1.4	.57	.96	.91	.29
AC-FT	107	501	470	885	471	613	743	189	115	258	134	66

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1962 - 1999, BY WATER YEAR (WY)

MEAN	6.75	13.8	14.4	13.2	10.8	15.5	13.4	9.31	5.34	7.78	5.93	4.64
MAX	22.2	49.2	56.6	45.8	60.3	73.2	57.6	40.9	19.5	29.3	35.7	20.4
(WY)	1964	1966	1988	1982	1969	1968	1989	1965	1980	1970	1982	1992
MIN	.95	2.15	1.15	.82	.78	1.15	1.65	1.49	.87	1.17	.83	.64
(WY)	1985	1981	1977	1977	1978	1983	1992	1966	1966	1984	1984	1984

HAWAII, ISLAND OF OAHU
 16229300 KALIHI STREAM AT KALIHI--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1962 - 1999	
ANNUAL TOTAL	1484.79	2294.80		
ANNUAL MEAN	4.07	6.29	10.1	
HIGHEST ANNUAL MEAN			21.3	1982
LOWEST ANNUAL MEAN			3.13	1984
HIGHEST DAILY MEAN	38 Dec 31	69 Jan 31	781	Feb 1 1969
LOWEST DAILY MEAN	.50 May 30	.29 Sep 20	.23	Jun 28 1966
ANNUAL SEVEN-DAY MINIMUM	.83 May 25	.81 Sep 18	.36	Oct 14 1984
ANNUAL RUNOFF (AC-FT)	2950	4550	7290	
10 PERCENT EXCEEDS	9.5	15	18	
50 PERCENT EXCEEDS	2.4	3.2	3.8	
90 PERCENT EXCEEDS	1.1	1.0	1.3	



HAWAII, ISLAND OF OAHU
16240500 WAIKEAKUA STREAM AT HONOLULU

LOCATION.--Lat 21°19'53", long 157°48'08", Hydrologic Unit 20060000, on right bank 5 ft downstream from bridge on Waaloa Way, 500 ft upstream from confluence with Waihi Stream, and 4.2 mi northeast of Honolulu Post Office.

DRAINAGE AREA.--1.06 mi².

PERIOD OF RECORD.--May 1913 to January 1921, August 1925 to current year. Prior to July 1960, published as East Branch Manoa Stream near Honolulu.

REVISED RECORDS.--WSP 1319: 1919(M), 1930-33(M). WSP 1569: Drainage area. WSP 1937: 1949(M), 1960(M).

GAGE.--Water-stage recorder and combination Parshall flume and concrete weir. Datum of gage is 294.50 ft above mean sea level (Honolulu Board of Water Supply benchmark). Prior to May 20, 1914, nonrecording gage at site 200 ft upstream at different datum. May 20, 1914 to January 16, 1921, water-stage recorder at site 30 ft upstream at different datum. August 18, 1925 to March 15, 1928, water-stage recorder at present site at datum 2.99 ft lower. March 16, 1928 to October 18, 1933, water-stage recorder at present site at datum 0.41 ft higher.

REMARKS.--Records computed by C.W. Yeung. Records good. Honolulu Board of Water Supply at times diverts a small amount of ground water from tunnel upstream of station. Occasional small diversions for irrigation upstream of station.

AVERAGE DISCHARGE.--81 years (water years 1914-20, 1926-99), 4.89 ft³/s (3,550 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,090 ft³/s, January 16, 1921, gage height, 10.4 ft, from floodmarks, site and datum then in use, from rating curve extended above 58 ft³/s; minimum, 0.6 ft³/s, June 7, 8, 1926.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 310 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr. 2	2030	*188	*2.70				

Minimum discharge, 1.9 ft³/s, September 27-30.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

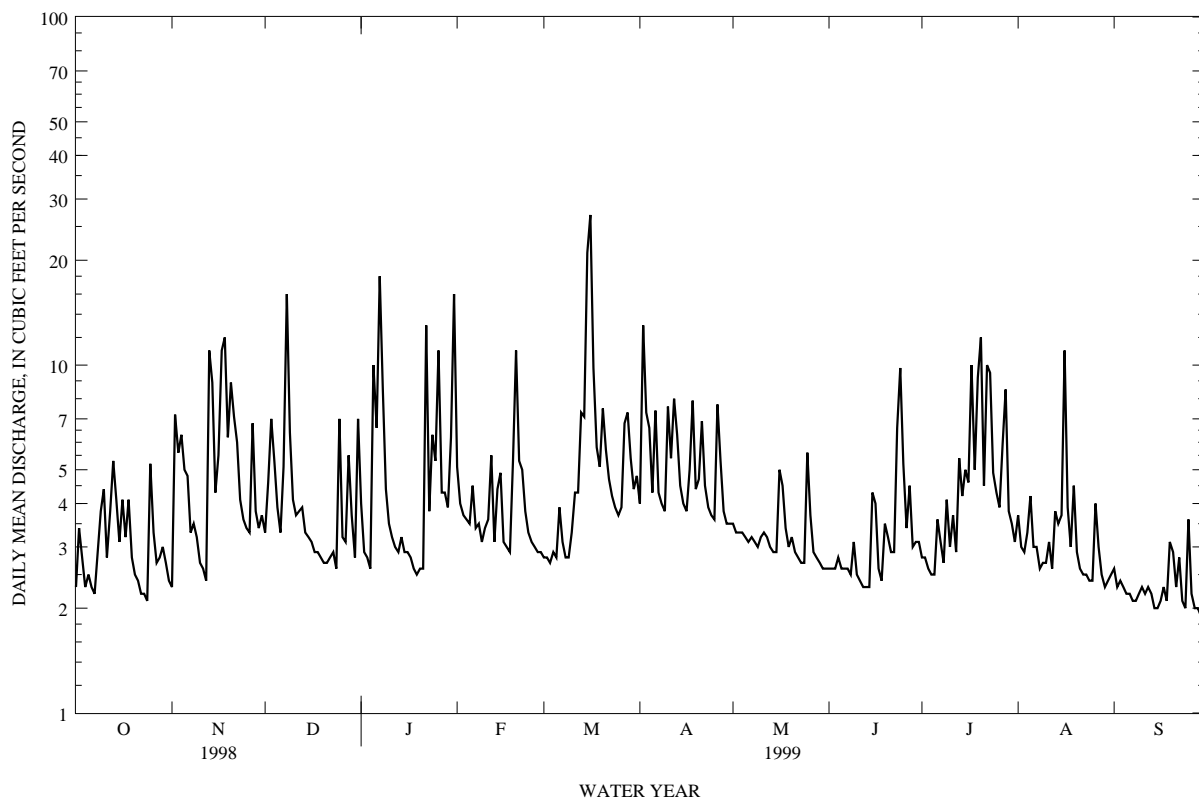
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.3	2.3	3.3	4.0	5.1	2.8	4.0	3.5	2.6	2.8	3.7	2.6
2	3.4	7.2	4.6	2.9	4.0	2.8	13	3.3	2.6	2.8	3.0	2.3
3	2.8	5.6	7.0	2.8	3.7	2.7	7.3	3.3	2.6	2.6	2.9	2.4
4	2.3	6.3	5.3	2.6	3.6	2.9	6.6	3.3	2.8	2.5	3.3	2.3
5	2.5	5.0	3.9	10	3.5	2.8	4.3	3.2	2.6	2.5	4.2	2.2
6	2.3	4.8	3.3	6.6	4.5	3.9	7.4	3.1	2.6	3.6	3.0	2.2
7	2.2	3.3	5.1	18	3.4	3.1	4.3	3.2	2.6	3.1	3.0	2.1
8	2.9	3.5	16	8.5	3.5	2.8	4.0	3.1	2.5	2.7	2.6	2.1
9	3.8	3.2	6.4	4.4	3.1	2.8	3.8	3.0	3.1	4.1	2.7	2.2
10	4.4	2.7	4.1	3.5	3.4	3.3	7.6	3.2	2.5	3.0	2.7	2.3
11	2.8	2.6	3.7	3.2	3.6	4.3	5.4	3.3	2.4	3.7	3.1	2.2
12	3.8	2.4	3.8	3.0	5.5	4.3	8.0	3.2	2.3	2.9	2.6	2.3
13	5.3	11	3.9	2.9	3.1	7.3	6.3	3.0	2.3	5.4	3.8	2.2
14	4.1	8.9	3.3	3.2	4.4	7.1	4.5	2.9	2.3	4.2	3.5	2.0
15	3.1	4.3	3.2	2.9	4.9	21	4.0	2.9	4.3	5.0	3.7	2.0
16	4.1	5.5	3.1	2.9	3.1	27	3.8	5.0	4.0	4.6	11	2.1
17	3.2	11	2.9	2.8	3.0	9.8	5.0	4.5	2.6	10	3.9	2.3
18	4.1	12	2.9	2.6	2.9	5.8	7.9	3.4	2.4	5.0	3.0	2.1
19	2.8	6.2	2.8	2.5	5.3	5.1	4.4	3.0	3.5	9.2	4.5	3.1
20	2.5	8.9	2.7	2.6	11	7.5	4.7	3.2	3.2	12	2.9	2.9
21	2.4	7.1	2.7	2.6	5.3	5.7	6.9	2.9	2.9	4.5	2.6	2.3
22	2.2	6.0	2.8	13	5.0	4.7	4.5	2.8	2.9	10	2.5	2.8
23	2.2	4.1	2.9	3.8	3.8	4.2	3.9	2.7	6.6	9.5	2.5	2.1
24	2.1	3.6	2.6	6.3	3.3	3.9	3.7	2.7	9.8	4.9	2.4	2.0
25	5.2	3.4	7.0	5.3	3.1	3.7	3.6	5.6	5.2	4.3	2.4	3.6
26	3.3	3.3	3.2	11	3.0	3.9	7.7	3.7	3.4	3.9	4.0	2.2
27	2.7	6.8	3.1	4.3	2.9	6.8	5.3	2.9	4.5	5.9	3.0	2.0
28	2.8	3.8	5.5	4.3	2.9	7.3	3.8	2.8	3.0	8.5	2.5	2.0
29	3.0	3.4	3.7	3.9	---	5.4	3.5	2.7	3.1	3.8	2.3	1.9
30	2.7	3.7	2.8	6.2	---	4.4	3.5	2.6	3.1	3.5	2.4	1.9
31	2.4	---	7.0	16	---	4.8	---	2.6	---	3.1	2.5	---
TOTAL	95.7	161.9	134.6	168.6	113.9	183.9	162.7	100.6	100.3	153.6	102.2	68.7
MEAN	3.09	5.40	4.34	5.44	4.07	5.93	5.42	3.25	3.34	4.95	3.30	2.29
MAX	5.3	12	16	18	11	27	13	5.6	9.8	12	11	3.6
MIN	2.1	2.3	2.6	2.5	2.9	2.7	3.5	2.6	2.3	2.5	2.3	1.9
AC-FT	190	321	267	334	226	365	323	200	199	305	203	136

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1913 - 1999, BY WATER YEAR (WY)

MEAN	4.19	5.26	5.33	4.90	4.47	5.43	5.68	5.15	4.19	4.96	4.83	4.16
MAX	10.7	18.1	15.5	14.8	15.6	19.5	17.5	13.3	10.3	12.3	13.6	13.3
(WY)	1915	1928	1988	1988	1955	1942	1989	1988	1938	1958	1958	1914
MIN	1.18	1.17	1.42	1.28	1.03	1.14	1.16	.87	1.27	.87	1.31	1.27
(WY)	1946	1934	1920	1977	1920	1926	1926	1926	1920	1926	1984	1984

HAWAII, ISLAND OF OAHU
 16240500 WAIAKEAKUA STREAM AT HONOLULU--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1913 - 1999	
ANNUAL TOTAL	1369.0	1546.7		
ANNUAL MEAN	3.75	4.24	4.89	
HIGHEST ANNUAL MEAN			8.23	1988
LOWEST ANNUAL MEAN			1.94	1920
HIGHEST DAILY MEAN	23 Jan 1	27 Mar 16	183	Mar 24 1994
LOWEST DAILY MEAN	1.9 Mar 20	1.9 Sep 29	.62	Feb 26 1920
ANNUAL SEVEN-DAY MINIMUM	2.0 Mar 16	2.1 Sep 12	.75	May 23 1926
ANNUAL RUNOFF (AC-FT)	2720	3070	3550	
10 PERCENT EXCEEDS	6.1	7.1	8.0	
50 PERCENT EXCEEDS	2.9	3.3	3.5	
90 PERCENT EXCEEDS	2.2	2.4	1.8	



HAWAII, ISLAND OF OAHU
 16240500 WAIAKEAKUA STREAM AT HONOLULU--Continued
 WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1970-86, 1999.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	OXYGEN, DIS-SOLVED (PER-CENT SATURATION) (00301)	OXYGEN, DIS-SOLVED (MG/L) (00300)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE WATER (DEG C) (00010)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNESIUM, DIS-SOLVED (MG/L AS MG) (00925)	POTASSIUM, DIS-SOLVED (MG/L AS K) (00935)
JUN 17...	1010	2.5	101	8.9	129	21.0	7.5	5.9	.6
AUG 24...	0940	2.4	97	8.5	135	21.5	7.6	6.2	.7

DATE	TIME	ALKALINITY, WATER DIS-SOLVED (MG/L AS NA) (00930)	BICARBONATE, WATER DIS-SOLVED (MG/L AS NA) (00453)	CHLORIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUORIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SULFATE, DIS-SOLVED (MG/L AS SO4) (00945)	NITROGEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC DIS-SOLVED (MG/L AS N) (00623)
JUN 17...	11	45	55	12	<.1	21	1.9	<.02	<.1
AUG 24...	10	44	54	13	<.1	22	1.6	<.02	E.05

DATE	TIME	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITROGEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	PHOSPHORUS, PHOSPHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOSPHORUS, ORTHO, PHOSPHORUS DIS-SOLVED (MG/L AS P) (00671)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGANESE, DIS-SOLVED (UG/L AS MN) (01056)
JUN 17...	.1	<.05	<.01	.014	.02	.025	97	13	4
AUG 24...	.1	.05	<.01	.012	.01	.029	89	10	6

DATE	TIME	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C) (00689)	SEDIMENT, SUSPENDED (MG/L) (80154)	PH WATER FILTERED FIELD (STANDARD UNITS) (99900)
JUN 17...		.7	.5	6	8.2
AUG 24...		.6	.7	8	8.0

DATE	TIME	ALUMINUM, DIS-SOLVED (UG/L AS AL) (01106)	ANTIMONY, DIS-SOLVED (UG/L AS SB) (01095)	ARSENIC, DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	BERYLLIUM, DIS-SOLVED (UG/L AS BE) (01010)	CADMIUM, DIS-SOLVED (UG/L AS CD) (01025)	CHROMIUM, DIS-SOLVED (UG/L AS CR) (01030)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)
AUG 24...		8	<1	<1	1	<1	<1	<1.0	<1

E Estimated

HAWAII, ISLAND OF OAHU
 16240500 WAIAKEAKUA STREAM AT HONOLULU--Continued
 WATER-QUALITY RECORDS

DATE	COPPER, DIS- SOLVED (UG/L AS CU (01040)	LEAD, DIS- SOLVED (UG/L AS PB (01049)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO (01060)	NICKEL, DIS- SOLVED (UG/L AS NI (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE (01145)	SILVER, DIS- SOLVED (UG/L AS AG (01075)	ZINC, DIS- SOLVED (UG/L AS ZN (01090)	URANIUM NATURAL DIS- SOLVED (UG/L AS U (22703)		
AUG 24...	<1	<1	<1	<1	<1	<1	<1	<1		
DATE	2,6-DI- ETHYL ANILINE WAT FLT 0.7 U GF, REC (UG/L (82660)	ACETO- CHLOR, WATER FLTRD REC (UG/L (49260)	ALA- CHLOR, WATER, DISS, REC, (UG/L (46342)	ALPHA BHC DIS- SOLVED (UG/L (34253)	ATRA- ZINE, WATER, DISS, REC (UG/L (39632)	BEN- FLUR- ALIN WAT FLD 0.7 U GF, REC (UG/L (82673)	BUTYL- ATE, WATER, DISS, REC (UG/L (04028)	CAR- BARYL WATER FLTRD 0.7 U GF, REC (UG/L (82680)	CARBO- FURAN WATER FLTRD 0.7 U GF, REC (UG/L (82674)	CHLOR- PYRIFOS DIS- SOLVED (UG/L (38933)
AUG 24...	<.003	<.002	<.002	<.002	<.001	<.002	<.002	<.003	<.003	<.004
DATE	CYANA- ZINE, WATER, DISS, REC (UG/L (04041)	DCPA WATER FLTRD 0.7 U GF, REC (UG/L (82682)	DEETHYL ATRA- ZINE, WATER, DISS, REC (UG/L (04040)	DI- AZINON, DIS- SOLVED (UG/L (39572)	DI- ELDRIN DIS- SOLVED (UG/L (39381)	DISUL- FOTON WATER FLTRD 0.7 U GF, REC (UG/L (82677)	EPTC WATER FLTRD 0.7 U GF, REC (UG/L (82668)	ETHAL- FLUR- ALIN WAT FLT 0.7 U GF, REC (UG/L (82663)	ETHO- PROP WATER FLTRD 0.7 U GF, REC (UG/L (82672)	FONOFOS WATER DISS REC (UG/L (04095)
AUG 24...	<.004	<.002	<.002	<.002	<.001	<.017	<.002	<.004	<.003	<.003
DATE	LINDANE DIS- SOLVED (UG/L (39341)	LIN- URON WATER FLTRD 0.7 U GF, REC (UG/L (82666)	MALA- THION, DIS- SOLVED (UG/L (39532)	METHYL AZIN- PHOS WAT FLT 0.7 U GF, REC (UG/L (82686)	METHYL PARA- THION WAT FLT 0.7 U GF, REC (UG/L (82667)	METO- LACHLOR WATER DISSOLV (UG/L (39415)	METRI- BUZIN SENCOR WATER DISSOLV (UG/L (82630)	MOL- INATE WATER FLTRD 0.7 U GF, REC (UG/L (82671)	NAPROP- AMIDE WATER FLTRD 0.7 U GF, REC (UG/L (82684)	P, P' DDE DISSOLV (UG/L (34653)
AUG 24...	<.004	<.002	<.005	<.001	<.006	<.002	<.004	<.004	<.003	<.006
DATE	PARA- THION, DIS- SOLVED (UG/L (39542)	PENDI- METH- ALIN WAT FLT 0.7 U GF, REC (UG/L (82683)	PEB- ULATE FILTRD 0.7 U GF, REC (UG/L (82669)	PER- METHRIN CIS WAT FLT 0.7 U GF, REC (UG/L (82687)	PHORATE WATER FLTRD 0.7 U GF, REC (UG/L (82664)	PRO- METON, WATER, DISS, REC (UG/L (04037)	PRON- AMIDE WATER FLTRD 0.7 U GF, REC (UG/L (82676)	PROP- CHLOR, WATER, DISS, REC (UG/L (04024)		
AUG 24...	<.004	<.004	<.004	<.005	<.002	<.018	<.003	<.003	<.007	
DATE	PRO- PANIL WATER FLTRD 0.7 U GF, REC (82679)	PRO- PARGITE WATER FLTRD 0.7 U GF, REC (82685)	SI- MAZINE, WATER, DISS, REC (UG/L (04035)	TEBU- THIURON WATER FLTRD 0.7 U GF, REC (82670)	TER- BACIL WATER FLTRD 0.7 U GF, REC (82665)	TER- BUFOS WATER FLTRD 0.7 U GF, REC (82675)	THIO- BENCARB WATER FLTRD 0.7 U GF, REC (82681)	TRI- FLUR- ALIN WAT FLT 0.7 U GF, REC (82661)		
AUG 24...	<.004	<.013	<.005	<.010	<.007	<.013	<.002	<.002		

HAWAII, ISLAND OF OAHU
16242500 MANOA STREAM AT KANEWAI FIELD

LOCATION.--Lat 21°17'47", long 157°48'56", Hydrologic Unit 20060000, on left bank, 0.5 mi northeast of Kaimuki High School, 0.4 mi northwest of St. Louis High School, and 0.3 mi upstream from confluence with Palolo Stream.

DRAINAGE AREA.--5.99 mi².

PERIOD OF RECORD.--January 1999 to September 1999.

GAGE.--Water-stage recorder. Elevation of gage is 22 ft above mean sea level, from topographic map.

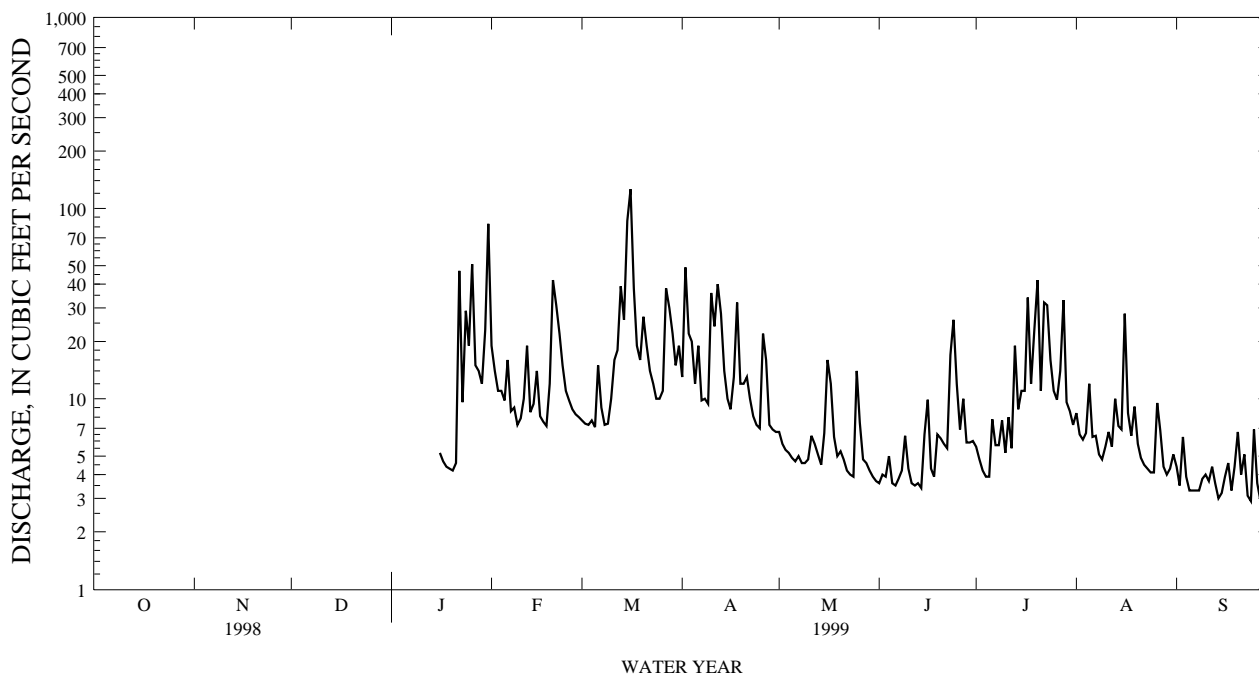
REMARKS.--Records computed by Lisa Miller. Records good except for estimated daily discharges, March 17-24, which are fair.

EXTREMES FOR CURRENT YEAR.--Maximum discharge during period January 16 to September 30, 614 ft³/s, April 2, gage height, 11.96 ft. Minimum discharge during period January 16 to September 30, 1999, 2.7 ft³/s, September 29 and 30, gage height, 8.84 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	19	7.7	13	6.7	3.6	5.6	8.4	4.4
2	---	---	---	---	14	7.4	49	5.8	4.0	4.8	6.5	3.5
3	---	---	---	---	11	7.3	22	5.4	3.9	4.2	6.1	6.3
4	---	---	---	---	11	7.7	20	5.2	5.0	3.9	6.6	3.9
5	---	---	---	---	9.8	7.1	12	4.9	3.6	3.9	12	3.3
6	---	---	---	---	16	15	19	4.7	3.5	7.8	6.3	e3.3
7	---	---	---	---	8.6	9.0	9.8	5.0	3.8	5.7	6.4	e3.3
8	---	---	---	---	9.0	7.3	10	4.6	4.2	5.7	5.1	3.3
9	---	---	---	---	7.3	7.4	9.4	4.6	6.4	7.7	4.8	3.8
10	---	---	---	---	7.9	10	36	4.8	4.3	5.2	5.6	4.0
11	---	---	---	---	10	16	24	6.4	3.6	8.0	6.7	3.7
12	---	---	---	---	19	18	40	5.8	3.5	5.5	5.6	4.4
13	---	---	---	---	8.5	39	28	5.1	3.6	19	10	3.6
14	---	---	---	---	9.4	26	14	4.5	3.4	8.8	7.2	e3.0
15	---	---	---	---	14	86	10	6.6	6.5	11	6.9	3.2
16	---	---	---	5.2	8.1	126	8.8	16	9.9	11	28	3.9
17	---	---	---	4.7	7.6	e38	13	12	4.3	34	8.4	4.6
18	---	---	---	4.4	7.2	e19	32	6.3	3.9	12	6.4	3.3
19	---	---	---	4.3	12	e16	12	5.0	6.5	23	9.1	4.4
20	---	---	---	4.2	42	e27	12	5.3	6.2	42	5.8	6.7
21	---	---	---	4.6	31	e19	13	4.8	5.8	11	4.9	4.0
22	---	---	---	47	22	e14	10	4.2	5.5	32	4.5	5.1
23	---	---	---	9.6	15	e12	8.1	4.0	17	31	4.3	3.1
24	---	---	---	29	11	e10	7.3	3.9	26	16	4.1	2.9
25	---	---	---	19	9.8	10	7.0	14	12	11	4.1	6.9
26	---	---	---	51	8.8	11	22	7.5	6.9	9.9	9.5	3.6
27	---	---	---	15	8.3	38	16	4.8	10	14	6.8	2.9
28	---	---	---	14	8.0	30	7.3	4.6	5.9	33	4.4	2.9
29	---	---	---	12	---	22	6.9	4.2	5.9	9.6	4.0	2.7
30	---	---	---	23	---	15	6.7	3.9	6.0	8.6	4.3	2.7
31	---	---	---	83	---	19	---	3.7	---	7.3	5.1	---
TOTAL	---	---	---	---	365.3	696.9	498.3	184.3	194.7	412.2	217.9	116.7
MEAN	---	---	---	---	13.0	22.5	16.6	5.95	6.49	13.3	7.03	3.89
MAX	---	---	---	---	42	126	49	16	26	42	28	6.9
MIN	---	---	---	---	7.2	7.1	6.7	3.7	3.4	3.9	4.0	2.7
AC-FT	---	---	---	---	725	1380	988	366	386	818	432	231
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1999 - 1999, BY WATER YEAR (WY)												
MEAN	---	---	---	---	13.0	22.5	16.6	5.95	6.49	13.3	7.03	3.89
MAX	---	---	---	---	13.0	22.5	16.6	5.95	6.49	13.3	7.03	3.89
(WY)	---	---	---	---	1999	1999	1999	1999	1999	1999	1999	1999
MIN	---	---	---	---	13.0	22.5	16.6	5.95	6.49	13.3	7.03	3.89
(WY)	---	---	---	---	1999	1999	1999	1999	1999	1999	1999	1999

e Estimated



HAWAII, ISLAND OF OAHU
 162425000 MANOA STREAM AT KANEWAI FIELD--Continued
 WATER-QUALITY RECORDS

PERIOD OF RECORD.--January to September 1999.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: January to September 1999.

WATER TEMPERATURE: January to September 1999.

INSTRUMENTATION.--Specific conductance and temperature monitor from January to September 1999. Automatic water-quality (point) sampler from March to September 1999.

REMARKS.--Water-quality samples were collected monthly beginning in March 1999. Monthly samples were collected with a hand-held sampler using the equal-width-increment sampling method. Additional samples were collected during storm events (May 16, June 16, and July 20 and 22) using an automatic (point) sampler located on the left bank of the stream. All samples analyzed for VOCs were collected near the centroid of flow using a hand-held VOC sampler.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum, 676 microsiemens per centimeter, June 19; minimum, 52 microsiemens per centimeter, May 25.

WATER TEMPERATURE: Maximum, 25.5° C, Aug. 3; minimum, 18.5° C, Feb. 13.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	OXYGEN, DIS-SOLVED (PER-CENT SATURATION) (00301)	OXYGEN, DIS-SOLVED (MG/L) (00300)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE WATER (DEG C) (00010)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNESIUM, DIS-SOLVED (MG/L AS MG) (00925)	POTASSIUM, DIS-SOLVED (MG/L AS K) (00935)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)
MAR										
10...	1600	10	112	9.7	211	22.5	10	9.4	1.3	15
APR										
26...	1220	8.6	94	8.0	231	23.0	10	9.1	.9	18
MAY										
16...	2045	65	--	--	105	23.0	6.4	3.3	1.2	7.2
19...	1150	4.9	96	8.2	225	23.0	11	8.8	5.3	17
JUN										
10...	1120	4.2	93	8.0	186	23.0	9.0	8.0	1.1	14
16...	0006	49	--	--	104	22.5	5.9	3.8	1.1	8.3
JUL										
20...	0420	88	--	--	81	22.0	3.5	2.5	1.3	6.5
22...	1100	17	100	8.8	157	22.0	8.8	6.5	1	12
22...	1615	103	97	8.3	82	23.0	4.0	2.4	1.2	6.2
AUG										
17...	1250	8.1	95	8.0	174	24.0	9.5	7.7	1.2	13
SEP										
14...	1130	3.0	96	8.0	213	24.0	11	9.3	1.1	15

DATE	ALKALINITY WATER TOTAL FIELD (MG/L AS CACO3) (39086)	BICARBONATE WATER FIELD (MG/L AS HCO3) (00453)	CARBONATE WATER FIELD (MG/L AS CO3) (00452)	CHLORIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUORIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	NITROGEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)
MAR									
10...	61	--	--	22	<.1	21	6.1	.02	.1
APR									
26...	58	71	--	27	<.1	19	6.4	.03	.1
MAY									
16...	32	38	--	8.6	<.1	7.0	3.1	.03	E.07
19...	60	67	3	21	<.1	19	6.9	.03	.1
JUN									
10...	51	62	--	20	<.1	17	5.8	.02	.2
16...	33	39	--	9.6	<.1	9.7	2.3	<.02	.2
JUL									
20...	18	23	--	9.0	<.1	8.1	1.6	<.02	.3
22...	43	53	--	16	<.1	15	4.4	<.02	E.05
22...	18	23	--	8.7	<.1	6.8	2.6	<.02	.2
AUG									
17...	50	61	--	18	<.1	19	5.6	<.02	.1
SEP									
14...	65	79	--	21	<.1	21	6.1	.02	E.09

E Estimated

HAWAII, ISLAND OF OAHU
 162425000 MANOA STREAM AT KANEWAI FIELD--Continued
 WATER-QUALITY RECORDS

DATE	NITRO- GEN, AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)
MAR 10...	.3	.17	<.01	.022	.03	.06	129	210	8
APR 26...	.3	.14	<.01	.018	.03	.048	141	94	16
MAY 16...	2.0	.18	<.01	.069	.06	.57	62	25	E3
MAY 19...	.2	.16	<.01	.022	.03	.046	129	100	16
JUN 10...	.3	.13	.02	.024	.03	.049	120	150	13
JUN 16...	2.0	.16	<.01	.033	.02	.42	82	30	<3
JUL 20...	.5	.09	<.01	.021	.02	.12	56	91	4
JUL 22...	E.10	.14	<.01	.017	.02	.057	99	36	9
JUL 22...	.5	.17	<.01	.045	.04	.44	52	83	2
AUG 17...	.2	.16	<.01	.024	.01	.071	105	53	10
SEP 14...	.2	.12	<.01	.022	.02	.057	129	130	8

DATE	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS- PENDE TOTAL (MG/L AS C) (00689)	PH WATER SEDIMENT, SUS- PENDE (MG/L) (80154)	PH WATER FIELD (STAND- ARD UNITS) (99900)
MAR 10...	1.0	.8	13	8.2
APR 26...	1.1	.9	15	8.0
MAY 16...	3.5	>5.0	186	8.1
MAY 19...	1.5	.6	8	8.1
JUN 10...	3.0	.8	9	8.3
JUN 16...	2.9	>3.6	146	8.0
JUL 20...	4.2	>17	1030	7.4
JUL 22...	1.9	>1.6	19	8.1
JUL 22...	3.6	>8.1	567	7.7
AUG 17...	1.9	2.0	18	8.5
SEP 14...	1.5	1.3	11	8.3

DATE	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)	ANTI- MONY, DIS- SOLVED (UG/L AS SB) (01095)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR) (01030)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)
JUL 20...	43	<1	<1	2	<1	<1	<1.0	<1
JUL 22...	18	<1	<1	3	<1	<1	--	<1
JUL 22...	52	<1	2	1	<1	<1	<1.0	<1
AUG 17...	24	<1	<1	3	<1	<1	<1.0	<1
SEP 14...	9	<1	<1	3	<1	<1	<1.0	<1

E Estimated

HAWAII, ISLAND OF OAHU
162425000 MANOA STREAM AT KANEWAI FIELD--Continued
WATER-QUALITY RECORDS

DATE	COPPER, DIS- SOLVED (UG/L AS CU) (01040)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	URANIUM NATURAL DIS- SOLVED (UG/L AS U) (22703)		
	JUL									
20...	2	<1	<1	<1	1	<1	<1	<1		
22...	1	<1	<1	<1	<1	<1	1	<1		
22...	2	<1	<1	<1	<1	<1	1	<1		
AUG										
17...	<1	<1	<1	<1	<1	<1	<1	<1		
SEP										
14...	<1	<1	<1	<1	<1	<1	<1	<1		
DATE	2,6-DI- ETHYL ANILINE WAT FLT 0.7 U GF, REC (UG/L) (82660)	ACETO- CHLOR, WATER FLTRD REC (UG/L) (49260)	ALA- CHLOR, WATER, DISS, REC, (UG/L) (46342)	ALPHA BHC DIS- SOLVED (UG/L) (34253)	ATRA- ZINE, WATER, DISS, REC (UG/L) (39632)	BEN- FLUR- ALIN WAT FLD GF, REC (UG/L) (82673)	BUTYL- ATE, WATER, DISS, REC (UG/L) (04028)	CAR- BARYL WATER FLTRD GF, REC (UG/L) (82680)	CARBO- FURAN WATER FLTRD GF, REC (UG/L) (82674)	CHLOR- PYRIFOS DIS- SOLVED (UG/L) (38933)
JUL										
20...	<.003	<.002	<.002	<.002	<.001	<.002	<.002	<.003	<.003	<.004
22...	<.003	<.002	<.002	<.002	<.001	<.002	<.002	<.003	<.003	<.004
22...	<.003	<.002	<.002	<.002	<.001	<.002	<.002	E.0091	<.003	<.004
AUG										
17...	<.003	<.002	<.002	<.002	<.001	<.002	<.002	<.003	<.003	<.004
SEP										
14...	<.003	<.002	<.002	<.002	<.001	<.002	<.002	<.003	<.010	<.004
DATE	CYANA- ZINE, WATER, DISS, REC (UG/L) (04041)	DCPA WATER FLTRD GF, REC (UG/L) (82682)	DEETHYL ATRA- ZINE, WATER, DISS, REC (UG/L) (04040)	DI- AZINON, DIS- SOLVED (UG/L) (39572)	DI- ELDRIN DIS- SOLVED (UG/L) (39381)	DISUL- FOTON WATER FLTRD GF, REC (UG/L) (82677)	EPTC WATER FLTRD GF, REC (UG/L) (82668)	ETHAL- FLUR- ALIN WAT FLT GF, REC (UG/L) (82663)	ETHO- PROP WATER FLTRD GF, REC (UG/L) (82672)	FONOFOS WATER DISS REC (UG/L) (04095)
JUL										
20...	<.004	<.002	<.002	.0831	<.001	<.017	<.002	<.004	<.003	<.003
22...	<.004	<.002	<.002	.0152	.0727	<.017	<.002	<.004	<.003	<.003
22...	<.004	<.002	<.002	.0571	.0182	<.017	<.002	<.004	<.003	<.003
AUG										
17...	<.004	<.002	<.002	.0280	.0520	<.017	<.002	<.004	<.003	<.003
SEP										
14...	<.004	<.002	<.002	<.002	.0433	<.017	<.002	<.004	<.003	<.003
DATE	LINDANE DIS- SOLVED (UG/L) (39341)	LIN- URON WATER FLTRD GF, REC (UG/L) (82666)	MALA- THION, WAT FLT DIS- SOLVED (UG/L) (39532)	METHYL AZIN- PHOS WAT FLT GF, REC (UG/L) (82686)	METHYL PARA- THION WAT FLT GF, REC (UG/L) (82667)	METO- LACHLOR WATER DISSOLV (UG/L) (39415)	METRI- BUZIN WATER FLTRD GF, REC (UG/L) (82630)	MOL- INATE WATER FLTRD GF, REC (UG/L) (82671)	NAPPROP- AMIDE WATER FLTRD GF, REC (UG/L) (82684)	P, P' DDE DISSOLV (UG/L) (34653)
JUL										
20...	<.004	<.002	<.005	<.001	<.006	<.002	<.004	<.004	<.003	<.006
22...	<.004	<.002	<.005	<.001	<.006	<.002	<.004	<.004	<.003	<.006
22...	<.004	<.002	<.005	<.001	<.006	<.002	.0181	<.004	<.003	<.006
AUG										
17...	<.004	<.002	<.005	<.001	<.006	<.002	<.004	<.004	<.003	<.006
SEP										
14...	<.004	<.002	<.005	<.001	<.006	<.002	.0125	<.004	<.003	<.006

E Estimated

HAWAII, ISLAND OF OAHU
162425000 MANOA STREAM AT KANEWAI FIELD--Continued
WATER-QUALITY RECORDS

DATE	PARA- THION, DIS- SOLVED (UG/L) (39542)	PENDI- METH- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82683)	PEB- ULATE WATER FILTRD 0.7 U GF, REC (UG/L) (82669)	PER- METHRIN CIS WAT FLT 0.7 U GF, REC (UG/L) (82687)	PHORATE WATER FLTRD 0.7 U GF, REC (UG/L) (82664)	PRO- METON, WATER, DISS, REC (UG/L) (04037)	PRON- AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82676)	PROP- CHLOR, WATER, DISS, REC (UG/L) (04024)		
	JUL									
20...	<.004	<.004	<.004	<.005	<.002	<.018	<.003	<.007		
22...	<.004	<.004	<.004	<.005	<.002	<.018	<.003	<.007		
22...	<.004	<.004	<.004	<.005	<.002	E.0133	<.003	<.007		
AUG										
17...	<.004	<.004	<.004	<.005	<.002	E.0044	<.003	<.007		
SEP										
14...	<.004	<.004	<.004	<.005	<.002	<.018	<.003	<.007		
DATE	PRO- PANIL WATER FLTRD 0.7 U GF, REC (UG/L) (82679)	PRO- PARGITE WATER FLTRD 0.7 U GF, REC (UG/L) (82685)	SI- MAZINE, WATER, DISS, REC (UG/L) (04035)	TEBU- THIURON WATER FLTRD 0.7 U GF, REC (UG/L) (82670)	TER- BACIL WATER FLTRD 0.7 U GF, REC (UG/L) (82665)	TER- BUFOS WATER FLTRD 0.7 U GF, REC (UG/L) (82675)	THIO- BENCARB WATER FLTRD 0.7 U GF, REC (UG/L) (82681)	TRI- FLUR- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82661)		
JUL										
20...	<.004	<.013	<.005	<.010	<.007	<.013	<.002	<.002		
22...	<.004	<.013	<.005	<.010	<.007	<.013	<.002	<.002		
22...	<.004	<.013	<.005	<.010	<.007	<.013	<.002	<.002		
AUG										
17...	<.004	<.013	<.005	<.010	<.007	<.013	<.002	<.002		
SEP										
14...	<.004	<.013	<.005	<.010	<.007	<.013	<.002	<.002		
DATE	CARBON DI- SULFIDE WATER WHOLE TOTAL (UG/L) (77041)	1,1,1- TRI- CHLORO- ETHANE TOTAL (UG/L) (34506)	1,1,2- TRI- CHLORO- ETHANE TOTAL (UG/L) (34511)	1,1-DI- CHLORO- ETHANE TOTAL (UG/L) (34496)	1,1-DI- CHLORO- ETHYL- ENE TOTAL (UG/L) (34501)	1,1-DI- CHLORO- PRO- PENE, WAT, WH TOTAL (UG/L) (77168)	123-TRI- CHLORO- PROPANE WATER WHOLE TOTAL (UG/L) (77443)	1,2- DIBROMO ETHANE WATER WHOLE TOTAL (UG/L) (77651)	1,2-DI- CHLORO- ETHANE TOTAL (UG/L) (32103)	1,2-DI- CHLORO- PROPANE TOTAL (UG/L) (34541)
JUL										
22...	<.37	<.032	<.064	<.066	<.044	<.026	<.16	<.036	<.13	<.068
22...	<.37	<.032	<.064	<.066	<.044	<.026	<.16	<.036	<.13	<.068
AUG										
17...	<.37	<.032	<.064	<.066	<.044	<.026	<.16	<.036	<.13	<.068
SEP										
14...	<.37	<.032	<.064	<.066	<.044	<.026	<.16	<.036	<.13	<.068
DATE	TRANS- 1,2-DI- CHLORO- ETHENE TOTAL (UG/L) (34546)	2,2-DI- CHLORO- PRO- PANE WAT, WH TOTAL (UG/L) (77170)	2BUTENE TRANS-1 4-DI- CHLORO UNFLTRD RECOVER (UG/L) (73547)	2-HEXA- NONE WATER WHOLE TOTAL (UG/L) (77103)	ACETONE WATER WHOLE TOTAL (UG/L) (81552)	ACRYLO- NITRILE TOTAL (UG/L) (34215)	1,2,3- TRI- CHLORO- BENZENE WAT, WH REC (UG/L) (77613)	BENZENE 123-TRI- METHYL- WATER UNFLTRD RECOVER (UG/L) (77221)	BENZENE 1,2,4- TRI- CHLORO- WAT UNF REC (UG/L) (34551)	BENZENE 124-TRI- METHYL UNFILT RECOVER (UG/L) (77222)
JUL										
22...	<.032	<.078	<.7	<.7	<5	<1.2	<.27	<.12	<.19	<.056
22...	<.032	<.078	<.7	<.7	8.47	<1.2	<.27	<.12	<.19	<.056
AUG										
17...	<.032	<.078	<.7	<.7	<5	<1.2	<.27	<.12	<.19	<.056
SEP										
14...	<.032	<.078	<.7	<.7	<5	<1.2	<.27	<.12	<.19	<.056

E Estimated

HAWAII, ISLAND OF OAHU
 162425000 MANOA STREAM AT KANEWAI FIELD--Continued
 WATER-QUALITY RECORDS

DATE	BENZENE 135-TRI METHYL WATER UNFLTRD REC (UG/L) (77226)	BENZENE 1,3-DI- CHLORO- WATER UNFLTRD REC (UG/L) (34566)	BENZENE 1,4-DI- CHLORO- WATER UNFLTRD REC (UG/L) (34571)	ISO- PROPYL- BENZENE WATER WHOLE REC (UG/L) (77223)	BENZENE N-BUTYL WATER UNFLTRD REC (UG/L) (77342)	BENZENE N-PROPY WATER UNFLTRD REC (UG/L) (77224)	BENZENE O-DI- CHLORO- WATER UNFLTRD REC (UG/L) (34536)	BENZENE SEC BUTYL- WATER UNFLTRD REC (UG/L) (77350)	BENZENE TERT- BUTYL- WATER UNFLTRD REC (UG/L) (77353)	BENZENE TOTAL (UG/L) (34030)
JUL										
22...	<.044	<.054	<.05	<.032	<.19	<.042	<.048	<.048	<.1	<.1
22...	<.044	<.054	<.05	<.032	<.19	<.042	<.048	<.048	<.1	<.1
AUG										
17...	<.044	<.054	<.05	<.032	<.19	<.042	<.048	<.048	<.1	<.1
SEP										
14...	<.044	<.054	<.05	<.032	<.19	<.042	<.048	<.048	<.1	<.1

DATE	BROMO- BENZENE WATER, WHOLE, TOTAL (UG/L) (81555)	BROMO- ETHENE WATER UNFLTRD RECOVER (UG/L) (50002)	BROMO- FORM TOTAL (UG/L) (32104)	CARBON TETRA- RIDE TOTAL (UG/L) (32102)	CHLORO- CHLORO- BENZENE TOTAL (UG/L) (34301)	CHLORO- DI- BROMO- METHANE TOTAL (UG/L) (32105)	CHLORO- ETHANE TOTAL (UG/L) (34311)	CHLORO- FORM TOTAL (UG/L) (32106)	CIS-1,2 -DI- ETHENE TOTAL (UG/L) (77093)	CIS 1,3-DI- CHLORO- PROPENE TOTAL (UG/L) (34704)
JUL										
22...	<.036	<.1	<.1	<.088	<.028	<.18	<.12	<.052	<.038	<.09
22...	<.036	<.1	<.1	<.088	<.028	<.18	<.12	<.052	<.038	<.09
AUG										
17...	<.036	<.1	<.1	<.088	<.028	<.18	<.12	<.052	<.038	<.09
SEP										
14...	<.036	<.1	<.1	<.088	<.028	<.18	<.12	<.052	<.038	<.09

DATE	DIBROMO CHLORO- PROPANE WATER WHOLE TOT.REC (UG/L) (82625)	DI- BROMO- METHANE WATER WHOLE RECOVER (UG/L) (30217)	BROMO- DI- CHLORO- METHANE TOTAL (UG/L) (32101)	DI- CHLORO- DI- FLUORO- METHANE TOTAL (UG/L) (34668)	DI-ISO- PROPYL- ETHER, WATER, UNFLTRD RECOVER (UG/L) (81577)	ETHANE, 1112- TETRA- CHLORO- REC (UG/L) (77562)	ETHANE, 1,1,2,2 TETRA- CHLORO- REC (UG/L) (34516)	ETHANE HEXA- CHLORO- WATER UNFLTRD RECOVER (UG/L) (34396)	ETHER ETHYL WATER UNFLTRD RECOVER (UG/L) (81576)	ETHER TERT- BUTYL ETHYL UNFLTRD RECOVER (UG/L) (50004)	ETHER TERT- PENTYL METHYL UNFLTRD RECOVER (UG/L) (50005)
JUL											
22...	<.21	<.05	<.048	<.14	<.098	<.044	<.13	<.36	<.17	<.054	<.11
22...	<.21	<.05	<.048	<.14	<.098	<.044	<.13	<.36	<.17	<.054	<.11
AUG											
17...	<.21	<.05	<.048	<.14	<.098	<.044	<.13	<.36	<.17	<.054	<.11
SEP											
14...	<.21	<.05	<.048	<.14	<.098	<.044	<.13	<.36	<.17	<.054	<.11

DATE	ETHYL- BENZENE TOTAL (UG/L) (34371)	FREON- 113 WATER UNFLTRD REC (UG/L) (77652)	FURAN, TETRA- HYDRO- WATER UNFLTRD RECOVER (UG/L) (81607)	HEXA- CHLORO- BUT- ADIENE TOTAL (UG/L) (39702)	ISO- DURENE WATER UNFLTRD RECOVER (UG/L) (50000)	METHAC- RYLATE ETHYL- WATER UNFLTRD RECOVER (UG/L) (73570)	METHAC- RYLATE METHYL WATER UNFLTRD RECOVER (UG/L) (81597)	METH- ACRYLO- NITRITE WATER UNFLTRD RECOVER (UG/L) (81593)	METHANE BROMO CHLORO- WAT UNFLTRD REC (UG/L) (77297)	METHYL ACRY- LATE WATER UNFLTRD RECOVER (UG/L) (49991)
JUL										
22...	<.03	<.032	<9	<.14	<.2	<.28	<.35	<.57	<.044	<1.4
22...	<.03	<.032	<9	<.14	<.2	<.28	<.35	<.57	<.044	<1.4
AUG										
17...	<.03	<.032	<9	<.14	<.2	<.28	<.35	<.57	<.044	<1.4
SEP										
14...	<.03	<.032	<9	<.14	<.2	<.28	<.35	<.57	<.044	<1.4

HAWAII, ISLAND OF OAHU
 162425000 MANOA STREAM AT KANEWAI FIELD--Continued
 WATER-QUALITY RECORDS

DATE	METHYL IODIDE WATER UNFLTRD RECOVER (UG/L) (77424)	METHYL TERT-BUTYL ETHER WAT UNF REC (UG/L) (78032)	METHYL-BROMIDE TOTAL (UG/L) (34413)	METHYL-CHLORIDE TOTAL (UG/L) (34418)	METHYL-CHLORIDE TOTAL (UG/L) (34423)	METHYL-ETHYL-KETONE WHOLE (UG/L) (81595)	METHYL-ISO-BUTYL KETONE WAT. WH. TOTAL (UG/L) (78133)	META-PARA-XYLENE UNFLTRD REC (UG/L) (85795)	NAPHTH-ALENE TOTAL (UG/L) (34696)	O-CHLORO-TOLUENE WATER WHOLE TOTAL (UG/L) (77275)
JUL 22...	<.21	<.17	<.15	<.25	<.38	<1.6	<.37	<.06	<.25	<.042
JUL 22...	<.21	<.17	<.15	<.25	<.38	<1.6	<.37	<.06	<.25	<.042
AUG 17...	<.21	<.17	<.15	E.0583	<.38	<1.6	<.37	<.06	<.25	<.042
SEP 14...	<.21	<.17	<.15	<.25	<.38	<1.6	<.37	<.06	<.25	<.042

DATE	O-XYLENE WATER WHOLE TOTAL (UG/L) (77135)	P-ISO-PROPYL-TOLUENE WATER WHOLE REC (UG/L) (77356)	PREH-NITENE WATER UNFLTRD RECOVER (UG/L) (49999)	1,3-DI-CHLORO-PROPANE WAT. WH TOTAL (UG/L) (77173)	STYRENE TOTAL (UG/L) (77128)	TETRA-CHLORO-ETHYL-ENE TOTAL (UG/L) (34475)	TOLUENE O-ETHYL WATER UNFLTRD RECOVER (UG/L) (77220)	TOLUENE P-CHLOR WATER UNFLTRD REC (UG/L) (77277)	TOLUENE TOTAL (UG/L) (34010)	TRANS-1,3-DI-CHLORO-PROPENE TOTAL (UG/L) (34699)
JUL 22...	<.06	<.11	<.23	<.12	<.042	<.1	<.1	<.056	E.0173	<.13
JUL 22...	<.06	E.0208	<.23	<.12	<.042	<.1	<.1	<.056	E.0192	<.13
AUG 17...	<.06	<.11	<.23	<.12	<.042	<.1	<.1	<.056	E.0188	<.13
SEP 14...	<.06	<.11	<.23	<.12	<.042	<.1	<.1	<.056	E.0193	<.13

DATE	TRI-CHLORO-ETHYL-ENE TOTAL (UG/L) (39180)	TRI-CHLORO-FLURO-METHANE TOTAL (UG/L) (34488)	VINYL CHLO-RIDE TOTAL (UG/L) (39175)	PROPENE 3-CHLORO-WATER UNFLTRD RECOVER (UG/L) (78109)
JUL 22...	<.038	<.09	<.11	<.2
JUL 22...	<.038	<.09	<.11	<.2
AUG 17...	<.038	<.09	<.11	<.2
SEP 14...	<.038	<.09	<.11	<.2

E Estimated

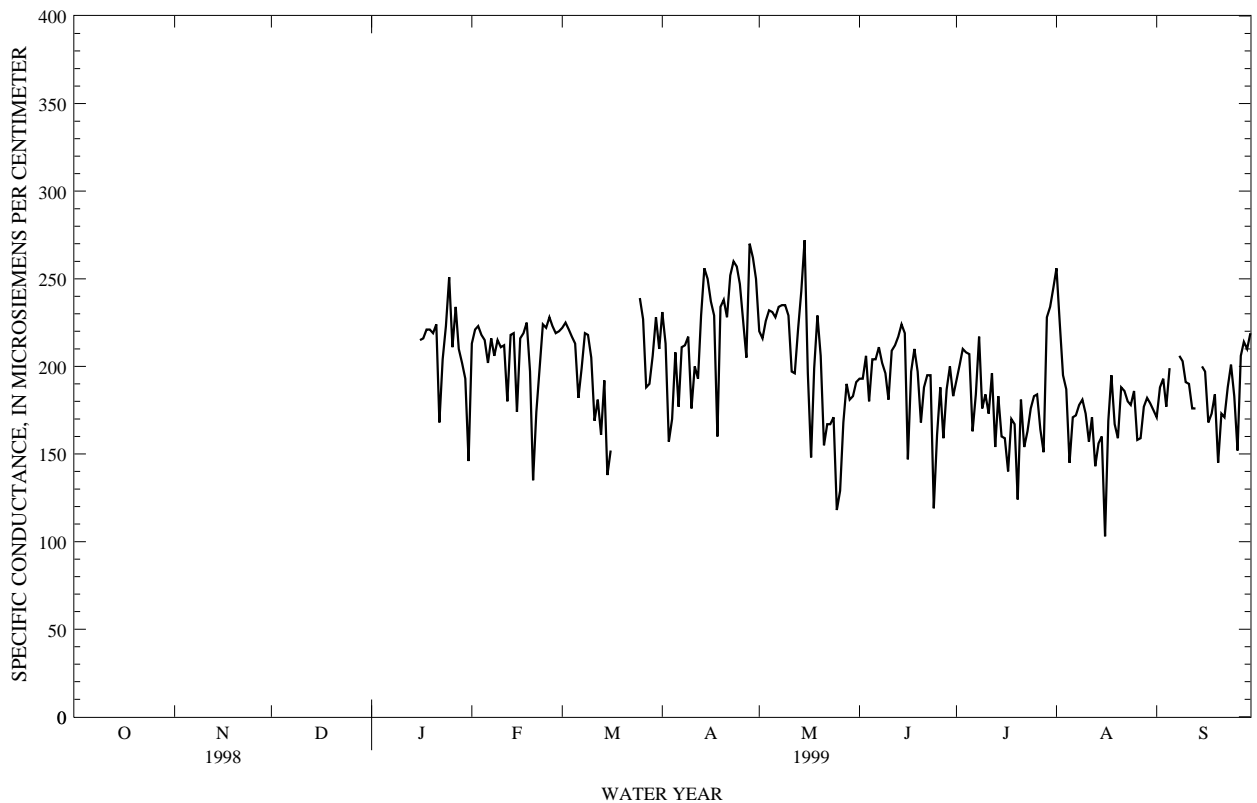
HAWAII, ISLAND OF OAHU
162425000 MANOA STREAM AT KANEWAI FIELD--Continued
WATER-QUALITY RECORDS

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999												
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	---	---	---	---	---	---	---	---	---	---	---	---
2	---	---	---	---	---	---	---	---	---	---	---	---
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13	---	---	---	---	---	---	---	---	---	---	---	---
14	---	---	---	---	---	---	---	---	---	---	---	---
15	---	---	---	---	---	---	---	---	---	---	---	---
16	---	---	---	---	---	---	---	---	---	223	204	215
17	---	---	---	---	---	---	---	---	---	232	208	216
18	---	---	---	---	---	---	---	---	---	301	208	221
19	---	---	---	---	---	---	---	---	---	231	208	221
20	---	---	---	---	---	---	---	---	---	232	208	219
21	---	---	---	---	---	---	---	---	---	235	210	224
22	---	---	---	---	---	---	---	---	---	250	76	168
23	---	---	---	---	---	---	---	---	---	221	163	204
24	---	---	---	---	---	---	---	---	---	234	213	223
25	---	---	---	---	---	---	---	---	---	274	228	251
26	---	---	---	---	---	---	---	---	---	259	149	211
27	---	---	---	---	---	---	---	---	---	244	221	234
28	---	---	---	---	---	---	---	---	---	242	157	210
29	---	---	---	---	---	---	---	---	---	216	174	202
30	---	---	---	---	---	---	---	---	---	217	110	193
31	---	---	---	---	---	---	---	---	---	205	90	146
MONTH	---	---	---	---	---	---	---	---	---	---	---	---
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1	226	205	213	229	214	222	277	224	231	245	195	220
2	252	213	221	243	216	225	234	64	213	225	204	216
3	251	213	223	278	207	221	212	74	157	235	220	226
4	231	195	218	226	203	217	212	131	170	251	227	232
5	235	195	215	240	203	213	220	145	208	233	226	231
6	228	174	202	239	149	182	224	122	177	240	220	228
7	223	196	216	222	157	199	368	192	211	241	225	234
8	229	183	206	225	203	219	238	187	212	246	228	235
9	218	212	215	229	206	218	370	171	217	246	226	235
10	222	198	211	223	160	205	295	116	176	233	215	229
11	218	156	212	206	151	169	233	147	200	215	186	197
12	213	122	180	313	136	181	233	148	193	202	186	196
13	223	213	218	211	109	161	252	178	229	238	202	221
14	223	205	219	222	120	192	272	250	256	257	237	243
15	210	135	174	178	112	138	314	243	250	305	251	272
16	231	209	216	215	108	152	245	232	237	266	115	196
17	227	210	219	---	---	---	241	172	229	184	115	148
18	305	211	225	---	---	---	204	131	160	222	184	199
19	240	119	197	---	---	---	245	204	234	243	222	229
20	173	103	135	---	---	---	251	209	238	245	138	206
21	215	108	174	---	---	---	242	209	228	260	140	155
22	228	165	199	---	---	---	265	227	252	181	152	167
23	263	200	224	---	---	---	289	233	260	198	148	167
24	224	216	222	---	---	---	262	254	257	187	126	171
25	357	219	228	321	231	239	260	229	247	189	52	118
26	234	216	223	240	218	227	273	117	226	162	89	129
27	224	213	219	234	132	188	264	119	205	180	161	168
28	225	214	220	219	168	190	278	263	270	329	170	190
29	---	---	---	220	194	206	277	256	262	217	144	181
30	---	---	---	262	215	228	270	228	250	193	168	183
31	---	---	---	229	171	210	---	---	---	422	140	191
MONTH	357	103	209	---	---	---	370	64	222	422	52	200

HAWAII, ISLAND OF OAHU
 162425000 MANOA STREAM AT KANEWAI FIELD--Continued
 WATER-QUALITY RECORDS

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAY	JUNE			JULY			AUGUST			SEPTEMBER		
	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
1	213	175	193	466	165	192	265	246	256	176	166	171
2	214	154	193	245	177	201	255	177	225	201	175	188
3	352	187	206	338	189	210	314	184	195	209	157	193
4	218	151	180	239	192	208	196	182	187	202	151	177
5	225	153	204	218	193	207	262	123	145	203	191	199
6	243	163	204	213	125	163	293	154	171	---	---	---
7	238	195	211	483	165	184	363	137	172	---	---	---
8	238	166	202	426	180	217	191	172	178	211	198	206
9	228	139	196	441	144	176	185	173	181	217	198	203
10	209	149	181	200	145	184	395	137	173	202	178	191
11	220	193	209	209	136	173	185	130	157	218	174	190
12	227	153	212	216	183	196	296	132	171	198	155	176
13	236	200	217	215	117	154	224	117	143	185	168	176
14	235	212	224	381	159	183	227	143	156	---	---	---
15	243	111	219	269	126	160	176	139	160	212	183	200
16	330	99	147	181	133	159	168	69	103	214	161	197
17	216	180	197	212	85	140	187	141	169	194	157	168
18	346	193	210	194	136	170	216	183	195	182	159	173
19	676	137	197	350	72	167	217	121	167	194	177	184
20	194	142	168	162	62	124	186	126	159	179	137	145
21	487	164	188	313	150	181	192	182	188	186	148	173
22	404	137	195	289	85	154	192	179	186	189	161	171
23	507	74	195	278	71	163	203	172	180	212	163	188
24	144	78	119	239	143	176	183	171	178	238	185	201
25	268	132	161	190	166	183	195	180	186	220	132	183
26	318	147	188	278	171	184	203	125	158	173	130	152
27	211	126	159	209	123	164	184	146	159	234	173	206
28	200	175	187	187	115	151	186	167	177	246	197	214
29	346	180	200	248	187	228	193	170	182	221	202	210
30	258	141	183	246	221	234	190	163	179	230	213	219
31	---	---	---	261	234	245	212	153	175	---	---	---
MONTH	676	74	192	483	62	182	395	69	175	---	---	---



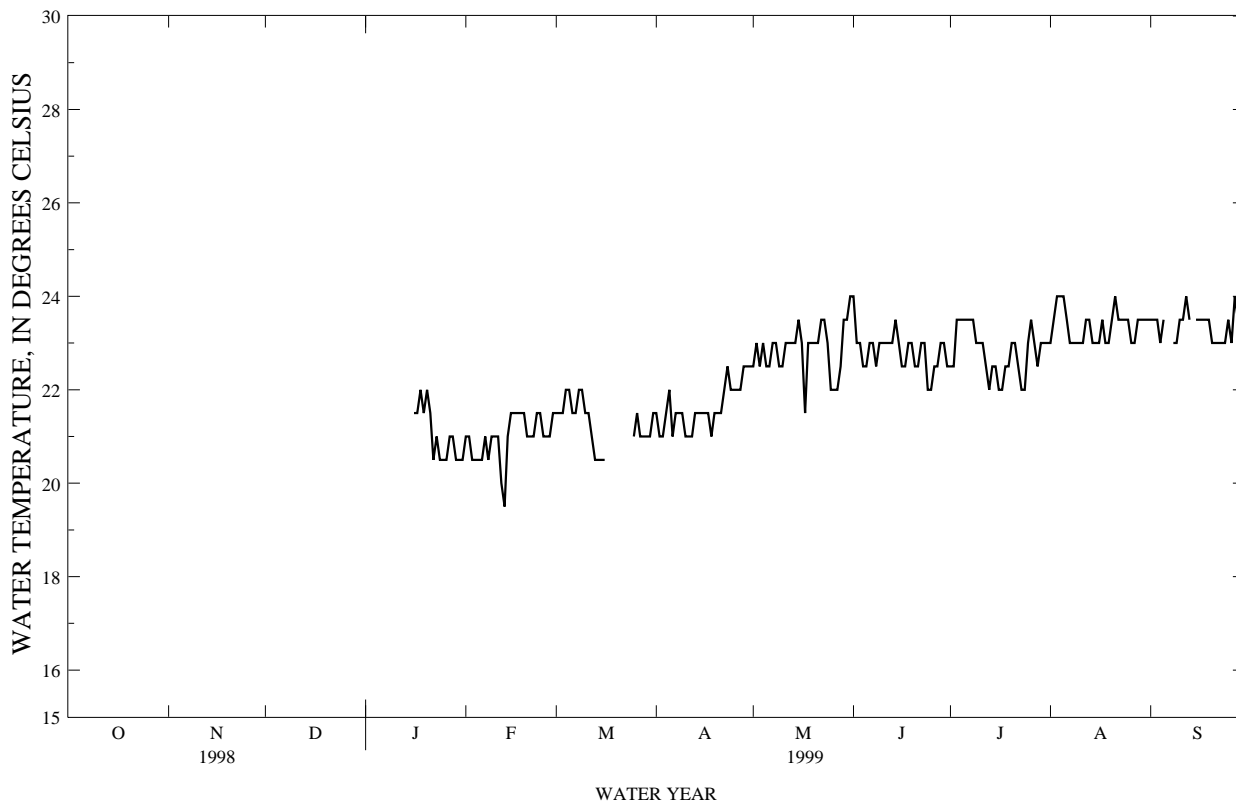
HAWAII, ISLAND OF OAHU
 162425000 MANOA STREAM AT KANEWAI FIELD--Continued
 WATER-QUALITY RECORDS

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999												
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	---	---	---	---	---	---	---	---	---	---	---	---
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13	---	---	---	---	---	---	---	---	---	---	---	---
14	---	---	---	---	---	---	---	---	---	---	---	---
15	---	---	---	---	---	---	---	---	---	---	---	---
16	---	---	---	---	---	---	---	---	---	22.5	20.5	21.5
17	---	---	---	---	---	---	---	---	---	22.5	21.0	21.5
18	---	---	---	---	---	---	---	---	---	22.5	21.0	22.0
19	---	---	---	---	---	---	---	---	---	22.0	20.5	21.5
20	---	---	---	---	---	---	---	---	---	22.5	21.0	22.0
21	---	---	---	---	---	---	---	---	---	22.5	21.0	21.5
22	---	---	---	---	---	---	---	---	---	22.5	20.0	20.5
23	---	---	---	---	---	---	---	---	---	22.0	20.0	21.0
24	---	---	---	---	---	---	---	---	---	22.0	20.0	20.5
25	---	---	---	---	---	---	---	---	---	21.5	20.0	20.5
26	---	---	---	---	---	---	---	---	---	21.5	19.5	20.5
27	---	---	---	---	---	---	---	---	---	22.5	20.0	21.0
28	---	---	---	---	---	---	---	---	---	22.5	20.5	21.0
29	---	---	---	---	---	---	---	---	---	22.0	20.0	20.5
30	---	---	---	---	---	---	---	---	---	22.5	19.5	20.5
31	---	---	---	---	---	---	---	---	---	22.0	19.5	20.5
MONTH	---	---	---	---	---	---	---	---	---	---	---	---
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1	22.0	20.5	21.0	23.0	20.5	21.5	23.0	20.0	21.5	23.5	21.0	22.5
2	22.0	20.0	21.0	22.5	20.0	21.5	23.0	19.0	21.0	24.0	21.5	23.0
3	21.5	20.0	20.5	23.0	20.0	21.5	23.0	19.0	21.0	24.0	21.5	22.5
4	21.5	19.5	20.5	23.5	20.5	22.0	23.0	20.0	21.5	23.5	22.0	23.0
5	22.0	19.5	20.5	23.0	21.0	22.0	24.0	20.5	22.0	23.5	21.0	22.5
6	21.5	20.0	20.5	23.0	20.5	21.5	21.5	20.5	21.0	23.5	21.5	22.5
7	22.0	20.0	21.0	23.0	20.5	21.5	23.5	20.0	21.5	24.0	21.5	23.0
8	21.5	20.0	20.5	23.0	20.5	22.0	23.0	20.0	21.5	23.5	21.5	23.0
9	22.0	19.5	21.0	23.0	21.0	22.0	23.0	20.0	21.5	24.0	21.5	22.5
10	22.5	20.5	21.0	22.5	20.5	21.5	22.5	19.5	21.0	24.0	21.0	22.5
11	22.0	19.5	21.0	22.5	20.5	21.5	22.5	19.5	21.0	24.0	22.0	23.0
12	21.0	19.5	20.0	22.5	20.5	21.0	22.5	20.0	21.0	23.5	22.0	23.0
13	21.0	18.5	19.5	22.0	20.0	20.5	23.5	20.0	21.5	25.0	22.0	23.0
14	22.5	19.5	21.0	23.5	19.5	20.5	24.0	20.5	21.5	24.0	21.5	23.0
15	23.0	20.0	21.5	22.0	19.5	20.5	23.5	20.0	21.5	24.5	22.0	23.5
16	22.5	20.0	21.5	21.5	20.0	20.5	23.0	20.0	21.5	24.5	22.0	23.0
17	22.5	20.0	21.5	---	---	---	23.5	20.5	21.5	22.5	20.5	21.5
18	23.0	20.5	21.5	---	---	---	22.5	20.0	21.0	24.0	21.5	23.0
19	23.0	21.0	21.5	---	---	---	23.5	20.0	21.5	24.0	21.5	23.0
20	21.5	20.5	21.0	---	---	---	23.5	20.5	21.5	24.5	21.5	23.0
21	22.5	20.5	21.0	---	---	---	23.0	20.0	21.5	24.5	21.5	23.0
22	22.0	20.5	21.0	---	---	---	23.5	20.5	22.0	24.5	22.0	23.5
23	23.0	20.5	21.5	---	---	---	24.0	21.0	22.5	24.5	22.5	23.5
24	23.0	20.5	21.5	---	---	---	24.0	20.5	22.0	24.0	22.0	23.0
25	22.0	19.5	21.0	22.5	19.5	21.0	24.0	20.5	22.0	22.5	21.5	22.0
26	22.0	19.5	21.0	23.5	20.5	21.5	24.0	20.5	22.0	23.5	21.0	22.0
27	22.5	20.0	21.0	22.5	20.0	21.0	24.0	20.5	22.0	23.0	21.0	22.0
28	23.0	20.0	21.5	22.5	20.5	21.0	24.0	21.0	22.5	23.5	21.5	22.5
29	---	---	---	22.5	20.5	21.0	24.5	21.0	22.5	24.5	22.0	23.5
30	---	---	---	22.5	20.0	21.0	23.0	21.5	22.5	24.5	22.5	23.5
31	---	---	---	22.5	20.0	21.5	---	---	---	24.5	23.0	24.0
MONTH	23.0	18.5	21.0	---	---	---	24.5	19.0	21.5	25.0	20.5	23.0

HAWAII, ISLAND OF OAHU
 162425000 MANOA STREAM AT KANEWAI FIELD--Continued
 WATER-QUALITY RECORDS

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAY	JUNE			JULY			AUGUST			SEPTEMBER		
	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
1	25.0	23.0	24.0	23.5	21.5	22.5	24.5	22.0	23.0	24.5	22.5	23.5
2	24.0	22.0	23.0	24.0	21.5	22.5	25.0	22.0	23.5	24.5	22.5	23.5
3	24.0	22.0	23.0	24.5	22.0	23.5	25.5	22.5	24.0	25.0	22.0	23.5
4	23.5	21.5	22.5	24.5	22.0	23.5	25.0	23.0	24.0	24.0	22.0	23.0
5	24.0	21.5	22.5	24.5	22.5	23.5	25.0	23.0	24.0	24.5	22.5	23.5
6	24.0	21.5	23.0	24.5	22.0	23.5	24.5	22.0	23.5	---	---	---
7	24.0	21.5	23.0	24.5	22.5	23.5	24.5	22.0	23.0	---	---	---
8	24.0	21.5	22.5	24.5	22.5	23.5	24.0	21.5	23.0	24.0	22.5	23.0
9	24.5	22.0	23.0	24.0	22.0	23.0	24.5	22.0	23.0	24.0	22.0	23.0
10	24.0	21.5	23.0	24.0	22.0	23.0	24.0	22.0	23.0	24.5	22.0	23.5
11	23.5	22.0	23.0	24.0	21.5	23.0	24.5	21.5	23.0	24.0	22.5	23.5
12	24.5	22.0	23.0	23.0	21.5	22.5	24.5	22.0	23.5	25.0	22.5	24.0
13	24.0	21.5	23.0	23.5	21.5	22.0	25.0	22.0	23.5	24.5	22.5	23.5
14	24.5	22.5	23.5	24.0	21.5	22.5	24.5	22.0	23.0	---	---	---
15	23.5	22.5	23.0	23.5	21.5	22.5	24.0	22.0	23.0	25.0	22.5	23.5
16	24.0	21.5	22.5	23.0	21.5	22.0	24.0	22.5	23.0	24.5	22.5	23.5
17	23.0	22.0	22.5	23.0	21.0	22.0	24.5	22.5	23.5	24.0	22.5	23.5
18	24.0	21.5	23.0	24.0	21.5	22.5	24.0	22.0	23.0	24.5	22.5	23.5
19	23.5	22.0	23.0	24.5	21.5	22.5	24.5	22.0	23.0	24.5	22.5	23.5
20	23.5	21.5	22.5	25.0	21.5	23.0	25.0	22.0	23.5	24.5	22.0	23.0
21	23.5	21.5	22.5	24.0	22.0	23.0	25.0	23.0	24.0	24.0	22.0	23.0
22	23.5	21.5	23.0	24.0	21.5	22.5	24.5	23.0	23.5	24.0	22.0	23.0
23	24.0	22.0	23.0	24.0	21.5	22.0	24.0	22.5	23.5	24.5	22.0	23.0
24	23.5	21.5	22.0	24.0	21.0	22.0	24.5	22.0	23.5	24.5	22.0	23.0
25	23.5	21.0	22.0	25.0	21.5	23.0	24.0	22.5	23.5	25.0	22.5	23.5
26	23.0	21.5	22.5	25.0	22.5	23.5	23.5	22.0	23.0	24.5	22.0	23.0
27	24.0	21.5	22.5	24.0	22.0	23.0	24.5	22.0	23.0	25.0	23.0	24.0
28	24.0	21.5	23.0	23.5	21.0	22.5	24.5	22.0	23.5	24.5	22.5	23.5
29	24.0	22.0	23.0	24.5	21.5	23.0	24.5	22.5	23.5	25.0	23.0	24.0
30	24.0	21.5	22.5	24.5	22.0	23.0	24.0	22.0	23.5	24.5	23.0	23.5
31	---	---	---	24.0	21.5	23.0	24.0	22.5	23.5	---	---	---
MONTH	25.0	21.0	23.0	25.0	21.0	23.0	25.5	21.5	23.5	---	---	---



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HAWAII, ISLAND OF OAHU
16249500 MAUNAWILI DITCH AT AINONI SPRING

LOCATION.--Lat 21°21'08", long 157°46'03", on left bank about 1,000 ft below Siphon 8, 3.2 mi east of Waimanalo Elementary School, and 3.8 mi northeast of Manoa Elementary School.

PERIOD OF RECORD.--June 1991 to current year.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 440 ft above mean sea level (from topographic map).

REMARKS.--Records computed by C.W. Yeung. Records good. At times flow is diverted above gage by Waimanalo Irrigation System, State Department of Agriculture.

AVERAGE DISCHARGE.--8 years (water years 1992-99) 1.15 ft³/s (830 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 2.9 ft³/s, May 20, 1997; minimum daily, no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 1.9 ft³/s, January 6, 7; minimum daily, 0.0 ft³/s, many days from January to April.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.96	1.1	1.1	.86	.27	.00	.19	.85	.98	1.2	.80	1.1
2	.99	1.3	1.2	.71	.27	.15	.59	.64	1.2	1.2	1.0	1.2
3	.93	1.3	1.1	.64	.27	.68	.59	.84	1.3	.97	1.2	1.2
4	.77	1.5	1.1	1.2	.27	.87	.51	1.0	1.2	.75	1.1	1.1
5	.91	1.5	.71	1.7	.27	.88	.62	1.0	.94	.66	1.1	1.0
6	.98	1.8	.59	1.9	.27	.72	.76	.93	.59	.93	1.1	1.0
7	.98	1.3	.95	1.9	.27	.65	.64	1.1	.87	1.1	1.0	1.1
8	1.0	1.0	1.7	1.2	.27	.85	.52	1.0	1.1	1.1	.87	1.1
9	.94	1.2	1.5	1.6	.27	1.0	.52	.81	1.3	1.2	1.0	1.1
10	.87	1.3	1.4	1.3	.29	1.1	.51	1.1	1.3	.87	1.2	1.1
11	.78	1.0	1.4	.50	.28	1.1	.46	1.4	1.1	.62	1.1	1.1
12	.88	1.1	1.0	.00	.31	1.1	.24	1.3	.92	.75	1.0	.81
13	1.1	1.6	.64	.00	.27	.86	.00	1.4	.89	.86	1.2	.94
14	1.2	1.0	1.0	.00	.27	.64	.00	1.4	1.2	.49	1.1	1.2
15	1.1	.71	1.4	.00	.27	.69	.16	1.3	1.2	.34	.80	1.1
16	1.1	1.1	1.3	.00	.26	1.5	.68	.91	.75	1.1	1.0	1.1
17	1.1	1.6	1.4	.00	.23	.93	.78	1.2	1.0	1.1	1.2	1.1
18	.89	1.8	1.2	.00	.25	.74	.71	1.3	1.2	.79	1.2	1.0
19	.95	1.5	1.1	.00	.27	.07	.28	1.2	.97	.96	1.2	.82
20	1.1	1.6	1.0	.00	.29	.00	.06	1.4	.72	e.85	1.2	1.0
21	1.1	1.5	1.1	.00	.27	.00	.00	1.4	.97	e1.3	.86	1.1
22	1.1	1.4	1.2	.03	.26	.00	.29	1.2	1.3	1.3	.71	1.1
23	1.1	1.2	1.2	.00	.23	.10	.96	.85	1.2	1.3	.92	1.1
24	.92	1.4	1.2	.00	.23	.51	.94	1.1	1.2	1.1	1.1	1.1
25	.68	1.3	1.1	.13	.23	.63	.77	1.1	1.2	.94	1.2	1.1
26	.41	1.2	.75	.34	.10	.58	.94	1.2	.77	.97	1.2	.94
27	.88	1.2	.67	.31	.00	.50	.99	1.2	.61	1.1	1.3	1.0
28	1.1	1.1	1.3	.30	.00	.46	1.0	1.3	.99	1.2	1.2	1.1
29	1.0	.91	1.2	.27	---	.55	.99	1.0	1.2	1.2	1.0	1.1
30	1.1	.95	.82	.27	---	.24	.96	.69	1.2	1.2	1.1	1.1
31	1.1	---	1.1	.34	---	.00	---	.52	---	1.1	1.1	---
TOTAL	30.02	38.47	34.43	15.50	6.74	18.10	16.66	33.64	31.37	30.55	33.06	31.91
MEAN	.97	1.28	1.11	.50	.24	.58	.56	1.09	1.05	.99	1.07	1.06
MAX	1.2	1.8	1.7	1.9	.31	1.5	1.0	1.4	1.3	1.3	1.3	1.2
MIN	.41	.71	.59	.00	.00	.00	.00	.52	.59	.34	.71	.81
AC-FT	60	76	68	31	13	36	33	67	62	61	66	63

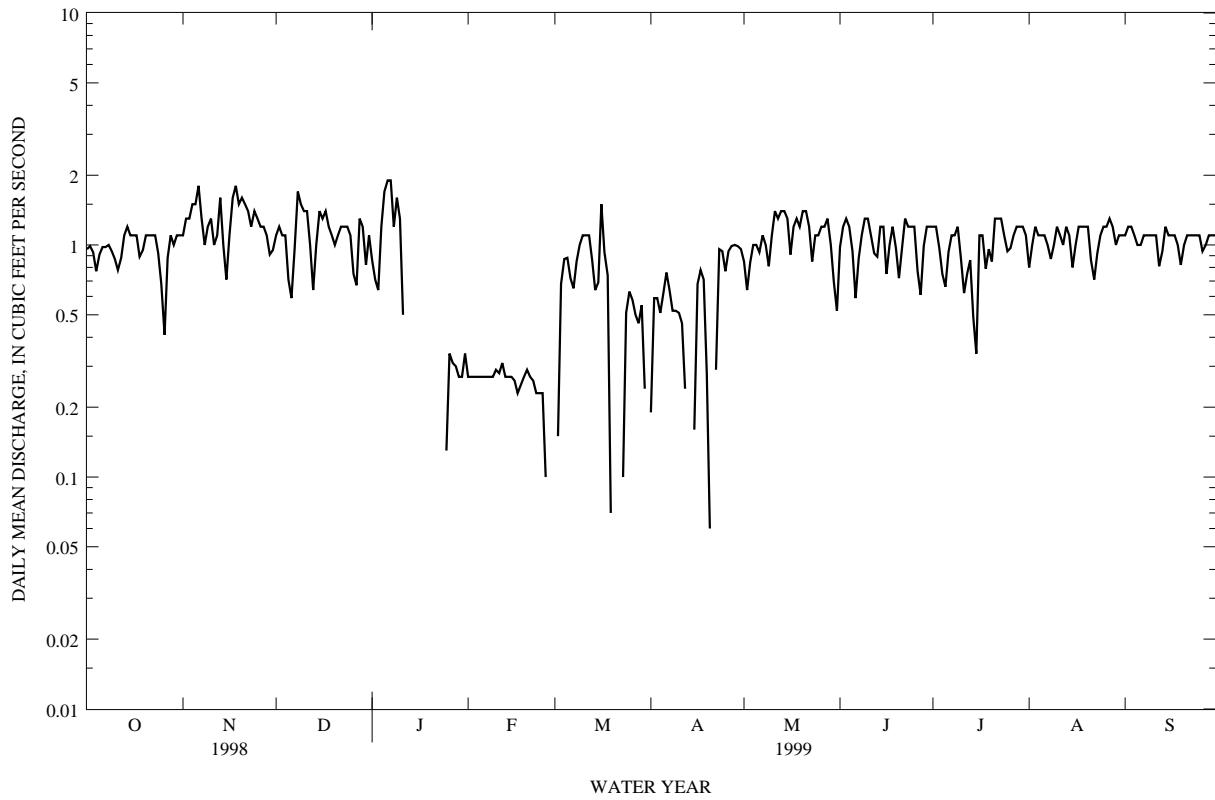
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1991 - 1999, BY WATER YEAR (WY)

	1991	1992	1993	1994	1995	1996	1997	1998	1999
MEAN	1.22	1.26	1.02	.84	.87	1.08	1.06	1.37	1.30
MAX	2.01	1.84	1.86	1.89	1.60	1.76	1.63	1.64	1.80
(WY)	1992	1992	1992	1992	1995	1992	1992	1994	1991
MIN	.81	.70	.44	.32	.24	.34	.56	1.02	.87
(WY)	1997	1997	1997	1996	1999	1996	1999	1996	1997

e Estimated

HAWAII, ISLAND OF OAHU
 16249500 MAUNAWILI DITCH AT AINONI SPRING

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1991 - 1999
ANNUAL TOTAL	390.67	320.45	
ANNUAL MEAN	1.07	.88	1.15
HIGHEST ANNUAL MEAN			1.75 1992
LOWEST ANNUAL MEAN			.81 1996
HIGHEST DAILY MEAN	1.8 Mar 19	1.9 Jan 6	2.9 May 20 1997
LOWEST DAILY MEAN	.18 Jan 7	.00 Jan 12	.00 Jan 1 1993
ANNUAL SEVEN-DAY MINIMUM	.24 Jan 4	.00 Jan 12	.00 Jan 12 1999
ANNUAL RUNOFF (AC-FT)	775	636	830
10 PERCENT EXCEEDS	1.4	1.3	1.9
50 PERCENT EXCEEDS	1.1	1.0	1.1
90 PERCENT EXCEEDS	.71	.24	.48



HAWAII, ISLAND OF OAHU
16249900 MAUNAWILI DITCH ABOVE ANIANINUI TUNNEL NR KAILUA

LOCATION.--Lat 21°20'50", long 157°46'26", on left bank about 1,000 ft above Aniani Nui Tunnel, 2.5 mi east of Waimanalo Elementary School, and 3.6 mi north of Wailupe Valley Elementary School.

PERIOD OF RECORD.--December 3, 1990 to current year.

GAGE.--Water-stage recorder and 3 ft semi-circular corrugated metal pipe control with concrete on upstream end. Elevation of gage is 400 ft above mean sea level (from topographic map).

REMARKS.--Records computed by C.W. Yeung. Records good.

AVERAGE DISCHARGE.--9 years (water years 1991-99), 1.60 ft³/s (1,160 acre-ft/yr)

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 5.5 ft³/s, March 24, 1994; no flow on March 22, 24, 1991.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 2.9 ft³/s, November 18; minimum daily, 0.25 ft³/s, January 18.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.5	1.4	1.5	1.3	.64	.68	.72	1.3	1.3	1.5	1.3	1.6
2	1.6	1.7	1.7	1.1	.71	.75	.94	1.1	1.5	1.5	1.4	1.6
3	1.5	1.9	1.5	1.0	.67	1.1	.87	1.2	1.5	1.4	1.5	1.6
4	1.4	2.2	1.5	1.5	.63	1.3	.67	1.4	1.6	1.1	1.3	1.6
5	1.4	2.2	1.4	2.3	.60	1.3	.80	1.5	1.4	.86	1.4	1.4
6	1.5	2.5	1.1	2.6	.56	1.3	.90	1.4	1.1	1.2	1.4	1.4
7	1.5	2.0	1.4	2.6	.56	1.2	1.1	1.5	1.3	1.5	1.4	1.5
8	1.6	1.8	2.1	1.9	.61	1.2	1.1	1.4	1.5	1.1	1.2	1.6
9	1.6	1.8	2.0	1.3	.71	1.4	1.1	1.2	1.7	.58	1.3	1.6
10	1.5	1.9	2.0	.72	.82	1.4	1.0	1.4	1.7	.58	1.4	1.6
11	1.4	1.5	2.1	.69	.82	1.5	.90	1.7	1.6	.93	1.4	1.6
12	1.5	1.7	1.7	.62	.94	1.5	.73	1.7	1.4	1.1	1.4	1.4
13	1.7	2.6	1.3	.37	.80	1.4	.65	1.8	1.4	1.3	1.3	1.5
14	1.8	1.8	1.5	.29	.66	1.2	.64	1.7	1.5	1.1	1.2	1.6
15	1.8	1.4	1.8	.28	.57	1.3	.66	1.6	1.6	.81	1.0	1.6
16	1.7	1.7	1.8	.31	.72	2.1	.98	1.4	1.3	1.3	1.3	1.6
17	1.6	2.6	1.9	.27	.81	1.7	1.2	1.3	1.4	1.1	1.5	1.7
18	1.5	2.9	1.7	.25	.82	1.4	1.0	1.7	1.5	.97	1.6	1.5
19	1.5	2.1	1.5	.43	.86	.92	.72	1.6	1.2	.78	1.6	1.2
20	1.7	1.9	1.2	.53	.79	.78	.62	1.6	1.2	.97	1.4	1.5
21	1.7	1.8	1.4	.52	.75	.73	.58	1.6	1.3	.94	1.3	1.7
22	1.7	1.7	1.7	.65	.79	.72	.73	1.6	1.6	.61	1.0	1.6
23	1.7	1.7	1.7	.43	.82	.74	1.2	1.4	1.6	.58	1.2	1.8
24	1.6	1.9	1.7	.29	.83	1.1	1.2	1.5	1.5	.79	1.5	1.9
25	1.2	1.8	1.4	.41	.83	1.2	1.1	1.6	1.6	1.1	1.6	1.6
26	.92	1.7	1.1	.51	.74	1.1	1.2	1.6	1.4	.69	1.6	1.4
27	1.3	1.6	1.0	.51	.67	.90	1.3	1.0	1.3	1.1	1.7	1.5
28	1.7	1.4	1.4	.50	.67	.62	1.4	.64	1.3	1.2	1.6	1.6
29	1.7	1.3	1.5	.50	---	.75	1.4	1.0	1.6	1.5	1.4	1.7
30	1.7	1.5	1.4	.50	---	.80	1.4	1.2	1.6	1.6	1.4	1.6
31	1.7	---	1.6	.56	---	.67	---	.98	---	1.4	1.5	---
TOTAL	48.22	56.0	48.6	25.74	20.40	34.76	28.81	43.62	43.5	33.19	43.1	47.1
MEAN	1.56	1.87	1.57	.83	.73	1.12	.96	1.41	1.45	1.07	1.39	1.57
MAX	1.8	2.9	2.1	2.6	.94	2.1	1.4	1.8	1.7	1.6	1.7	1.9
MIN	.92	1.3	1.0	.25	.56	.62	.58	.64	1.1	.58	1.0	1.2
AC-FT	96	111	96	51	40	69	57	87	86	66	85	93

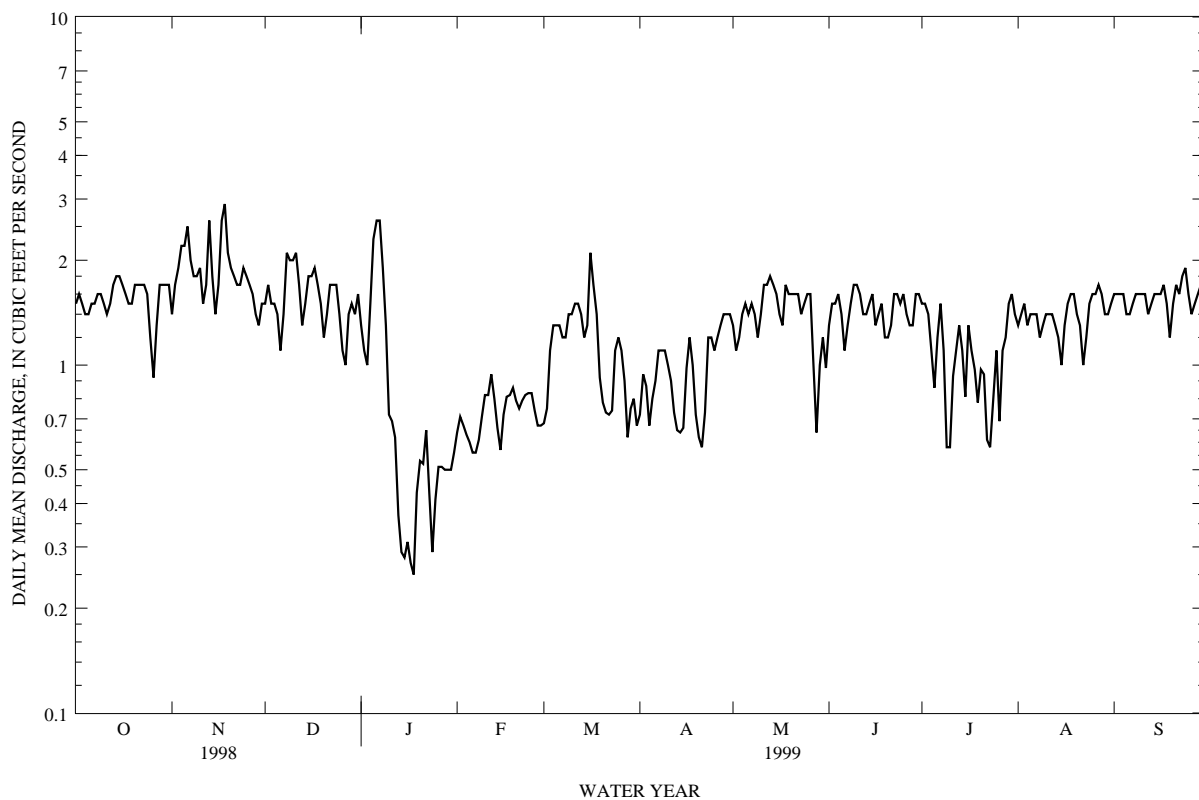
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1991 - 1999, BY WATER YEAR (WY)

	1991	1992	1993	1994	1995	1996	1997	1998	1999
MEAN	1.77	1.81	1.42	1.26	1.44	1.51	1.56	1.83	1.84
MAX	2.69	2.99	2.57	2.22	2.46	2.23	2.26	2.38	2.39
(WY)	1992	1992	1992	1992	1991	1992	1991	1994	1991
MIN	1.00	1.06	.72	.58	.66	.63	.96	1.39	1.36
(WY)	1997	1998	1997	1996	1996	1996	1999	1998	1997

HAWAII, ISLAND OF OAHU

1624990 MAUNAWILI DITCH ABOVE ANIANINUI TUNNEL NR KAILUA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1991 - 1999	
ANNUAL TOTAL	528.83	473.04		
ANNUAL MEAN	1.45	1.30	1.60	
HIGHEST ANNUAL MEAN			2.48	1992
LOWEST ANNUAL MEAN			1.07	1997
HIGHEST DAILY MEAN	2.9 Nov 18	2.9 Nov 18	5.5	Mar 24 1994
LOWEST DAILY MEAN	.50 Jan 2	.25 Jan 18	.00	Mar 22 1991
ANNUAL SEVEN-DAY MINIMUM	.62 Jan 2	.31 Jan 13	.13	Jan 26 1996
ANNUAL RUNOFF (AC-FT)	1050	938	1160	
10 PERCENT EXCEEDS	1.9	1.7	2.6	
50 PERCENT EXCEEDS	1.5	1.4	1.6	
90 PERCENT EXCEEDS	.91	.65	.79	



HAWAII, ISLAND OF OAHU
16250000 MAUNAWILI DITCH NEAR WAIMANALO

LOCATION.--Lat 21°20'45", long 157°45'10", Hydrologic Unit 20060000, on left bank 80 ft downstream from Aniani Nui Ridge tunnel, and 3.5 mi west of Waimanalo Post Office.

PERIOD OF RECORD.--March 1954 to September 1968, October 1993 to current year.

GAGE.--Water-stage recorder with concrete Columbus type control. Altitude of gage is 390 ft above mean sea level (from topographic map). Prior to July 12, 1993, water stage recorder at same site with different datum.

REMARKS.--Records computed by C.W. Yeung. Records good. Ditch diverts from headwaters of Maunawili and Makawao streams for irrigation in vicinity of Waimanalo.

AVERAGE DISCHARGE.--20 years (water years 1955-68, 1994-99), 2.19 ft³/s (1,580 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 11 ft³/s, March 5, 1958; minimum, no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 2.9 ft³/s, November 18; minimum daily 0.01 ft³/s, January 14-15, 17-18.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

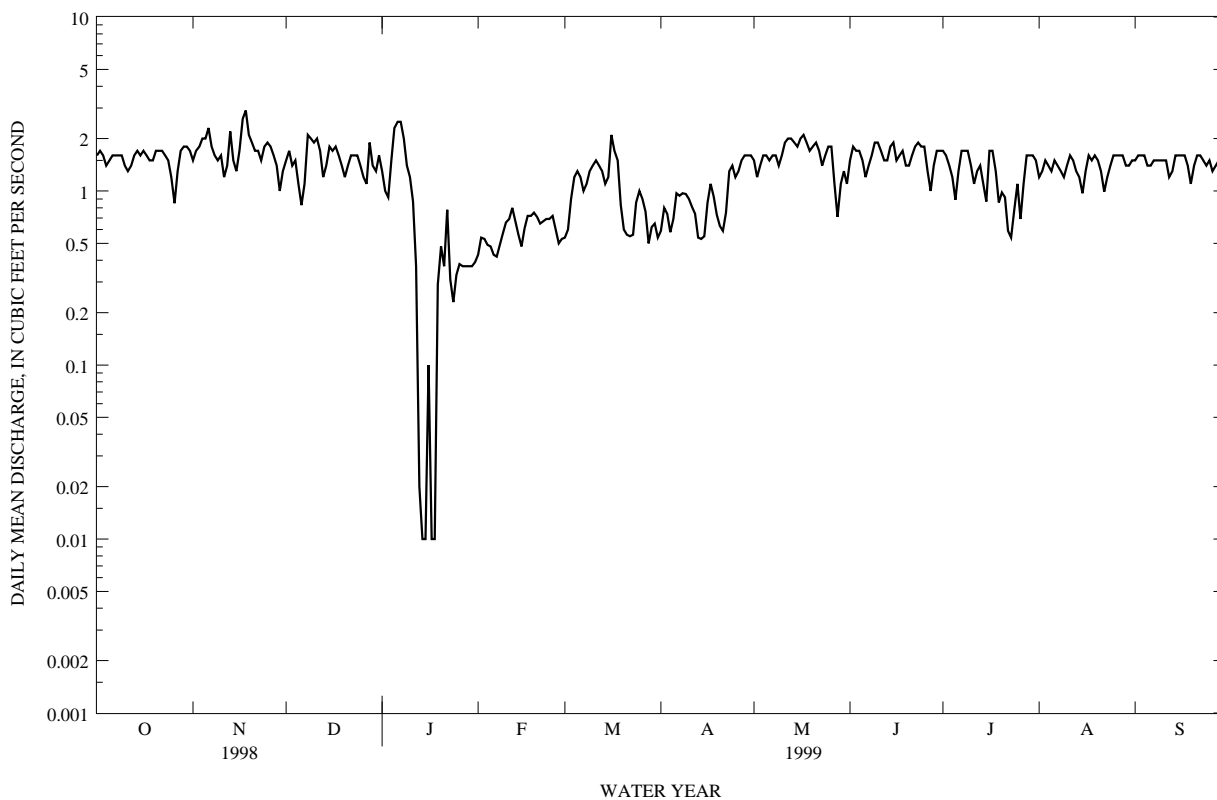
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.6	1.5	1.5	1.3	.43	.54	.59	1.5	1.5	1.7	1.2	1.5
2	1.7	1.7	1.7	1.0	.54	.60	.80	1.2	1.8	1.6	1.3	1.6
3	1.6	1.8	1.4	.92	.53	.90	.74	1.4	1.7	1.4	1.5	1.6
4	1.4	2.0	1.5	1.5	.49	1.2	.58	1.6	1.7	1.2	1.4	1.6
5	1.5	2.0	1.1	2.3	.48	1.3	.69	1.6	1.5	.89	1.3	1.4
6	1.6	2.3	.83	2.5	.43	1.2	.97	1.5	1.2	1.3	1.5	1.4
7	1.6	1.8	1.1	2.5	.42	1.0	.94	1.6	1.4	1.7	1.4	1.5
8	1.6	1.6	2.1	2.0	.49	1.1	.97	1.6	1.6	1.7	1.3	1.5
9	1.6	1.5	2.0	1.4	.57	1.3	.96	1.4	1.9	1.7	1.2	1.5
10	1.4	1.6	1.9	1.2	.66	1.4	.90	1.6	1.9	1.4	1.4	1.5
11	1.3	1.2	2.0	.87	.69	1.5	.81	1.9	1.7	1.1	1.6	1.5
12	1.4	1.4	1.7	.37	.80	1.4	.74	2.0	1.5	1.3	1.5	1.2
13	1.6	2.2	1.2	.02	.67	1.3	.54	2.0	1.5	1.4	1.3	1.3
14	1.7	1.5	1.4	.01	.56	1.1	.53	1.9	1.8	1.1	1.2	1.6
15	1.6	1.3	1.8	.01	.48	1.2	.55	1.8	1.9	.87	.97	1.6
16	1.7	1.7	1.7	.10	.61	2.1	.86	2.0	1.5	1.7	1.3	1.6
17	1.6	2.6	1.8	.01	.72	1.7	1.1	2.1	1.6	1.7	1.6	1.6
18	1.5	2.9	1.6	.01	.72	1.5	.93	1.9	1.7	1.3	1.5	1.4
19	1.5	2.1	1.4	.29	.75	.83	.73	1.7	1.4	.86	1.6	1.1
20	1.7	1.9	1.2	.48	.71	.60	.63	1.8	1.4	.98	1.5	1.4
21	1.7	1.7	1.4	.37	.65	.56	.59	1.9	1.6	.92	1.3	1.6
22	1.7	1.7	1.6	.78	.67	.55	.75	1.7	1.8	.59	.99	1.6
23	1.6	1.5	1.6	.31	.69	.56	1.3	1.4	1.9	.54	1.2	1.5
24	1.5	1.8	1.6	.23	.69	.86	1.4	1.6	1.8	.77	1.4	1.4
25	1.2	1.9	1.4	.33	.72	1.0	1.2	1.8	1.8	1.1	1.6	1.5
26	.85	1.8	1.2	.38	.60	.90	1.3	1.8	1.3	.69	1.6	1.3
27	1.3	1.6	1.1	.37	.50	.76	1.5	1.1	1.0	1.1	1.6	1.4
28	1.7	1.4	1.9	.37	.53	.50	1.6	.71	1.4	1.6	1.6	1.5
29	1.8	1.0	1.4	.37	---	.62	1.6	1.1	1.7	1.6	1.4	1.5
30	1.8	1.3	1.3	.37	---	.65	1.6	1.3	1.7	1.6	1.4	1.5
31	1.7	---	1.6	.39	---	.54	---	1.1	---	1.5	1.5	---
TOTAL	48.05	52.3	47.03	23.06	16.80	31.27	28.40	49.61	48.2	38.91	43.16	44.2
MEAN	1.55	1.74	1.52	.74	.60	1.01	.95	1.60	1.61	1.26	1.39	1.47
MAX	1.8	2.9	2.1	2.5	.80	2.1	1.6	2.1	1.9	1.7	1.6	1.6
MIN	.85	1.0	.83	.01	.42	.50	.53	.71	1.0	.54	.97	1.1
AC-FT	95	104	93	46	33	62	56	98	96	77	86	88

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1954 - 1999, BY WATER YEAR (WY)

MEAN	2.58	2.26	1.53	1.49	1.36	1.65	2.25	2.81	2.86	2.66	2.63	2.60
MAX	4.36	3.87	3.24	3.22	2.67	3.89	4.07	4.90	4.52	4.02	4.74	4.61
(WY)	1955	1955	1961	1955	1957	1956	1966	1955	1955	1955	1954	1954
MIN	1.00	.85	.026	.000	.000	.097	.39	1.19	1.14	.92	1.22	.61
(WY)	1998	1998	1968	1968	1968	1968	1963	1965	1997	1997	1997	1968

HAWAII, ISLAND OF OAHU
 16250000 MAUNAWILI DITCH NEAR WAIMANALO--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1954 - 1999	
ANNUAL TOTAL	537.13	470.99		
ANNUAL MEAN	1.47	1.29	2.19	
HIGHEST ANNUAL MEAN			3.43	1955
LOWEST ANNUAL MEAN			1.06	1997
HIGHEST DAILY MEAN	2.9 May 25	2.9 Nov 18	11	Mar 5 1958
LOWEST DAILY MEAN	.47 Jan 4	.01 Jan 14	.00	Dec 27 1955
ANNUAL SEVEN-DAY MINIMUM	.56 Jan 6	.06 Jan 13	.00	Dec 27 1955
ANNUAL RUNOFF (AC-FT)	1070	934	1580	
10 PERCENT EXCEEDS	2.0	1.8	3.9	
50 PERCENT EXCEEDS	1.5	1.4	2.3	
90 PERCENT EXCEEDS	.83	.55	.57	



HAWAII, ISLAND OF OAHU
 16254000 MAKAWAO STREAM NEAR KAILUA

LOCATION.--Lat 21°21'49", long 157°46'02", Hydrologic Unit 20060000, on left bank 650 ft upstream from mouth, 2.7 mi southwest of Kailua, and 4.3 mi southeast of Kaneohe Courthouse.

DRAINAGE AREA.--2.04 mi².

PERIOD OF RECORD.--November 1912 to June 1916, January 1958 to current year.

REVISED RECORDS.--WSP 1937: Drainage area.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 80 ft above mean sea level (from topographic map). Prior to January 1, 1958, nonrecording gage at sites about 200 ft upstream at different datums.

REMARKS.--Records computed by C.W. Yeung. Records good. Maunawili ditch diverts water 1.5 mi upstream of station for irrigation in vicinity of Waimanalo. Records do not include flow of Maunawili ditch (stations 16249500, 16249900, and 16250000).

AVERAGE DISCHARGE.--43 years (water years 1914-15, 1959-99), 5.04 ft³/s (3,650 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,000 ft³/s, February 4, 1965, gage height, 12.41 ft, from rating curve extended above 470 ft³/s on basis of slope-area measurement of peak flow; minimum, 0.43 ft³/s, September 8-12, 14, 16-20, 22, 23, 1964.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 390 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 7	1715	*238	*4.22				

Minimum discharge, 0.85 ft³/s, September 14, 15, and 16, minimum daily discharge, 0.93 ft³/s, September 15.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
 DAILY MEAN VALUES

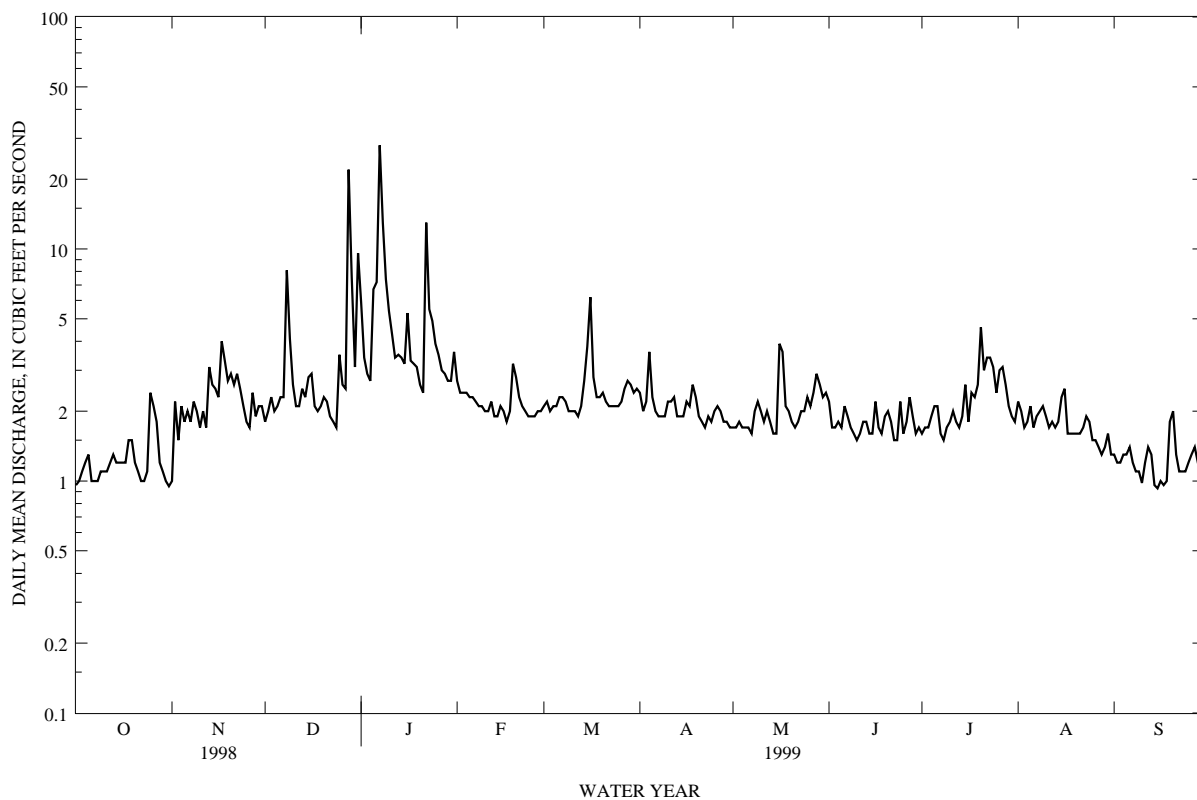
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.96	1.0	1.8	5.9	2.7	2.1	2.4	1.7	2.2	1.6	2.2	1.3
2	1.0	2.2	2.0	3.4	2.4	2.2	2.0	1.7	1.7	1.7	2.0	1.2
3	1.1	1.5	2.3	2.9	2.4	2.0	2.2	1.8	1.7	1.7	1.7	1.2
4	1.2	2.1	2.0	2.7	2.4	2.1	3.6	1.7	1.8	1.9	1.8	1.3
5	1.3	1.8	2.1	6.7	2.3	2.1	2.3	1.7	1.7	2.1	2.1	1.3
6	1.0	2.0	2.3	7.2	2.3	2.3	2.0	1.7	2.1	2.1	1.7	1.4
7	1.0	1.8	2.3	28	2.2	2.3	1.9	1.6	1.9	1.6	1.9	1.2
8	1.0	2.2	8.1	13	2.1	2.2	1.9	2.0	1.7	1.5	2.0	1.1
9	1.1	2.0	4.1	7.4	2.1	1.9	2.2	1.6	1.7	2.1	2.1	1.1
10	1.1	1.7	2.6	5.4	2.0	2.0	2.2	2.0	1.5	1.8	1.9	.98
11	1.1	2.0	2.1	4.3	2.0	2.0	2.2	1.8	1.6	2.0	1.7	1.2
12	1.2	1.7	2.1	3.4	2.2	1.9	2.3	2.0	1.8	1.8	1.8	1.4
13	1.3	3.1	2.5	3.5	1.9	1.9	1.8	1.8	1.8	1.7	1.7	1.3
14	1.2	2.6	2.3	3.4	1.9	2.7	1.9	1.6	1.6	1.9	1.8	.96
15	1.2	2.5	2.8	3.2	2.1	3.8	1.9	1.6	1.6	2.6	2.3	.93
16	1.2	2.3	2.9	5.3	2.0	6.2	2.2	3.9	2.2	1.8	2.5	1.0
17	1.2	4.0	2.1	3.3	1.8	2.8	2.1	3.6	1.7	2.4	1.6	.96
18	1.5	3.3	2.0	3.2	2.0	2.3	2.6	2.1	1.6	2.3	1.6	1.0
19	1.5	2.7	2.1	3.1	3.2	2.3	2.3	2.0	1.9	2.6	1.6	1.8
20	1.2	2.9	2.3	2.6	2.8	2.4	1.9	1.8	2.0	4.6	1.6	2.0
21	1.1	2.6	2.2	2.4	2.3	2.2	1.8	1.7	1.8	3.0	1.6	1.3
22	1.0	2.9	1.9	13	2.1	2.1	1.7	1.8	1.5	3.4	1.7	1.1
23	1.0	2.5	1.8	5.5	2.0	2.1	1.9	2.0	1.5	3.4	1.9	1.1
24	1.1	2.1	1.7	4.9	1.9	2.1	1.8	2.0	2.2	3.1	1.8	1.1
25	2.4	1.8	3.5	3.9	1.9	2.1	2.0	2.3	1.6	2.4	1.5	1.2
26	2.1	1.7	2.6	3.5	1.9	2.2	2.1	2.1	1.8	3.0	1.5	1.3
27	1.8	2.4	2.5	3.0	2.0	2.5	2.0	2.4	2.3	3.1	1.4	1.4
28	1.2	1.9	22	2.9	2.0	2.7	1.8	2.9	1.9	2.6	1.3	1.2
29	1.1	2.1	7.6	2.7	---	2.6	1.8	2.6	1.6	2.1	1.4	1.2
30	1.0	2.1	3.1	2.7	---	2.4	1.7	2.3	1.7	1.9	1.6	1.2
31	.95	---	9.6	3.6	---	2.5	---	2.4	---	1.8	1.3	---
TOTAL	38.11	67.5	111.3	166.0	60.9	75.3	62.3	64.8	53.6	71.2	54.6	36.73
MEAN	1.23	2.25	3.59	5.35	2.17	2.43	2.08	2.09	1.79	2.30	1.76	1.22
MAX	2.4	4.0	22	28	3.2	6.2	3.6	3.9	2.3	4.6	2.5	2.0
MIN	.95	1.0	1.7	2.4	1.8	1.9	1.7	1.6	1.5	1.5	1.3	.93
AC-FT	76	134	221	329	121	149	124	129	106	141	108	73

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1913 - 1999, BY WATER YEAR (WY)

MEAN	2.99	5.62	6.92	8.36	6.94	7.55	6.56	5.30	3.31	2.72	2.56	2.47
MAX	8.43	38.2	34.8	39.2	27.2	24.3	31.4	17.2	11.3	6.66	8.52	15.1
(WY)	1966	1966	1988	1916	1979	1958	1963	1981	1982	1982	1982	1914
MIN	1.06	.99	1.22	1.24	1.11	1.25	1.55	1.40	1.15	1.25	1.18	1.00
(WY)	1976	1963	1978	1973	1978	1978	1973	1973	1973	1959	1984	1975

HAWAII, ISLAND OF OAHU
16254000 MAKAWAO STREAM NEAR KAILUA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1913 - 1999	
ANNUAL TOTAL	943.40	862.34		
ANNUAL MEAN	2.58	2.36	5.04	
HIGHEST ANNUAL MEAN			11.1	1982
LOWEST ANNUAL MEAN			1.31	1973
HIGHEST DAILY MEAN	37 Jan 1	28 Jan 7	518	Dec 31 1987
LOWEST DAILY MEAN	.95 Oct 31	.93 Sep 15	.50	Sep 8 1964
ANNUAL SEVEN-DAY MINIMUM	1.0 Sep 26	1.1 Oct 6	.67	Sep 8 1964
ANNUAL RUNOFF (AC-FT)	1870	1710	3650	
10 PERCENT EXCEEDS	3.7	3.2	8.7	
50 PERCENT EXCEEDS	2.1	2.0	2.8	
90 PERCENT EXCEEDS	1.2	1.2	1.4	



HAWAII, ISLAND OF OAHU

16272200 KAMOOALII STREAM BELOW LULUKU STREAM NEAR KANEOHE

LOCATION.--Lat 21°23'47", long 157°48'23", Hydrologic Unit 20060000, on left bank 300 ft downstream from Luluku Stream, 1.0 mi southwest of Castle High School, and 1.9 mi northwest of the intersection of State Highways 61 and 83.

DRAINAGE AREA.--3.81 mi².

PERIOD OF RECORD.--November 1976 to current year.

REVISED RECORDS.--WDR HI-92-1: 1991(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 116.39 ft above mean sea level (levels by Corps of Engineers).

REMARKS.--Records computed by S.T.M. Young. Records good. Flow regulated by a flood-control dam upstream.

AVERAGE DISCHARGE.--22 years (water years 1977-99), 10.8 ft³/s (7,790 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,650 ft³/s, December 31, 1987, gage height, 5.72 ft, from rating curve extended above 200 ft³/s; minimum, 0.25 ft³/s on several days in October 1984.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 700 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 7	2000	*187	*2.82				

Minimum daily discharge, 0.92 ft³/s, October 28. Minimum discharge, 0.52 ft³/s, October 29, result of maintenance work on dam upstream.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.2	3.1	4.9	14	6.0	4.2	4.4	5.7	4.2	3.5	3.4	2.9
2	3.5	5.0	5.1	6.4	5.4	4.2	22	4.9	4.2	4.4	3.3	2.8
3	3.2	5.0	5.9	5.5	5.1	4.2	20	4.5	4.1	3.7	3.1	2.9
4	3.0	6.3	5.7	4.8	5.3	3.9	11	4.7	4.0	3.4	3.3	4.4
5	3.4	8.6	5.1	4.9	4.9	4.1	5.5	4.6	4.2	3.3	3.6	3.0
6	3.3	6.6	4.8	5.7	5.3	5.1	6.4	4.4	4.3	3.8	3.3	2.8
7	3.4	4.6	5.0	39	4.8	4.5	5.3	4.2	4.2	3.6	3.1	2.8
8	3.6	5.6	11	23	4.7	4.0	4.8	4.2	4.3	3.6	3.0	2.7
9	3.4	4.7	10	12	4.5	4.2	4.9	3.9	4.4	3.7	3.0	2.7
10	3.6	4.2	5.8	6.4	4.6	4.4	7.3	4.0	4.3	3.4	3.3	2.9
11	3.2	4.2	5.2	5.7	4.6	4.3	6.8	4.5	3.9	3.9	3.0	4.1
12	3.7	4.2	4.8	5.3	4.7	4.0	9.6	4.7	3.9	3.5	3.1	3.1
13	5.1	5.5	5.0	4.8	4.5	4.0	7.6	4.6	3.8	4.1	3.3	2.7
14	3.9	5.0	4.8	5.1	4.5	4.2	5.7	4.3	3.8	3.6	3.5	2.5
15	3.6	4.3	5.2	5.0	4.7	5.6	5.0	4.1	4.1	4.1	3.2	2.5
16	3.6	4.6	5.7	8.4	4.6	7.3	4.8	22	4.6	3.7	3.9	2.6
17	3.4	7.3	4.4	5.2	5.0	5.1	6.1	15	4.1	5.0	3.3	2.8
18	3.5	6.7	4.2	4.8	5.2	4.3	7.2	6.4	3.7	3.9	2.9	2.7
19	3.4	6.6	4.1	4.9	5.2	4.2	5.4	5.3	4.0	3.7	3.1	3.0
20	3.2	8.2	3.9	4.8	6.9	4.9	5.8	5.0	3.8	5.6	3.0	3.5
21	3.2	6.2	3.9	4.9	5.9	4.6	7.7	4.8	3.6	4.0	3.0	2.9
22	3.2	6.2	3.9	11	5.3	4.3	5.3	4.7	4.0	3.7	2.9	3.0
23	3.0	5.3	4.0	7.4	4.7	4.0	4.8	4.5	3.7	3.5	2.8	2.6
24	3.2	5.0	3.7	6.2	4.5	3.9	4.8	4.5	5.4	3.5	2.7	2.7
25	4.7	4.9	4.7	5.7	4.5	3.9	4.8	5.1	4.1	3.6	2.7	2.5
26	4.5	5.0	4.2	8.5	4.4	4.1	4.7	4.8	3.4	3.5	2.9	2.7
27	7.3	6.3	3.9	6.1	4.1	5.8	4.9	4.3	4.2	3.9	2.8	2.8
28	.92	5.2	17	6.1	4.2	5.3	4.6	4.2	3.8	4.0	2.7	2.8
29	3.7	5.0	8.2	5.5	---	5.0	4.5	4.2	3.7	3.4	2.8	2.7
30	1.4	5.1	5.2	5.1	---	4.4	5.8	4.4	3.8	3.2	3.2	2.5
31	3.1	---	26	7.7	---	4.3	---	4.1	---	3.2	2.9	---
TOTAL	108.42	164.5	195.3	249.9	138.1	140.3	207.5	170.6	121.6	117.0	96.1	86.6
MEAN	3.50	5.48	6.30	8.06	4.93	4.53	6.92	5.50	4.05	3.77	3.10	2.89
MAX	7.3	8.6	26	39	6.9	7.3	22	22	5.4	5.6	3.9	4.4
MIN	.92	3.1	3.7	4.8	4.1	3.9	4.4	3.9	3.4	3.2	2.7	2.5
AC-FT	215	326	387	496	274	278	412	338	241	232	191	172

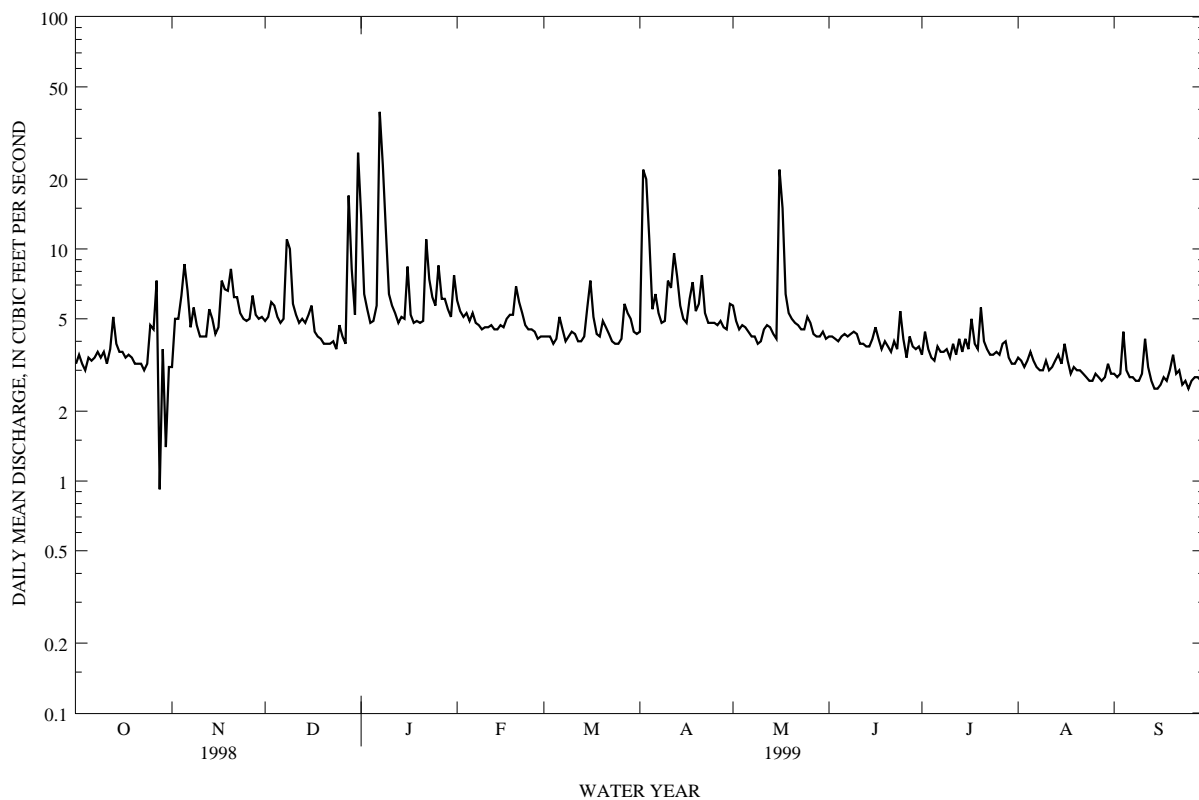
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1977 - 1999, BY WATER YEAR (WY)

MEAN	8.08	11.3	12.3	15.3	12.3	13.5	12.4	10.6	8.87	7.91	7.35	7.28
MAX	16.8	29.6	37.2	53.4	35.9	34.3	49.1	23.0	25.7	19.9	24.0	16.9
(WY)	1983	1987	1988	1988	1979	1982	1989	1981	1982	1982	1982	1982
MIN	2.91	3.90	4.56	4.05	3.83	4.03	5.32	4.53	3.59	3.19	2.91	2.89
(WY)	1985	1985	1978	1977	1978	1978	1985	1984	1984	1984	1984	1999

HAWAII, ISLAND OF OAHU

16272200 KAMOOALII STREAM BELOW LULUKU STREAM NEAR KANEOHE--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1977 - 1999	
ANNUAL TOTAL	2247.12		1795.92			
ANNUAL MEAN	6.16		4.92		10.8	
HIGHEST ANNUAL MEAN					22.0 1982	
LOWEST ANNUAL MEAN					4.36 1984	
HIGHEST DAILY MEAN	96	Jan 1	39	Jan 7	723	Jan 1 1988
LOWEST DAILY MEAN	.92	Oct 28	.92	Oct 28	.29	Oct 10 1984
ANNUAL SEVEN-DAY MINIMUM	3.2	Oct 28	2.7	Sep 24	.30	Oct 10 1984
ANNUAL RUNOFF (AC-FT)	4460		3560		7790	
10 PERCENT EXCEEDS	8.6		6.4		16	
50 PERCENT EXCEEDS	5.2		4.3		7.3	
90 PERCENT EXCEEDS	3.6		3.0		4.4	



HAWAII, ISLAND OF OAHU
16275000 HAIKU STREAM NEAR HEEIA

LOCATION.--Lat 21°24'45", long 157°49'35", Hydrologic Unit 20060000, on left bank, 1.7 mi west of Kaneohe Post Office, and 1.8 mi southwest of Heeia.

DRAINAGE AREA.--0.97 mi².

PERIOD OF RECORD.--January 1914 to October 1919, July 1939 to September 1977, October 1982 to current year.

REVISED RECORDS (FISCAL YEARS)--WSP 935: 1940. WSP 1319: 1916-19(M). WSP 1569: Drainage area. WSP 1719: 1942-43, 1946(M), 1947, 1949, 1951, 1954(M), 1955, 1957-59. WSP 1937: 1940-45(M), 1947(M), 1948-50(P), 1951, 1952(P), 1953(M), 1955-57(P), 1958-59, 1960(M).

GAGE.--Water-stage recorder. Datum of gage is 271.9 ft above mean sea level (levels by City and County of Honolulu). Prior to April 28, 1914, nonrecording gage and April 28, 1914 to October 25, 1919, water-stage recorder, at same site at different datums.

REMARKS.--Records computed by J.R. Mullen. Records poor. Honolulu Board of Water Supply has diverted ground water from tunnel in drainage area since 1943.

AVERAGE DISCHARGE (since diversion from tunnel began)--51 years (water years 1944-77, 1983-99), 2.21 ft³/s, (1,600 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,740 ft³/s, May 2, 1965, gage height, 7.94 ft, from rating curve extended above 57 ft³/s on basis of slope-area measurements at gage heights 3.87 ft, 3.88 ft, and 7.94 ft; minimum, 0.20 ft³/s, July 20, 1957, September 17, 1961.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 340 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 7	1700	*133	*2.54				

Minimum discharge, 1.2 ft³/s, for many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

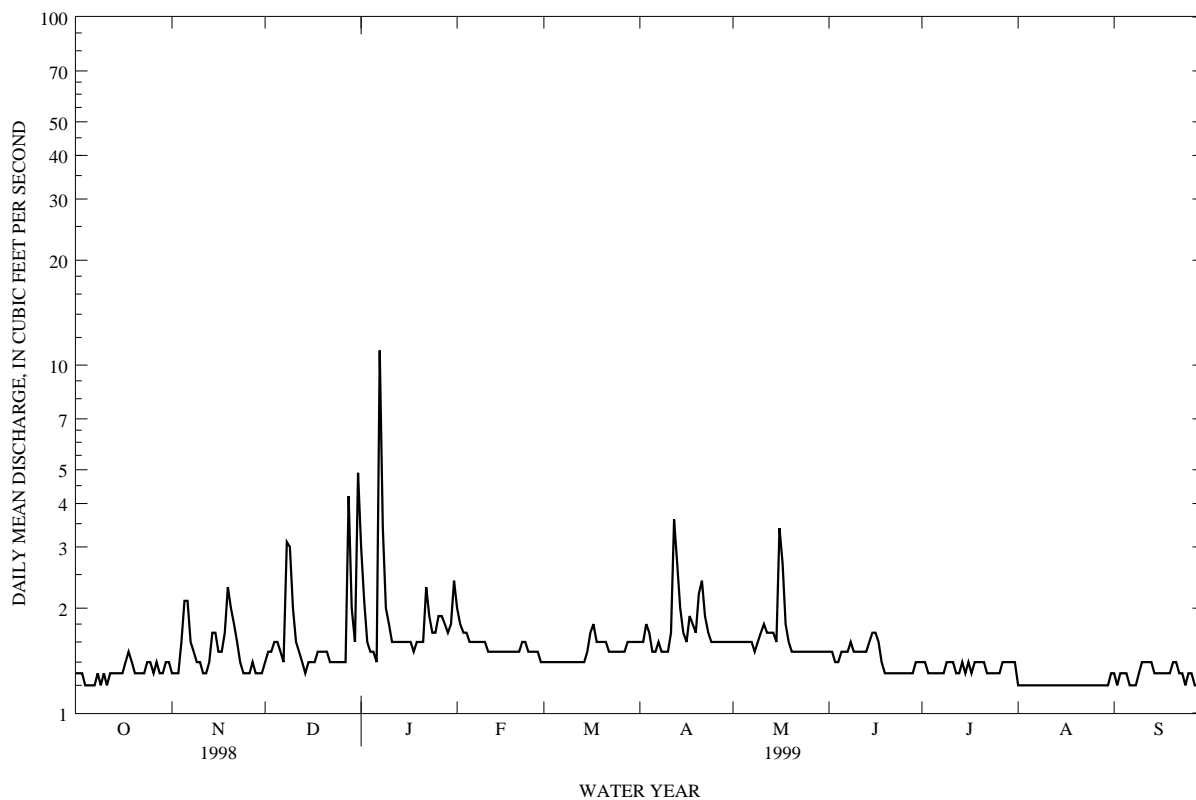
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.3	1.3	1.4	3.0	2.0	1.4	1.6	1.6	1.5	1.4	1.2	1.3
2	1.3	1.3	1.5	2.1	1.8	1.4	1.6	1.6	1.5	1.4	1.2	1.2
3	1.3	1.3	1.5	1.6	1.7	1.4	1.8	1.6	1.4	1.3	1.2	1.3
4	1.2	1.6	1.6	1.5	1.7	1.4	1.7	1.6	1.4	1.3	1.2	1.3
5	1.2	2.1	1.6	1.5	1.6	1.4	1.5	1.6	1.5	1.3	1.2	1.3
6	1.2	2.1	1.5	1.4	1.6	1.4	1.5	1.6	1.5	1.3	1.2	1.2
7	1.2	1.6	1.4	1.1	1.6	1.4	1.6	1.6	1.5	1.3	1.2	1.2
8	1.3	1.5	3.1	3.4	1.6	1.4	1.5	1.5	1.6	1.3	1.2	1.2
9	1.2	1.4	3.0	2.0	1.6	1.4	1.5	1.6	1.5	1.4	1.2	1.3
10	1.3	1.4	2.0	1.8	1.6	1.4	1.5	1.7	1.5	1.4	1.2	1.4
11	1.2	1.3	1.6	1.6	1.5	1.4	1.7	1.8	1.5	1.4	1.2	1.4
12	1.3	1.3	1.5	1.6	1.5	1.4	3.6	1.7	1.5	1.3	1.2	1.4
13	1.3	1.4	1.4	1.6	1.5	1.4	2.7	1.7	1.5	1.3	1.2	1.4
14	1.3	1.7	1.3	1.6	1.5	1.4	2.0	1.7	1.6	1.4	1.2	1.3
15	1.3	1.7	1.4	1.6	1.5	1.5	1.7	1.6	1.7	1.3	1.2	1.3
16	1.3	1.5	1.4	1.6	1.5	1.7	1.6	3.4	1.7	1.4	1.2	1.3
17	1.4	1.5	1.4	1.6	1.5	1.8	1.9	2.7	1.6	1.3	1.2	1.3
18	1.5	1.7	1.5	1.5	1.5	1.6	1.8	1.8	1.4	1.4	1.2	1.3
19	1.4	2.3	1.5	1.6	1.5	1.6	1.7	1.6	1.3	1.4	1.2	1.3
20	1.3	2.0	1.5	1.6	1.5	1.6	2.2	1.5	1.3	1.4	1.2	1.4
21	1.3	1.8	1.5	1.6	1.5	1.6	2.4	1.5	1.3	1.4	1.2	1.4
22	1.3	1.6	1.4	2.3	1.6	1.5	1.9	1.5	1.3	1.3	1.2	1.3
23	1.3	1.4	1.4	1.9	1.6	1.5	1.7	1.5	1.3	1.3	1.2	1.3
24	1.4	1.3	1.4	1.7	1.5	1.5	1.6	1.5	1.3	1.3	1.2	1.2
25	1.4	1.3	1.4	1.7	1.5	1.5	1.6	1.5	1.3	1.3	1.2	1.3
26	1.3	1.3	1.4	1.9	1.5	1.5	1.6	1.5	1.3	1.3	1.2	1.3
27	1.4	1.4	1.4	1.9	1.5	1.5	1.6	1.5	1.3	1.4	1.2	1.2
28	1.3	1.3	4.2	1.8	1.4	1.6	1.6	1.5	1.3	1.4	1.2	1.2
29	1.3	1.3	2.0	1.7	---	1.6	1.6	1.5	1.4	1.4	1.2	1.2
30	1.4	1.3	1.6	1.8	---	1.6	1.6	1.5	1.4	1.4	1.2	1.2
31	1.4	---	4.9	2.4	---	1.6	---	1.5	---	1.4	1.3	---
TOTAL	40.6	46.0	55.7	65.9	43.9	46.4	53.9	52.0	43.2	41.9	37.3	38.7
MEAN	1.31	1.53	1.80	2.13	1.57	1.50	1.80	1.68	1.44	1.35	1.20	1.29
MAX	1.5	2.3	4.9	1.1	2.0	1.8	3.6	3.4	1.7	1.4	1.3	1.4
MIN	1.2	1.3	1.3	1.4	1.4	1.4	1.5	1.5	1.3	1.3	1.2	1.2
AC-FT	81	91	110	131	87	92	107	103	86	83	74	77

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1944 - 1999, BY WATER YEAR (WY)

MEAN	1.92	2.78	2.67	2.65	2.49	3.25	2.52	2.32	1.40	1.56	1.58	1.45
MAX	11.6	15.7	9.72	9.68	10.7	16.5	13.0	27.3	2.34	3.25	4.24	3.62
(WY)	1959	1966	1988	1949	1955	1958	1989	1965	1989	1989	1967	1992
MIN	.32	.33	.64	.94	.86	.60	.50	.51	.38	.41	.56	.36
(WY)	1946	1946	1960	1977	1963	1946	1946	1961	1946	1945	1961	1945

HAWAII, ISLAND OF OAHU
 16275000 HAIKU STREAM NEAR HEEIA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1944 - 1999	
ANNUAL TOTAL	604.7	565.5		
ANNUAL MEAN	1.66	1.55	2.21	
HIGHEST ANNUAL MEAN			4.82	1965
LOWEST ANNUAL MEAN			.67	1946
HIGHEST DAILY MEAN	32 Jan 1	11 Jan 7	620	May 2 1965
LOWEST DAILY MEAN	1.2 Oct 4	1.2 Oct 4	.29	Jul 13 1945
ANNUAL SEVEN-DAY MINIMUM	1.2 Oct 3	1.2 Aug 1	.29	Oct 19 1945
ANNUAL RUNOFF (AC-FT)	1200	1120	1600	
10 PERCENT EXCEEDS	1.9	1.8	2.6	
50 PERCENT EXCEEDS	1.5	1.5	1.5	
90 PERCENT EXCEEDS	1.3	1.2	.90	



HAWAII, ISLAND OF OAHU
16283200 KAHALUU STREAM NEAR AHUIMANU

LOCATION.--Lat 21°26'32", long 157°50'47", Hydrologic Unit 20060000, on left bank, 1.1 mi west of Valley of the Temples Memorial Park, 1.3 mi south of Kahaluu School, and 2.7 mi northwest of Heeia Elementary School.

DRAINAGE AREA.--0.84 mi², revised, exclusion of drainage area from right bank tributary downstream of gage.

PERIOD OF RECORD.--October 1983 to current year.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 150 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Ben Shimizu. Records good except for discharges greater than 30 ft³/s which are poor. Honolulu Board of Water Supply has diverted ground water from tunnel in drainage area since 1947. At times, farmers upstream of gage pump and/or divert small amounts of water from the stream.

AVERAGE DISCHARGE.--16 years (water years 1984-99), 3.35 ft³/s (2,430 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 728 ft³/s, September 18, 1994, gage height, 6.05 ft; minimum, 0.58 ft³/s on several days in September, October, November 1984.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 180 ft³/s and maximum(*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 7	1900	*127	*3.14				

Minimum discharge, 0.76 ft³/s, November 13, June 29, August 22-23, 25-26, 29, and September 5-7.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

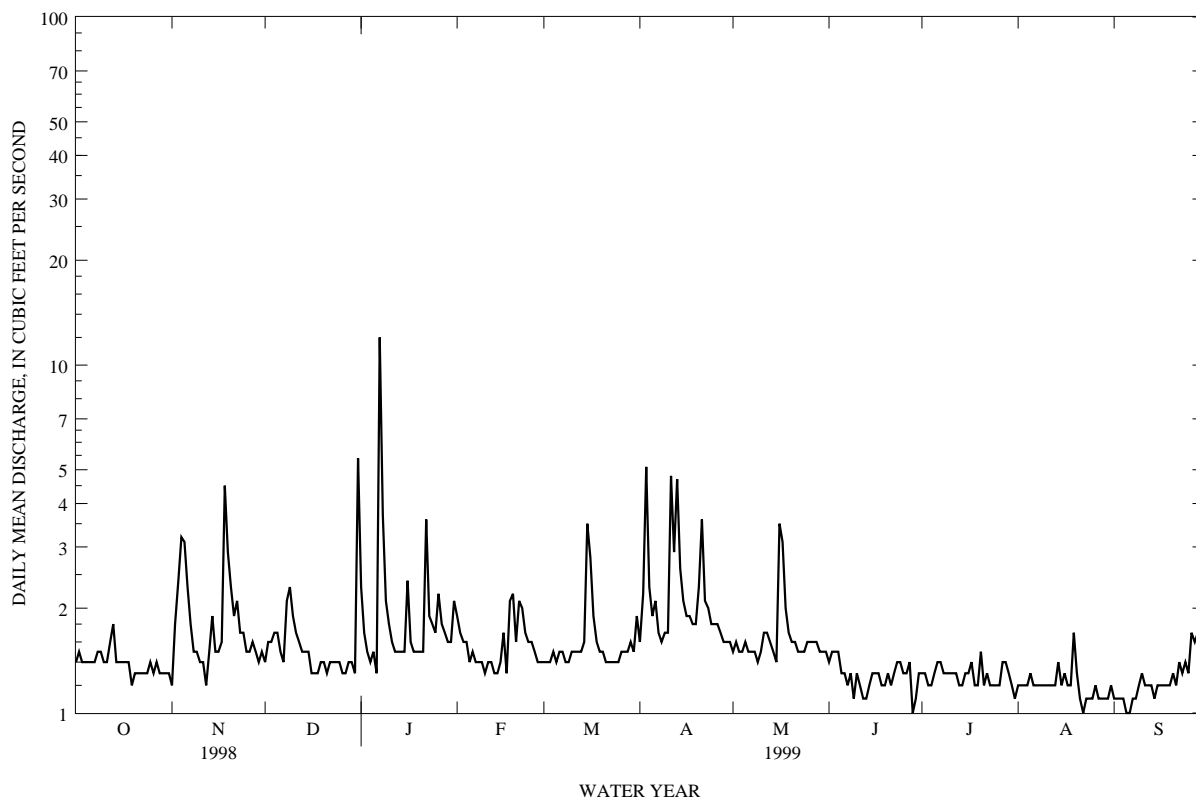
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.4	1.2	1.4	2.3	1.9	1.4	1.6	1.5	1.4	1.3	1.2	1.1
2	1.5	1.8	1.6	1.7	1.7	1.4	2.2	1.6	1.5	1.3	1.2	1.1
3	1.4	2.4	1.6	1.5	1.6	1.4	5.1	1.5	1.5	1.2	1.2	1.1
4	1.4	3.2	1.7	1.4	1.6	1.5	2.3	1.5	1.5	1.2	1.2	1.1
5	1.4	3.1	1.7	1.5	1.4	1.4	1.9	1.6	1.3	1.3	1.3	1.0
6	1.4	2.3	1.5	1.3	1.5	1.5	2.1	1.5	1.3	1.4	1.2	1.0
7	1.4	1.8	1.4	1.2	1.4	1.5	1.7	1.5	1.2	1.4	1.2	1.1
8	1.5	1.5	2.1	3.7	1.4	1.4	1.6	1.5	1.3	1.3	1.2	1.1
9	1.5	1.5	2.3	2.1	1.4	1.4	1.7	1.4	1.1	1.3	1.2	1.2
10	1.4	1.4	1.9	1.8	1.3	1.5	1.7	1.5	1.3	1.3	1.2	1.3
11	1.4	1.4	1.7	1.6	1.4	1.5	4.8	1.7	1.2	1.3	1.2	1.2
12	1.6	1.2	1.6	1.5	1.4	1.5	2.9	1.7	1.1	1.3	1.2	1.2
13	1.8	1.5	1.5	1.5	1.3	1.5	4.7	1.6	1.1	1.2	1.2	1.2
14	1.4	1.9	1.5	1.5	1.3	1.6	2.6	1.5	1.2	1.2	1.4	1.1
15	1.4	1.5	1.5	1.5	1.4	3.5	2.1	1.4	1.3	1.3	1.2	1.2
16	1.4	1.5	1.3	2.4	1.7	2.8	1.9	3.5	1.3	1.3	1.3	1.2
17	1.4	1.6	1.3	1.6	1.3	1.9	1.9	3.1	1.3	1.4	1.2	1.2
18	1.4	4.5	1.3	1.5	2.1	1.6	1.8	2.0	1.2	1.2	1.2	1.2
19	1.2	2.9	1.4	1.5	2.2	1.5	1.8	1.7	1.2	1.2	1.7	1.2
20	1.3	2.3	1.4	1.5	1.6	1.5	2.3	1.6	1.3	1.5	1.3	1.3
21	1.3	1.9	1.3	1.5	2.1	1.4	3.6	1.6	1.2	1.2	1.1	1.2
22	1.3	2.1	1.4	3.6	2.0	1.4	2.1	1.5	1.3	1.3	1.0	1.4
23	1.3	1.7	1.4	1.9	1.7	1.4	2.0	1.5	1.4	1.2	1.1	1.3
24	1.3	1.7	1.4	1.8	1.6	1.4	1.8	1.5	1.4	1.2	1.1	1.4
25	1.4	1.5	1.4	1.7	1.6	1.4	1.8	1.6	1.3	1.2	1.1	1.3
26	1.3	1.5	1.3	2.2	1.5	1.5	1.8	1.6	1.3	1.2	1.2	1.7
27	1.4	1.6	1.3	1.8	1.4	1.5	1.7	1.6	1.4	1.4	1.1	1.6
28	1.3	1.5	1.4	1.7	1.4	1.5	1.6	1.6	1.0	1.4	1.1	1.7
29	1.3	1.4	1.4	1.6	---	1.6	1.6	1.5	1.1	1.3	1.1	1.5
30	1.3	1.5	1.3	1.6	---	1.5	1.6	1.5	1.3	1.2	1.1	1.7
31	1.3	---	5.4	2.1	---	1.9	---	1.5	---	1.1	1.2	---
TOTAL	43.1	56.9	50.7	66.9	44.2	49.8	68.3	51.9	38.3	39.6	37.2	37.9
MEAN	1.39	1.90	1.64	2.16	1.58	1.61	2.28	1.67	1.28	1.28	1.20	1.26
MAX	1.8	4.5	5.4	12	2.2	3.5	5.1	3.5	1.5	1.5	1.7	1.7
MIN	1.2	1.2	1.3	1.3	1.3	1.4	1.6	1.4	1.0	1.1	1.0	1.0
AC-FT	85	113	101	133	88	99	135	103	76	79	74	75

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1984 - 1999, BY WATER YEAR (WY)

MEAN	3.11	3.87	3.67	3.74	3.67	4.16	3.56	3.11	2.72	2.98	2.68	2.95
MAX	6.69	10.6	9.56	8.65	7.55	11.8	10.6	5.52	4.78	5.89	5.78	5.81
(WY)	1992	1991	1988	1988	1989	1991	1989	1988	1991	1989	1991	1992
MIN	.66	1.24	1.09	.95	1.03	.92	.85	.73	.74	.67	.67	.67
(WY)	1985	1986	1986	1986	1986	1984	1985	1984	1984	1984	1984	1984

HAWAII, ISLAND OF OAHU
 16283200 KAHALUU STREAM NEAR AHUIMANU--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1984 - 1999	
ANNUAL TOTAL	856.0		584.8		3.35	
ANNUAL MEAN	2.35		1.60		1.07	
HIGHEST ANNUAL MEAN					5.97	1991
LOWEST ANNUAL MEAN					1.07	1984
HIGHEST DAILY MEAN	30	Jan 1	12	Jan 7	97	Mar 19 1991
LOWEST DAILY MEAN	1.2	Oct 19	1.0	Jun 28	.58	Sep 22 1984
ANNUAL SEVEN-DAY MINIMUM	1.3	Oct 18	1.1	Sep 1	.59	Nov 5 1984
ANNUAL RUNOFF (AC-FT)	1700		1160		2430	
10 PERCENT EXCEEDS	3.3		2.1		4.9	
50 PERCENT EXCEEDS	2.2		1.4		2.8	
90 PERCENT EXCEEDS	1.4		1.2		1.0	



HAWAII, ISLAND OF OAHU
16284200 WAIHEE STREAM NEAR KAHALUU

LOCATION.--Lat 21°27'04", long 157°51'36", Hydrologic Unit 20060000, on right bank, 0.2 mi downstream from forest-reserve boundary, 1.0 mi south of Kahaluu School, and 1.6 mi west of Ahuimanu sewage treatment plant.

DRAINAGE AREA.--0.97 mi².

PERIOD OF RECORD.--October 1974 to current year.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 170 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Ben Shimizu. Records good. Honolulu Board of Water Supply diverts water from tunnel and wells in drainage area.

AVERAGE DISCHARGE.--25 years (water years 1975-99), 6.17 ft³/s (4,470 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,530 ft³/s, March 21, 1991, gage height, 7.93 ft, from rating curve extended above 100 ft³/s on basis of slope area measurement at gage height 7.93 ft; minimum, 1.1 ft³/s, April 7, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 280 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 7	1900	*163	*4.42				

Minimum discharge, 3.6 ft³/s, October 1-2, 11-12.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

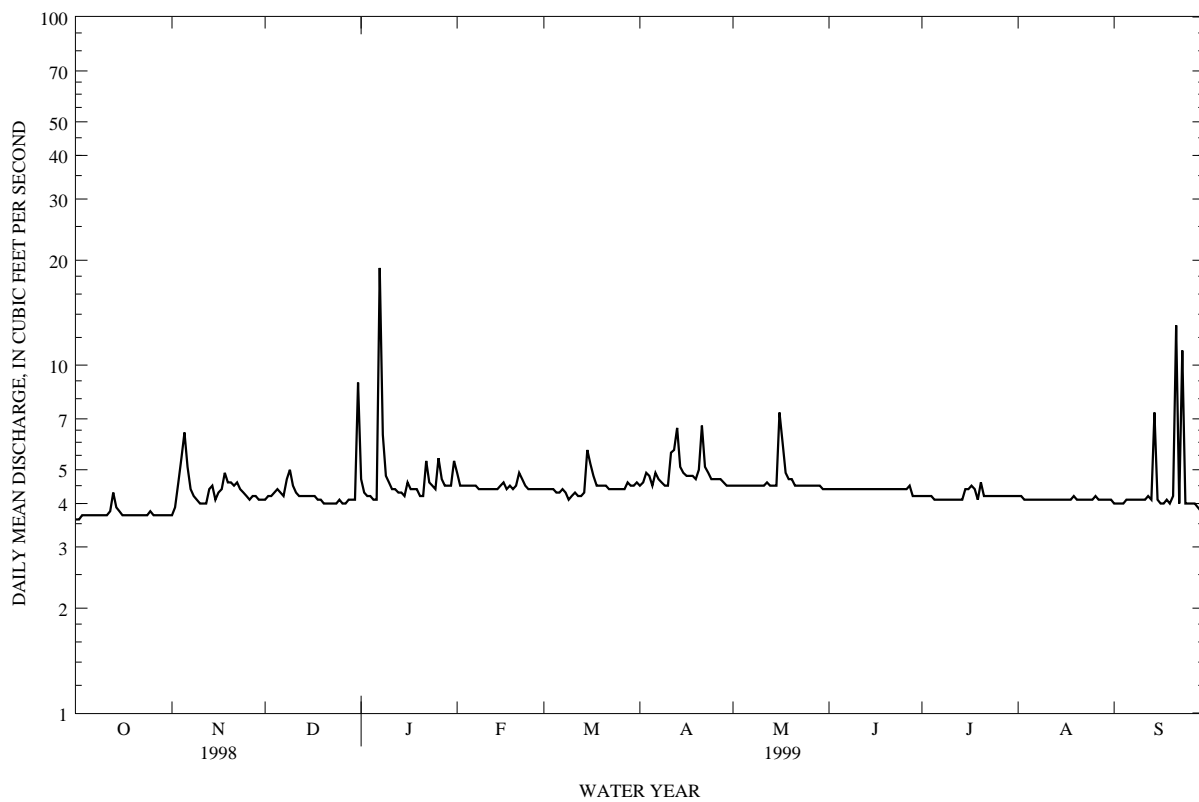
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.6	3.7	4.1	4.7	4.9	4.4	4.5	4.5	4.4	4.2	4.2	4.0
2	3.6	3.9	4.2	4.3	4.5	4.4	4.6	4.5	4.4	4.2	4.2	4.0
3	3.7	4.6	4.2	4.2	4.5	4.4	4.9	4.5	4.4	4.2	4.1	4.0
4	3.7	5.4	4.3	4.2	4.5	4.4	4.8	4.5	4.4	4.2	4.1	4.0
5	3.7	6.4	4.4	4.1	4.5	4.3	4.5	4.5	4.4	4.1	4.1	4.1
6	3.7	5.1	4.3	4.1	4.5	4.3	4.9	4.5	4.4	4.1	4.1	4.1
7	3.7	4.4	4.2	19	4.5	4.4	4.7	4.5	4.4	4.1	4.1	4.1
8	3.7	4.2	4.7	6.3	4.4	4.3	4.6	4.5	4.4	4.1	4.1	4.1
9	3.7	4.1	5.0	4.8	4.4	4.1	4.5	4.5	4.4	4.1	4.1	4.1
10	3.7	4.0	4.5	4.6	4.4	4.2	4.5	4.5	4.4	4.1	4.1	4.1
11	3.7	4.0	4.3	4.4	4.4	4.3	5.6	4.5	4.4	4.1	4.1	4.1
12	3.8	4.0	4.2	4.4	4.4	4.2	5.7	4.6	4.4	4.1	4.1	4.2
13	4.3	4.4	4.2	4.3	4.4	4.2	6.6	4.5	4.4	4.1	4.1	4.1
14	3.9	4.5	4.2	4.3	4.4	4.3	5.1	4.5	4.4	4.1	4.1	7.3
15	3.8	4.1	4.2	4.2	4.5	5.7	4.9	4.5	4.4	4.4	4.1	4.1
16	3.7	4.3	4.2	4.6	4.6	5.2	4.8	7.3	4.4	4.4	4.1	4.0
17	3.7	4.4	4.2	4.4	4.4	4.8	4.8	6.0	4.4	4.5	4.1	4.0
18	3.7	4.9	4.1	4.4	4.5	4.5	4.8	4.9	4.4	4.4	4.1	4.1
19	3.7	4.6	4.1	4.4	4.4	4.5	4.7	4.7	4.4	4.1	4.2	4.0
20	3.7	4.6	4.0	4.2	4.5	4.5	5.0	4.7	4.4	4.6	4.1	4.2
21	3.7	4.5	4.0	4.2	4.9	4.5	6.7	4.5	4.4	4.2	4.1	13
22	3.7	4.6	4.0	5.3	4.7	4.4	5.1	4.5	4.4	4.2	4.1	4.0
23	3.7	4.4	4.0	4.6	4.5	4.4	4.9	4.5	4.4	4.2	4.1	11
24	3.7	4.3	4.0	4.5	4.4	4.4	4.7	4.5	4.4	4.2	4.1	4.0
25	3.8	4.2	4.1	4.4	4.4	4.4	4.7	4.5	4.4	4.2	4.1	4.0
26	3.7	4.1	4.0	5.4	4.4	4.4	4.7	4.5	4.4	4.2	4.2	4.0
27	3.7	4.2	4.0	4.7	4.4	4.4	4.7	4.5	4.5	4.2	4.1	4.0
28	3.7	4.2	4.1	4.5	4.4	4.6	4.6	4.5	4.2	4.2	4.1	3.9
29	3.7	4.1	4.1	4.5	---	4.5	4.5	4.5	4.2	4.2	4.1	3.8
30	3.7	4.1	4.1	4.5	---	4.5	4.5	4.4	4.2	4.2	4.1	3.8
31	3.7	---	8.9	5.3	---	4.6	---	4.4	---	4.2	4.1	---
TOTAL	115.6	132.3	134.9	155.8	125.7	138.5	147.6	144.5	131.5	130.4	127.5	140.2
MEAN	3.73	4.41	4.35	5.03	4.49	4.47	4.92	4.66	4.38	4.21	4.11	4.67
MAX	4.3	6.4	8.9	19	4.9	5.7	6.7	7.3	4.5	4.6	4.2	13
MIN	3.6	3.7	4.0	4.1	4.4	4.1	4.5	4.4	4.2	4.1	4.1	3.8
AC-FT	229	262	268	309	249	275	293	287	261	259	253	278

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1975 - 1999, BY WATER YEAR (WY)

MEAN	5.77	6.63	6.44	6.80	6.51	7.31	6.27	5.85	5.61	5.72	5.59	5.56
MAX	9.81	14.3	15.5	12.1	13.2	17.7	15.1	8.46	8.88	9.95	10.6	9.43
(WY)	1983	1991	1988	1988	1979	1991	1989	1981	1982	1989	1982	1982
MIN	2.70	4.08	3.60	3.71	3.05	2.85	2.72	3.18	3.36	2.40	2.61	2.74
(WY)	1976	1978	1976	1977	1977	1977	1977	1977	1976	1977	1976	1976

HAWAII, ISLAND OF OAHU
 16284200 WAIHEE STREAM NEAR KAHALUU--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1975 - 1999	
ANNUAL TOTAL	1751.3	1624.5		
ANNUAL MEAN	4.80	4.45	6.17	
HIGHEST ANNUAL MEAN			9.36	1982
LOWEST ANNUAL MEAN			3.32	1977
HIGHEST DAILY MEAN	45 Jan 1	19 Jan 7	149	Mar 19 1991
LOWEST DAILY MEAN	3.6 Sep 30	3.6 Oct 1	1.3	Apr 15 1977
ANNUAL SEVEN-DAY MINIMUM	3.7 Sep 30	3.7 Oct 1	1.4	Apr 12 1977
ANNUAL RUNOFF (AC-FT)	3470	3220	4470	
10 PERCENT EXCEEDS	5.5	4.8	7.4	
50 PERCENT EXCEEDS	4.6	4.4	5.5	
90 PERCENT EXCEEDS	3.7	4.0	4.0	



HAWAII, ISLAND OF OAHU
16284200 WAIHEE STREAM NEAR KAHALUU--Continued
WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1975-86, March to September 1999.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: June to September 1999.

WATER TEMPERATURE: June to September 1999.

INSTRUMENTATION.--Specific-conductance and temperature monitor from June to September 1999. Automatic water-quality (point) sampler from January to September 1999.

REMARKS.--Water-quality samples were collected monthly beginning in March 1999. Monthly samples were collected with a hand-held sampler using the equal-width-increment sampling method. Additional samples were collected during storm events (September 14 and 21) using an automatic (point) sampler located on the right bank of the stream.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum, 180 microsiemens per centimeter, Apr. 22, 1980; Minimum, 100 microsiemens per centimeter, Aug. 9, 1977.

WATER TEMPERATURE: Maximum, 24.0°C, Aug. 9, 1977; Minimum, 19.0°C, Jan. 24, Mar. 6, 1980.

EXTREMES FOR THE CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum, 228 microsiemens per centimeter, Sept. 21; minimum, 126 microsiemens per centimeter, Sept. 23.

WATER TEMPERATURE: Maximum, 21.5°C, July 8, Aug. 1; minimum, 19.5°C, Sept. 14, 21, 23.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	OXYGEN, DIS- SOLVED (MG/L) (00300)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	
		MAR	17...	1430	4.6	--	--	138	20.5	8.6
APR	21...	1420	5.5	91	8.1	146	20.5	8.3	5.7	.9
MAY	21...	1300	4.4	97	8.6	150	21.0	8.2	5.4	.9
JUN	15...	1120	4.4	99	8.9	155	20.5	8.2	5.0	.9
JUL	08...	1100	4.1	--	--	147	21.5	8.3	5.4	.9
AUG	19...	1010	4.1	96	8.5	146	21.0	8.7	5.6	1.0
SEP	14...	2214	28	--	--	140	19.5	7.7	5.1	1.1
	16...	1000	4	98	8.7	148	21.0	8.2	5.5	1.0
	21...	0833	36	--	--	131	20.0	6.7	4.5	1.2
DATE		SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	ALKA- LITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	BICAR- BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	NITRO- GEN, DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N) (00623)
MAR	17...	12	47	--	16	<.1	30	2.0	<.02	<.1
APR	21...	12	45	55	16	<.1	28	2.6	<.02	<.1
MAY	21...	12	50	60	16	<.1	29	2.3	<.02	<.1
JUN	15...	13	44	54	15	<.1	28	2.0	<.02	<.1
JUL	08...	12	44	54	15	<.1	30	2.4	<.02	E.08
AUG	19...	13	44	54	15	<.1	31	2.6	<.02	E.08
SEP	14...	12	42	52	16	<.1	32	2.6	.02	E.07
	16...	11	47	57	15	<.1	30	2.7	<.02	<.1
	21...	11	38	47	14	<.1	28	2.3	<.02	<.1

E Estimated

HAWAII, ISLAND OF OAHU
 16284200 WAIHEE STREAM NEAR KAHALUU--Continued
 WATER-QUALITY RECORDS

DATE	NITRO- GEN, AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)
MAR 17...	<.1	.13	<.01	.032	.03	.037	108	E7	E2
APR 21...	E.09	.12	<.01	.031	.02	.033	110	E9	<3
MAY 21...	E.05	.11	<.01	.032	.04	.032	110	<10	<3
JUN 15...	E.05	.12	<.01	.031	.03	.033	122	<10	<3
JUL 08...	E.06	.11	<.01	.033	.03	.036	108	<10	<3
AUG 19...	E.06	.11	<.01	.032	.04	.035	108	E7	<1
SEP 14...	.1	.15	<.01	.043	.04	.055	107	<10	<2
16...	E.10	.09	<.01	.033	.03	.056	108	<10	E2
21...	.9	.06	<.01	.04	.03	.23	102	<10	<2

DATE	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS- PENDE TOTAL (MG/L AS C) (00689)	PH WATER FILTERED FIELD (STAND- ARD UNITS) (99900)
MAR 17...	.4	.2	--
APR 21...	.4	.2	3
MAY 21...	.2	<.2	1
JUN 15...	.3	.2	2
JUL 08...	.3	<.2	5
AUG 19...	.3	--	1
SEP 14...	.7	.9	13
16...	.4	.2	1
21...	.9	>4.2	165

DATE	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)	ANTI- MONY, DIS- SOLVED (UG/L AS SB) (01095)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR) (01030)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)
AUG 19...	3	<1	<1	2	<1	<1	1.0	<1

DATE	COPPER, DIS- SOLVED (UG/L AS CU) (01040)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	URANIUM NATURAL DIS- SOLVED (UG/L AS U) (22703)
AUG 19...	<1	<1	<1	<1	<1	<1	<1	<1

E Estimated

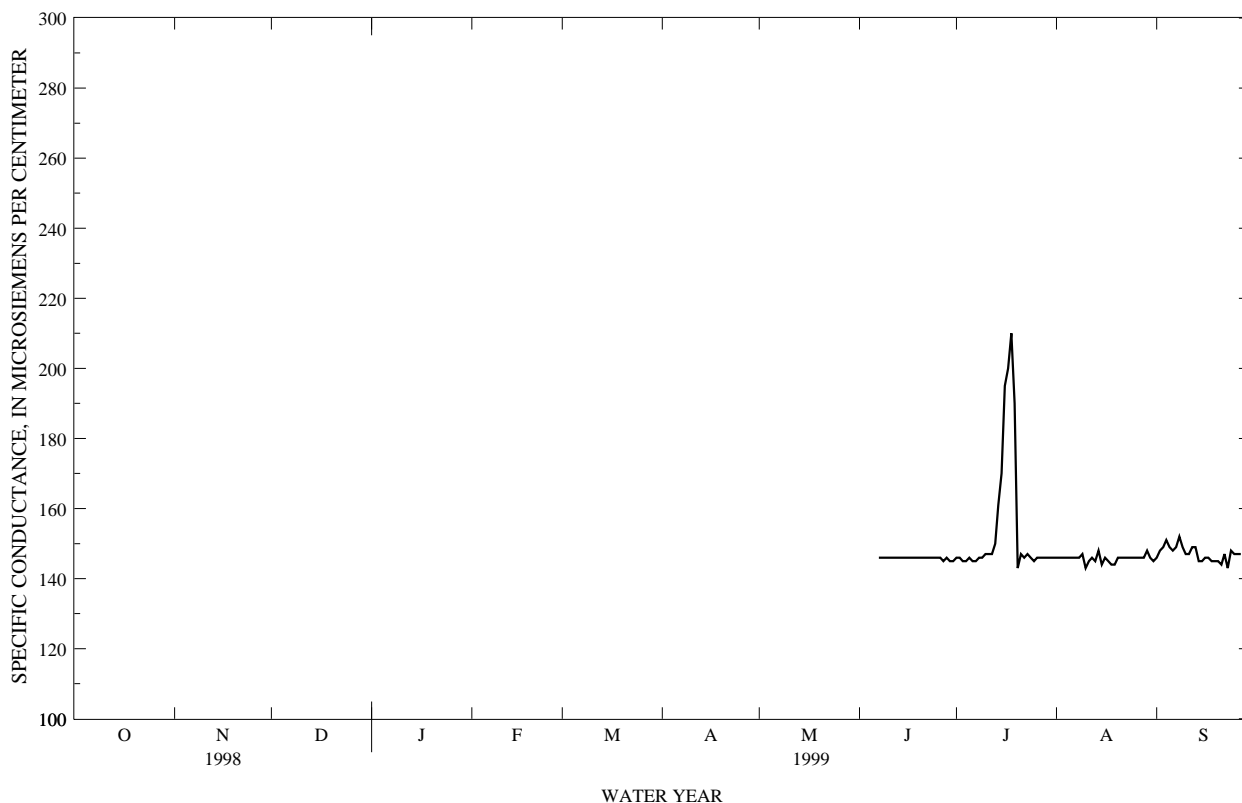
HAWAII, ISLAND OF OAHU
16284200 WAIHEE STREAM NEAR KAHALUU--Continued
WATER-QUALITY RECORDS

DATE	2,6-DI-ETHYL ANILINE WAT FLT 0.7 U GF, REC (UG/L)	ACETO-CHLOR, WATER, FLTRD (UG/L)	ALA-CHLOR, WATER, DISS, REC, (UG/L)	ALPHA BHC DIS-SOLVED (UG/L)	ATRA-ZINE, WATER, DISS, REC (UG/L)	BEN-FLUR-ALIN WAT FLD (UG/L)	BUTYL-ATE, WATER, DISS, REC (UG/L)	CAR-BARYL WATER, FLTRD (UG/L)	CARBO-FURAN WATER, FLTRD (UG/L)	CHLOR-PYRIFOS DIS-SOLVED (UG/L)
AUG 19...	<.003	<.002	<.002	<.002	<.001	<.002	<.002	<.003	<.003	<.004
DATE	CYANA-ZINE, WATER, DISS, REC (UG/L)	DCPA WATER, FLTRD (UG/L)	DEETHYL ATRA-ZINE, WATER, DISS, REC (UG/L)	DI-AZINON, DIS-SOLVED (UG/L)	DI-ELDRIN, DIS-SOLVED (UG/L)	DISUL-FOTON WATER, FLTRD (UG/L)	EPTC WATER, FLTRD (UG/L)	ETHAL-FLUR-ALIN WAT FLT (UG/L)	ETHO-PROP WATER, FLTRD (UG/L)	FONOFOS WATER, REC (UG/L)
AUG 19...	<.004	<.002	<.002	<.002	<.001	<.017	<.002	<.004	<.003	<.003
DATE	LINDANE DIS-SOLVED (UG/L)	LIN-URON WATER, FLTRD (UG/L)	MALA-THION, DIS-SOLVED (UG/L)	METHYL AZIN-PHOS WAT FLT (UG/L)	METHYL PARA-THION WAT FLT (UG/L)	METO-LACHLOR WATER, DISSOLV (UG/L)	METRI-BUZIN WATER, DISSOLV (UG/L)	MOL-INATE WATER, FLTRD (UG/L)	NAPROP-AMIDE WATER, FLTRD (UG/L)	P,P'DDE DISSOLV (UG/L)
AUG 19...	<.004	<.002	<.005	<.001	<.006	<.002	<.004	<.004	<.003	<.006
DATE	PARA-THION, DIS-SOLVED (UG/L)	PENDI-METH-ALIN WAT FLT (UG/L)	PEB-ULATE WATER, FILTRD (UG/L)	PER-METHRIN CIS WAT FLT (UG/L)	PHORATE WATER, FLTRD (UG/L)	PRO-METON, WATER, DISS, REC (UG/L)	PRON-AMIDE WATER, FLTRD (UG/L)	PROP-CHLOR, WATER, DISS, REC (UG/L)	PRO-PANIL WATER, FLTRD (UG/L)	PRO-PARGITE WATER, FLTRD (UG/L)
AUG 19...	<.004	<.004	<.004	<.005	<.002	<.018	<.003	<.007	<.004	<.013
DATE			SI-MAZINE, WATER, DISS, REC (UG/L)	TEBU-THIURON WATER, FLTRD (UG/L)	TER-BACIL WATER, FLTRD (UG/L)	TER-BUFOS WATER, FLTRD (UG/L)	THIO-BENCARB WATER, FLTRD (UG/L)	TRI-FLUR-ALIN WAT FLT (UG/L)		
AUG 19...			<.005	<.010	<.007	<.013	<.002	<.002		

HAWAII, ISLAND OF OAHU
 16284200 WAIHEE STREAM NEAR KAHALUU--Continued
 WATER-QUALITY RECORDS

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

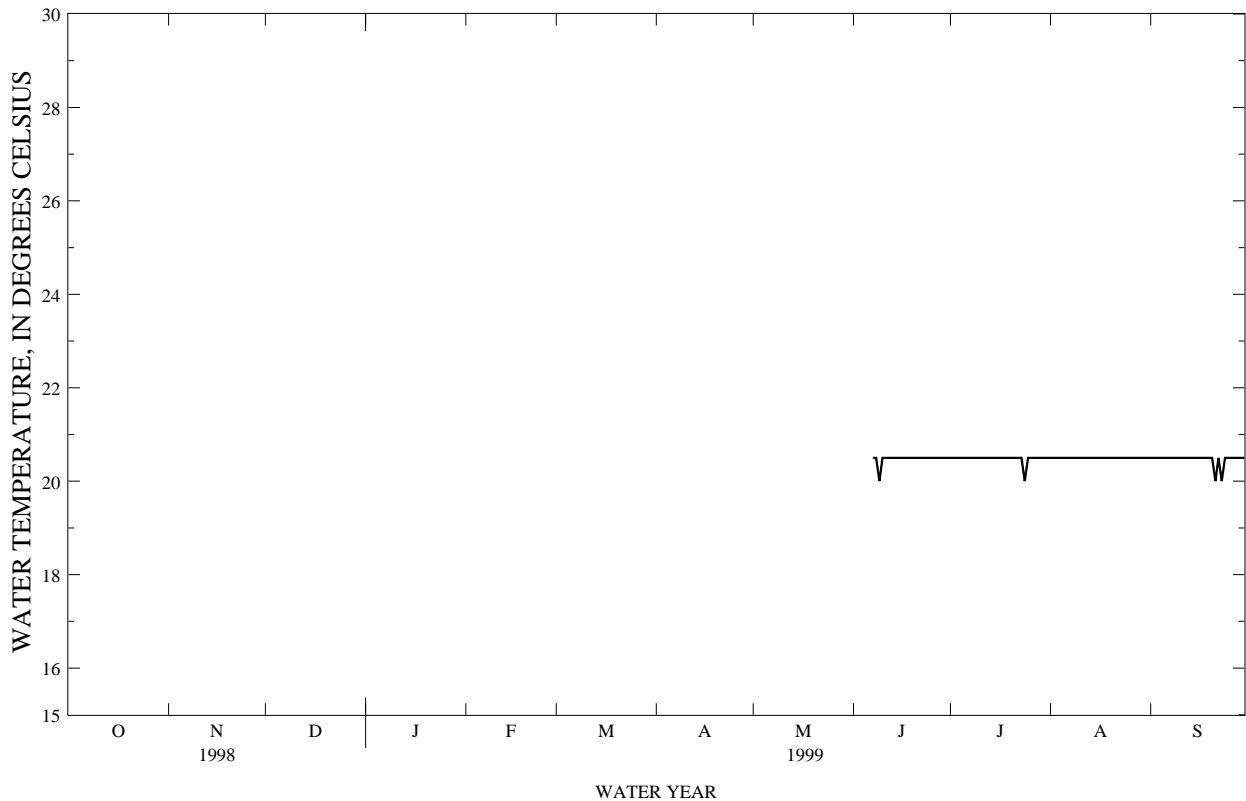
DAY	JUNE			JULY			AUGUST			SEPTEMBER		
	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
1	---	---	---	147	145	146	147	145	146	146	145	146
2	147	146	147	146	144	146	147	145	146	149	146	148
3	---	---	---	146	144	145	147	145	146	152	147	149
4	---	---	---	146	144	145	146	146	146	153	149	151
5	---	---	---	146	144	146	147	146	146	150	148	149
6	---	---	---	147	144	145	147	145	146	148	147	148
7	147	145	146	147	143	145	147	145	146	152	147	149
8	147	145	146	148	145	146	147	144	146	154	149	152
9	147	145	146	148	143	146	148	145	147	149	148	149
10	147	145	146	149	146	147	145	142	143	148	145	147
11	147	145	146	147	146	147	146	143	145	148	146	147
12	147	145	146	148	147	147	146	144	146	150	148	149
13	147	145	146	155	148	150	147	144	145	150	148	149
14	147	145	146	163	155	161	150	145	148	150	130	145
15	146	145	146	188	162	170	145	143	144	147	133	145
16	147	145	146	199	188	195	148	144	146	146	145	146
17	146	144	146	206	196	200	150	141	145	147	145	146
18	147	145	146	215	206	210	144	143	144	147	143	145
19	146	145	146	220	143	190	145	143	144	146	144	145
20	146	145	146	147	138	143	147	145	146	147	143	145
21	147	145	146	147	145	147	147	145	146	228	131	144
22	147	145	146	147	145	146	147	145	146	149	146	147
23	146	145	146	147	146	147	147	145	146	149	126	143
24	146	144	146	147	145	146	147	145	146	149	147	148
25	146	145	146	146	142	145	147	145	146	148	146	147
26	146	145	146	147	146	146	147	144	146	147	146	147
27	146	143	145	147	145	146	146	145	146	148	146	147
28	149	145	146	146	145	146	148	145	146	---	---	---
29	147	144	145	147	145	146	149	146	148	148	146	147
30	147	144	145	147	145	146	148	142	146	150	147	149
31	---	---	---	147	145	146	146	145	145	---	---	---
MONTH	---	---	---	220	138	154	150	141	146	---	---	---



HAWAII, ISLAND OF OAHU
 16284200 WAIHEE STREAM NEAR KAHALUU--Continued
 WATER-QUALITY RECORDS

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
1	---	---	---	21.0	20.0	20.5	21.5	20.0	20.5	21.0	20.5	20.5
2	20.5	20.0	20.5	20.5	20.0	20.5	21.0	20.0	20.5	21.0	20.5	20.5
3	---	---	---	21.0	20.0	20.5	20.5	20.5	20.5	21.0	20.0	20.5
4	---	---	---	21.0	20.0	20.5	20.5	20.5	20.5	21.0	20.0	20.5
5	---	---	---	21.0	20.0	20.5	21.0	20.5	20.5	21.0	20.0	20.5
6	---	---	---	21.0	20.5	20.5	21.0	20.5	20.5	21.0	20.5	20.5
7	21.0	20.0	20.5	21.0	20.5	20.5	21.0	20.5	20.5	21.0	20.0	20.5
8	20.5	20.0	20.5	21.5	20.5	20.5	20.5	20.0	20.5	20.5	20.0	20.5
9	20.5	20.0	20.0	20.5	20.5	20.5	21.0	20.0	20.5	21.0	20.0	20.5
10	21.0	20.0	20.5	21.0	20.0	20.5	21.0	20.0	20.5	21.0	20.0	20.5
11	20.5	20.0	20.5	21.0	20.0	20.5	21.0	20.0	20.5	20.5	20.0	20.5
12	21.0	20.0	20.5	20.5	20.0	20.5	21.0	20.0	20.5	21.0	20.0	20.5
13	21.0	20.0	20.5	20.5	20.0	20.5	21.0	20.5	20.5	21.0	20.0	20.5
14	21.0	20.0	20.5	20.5	20.0	20.5	21.0	20.5	20.5	21.0	19.5	20.5
15	20.5	20.0	20.5	20.5	20.0	20.5	21.0	20.0	20.5	20.5	20.0	20.5
16	21.0	20.0	20.5	21.0	20.0	20.5	21.0	20.5	20.5	20.5	20.0	20.5
17	20.5	20.0	20.5	20.5	20.0	20.5	21.0	20.5	20.5	21.0	20.0	20.5
18	21.0	20.0	20.5	21.0	20.0	20.5	21.0	20.0	20.5	21.0	20.0	20.5
19	21.0	20.0	20.5	20.5	20.5	20.5	20.5	20.0	20.5	20.5	20.0	20.5
20	21.0	20.0	20.5	21.0	20.5	20.5	21.0	20.0	20.5	21.0	20.0	20.5
21	21.0	20.0	20.5	21.0	20.5	20.5	20.5	20.5	20.5	20.5	19.5	20.0
22	21.0	20.0	20.5	20.5	20.5	20.5	21.0	20.5	20.5	21.0	20.0	20.5
23	21.0	20.0	20.5	20.5	20.0	20.5	21.0	20.5	20.5	20.5	19.5	20.0
24	20.5	20.5	20.5	20.5	20.0	20.0	20.5	20.5	20.5	20.5	20.0	20.5
25	21.0	20.0	20.5	20.5	20.0	20.5	21.0	20.5	20.5	20.5	20.0	20.5
26	20.5	20.0	20.5	21.0	20.5	20.5	21.0	20.5	20.5	20.5	20.5	20.5
27	21.0	20.0	20.5	21.0	20.5	20.5	21.0	20.0	20.5	21.0	20.0	20.5
28	21.0	20.0	20.5	20.5	20.0	20.5	21.0	20.0	20.5	20.5	20.0	20.5
29	20.5	20.0	20.5	21.0	20.0	20.5	21.0	20.0	20.5	21.0	20.0	20.5
30	20.5	20.0	20.5	21.0	20.0	20.5	21.0	20.0	20.5	20.5	20.0	20.5
31	---	---	---	21.0	20.0	20.5	20.5	20.5	20.5	---	---	---
MONTH	---	---	---	21.5	20.0	20.5	21.5	20.0	20.5	21.0	19.5	20.5



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HAWAII, ISLAND OF OAHU

16294900 WAIKANE STREAM AT ALTITUDE 75 FT, AT WAIKANE

LOCATION.--Lat 21°30'00", long 157°51'54", Hydrologic Unit 20060000, on right bank, 0.3 mi downstream from Waieekee Stream, 0.7 mi west of Waikane, and 1.2 mi northwest of Waiahole School.

DRAINAGE AREA.--2.22 mi².

PERIOD OF RECORD.--December 1959 to current year.

REVISED RECORDS.--WSP 1937: Drainage area, WDR HI-94-1: 1993 (M).

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 75 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Ben Shimizu. Records fair. Waiahole tunnel diverts water from tributaries and tunnels upstream of station. Elevation of the Waiahole tunnel is 800 ft (from topographic map).

AVERAGE DISCHARGE.--39 years (water years 1961-99), 8.70 ft³/s (6,300 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,800 ft³/s, February 4, 1965, gage height, 10.76 ft, from rating curve extended above 120 ft³/s on basis of slope-area measurements at gage heights 4.88 ft, 9.46 ft, and 10.76 ft; minimum, 0.76 ft³/s, October 27, 1975.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 700 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Dec. 31	0145	*1,520	*6.28	Jan. 22	1345	1,160	5.71

Minimum discharge, 1.60 ft³/s, October 1, 4-8, November 1, January 4, 7, and September 30.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

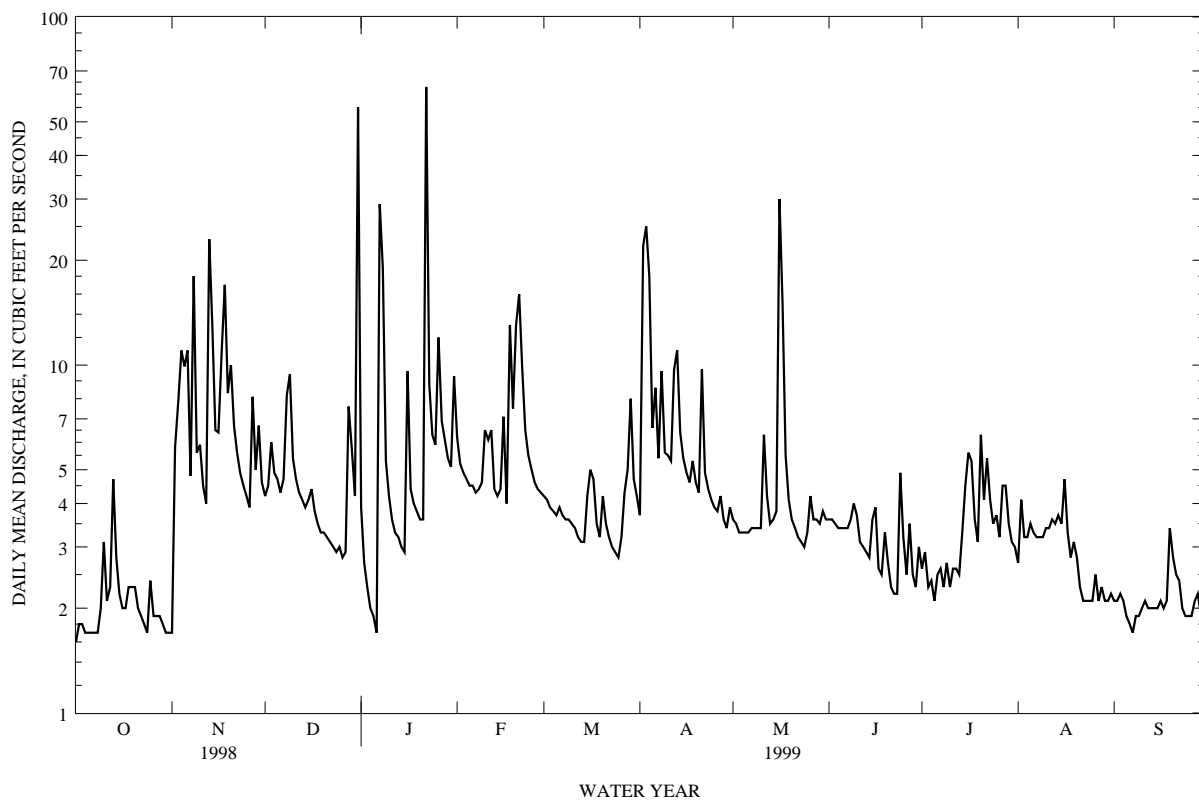
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.6	1.7	4.2	3.9	6.2	4.2	3.7	3.6	3.6	2.6	2.7	2.1
2	1.8	5.8	4.5	2.7	5.2	4.1	22	3.5	3.6	2.9	4.1	2.1
3	1.8	7.9	6.0	2.3	4.9	3.9	25	3.3	3.5	2.3	3.2	2.2
4	1.7	11	4.9	2.0	4.7	3.8	18	3.3	3.4	2.4	3.2	2.1
5	1.7	9.9	4.7	1.9	4.5	3.7	6.6	3.3	3.4	2.1	3.5	1.9
6	1.7	11	4.3	1.7	4.5	3.9	8.6	3.3	3.4	2.5	3.3	1.8
7	1.7	4.8	4.7	29	4.3	3.7	5.4	3.4	3.4	2.6	3.2	1.7
8	1.7	18	8.2	19	4.4	3.6	9.6	3.4	3.6	2.3	3.2	1.9
9	2.0	5.6	9.4	5.3	4.6	3.6	5.6	3.4	4.0	2.7	3.2	1.9
10	3.1	5.9	5.4	4.2	6.5	3.5	5.5	3.4	3.7	2.3	3.4	2.0
11	2.1	4.5	4.7	3.6	6.1	3.4	5.3	6.3	3.1	2.6	3.4	2.1
12	2.3	4.0	4.3	3.3	6.5	3.2	9.7	4.2	3.0	2.6	3.6	2.0
13	4.7	23	4.1	3.2	4.4	3.1	11	3.5	2.9	2.5	3.5	2.0
14	2.8	13	3.9	3.0	4.2	3.1	6.4	3.6	2.8	3.3	3.7	2.0
15	2.2	6.5	4.1	2.9	4.4	4.2	5.4	3.8	3.6	4.5	3.5	2.0
16	2.0	6.4	4.4	9.6	7.1	5.0	4.9	30	3.9	5.6	4.7	2.1
17	2.0	11	3.8	4.4	4.0	4.7	4.6	15	2.6	5.3	3.3	2.0
18	2.3	17	3.5	4.0	13	3.5	5.3	5.5	2.5	3.6	2.8	2.1
19	2.3	8.3	3.3	3.8	7.5	3.2	4.6	4.1	3.3	3.1	3.1	3.4
20	2.3	10	3.3	3.6	13	4.2	4.3	3.6	2.7	6.3	2.8	2.8
21	2.0	6.7	3.2	3.6	16	3.5	9.7	3.4	2.3	4.1	2.3	2.5
22	1.9	5.6	3.1	63	9.8	3.2	4.9	3.2	2.2	5.4	2.1	2.4
23	1.8	4.9	3.0	8.8	6.5	3.0	4.4	3.1	2.2	4.1	2.1	2.0
24	1.7	4.5	2.9	6.3	5.5	2.9	4.1	3.0	4.9	3.5	2.1	1.9
25	2.4	4.2	3.0	5.9	5.0	2.8	3.9	3.3	3.2	3.7	2.1	1.9
26	1.9	3.9	2.8	12	4.6	3.2	3.8	4.2	2.5	3.2	2.5	1.9
27	1.9	8.1	2.9	6.9	4.4	4.3	4.2	3.6	3.5	4.5	2.1	2.1
28	1.9	5.0	7.6	6.1	4.3	5.0	3.6	3.6	2.5	4.5	2.3	2.2
29	1.8	6.7	5.8	5.4	---	8.0	3.4	3.5	2.3	3.5	2.1	1.9
30	1.7	4.6	4.2	5.1	---	4.7	3.9	3.8	3.0	3.1	2.1	1.7
31	1.7	---	55	9.3	---	4.2	---	3.6	---	3.0	2.2	---
TOTAL	64.5	239.5	189.2	245.8	176.1	120.4	217.4	151.8	94.6	106.7	91.4	62.7
MEAN	2.08	7.98	6.10	7.93	6.29	3.88	7.25	4.90	3.15	3.44	2.95	2.09
MAX	4.7	23	55	63	16	8.0	25	30	4.9	6.3	4.7	3.4
MIN	1.6	1.7	2.8	1.7	4.0	2.8	3.4	3.0	2.2	2.1	2.1	1.7
AC-FT	128	475	375	488	349	239	431	301	188	212	181	124

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1960 - 1999, BY WATER YEAR (WY)

MEAN	6.63	11.5	9.47	11.5	11.9	12.7	10.3	8.46	5.38	6.34	5.30	5.21
MAX	31.0	55.7	44.1	45.6	65.5	53.1	49.3	29.3	16.2	30.2	25.0	22.1
(WY)	1992	1966	1988	1988	1994	1982	1963	1965	1977	1987	1967	1986
MIN	1.55	2.13	2.23	1.67	1.77	2.03	2.65	2.19	1.83	1.76	1.57	1.38
(WY)	1985	1963	1978	1977	1978	1978	1998	1991	1984	1984	1984	1984

HAWAII, ISLAND OF OAHU
 16294900 WAIKANE STREAM AT ALTITUDE 75 FT, AT WAIKANE--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1960 - 1999	
ANNUAL TOTAL	1887.7		1760.1		8.70	
ANNUAL MEAN	5.17		4.82		3.33	
HIGHEST ANNUAL MEAN					16.7	1982
LOWEST ANNUAL MEAN					3.33	1984
HIGHEST DAILY MEAN	406	Jan 1	63	Jan 22	868	Feb 4 1965
LOWEST DAILY MEAN	1.6	Sep 30	1.6	Oct 1	1.1	Oct 17 1975
ANNUAL SEVEN-DAY MINIMUM	1.7	Sep 30	1.7	Oct 1	1.3	Sep 19 1984
ANNUAL RUNOFF (AC-FT)	3740		3490		6300	
10 PERCENT EXCEEDS	6.6		7.9		14	
50 PERCENT EXCEEDS	2.8		3.6		4.2	
90 PERCENT EXCEEDS	1.9		2.0		2.2	



HAWAII, ISLAND OF OAHU
16296500 KAHANA STREAM AT ALTITUDE 30 FT, NEAR KAHANA

LOCATION.--Lat 21°32'37", long 157°53'07", Hydrologic Unit 20060000, on right bank 600 ft upstream from Kawa Stream, 1.1 mi southwest of Kahana, and 2.2 mi southwest of Swanzy Beach Park in Kaaawa.

DRAINAGE AREA.--3.74 mi².

PERIOD OF RECORD.--December 1958 to current year.

REVISED RECORDS.--WSP 1937: 1959-60.

GAGE.--Water-stage recorder and concrete-masonry control. Elevation of gage is 30 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Ben Shimizu. Records poor. Waiahole tunnel diverts water from tributaries and tunnels upstream of station. Elevation of the Waiahole tunnel is 800 ft (from topographic map). Recording rain gage located 50 ft from the streamgage at an elevation of 80 ft.

AVERAGE DISCHARGE.--40 years (water years 1960-99), 36.5 ft³/s (26,450 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,250 ft³/s, March 20, 1991, gage height, 8.60 ft, from rating curve extended above 530 ft³/s on basis of computation of peak flow over submerged weir; minimum, 10 ft³/s, September 17, 18, 20, 1961, and June 13, 1999.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,600 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 8	0015	*2,120	*5.37	No other peaks greater than base discharge.			

Minimum discharge, 10 ft³/s, June 13.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15	15	28	26	32	23	20	18	14	19	19	16
2	16	38	33	22	25	20	114	19	13	25	20	15
3	17	53	52	20	23	19	99	17	13	17	21	15
4	14	85	37	19	22	19	73	17	12	16	19	15
5	14	123	46	18	21	19	32	16	12	15	27	14
6	14	93	37	17	22	20	86	15	12	21	20	14
7	13	102	48	107	20	26	34	16	12	20	18	13
8	16	102	84	173	20	20	48	15	13	17	17	13
9	24	65	69	36	18	18	28	14	17	23	15	13
10	29	43	42	28	19	18	27	15	15	17	17	14
11	17	36	37	25	18	18	30	16	12	24	17	14
12	20	40	34	24	26	17	42	16	11	18	18	14
13	51	85	31	22	18	17	60	14	e12	16	16	13
14	25	50	30	20	18	16	32	14	e12	23	16	13
15	21	36	29	19	75	38	25	14	e20	29	14	12
16	25	32	28	26	49	43	23	40	e27	37	36	13
17	24	55	26	19	21	29	23	30	e13	40	22	12
18	36	66	25	18	49	22	43	22	e12	25	17	13
19	27	44	24	17	67	19	23	16	e18	22	89	30
20	23	45	23	17	115	22	22	17	e14	62	35	19
21	20	36	23	16	89	19	108	17	e13	32	25	18
22	19	32	26	135	69	18	33	15	e12	37	21	17
23	19	30	32	27	40	17	27	14	e12	25	19	14
24	18	28	25	25	32	17	24	13	e39	22	18	13
25	22	26	38	36	28	16	22	15	e18	24	18	13
26	17	25	26	77	26	17	21	18	e14	21	18	53
27	17	56	25	31	24	27	25	14	e23	28	17	19
28	16	29	29	30	23	30	20	13	14	26	17	17
29	17	42	28	25	---	50	19	14	13	21	16	15
30	16	29	25	25	---	23	19	19	18	20	16	13
31	16	---	122	62	---	23	---	15	---	19	17	---
TOTAL	638	1541	1162	1162	1009	700	1202	528	460	761	675	487
MEAN	20.6	51.4	37.5	37.5	36.0	22.6	40.1	17.0	15.3	24.5	21.8	16.2
MAX	51	123	122	173	115	50	114	40	39	62	89	53
MIN	13	15	23	16	18	16	19	13	11	15	14	12
AC-FT	1270	3060	2300	2300	2000	1390	2380	1050	912	1510	1340	966

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1959 - 1999, BY WATER YEAR (WY)

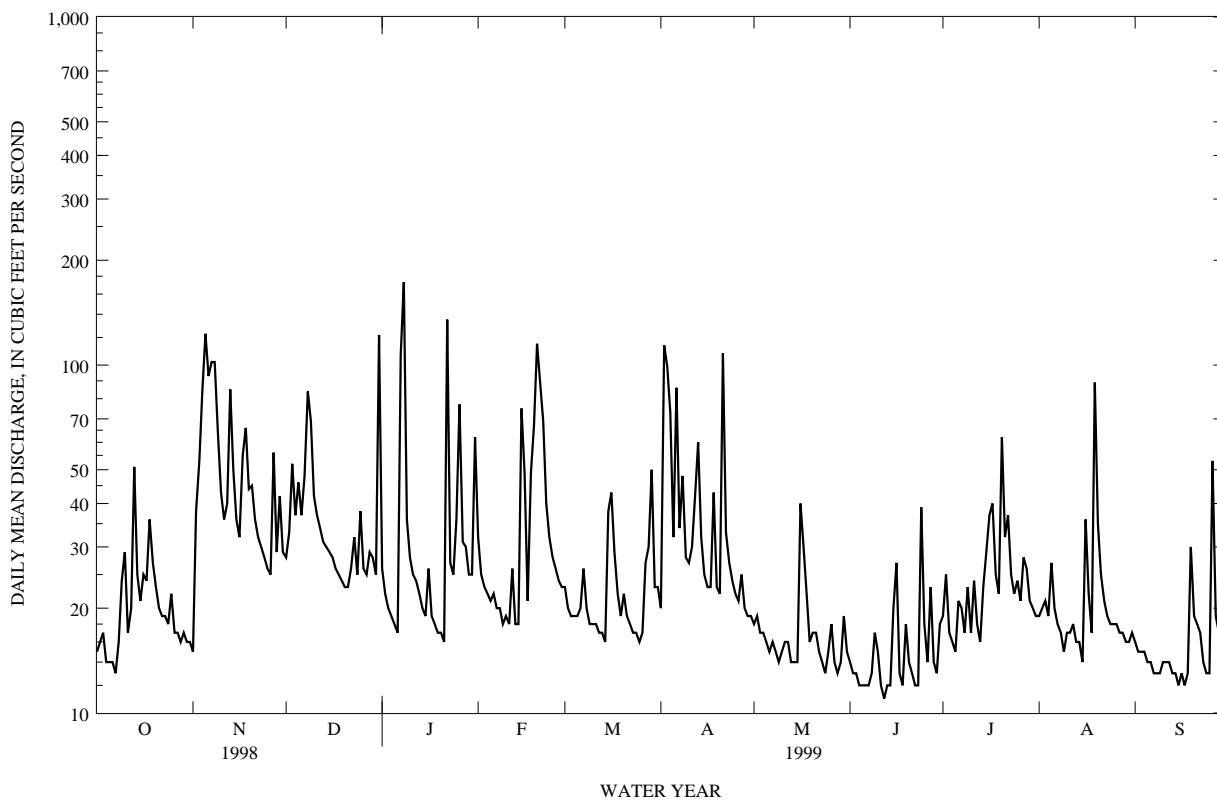
MEAN	32.4	45.1	37.7	37.2	36.5	44.2	45.3	38.4	27.2	32.4	30.1	29.4
MAX	55.1	170	101	94.9	141	176	137	102	56.5	90.5	73.7	84.7
(WY)	1992	1991	1988	1988	1969	1982	1963	1965	1978	1987	1978	1994
MIN	12.6	14.5	14.5	12.9	13.2	14.9	19.3	16.7	14.3	15.0	13.6	13.3
(WY)	1985	1963	1978	1977	1978	1998	1992	1998	1984	1984	1984	1975

e Estimated

HAWAII, ISLAND OF OAHU

16296500 KAHANA STREAM AT ALTITUDE 30 FT, NEAR KAHANA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1959 - 1999	
ANNUAL TOTAL	9411		10325			
ANNUAL MEAN	25.8		28.3		36.5	
HIGHEST ANNUAL MEAN					67.2	1982
LOWEST ANNUAL MEAN					20.1	1984
HIGHEST DAILY MEAN	443	Jan 1	173	Jan 8	1750	Apr 15 1963
LOWEST DAILY MEAN	13	Mar 23	11	Jun 12	11	Sep 16 1961
ANNUAL SEVEN-DAY MINIMUM	14	Mar 18	12	Jun 2	11	Oct 16 1984
ANNUAL RUNOFF (AC-FT)	18670		20480		26450	
10 PERCENT EXCEEDS	42		50		57	
50 PERCENT EXCEEDS	18		21		23	
90 PERCENT EXCEEDS	14		14		15	



HAWAII, ISLAND OF OAHU
16302000 PUNALUU DITCH NEAR PUNALUU

LOCATION.--Lat 21°33'41", long 157°54'10", Hydrologic Unit 20060000, on right bank 800 ft downstream from intake, 1.5 mi west of Kahana, and 1.7 mi southwest of Punaluu.

PERIOD OF RECORD.--May 1953 to current year.

REVISED RECORDS.--WSP 1719: 1954-55, WDR HI-91-1: 1990 (Maximum and minimum daily discharges).

GAGE.--Water-stage recorder. Elevation of gage is 200 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Ben Shimizu. Records good. Ditch diverts water from Punaluu Stream for irrigation in Punaluu Valley.

AVERAGE DISCHARGE.--46 years (water years 1954-99), 8.15 ft³/s (5,900 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 54 ft³/s, October 31, 1964; no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 16 ft³/s, November 7, January 11, February 23, and April 27; minimum daily, 1.5 ft³/s, December 29.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

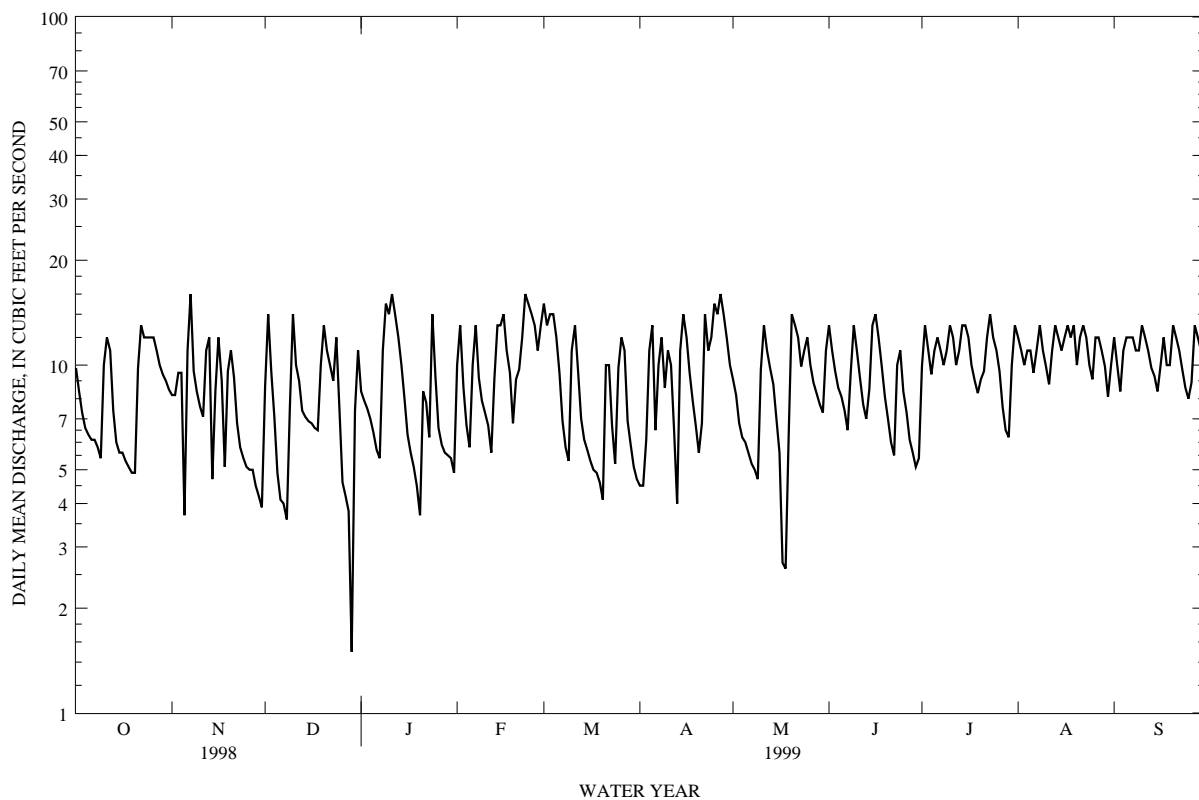
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.8	8.2	8.7	8.4	10	15	4.5	9.1	13	9.9	12	12
2	8.4	8.2	14	7.9	13	13	4.5	8.2	11	13	11	10
3	7.3	9.5	9.6	7.5	8.6	14	6.1	6.8	9.6	11	10	8.4
4	6.6	9.5	7.1	7.0	6.7	14	11	6.2	8.6	9.4	11	11
5	6.3	3.7	4.9	6.4	5.8	12	13	6.0	8.1	11	11	12
6	6.1	11	4.1	5.7	10	9.5	6.5	5.6	7.4	12	9.5	12
7	6.1	16	4.0	5.4	13	6.9	10	5.2	6.5	11	11	12
8	5.8	9.6	3.6	11	9.2	5.8	12	5.0	9.5	10	13	11
9	5.4	8.4	7.6	15	7.9	5.3	8.6	4.7	13	11	11	11
10	10	7.6	14	14	7.3	11	11	9.7	11	13	9.9	13
11	12	7.1	10	16	6.7	13	10	13	9.2	12	8.8	12
12	11	11	9.0	14	5.6	9.6	6.5	11	7.7	10	11	11
13	7.4	12	7.4	12	9.1	7.0	4.0	9.8	7.0	11	13	9.8
14	6.0	4.7	7.1	10	13	6.1	11	8.8	8.5	13	12	9.3
15	5.6	8.4	6.9	8.0	13	5.7	14	7.0	13	13	11	8.4
16	5.6	12	6.8	6.3	14	5.3	12	5.6	14	12	12	10
17	5.3	9.0	6.6	5.6	11	5.0	9.5	2.7	12	10	13	12
18	5.1	5.1	6.5	5.1	9.5	4.9	7.9	2.6	10	9.0	12	10
19	4.9	9.6	10	4.5	6.8	4.6	6.7	6.3	8.1	8.3	13	10
20	4.9	11	13	3.7	9.1	4.1	5.6	14	7.0	9.1	10	13
21	9.8	9.2	11	8.4	9.7	10	6.8	13	6.0	9.6	12	12
22	13	6.8	10	7.8	12	10	14	12	5.5	12	13	11
23	12	5.8	9.0	6.2	16	6.7	11	9.9	10	14	12	9.7
24	12	5.4	12	14	15	5.2	12	11	11	12	10	8.6
25	12	5.1	7.5	9.3	14	9.8	15	12	8.4	11	9.1	8.0
26	12	5.0	4.6	6.6	13	12	14	10	7.3	9.6	12	8.9
27	11	5.0	4.2	5.9	11	11	16	8.9	6.1	7.6	12	13
28	10	4.5	3.8	5.6	13	6.9	14	8.3	5.6	6.5	11	12
29	9.4	4.2	1.5	5.5	---	5.9	12	7.7	5.1	6.2	9.9	11
30	9.0	3.9	7.4	5.4	---	5.1	10	7.3	5.4	10	8.1	9.9
31	8.5	---	11	4.9	---	4.7	---	11	---	13	10	---
TOTAL	258.3	236.5	242.9	253.1	293.0	259.1	299.2	258.4	264.6	330.2	344.3	322.0
MEAN	8.33	7.88	7.84	8.16	10.5	8.36	9.97	8.34	8.82	10.7	11.1	10.7
MAX	13	16	14	16	16	15	16	14	14	14	13	13
MIN	4.9	3.7	1.5	3.7	5.6	4.1	4.0	2.6	5.1	6.2	8.1	8.0
AC-FT	512	469	482	502	581	514	593	513	525	655	683	639

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1953 - 1999, BY WATER YEAR (WY)

	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
MEAN	9.10	7.47	6.03	5.92	5.94	6.83	8.35	8.70	9.54	9.96	10.2	10.0																																			
MAX	26.4	15.3	16.0	17.6	21.7	16.1	19.0	21.2	22.6	22.0	23.9	21.3																																			
(WY)	1965	1988	1988	1960	1964	1964	1964	1964	1963	1963	1958	1958																																			
MIN	.002	.000	.001	.003	.011	.046	.015	.027	.020	.003	.002	.001																																			
(WY)	1981	1981	1981	1981	1981	1979	1979	1981	1979	1980	1974	1980																																			

HAWAII, ISLAND OF OAHU
 16302000 PUNALUU DITCH NEAR PUNALUU--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1953 - 1999	
ANNUAL TOTAL	3339.5	3361.6	8.15	
ANNUAL MEAN	9.15	9.21	15.2	1964
HIGHEST ANNUAL MEAN			.23	1981
LOWEST ANNUAL MEAN			54	Oct 31 1964
HIGHEST DAILY MEAN	16 Jan 2	16 Nov 7	.00	Dec 7 1963
LOWEST DAILY MEAN	1.5 Dec 29	1.5 Dec 29	.00	Jan 5 1969
ANNUAL SEVEN-DAY MINIMUM	4.7 Nov 24	4.7 Nov 24		
ANNUAL RUNOFF (AC-FT)	6620	6670	5900	
10 PERCENT EXCEEDS	12	13	17	
50 PERCENT EXCEEDS	9.3	9.6	7.0	
90 PERCENT EXCEEDS	5.6	5.1	.23	



HAWAII, ISLAND OF OAHU
16303000 PUNALUU STREAM NEAR PUNALUU

LOCATION.--Lat 21°33'33", long 157°54'06", Hydrologic Unit 20060000, on left bank at Punaluu ditch diversion dam, 1.4 mi west of Kahana, and 1.8 mi southwest of Punaluu.

DRAINAGE AREA.--2.78 mi².

PERIOD OF RECORD.--May 1953 to current year.

REVISED RECORDS.--WSP 1569: Drainage area. WRD Hawaii 1974: 1971-72(P), 1973(M). WDR HI-78-1: 1954(M), 1955-70(P).

GAGE.--Gage destroyed by flood of March 20-21, 1991 was restored and water-stage recorder installed on March 29, 1993. Masonry control and elevation of gage is 212 ft above mean sea level (from topographic map). Prior to March 29, 1993, datum 2.00 ft higher.

REMARKS.--Records computed by Roy Taogoshi. Records fair, except for estimated daily discharges, which are poor. Records do not include flow of Punaluu ditch (see station 16302000).

AVERAGE DISCHARGE.--46 years (water years 1954-99), 16.8 ft³/s (12,180 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,900 ft³/s, March 20, 1991, gage height, 10.02 ft, from rating curve extended above 170 ft³/s on basis of slope-area measurements at gage heights 7.77 ft and 9.60 ft; no flow at times.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 930 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 7	2345	*1,160	*5.75	No other peaks greater than base discharge.			

Minimum discharge, no flow on several days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.7	4.4	7.2	10	10	2.5	13	e10	2.0	3.8	1.6	1.7
2	4.0	11	2.3	9.1	4.9	3.8	e36	e10	4.2	4.5	2.7	3.4
3	6.1	15	13	8.7	8.9	2.9	e28	e11	5.4	3.6	3.9	4.9
4	6.5	23	12	8.7	11	3.2	e14	e11	6.3	4.5	2.6	2.5
5	6.7	39	21	8.9	11	4.8	e7.0	e11	6.8	2.6	4.3	.68
6	7.0	18	16	9.3	7.0	8.2	e30	e10	7.4	2.1	4.6	1.2
7	7.0	14	20	55	3.5	13	e15	e10	8.3	2.8	3.1	1.5
8	6.6	16	32	83	7.1	11	e18	e9.0	5.3	3.3	.86	2.3
9	e9.5	13	18	13	8.3	12	e14	e9.3	2.2	2.7	2.4	1.6
10	e8.0	11	7.3	9.1	8.7	5.4	e11	e4.2	4.0	.24	4.4	.17
11	e3.0	10	9.1	5.1	9.4	3.5	e13	2.6	5.2	1.3	5.2	1.1
12	e6.0	4.9	9.4	5.4	12	6.6	e19	4.1	6.6	3.4	3.1	2.4
13	e18	18	9.9	7.1	6.9	9.3	e26	5.4	7.1	2.4	1.0	3.0
14	e11	17	9.9	8.2	2.2	11	e19	6.0	5.5	.44	1.9	3.5
15	7.6	9.6	10	9.9	3.7	14	e3.0	7.9	1.4	1.9	2.9	4.5
16	8.5	4.5	9.7	13	3.7	15	e4.0	24	2.3	4.7	3.4	2.2
17	8.2	12	9.3	12	4.2	14	e6.4	20	2.2	7.4	1.2	.44
18	12	36	9.0	12	9.6	13	e12	20	4.1	5.6	1.1	3.0
19	9.2	12	4.9	13	16	13	e11	10	6.2	5.9	6.9	5.5
20	8.5	7.8	2.1	13	23	14	e24	2.9	7.1	19	5.9	.68
21	3.0	9.3	3.5	8.0	38	4.6	e43	3.5	7.7	6.7	2.4	2.6
22	.24	10	5.5	41	27	7.1	e13	3.7	8.4	5.1	1.2	3.2
23	.65	11	7.8	14	7.2	9.9	e9.0	5.2	3.8	1.6	2.4	3.2
24	1.4	11	4.2	6.1	5.9	11	e7.0	3.6	4.3	2.6	3.5	4.2
25	2.1	11	18	14	5.7	3.9	e3.0	2.8	6.2	5.3	4.5	6.4
26	.80	11	11	26	6.2	3.5	e3.0	5.0	6.8	5.3	2.4	8.2
27	2.0	15	11	16	6.6	11	e1.0	5.8	9.0	7.8	1.2	.37
28	2.7	11	34	15	4.2	13	e5.0	6.6	8.4	8.3	2.4	1.2
29	3.7	14	18	13	---	16	e6.0	7.9	8.7	8.4	3.6	1.9
30	3.8	13	9.5	13	---	13	e8.0	14	8.8	4.1	5.5	2.9
31	4.2	---	24	19	---	13	---	6.0	---	.94	3.0	---
TOTAL	180.69	412.5	378.6	498.6	271.9	286.2	421.4	262.5	171.7	138.32	95.16	80.44
MEAN	5.83	13.8	12.2	16.1	9.71	9.23	14.0	8.47	5.72	4.46	3.07	2.68
MAX	18	39	34	83	38	16	43	24	9.0	19	6.9	8.2
MIN	.24	4.4	2.1	5.1	2.2	2.5	1.0	2.6	1.4	.24	.86	.17
AC-FT	358	818	751	989	539	568	836	521	341	274	189	160

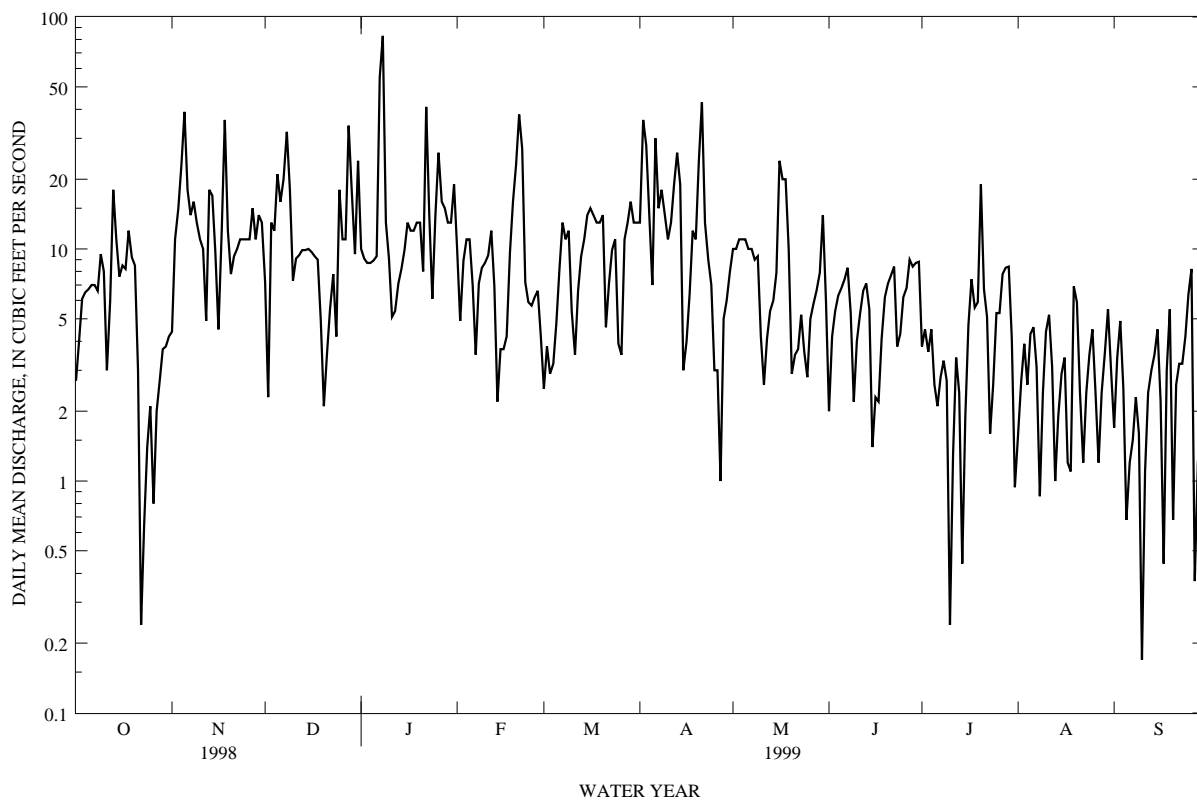
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1953 - 1999, BY WATER YEAR (WY)

MEAN	13.7	20.2	20.4	20.9	21.1	21.7	21.4	16.9	11.3	12.0	11.2	10.2
MAX	38.7	74.7	64.5	40.9	76.3	73.1	84.6	64.9	35.4	39.0	36.9	30.0
(WY)	1959	1991	1965	1988	1969	1982	1963	1965	1982	1974	1982	1994
MIN	.28	4.58	.23	3.32	.58	3.19	2.37	1.00	.000	.000	.31	.49
(WY)	1958	1960	1960	1960	1964	1993	1954	1961	1953	1953	1961	1961

e Estimated

HAWAII, ISLAND OF OAHU
16303000 PUNALUU STREAM NEAR PUNALUU--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1953 - 1999	
ANNUAL TOTAL	2948.41	3198.01		
ANNUAL MEAN	8.08	8.76	16.8	
HIGHEST ANNUAL MEAN			35.4	1982
LOWEST ANNUAL MEAN			7.27	1961
HIGHEST DAILY MEAN	188 Jan 1	83 Jan 8	1010	Apr 15 1963
LOWEST DAILY MEAN	.04 Sep 27	.17 Sep 10	.00	Jun 1 1953
ANNUAL SEVEN-DAY MINIMUM	1.4 Oct 22	1.2 Sep 5	.00	Jun 1 1953
ANNUAL RUNOFF (AC-FT)	5850	6340	12180	
10 PERCENT EXCEEDS	14	16	30	
50 PERCENT EXCEEDS	6.6	6.9	12	
90 PERCENT EXCEEDS	2.3	2.1	2.5	



HAWAII, ISLAND OF OAHU
 16303000 PUNALUU STREAM NEAR PUNALUU--Continued
 WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1970-86, 1999.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	OXYGEN, DIS-SOLVED (PER-CENT SATURATION) (00301)	OXYGEN, DIS-SOLVED (MG/L) (00300)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE (DEG C) (00010)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	
JUN 22...	1220	8.2	107	9.4	123	21.5	6.2	4.9	.7	
DATE	TIME	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	ALKA-LINITY WAT DIS-TOT IT FIELD (MG/L AS CACO3) (39086)	BICAR-BONATE WATER DIS IT FIELD (MG/L AS HCO3) (00453)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	NITRO-GEN, AMMONIA + DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)
JUN 22...	10	37	45	12	<.1	28	1.5	<.02	<.1	
DATE	TIME	NITRO-GEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L AS FE) (70300)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)
JUN 22...	.1	<.05	<.01	.041	.03	.024	90	45	3	
DATE	TIME	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (80154)	PH WATER FILTERED FIELD (STAND-ARD UNITS) (99900)					
JUN 22...		.5	.2	3	8.3					

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HAWAII, ISLAND OF OAHU
16304200 KALUANUI STREAM NEAR PUNALUU

LOCATION.--Lat 21°35'22", long 157°54'38", Hydrologic Unit 20060000, on right bank, 0.8 mi downstream from Sacred Falls, 1.6 mi west of Punaluu Beach Park, and 1.7 mi south of cemetery in Hauula.

DRAINAGE AREA.--1.11 mi².

PERIOD OF RECORD.--May 1967 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 110 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Roy Taogoshi. Records good except for discharges greater than 50 ft³/s which are fair and for estimated periods which are poor. No diversion upstream of station.

AVERAGE DISCHARGE.--32 years (water years 1968-99), 4.32 ft³/s (3,130 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,390 ft³/s, January 6, 1982, gage height, 11.90 ft, from rating curve extended above 14 ft³/s on basis of slope-area measurements at gage heights 8.85 ft and 10.0 ft; no flow at times.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 500 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 22	1345	*279	*7.54				
Minimum discharge, 0.14 ft ³ /s, September 15, 16.							

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.58	.53	3.7	1.3	5.5	e2.0	e2.0	.73	1.5	1.6	1.2	.91
2	2.9	11	4.0	.87	1.8	e1.5	e20	.53	.86	4.5	1.1	.91
3	3.2	7.0	11	.68	1.3	e1.3	e10	.45	.64	1.1	.95	1.1
4	.83	12	6.5	.56	1.2	e1.2	e8.5	.44	.49	.94	.89	.68
5	.71	11	9.1	.48	1.0	e1.0	e5.0	.37	.41	.91	6.8	.47
6	.81	4.7	5.6	.44	4.0	e1.4	e11	.30	.44	4.6	1.6	.37
7	1.0	2.9	15	32	1.8	e5.0	e4.0	.27	.53	2.3	.98	.32
8	3.5	4.2	9.2	21	3.5	e2.5	e5.0	.32	2.0	1.5	.81	.32
9	9.9	3.8	4.6	2.2	e1.7	e3.0	e3.5	.24	8.7	4.6	.66	.35
10	9.1	1.6	2.9	1.2	e1.5	e1.4	e2.4	.18	2.8	1.7	2.2	.31
11	1.8	1.1	2.1	.82	e1.4	e1.2	e3.0	2.1	.84	5.6	2.6	.36
12	1.2	.92	2.2	.63	e5.0	e1.1	e3.5	.93	.55	1.4	2.3	.33
13	8.3	14	2.6	.50	e2.0	e1.0	e4.5	.90	.42	1.7	1.5	.22
14	2.3	5.3	2.2	.43	e1.4	e.90	e2.5	.56	.34	4.6	1.8	.17
15	1.7	2.1	2.4	.43	e5.0	e8.0	1.3	.36	4.3	6.6	1.5	.15
16	2.4	1.7	3.7	1.0	e4.0	e10	1.1	11	6.4	7.2	12	.15
17	2.6	6.9	1.2	.50	e3.0	e3.0	1.0	6.6	1.1	7.3	2.7	.18
18	5.3	15	1.0	.33	e6.0	e2.0	7.2	3.4	1.2	3.5	1.4	1.2
19	1.6	5.9	.88	.30	e8.0	e1.3	1.8	.75	2.4	2.6	11	3.0
20	1.5	4.1	.77	.26	e10	e1.8	9.8	3.4	1.4	17	4.0	2.8
21	1.1	3.7	.82	.26	e15	e1.2	19	1.4	.94	3.1	1.3	.78
22	.89	1.7	1.4	21	e10	e1.8	2.7	.64	.83	9.1	1.0	3.4
23	.75	1.5	2.5	2.0	e5.0	e2.0	1.5	.45	1.6	2.5	.90	.46
24	.62	1.2	1.2	2.2	e3.0	e1.5	1.2	.36	11	1.9	.83	.25
25	3.4	1.3	8.5	8.3	e2.2	e1.0	.99	.30	3.8	5.2	.77	.19
26	.79	2.2	1.1	13	e1.9	e1.6	.98	3.1	1.1	2.3	1.9	1.5
27	.93	17	1.0	3.0	e1.7	e5.0	1.2	.75	3.0	6.1	.85	1.1
28	1.4	1.8	14	3.6	e1.6	e3.0	.84	.48	1.1	4.1	.88	1.9
29	1.2	4.7	3.8	1.9	---	e5.0	.63	1.5	.91	2.4	1.0	.55
30	.67	4.3	1.3	1.5	---	e3.2	.65	11	2.5	1.7	.63	.28
31	.85	---	7.8	9.4	---	e2.5	---	3.3	---	1.5	2.7	---
TOTAL	73.83	155.15	134.07	132.09	109.5	78.40	136.79	57.11	64.10	121.15	70.75	24.71
MEAN	2.38	5.17	4.32	4.26	3.91	2.53	4.56	1.84	2.14	3.91	2.28	.82
MAX	9.9	17	15	32	15	10	20	11	11	17	12	3.4
MIN	.58	.53	.77	.26	1.0	.90	.63	.18	.34	.91	.63	.15
AC-FT	146	308	266	262	217	156	271	113	127	240	140	49

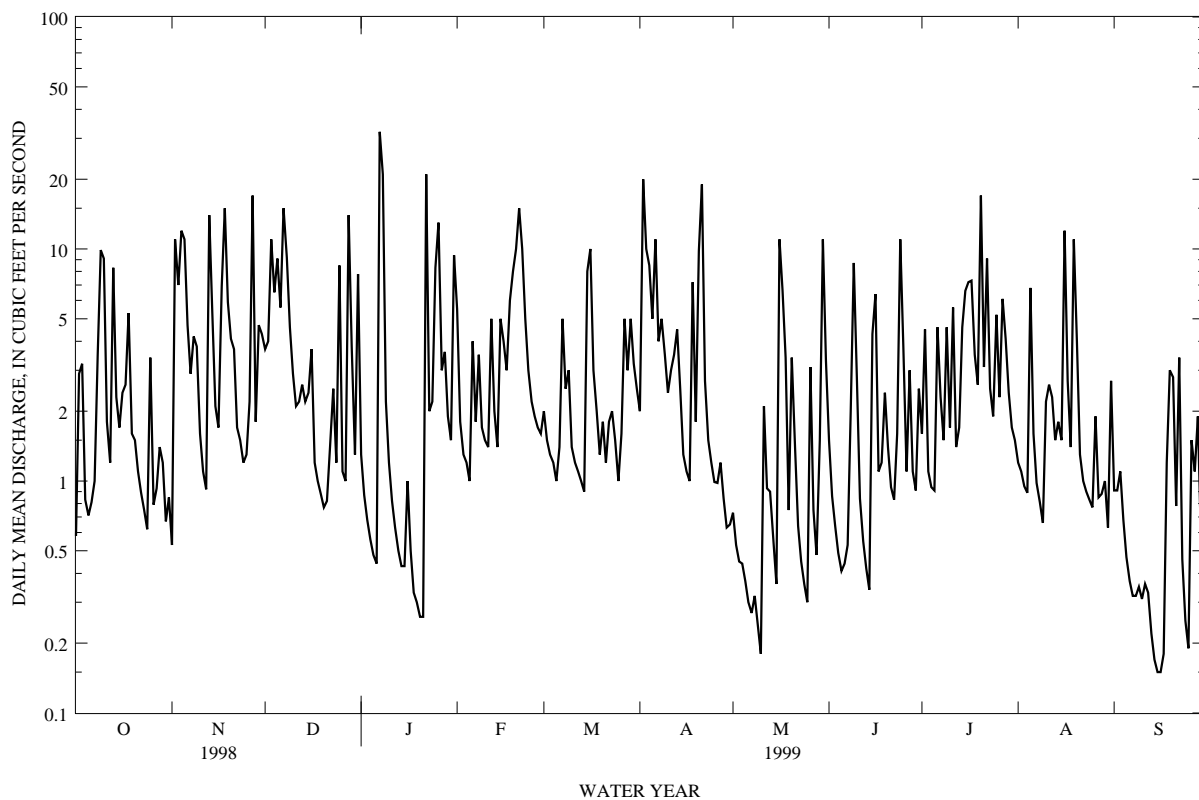
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1967 - 1999, BY WATER YEAR (WY)

MEAN	3.33	5.98	4.98	5.30	4.52	5.50	5.74	3.73	2.82	4.03	3.20	2.98
MAX	7.68	19.0	17.7	17.9	19.7	32.2	19.3	7.93	7.72	11.7	8.37	9.34
(WY)	1992	1991	1988	1988	1979	1982	1989	1988	1987	1982	1991	1994
MIN	.27	1.66	.48	.26	.41	.14	.87	.85	.61	.21	.53	.22
(WY)	1985	1981	1977	1986	1983	1983	1979	1991	1981	1971	1984	1975

e Estimated

HAWAII, ISLAND OF OAHU
 16304200 KALUANUI STREAM NEAR PUNALUU--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1967 - 1999
ANNUAL TOTAL	1001.08	1157.65	
ANNUAL MEAN	2.74	3.17	4.32
HIGHEST ANNUAL MEAN			9.94 1982
LOWEST ANNUAL MEAN			2.04 1984
HIGHEST DAILY MEAN	80 Jan 1	32 Jan 7	230 Feb 1 1969
LOWEST DAILY MEAN	.00 Mar 15	.15 Sep 15	.00 Jul 24 1971
ANNUAL SEVEN-DAY MINIMUM	.00 Mar 15	.22 Sep 11	.00 Sep 14 1975
ANNUAL RUNOFF (AC-FT)	1990	2300	3130
10 PERCENT EXCEEDS	7.0	8.5	9.4
50 PERCENT EXCEEDS	1.3	1.6	1.4
90 PERCENT EXCEEDS	.14	.45	.26



HAWAII, ISLAND OF OAHU
 16304200 KALUANUI STREAM NEAR PUNALUU--Continued
 WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1970-81, 1983-86, 1999.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	OXYGEN, DIS-SOLVED (PER-CENT SATURATION) (00301)	OXYGEN, DIS-SOLVED (MG/L) (00300)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE (DEG C) (00010)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNESIUM, DIS-SOLVED (MG/L AS MG) (00925)	POTASSIUM, DIS-SOLVED (MG/L AS K) (00935)	
AUG 12...	1100	3.3	75	6.5	54	22.5	.94	1.4	.4	
DATE	TIME	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	ALKALINITY, WATER DIS-SOLVED (MG/L AS CACO3) (39086)	BICARBONATE, WATER DIS-SOLVED (MG/L AS HCO3) (00453)	CHLORIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUORIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SULFATE, DIS-SOLVED (MG/L AS SO4) (00945)	NITROGEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC DIS-SOLVED (MG/L AS N) (00623)
AUG 12...	6.6	4	5	11	<.1	4.0	1.3	<.02	<.1	
DATE	TIME	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITROGEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	PHOSPHORUS, DIS-SOLVED (MG/L AS P) (00666)	PHOSPHORUS, ORTHO, DIS-SOLVED (MG/L AS P) (00671)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGANESE, DIS-SOLVED (UG/L AS MN) (01056)
AUG 12...		.2	<.05	<.01	.004	<.01	.007	35	130	<3
DATE	TIME	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C) (00689)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C) (00689)	SEDIMENT, SUSPENDED (MG/L) (80154)	PH WATER FILTERED FIELD (STANDARD UNITS) (99900)				
AUG 12...			3.9	.2	4	7.5				

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HAWAII, ISLAND OF OAHU

16325000 KAMANANUI STREAM AT PUPUKEA MILITARY ROAD, NEAR MAUNAWAI

LOCATION.--Lat 21°37'25", long 158°01'04", Hydrologic Unit 20060000, on left bank 75 ft upstream from Pupukea Military Road, and 3.5 mi southeast of Maunawai.

DRAINAGE AREA.--3.13 mi².

PERIOD OF RECORD.--June 1963 to current year. Occasional low-flow measurements, water years 1961 and 1963.

REVISED RECORDS.--WDR HI-94-1: 1992-93 (M).

GAGE.--Water-stage recorder and combination pipe culvert and paved road control. Elevation of gage is 590 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Roy Taogoshi. Records fair for discharges up to 30 ft³/s and poor for discharges greater than 30 ft³/s. No diversion upstream of station. Recording rain gage located at station.

AVERAGE DISCHARGE.--36 years (water years 1964-99), 10.1 ft³/s (7,310 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,810 ft³/s, revised, November 20, 1990, gage height, 11.34 ft, from rating curve extended above 42 ft³/s on basis of slope-area measurements at gage heights 10.06 ft, and 11.34 ft; no flow at times.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 950 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 8	0145	*342	*5.58				

Minimum discharge, 0.41 ft³/s, June 14.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.87	.61	15	7.2	13	2.5	6.4	2.3	1.4	2.6	2.1	2.5
2	.53	.76	5.0	4.3	6.0	2.3	3.9	2.1	1.2	5.4	1.7	1.3
3	5.4	11	29	3.4	4.4	2.2	3.4	1.9	.81	2.4	1.5	.97
4	2.2	2.9	21	3.1	3.9	2.1	14	1.7	.67	1.0	1.4	.91
5	.87	4.9	21	2.8	3.7	2.0	4.7	1.7	.58	.65	6.2	.95
6	.55	1.8	8.8	2.6	7.2	2.0	23	1.6	.58	.93	4.4	.74
7	.47	1.4	20	22	4.9	2.2	6.6	1.6	.69	2.8	2.3	.64
8	.53	5.9	32	59	5.5	2.0	5.7	1.6	.90	1.5	1.6	.59
9	1.4	2.2	11	15	3.8	2.0	6.1	1.4	1.5	8.6	1.4	.61
10	14	1.2	7.1	6.7	3.1	2.4	24	1.4	3.3	4.0	1.2	1.1
11	3.4	.94	5.7	4.7	3.0	3.7	8.6	1.7	1.6	4.6	1.5	.98
12	1.5	.68	5.1	3.9	17	2.9	8.0	1.8	.73	3.0	3.5	.80
13	12	18	5.2	3.4	4.4	4.6	7.5	1.7	.52	1.5	3.7	.83
14	5.1	21	5.8	3.3	3.1	3.9	4.8	1.3	.43	1.9	2.6	.78
15	2.7	9.1	4.5	3.1	2.8	19	3.7	1.2	.49	4.2	1.8	.72
16	1.7	3.5	5.8	12	2.6	27	3.2	4.1	11	10	12	.78
17	2.5	26	4.0	5.1	2.5	11	3.1	21	2.9	7.0	6.3	.72
18	4.5	33	3.4	3.2	2.3	5.6	20	3.4	1.2	4.4	2.9	.72
19	4.3	12	3.1	2.7	2.4	3.8	6.8	2.2	.77	2.4	1.8	.60
20	1.5	6.4	2.9	2.5	6.6	8.2	3.8	1.7	1.1	21	4.0	.60
21	.84	5.6	3.1	2.4	8.4	4.7	30	1.8	1.0	6.0	1.8	1.8
22	.63	4.1	2.8	14	46	2.8	5.2	1.6	.72	7.2	1.3	1.6
23	.53	2.7	4.4	8.4	11	2.2	3.7	1.2	.76	5.7	1.1	1.3
24	.48	2.1	3.3	7.2	4.8	2.0	3.2	.96	15	3.3	1.1	1.1
25	.75	1.8	9.8	6.4	3.5	1.7	3.0	.97	8.6	3.1	1.3	.72
26	2.5	1.7	4.5	41	3.0	2.0	3.0	2.7	2.6	3.8	1.3	.60
27	.82	34	3.1	9.4	2.7	15	3.1	2.7	1.6	3.5	1.2	.60
28	.60	8.1	29	5.7	2.5	7.6	2.7	1.4	2.1	7.9	1.1	.60
29	.63	6.3	19	4.7	---	13	2.3	1.1	1.1	5.8	1.2	.72
30	1.1	9.8	4.8	4.0	---	6.5	2.2	1.4	.77	3.6	1.6	.72
31	.83	---	23	20	---	6.4	---	2.3	---	2.7	2.5	---
TOTAL	75.73	239.49	322.2	293.2	184.1	175.3	225.7	75.53	66.62	142.48	79.4	27.60
MEAN	2.44	7.98	10.4	9.46	6.58	5.65	7.52	2.44	2.22	4.60	2.56	.92
MAX	14	34	32	59	46	27	30	21	15	21	12	2.5
MIN	.47	.61	2.8	2.4	2.3	1.7	2.2	.96	.43	.65	1.1	.59
AC-FT	150	475	639	582	365	348	448	150	132	283	157	55

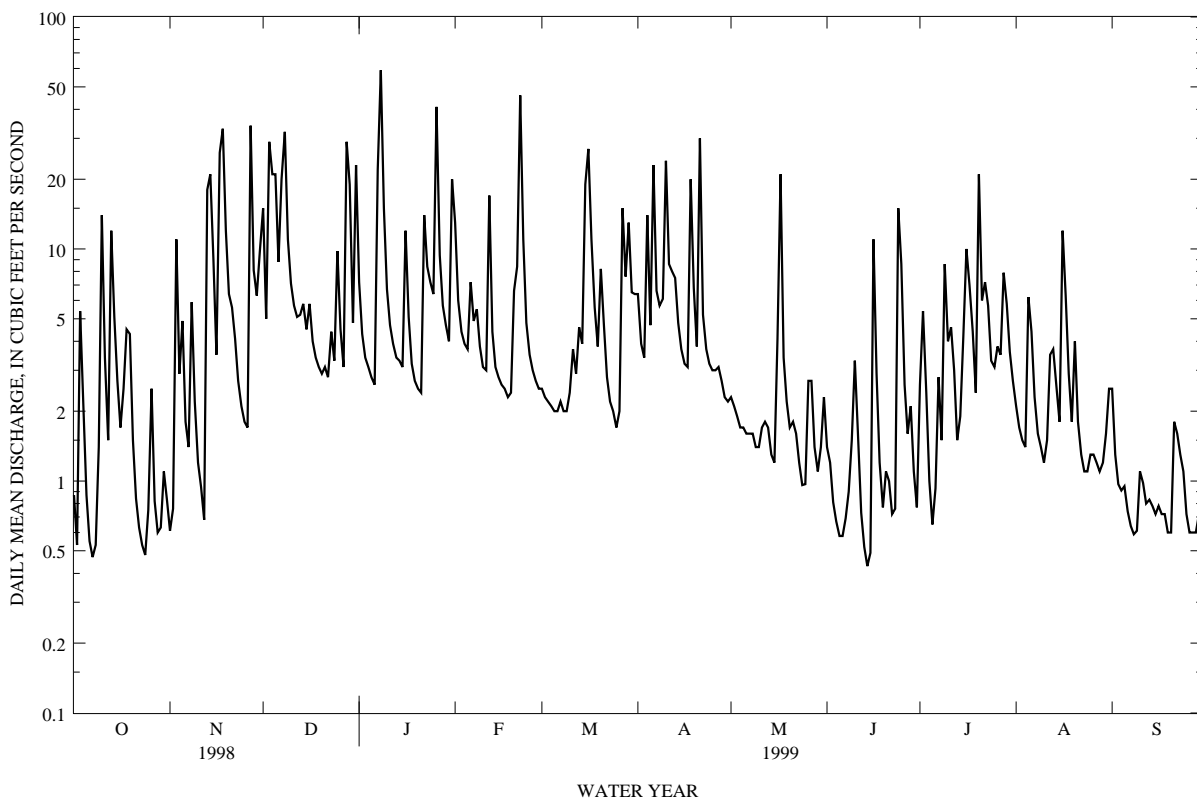
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1963 - 1999, BY WATER YEAR (WY)

MEAN	6.53	15.7	12.5	14.7	12.1	15.2	13.9	8.12	5.10	7.98	5.33	3.96
MAX	16.3	68.6	44.8	75.8	64.2	77.3	53.6	30.5	20.1	20.2	19.7	10.8
(WY)	1966	1966	1965	1988	1969	1968	1989	1965	1978	1982	1982	1994
MIN	.000	2.27	.91	.45	.073	1.07	.79	.95	1.00	.76	.57	.000
(WY)	1985	1990	1977	1986	1978	1983	1992	1966	1992	1971	1984	1984

HAWAII, ISLAND OF OAHU

16325000 KAMANANUI STREAM AT PUPUKEA MILITARY ROAD, NEAR MAUNAWAI--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1963 - 1999	
ANNUAL TOTAL	1799.39	1907.35		
ANNUAL MEAN	4.93	5.23	10.1	
HIGHEST ANNUAL MEAN			22.1	1982
LOWEST ANNUAL MEAN			4.09	1984
HIGHEST DAILY MEAN	58 Jun 24	59 Jan 8	620	Nov 20 1990
LOWEST DAILY MEAN	.31 Apr 19	.43 Jun 14	.00	Aug 27 1971
ANNUAL SEVEN-DAY MINIMUM	.40 Mar 16	.70 Sep 14	.00	Oct 15 1971
ANNUAL RUNOFF (AC-FT)	3570	3780	7310	
10 PERCENT EXCEEDS	12	12	19	
50 PERCENT EXCEEDS	2.3	2.8	3.3	
90 PERCENT EXCEEDS	.56	.75	.67	



HAWAII, ISLAND OF OAHU
16330000 KAMANANUI STREAM AT MAUNAWAI

LOCATION.--Lat 21°38'20", long 158°03'27", Hydrologic Unit 20060000, on right bank, 0.5 mi upstream from Kamehameha Highway, 4.9 mi northeast of Waialua School, and 7.3 mi southwest of Kahuku School.

DRAINAGE AREA.--12.36 mi², revised, including that of Elehaha Stream which is mostly diverted into Kamananui Stream since June 14, 1975.

PERIOD OF RECORD.--February 1958 to current year.

REVISED RECORDS.--WSP 1937: 1958-60. WRD Hawaii 1974: 1971(P), 1972-73(M). WDR HI-81-1: Drainage area.

GAGE.--Gage destroyed by flood of November 20, 1990 was restored and water-stage recorder installed on February 25, 1993. Control rebuilt about 75 ft downstream of gage. Elevation of gage is 20 ft above mean sea level (from topographic map). Prior to May 18, 1966, datum 2.00 ft higher.

REMARKS.--Records computed by J.R. Mullen. Records fair except for discharges above 50 ft³/s which are poor. Small diversion upstream of station.

AVERAGE DISCHARGE.--25 years (water years 1975-99), 19.4 ft³/s (14,040 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 16,800 ft³/s, November 20, 1990, gage height, 15.84 ft, from rating curve extended above 150 ft³/s on basis of slope-area measurements at gage heights 5.68 ft, 11.46 ft, and 15.84 ft; no flow at times.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,300 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 8	0245	*1,120	*5.41				

Minimum daily discharge, 0.02 ft³/s, September 30.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e.71	.37	26	19	29	2.9	12	2.3	1.9	1.1	3.1	2.5
2	e.54	.24	9.9	7.5	12	2.7	7.2	2.2	1.2	6.8	2.5	1.9
3	2.2	12	58	5.2	7.2	2.5	4.6	1.8	.94	5.6	1.9	.88
4	3.1	5.5	61	4.2	5.7	2.0	27	1.4	.61	2.1	1.3	.60
5	1.4	6.9	55	3.6	4.9	1.8	10	1.2	.43	1.0	3.9	.42
6	.66	3.0	23	3.0	6.1	1.7	36	1.1	.30	.82	9.5	.33
7	.38	1.4	20	24	8.3	1.7	16	.98	.24	1.5	4.0	.21
8	.16	5.0	84	171	5.7	1.7	8.2	.98	.30	3.0	2.5	.11
9	.09	4.2	27	37	5.4	1.7	9.7	.96	.39	11	1.6	.09
10	11	1.6	12	13	3.9	1.7	35	.86	1.6	10	1.1	.08
11	6.1	.96	8.3	7.9	3.4	2.6	19	.80	2.6	5.4	.98	.26
12	2.1	.62	6.7	5.8	21	3.5	13	.92	.96	7.8	1.6	.34
13	8.8	26	6.0	4.5	8.3	3.1	12	.98	.49	3.4	6.5	.20
14	9.5	62	5.7	4.0	4.5	6.8	9.0	.94	.22	2.5	4.3	.21
15	3.6	17	5.4	3.7	3.6	23	5.9	.78	.11	4.8	3.1	.12
16	2.0	6.9	5.8	19	3.1	49	4.1	1.6	11	21	13	.10
17	1.2	49	6.4	11	2.5	21	3.3	46	7.5	12	15	.07
18	1.5	82	4.2	4.7	2.5	13	19	6.9	2.3	10	5.6	.05
19	6.3	31	3.2	3.6	2.5	6.9	18	2.8	1.1	4.3	3.0	.05
20	2.2	14	2.7	3.1	2.7	8.7	6.3	2.0	.71	38	5.5	.05
21	.95	6.8	2.5	2.7	13	10	66	1.5	.79	15	3.7	.05
22	.55	6.4	2.4	23	85	5.0	9.8	1.4	.72	8.9	2.0	.48
23	.35	4.1	2.5	20	32	3.3	5.8	1.1	.54	13	1.2	.40
24	.17	2.9	3.7	7.4	10	2.7	4.2	.78	19	5.5	.90	.27
25	.08	2.2	8.8	11	6.0	2.3	3.2	.67	20	3.8	.80	.17
26	.77	1.7	8.6	94	4.2	1.9	3.2	.60	5.2	4.7	.98	.06
27	.98	66	4.1	23	3.4	15	3.0	3.3	2.2	3.7	1.0	.03
28	.48	25	97	11	3.0	14	2.9	2.2	1.7	11	.85	.03
29	.30	7.7	58	7.8	---	17	2.4	1.1	1.5	13	.73	.03
30	.17	12	8.4	5.8	---	16	2.3	.80	.88	6.2	.63	.03
31	.40	---	38	25	---	8.3	---	1.4	---	4.2	.80	---
TOTAL	68.74	464.49	664.3	585.5	298.9	253.5	378.1	92.35	87.43	241.12	103.57	10.12
MEAN	2.22	15.5	21.4	18.9	10.7	8.18	12.6	2.98	2.91	7.78	3.34	.34
MAX	11	82	97	171	85	49	66	46	20	38	15	2.5
MIN	.08	.24	2.4	2.7	2.5	1.7	2.3	.60	.11	.82	.63	.03
AC-FT	136	921	1320	1160	593	503	750	183	173	478	205	20

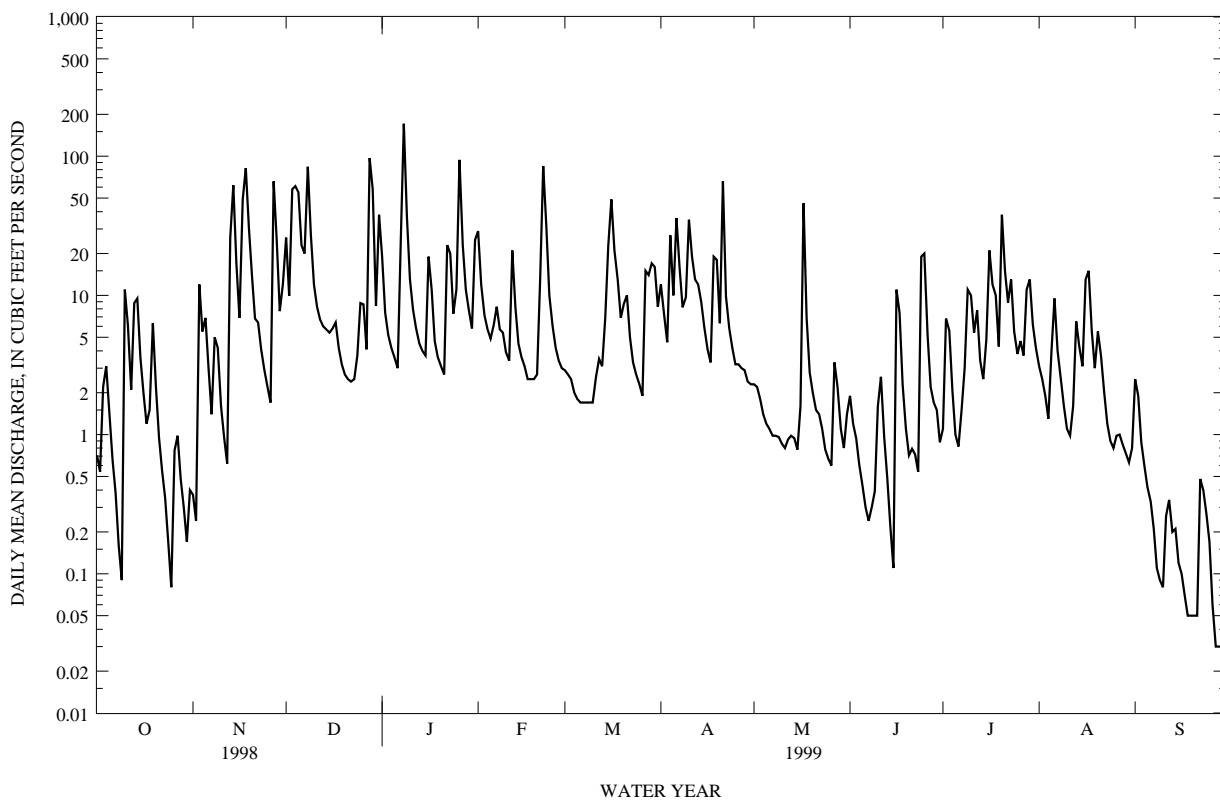
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1975 - 1999, BY WATER YEAR (WY)

MEAN	11.7	33.0	21.0	31.9	21.3	33.4	26.0	14.8	9.32	13.5	9.74	6.75
MAX	54.1	168	107	143	96.9	155	168	58.3	52.9	52.7	46.2	19.9
(WY)	1992	1991	1988	1988	1979	1982	1989	1988	1978	1989	1995	1994
MIN	.006	2.60	.67	.094	.022	.85	.64	.95	.68	.98	.58	.006
(WY)	1985	1990	1977	1986	1978	1998	1992	1984	1984	1984	1984	1984

e Estimated

HAWAII, ISLAND OF OAHU
 16330000 KAMANANUI STREAM AT MAUNAWAI--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1975 - 1999	
ANNUAL TOTAL	2785.05		3248.12			
ANNUAL MEAN	7.63		8.90		19.4	
HIGHEST ANNUAL MEAN					50.3	1982
LOWEST ANNUAL MEAN					4.81	1984
HIGHEST DAILY MEAN	109	Jan 1	171	Jan 8	1940	Jan 1 1988
LOWEST DAILY MEAN	.03	Mar 21	.03	Sep 27	.00	Sep 15 1975
ANNUAL SEVEN-DAY MINIMUM	.04	Mar 17	.07	Sep 15	.00	Sep 15 1975
ANNUAL RUNOFF (AC-FT)	5520		6440		14040	
10 PERCENT EXCEEDS	18		21		31	
50 PERCENT EXCEEDS	2.4		3.3		4.1	
90 PERCENT EXCEEDS	.17		.36		.30	



HAWAII, ISLAND OF OAHU
16345000 OPAEULA STREAM NEAR WAHIAWA

LOCATION.--Lat 21°33'55", long 158°00'10", Hydrologic Unit 20060000, on left bank, 4.3 mi northeast of Leilehua High School in Wahiawa, and 8.1 mi east of Waiialua School.

DRAINAGE AREA.--2.98 mi².

PERIOD OF RECORD.--August 1959 to current year.

REVISED RECORDS.--WSP 1937: 1960.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 1,120 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Alex Okihara. Records good. No diversion upstream of station.

AVERAGE DISCHARGE.--40 years (water years 1960-99), 13.6 ft³/s (9,860 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,540 ft³/s, July 17, 1974, gage height, 11.94 ft from rating curve extended above 110 ft³/s on basis of slope-area measurements at gage heights 6.74 ft and 10.12 ft; maximum gage height, 13.20 ft, November 20, 1990; no flow at times.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,200 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 22	1600	*652	*5.52				

Minimum discharge, 0.59 ft³/s, September 17-18.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

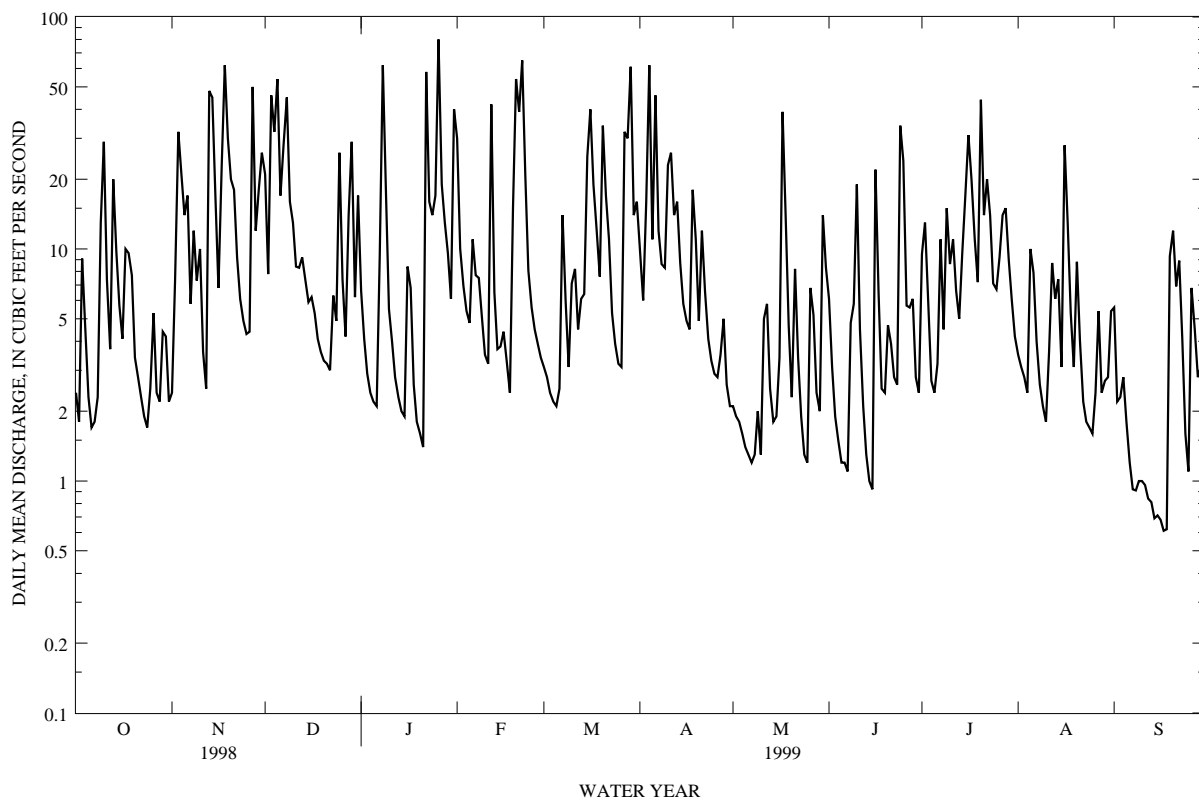
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.4	2.4	21	6.6	30	3.1	10	2.1	6.1	9.5	3.5	5.6
2	1.8	7.3	7.8	4.1	10	2.8	6.0	1.9	3.1	13	3.1	2.2
3	9.1	32	46	2.9	6.9	2.4	16	1.8	1.9	5.8	2.8	2.3
4	4.6	21	32	2.4	5.4	2.2	62	1.6	1.5	2.7	2.4	2.8
5	2.3	14	54	2.2	4.8	2.1	11	1.4	1.2	2.4	10	1.8
6	1.7	17	17	2.1	11	2.5	46	1.3	1.2	3.2	7.9	1.2
7	1.8	5.8	28	9.3	7.7	14	12	1.2	1.1	11	4.0	.92
8	2.3	12	45	62	7.5	6.0	8.6	1.3	4.8	4.5	2.6	.91
9	13	7.3	16	18	5.1	3.1	8.3	2.0	5.8	15	2.1	1.0
10	29	10	13	5.5	3.5	7.1	23	1.3	19	8.6	1.8	1.0
11	7.4	3.6	8.4	4.0	3.2	8.2	26	5.0	4.5	11	3.6	.96
12	3.7	2.5	8.3	2.8	42	4.5	14	5.8	2.1	6.6	8.7	.84
13	20	48	9.2	2.3	6.5	6.1	16	2.5	1.3	5.0	6.1	.81
14	9.8	45	7.4	2.0	3.7	6.4	8.7	1.8	1.0	9.6	7.4	.69
15	5.7	17	5.9	1.9	3.8	25	5.8	1.9	.92	17	3.1	.71
16	4.1	6.8	6.2	8.4	4.4	40	4.9	3.4	22	31	28	.68
17	10	23	5.3	6.8	3.3	19	4.5	39	6.5	20	13	.61
18	9.6	62	4.1	2.6	2.4	12	18	14	2.5	11	5.3	.62
19	7.7	30	3.6	1.8	15	7.6	11	4.7	2.4	7.2	3.1	9.3
20	3.4	20	3.3	1.6	54	34	4.9	2.3	4.7	44	8.8	12
21	2.8	18	3.2	1.4	39	17	12	8.2	3.9	14	4.0	6.9
22	2.3	9.2	3.0	58	65	11	6.6	3.4	2.8	20	2.2	8.9
23	1.9	6.1	6.3	16	21	5.3	4.1	1.9	2.6	14	1.8	4.1
24	1.7	4.9	4.9	14	8.1	3.9	3.3	1.3	34	7.1	1.7	1.6
25	2.5	4.3	26	17	5.6	3.2	2.9	1.2	24	6.7	1.6	1.1
26	5.3	4.4	7.4	80	4.5	3.1	2.8	6.8	5.7	9.2	2.4	6.8
27	2.4	50	4.2	19	3.9	32	3.5	5.2	5.6	14	5.4	4.5
28	2.2	12	14	13	3.4	30	5.0	2.4	6.1	15	2.4	2.8
29	4.4	18	29	9.6	---	61	2.6	2.0	2.8	9.0	2.7	3.1
30	4.2	26	6.2	6.1	---	14	2.1	14	2.4	6.0	2.8	1.7
31	2.2	---	17	40	---	16	---	8.3	---	4.2	5.4	---
TOTAL	181.3	539.6	462.7	423.4	380.7	404.6	361.6	151.0	183.52	357.3	159.7	88.45
MEAN	5.85	18.0	14.9	13.7	13.6	13.1	12.1	4.87	6.12	11.5	5.15	2.95
MAX	29	62	54	80	65	61	62	39	34	44	28	12
MIN	1.7	2.4	3.0	1.4	2.4	2.1	2.1	1.2	.92	2.4	1.6	.61
AC-FT	360	1070	918	840	755	803	717	300	364	709	317	175

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1959 - 1999, BY WATER YEAR (WY)

MEAN	10.9	18.7	15.6	16.1	13.6	20.5	20.6	12.1	7.60	11.8	8.47	7.52
MAX	30.7	71.9	52.6	54.1	66.9	90.0	75.7	43.7	24.9	29.3	31.0	24.9
(WY)	1982	1991	1988	1988	1969	1982	1989	1965	1978	1989	1982	1994
MIN	.057	2.90	1.29	.37	.32	.35	1.57	1.75	2.02	.95	1.51	.52
(WY)	1985	1963	1977	1977	1978	1983	1966	1966	1975	1971	1984	1975

HAWAII, ISLAND OF OAHU
 16345000 OPAEULA STREAM NEAR WAHIAWA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1959 - 1999	
ANNUAL TOTAL	2801.24	3693.87		
ANNUAL MEAN	7.67	10.1	13.6	
HIGHEST ANNUAL MEAN			29.7	1982
LOWEST ANNUAL MEAN			7.12	1998
HIGHEST DAILY MEAN	83 Jan 1	80 Jan 26	825	Feb 1 1969
LOWEST DAILY MEAN	.16 Mar 21	.61 Sep 17	.00	Jan 24 1977
ANNUAL SEVEN-DAY MINIMUM	.19 Mar 17	.71 Sep 12	.00	Oct 24 1984
ANNUAL RUNOFF (AC-FT)	5560	7330	9860	
10 PERCENT EXCEEDS	20	26	28	
50 PERCENT EXCEEDS	4.0	5.5	4.6	
90 PERCENT EXCEEDS	.84	1.7	.94	



Surface-Water Station Records
for Molokai

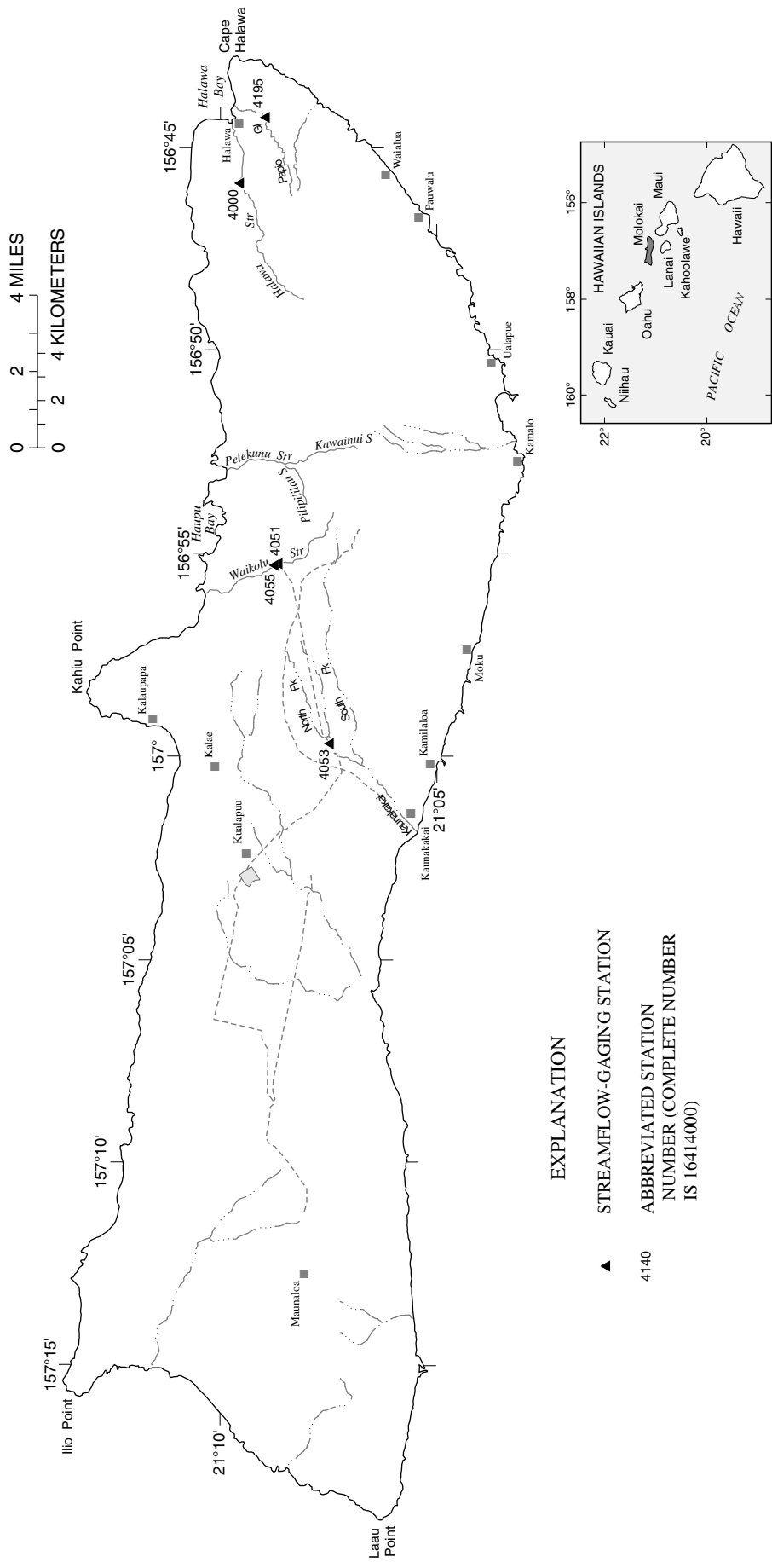


Figure 7. Locations of gaging, water-quality, and partial-record stations on Molokai.

HAWAII, ISLAND OF MOLOKAI
16400000 HALAWA STREAM NEAR HALAWA

LOCATION.--Lat 21°09'31 " , long 156°45'53 " , Hydrologic Unit 20050000, on right bank 600 ft downstream from Hipuapua Stream, and 1.5 mi west of Halawa.

DRAINAGE AREA.--4.62 mi².

PERIOD OF RECORD.--July 1917 to July 1932, November 1937 to current year.

REVISED RECORDS.--WSP 1319: 1928, 1929(M), 1930-31, 1938-50(M), drainage area. WSP 1719: 1954.

GAGE.--Water-stage recorder. Elevation of gage is 210 ft above mean sea level (from topographic map). Prior to June 25, 1923, at site 350 ft upstream of gage at different datum. June 25, 1923 to July 18, 1932, and November 17, 1937 to February 3, 1965, at present site at datum 2.00 ft higher.

REMARKS.--Records computed by Roy Taogoshi. Records fair. No diversion upstream.

AVERAGE DISCHARGE.--75 years (water years 1918-31, 1939-99), 29.7 ft³/s (21,510 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 26,900 ft³/s, February 4, 1965, gage height, 19.91 ft, from floodmarks, from rating curve extended above 163 ft³/s on basis of slope-area measurement of peak flow; minimum, 0.76 ft³/s, about November 23, 1962.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,900 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Dec. 28	2215	*1,670	*8.04				

Minimum discharge, 3.4 ft³/s, September 29.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.0	9.4	28	38	27	6.8	9.7	9.1	4.5	6.8	7.6	11
2	54	47	22	15	31	6.3	7.7	5.2	5.0	8.1	6.5	6.6
3	27	100	74	11	20	5.9	36	4.8	4.7	5.6	8.1	22
4	11	130	40	9.2	39	6.1	14	4.5	4.2	4.5	8.0	8.8
5	27	123	29	8.3	18	5.8	9.7	6.3	4.4	4.3	38	5.6
6	14	32	15	7.7	25	27	110	5.1	3.6	26	11	5.0
7	9.6	18	40	7.2	12	29	13	15	10	12	59	4.5
8	63	24	91	55	11	9.0	17	5.8	18	7.3	24	4.5
9	46	51	52	65	9.1	13	11	4.4	61	14	11	5.0
10	48	21	29	11	8.5	21	24	4.3	19	26	25	5.6
11	14	20	18	8.6	11	19	65	4.2	6.8	19	52	14
12	93	17	37	7.7	51	16	39	10	4.9	7.8	24	6.1
13	44	12	35	7.0	9.4	55	23	4.7	4.4	40	95	6.0
14	36	45	16	6.9	9.3	16	14	12	3.7	17	53	8.8
15	18	59	17	6.4	22	89	53	32	8.0	14	25	5.1
16	47	23	71	6.0	13	58	11	15	16	22	47	26
17	28	61	13	6.1	7.6	34	37	33	4.7	35	20	8.3
18	85	71	11	7.8	28	24	112	25	3.7	e16	11	5.6
19	27	74	9.9	6.8	147	11	20	7.9	5.3	e50	20	16
20	21	85	9.4	11	105	32	14	9.0	18	e30	15	11
21	14	39	16	7.9	84	61	15	7.6	16	e14	22	30
22	11	26	34	218	60	24	9.6	5.8	15	78	9.4	35
23	10	16	39	23	24	11	8.1	4.6	10	32	17	6.7
24	9.2	13	14	52	13	8.8	7.4	4.3	69	36	10	5.0
25	60	20	103	28	10	7.4	11	8.7	25	79	7.4	4.4
26	23	12	16	69	8.8	7.9	9.4	25	66	58	16	5.0
27	33	48	16	14	7.9	45	8.9	9.4	52	40	15	4.2
28	24	25	127	16	7.3	27	6.5	11	11	21	7.5	4.0
29	39	18	54	14	---	23	5.7	6.6	8.3	12	6.4	3.6
30	12	25	15	38	---	25	5.2	6.0	8.3	12	5.8	3.6
31	12	---	44	104	---	24	---	5.1	---	8.8	8.1	---
TOTAL	968.8	1264.4	1135.3	885.6	818.9	748.0	726.9	311.4	490.5	756.2	684.8	287.0
MEAN	31.3	42.1	36.6	28.6	29.2	24.1	24.2	10.0	16.4	24.4	22.1	9.57
MAX	93	130	127	218	147	89	112	33	69	79	95	35
MIN	9.0	9.4	9.4	6.0	7.3	5.8	5.2	4.2	3.6	4.3	5.8	3.6
AC-FT	1920	2510	2250	1760	1620	1480	1440	618	973	1500	1360	569

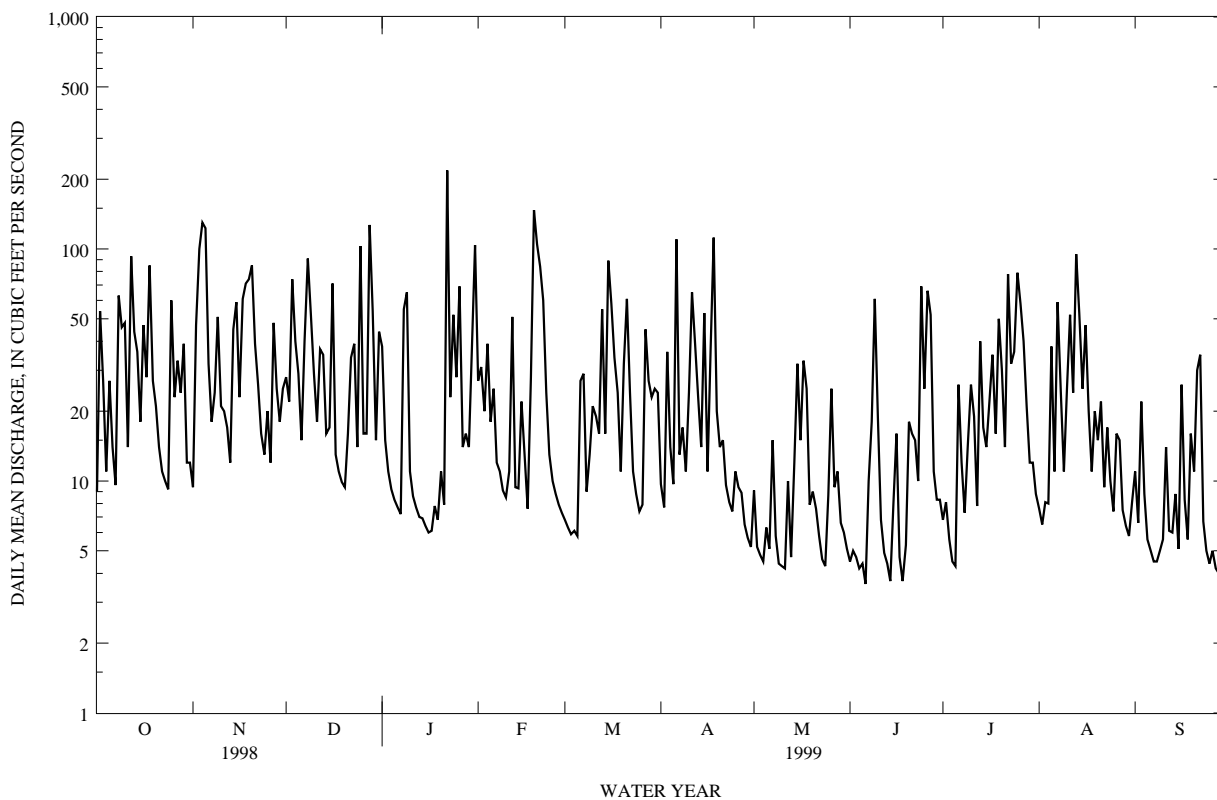
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1917 - 1999, BY WATER YEAR (WY)

MEAN	26.5	36.6	36.2	33.7	29.5	37.3	40.0	27.0	19.0	25.7	24.6	20.5
MAX	100	97.8	84.7	118	114	134	157	85.2	59.2	58.2	69.8	58.2
(WY)	1942	1951	1947	1921	1932	1942	1989	1963	1961	1954	1938	1992
MIN	2.04	5.80	8.56	5.31	2.98	5.48	11.7	4.26	4.93	6.00	1.19	2.85
(WY)	1918	1920	1977	1977	1978	1970	1990	1920	1966	1917	1971	1975

e Estimated

HAWAII, ISLAND OF MOLOKAI
 16400000 HALAWA STREAM NEAR HALAWA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1917 - 1999	
ANNUAL TOTAL	9200.2		9077.8			
ANNUAL MEAN	25.2		24.9		29.7	
HIGHEST ANNUAL MEAN					47.4 1965	
LOWEST ANNUAL MEAN					17.4 1975	
HIGHEST DAILY MEAN	261	Jan 1	218	Jan 22	1240	Feb 4 1965
LOWEST DAILY MEAN	3.6	Feb 17	3.6	Jun 6	.86	Sep 1 1971
ANNUAL SEVEN-DAY MINIMUM	3.7	Feb 15	4.3	Sep 24	.90	Aug 26 1971
ANNUAL RUNOFF (AC-FT)	18250		18010		21510	
10 PERCENT EXCEEDS	58		59		65	
50 PERCENT EXCEEDS	15		15		13	
90 PERCENT EXCEEDS	5.9		5.2		4.8	



HAWAII, ISLAND OF MOLOKAI
16405100 MOLOKAI TUNNEL AT EAST PORTAL

LOCATION.--Lat 21°08'38", long 156°55'16", Hydrologic Unit 20050000, on left bank 100 ft downstream from the east portal, 5.3 mi southeast of Kalaupapa, and 7.5 mi northeast of Kaunakakai.

PERIOD OF RECORD.--July 1966 to current year.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 989 ft above mean sea level, from tunnel plans.

REMARKS.--Records computed by Phillip Teeters. Records fair except for periods of estimated discharge, which are poor. Tunnel diverts water from Waikolu Stream and two tributaries; diversion is augmented by water pumped from two wells and from the stream at elevation 728 ft in Waikolu Valley near the east portal. Water is used for irrigation in west-central Molokai.

AVERAGE DISCHARGE.--33 years (water years 1967-99), 4.77 ft³/s (3,450 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 41 ft³/s, March 19, 1986; no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 24 ft³/s, March 20-21; minimum daily, 2.9 ft³/s, August 25.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.3	e4.4	e13	8.6	11	5.0	7.6	4.5	4.9	5.5	3.1	6.3
2	4.0	e4.4	10	6.2	10	4.9	5.5	4.5	4.8	5.3	3.5	4.8
3	9.4	e7.4	17	5.2	10	4.8	11	5.3	5.1	4.6	4.0	4.6
4	4.0	e10	14	4.9	17	4.7	14	4.9	4.8	4.5	3.7	4.7
5	4.7	e7.8	14	4.8	9.8	4.7	8.0	4.5	4.5	4.7	7.7	4.4
6	5.2	e9.0	11	4.7	12	4.8	15	3.9	3.9	6.6	5.3	4.3
7	3.6	e7.2	15	4.3	7.1	4.7	8.1	3.0	5.2	6.4	7.9	4.3
8	3.3	e6.5	13	6.2	6.2	4.6	11	4.3	5.3	6.5	5.9	4.7
9	6.9	e6.0	12	13	6.6	4.5	7.4	4.2	5.4	8.9	5.6	4.6
10	9.9	e6.0	11	7.3	6.2	5.1	7.1	5.7	5.1	7.6	4.8	4.4
11	6.4	e5.8	8.7	5.5	6.7	7.5	13	5.1	4.3	7.3	5.3	4.6
12	5.7	e5.7	10	5.0	17	6.3	12	5.3	4.1	6.2	5.3	4.1
13	7.8	e5.6	10	4.8	8.9	16	9.3	5.5	4.1	11	11	6.2
14	7.2	e14	6.8	4.7	7.2	8.8	6.1	5.0	4.9	9.4	8.8	5.1
15	7.2	e11	6.4	4.7	6.8	14	5.7	4.6	4.9	8.2	8.6	3.9
16	4.2	e9.2	13	4.6	6.4	13	5.3	4.6	5.0	7.5	16	5.2
17	4.5	e12	5.1	4.6	5.0	13	6.4	5.0	4.5	7.5	8.9	5.3
18	4.0	e16	5.0	4.5	4.6	12	12	5.0	4.5	8.1	5.5	4.3
19	3.8	e16	5.1	4.5	8.2	8.0	8.9	4.2	4.4	7.9	4.8	4.3
20	3.3	e21	5.0	4.4	16	24	6.1	4.7	4.6	11	4.6	4.9
21	3.1	e13	5.9	4.5	12	24	5.3	5.1	5.6	6.0	4.5	5.3
22	3.1	e8.8	4.4	14	14	15	4.9	4.2	7.0	11	4.4	5.4
23	e3.1	e8.3	7.2	8.5	11	8.4	4.4	4.1	6.3	13	4.4	4.5
24	e3.0	e8.2	5.7	13	6.5	5.2	4.8	4.8	11	8.4	3.3	5.8
25	e3.0	e8.2	13	11	5.5	5.6	8.5	4.5	9.8	8.2	2.9	6.0
26	e3.3	e8.2	6.8	14	5.3	5.4	7.6	6.8	11	8.3	5.5	5.9
27	e5.6	e8.4	5.8	8.0	5.1	13	5.8	5.4	9.0	7.8	5.7	5.9
28	e5.0	e9.6	5.3	7.2	5.0	13	5.2	3.9	6.5	8.1	4.9	5.9
29	e5.7	e9.8	5.5	8.1	---	14	5.7	4.7	5.5	6.0	4.6	5.9
30	e4.8	e11	5.0	9.8	---	6.5	5.5	4.5	5.7	5.4	4.5	5.9
31	e4.6	---	11	17	---	8.5	---	4.4	---	3.3	6.3	---
TOTAL	152.7	278.5	280.7	227.6	247.1	289.0	237.2	146.2	171.7	230.2	181.3	151.5
MEAN	4.93	9.28	9.05	7.34	8.82	9.32	7.91	4.72	5.72	7.43	5.85	5.05
MAX	9.9	21	17	17	17	24	15	6.8	11	13	16	6.3
MIN	3.0	4.4	4.4	4.3	4.6	4.5	4.4	3.0	3.9	3.3	2.9	3.9
AC-FT	303	552	557	451	490	573	470	290	341	457	360	301

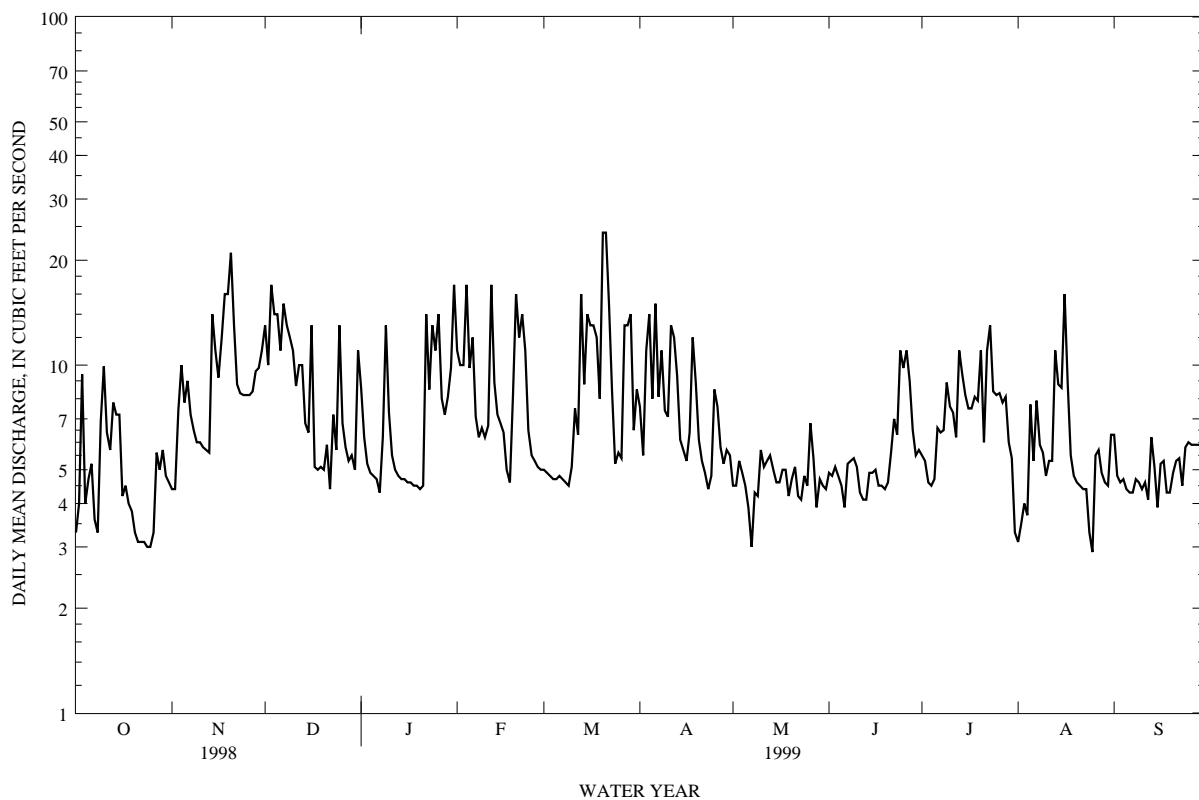
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 1999, BY WATER YEAR (WY)

	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999				
MEAN	3.99	5.72	5.58	5.09	4.95	5.67	5.61	4.55	4.23	4.51	3.81	3.35																										
MAX	8.05	10.2	10.8	12.5	12.5	13.8	12.8	12.3	9.49	9.89	7.22	5.81																										
(WY)	1996	1988	1997	1987	1990	1986	1987	1998	1986	1987	1998	1986	1994																									
MIN	1.80	1.86	.41	.086	.010	.009	.001	.037	.016	.055	.004	.24																										
(WY)	1972	1992	1968	1968	1968	1968	1967	1967	1974	1974	1974	1974																										

e Estimated

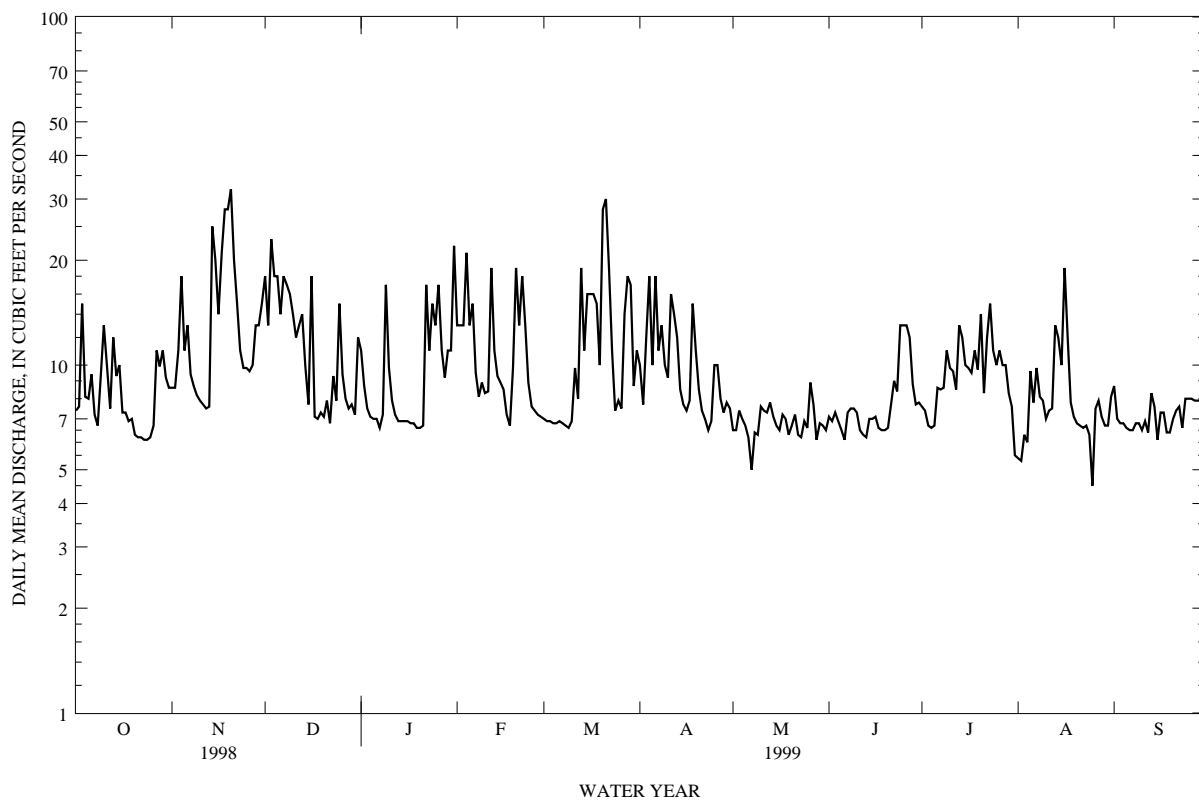
HAWAII, ISLAND OF MOLOKAI
 16405100 MOLOKAI TUNNEL AT EAST PORTAL--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1966 - 1999
ANNUAL TOTAL	2444.3	2593.7	
ANNUAL MEAN	6.70	7.11	4.77
HIGHEST ANNUAL MEAN			8.19 1987
LOWEST ANNUAL MEAN			1.31 1974
HIGHEST DAILY MEAN	22 Apr 2	24 Mar 20	41 Mar 19 1986
LOWEST DAILY MEAN	3.0 Sep 28	2.9 Aug 25	.00 Mar 30 1967
ANNUAL SEVEN-DAY MINIMUM	3.1 Oct 20	3.1 Oct 20	.00 Mar 30 1967
ANNUAL RUNOFF (AC-FT)	4850	5140	3450
10 PERCENT EXCEEDS	12	13	9.9
50 PERCENT EXCEEDS	5.3	5.7	3.6
90 PERCENT EXCEEDS	3.3	4.3	1.1



HAWAII, ISLAND OF MOLOKAI
 16405300 MOLOKAI TUNNEL AT WEST PORTAL--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1965 - 1999	
ANNUAL TOTAL	3608.5	3556.2		
ANNUAL MEAN	9.89	9.74	7.32	
HIGHEST ANNUAL MEAN			11.4	1987
LOWEST ANNUAL MEAN			3.46	1974
HIGHEST DAILY MEAN	32 Nov 20	32 Nov 20	39 Apr 8	1986
LOWEST DAILY MEAN	5.9 Mar 19	4.5 Aug 25	1.8 Oct 15	1967
ANNUAL SEVEN-DAY MINIMUM	6.0 Aug 17	6.3 Oct 20	1.9 May 3	1976
ANNUAL RUNOFF (AC-FT)	7160	7050	5310	
10 PERCENT EXCEEDS	16	16	12	
50 PERCENT EXCEEDS	8.1	7.9	6.1	
90 PERCENT EXCEEDS	6.4	6.5	3.1	



HAWAII, ISLAND OF MOLOKAI
16405500 WAIKOLU STREAM AT ALTITUDE 900 FT, NEAR KALAUPAPA

LOCATION.--Lat 21°08'43" N, long 156°55'18" W, Hydrologic Unit 20050000, on right bank 1.8 mi southwest of Haupu Bay, 2.3 mi upstream from mouth, and 5.2 mi southeast of Kalaupapa.

DRAINAGE AREA.--1.99 mi².

PERIOD OF RECORD.--May 1956 to October 1961, July 1962 to current year.

REVISED RECORDS.--WSP 1719: 1959. WSP 2137: 1965(P).

GAGE.--Water-stage recorder. Elevation of gage is 900 ft above mean sea level (from topographic map). Prior to July 1, 1962, at site 200 ft upstream of gage at datum 6.14 ft higher.

REMARKS.--Records computed by Phillip Teeters. Records good up to 50 ft³/s and fair above that. Since November 16, 1960, water diverted upstream at times, either into or from Molokai tunnel.

AVERAGE DISCHARGE (since Molokai tunnel diversion began)--38 years (water years 1961, 1963-99), 6.04 ft³/s (4,380 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,570 ft³/s, January 25, 1982, gage height, 6.64 ft, from rating curve extended above 43 ft³/s on basis of slope-area measurement at gage height 5.25 ft; no flow at times since 1984.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of October 31, 1961, reached a stage of 13.62 ft, from floodmarks, former site and datum, discharge, 6,220 ft³/s, by slope-area measurement.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 590 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 22	1430	*770	*4.04	No other peak greater than base discharge.			

Minimum discharge, no flow on many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.65	e.48	e3.0	.97	4.8	.00	.41	.25	.11	.01	.02	.00
2	.74	e1.1	e3.2	.04	4.2	.00	.33	.34	.19	.00	.02	.00
3	1.1	e1.4	15	.01	3.7	.00	23	.43	.21	.00	.02	.00
4	.65	e1.6	11	.00	19	.00	24	.34	.24	.00	.02	.00
5	.65	e1.5	6.8	.00	2.9	.00	.62	.34	.27	.00	.11	.00
6	.77	e1.0	4.3	.00	2.0	.00	11	.43	.27	.00	.18	.00
7	.76	e.70	9.0	.03	.02	.00	.70	.55	.23	.00	.30	.00
8	.76	e.80	4.8	.94	.00	.00	6.0	.53	.26	.00	.09	.00
9	.80	e1.2	3.2	11	.00	.00	.88	.53	.33	.39	.01	.00
10	1.3	e.70	2.1	.42	.00	.00	.68	.53	.38	.08	.00	.00
11	.95	e.64	.69	.04	.00	.01	7.8	.64	.38	.01	.00	.00
12	1.9	e.56	3.7	.00	22	.02	3.9	.64	.33	.00	.00	.00
13	1.5	e.45	3.7	.00	.19	13	1.7	.64	.31	2.9	1.6	.00
14	e.92	e1.6	.85	.00	.00	.73	.62	.64	.29	1.2	.49	.00
15	e.80	e2.1	20	.00	.00	3.1	.58	.64	.28	.08	2.3	.00
16	e1.0	e1.1	19	.00	.00	3.0	.59	.64	.20	.03	7.9	.00
17	e1.3	e6.0	.84	.00	.00	7.9	1.4	.64	.14	.01	.71	.00
18	e1.5	e15	.78	.00	.00	3.1	8.8	.64	.05	.10	.06	.00
19	e1.1	e9.2	.65	.00	2.6	.27	1.1	.53	.02	.85	.05	.00
20	e1.0	e5.8	.60	.00	15	85	.56	.53	.01	2.9	.04	.00
21	e.84	e5.4	.61	.00	5.6	58	.55	.53	.08	.07	.03	.00
22	e.70	e5.0	.53	54	7.9	8.1	.57	.43	.30	1.7	.01	.00
23	e.56	e4.4	.39	1.2	.93	.86	.57	.34	.38	5.8	.00	.00
24	e.40	e4.0	.44	11	.02	.40	.53	.20	1.3	.96	.00	.00
25	e1.5	e3.6	7.1	5.6	.00	.31	4.0	.29	2.2	.19	.14	.00
26	e1.0	e4.5	.33	11	.00	.30	1.1	.44	2.2	.05	.10	.00
27	e1.2	e5.4	.17	.95	.00	8.3	.64	.48	.49	.11	.12	.00
28	e.90	e4.2	.11	.01	.00	7.2	.43	.28	.03	.14	.02	.00
29	e1.3	e2.6	.11	.97	---	4.4	.34	.10	.02	.10	.00	.00
30	e.80	e2.8	.05	4.8	---	.71	.25	.08	.01	.06	.00	.00
31	e.54	---	5.0	20	---	1.2	---	.07	---	.02	.00	---
TOTAL	29.89	94.83	128.05	122.98	90.86	205.91	103.65	13.69	11.51	17.76	14.34	0.00
MEAN	.96	3.16	4.13	3.97	3.25	6.64	3.46	.44	.38	.57	.46	.000
MAX	1.9	15	20	54	22	85	24	.64	2.2	5.8	7.9	.00
MIN	.40	.45	.05	.00	.00	.00	.25	.07	.01	.00	.00	.00
AC-FT	59	188	254	244	180	408	206	27	23	35	28	.00

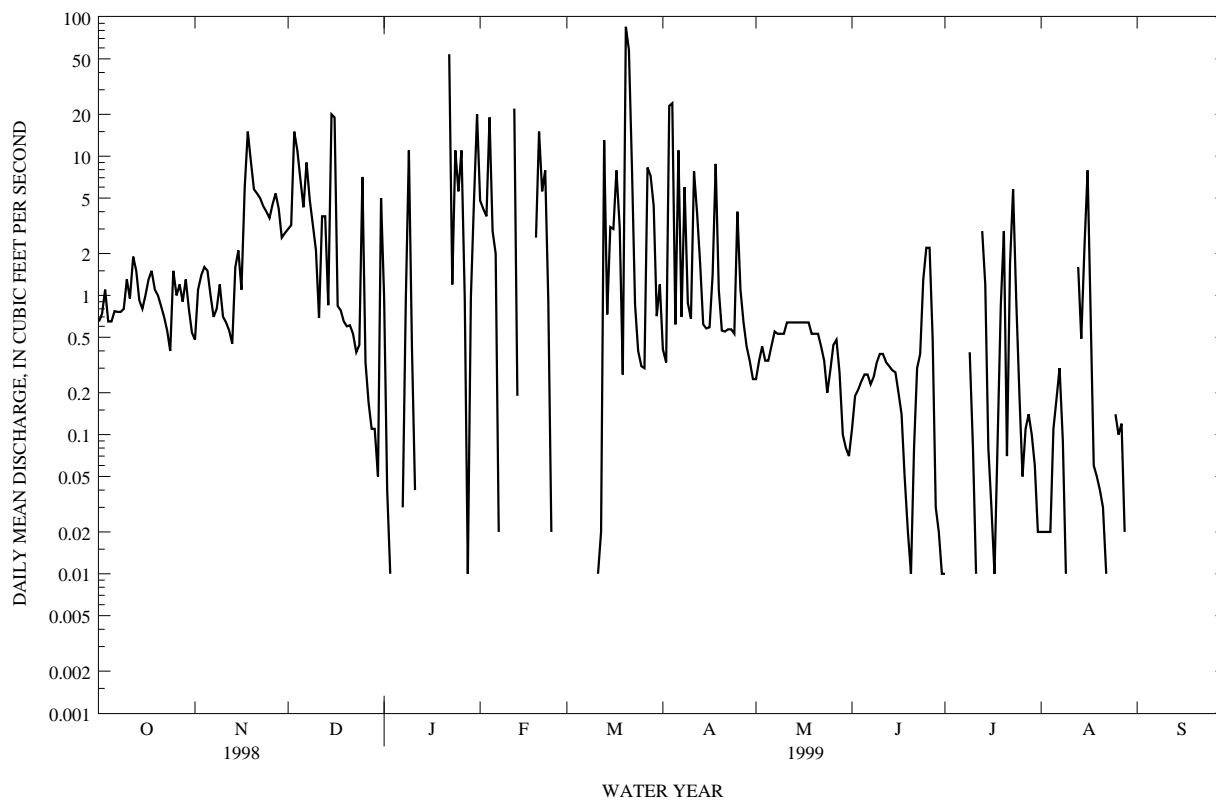
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1961 - 1999, BY WATER YEAR (WY)

MEAN	3.17	8.73	9.29	10.9	8.81	8.91	9.53	4.65	2.43	2.85	2.00	1.42
MAX	16.7	30.5	31.0	40.5	30.6	22.6	64.8	23.6	10.5	11.0	7.52	6.81
(WY)	1966	1971	1966	1982	1979	1968	1989	1987	1961	1964	1961	1963
MIN	.000	.77	.37	.78	.81	1.31	.71	.19	.000	.23	.010	.000
(WY)	1985	1985	1976	1996	1978	1983	1996	1996	1985	1984	1996	1996

e Estimated

HAWAII, ISLAND OF MOLOKAI
16405500 WAIKOLU STREAM AT ALTITUDE 900 FT, NEAR KALAUPAPA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1961 - 1999	
ANNUAL TOTAL	923.99	833.47		
ANNUAL MEAN	2.53	2.28	6.04	
HIGHEST ANNUAL MEAN			11.8	1965
LOWEST ANNUAL MEAN			1.26	1985
HIGHEST DAILY MEAN	64 Apr 2	85 Mar 20	847	Apr 8 1989
LOWEST DAILY MEAN	.05 Dec 30	.00 Jan 4	.00	Sep 12 1984
ANNUAL SEVEN-DAY MINIMUM	.57 Dec 18	.00 Jan 12	.00	Sep 12 1984
ANNUAL RUNOFF (AC-FT)	1830	1650	4380	
10 PERCENT EXCEEDS	5.6	5.6	11	
50 PERCENT EXCEEDS	1.0	.43	1.3	
90 PERCENT EXCEEDS	.69	.00	.18	



HAWAII, ISLAND OF MOLOKAI
16419500 PAPIO GULCH AT HALAWA

LOCATION.--Lat 21°08'55", long 156°44'16", Hydrologic Unit 20050000, on left bank 200 ft downstream from wooden bridge on Highway 45, and 0.8 mi south of Halawa.

DRAINAGE AREA.--0.94 mi².

PERIOD OF RECORD.--July 1963 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 640 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Roy Taogoshi. Records good. Diversion upstream of station for domestic use at Puu O Hoku Ranch.

AVERAGE DISCHARGE.--36 years (water years 1964-99), 0.83 ft³/s (603 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,720 ft³/s, April 13, 1965, gage height, 11.25 ft, from rating curve extended above 37 ft³/s on basis of slope-area measurements at gage heights 4.60 ft, 7.15 ft, and 11.25 ft; no flow at times.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 210 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 22	1800	*44	*2.40				

Minimum discharge, no flow for many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

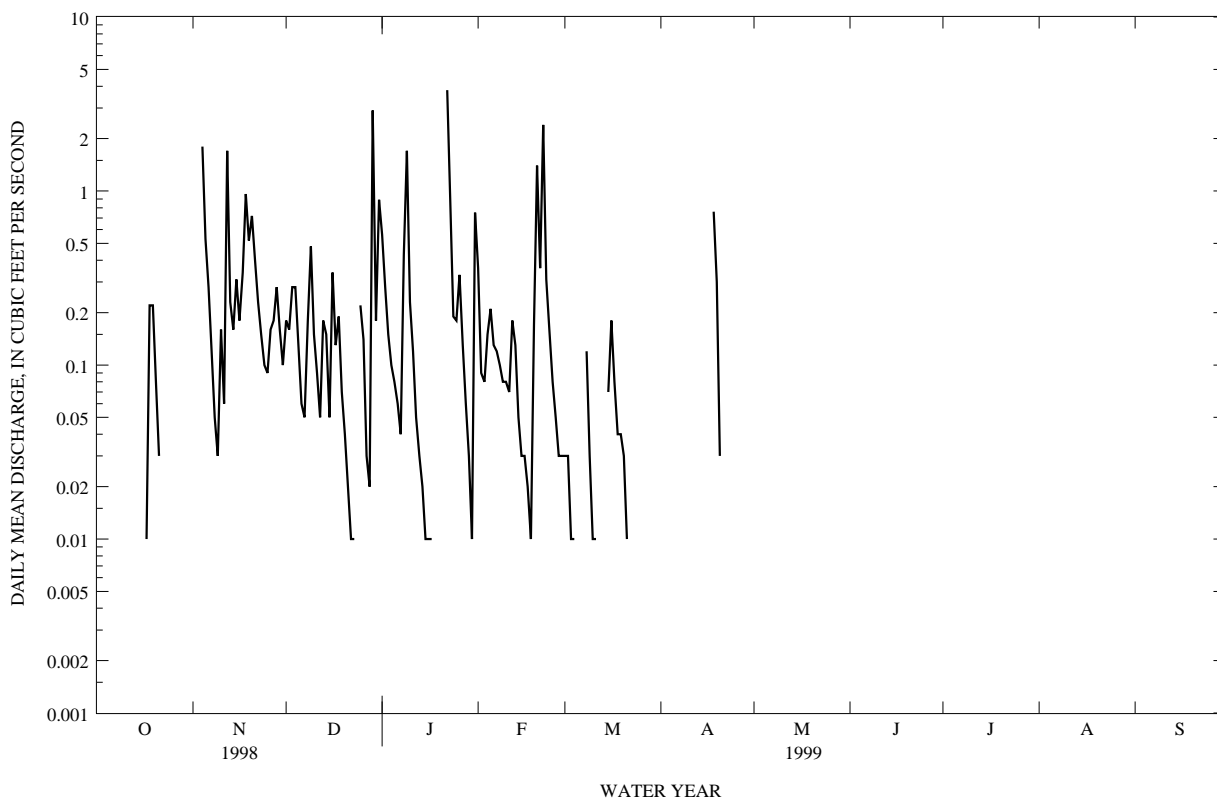
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.18	.56	.36	.03	.00	.00	.00	.00	.00	.00
2	.00	.00	.16	.28	.09	.03	.00	.00	.00	.00	.00	.00
3	.00	.00	.28	.15	.08	.01	.00	.00	.00	.00	.00	.00
4	.00	1.8	.28	.10	.15	.01	.00	.00	.00	.00	.00	.00
5	.00	.53	.13	.08	.21	.00	.00	.00	.00	.00	.00	.00
6	.00	.28	.06	.06	.13	.00	.00	.00	.00	.00	.00	.00
7	.00	.12	.05	.04	.12	.00	.00	.00	.00	.00	.00	.00
8	.00	.05	.18	.43	.10	.12	.00	.00	.00	.00	.00	.00
9	.00	.03	.48	1.7	.08	.03	.00	.00	.00	.00	.00	.00
10	.00	.16	.15	.23	.08	.01	.00	.00	.00	.00	.00	.00
11	.00	.06	.09	.12	.07	.01	.00	.00	.00	.00	.00	.00
12	.00	1.7	.05	.05	.18	.00	.00	.00	.00	.00	.00	.00
13	.00	.23	.18	.03	.13	.00	.00	.00	.00	.00	.00	.00
14	.06	.16	.15	.02	.05	.00	.00	.00	.00	.00	.00	.00
15	.00	.31	.05	.01	.03	.07	.00	.00	.00	.00	.00	.00
16	.00	.18	.34	.01	.03	.18	.00	.00	.00	.00	.00	.00
17	.01	.34	.13	.01	.02	.08	.00	.00	.00	.00	.00	.00
18	.22	.96	.19	.00	.01	.04	.76	.00	.00	.00	.00	.00
19	.22	.52	.07	.00	.17	.04	.30	.00	.00	.00	.00	.00
20	.08	.72	.04	.00	1.4	.03	.03	.00	.00	.00	.00	.00
21	.03	.40	.02	.00	.36	.01	.00	.00	.00	.00	.00	.00
22	.00	.23	.01	3.8	2.4	.00	.00	.00	.00	.00	.00	.00
23	.00	.15	.01	.87	.31	.00	.00	.00	.00	.00	.00	.00
24	.00	.10	.00	.19	.16	.00	.00	.00	.00	.00	.00	.00
25	.00	.09	.22	.18	.08	.00	.00	.00	.00	.00	.00	.00
26	.00	.16	.14	.33	.05	.00	.00	.00	.00	.00	.00	.00
27	.00	.18	.03	.13	.03	.00	.00	.00	.00	.00	.00	.00
28	.00	.28	.02	.06	.03	.00	.00	.00	.00	.00	.00	.00
29	.00	.16	2.9	.03	---	.00	.00	.00	.00	.00	.00	.00
30	.00	.10	.18	.01	---	.00	.00	.00	.00	.00	.00	.00
31	.00	---	.89	.75	---	.00	---	.00	---	.00	.00	---
TOTAL	0.62	10.00	7.66	10.23	6.91	0.70	1.09	0.00	0.00	0.00	0.00	0.00
MEAN	.020	.33	.25	.33	.25	.023	.036	.000	.000	.000	.000	.000
MAX	.22	1.8	2.9	3.8	2.4	.18	.76	.00	.00	.00	.00	.00
MIN	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00
AC-FT	1.2	20	15	20	14	1.4	2.2	.00	.00	.00	.00	.00

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1963 - 1999, BY WATER YEAR (WY)

MEAN	.50	1.17	1.08	1.28	1.17	1.39	1.38	.68	.33	.44	.29	.30
MAX	2.63	7.56	6.12	4.84	5.88	6.42	10.3	3.99	1.43	1.56	1.21	2.24
(WY)	1986	1971	1965	1988	1965	1968	1989	1987	1982	1993	1980	1992
MIN	.000	.000	.000	.000	.000	.007	.003	.000	.000	.000	.000	.000
(WY)	1972	1972	1972	1977	1973	1973	1975	1975	1964	1972	1964	1964

HAWAII, ISLAND OF MOLOKAI
 16419500 PAPIO GULCH AT HALAWA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1963 - 1999	
ANNUAL TOTAL	70.26	37.21		
ANNUAL MEAN	.19	.10	.83	
HIGHEST ANNUAL MEAN			2.32	1989
LOWEST ANNUAL MEAN			.063	1973
HIGHEST DAILY MEAN	12 Jan 1	3.8 Jan 22	164	Apr 13 1965
LOWEST DAILY MEAN	.00 Mar 7	.00 Oct 1	.00	Jul 5 1963
ANNUAL SEVEN-DAY MINIMUM	.00 May 13	.00 Oct 1	.00	Aug 3 1963
ANNUAL RUNOFF (AC-FT)	139	74	603	
10 PERCENT EXCEEDS	.37	.22	1.5	
50 PERCENT EXCEEDS	.07	.00	.22	
90 PERCENT EXCEEDS	.00	.00	.00	



Surface-Water Station Records
for Maui

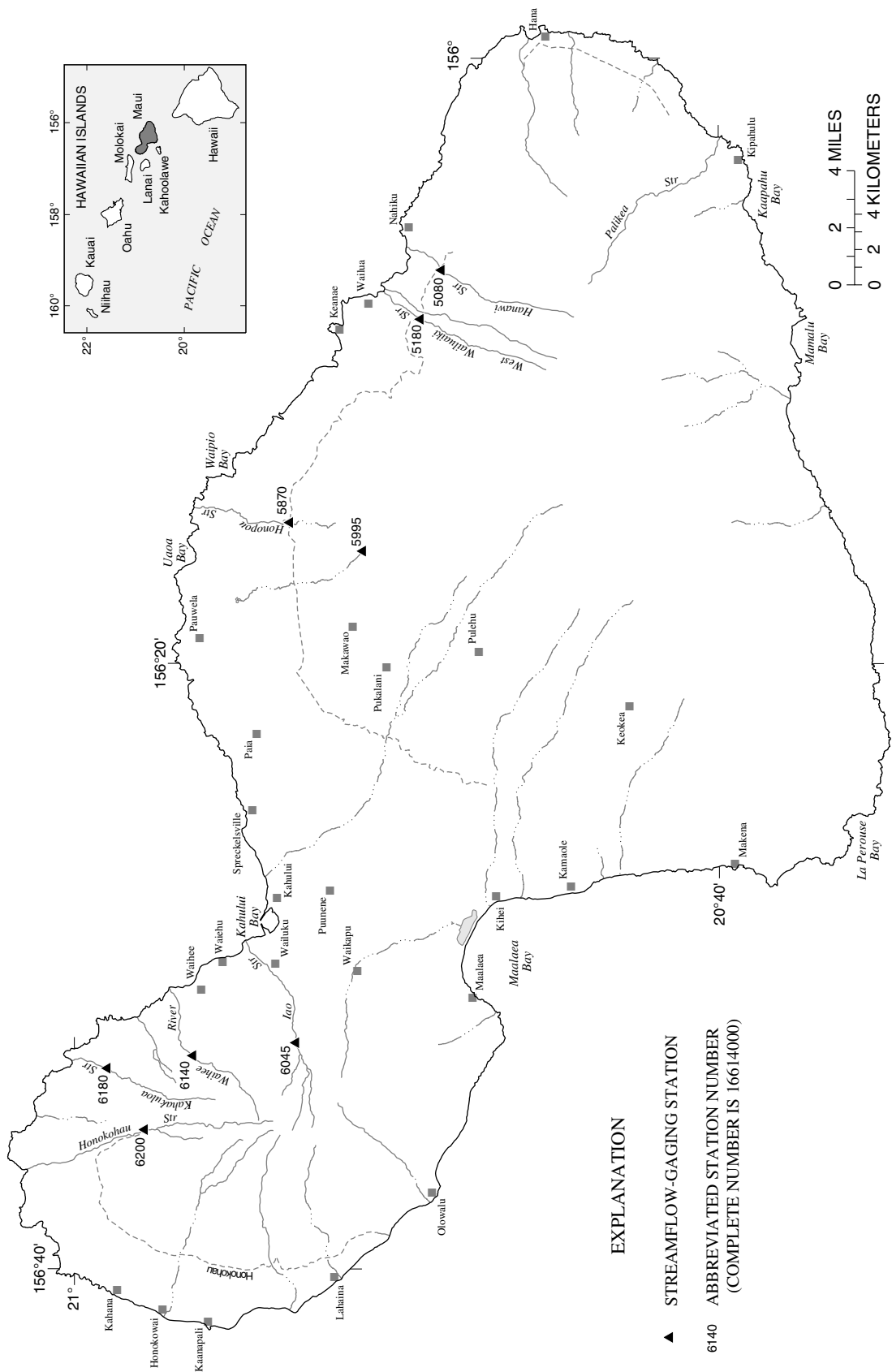


Figure 8. Locations of gaging, water-quality, and partial-record stations on Maui.

HAWAII, ISLAND OF MAUI
16508000 HANAWI STREAM NEAR NAHIKU

LOCATION.--Lat 20°48'37 " ,long 156°07'00 " ,Hydrologic Unit 20020000, on left bank 200 ft upstream from Koolau ditch intake and trail, 1.9 mi southwest of Nahiku, and 4.5 mi southeast of Keanae.

DRAINAGE AREA.--3.49 mi².

PERIOD OF RECORD.--January 1914 to January 1916, November 1921 to current year. Monthly discharge only April to June 1915, published in WSP 1319.

REVISED RECORDS.--WSP 1045: 1922-43(M). WSP 1569: Drainage area. WSP 1719: 1915(M), 1922, 1924-25, 1927, 1930-35, 1937, 1939-40, 1942-43.

GAGE.--Water-stage recorder. Datum of gage is 1,318 ft above mean sea level (by vertical angles). Prior to November 1, 1921, at site 50 ft downstream of gage at datum 0.12 ft lower.

REMARKS.--Records computed by Matt Wong. Records good. No diversion upstream of station.

AVERAGE DISCHARGE.--77 years (water years 1923-99), 24.0 ft³/s (17,400 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 5,570 ft³/s, January 18, 1916, gage height, 11.6 ft, present site and datum, from rating curve extended above 814 ft³/s by physical model of station site; minimum, 0.90 ft³/s, October 28 to November 1, 1984.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,700 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 31	0445	*2,030	*7.08	No other peak greater than base discharge.			

Minimum discharge, 2.0 ft³/s, July 4, 7.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

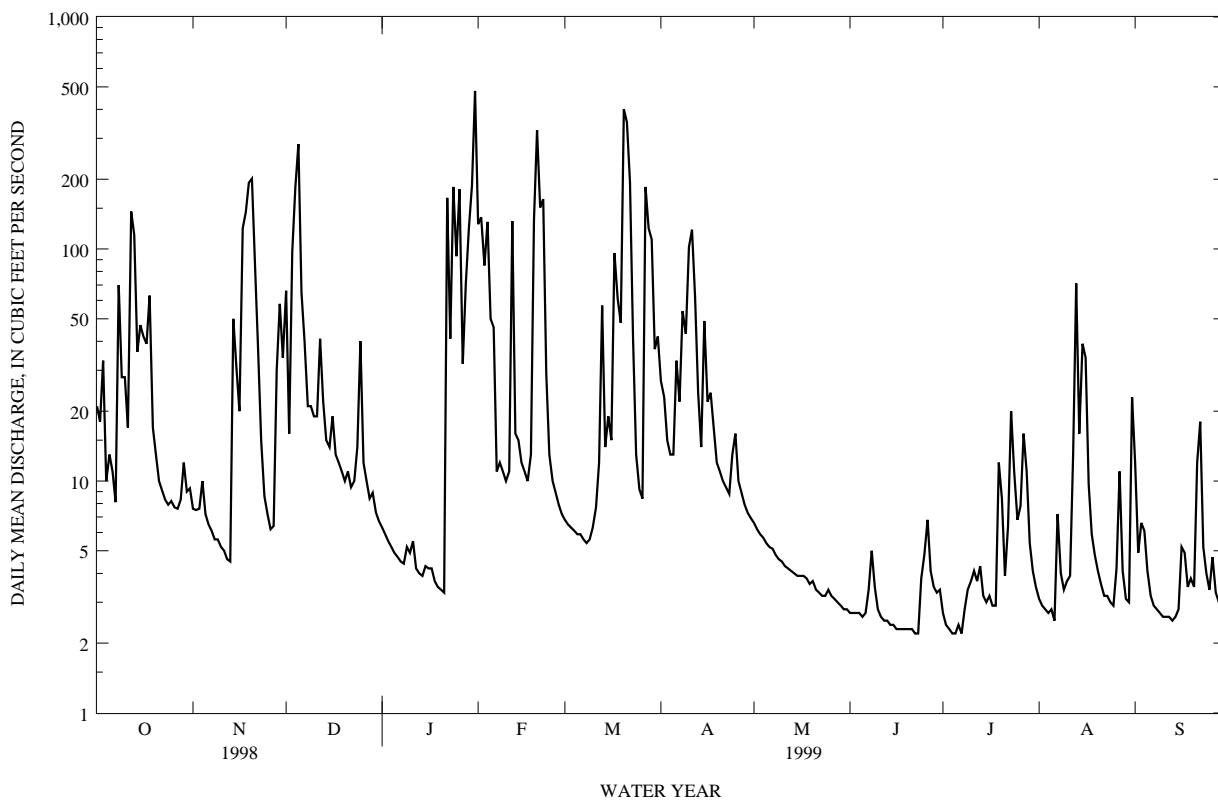
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	7.6	66	6.3	128	6.8	27	6.6	2.7	2.7	3.1	12
2	18	7.5	16	5.9	137	6.5	23	6.2	2.7	2.4	2.9	4.9
3	33	7.6	97	5.5	85	6.3	15	5.9	2.7	2.3	2.8	6.6
4	10	10	184	5.2	131	6.1	13	5.7	2.7	2.2	2.7	6.1
5	13	7.2	283	4.9	50	5.9	13	5.4	2.6	2.2	2.8	4.1
6	11	6.5	65	4.7	46	5.9	33	5.2	2.7	2.4	2.5	3.2
7	8.1	6.1	40	4.5	11	5.6	22	5.1	3.4	2.2	7.2	2.9
8	70	5.6	21	4.4	12	5.4	54	4.8	5.0	2.8	4.0	2.8
9	28	5.6	21	5.2	11	5.6	43	4.6	3.5	3.4	3.4	2.7
10	28	5.2	19	4.9	10	6.3	102	4.5	2.8	3.7	3.7	2.6
11	17	5.0	19	5.5	11	7.7	121	4.3	2.6	4.1	3.9	2.6
12	145	4.6	41	4.2	132	12	62	4.2	2.5	3.7	13	2.6
13	115	4.5	22	4.0	16	57	24	4.1	2.5	4.3	71	2.5
14	36	50	15	3.9	15	14	14	4.0	2.4	3.2	16	2.6
15	47	31	14	4.3	12	19	49	3.9	2.4	3.0	39	2.8
16	42	20	19	4.2	11	15	22	3.9	2.3	3.2	34	5.2
17	39	123	13	4.2	10	96	24	3.9	2.3	2.9	9.7	4.9
18	63	144	12	3.7	13	61	17	3.8	2.3	2.9	5.9	3.5
19	17	193	11	3.5	134	48	12	3.6	2.3	12	4.8	3.8
20	13	201	10	3.4	325	401	11	3.7	2.3	8.4	4.1	3.5
21	10	85	11	3.3	151	352	10	3.4	2.3	3.9	3.6	12
22	9.1	37	9.4	166	164	194	9.4	3.3	2.2	6.4	3.2	18
23	8.3	15	10	41	29	41	8.8	3.2	2.2	20	3.2	5.2
24	7.9	8.6	14	185	13	13	13	3.2	3.8	11	3.0	4.0
25	8.2	7.2	40	93	10	9.2	16	3.4	4.8	6.8	2.9	3.4
26	7.7	6.2	12	181	8.9	8.4	10	3.2	6.8	7.8	4.2	4.7
27	7.6	6.4	10	32	7.9	185	8.9	3.1	4.1	16	11	3.3
28	8.3	30	8.4	71	7.2	123	7.9	3.0	3.5	11	4.1	3.0
29	12	58	8.9	123	---	110	7.3	2.9	3.3	5.4	3.1	2.9
30	9.0	34	7.3	188	---	37	6.9	2.8	3.4	4.1	3.0	3.1
31	9.3	---	6.7	480	---	42	---	2.8	---	3.5	23	---
TOTAL	871.5	1132.4	1125.7	1655.7	1691.0	1905.7	799.2	127.7	91.1	169.9	300.8	141.5
MEAN	28.1	37.7	36.3	53.4	60.4	61.5	26.6	4.12	3.04	5.48	9.70	4.72
MAX	145	201	283	480	325	401	121	6.6	6.8	20	71	18
MIN	7.6	4.5	6.7	3.3	7.2	5.4	6.9	2.8	2.2	2.2	2.5	2.5
AC-FT	1730	2250	2230	3280	3350	3780	1590	253	181	337	597	281

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1914 - 1999, BY WATER YEAR (WY)

MEAN	14.9	30.0	32.2	30.3	31.0	41.4	36.5	20.3	11.4	16.2	16.9	11.7
MAX	101	110	129	123	182	235	161	68.2	61.2	62.0	66.2	52.3
(WY)	1942	1991	1947	1979	1969	1989	1989	1987	1997	1997	1957	1914
MIN	1.15	2.99	2.71	1.87	2.25	2.10	2.75	2.82	2.16	2.42	2.40	1.88
(WY)	1985	1990	1981	1977	1983	1983	1992	1945	1981	1926	1973	1974

HAWAII, ISLAND OF MAUI
16508000 HANAWI STREAM NEAR NAHIKU--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1914 - 1999	
ANNUAL TOTAL	7678.6		10012.2		24.0	
ANNUAL MEAN	21.0		27.4		52.6	
HIGHEST ANNUAL MEAN					1969	
LOWEST ANNUAL MEAN					1926	
HIGHEST DAILY MEAN	283	Dec 5	480	Jan 31	1610	Jan 25 1948
LOWEST DAILY MEAN	1.9	Mar 20	2.2	Jun 22	.90	Oct 31 1984
ANNUAL SEVEN-DAY MINIMUM	2.0	Mar 16	2.3	Jun 17	.96	Oct 25 1984
ANNUAL RUNOFF (AC-FT)	15230		19860		17400	
10 PERCENT EXCEEDS	49		71		52	
50 PERCENT EXCEEDS	10		7.3		7.2	
90 PERCENT EXCEEDS	2.7		2.8		2.8	



HAWAII, ISLAND OF MAUI
16518000 WEST WAILUAIKI STREAM NEAR KEANAE

LOCATION.--Lat 20°49'16", long 156°08'37", Hydrologic Unit 20020000, on left bank 500 ft upstream from Koolau Ditch crossing and trail bridge, and 2.8 mi south of Keanae Post Office.

DRAINAGE AREA.--3.66 mi².

PERIOD OF RECORD.--January 1914 to December 1915, May 1916 to October 1917, November 1921 to current year. Monthly discharge only for some periods, published in WSP 1319.

REVISED RECORDS.--WSP 1569. Drainage area. WSP 2137: 1915-16(M), 1923-25(M), 1929-31(M), 1934-35(M), 1937-39(M), 1941-43(M), 1946-47(M), 1948(P), 1949(M), 1952-53(M), 1955-56(M), 1959-60(M), 1960(P), 1961(M), 1963(M).

GAGE.--Water-stage recorder. Datum of gage is 1,343.1 ft above mean sea level (by vertical angles). Prior to October 3, 1974, at present site at datum 0.50 ft higher.

REMARKS.--Records computed by Matt Wong. Records good. No diversion upstream of station. Water is diverted by Koolau Ditch, 500 ft downstream, for domestic supply and irrigation of sugarcane in central Maui.

AVERAGE DISCHARGE.--79 years (water years 1915, 1917, 1923-99), 35.0 ft³/s (25,370 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,900 ft³/s, January 14, 1923, gage height, 13.5 ft, from floodmarks, from rating curve extended above 660 ft³/s; minimum, 0.5 ft³/s, July 26, 1922.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,900 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Oct. 12	1830	2,430	8.34	Feb. 20	0330	2,370	8.26
Jan. 31	0515	*3,800	*9.81				

Minimum discharge, 1.6 ft³/s, July 5.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	30	8.3	60	7.8	95	9.8	30	7.3	2.6	2.7	5.0	19
2	22	8.3	23	6.9	133	9.3	26	6.8	2.6	2.2	4.6	12
3	18	8.4	58	6.3	161	8.7	18	6.3	2.5	2.0	4.3	20
4	15	11	150	5.9	211	8.0	16	6.0	2.6	1.8	4.1	13
5	16	7.7	220	5.6	78	7.5	14	5.9	2.5	1.9	4.2	10
6	14	7.1	54	5.4	53	8.4	20	5.5	2.7	2.9	3.7	8.3
7	13	6.7	31	5.2	32	6.8	15	5.5	4.4	2.1	16	7.1
8	81	5.9	21	5.1	31	6.2	24	5.1	5.5	3.2	7.4	6.3
9	34	6.0	22	10	27	6.7	29	5.1	3.5	5.4	7.5	6.4
10	28	5.4	21	7.3	21	7.8	84	4.8	2.5	4.3	7.0	6.3
11	22	5.2	20	7.1	20	8.8	96	4.6	2.4	5.3	6.9	5.7
12	215	4.9	31	5.3	184	19	49	4.4	2.4	4.6	17	5.6
13	89	4.8	23	5.0	33	59	23	4.2	2.3	6.4	103	6.0
14	41	57	15	5.0	26	21	17	4.1	2.3	3.9	28	5.2
15	60	41	14	5.8	20	22	45	4.0	2.3	3.8	49	5.9
16	37	28	21	5.2	18	20	29	4.1	2.2	4.1	43	10
17	37	175	13	4.7	17	94	24	4.6	2.2	3.5	17	8.3
18	70	170	11	4.3	26	67	20	4.3	2.2	3.5	12	6.3
19	26	209	10	4.1	268	52	15	3.8	2.2	18	9.8	7.1
20	18	234	10	4.0	472	552	13	3.8	2.2	13	8.4	7.1
21	15	100	10	3.9	140	498	11	3.5	2.4	5.6	7.6	17
22	13	48	8.9	178	123	261	11	3.4	2.2	8.2	6.6	26
23	11	25	9.3	28	33	50	9.7	3.3	2.2	26	6.9	9.8
24	11	17	13	197	20	22	16	3.2	4.4	16	6.1	7.6
25	11	15	36	79	16	16	19	3.8	6.7	9.9	6.3	6.6
26	9.6	12	13	205	14	15	12	3.1	9.4	10	11	8.6
27	9.4	12	10	38	12	193	9.8	3.0	4.9	19	26	5.8
28	9.6	32	8.9	56	11	106	9.0	2.9	4.6	14	9.2	5.2
29	13	67	11	143	---	95	8.3	2.8	4.1	8.8	6.9	4.8
30	10	63	8.9	225	---	37	7.8	2.7	3.8	6.8	7.1	5.4
31	9.8	---	8.1	632	---	41	---	2.6	---	5.7	41	---
TOTAL	1008.4	1394.7	965.1	1900.9	2295	2328.0	720.6	134.5	98.8	224.6	492.6	272.4
MEAN	32.5	46.5	31.1	61.3	82.0	75.1	24.0	4.34	3.29	7.25	15.9	9.08
MAX	215	234	220	632	472	552	96	7.3	9.4	26	103	26
MIN	9.4	4.8	8.1	3.9	11	6.2	7.8	2.6	2.2	1.8	3.7	4.8
AC-FT	2000	2770	1910	3770	4550	4620	1430	267	196	445	977	540

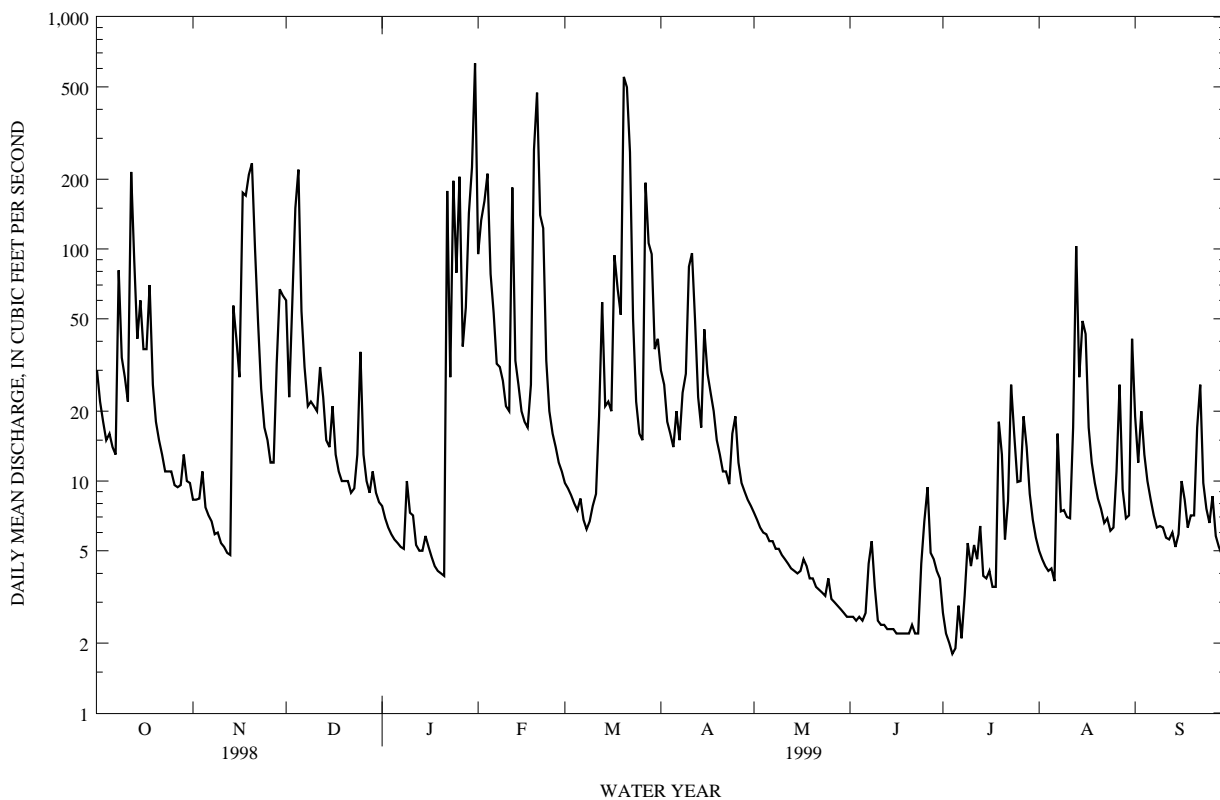
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1914 - 1999, BY WATER YEAR (WY)

	MEAN	MAX	MIN	(WY)
MEAN	23.6	46.1	48.5	41.7
MAX	133	198	200	192
(WY)	1942	1922	1937	1979
MIN	.88	4.06	2.82	2.01
(WY)	1985	1992	1981	1977

HAWAII, ISLAND OF MAUI

16518000 WEST WAILUAIKI STREAM NEAR KEANAE--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1914 - 1999	
ANNUAL TOTAL	9523.2		11835.6		35.0	
ANNUAL MEAN	26.1		32.4		14.5	
HIGHEST ANNUAL MEAN					67.3	1980
LOWEST ANNUAL MEAN					14.5	1981
HIGHEST DAILY MEAN	234	Nov 20	632	Jan 31	2260	Jan 26 1948
LOWEST DAILY MEAN	1.4	Mar 20	1.8	Jul 4	.62	Jul 23 1922
ANNUAL SEVEN-DAY MINIMUM	1.5	Mar 15	2.2	Jun 14	.71	Oct 25 1984
ANNUAL RUNOFF (AC-FT)	18890		23480		25370	
10 PERCENT EXCEEDS	60		78		77	
50 PERCENT EXCEEDS	13		9.8		10	
90 PERCENT EXCEEDS	2.8		3.4		3.3	



HAWAII, ISLAND OF MAUI
16587000 HONOPOU STREAM NEAR HUELO

LOCATION.--Lat 20°53'20 " , long 156°15'20 " , Hydrologic Unit 20020000, on left bank 75 ft upstream from Wailoa Ditch intake, 2.2 mi southwest of Huelo, and 2.5 mi west of Kailua.

DRAINAGE AREA.--0.64 mi².

PERIOD OF RECORD.--December 1910 to current year. Monthly discharge only for some periods, published in WSP 1319.

REVISED RECORDS.--WSP 1219: 1914(M), 1916-50(M). WSP 1249: 1948-50(P). WSP 1569: Drainage area.

GAGE.--Water-stage recorders and concrete control. Datum of gage is 1,208 ft above mean sea level (by vertical angles). Prior to June 19, 1914, nonrecording gage at same site and datum.

REMARKS.--Records computed by Phillip Teeters. Records good. No diversion upstream of station.

AVERAGE DISCHARGE.--88 years (water years 1912-99), 4.83 ft³/s (3,500 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,710 ft³/s, November 18, 1930, gage height, 7.28 ft from rating curve extended above 110 ft³/s by test of physical model of station site; minimum, 0.02 ft³/s, several days in 1933, 1934.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 270 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 22	0920	*1,180	*4.21	Feb. 21	2300	400	3.30

Minimum discharge, 0.29 ft³/s, on many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

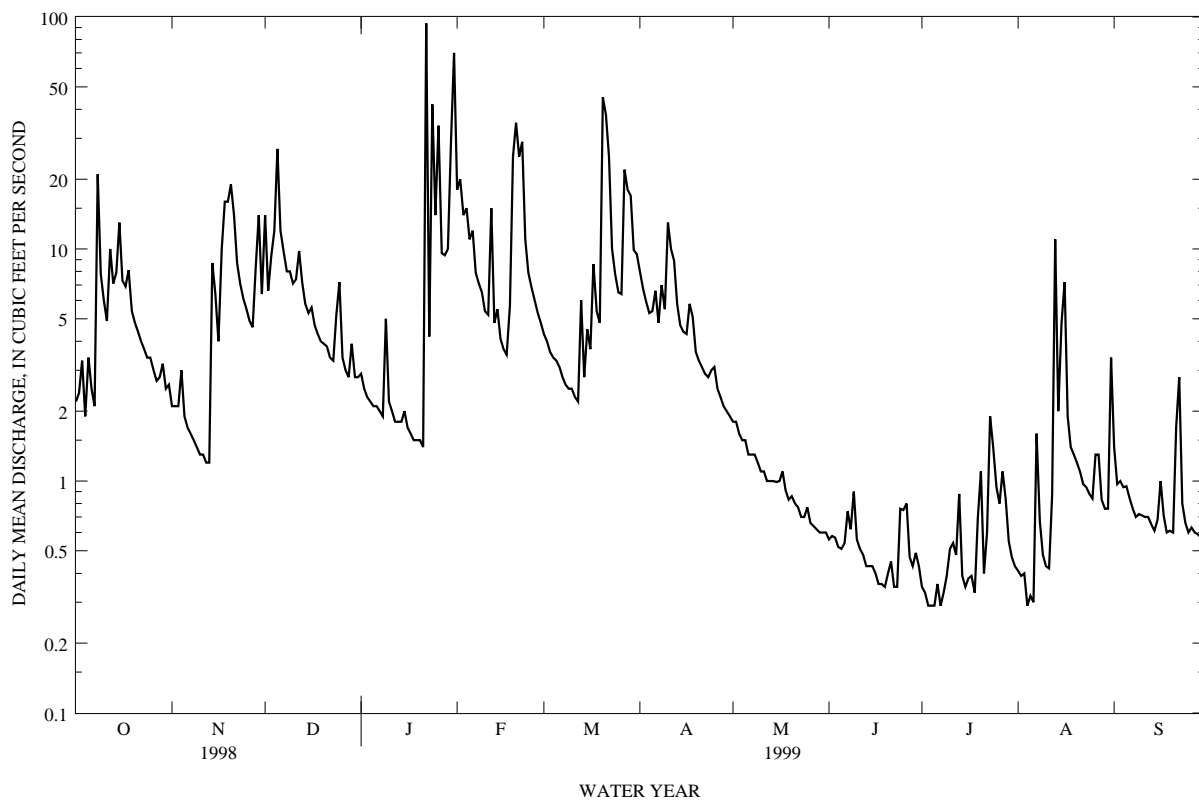
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.2	2.1	14	2.9	18	4.3	8.0	1.8	.56	.35	.41	1.4
2	2.4	2.1	6.6	2.5	20	4.0	6.7	1.8	.58	.33	.39	.97
3	3.3	2.1	9.3	2.3	14	3.6	5.9	1.6	.57	.29	.40	1.0
4	1.9	3.0	12	2.2	15	3.4	5.3	1.5	.52	.29	.29	.94
5	3.4	1.9	27	2.1	11	3.3	5.4	1.5	.51	.29	.32	.95
6	2.5	1.7	12	2.1	12	3.1	6.6	1.3	.54	.36	.30	.84
7	2.1	1.6	9.8	2.0	7.9	2.8	4.8	1.3	.74	.29	1.6	.76
8	21	1.5	8.0	1.9	7.1	2.6	7.0	1.3	.62	.33	.67	.70
9	7.8	1.4	8.0	5.0	6.5	2.5	5.5	1.2	.90	.39	.48	.72
10	6.0	1.3	7.1	2.2	5.4	2.5	13	1.1	.56	.51	.43	.71
11	4.9	1.3	7.4	2.0	5.2	2.3	10	1.1	.51	.54	.42	.70
12	10	1.2	9.8	1.8	15	2.2	8.9	1.0	.48	.48	.87	.70
13	7.1	1.2	7.2	1.8	4.8	6.0	5.8	1.0	.43	.88	11	.65
14	7.9	8.7	5.8	1.8	5.5	2.8	4.7	1.0	.43	.39	2.0	.61
15	13	6.4	5.3	2.0	4.1	4.5	4.4	.99	.43	.35	4.8	.68
16	7.3	4.0	5.6	1.7	3.7	3.7	4.3	1.0	.40	.38	7.2	1.0
17	6.9	10	4.7	1.6	3.5	8.6	5.8	1.1	.36	.39	1.9	.71
18	8.1	16	4.3	1.5	5.7	5.4	5.1	.91	.36	.33	1.4	.60
19	5.4	16	4.0	1.5	25	4.8	3.6	.83	.35	.69	1.3	.61
20	4.8	19	3.9	1.5	35	45	3.3	.86	.40	1.1	1.2	.60
21	4.4	14	3.8	1.4	25	38	3.1	.80	.45	.40	1.1	1.7
22	4.0	8.7	3.4	94	29	25	2.9	.77	.35	.60	.97	2.8
23	3.7	7.1	3.3	4.2	11	10	2.8	.70	.35	1.9	.94	.80
24	3.4	6.1	5.2	42	7.9	7.8	3.0	.70	.76	1.4	.88	.66
25	3.4	5.5	7.2	14	6.8	6.5	3.1	.77	.75	.94	.84	.60
26	3.0	4.9	3.4	34	6.0	6.4	2.5	.66	.80	.80	1.3	.63
27	2.7	4.6	3.0	9.6	5.3	22	2.3	.64	.47	1.1	1.3	.60
28	2.8	8.3	2.8	9.4	4.8	18	2.1	.62	.43	.84	.83	.59
29	3.2	14	3.9	10	---	17	2.0	.60	.49	.55	.76	.57
30	2.5	6.4	2.8	29	---	9.9	1.9	.60	.43	.47	.76	.68
31	2.6	---	2.8	70	---	9.5	---	.60	---	.43	3.4	---
TOTAL	163.7	182.1	213.4	360.0	320.2	287.5	149.8	31.65	15.53	18.39	50.46	25.48
MEAN	5.28	6.07	6.88	11.6	11.4	9.27	4.99	1.02	.52	.59	1.63	.85
MAX	21	19	27	94	35	45	13	1.8	.90	1.9	11	2.8
MIN	1.9	1.2	2.8	1.4	3.5	2.2	1.9	.60	.35	.29	.29	.57
AC-FT	325	361	423	714	635	570	297	63	31	36	100	51

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1912 - 1999, BY WATER YEAR (WY)

MEAN	2.73	5.48	6.10	5.51	5.25	7.26	7.61	5.08	2.80	3.61	3.95	2.59
MAX	15.9	21.4	20.0	20.9	24.5	33.0	43.4	24.3	9.97	14.6	18.1	14.6
(WY)	1942	1991	1947	1921	1969	1942	1989	1916	1914	1997	1982	1992
MIN	.15	.25	1.04	.61	.62	.79	.58	.84	.52	.41	.40	.25
(WY)	1985	1963	1981	1977	1983	1992	1992	1933	1999	1981	1973	1984

HAWAII, ISLAND OF MAUI
 16587000 HONOPOU STREAM NEAR HUELO--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1912 - 1999	
ANNUAL TOTAL	1743.18	1818.21		
ANNUAL MEAN	4.78	4.98	4.83	
HIGHEST ANNUAL MEAN			9.88	1914
LOWEST ANNUAL MEAN			1.73	1981
HIGHEST DAILY MEAN	27 Dec 5	94 Jan 22	305	Apr 7 1989
LOWEST DAILY MEAN	.50 Feb 21	.29 Jul 3	.11	Oct 27 1984
ANNUAL SEVEN-DAY MINIMUM	.52 Feb 15	.31 Jul 2	.11	Oct 26 1984
ANNUAL RUNOFF (AC-FT)	3460	3610	3500	
10 PERCENT EXCEEDS	9.9	11	10	
50 PERCENT EXCEEDS	3.6	2.2	2.4	
90 PERCENT EXCEEDS	.83	.44	.74	



HAWAII, ISLAND OF MAUI
16599500 OPANA TUNNEL AT KAILIILI

LOCATION.--Lat 20°51'04 " , long 156°16'17 " , Hydrologic Unit 20020000, on left bank at tunnel outlet, 0.3 mi north of Kailiili, and 2.7 mi east of Makawao.

PERIOD OF RECORD.--May 1965 to current year.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 2,340 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Phillip Teeters. Records fair. Tunnel diverts water from Opana Gulch for agricultural and domestic use in the Kokomo, Makawao, and Pukalani areas.

AVERAGE DISCHARGE.--34 years (water years 1966-99), 3.24 ft³/s (2,340 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 18 ft³/s, March 31, 1982, April 12, 1986, March 23, 1994; minimum daily, 0.11 ft³/s, November 5-10, 1973, October 5, 6, 25, 26, 1974.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 14 ft³/s, January 31, March 20, 21; minimum daily, 0.20 ft³/s, August 6.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

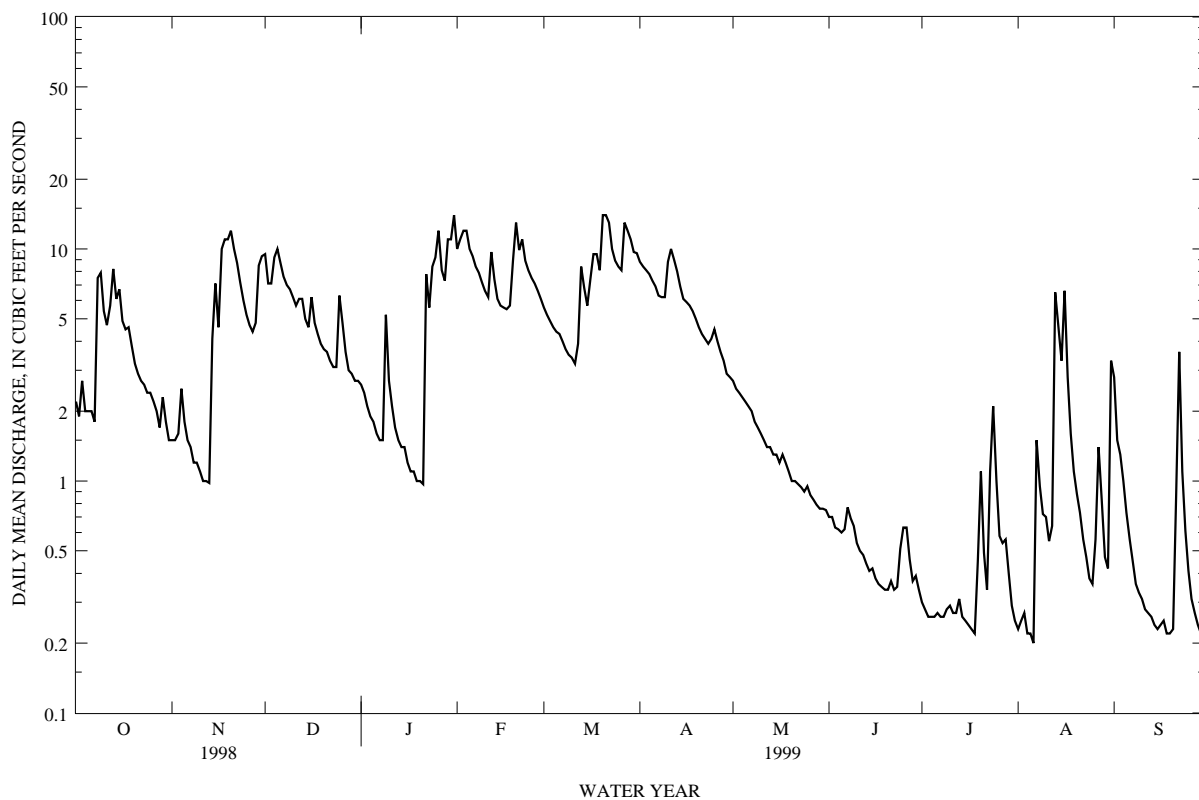
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.2	1.5	9.5	2.6	10	5.6	8.8	2.7	.70	.30	.23	2.8
2	1.9	1.5	7.1	2.4	11	5.2	8.4	2.5	.70	.28	.25	1.5
3	2.7	1.6	7.1	2.1	12	4.9	8.1	2.4	.63	.26	.27	1.3
4	2.0	2.5	9.2	1.9	12	4.6	7.8	2.3	.62	.26	.22	1.0
5	2.0	1.8	10	1.8	10	4.4	7.3	2.2	.60	.26	.22	.73
6	2.0	1.5	8.7	1.6	9.3	4.3	6.9	2.1	.62	.27	.20	.56
7	1.8	1.4	7.6	1.5	8.4	4.0	6.3	2.0	.77	.26	1.5	.45
8	7.5	1.2	7.0	1.5	7.9	3.7	6.2	1.8	.69	.26	.95	.36
9	7.9	1.2	6.7	5.2	7.2	3.5	6.2	1.7	.64	.28	.72	.33
10	5.4	1.1	6.2	2.7	6.6	3.4	8.8	1.6	.54	.29	.70	.31
11	4.7	1.0	5.7	2.1	6.2	3.2	10	1.5	.50	.27	.55	.28
12	5.7	1.0	6.1	1.7	9.7	3.9	9.0	1.4	.48	.27	.64	.27
13	8.2	.98	6.1	1.5	7.4	8.4	8.0	1.4	.44	.31	6.5	.26
14	6.1	4.1	5.0	1.4	6.1	6.8	6.9	1.3	.41	.26	4.7	.24
15	6.7	7.1	4.6	1.4	5.7	5.7	6.1	1.3	.42	.25	3.3	.23
16	4.9	4.6	6.2	1.2	5.6	7.4	5.9	1.2	.38	.24	6.6	.24
17	4.5	10	4.8	1.1	5.5	9.5	5.7	1.3	.36	.23	2.8	.25
18	4.6	11	4.3	1.1	5.7	9.5	5.4	1.2	.35	.22	1.6	.22
19	3.8	11	3.9	1.0	8.9	8.1	5.0	1.1	.34	.45	1.1	.22
20	3.2	12	3.7	1.0	13	14	4.6	1.0	.34	1.1	.88	.23
21	2.9	10	3.6	.97	9.9	14	4.3	1.0	.37	.49	.73	.87
22	2.7	8.7	3.3	7.8	11	13	4.1	.97	.34	.34	.56	3.6
23	2.6	7.2	3.1	5.6	8.9	10	3.9	.94	.35	1.1	.47	1.1
24	2.4	6.0	3.1	8.4	8.1	8.9	4.1	.90	.51	2.1	.38	.61
25	2.4	5.2	6.3	9.2	7.5	8.4	4.5	.95	.63	1.0	.36	.41
26	2.2	4.7	4.8	12	7.1	8.1	4.0	.87	.63	.58	.56	.31
27	2.0	4.4	3.6	8.1	6.6	13	3.6	.83	.46	.54	1.4	.27
28	1.7	4.8	3.0	7.3	6.1	12	3.3	.79	.37	.56	.84	.24
29	2.3	8.5	2.9	11	---	11	2.9	.76	.39	.40	.47	.22
30	1.8	9.3	2.7	11	---	9.7	2.8	.76	.34	.29	.42	.22
31	1.5	---	2.7	14	---	9.6	---	.75	---	.25	3.3	---
TOTAL	112.3	146.88	168.6	132.17	233.4	237.8	178.9	43.52	14.92	13.97	43.42	19.63
MEAN	3.62	4.90	5.44	4.26	8.34	7.67	5.96	1.40	.50	.45	1.40	.65
MAX	8.2	12	10	14	13	14	10	2.7	.77	2.1	6.6	3.6
MIN	1.5	.98	2.7	.97	5.5	3.2	2.8	.75	.34	.22	.20	.22
AC-FT	223	291	334	262	463	472	355	86	30	28	86	39

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1965 - 1999, BY WATER YEAR (WY)

MEAN	1.86	3.35	3.98	3.71	3.73	4.78	5.20	3.57	2.26	2.69	2.15	1.56
MAX	5.40	7.97	9.19	7.55	9.04	11.1	9.35	7.42	6.38	8.17	4.98	5.69
(WY)	1984	1968	1971	1989	1969	1982	1968	1987	1997	1997	1969	1992
MIN	.14	.25	.65	.22	.36	.51	.27	1.28	.50	.40	.19	.15
(WY)	1985	1992	1977	1977	1978	1983	1992	1992	1999	1981	1974	1984

HAWAII, ISLAND OF MAUI
 16599500 OPANA TUNNEL AT KAILILI--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1965 - 1999	
ANNUAL TOTAL	1519.00	1345.51		
ANNUAL MEAN	4.16	3.69	3.24	
HIGHEST ANNUAL MEAN			5.34	1969
LOWEST ANNUAL MEAN			1.45	1981
HIGHEST DAILY MEAN	12 Apr 11	14 Jan 31	18	Mar 31 1982
LOWEST DAILY MEAN	.30 Mar 19	.20 Aug 6	.11	Nov 5 1973
ANNUAL SEVEN-DAY MINIMUM	.36 Mar 14	.23 Sep 14	.11	Nov 4 1973
ANNUAL RUNOFF (AC-FT)	3010	2670	2340	
10 PERCENT EXCEEDS	8.7	9.1	7.9	
50 PERCENT EXCEEDS	3.3	2.3	2.2	
90 PERCENT EXCEEDS	.95	.29	.39	



HAWAII, ISLAND OF MAUI
16604500 IAO STREAM AT KEPANIWAI PARK, NEAR WAILUKU

LOCATION.--Lat 20°53'08", long 156°32'32", Hydrologic Unit 20020000, on left bank of Maniania and Waikapu Ditch intake, 0.3 mi upstream from Kepaniwai Park, 0.5 mi downstream from Iao Valley State Park, and 2.3 mi west of Wailuku Post Office.

DRAINAGE AREA.--5.98 mi².

PERIOD OF RECORD.--May 1983 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 780 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Roy Taogoshi. Records fair. No appreciable diversion upstream of station.

AVERAGE DISCHARGE.--16 years (water years 1984-99), 66.2 ft³/s (47,950 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge 6,260 ft³/s, January 28, 1988, gage height, 9.0 ft, from rating curve extended above 181 ft³/s on basis of slope-area measurements at gage heights 6.48 ft and 9.0 ft; minimum, 11 ft³/s for several days in October and November 1984, May 1996, several days in October and November 1996.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge known, 7,540 ft³/s, December 3, 1950, from rating curve based on model study of site 2.3 mi downstream.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,000 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Feb. 19	2145	*666	*3.20				

Minimum discharge, 16 ft³/s, June 17, 18.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	41	25	90	50	115	28	49	30	17	22	22	35
2	120	39	53	34	130	27	73	29	18	21	21	31
3	55	54	62	29	88	25	52	28	19	18	21	36
4	35	74	46	27	113	27	42	27	21	17	21	25
5	46	33	51	25	73	28	53	25	19	19	32	103
6	34	29	62	24	70	36	56	25	20	29	21	39
7	32	28	53	22	46	25	57	25	29	19	104	28
8	149	26	42	28	42	24	37	25	20	24	29	26
9	134	24	51	47	39	25	36	25	53	25	26	25
10	150	24	41	32	33	45	42	25	23	52	22	24
11	71	23	50	25	37	32	46	24	20	31	23	25
12	76	23	98	22	e233	54	83	24	20	29	44	24
13	85	51	51	22	90	108	38	23	17	39	e180	23
14	115	e170	37	22	101	42	32	22	17	26	81	22
15	e179	125	31	22	55	106	72	23	27	27	162	22
16	100	95	38	21	42	79	61	22	18	29	e235	28
17	92	163	30	26	59	e219	77	24	17	36	74	25
18	75	e213	28	22	89	163	70	24	17	35	44	24
19	57	162	27	21	e268	120	41	22	18	84	40	24
20	43	165	29	21	e274	e279	36	26	25	48	35	23
21	34	164	57	42	157	e317	32	22	25	29	31	39
22	32	90	31	e180	188	e277	29	21	20	152	27	38
23	30	55	29	55	95	131	29	20	21	183	37	23
24	27	44	45	e150	62	78	62	18	94	91	28	22
25	46	45	60	100	45	56	93	24	43	39	26	32
26	27	38	44	167	35	57	54	22	44	45	40	25
27	31	40	32	63	31	e223	41	20	29	81	34	22
28	46	67	26	75	29	142	36	20	28	41	26	21
29	52	e155	27	109	---	129	34	20	26	28	25	20
30	28	79	24	e181	---	70	32	20	24	25	29	21
31	30	---	123	e256	---	63	---	19	---	22	38	---
TOTAL	2072	2323	1468	1920	2639	3035	1495	724	789	1366	1578	875
MEAN	66.8	77.4	47.4	61.9	94.2	97.9	49.8	23.4	26.3	44.1	50.9	29.2
MAX	179	213	123	256	274	317	93	30	94	183	235	103
MIN	27	23	24	21	29	24	29	18	17	17	21	20
AC-FT	4110	4610	2910	3810	5230	6020	2970	1440	1560	2710	3130	1740

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1983 - 1999, BY WATER YEAR (WY)

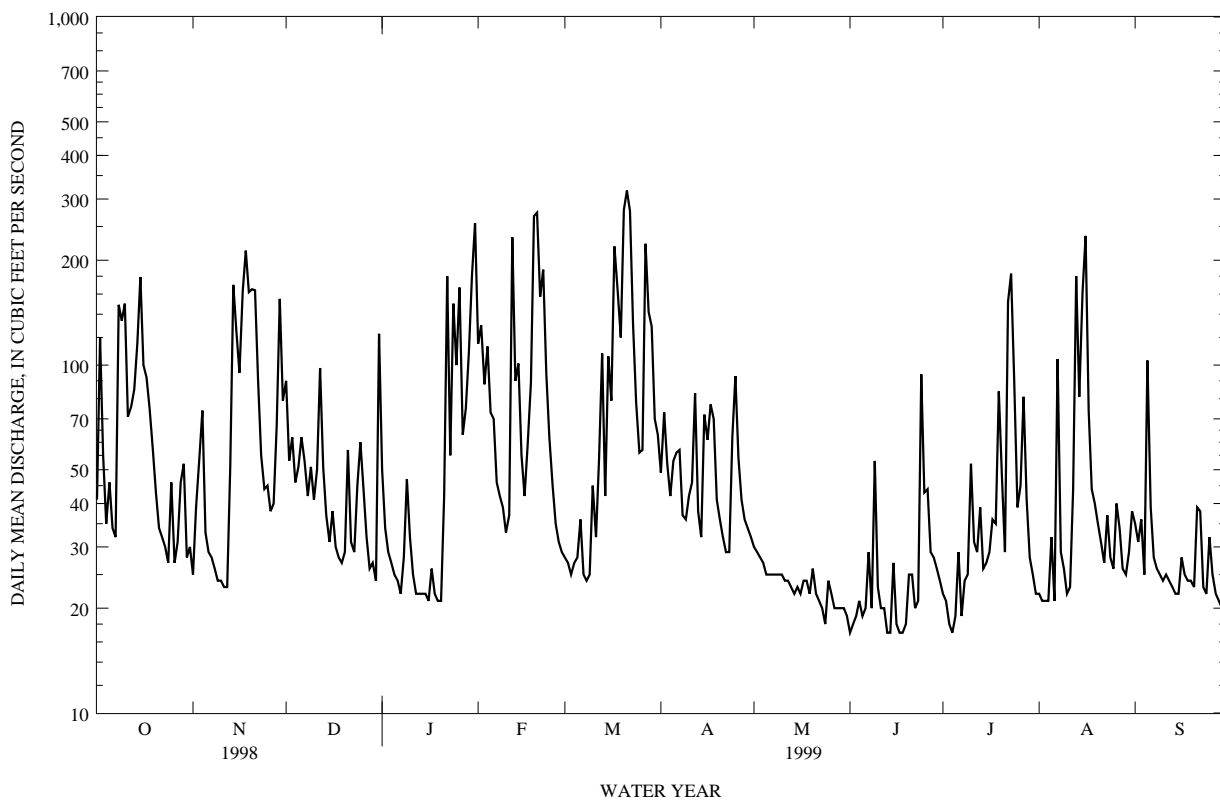
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
MEAN	52.5	70.7	65.5	67.8	58.7	81.6	86.5	65.4	60.1	71.8	60.0	48.4					
MAX	103	132	103	149	108	176	230	136	110	137	97.0	133					
(WY)	1984	1998	1997	1988	1994	1994	1989	1987	1998	1994	1993	1992					
MIN	11.9	20.5	18.3	25.4	24.6	23.6	20.8	23.4	24.4	25.2	26.0	15.8					
(WY)	1985	1985	1985	1985	1998	1998	1992	1999	1985	1984	1984	1984					

e Estimated

HAWAII, ISLAND OF MAUI

16604500 IAO STREAM AT KEPANIWAI PARK, NEAR WAILUKU--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1983 - 1999	
ANNUAL TOTAL	22858		20284			
ANNUAL MEAN	62.6		55.6		66.2	
HIGHEST ANNUAL MEAN					93.4	1994
LOWEST ANNUAL MEAN					41.4	1985
HIGHEST DAILY MEAN	450	Sep 2	317	Mar 21	913	Apr 10 1986
LOWEST DAILY MEAN	14	Feb 20	17	Jun 1	11	Oct 7 1984
ANNUAL SEVEN-DAY MINIMUM	15	Mar 15	19	Jun 13	11	Oct 16 1984
ANNUAL RUNOFF (AC-FT)	45340		40230		47950	
10 PERCENT EXCEEDS	139		127		136	
50 PERCENT EXCEEDS	44		34		42	
90 PERCENT EXCEEDS	18		21		21	



HAWAII, ISLAND OF MAUI
16614000 WAIHEE RIVER AT DAM NEAR WAIHEE

LOCATION.--Lat 20°56'21 " , long 156°32'59 " , Hydrologic Unit 20020000, on right bank at dam 8 ft upstream from the abandoned Waihee canal intake, 2.6 mi southwest from Waihee Point, and 4.4 mi northwest from Wailuku Post Office.

DRAINAGE AREA.--4.20 mi².

PERIOD OF RECORD.--November 1910 to December 1913, November 1983 to current year. Low-flow records not equivalent prior to December 31, 1913, due to Waihee canal diverted water upstream.

GAGE.--Water-stage recorder. Elevation of gage is 605 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Matt Wong. Records fair. No diversion upstream of station.

AVERAGE DISCHARGE.--15 years (water years 1985-99), 79.8 ft³/s (57,850 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,660 ft³/s, January 28, 1988, gage height, 8.95 ft, from rating curve extended above 280 ft³/s on basis of slope-area measurements at gage heights 6.70 ft and 8.95 ft; minimum, 14 ft³/s, July 13, 1995.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 2,000 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Feb. 19	2130	*2,250	*5.06	No other peak greater than base discharge.			

Minimum discharge, 33 ft³/s, September 29.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

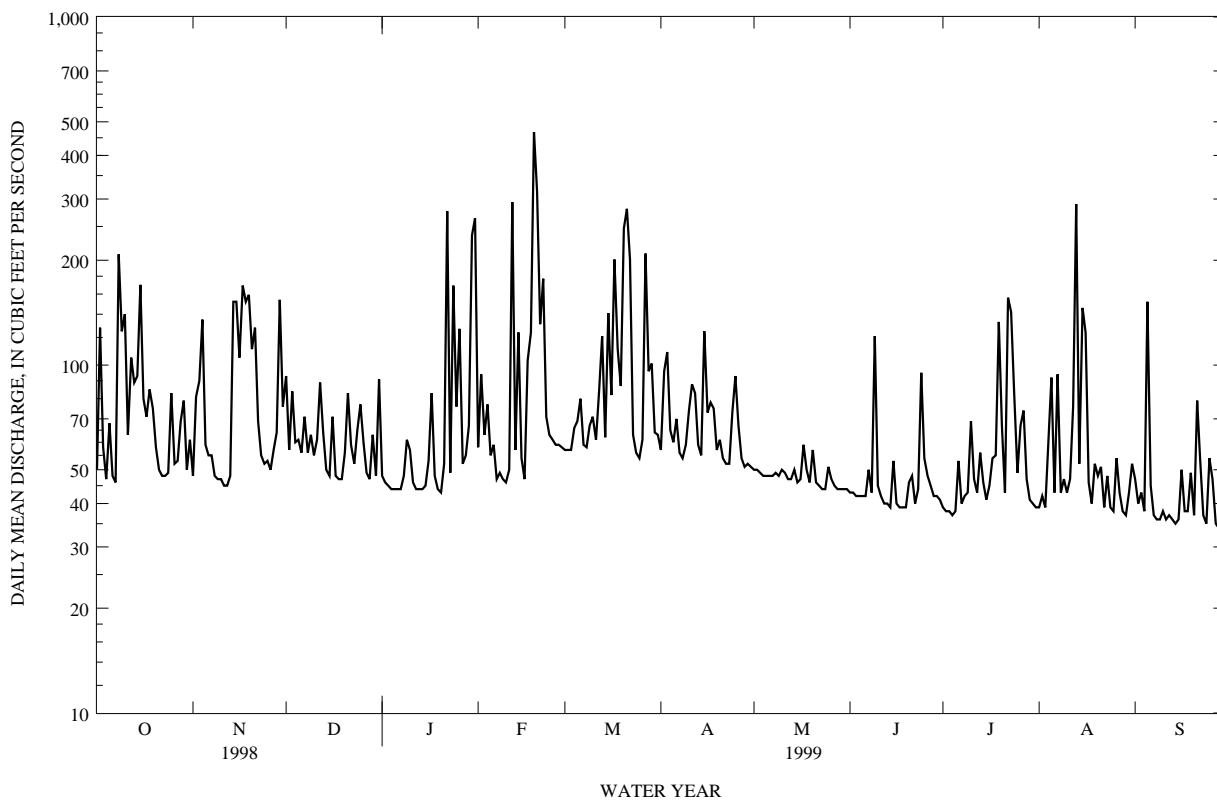
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	50	48	93	48	58	57	57	50	43	39	39	47
2	128	81	57	46	94	57	96	50	43	38	42	40
3	58	90	84	45	63	57	109	49	42	38	39	43
4	47	135	60	44	77	66	65	48	42	37	60	38
5	68	59	61	44	55	69	60	48	42	38	92	152
6	48	55	56	44	59	80	70	48	42	53	43	45
7	46	55	71	44	47	59	56	48	50	40	94	37
8	208	48	56	48	49	58	54	49	43	42	43	36
9	125	47	63	61	47	67	59	48	121	43	47	36
10	140	47	55	57	46	71	74	50	45	69	43	38
11	63	45	61	46	50	61	88	49	42	47	47	36
12	105	45	89	44	294	84	83	47	40	43	76	37
13	89	48	64	44	57	121	59	47	40	56	290	36
14	93	152	50	44	124	62	55	50	39	46	52	35
15	170	152	48	45	54	141	125	46	53	41	146	36
16	80	105	71	53	47	82	73	47	40	45	124	50
17	71	169	48	83	103	201	78	59	39	54	46	38
18	85	152	47	48	124	111	75	50	39	55	40	38
19	75	159	47	44	467	87	57	46	39	133	52	49
20	58	111	56	43	316	247	61	57	46	67	48	37
21	50	128	83	52	131	281	54	46	48	43	51	79
22	48	69	59	277	177	201	52	45	40	156	39	53
23	48	55	52	49	71	63	52	44	44	142	48	37
24	49	52	65	169	63	56	73	44	95	83	39	35
25	83	53	77	76	61	54	93	51	54	49	38	54
26	52	50	60	127	59	61	67	47	48	67	54	47
27	53	57	49	52	59	209	54	45	45	74	43	35
28	69	64	47	55	58	96	51	44	42	47	38	34
29	79	154	63	67	---	101	52	44	42	41	37	34
30	50	76	48	236	---	64	51	44	41	40	43	37
31	61	---	91	264	---	63	---	44	---	39	52	---
TOTAL	2449	2561	1931	2399	2910	3087	2053	1484	1429	1805	1945	1349
MEAN	79.0	85.4	62.3	77.4	104	99.6	68.4	47.9	47.6	58.2	62.7	45.0
MAX	208	169	93	277	467	281	125	59	121	156	290	152
MIN	46	45	47	43	46	54	51	44	39	37	37	34
AC-FT	4860	5080	3830	4760	5770	6120	4070	2940	2830	3580	3860	2680

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1984 - 1999, BY WATER YEAR (WY)

MEAN	68.7	84.6	72.9	75.2	68.3	91.2	93.1	79.0	73.9	88.8	75.8	70.9
MAX	91.7	150	109	186	106	179	276	143	118	136	99.6	160
(WY)	1986	1991	1988	1988	1988	1994	1989	1987	1987	1994	1991	1992
MIN	27.4	36.8	31.3	29.4	42.2	43.7	36.6	41.5	43.4	54.8	46.1	32.9
(WY)	1985	1985	1985	1985	1993	1992	1992	1996	1984	1984	1984	1984

HAWAII, ISLAND OF MAUI
 16614000 WAIHEE RIVER AT DAM NEAR WAIHEE--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1984 - 1999	
ANNUAL TOTAL	26724		25402		79.8	
ANNUAL MEAN	73.2		69.6		57.5	
HIGHEST ANNUAL MEAN					106	1994
LOWEST ANNUAL MEAN					57.5	1985
HIGHEST DAILY MEAN	416	Sep 2	467	Feb 19	1160	Jan 28 1988
LOWEST DAILY MEAN	35	Mar 20	34	Sep 28	22	Jan 18 1985
ANNUAL SEVEN-DAY MINIMUM	37	Mar 15	36	Sep 8	23	Jan 18 1985
ANNUAL RUNOFF (AC-FT)	53010		50380		57850	
10 PERCENT EXCEEDS	123		124		134	
50 PERCENT EXCEEDS	60		53		55	
90 PERCENT EXCEEDS	44		40		38	



HAWAII, ISLAND OF MAUI
16618000 KAHAKULOA STREAM NEAR HONOKOHAU
(Hydrologic Benchmark Network Station)

LOCATION.--Lat 20°58'54", long 156°33'26", Hydrologic Unit 20020000, on right bank 0.5 mi downstream from Kapuna Stream, 1.3 mi south of Kahakuloa, 2.0 mi west of Puu Makawana, and 4.3 mi southeast of Honokohau.

DRAINAGE AREA.--3.47 mi².

PERIOD OF RECORD.--July 1939 to August 1943, September 1947 to November 1970, December 1974 to current year. Records for January 1913 to December 1914 (fragmentary) at site 1.0 mi upstream not equivalent owing to difference in drainage areas.

REVISED RECORDS.--WSP 1319: 1948, 1949(M). WSP 1569: Drainage area.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 330 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Matt Wong. Records fair except for estimated discharges which are poor. No diversion upstream of station.

AVERAGE DISCHARGE.--50 years (water years 1940-42, 1948-70, 1976-99), 17.8 ft³/s (12,910 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,220 ft³/s, January 28, 1988, gage height, 9.93 ft from floodmarks, from rating curve extended above 510 ft³/s, on basis of slope-area measurements at gage heights 6.70 ft, 8.48 ft, and 9.93 ft; minimum, 2.7 ft³/s, January 22, 28, 29, February 10, 12, 13, 1985.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 700 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 22	0700	*591	*5.40				

Minimum discharge, 4.2 ft³/s, September 29.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.3	7.6	23	9.7	14	7.6	9.7	6.8	5.8	5.4	4.7	12
2	34	11	14	7.8	20	7.3	13	6.6	5.6	5.2	4.7	6.3
3	11	16	20	7.1	11	7.1	38	6.4	e5.6	4.8	5.9	5.9
4	7.2	30	13	6.4	18	e7.4	17	6.4	e5.6	4.8	4.6	7.4
5	23	25	12	6.2	11	e7.4	8.3	6.4	e5.5	5.4	11	12
6	8.7	12	9.1	6.2	12	e9.0	8.3	6.2	e5.7	9.1	5.8	8.8
7	6.9	9.7	9.1	6.0	8.3	e7.9	7.8	6.2	e7.7	5.8	16	5.5
8	98	7.8	8.6	6.2	8.3	e7.0	7.3	6.2	e6.3	5.6	6.2	5.1
9	46	e7.0	9.1	21	7.8	e7.9	9.7	6.2	e9.1	5.6	5.3	5.0
10	49	e7.0	8.6	15	7.6	e10	24	6.0	e6.4	9.5	5.2	4.8
11	14	e7.0	9.4	9.2	8.2	e6.8	20	6.6	e5.6	10	8.8	5.6
12	43	e7.2	16	6.8	112	7.8	24	6.0	e5.2	6.0	12	4.9
13	38	e9.8	12	6.2	13	26	8.9	6.0	e5.1	11	146	5.2
14	32	e50	8.3	6.8	25	e11	7.8	13	e5.1	9.5	18	4.7
15	43	e35	7.3	7.1	11	e29	38	8.1	e6.0	7.8	35	4.6
16	13	e30	33	6.4	8.3	e19	11	6.6	e5.4	7.2	28	6.1
17	18	e36	8.3	37	28	e31	11	12	e5.1	9.6	11	6.4
18	24	e30	7.3	13	87	e23	27	9.5	e5.0	14	7.7	6.5
19	14	e39	6.8	8.6	182	e19	9.7	6.4	5.0	33	7.6	8.8
20	12	e29	7.4	7.8	81	e58	8.3	6.8	5.2	24	13	6.5
21	8.5	e29	18	9.0	68	e61	7.8	6.8	6.8	7.5	12	23
22	7.8	e19	7.8	120	39	e31	7.6	6.0	5.6	49	6.6	19
23	7.3	e14	7.3	11	13	e13	7.1	5.8	5.0	37	8.7	6.1
24	7.6	e11	7.1	49	11	e8.8	8.9	5.8	11	28	6.5	5.2
25	18	e12	25	16	9.4	e8.1	20	9.1	10	13	5.9	4.8
26	9.3	e11	8.4	32	8.6	7.6	8.9	6.8	9.1	9.9	9.8	4.8
27	8.6	e14	7.1	9.7	8.1	54	7.8	6.0	7.1	14	11	4.8
28	20	e20	9.2	11	7.8	42	7.3	5.8	5.8	7.5	6.2	4.5
29	19	e31	30	14	---	22	6.8	5.8	5.6	5.8	5.5	4.4
30	7.3	e18	11	98	---	11	6.8	5.8	5.8	5.3	6.4	5.7
31	11	---	29	93	---	10	---	6.2	---	4.9	8.6	---
TOTAL	665.5	585.1	402.2	663.2	838.4	577.7	397.8	214.3	187.8	375.2	443.7	214.4
MEAN	21.5	19.5	13.0	21.4	29.9	18.6	13.3	6.91	6.26	12.1	14.3	7.15
MAX	98	50	33	120	182	61	38	13	11	49	146	23
MIN	6.3	7.0	6.8	6.0	7.6	6.8	6.8	5.8	5.0	4.8	4.6	4.4
AC-FT	1320	1160	798	1320	1660	1150	789	425	373	744	880	425

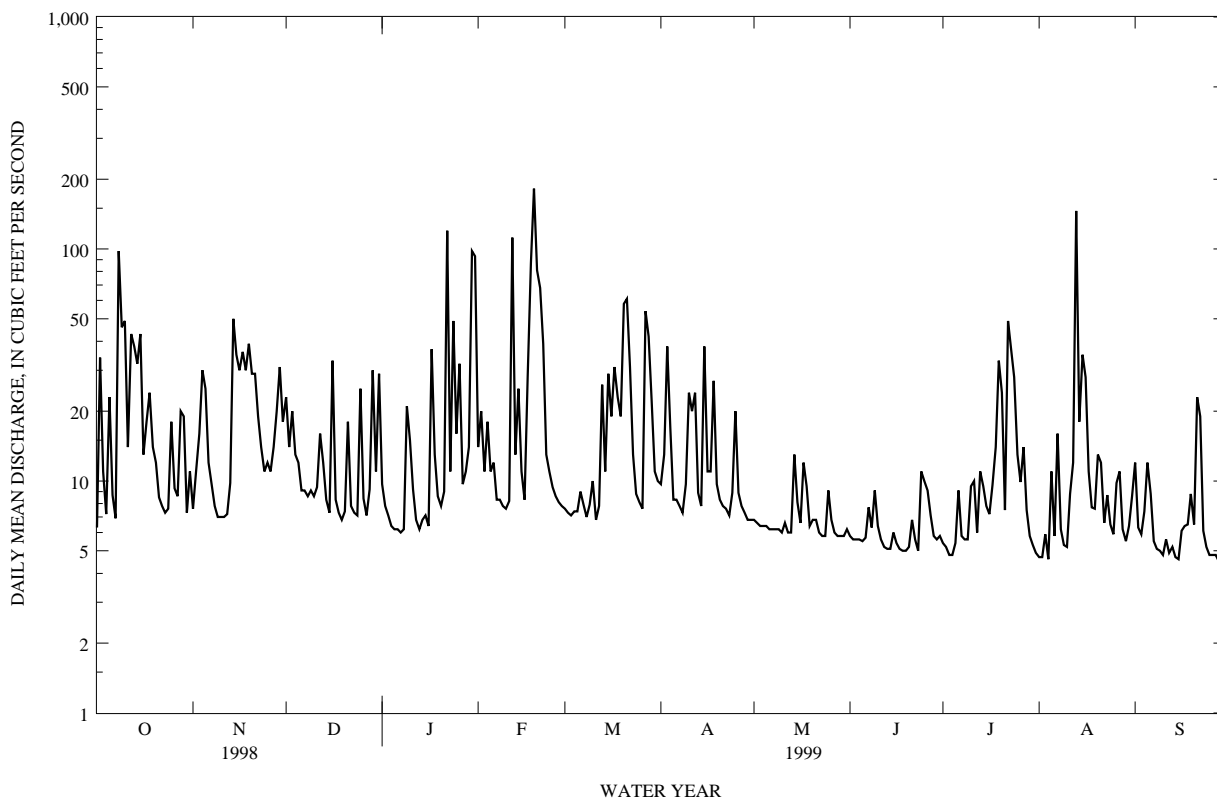
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1939 - 1999, BY WATER YEAR (WY)

	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999			
MEAN	15.2	20.7	18.8	18.0	17.6	24.9	23.8	17.2	12.2	16.2	16.4	11.9	49.6	51.2	37.5	71.2	50.2	133	121	54.5	28.1	34.4	37.2	40.4	(WY)	1942	1979	1955	1988	1969	1942	1989	1987	1987	1989	1989	1957	1992	MIN	3.20	4.41	4.88	4.82	5.09	5.78	7.02	5.21	4.99	6.32	6.09	4.18	(WY)	1985	1963	1985	1977	1978	1961	1992	1975	1962	1975	1976	1984

e Estimated

HAWAII, ISLAND OF MAUI
 16618000 KAHAKULOA STREAM NEAR HONOKOHAU--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1939 - 1999	
ANNUAL TOTAL	5275.8		5565.3			
ANNUAL MEAN	14.5		15.2		17.8	
HIGHEST ANNUAL MEAN					30.8	1942
LOWEST ANNUAL MEAN					11.0	1981
HIGHEST DAILY MEAN	169	Sep 2	182	Feb 19	696	Mar 10 1942
LOWEST DAILY MEAN	4.6	Mar 9	4.4	Sep 29	2.7	Jan 28 1985
ANNUAL SEVEN-DAY MINIMUM	4.6	Mar 8	4.9	Sep 24	2.8	Feb 6 1985
ANNUAL RUNOFF (AC-FT)	10460		11040		12910	
10 PERCENT EXCEEDS	30		31		35	
50 PERCENT EXCEEDS	8.6		8.6		8.9	
90 PERCENT EXCEEDS	5.3		5.5		5.2	



HAWAII, ISLAND OF MAUI
16620000 HONOKOHAU STREAM NEAR HONOKOHAU

LOCATION.--Lat 20°57'45 " , long 156°35'22 " , Hydrologic Unit 20020000, on left bank 1,250 ft upstream from intake of Honokohau Ditch, and 4.1 mi southeast of Honokohau.

DRAINAGE AREA.--4.11 mi².

PERIOD OF RECORD.--September, November, and December 1911 (combined flow of stream and ditch below point of diversion), March 1913 to September 1920, May 1922 to November 1988, October 1990 to current year. Record since October 1990 equivalent to earlier records.

REVISED RECORDS.--WSP 1937: Drainage area. WDR HI-79-1: 1927-48(M), 1949-78(P).

GAGE.--Water-stage recorders. Elevation of gage is 870 ft above mean sea level (from topographic map). Prior to March 7, 1913, nonrecording gage at site just below Honokohau Ditch intake at different datum. Prior to October 1, 1990, at site 250 ft downstream of gage at datum 26.67 ft lower.

REMARKS.--Records computed by Matt Wong. Records fair. No diversion upstream of station. All medium and low flow, together with the inflow from two development tunnels downstream of station, is diverted into Honokohau Ditch.

AVERAGE DISCHARGE.--81 years (water years 1914-19, 1923-88, 1991-99), 39.2 ft³/s (28,370 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,260 ft³/s, January 28, 1988 (gage-height, 8.38 ft for datum and site then in use) from rating curve extended above 3,200 ft³/s, on basis of slope-area measurement at gage height 8.38 ft; minimum, 8.4 ft³/s, May 1, 1945, January 5, 1946.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,000 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Feb. 20	0845	*754	*3.99				

Minimum discharge, 13.0 ft³/s, September 29.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

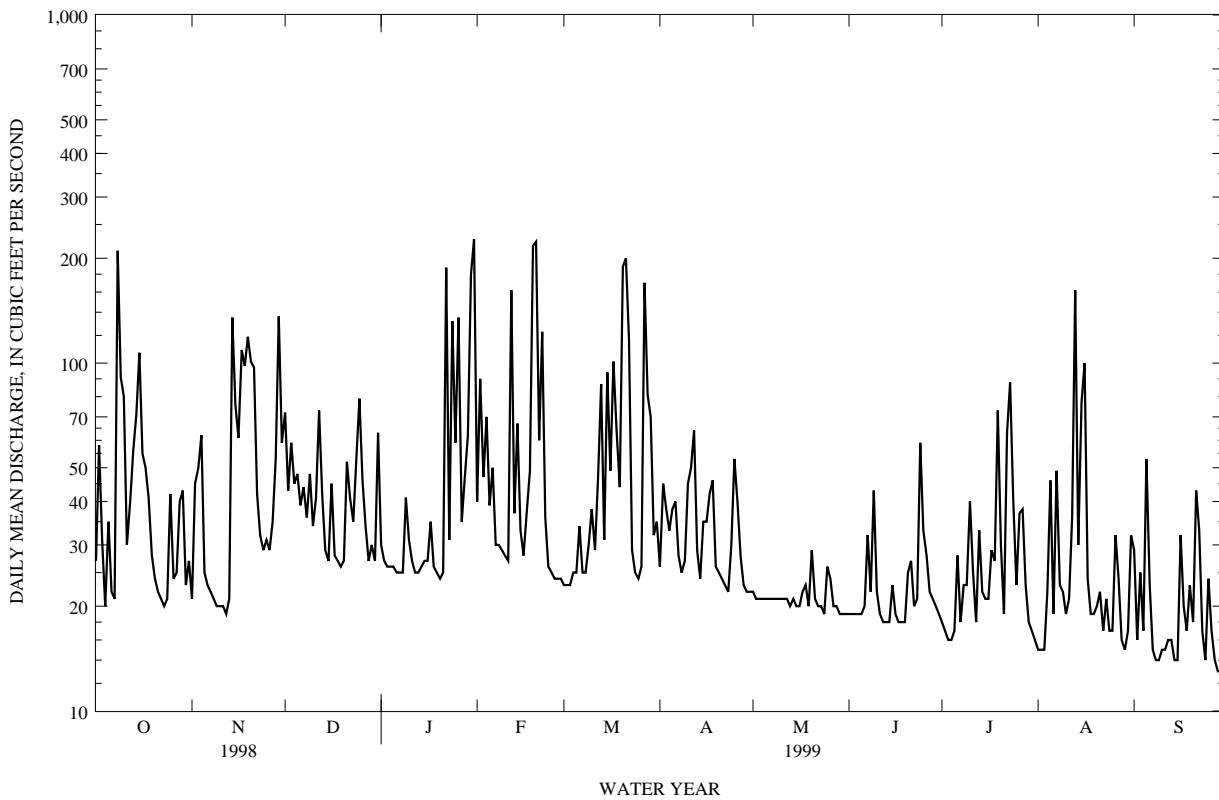
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	27	21	72	30	40	23	26	22	19	18	15	29
2	58	45	43	27	90	23	45	21	19	17	15	16
3	31	50	59	26	47	23	38	21	19	16	15	25
4	20	62	45	26	70	25	33	21	19	16	22	17
5	35	25	48	26	39	25	38	21	19	17	46	53
6	22	23	39	25	50	34	40	21	20	28	19	23
7	21	22	44	25	30	25	28	21	32	18	49	15
8	210	21	36	25	30	25	25	21	22	23	23	14
9	91	20	48	41	29	30	27	21	43	23	22	14
10	80	20	34	31	28	38	45	21	22	40	19	15
11	30	20	41	27	27	29	50	21	19	25	21	15
12	40	19	73	25	162	47	64	21	18	18	36	16
13	56	21	42	25	37	87	29	20	18	33	162	16
14	71	135	29	26	67	31	24	21	18	22	30	14
15	107	76	27	27	33	94	35	20	23	21	77	14
16	55	61	45	27	28	49	35	20	19	21	100	32
17	50	109	28	35	37	101	42	22	18	29	24	20
18	41	98	27	26	49	63	46	23	18	27	19	17
19	28	119	26	25	217	44	26	20	18	73	19	23
20	24	101	27	24	223	189	25	29	25	30	20	18
21	22	97	52	25	60	200	24	21	27	19	22	43
22	21	42	41	188	123	117	23	20	20	63	17	33
23	20	32	35	31	36	29	22	20	21	88	21	17
24	21	29	53	132	26	25	30	19	59	41	17	14
25	42	31	79	59	25	24	53	26	33	23	17	24
26	24	29	46	135	24	26	40	24	28	37	32	17
27	25	35	34	35	24	170	28	20	22	38	24	14
28	40	53	27	47	24	81	23	20	21	23	16	13
29	43	136	30	62	---	70	22	19	20	18	15	13
30	23	59	27	180	---	32	22	19	19	17	17	14
31	27	---	63	227	---	35	---	19	---	16	32	---
TOTAL	1405	1611	1320	1670	1675	1814	1008	655	698	898	983	608
MEAN	45.3	53.7	42.6	53.9	59.8	58.5	33.6	21.1	23.3	29.0	31.7	20.3
MAX	210	136	79	227	223	200	64	29	59	88	162	53
MIN	20	19	26	24	24	23	22	19	18	16	15	13
AC-FT	2790	3200	2620	3310	3320	3600	2000	1300	1380	1780	1950	1210

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1913 - 1999, BY WATER YEAR (WY)

MEAN	31.5	41.2	41.0	35.7	37.0	44.2	48.7	41.0	34.6	40.1	40.9	30.4
MAX	94.8	110	97.5	98.6	132	144	120	130	81.1	116	103	122
(WY)	1915	1915	1955	1916	1932	1942	1980	1916	1916	1914	1914	1914
MIN	10.8	11.8	13.0	12.3	13.5	13.4	12.9	12.2	14.2	16.2	14.5	12.1
(WY)	1985	1963	1936	1944	1963	1926	1992	1945	1962	1926	1971	1984

HAWAII, ISLAND OF MAUI
 16620000 HONOKOHAU STREAM NEAR HONOKOHAU--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1913 - 1999	
ANNUAL TOTAL	13644		14345			
ANNUAL MEAN	37.4		39.3		39.2	
HIGHEST ANNUAL MEAN					68.3	1914
LOWEST ANNUAL MEAN					24.1	1926
HIGHEST DAILY MEAN	210	Oct 8	227	Jan 31	781	Apr 7 1938
LOWEST DAILY MEAN	15	Mar 18	13	Sep 28	8.0	Aug 10 1920
ANNUAL SEVEN-DAY MINIMUM	15	Mar 15	15	Sep 8	8.5	Feb 6 1985
ANNUAL RUNOFF (AC-FT)	27060		28450		28370	
10 PERCENT EXCEEDS	72		73		79	
50 PERCENT EXCEEDS	27		27		24	
90 PERCENT EXCEEDS	18		18		13	



Surface-Water Station Records
for Hawaii

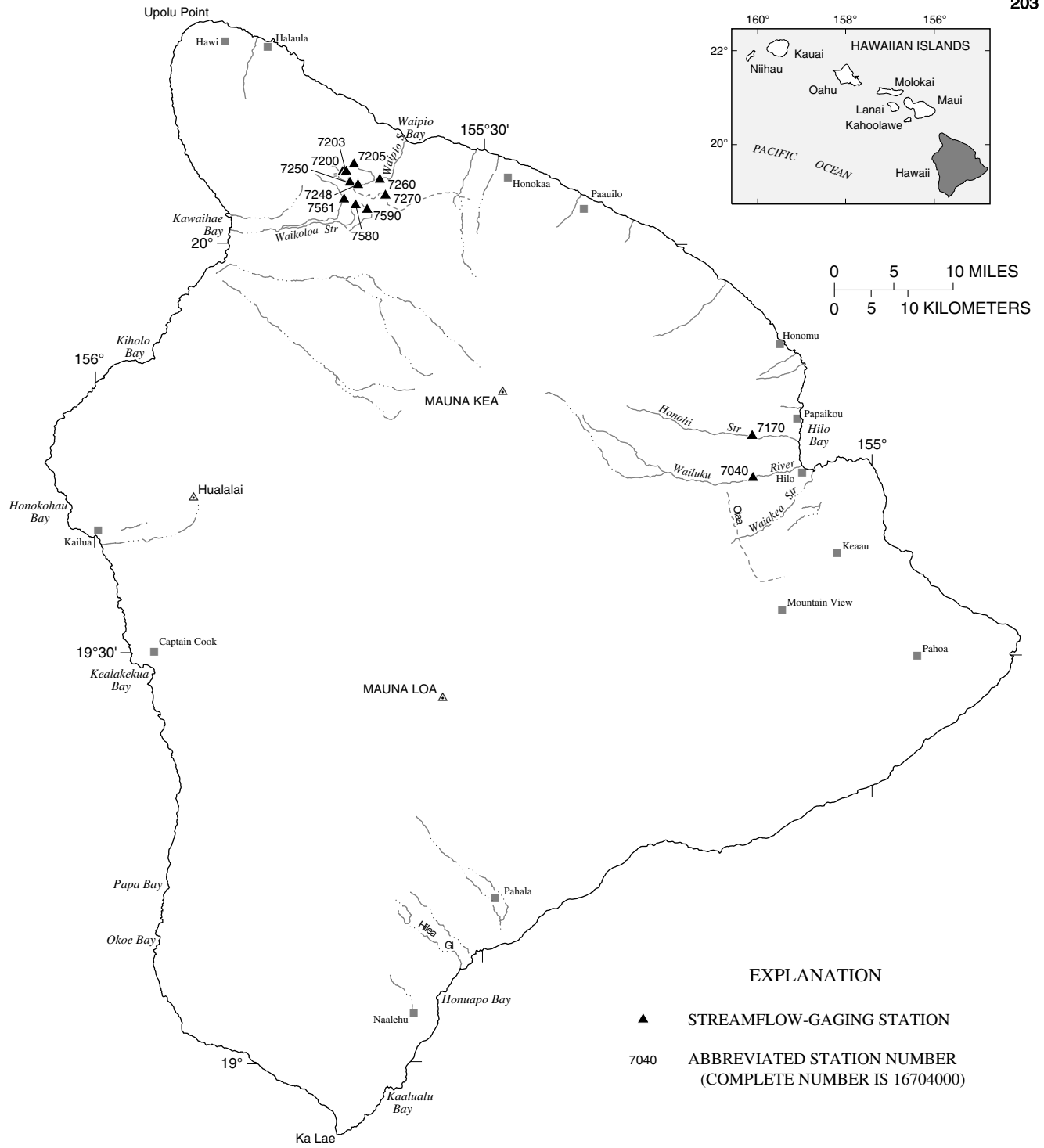


Figure 9. Locations of gaging, water-quality, and partial-record stations on Hawaii.

HAWAII, ISLAND OF HAWAII
16700000 WAIAKEA STREAM NEAR MOUNTAIN VIEW

THE RECORDS FOR WATER YEARS 1992-95 WERE NOT COMPUTED
AT THE TIME OF PUBLICATION

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HAWAII, ISLAND OF HAWAII
16704000 WAILUKU RIVER AT PIIHONUA

LOCATION.--Lat 19°42'56", long 155°09'12", Hydrologic Unit 20010000, on right bank 0.2 mi downstream from Hookelekele Stream, 0.9 mi west of Piihonua, and 4.1 mi west of Hilo Post Office. Prior to November 16, 1977, at site directly across river, on left bank.

DRAINAGE AREA.--230 mi², of which a portion probably is noncontributing.

PERIOD OF RECORD.--July 1928 to July 1940, October 1940 to December 1947, April 1948 to current year. Monthly discharge only July 1928, published in WSP 1319. Prior to July 1960, published as "above Hilo Boarding School ditch intake, near Hilo."

REVISED RECORDS.--WSP 865: 1929-36(M). WSP 965: 1941. WDR HI-80-1: 1929-79(P). WDR HI-81-1: 1940(M).

GAGE.--Water-stage recorder. Elevation of gage is 1,090 ft above mean sea level (from topographic map). Prior to November 16, 1977, at site directly across river, on left bank at same datum.

REMARKS.--Records computed by Dale Nishimoto. Records fair except for period of estimated record which is poor. Kapehu ditch diverted water from Kapehu Stream into Wailuku River upstream 1938-63. Department of Water Supply diverted about 6 ft³/s of water upstream of gage until 1967. Hydroelectric plant diverts water about 1 mi upstream of gage and discharges it about 500 ft below gage (from 1993).

AVERAGE DISCHARGE.--68 years (water years 1929-39, 1942-47, 1949-99), 280 ft³/s (202,800 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 80,200 ft³/s, revised, August 11, 1940, gage height, 28.6 ft, from floodmarks, from rating curve extended above 13,000 ft³/s based on slope-area measurement at gage height 26.16 ft; minimum, 0.15 ft³/s, January 20, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum discharge 6,410 ft³/s on February 2 at 1045 hours, gage height 13.67 ft; minimum recorded discharge, 30 ft³/s, January 21, but may have been less during period of no gage height record July 3-10, 14-19.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	63	53	478	59	2110	143	895	45	e45	e38	e30	e862
2	68	47	249	55	2820	119	688	45	e86	e35	e30	e162
3	365	49	473	51	1510	98	491	45	e59	e30	e32	e139
4	248	105	1850	50	1970	89	332	43	e88	e30	e32	e99
5	176	71	2840	51	1140	81	226	44	e71	e28	e45	e80
6	150	64	1710	49	605	75	421	40	e61	e28	e45	e84
7	129	83	988	47	346	88	318	47	e374	e28	e88	e63
8	347	73	482	44	257	75	882	48	e598	e28	e63	e57
9	482	74	355	43	266	66	1020	52	e166	e28	e88	e55
10	387	68	403	42	196	78	1150	50	e105	e28	e63	e57
11	327	63	258	39	170	74	1460	64	e80	e42	e57	e59
12	228	55	216	37	208	66	871	57	e65	e42	e55	e84
13	230	58	184	36	196	94	596	50	e55	e32	e563	e97
14	233	47	156	35	257	111	532	45	e53	e28	e255	e69
15	990	48	136	37	166	93	329	48	e50	e28	e195	e57
16	571	46	120	59	146	295	264	48	e48	e30	e528	e94
17	507	135	104	52	127	233	202	41	e48	e30	e178	e84
18	1150	273	103	43	115	331	166	52	e45	e28	e116	e78
19	347	1410	94	36	105	731	140	42	e45	e25	e94	e118
20	225	1490	77	33	808	1010	119	39	e42	e32	e116	e97
21	169	806	78	31	1190	2170	105	37	e45	e38	e147	e103
22	135	670	76	72	3340	1890	94	36	e45	e48	e84	e246
23	110	388	98	114	1260	1120	88	35	e42	e44	e103	e113
24	91	238	95	685	528	469	75	e55	e45	e50	e105	e78
25	78	165	146	1440	280	265	69	e71	e65	e48	e80	e80
26	68	144	124	3150	221	217	64	e61	e50	e42	e69	e153
27	68	119	98	499	203	1030	60	e55	e45	e65	e271	e92
28	55	280	87	349	150	2400	56	e48	e55	e50	e97	e65
29	56	811	77	467	---	991	52	e48	e50	e45	e76	e52
30	54	638	69	406	---	670	48	e47	e42	e40	e65	e48
31	63	---	64	2670	---	398	---	e46	---	e35	e246	---
TOTAL	8170	8571	12288	10781	20690	15570	11813	1484	2668	1123	4016	3525
MEAN	264	286	396	348	739	502	394	47.9	88.9	36.2	130	118
MAX	1150	1490	2840	3150	3340	2400	1460	71	598	65	563	862
MIN	54	46	64	31	105	66	48	35	42	25	30	48
AC-FT	16210	17000	24370	21380	41040	30880	23430	2940	5290	2230	7970	6990

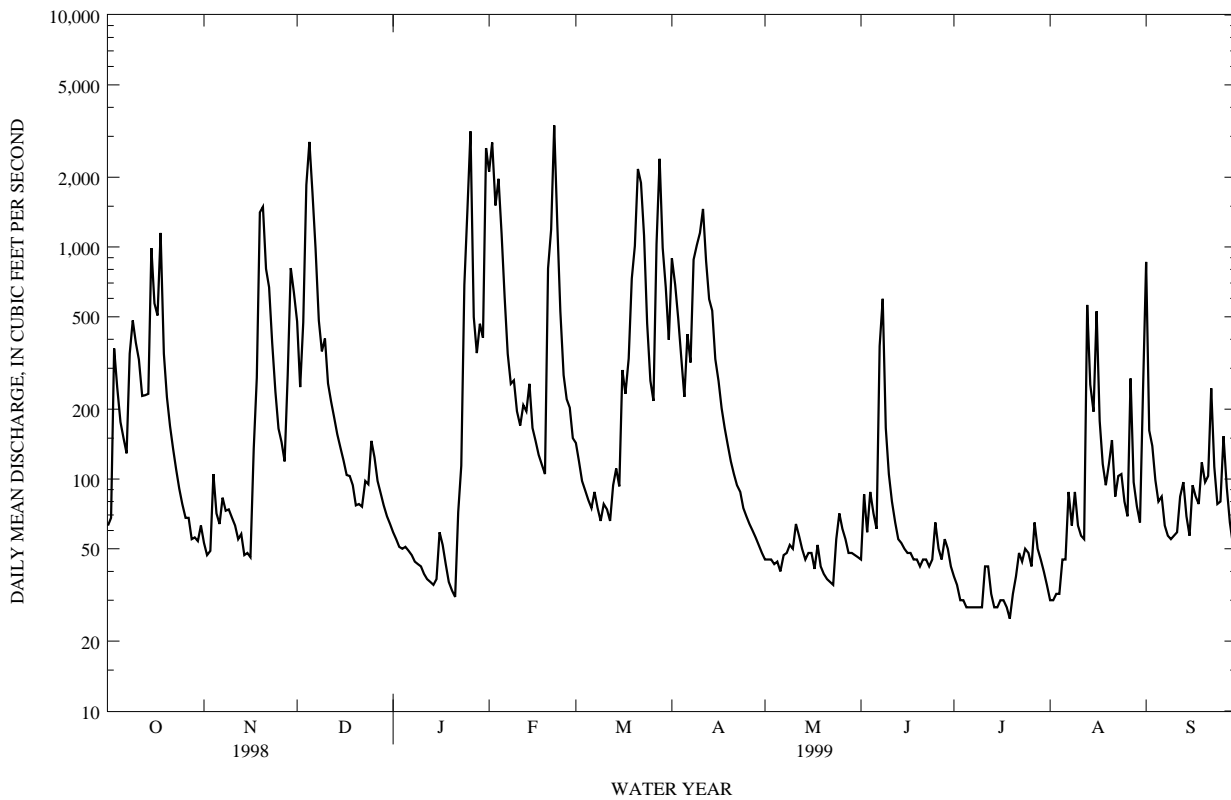
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1928 - 1999, BY WATER YEAR (WY)

	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
MEAN	170	382	347	289	305	414	385	225	132	217	287	167																																																												
MAX	765	2238	1368	2061	2050	2026	2262	1246	715	1140	1989	992																																																												
(WY)	1942	1991	1971	1975	1969	1991	1986	1964	1941	1989	1930	1930																																																												
MIN	2.96	19.1	7.15	1.10	.51	.26	7.83	6.23	5.48	2.79	12.8	10.2																																																												
(WY)	1985	1934	1934	1981	1983	1983	1992	1992	1981	1981	1971	1974																																																												

e Estimated

HAWAII, ISLAND OF HAWAII
 16704000 WAILUKU RIVER AT PIIHONUA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1928 - 1999	
ANNUAL TOTAL	64996.0		100699		280	
ANNUAL MEAN	178		276		588	
HIGHEST ANNUAL MEAN					103	
LOWEST ANNUAL MEAN					1991	
HIGHEST DAILY MEAN	2840	Dec 5	3340	Feb 22	22200	Jan 8 1975
LOWEST DAILY MEAN	7.9	Feb 2	25	Jul 19	.22	Mar 20 1983
ANNUAL SEVEN-DAY MINIMUM	9.2	Mar 19	28	Jul 4	.23	Mar 17 1983
ANNUAL RUNOFF (AC-FT)	128900		199700		202800	
10 PERCENT EXCEEDS	414		761		596	
50 PERCENT EXCEEDS	77		84		80	
90 PERCENT EXCEEDS	10		40		12	



HAWAII, ISLAND OF HAWAII
16717000 HONOLII STREAM NEAR PAPAIIKOU

LOCATION.--Lat 19°46'00", long 155°09'16", Hydrologic Unit 20010000, on left bank 0.7 mi downstream from Pohakupaa Stream, 4.1 mi west of Papaikou, and 4.8 mi northwest of Hilo Post Office.

DRAINAGE AREA.--11.6 mi².

PERIOD OF RECORD.--June 1911 to March 1913 (published as "at Kaiwiki, near Hilo"), February 1967 to current year.

REVISED RECORDS.--WDR HI-95-1: 1967-90 (maximum, 1988-90 (m), 1988-90).

GAGE.--Water-stage recorder. Elevation of gage is 1,540 ft above mean sea level (from topographic map). Prior to August 27, 1911, nonrecording gage and August 27, 1911 to March 24, 1913, water-stage recorder, at site 0.5 mi upstream at different datum.

REMARKS.--Record computed by Gary Sanchez. Records good. No diversion upstream. During period 1911-13, Honolii ditch diverted an average of about 3.2 ft³/s upstream for fluming cane and domestic use.

AVERAGE DISCHARGE.--33 years (water years 1912, 1968-99), 130 ft³/s (93,980 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,000 ft³/s, May 23, 1978, gage height, 20.00 ft, from floodmarks and from rating curve extended above 4,610 ft³/s on basis of slope-area measurement at gage height 20.00 ft; minimum, 0.8 ft³/s, January 31, 1912. Minimum discharge since February 1967 (period of no diversions), 1.0 ft³/s, February 22-28, 1980.

EXTREMES FOR CURRENT YEAR.-- Peak discharges greater than base discharge of 4,600 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Dec. 5	2115	*4,030	*11.15				

Minimum discharge, 10 ft³/s, July 19.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

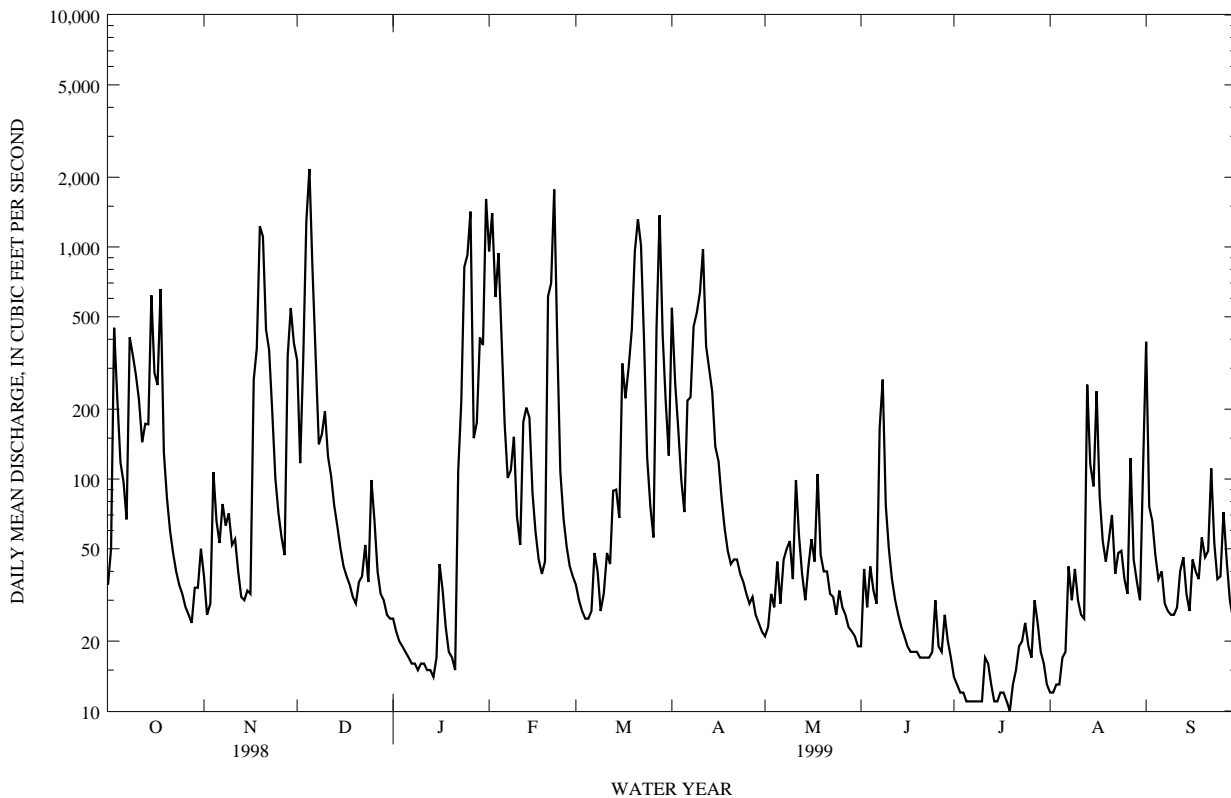
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	35	38	325	25	957	35	547	21	19	14	12	390
2	50	26	117	22	1400	30	259	23	41	13	12	76
3	449	29	331	20	608	27	165	32	28	12	13	66
4	226	107	1290	19	942	25	99	28	42	12	13	47
5	118	66	2170	18	405	25	72	44	33	11	17	37
6	97	53	807	17	172	27	218	29	29	11	18	40
7	67	78	347	16	101	48	225	45	166	11	42	29
8	408	63	141	16	109	40	454	50	268	11	30	27
9	343	71	156	15	152	27	522	54	77	11	41	26
10	282	52	196	16	69	32	636	37	50	11	30	26
11	221	55	125	16	52	48	979	99	37	17	26	28
12	144	40	103	15	176	43	374	57	30	16	25	40
13	173	31	77	15	203	89	299	39	26	13	255	46
14	172	30	63	14	184	90	238	30	23	11	116	32
15	619	33	50	17	87	68	138	42	21	11	93	27
16	287	32	42	43	59	315	119	55	19	12	239	45
17	254	268	38	33	45	223	82	44	18	12	84	40
18	659	365	35	23	39	304	61	105	18	11	54	37
19	130	1230	31	18	44	439	49	47	18	10	44	56
20	83	1110	29	17	613	958	43	40	17	13	55	46
21	60	440	36	15	700	1320	45	40	17	15	70	49
22	48	360	38	108	1770	1020	45	32	17	19	39	111
23	40	199	52	215	390	395	39	31	17	20	48	53
24	35	100	36	820	107	124	36	26	18	24	49	37
25	32	71	99	923	67	76	32	33	30	19	37	38
26	28	56	66	1420	51	56	29	28	19	17	32	72
27	26	47	40	150	42	449	31	26	18	30	123	44
28	24	340	32	175	38	1370	26	23	26	24	45	30
29	34	546	30	408	---	414	24	22	20	18	36	25
30	34	386	26	378	---	214	22	21	17	16	30	23
31	50	---	25	1610	---	126	---	19	---	13	111	---
TOTAL	5228	6322	6953	6617	9582	8457	5908	1222	1179	458	1839	1643
MEAN	169	211	224	213	342	273	197	39.4	39.3	14.8	59.3	54.8
MAX	659	1230	2170	1610	1770	1370	979	105	268	30	255	390
MIN	24	26	25	14	38	25	22	19	17	10	12	23
AC-FT	10370	12540	13790	13120	19010	16770	11720	2420	2340	908	3650	3260

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1911 - 1999, BY WATER YEAR (WY)

MEAN	81.5	194	154	129	117	211	191	95.7	77.7	119	116	84.0
MAX	222	783	625	648	752	1349	772	319	349	384	420	276
(WY)	1991	1995	1971	1975	1969	1980	1986	1989	1997	1989	1982	1994
MIN	9.70	18.7	10.5	5.64	4.80	6.71	12.5	11.4	8.61	9.66	13.9	8.81
(WY)	1985	1986	1984	1981	1980	1983	1992	1992	1981	1981	1973	1979

HAWAII, ISLAND OF HAWAII
 16717000 HONOLII STREAM NEAR PAPAIKOU--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1911 - 1999	
ANNUAL TOTAL	45754.3		55408		130	
ANNUAL MEAN	125		152		220	
HIGHEST ANNUAL MEAN					53.1 1991	
LOWEST ANNUAL MEAN					1981	
HIGHEST DAILY MEAN	2170	Dec 5	2170	Dec 5	5780	Jan 8 1975
LOWEST DAILY MEAN	5.3	Mar 25	10	Jul 19	.80	Jan 31 1912
ANNUAL SEVEN-DAY MINIMUM	5.5	Mar 20	11	Jul 4	1.0	Feb 22 1980
ANNUAL RUNOFF (AC-FT)	90750		109900		93980	
10 PERCENT EXCEEDS	341		399		269	
50 PERCENT EXCEEDS	51		43		42	
90 PERCENT EXCEEDS	7.4		17		11	



HAWAII, ISLAND OF HAWAII
16720000 KAWAINUI STREAM NEAR KAMUELA

LOCATION.--Lat 20°05'18 " , long 155°40'58 " , Hydrologic Unit 20010000, on left bank 250 ft upstream from Upper Hamakua ditch intake, and 4.5 mi north of Kamuela.

DRAINAGE AREA.--1.58 mi².

PERIOD OF RECORD.--January 1964 to current year.

REVISED RECORDS.--WDR HI-95-1: 1965-90 (m), 1970, 1971, 1979, 1984, 1990.

GAGE.--Water-stage recorder. Elevation of gage is 4,060 ft above mean sea level (from topographic map).

REMARKS.--Record computed by Dale Nishimoto. Records fair. No diversion upstream.

AVERAGE DISCHARGE.--35 years (water years 1965-99, 15.1 ft³/s (10,950 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,160 ft³/s, November 18, 1979, gage height, 10.03 ft, from rating curve extended above 53 ft³/s on basis of computations of peak flow over dam and slope-area measurement at gage height 10.03 ft; minimum, 0.01 ft³/s, January 23-28, February 20-21, 1977, December 16-19, February 23, 24, 1980 (revised).

EXTREMES FOR CURRENT YEAR.-- Peak discharges greater than base discharge of 440 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Oct. 12	1830	512	5.28	Mar. 20	2400	*514	*5.29

Minimum discharge, 0.30 ft³/s, January 8-9.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

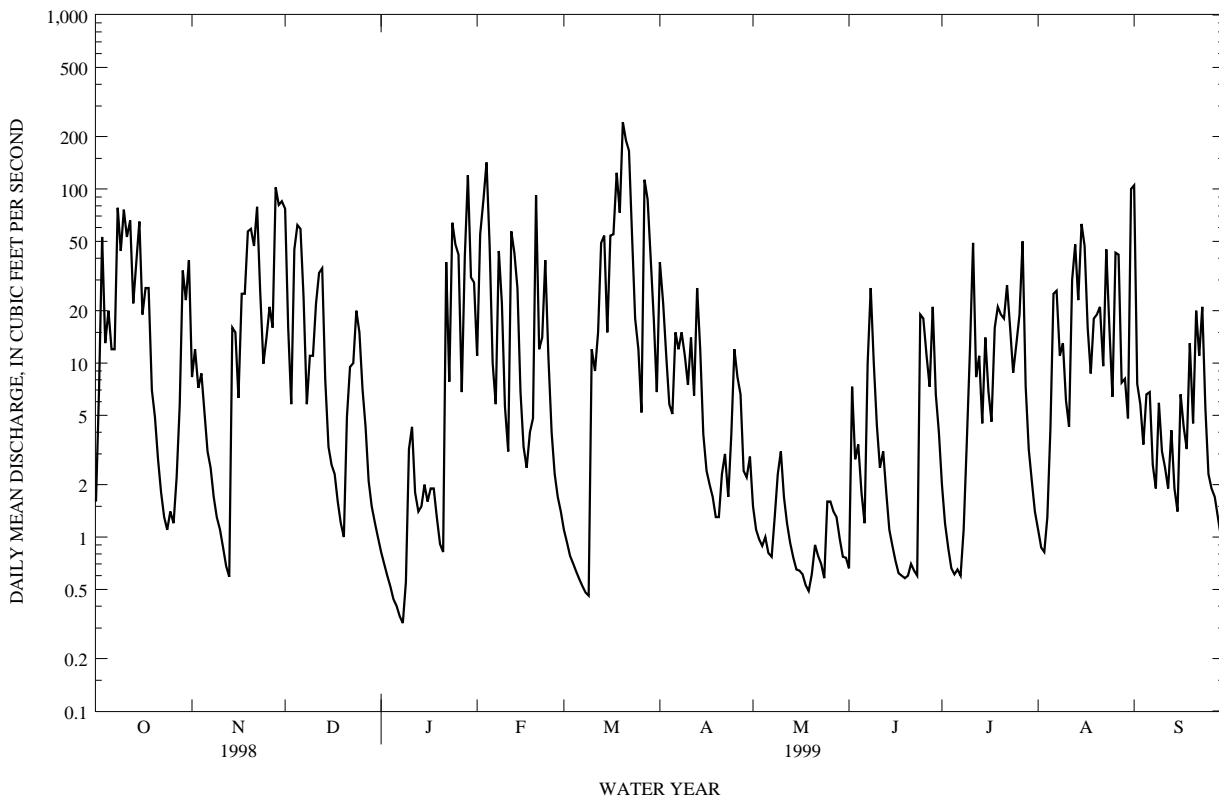
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.6	8.3	77	.82	11	1.1	38	1.5	.66	2.0	1.1	105
2	7.1	12	16	.70	55	.93	22	1.1	7.3	1.2	.87	7.6
3	53	7.2	5.8	.60	87	.78	11	.97	2.8	.86	.82	5.8
4	13	8.7	45	.52	142	.70	5.8	.89	3.4	.66	1.3	3.4
5	20	5.2	62	.44	48	.63	5.1	1.0	1.8	.61	4.2	6.6
6	12	3.1	59	.40	10	.57	15	.81	1.2	.65	25	6.8
7	12	2.5	24	.35	5.8	.52	12	.77	10	.60	26	2.6
8	78	1.7	5.8	.32	44	.48	15	1.3	27	1.1	11	1.9
9	44	1.3	11	.55	22	.46	11	2.3	10	3.4	13	5.9
10	76	1.1	11	3.2	5.6	12	7.5	3.1	4.4	12	6.1	3.1
11	53	.87	22	4.3	3.1	9.0	14	1.7	2.5	49	4.3	2.5
12	66	.68	33	1.8	57	15	6.5	1.2	3.1	8.3	30	1.9
13	22	.59	35	1.4	43	49	27	.93	1.8	11	48	4.1
14	38	16	8.0	1.5	27	54	12	.76	1.1	4.5	23	1.9
15	65	15	3.3	2.0	6.8	15	3.9	.65	.89	14	63	1.4
16	19	6.3	2.6	1.6	3.3	54	2.4	.64	.73	6.9	47	6.6
17	27	25	2.3	1.9	2.5	55	2.0	.61	.62	4.6	16	4.3
18	27	25	1.6	1.9	4.0	124	1.7	.53	.60	16	8.7	3.2
19	7.0	57	1.2	1.3	4.8	73	1.3	.49	.58	21	18	13
20	4.9	59	1.0	.91	92	242	1.3	.61	.60	19	19	4.5
21	2.8	47	4.9	.82	12	191	2.3	.90	.70	18	21	20
22	1.8	79	9.5	38	14	166	3.0	.78	.64	28	9.6	11
23	1.3	26	10	7.8	39	54	1.7	.70	.60	16	45	21
24	1.1	9.9	20	64	11	18	3.9	.58	19	8.8	16	5.5
25	1.4	14	15	48	4.0	12	12	1.6	18	13	6.4	2.3
26	1.2	21	7.1	42	2.3	5.2	8.3	1.6	11	19	43	1.9
27	2.2	16	4.3	6.8	1.7	113	6.6	1.4	7.3	50	42	1.7
28	5.7	102	2.1	41	1.4	87	2.4	1.3	21	7.4	7.7	1.3
29	34	81	1.5	120	---	40	2.2	.97	6.6	3.2	8.1	1.0
30	23	85	1.2	31	---	18	2.9	.77	4.0	2.1	4.8	1.1
31	39	---	.99	29	---	6.8	---	.76	---	1.4	100	---
TOTAL	759.1	737.44	503.19	454.93	759.3	1419.17	259.8	33.22	169.92	344.28	669.99	258.9
MEAN	24.5	24.6	16.2	14.7	27.1	45.8	8.66	1.07	5.66	11.1	21.6	8.63
MAX	78	102	77	120	142	242	38	3.1	27	50	100	105
MIN	1.1	.59	.99	.32	1.4	.46	1.3	.49	.58	.60	.82	1.0
AC-FT	1510	1460	998	902	1510	2810	515	66	337	683	1330	514

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1964 - 1999, BY WATER YEAR (WY)

	9.21	16.7	15.3	14.9	12.4	21.3	23.1	12.6	14.3	18.7	14.8	8.49
MEAN												
MAX	27.3	55.8	41.4	62.5	40.6	98.0	67.5	36.0	37.7	37.0	31.8	27.5
(WY)	1984	1980	1971	1979	1969	1980	1986	1998	1998	1982	1982	1992
MIN	.17	1.77	.51	.34	.51	3.33	1.71	1.07	3.18	4.56	2.70	.27
(WY)	1985	1990	1981	1981	1995	1983	1992	1999	1985	1981	1971	1965

HAWAII, ISLAND OF HAWAII
 16720000 KAWAINUI STREAM NEAR KAMUELA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1964 - 1999
ANNUAL TOTAL	8632.68	6369.24	
ANNUAL MEAN	23.7	17.4	15.1
HIGHEST ANNUAL MEAN			26.3 1980
LOWEST ANNUAL MEAN			7.33 1981
HIGHEST DAILY MEAN	178 Apr 10	242 Mar 20	612 Nov 18 1979
LOWEST DAILY MEAN	.13 Feb 14	.32 Jan 8	.01 Jan 23 1977
ANNUAL SEVEN-DAY MINIMUM	.14 Feb 9	.45 Jan 3	.01 Jan 22 1977
ANNUAL RUNOFF (AC-FT)	17120	12630	10950
10 PERCENT EXCEEDS	65	51	42
50 PERCENT EXCEEDS	12	5.9	4.5
90 PERCENT EXCEEDS	.25	.72	.50



HAWAII, ISLAND OF HAWAII
16720300 KAWAIKI STREAM NEAR KAMUELA

LOCATION.--Lat 20°05'13", long 155°40'59", Hydrologic Unit 20010000, on right bank 0.2 mi upstream from Upper Hamakua ditch intake, and 4.4 mi north of Kamuela.

DRAINAGE AREA.--0.45 mi².

PERIOD OF RECORD.--June 1968 to September 1999 (discontinued).

REVISED RECORDS.--WDR HI-80-1: 1969-79(P), WDR HI-95-1: 1968-90.

GAGE.--Water-stage recorder. Elevation of gage is 4,090 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Dale Nishimoto. Records good except for periods of estimated record which are poor. No diversions upstream.

AVERAGE DISCHARGE.-- 31 years (water years 1969-99), 3.77 ft³/s (2,730 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,470 ft³/s, November 18, 1979, gage height, 8.32 ft, from rating curve extended above 33 ft³/s on basis of slope-area measurement at gage height 8.32 ft; minimum, 0.00 ft³/s, November 14, 1968, July 5-11, 1981, March 10-16, 1983, October 16-20, 22, 1984, November 2, 1984.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 120 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Oct. 12	1830	176	3.11	Mar. 20	2330	166	3.05
Jan. 29	0145	*204	*3.28				

Minimum recorded discharge, 0.14 ft³/s, March 9-10, but may have been less during period of no gage height record March 8-9.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.29	2.1	13	.29	2.5	e.23	8.3	.48	.17	.48	.27	23
2	e1.8	3.6	3.4	.28	10	e.20	5.1	.35	2.0	.34	.24	1.5
3	e14	2.1	1.3	.27	17	e.16	2.4	.28	.79	.26	.24	.99
4	e3.4	2.6	5.9	.24	31	e.15	1.1	.29	.81	.22	.44	.76
5	e5.2	1.5	9.6	.22	9.5	e.13	.94	.32	.46	.22	1.4	2.1
6	e3.1	.89	12	.20	1.9	e.12	2.8	.28	.31	.24	5.7	2.0
7	e3.1	.73	4.7	.20	1.1	e.11	3.1	.28	2.6	.21	5.5	.76
8	e20	.59	1.3	.20	7.4	e.10	3.4	.36	6.4	.34	2.3	.59
9	e11	.53	2.8	.26	e4.6	e.10	2.3	.64	2.8	.98	3.3	1.2
10	e20	.50	2.7	.98	e1.2	2.9	1.3	.80	1.3	3.0	1.5	.81
11	e14	.45	3.5	1.4	e.65	1.9	2.4	.49	.72	12	1.0	.75
12	e17	.38	7.8	.57	e12	3.0	1.5	.36	1.2	2.0	7.2	.63
13	e5.7	.36	7.7	.47	e9.0	11	10	.28	.65	3.0	9.0	1.1
14	e9.9	2.5	2.0	.57	e5.7	12	3.0	.24	.37	1.1	4.7	.61
15	e17	3.3	.85	.63	e1.4	4.0	.93	.22	.27	3.9	15	.45
16	4.9	1.8	.63	.49	e.69	10	.60	.20	.22	1.7	9.8	1.4
17	5.1	5.1	.57	.56	e.52	11	.52	.20	.17	1.2	3.5	e1.2
18	6.4	5.5	.49	.63	e.84	28	.47	.17	.17	4.9	2.0	e.90
19	1.8	10	.43	.50	e1.0	17	.38	.17	.18	5.9	4.7	e3.6
20	1.5	13	.40	.38	e19	65	.40	.18	.19	5.0	5.5	e1.3
21	1.0	11	1.3	.35	e2.5	49	.71	.28	.20	5.1	5.5	e5.6
22	.73	18	3.0	8.9	e2.9	39	1.1	.24	.17	7.3	2.7	e3.1
23	.58	6.4	3.5	1.7	e8.2	12	.61	.22	.19	4.7	11	e5.9
24	.57	2.7	4.9	13	e2.3	4.5	1.3	.17	6.1	2.2	3.4	e1.5
25	.74	3.6	3.2	10	e.84	2.4	3.1	.45	4.5	3.7	1.3	.62
26	.65	5.2	1.4	7.5	e.48	1.0	2.3	.40	2.6	5.0	9.5	.45
27	.88	3.6	.92	1.5	e.36	23	1.8	.35	2.2	11	8.5	.43
28	2.2	19	.57	9.9	e.29	15	.60	.33	5.2	1.6	1.7	.38
29	8.7	18	.48	35	---	8.4	.54	.24	1.7	.68	2.2	.31
30	5.9	15	.41	6.8	---	3.9	.87	.21	.84	.49	1.4	.32
31	7.5	---	.33	6.4	---	1.2	---	.20	---	.35	23	---
TOTAL	194.64	160.03	101.08	110.39	154.87	326.50	63.87	9.68	45.48	89.11	153.49	64.26
MEAN	6.28	5.33	3.26	3.56	5.53	10.5	2.13	.31	1.52	2.87	4.95	2.14
MAX	20	19	13	35	31	65	10	.80	6.4	12	23	23
MIN	.29	.36	.33	.20	.29	.10	.38	.17	.17	.21	.24	.31
AC-FT	386	317	200	219	307	648	127	19	90	177	304	127

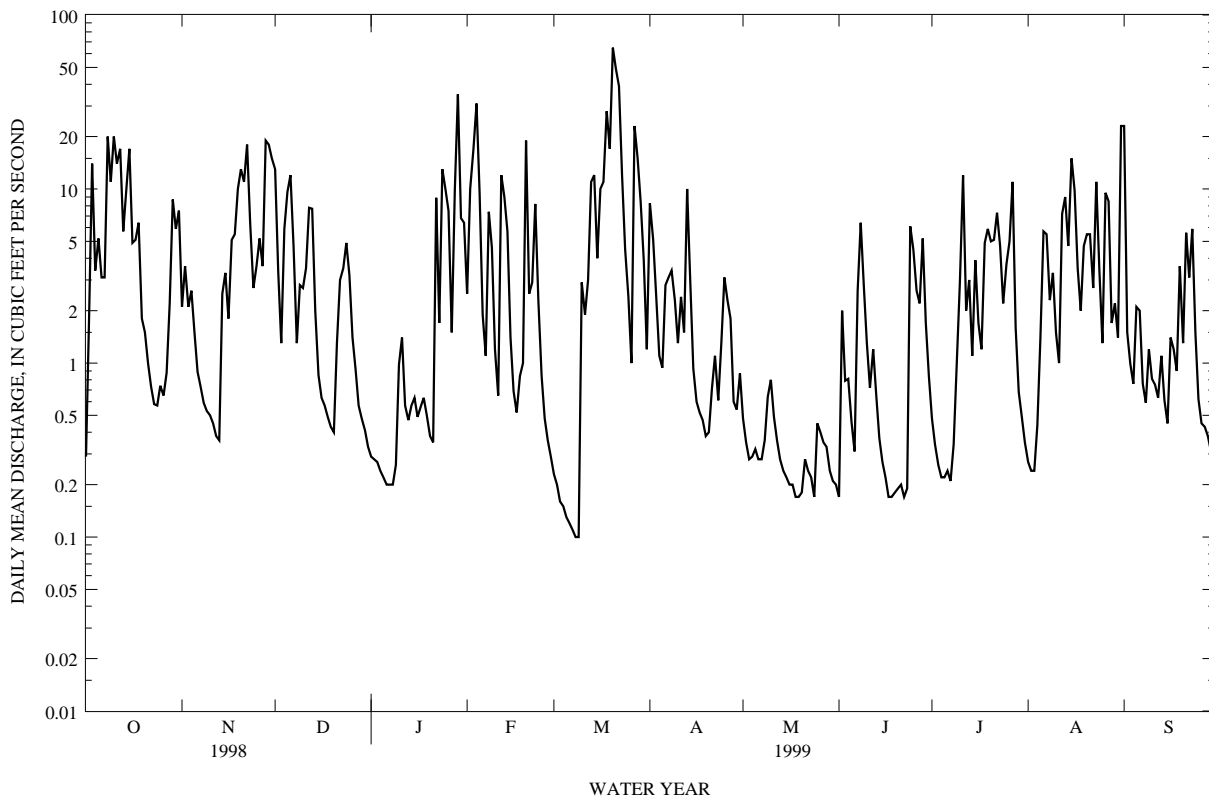
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1968 - 1999, BY WATER YEAR (WY)

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999				
MEAN	2.17	4.12	3.42	3.55	2.72	5.24	5.90	3.23	3.81	4.74	3.85	2.22																								
MAX	6.28	23.2	9.65	13.8	10.6	24.0	17.0	9.17	9.86	8.05	7.75	8.15																								
(WY)	1999	1980	1971	1979	1969	1980	1998	1998	1997	1970	1992																									
MIN	.006	.55	.11	.067	.15	.74	.53	.31	.88	.87	.67	.19																								
(WY)	1985	1996	1981	1981	1983	1983	1992	1999	1985	1981	1973	1984																								

e Estimated

HAWAII, ISLAND OF HAWAII
 16720300 KAWAIKI STREAM NEAR KAMUELA

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1968 - 1999	
ANNUAL TOTAL	2183.49	1473.40		
ANNUAL MEAN	5.98	4.04	3.77	
HIGHEST ANNUAL MEAN			7.48	1980
LOWEST ANNUAL MEAN			1.42	1981
HIGHEST DAILY MEAN	50 Apr 11	65 Mar 20	297	Nov 18 1979
LOWEST DAILY MEAN	.07 Mar 22	.10 Mar 8	.00	Nov 14 1968
ANNUAL SEVEN-DAY MINIMUM	.09 Feb 9	.12 Mar 3	.00	Jul 5 1981
ANNUAL RUNOFF (AC-FT)	4330	2920	2730	
10 PERCENT EXCEEDS	15	11	9.5	
50 PERCENT EXCEEDS	3.5	1.4	1.3	
90 PERCENT EXCEEDS	.14	.24	.16	



HAWAII, ISLAND OF HAWAII

16720500 UPPER HAMAKUA DITCH BELOW KAWAIKI STREAM, NEAR KAMUELA

LOCATION.--Lat 20°05'15", long 155°40'42", Hydrologic Unit 20010000, on right bank 800 ft downstream from Kawaiiki Stream intake and 4.4 mi north of Kamuela.

PERIOD OF RECORD.--January 1964 to current year.

GAGE.--Water-stage recorders and concrete control. Elevation of gage is 4,020 ft (from topographic map).

REMARKS.--Records computed by Gary Sanchez. Records good. Ditch diverts from Kawainui and Kawaiiki Streams for irrigation in vicinity of Kamuela. Rain gage located at station monitoring total rainfall between service dates.

AVERAGE DISCHARGE.-- 35 years (water years 1965-99), 7.44 ft³/s (5,390 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 49 ft³/s, November 2, 1967; no flow, July 8-9, 14-16, 1992, August 4-6, 1992.

EXTREMES FOR CURRENT YEAR.-- Maximum daily discharge, 14 ft³/s, October 3, 8-12, 15, January 29, February 4, March 18, 20-22, September 1; minimum daily, 0.48 ft³/s, March 8.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.5	9.8	13	1.2	11	1.1	13	2.2	.73	2.7	1.4	14
2	9.2	12	11	1.0	12	.87	13	1.5	7.2	1.7	1.1	8.9
3	14	9.4	9.4	.90	13	.75	11	1.3	3.9	1.2	1.1	7.5
4	12	10	13	.78	14	.66	7.9	1.2	4.5	.88	2.3	4.6
5	11	7.8	13	.72	13	.61	6.0	1.4	2.4	.89	6.4	7.2
6	12	5.3	13	.66	11	.56	12	1.1	1.5	.93	8.6	8.5
7	11	4.1	12	.61	7.4	.53	9.7	1.0	7.4	.81	12	3.7
8	14	3.1	7.4	.61	10	.48	12	1.9	13	1.6	9.2	2.8
9	14	2.6	6.6	.97	12	.49	11	3.4	10	4.6	12	7.5
10	14	2.2	10	5.3	7.2	5.9	9.2	4.5	6.0	10	8.1	4.5
11	14	1.7	12	6.3	3.4	9.3	10	2.2	3.8	13	5.9	3.6
12	14	1.4	13	2.7	11	10	8.6	1.5	5.1	9.2	7.5	2.8
13	13	1.3	13	2.3	13	13	8.9	1.2	2.7	11	13	5.9
14	13	5.8	9.1	2.4	13	13	11	.94	1.5	6.6	13	2.7
15	14	11	4.4	2.7	8.3	11	5.8	.80	1.2	12	13	1.9
16	13	8.2	3.8	2.0	3.7	13	3.5	.83	.89	8.5	13	7.2
17	13	12	3.1	2.5	2.8	13	3.0	.71	.76	6.8	12	6.2
18	13	12	2.4	2.6	5.8	14	2.5	.62	.75	11	8.8	4.9
19	9.5	13	1.8	1.7	7.3	13	1.8	.59	.78	10	12	12
20	7.7	13	1.6	1.2	13	14	2.0	.78	.85	12	13	6.5
21	4.8	13	7.5	1.1	11	14	3.7	1.2	.92	13	12	8.5
22	3.3	13	11	12	8.1	14	4.9	.91	.82	13	9.8	10
23	2.6	12	11	9.5	13	13	2.5	.81	.83	12	13	12
24	2.4	11	10	10	11	12	4.1	.68	11	10	12	7.3
25	3.2	11	12	13	5.0	11	11	2.2	11	9.3	7.9	3.1
26	2.6	12	8.8	12	2.5	7.4	8.5	2.2	10	12	10	2.4
27	4.5	8.3	5.8	8.3	1.8	11	8.4	1.8	7.6	13	13	2.1
28	7.4	13	3.1	11	1.4	13	3.4	1.7	12	8.9	9.0	1.6
29	13	13	2.4	14	---	13	3.2	1.1	8.3	4.4	9.2	1.2
30	12	13	1.8	13	---	12	4.5	.89	5.1	3.0	6.5	1.3
31	12	---	1.4	12	---	8.8	---	.89	---	1.9	13	---
TOTAL	305.7	265.0	247.4	155.05	245.7	264.45	216.1	44.05	142.53	225.91	288.8	172.4
MEAN	9.86	8.83	7.98	5.00	8.77	8.53	7.20	1.42	4.75	7.29	9.32	5.75
MAX	14	13	13	14	14	14	13	4.5	13	13	13	14
MIN	2.4	1.3	1.4	.61	1.4	.48	1.8	.59	.73	.81	1.1	1.2
AC-FT	606	526	491	308	487	525	429	87	283	448	573	342

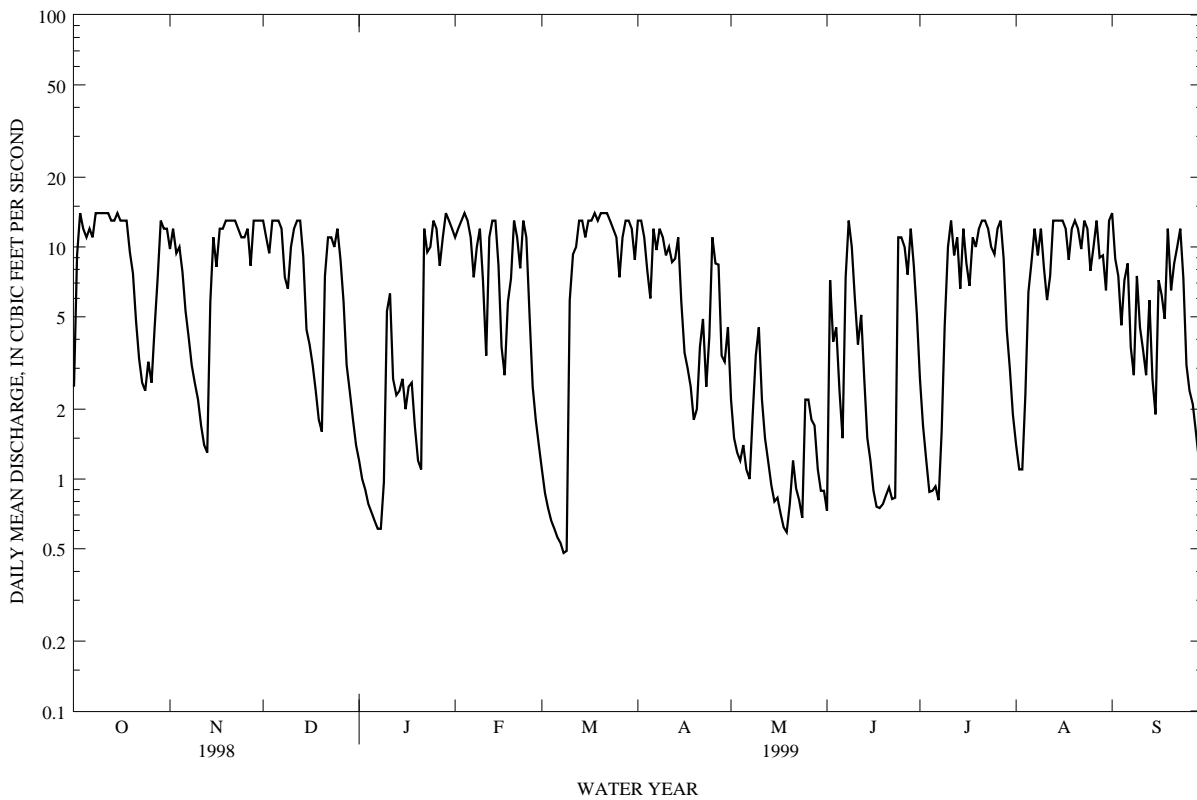
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1964 - 1999, BY WATER YEAR (WY)

MEAN	5.68	7.73	6.81	5.76	5.49	8.02	9.23	7.28	8.62	10.4	8.40	5.76
MAX	14.0	21.0	17.5	11.9	17.1	16.0	22.1	16.2	16.5	20.5	18.7	13.4
(WY)	1965	1968	1971	1967	1969	1973	1970	1970	1966	1967	1966	1964
MIN	.14	1.85	.77	.53	1.69	1.69	2.23	1.42	3.30	2.67	2.66	.19
(WY)	1985	1996	1981	1981	1995	1974	1992	1999	1984	1984	1973	1965

HAWAII, ISLAND OF HAWAII

16720500 UPPER HAMAKUA DITCH BELOW KAWAIKI STREAM, NEAR KAMUELA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1964 - 1999
ANNUAL TOTAL	3181.27	2573.09	
ANNUAL MEAN	8.72	7.05	7.44
HIGHEST ANNUAL MEAN			11.3 1970
LOWEST ANNUAL MEAN			3.78 1984
HIGHEST DAILY MEAN	15 Apr 9	14 Oct 3	49 Nov 2 1967
LOWEST DAILY MEAN	.15 Feb 14	.48 Mar 8	.00 Jul 8 1992
ANNUAL SEVEN-DAY MINIMUM	.18 Feb 9	.58 Mar 3	.04 Dec 29 1980
ANNUAL RUNOFF (AC-FT)	6310	5100	5390
10 PERCENT EXCEEDS	14	13	16
50 PERCENT EXCEEDS	11	7.4	5.2
90 PERCENT EXCEEDS	.45	.92	.70



HAWAII, ISLAND OF HAWAII

16724800 UPPER HAMAKUA DITCH ABOVE ALAKAHI STREAM, NEAR KAMUELA

LOCATION.--Lat 20°04'31 " , long 155°40'26" , Hydrologic Unit 20010000, on right bank 0.1 mi upstream from Alakahi Stream, and 3.6 mi north of Kamuela.

PERIOD OF RECORD.--April 1968 to current year.

REVISED RECORDS.--WDR HI-94-1: 1982-90.

GAGE.--Water-stage recorder and concrete, Columbus-type control. Elevation of gage is 3,890 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Gary Sanchez. Records good. Ditch diverts water from Kawainui and Kawaiki Streams for irrigation in vicinity of Kamuela.

AVERAGE DISCHARGE.--31 years (water years 1969-99), 5.32 ft³/s (3,850 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 41 ft³/s, August 18, 1972; no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 31 ft³/s, March 21; no flow May 30 to June 1.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.4	8.6	14	.60	10	.89	14	1.7	.00	1.2	.31	14
2	5.8	10	12	.40	12	.65	14	1.0	3.0	.54	.15	6.8
3	11	8.3	7.9	.29	14	.44	11	.79	1.7	.14	.12	5.3
4	9.7	8.9	12	.17	17	.32	8.3	.60	1.9	.01	.48	3.2
5	9.4	6.5	13	.07	14	.24	6.2	.68	.83	.01	2.3	4.7
6	9.3	4.0	13	.02	10	.15	11	.46	.28	.01	4.0	5.9
7	8.8	3.2	12	.03	7.5	.10	9.2	.39	3.2	.01	7.0	2.4
8	12	2.1	7.7	.02	10	.05	11	.78	8.1	.04	5.0	1.6
9	13	1.7	6.5	.07	12	.04	9.9	1.8	7.2	.73	7.0	4.0
10	16	1.3	10	2.4	7.3	3.5	8.4	2.3	3.8	3.7	4.2	2.6
11	15	.90	10	4.2	3.8	6.8	8.7	1.2	2.1	7.9	2.8	2.2
12	16	.60	12	1.5	12	7.1	7.8	.65	3.0	4.5	4.4	1.4
13	14	.47	12	.99	13	11	8.6	.33	1.4	5.3	8.3	3.0
14	14	3.1	9.1	.99	12	12	10	.15	.58	2.8	7.8	1.5
15	15	8.9	4.8	1.2	8.4	9.4	5.6	.05	.24	6.0	10	.93
16	13	6.6	3.7	.84	4.3	12	3.5	.04	.07	4.3	11	3.0
17	14	9.0	3.0	1.0	2.9	13	2.8	.01	.02	2.9	8.2	3.2
18	13	10	2.0	1.2	5.7	17	2.3	.01	.01	5.8	5.4	2.3
19	9.5	11	1.4	.65	6.7	16	1.5	.01	.01	6.3	8.4	6.1
20	7.7	12	1.2	.27	16	26	1.5	.01	.01	7.5	9.3	3.7
21	4.9	12	5.2	.20	11	31	2.9	.02	.01	7.7	9.3	5.1
22	3.2	15	8.1	8.4	7.7	29	3.9	.01	.01	8.8	6.9	6.2
23	2.2	12	8.6	6.7	12	22	2.0	.01	.01	7.9	11	7.1
24	1.7	9.8	8.9	8.1	10	16	2.5	.01	5.4	6.2	8.6	4.6
25	2.2	10	9.8	11	5.3	14	8.2	.14	7.1	5.3	5.3	1.9
26	1.8	11	7.5	10	2.9	9.0	6.6	.18	6.2	7.5	7.8	1.3
27	2.6	7.5	5.1	6.8	1.8	15	6.8	.13	4.3	9.2	11	1.1
28	5.2	14	2.6	9.6	1.3	16	2.8	.12	7.9	5.4	6.4	.65
29	11	14	1.7	16	---	15	2.4	.01	5.1	2.4	5.9	.38
30	10	14	1.2	12	---	13	3.8	.00	2.8	1.4	4.0	.31
31	11	---	.84	11	---	9.8	---	.00	---	.72	12	---
TOTAL	283.4	236.47	226.84	116.71	250.6	326.48	197.2	13.59	76.28	122.21	194.36	106.47
MEAN	9.14	7.88	7.32	3.76	8.95	10.5	6.57	.44	2.54	3.94	6.27	3.55
MAX	16	15	14	16	17	31	14	2.3	8.1	9.2	12	14
MIN	1.4	.47	.84	.02	1.3	.04	1.5	.00	.00	.01	.12	.31
AC-FT	562	469	450	231	497	648	391	27	151	242	386	211

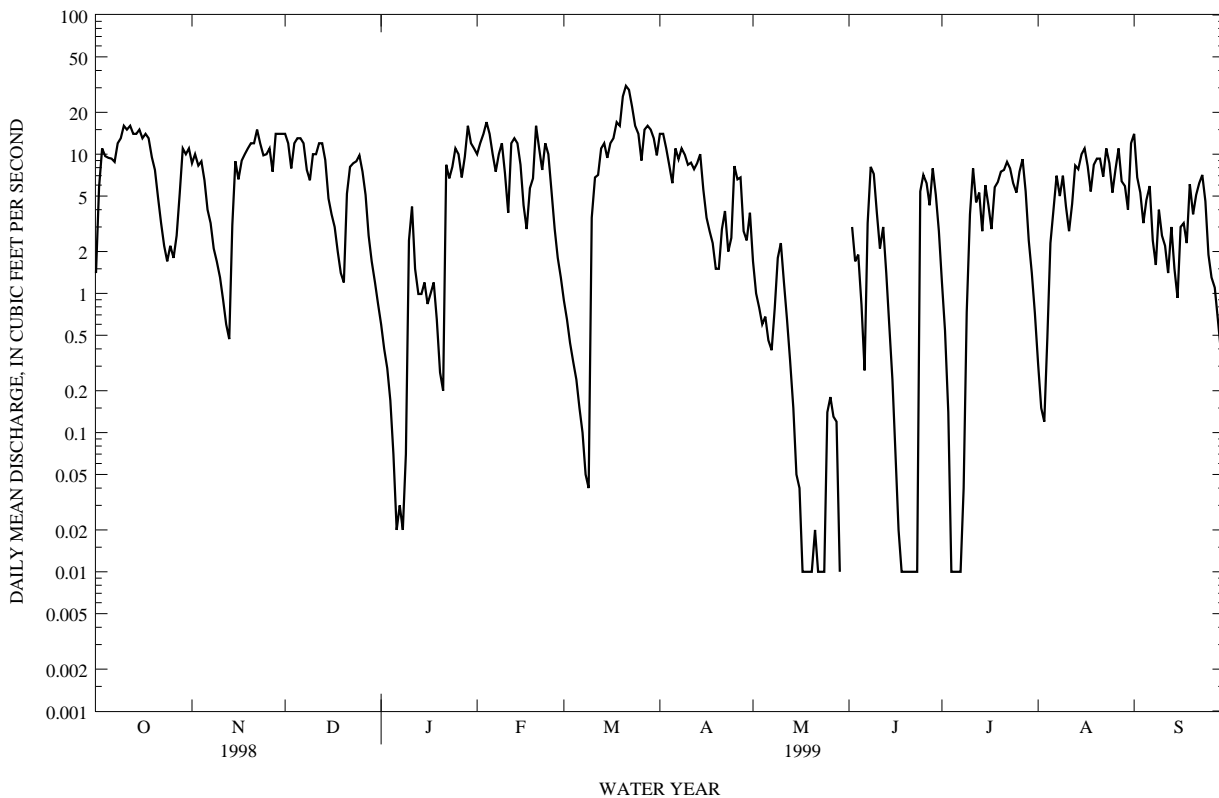
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1968 - 1999, BY WATER YEAR (WY)

MEAN	3.47	4.79	4.49	3.69	3.17	6.01	7.55	5.48	6.38	7.94	6.52	4.09
MAX	9.75	12.0	12.0	10.6	14.5	23.2	17.8	14.1	14.5	15.8	15.7	10.5
(WY)	1984	1973	1971	1979	1969	1973	1970	1998	1998	1982	1982	1992
MIN	.000	.79	.17	.088	.062	.76	.44	.44	.55	.49	.55	.33
(WY)	1985	1996	1981	1981	1980	1984	1992	1999	1980	1980	1980	1984

HAWAII, ISLAND OF HAWAII

16724800 UPPER HAMAKUA DITCH ABOVE ALAKAHI STREAM, NEAR KAMUELA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1968 - 1999	
ANNUAL TOTAL	3050.84	2150.61		
ANNUAL MEAN	8.36	5.89	5.32	
HIGHEST ANNUAL MEAN			9.22	1994
LOWEST ANNUAL MEAN			1.85	1980
HIGHEST DAILY MEAN	26 Apr 11	31 Mar 21	41	Aug 18 1972
LOWEST DAILY MEAN	.00 Mar 9	.00 May 30	.00	Oct 11 1968
ANNUAL SEVEN-DAY MINIMUM	.00 Mar 9	.01 May 17	.00	Oct 11 1968
ANNUAL RUNOFF (AC-FT)	6050	4270	3850	
10 PERCENT EXCEEDS	16	13	13	
50 PERCENT EXCEEDS	9.3	5.1	3.1	
90 PERCENT EXCEEDS	.01	.12	.01	



HAWAII, ISLAND OF HAWAII
 16725000 ALAKAHI STREAM NEAR KAMUELA

LOCATION.--Lat 20°04'27", long 155°40'25", Hydrologic Unit 20010000, on right bank 25 ft upstream from Upper Hamakua ditch intake, and 3.5 mi north of Kamuela.

DRAINAGE AREA.--0.87 mi².

PERIOD OF RECORD.--January 1964 to current year.

REVISED RECORDS.--WDR HI-94-1: 1964-90.

GAGE.--Water-stage recorders. Elevation of gage is 3,900 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Dale Nishimoto. Records fair. Parker Ranch pipeline diverts from tributary 0.4 mi upstream for ranch use in Kamuela area.

AVERAGE DISCHARGE.--35 years (water years 1965-99), 7.87 ft³/s (5,700 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,430 ft³/s (revised), January 11, 1967, gage height 8.65 ft, from rating curve extended above 28 ft³/s on basis of computations of peak flow over dam and slope-area measurement at gage height 8.65 ft; maximum gage height, 12.80 ft, November 18, 1979; minimum, 0.03 ft³/s on several days in 1965.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 180 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Oct. 12	1830	*291	*5.52	Mar. 20	2400	244	5.15
Jan. 29	0215	225	4.99				

Minimum discharge, 0.54 ft³/s, June 1-2, 20-23, July 7-8.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
 DAILY MEAN VALUES

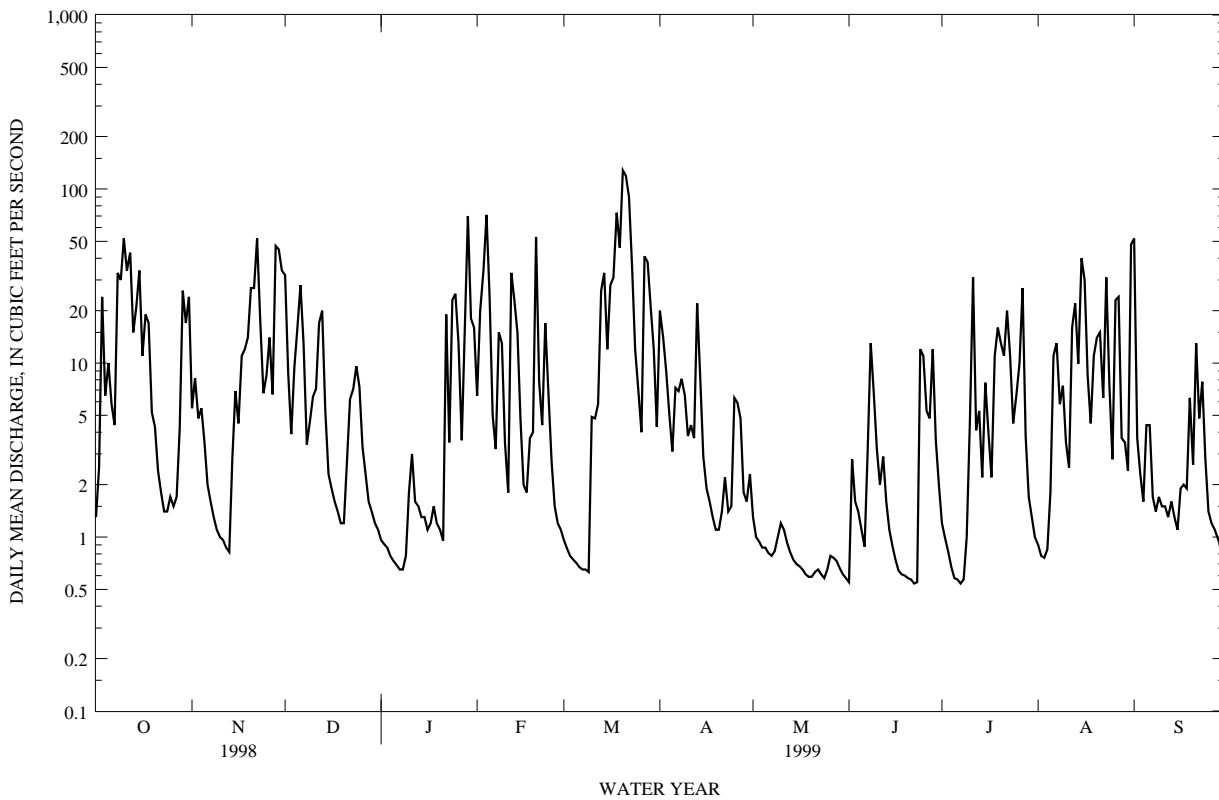
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.3	5.5	32	.96	6.5	.96	20	1.3	.55	1.2	.90	52
2	2.5	8.2	8.8	.91	20	.86	14	1.0	2.8	.99	.78	3.7
3	24	4.8	3.9	.87	34	.78	8.9	.94	1.6	.82	.76	2.3
4	6.5	5.5	9.4	.78	71	.74	5.1	.87	1.4	.67	.85	1.6
5	10	3.5	16	.73	24	.71	3.1	.87	1.1	.58	1.8	4.4
6	5.8	2.0	28	.69	5.0	.67	7.2	.81	.88	.57	11	4.4
7	4.4	1.6	13	.65	3.2	.65	6.9	.78	3.1	.54	13	1.7
8	33	1.3	3.4	.65	15	.65	8.1	.83	13	.57	5.8	1.4
9	30	1.1	4.6	.78	13	.63	6.5	1.0	6.7	1.0	7.4	1.7
10	52	1.0	6.4	1.8	3.5	4.9	3.8	1.2	3.2	4.8	3.5	1.5
11	34	.96	7.1	3.0	1.8	4.8	4.4	1.1	2.0	31	2.5	1.5
12	43	.87	17	1.6	33	5.8	3.7	.93	2.9	4.1	16	1.3
13	15	.82	20	1.5	23	26	22	.82	1.6	5.3	22	1.6
14	21	2.8	5.4	1.3	15	33	8.3	.74	1.1	2.2	9.9	1.3
15	34	6.9	2.3	1.3	4.7	12	2.9	.70	.89	7.7	40	1.1
16	11	4.5	1.9	1.1	2.0	28	1.9	.68	.74	4.0	30	1.9
17	19	11	1.6	1.2	1.8	31	1.6	.65	.64	2.2	8.4	2.0
18	17	12	1.4	1.5	3.7	73	1.3	.61	.61	11	4.5	1.9
19	5.2	14	1.2	1.2	4.0	46	1.1	.59	.60	16	11	6.3
20	4.3	27	1.2	1.1	53	128	1.1	.59	.58	13	14	2.6
21	2.4	27	2.7	.95	7.8	119	1.4	.63	.57	11	15	13
22	1.8	52	6.2	19	4.4	90	2.2	.65	.54	20	6.3	4.8
23	1.4	18	7.1	3.5	17	36	1.4	.61	.55	11	31	7.8
24	1.4	6.7	9.6	23	6.9	12	1.5	.58	12	4.5	7.5	2.8
25	1.7	8.5	7.3	25	2.7	6.9	6.3	.65	11	6.6	2.8	1.4
26	1.5	14	3.3	13	1.5	4.0	5.9	.78	5.3	10	23	1.2
27	1.7	6.6	2.3	3.6	1.2	41	4.8	.76	4.8	27	24	1.1
28	4.2	47	1.6	16	1.1	38	1.8	.73	12	3.8	3.7	.98
29	26	45	1.4	70	---	21	1.6	.66	3.6	1.7	3.5	.87
30	17	34	1.2	18	---	12	2.3	.61	2.0	1.3	2.4	.85
31	24	---	1.1	16	---	4.3	---	.58	---	1.0	48	---
TOTAL	456.1	374.15	228.4	231.67	379.8	783.35	161.1	24.25	98.35	206.14	371.29	131.00
MEAN	14.7	12.5	7.37	7.47	13.6	25.3	5.37	.78	3.28	6.65	12.0	4.37
MAX	52	52	32	70	71	128	22	1.3	13	31	48	52
MIN	1.3	.82	1.1	.65	1.1	.63	1.1	.58	.54	.54	.76	.85
AC-FT	905	742	453	460	753	1550	320	48	195	409	736	260

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1964 - 1999, BY WATER YEAR (WY)

MEAN	4.96	8.17	7.31	7.49	5.95	10.4	11.6	7.01	8.04	10.3	8.28	5.03
MAX	14.7	26.5	16.7	26.4	18.6	37.9	31.6	20.5	22.6	18.7	15.9	17.8
(WY)	1999	1980	1971	1979	1969	1980	1986	1998	1998	1978	1970	1992
MIN	.31	1.07	.54	.46	.40	1.27	.82	.78	2.04	2.38	1.72	.087
(WY)	1985	1969	1981	1981	1993	1983	1992	1999	1985	1981	1971	1965

HAWAII, ISLAND OF HAWAII
 16725000 ALAKAHI STREAM NEAR KAMUELA--Continued

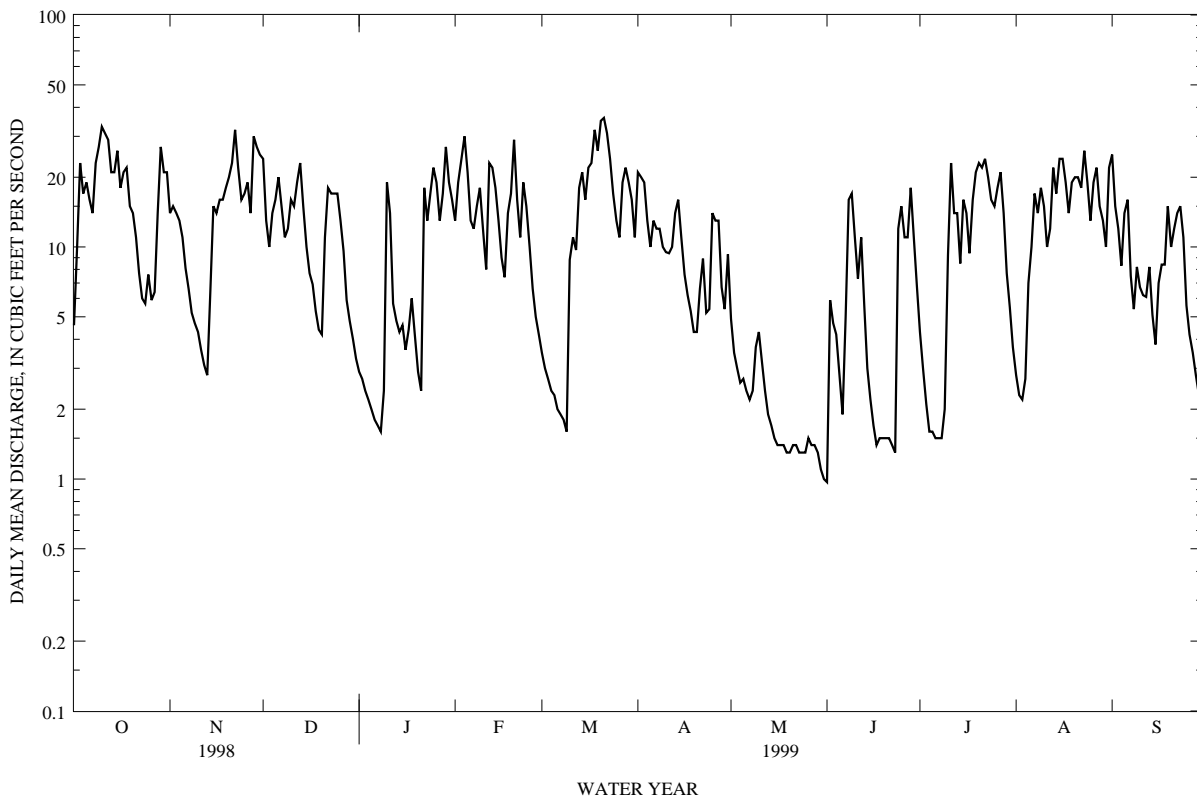
SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1964 - 1999	
ANNUAL TOTAL	4870.60	3445.60		
ANNUAL MEAN	13.3	9.44	7.87	
HIGHEST ANNUAL MEAN			13.4	1994
LOWEST ANNUAL MEAN			3.39	1981
HIGHEST DAILY MEAN	99 Apr 10	128 Mar 20	338	Nov 18 1979
LOWEST DAILY MEAN	.29 Feb 11	.54 Jun 22	.03	May 22 1965
ANNUAL SEVEN-DAY MINIMUM	.30 Feb 9	.58 Jun 17	.04	Sep 22 1965
ANNUAL RUNOFF (AC-FT)	9660	6830	5700	
10 PERCENT EXCEEDS	36	27	20	
50 PERCENT EXCEEDS	7.0	3.5	3.2	
90 PERCENT EXCEEDS	.42	.73	.57	



HAWAII, ISLAND OF HAWAII

16726000 UPPER HAMAKUA DITCH ABOVE WAIMEA RESERVOIR DIVERSION, NEAR KAMUELA--CONTINUED

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1975 - 1999	
ANNUAL TOTAL	5818.70	4185.17		
ANNUAL MEAN	15.9	11.5	9.83	
HIGHEST ANNUAL MEAN			15.0	1998
LOWEST ANNUAL MEAN			3.80	1981
HIGHEST DAILY MEAN	37 Apr 10	36 Mar 21	48	Apr 6 1977
LOWEST DAILY MEAN	.82 Feb 13	.97 Jun 1	.00	Oct 1 1974
ANNUAL SEVEN-DAY MINIMUM	.85 Feb 9	1.2 May 26	.00	Oct 1 1974
ANNUAL RUNOFF (AC-FT)	11540	8300	7120	
10 PERCENT EXCEEDS	29	22	24	
50 PERCENT EXCEEDS	16	11	6.6	
90 PERCENT EXCEEDS	1.2	1.8	.60	



HAWAII, ISLAND OF HAWAII

16727000 UPPER HAMAKUA DITCH ABOVE PUUKAPU RESERVOIR, NEAR KAMUELA

LOCATION.--Lat 20°02'53", long 155°37'17", Hydrologic Unit 20010000, on right bank 25 ft downstream from pipe railed bridge, and 4.0 mi northeast of Kamuela Post Office.

PERIOD OF RECORD.--October 1977 to current year.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 2,890 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Gary Sanchez. Records good. Ditch diverts water from Kawainui, Kawaiki, and Alakahi Streams for use in vicinity of Kamuela.

AVERAGE DISCHARGE.--22 years (water years 1978-99), 1.47 ft³/s (1,060 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 42 ft³/s, April 16, 1985; no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 13 ft³/s, June 9; no flow for many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	.08	.00	.00	.00	.00	1.2
2	.00	.00	.00	.00	.00	.00	.06	.00	.00	.00	.00	.00
3	.00	.00	.00	.00	.22	.00	.05	.00	.00	.00	.00	.00
4	.00	.28	.00	.00	.22	.00	.00	.00	.00	.00	.00	.00
5	.29	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00
6	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.16	.00
7	.00	.00	.00	.00	.00	.00	.00	.00	.11	.00	.00	.00
8	.00	.00	.00	.00	.15	.00	.00	.00	7.7	.00	.00	.00
9	.01	.00	.00	.00	.00	.00	.00	.00	13	.00	.00	.00
10	.04	.00	.00	.03	.00	.00	.00	.00	5.2	.00	.00	.00
11	.13	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
12	.11	.00	.00	.10	.03	.00	.00	.00	.00	.29	.00	.00
13	.00	.00	.00	.00	.00	.00	.13	.00	.00	.00	.00	.00
14	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.03
15	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
16	.00	.34	.00	.00	.00	.33	.00	.00	.00	.00	.24	.00
17	.03	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.08
18	.02	.00	.00	.00	.00	.31	.00	.00	.00	.00	.00	.00
19	.00	.00	.00	.00	.02	.24	.00	.00	.00	.00	.00	.00
20	.00	.00	.00	.00	.33	.60	.00	.00	.00	.00	.00	.00
21	.00	.00	.00	.00	.00	.81	.00	.00	.00	.00	.00	.00
22	.16	.14	.00	.00	.00	.34	.00	.00	.00	.00	.00	.00
23	.00	.01	.00	.00	.00	.13	.00	.00	.00	.00	.00	.00
24	.00	.34	.00	.00	.24	.00	.00	.00	.00	.00	.00	.00
25	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.11	.00
26	.00	.00	.00	.00	.00	.00	.00	.00	.00	.42	.00	.00
27	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
28	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
29	.00	.07	.00	.16	---	.01	.00	.00	.21	.00	.00	.00
30	.00	.14	.00	.02	---	.01	.00	.00	.00	.00	.00	.00
31	.00	---	.00	.00	---	.00	---	.00	---	.00	.00	---
TOTAL	0.79	1.33	0.00	0.31	1.23	2.78	0.32	0.00	26.22	0.71	0.51	1.31
MEAN	.025	.044	.000	.010	.044	.090	.011	.000	.87	.023	.016	.044
MAX	.29	.34	.00	.16	.33	.81	.13	.00	13	.42	.24	1.2
MIN	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
AC-FT	1.6	2.6	.00	.6	2.4	5.5	.6	.00	52	1.4	1.0	2.6

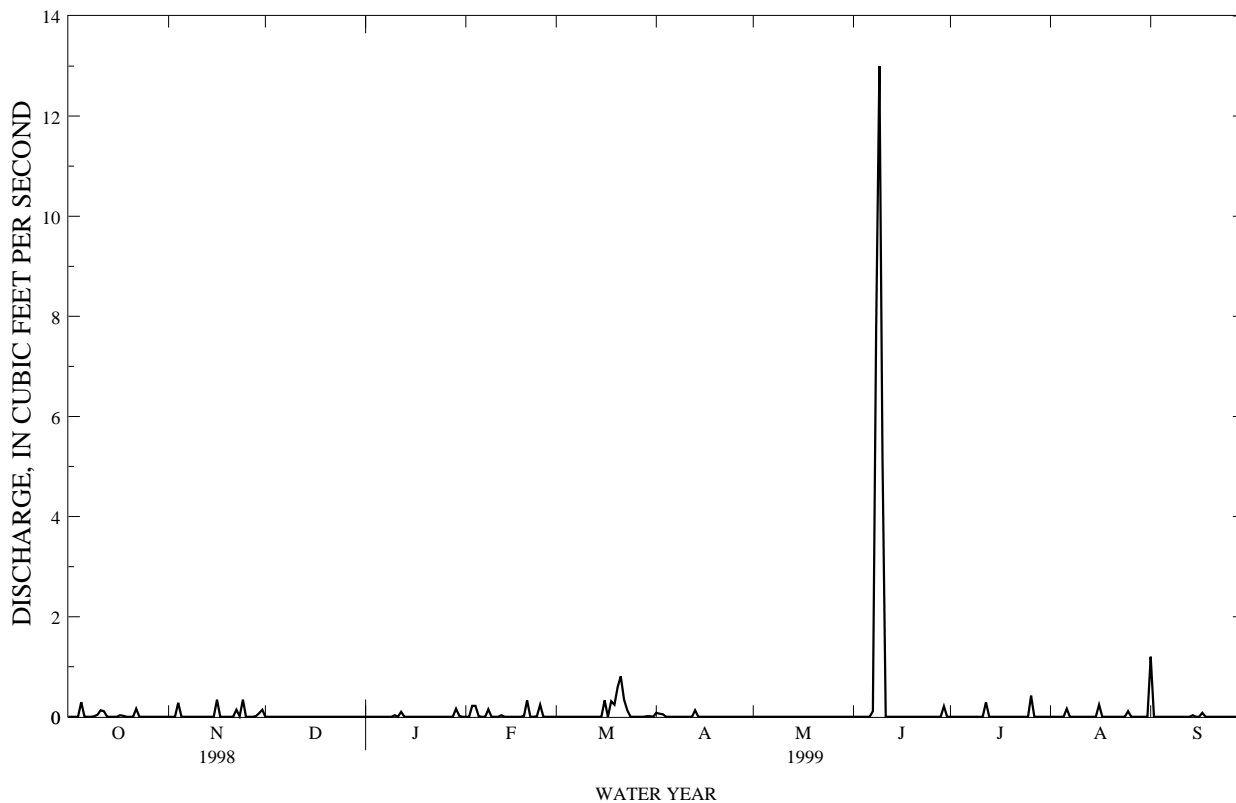
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1978 - 1999, BY WATER YEAR (WY)

MEAN	1.20	2.14	1.35	1.32	1.03	2.08	2.17	1.41	1.56	1.47	1.28	.57
MAX	6.36	10.1	5.46	8.23	4.56	15.2	13.9	9.55	11.6	9.04	10.8	4.44
(WY)	1986	1988	1988	1987	1988	1985	1986	1986	1986	1978	1985	1985
MIN	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
(WY)	1985	1990	1989	1989	1993	1989	1993	1983	1983	1980	1984	1984

HAWAII, ISLAND OF HAWAII

16727000 UPPER HAMAKUA DITCH ABOVE PUUKAPU RESERVOIR, NEAR KAMUELA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1978 - 1999	
ANNUAL TOTAL	81.79		35.51			
ANNUAL MEAN	.22		.097		1.47	
HIGHEST ANNUAL MEAN					6.79	1986
LOWEST ANNUAL MEAN					.007	1990
HIGHEST DAILY MEAN	18	Feb 24	13	Jun 9	42	Apr 16 1985
LOWEST DAILY MEAN	.00	Jan 1	.00	Oct 1	.00	Oct 1 1977
ANNUAL SEVEN-DAY MINIMUM	.00	Jan 7	.00	Oct 23	.00	Oct 1 1977
ANNUAL RUNOFF (AC-FT)	162		70		1060	
10 PERCENT EXCEEDS	.10		.08		5.0	
50 PERCENT EXCEEDS	.00		.00		.00	
90 PERCENT EXCEEDS	.00		.00		.00	



HAWAII, ISLAND OF HAWAII

16756100 KOHAKOHAU STREAM ABOVE DWS INTAKE, NEAR KAMUELA

LOCATION.--Lat 20°02'58", long 155°41'05", Hydrologic Unit 20010000, on right bank 200 ft upstream of Department of Water Supply dam and intake, 0.85 mi west of Puu Ohu, and 1.85 mi northwest of junction of Highways 19 and 190.

DRAINAGE AREA.--2.40 mi².

PERIOD OF RECORD.--June 1998 to current year.

GAGE.--Water-stage recorder. Datum of gage is 3,470 ft above mean sea level (from topographic map).

REMARKS.--Record computed by Dale Nishimoto. Records fair. Two Parker Ranch 4-in. pipelines divert water upstream at 4,250 ft and lower. Hawaii Department of Water Supply diverts water at dam 200 ft downstream for domestic use in the Kamuela and Kawaihae areas since August 20, 1973.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 746 ft³/s, March 21, 1999, gage height, 5.96 ft from rating curve developed using flow-over-dam computations and high water marks at gage; minimum, 0.26 ft³/s, June 22-24, 1999.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 400 ft³/s and maximum (*):

Water Year 1998.--Maximum and minimum discharge June 25 to September 30, 1998:

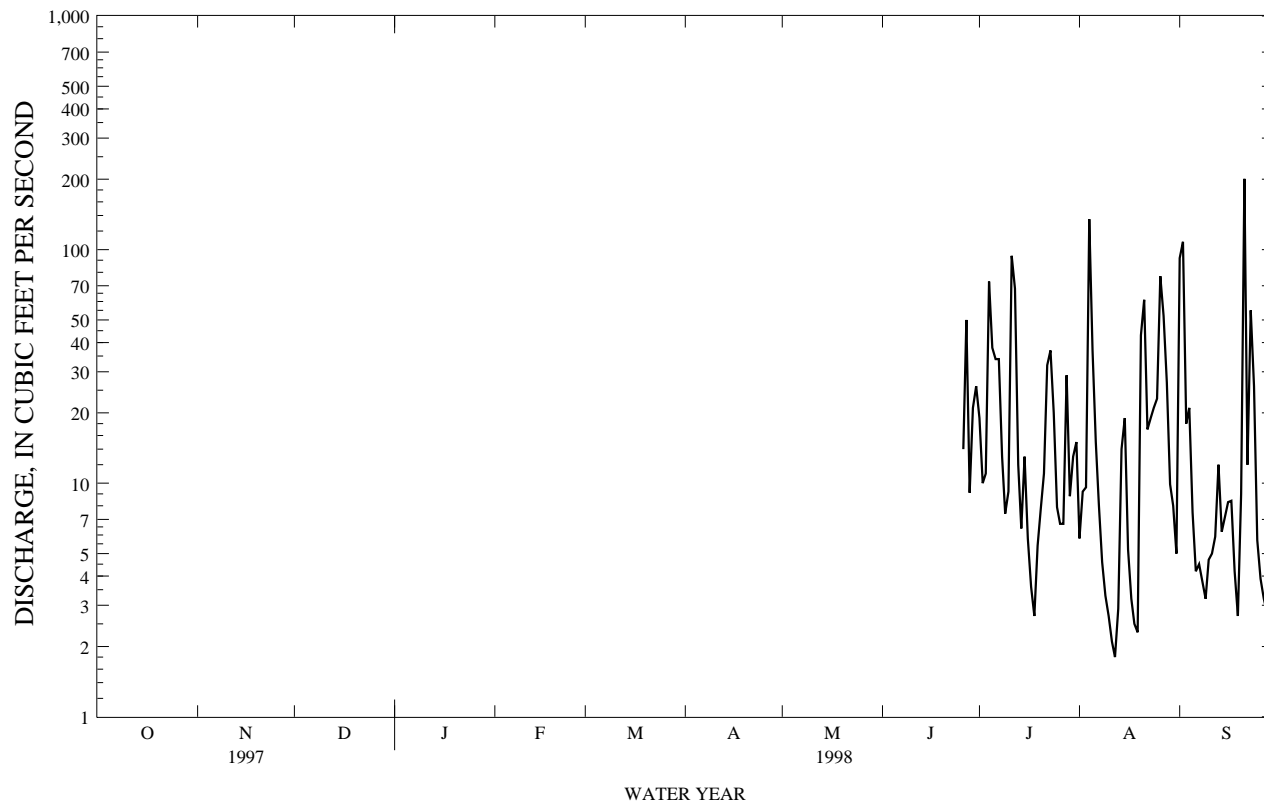
Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Sep. 21	0530	*622	*5.67				

Minimum discharge, 1.6 ft³/s, August 12-13.

Water Year 1999:

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Oct. 12	unknown	600	5.61	Mar. 21	0200	*746	*5.96
Jan. 29	0245	517	5.39				

Minimum discharge, 0.26 ft³/s, June 22-24.



HAWAII, ISLAND OF HAWAII
16756100 KOHAKOHAU STREAM BELOW DWS INTAKE, NEAR KAMUELA--Continued

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1997 TO SEPTEMBER 1998
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	---	---	---	19	5.8	92
2	---	---	---	---	---	---	---	---	---	10	9.2	108
3	---	---	---	---	---	---	---	---	---	11	9.6	18
4	---	---	---	---	---	---	---	---	---	73	135	21
5	---	---	---	---	---	---	---	---	---	38	37	7.5
6	---	---	---	---	---	---	---	---	---	34	15	4.2
7	---	---	---	---	---	---	---	---	---	34	8.1	4.5
8	---	---	---	---	---	---	---	---	---	13	4.6	3.8
9	---	---	---	---	---	---	---	---	---	7.4	3.3	3.2
10	---	---	---	---	---	---	---	---	---	9.2	2.7	4.7
11	---	---	---	---	---	---	---	---	---	94	2.1	5.0
12	---	---	---	---	---	---	---	---	---	68	1.8	5.9
13	---	---	---	---	---	---	---	---	---	12	2.9	12
14	---	---	---	---	---	---	---	---	---	6.4	14	6.2
15	---	---	---	---	---	---	---	---	---	13	19	7.2
16	---	---	---	---	---	---	---	---	---	5.8	5.2	8.3
17	---	---	---	---	---	---	---	---	---	3.6	3.2	8.4
18	---	---	---	---	---	---	---	---	---	2.7	2.5	4.2
19	---	---	---	---	---	---	---	---	---	5.4	2.3	2.7
20	---	---	---	---	---	---	---	---	---	7.7	43	9.0
21	---	---	---	---	---	---	---	---	---	11	61	201
22	---	---	---	---	---	---	---	---	---	32	17	12
23	---	---	---	---	---	---	---	---	---	37	19	55
24	---	---	---	---	---	---	---	---	---	20	21	e26
25	---	---	---	---	---	---	---	---	---	7.9	23	e5.7
26	---	---	---	---	---	---	---	---	14	6.7	77	e3.9
27	---	---	---	---	---	---	---	---	50	6.7	52	e3.2
28	---	---	---	---	---	---	---	---	9.1	29	27	e2.8
29	---	---	---	---	---	---	---	---	21	8.8	9.9	e2.5
30	---	---	---	---	---	---	---	---	26	13	8.0	e2.3
31	---	---	---	---	---	---	---	---	---	15	5.0	---
TOTAL	---	---	---	---	---	---	---	---	---	654.3	646.2	650.2
MEAN	---	---	---	---	---	---	---	---	---	21.1	20.8	21.7
MAX	---	---	---	---	---	---	---	---	---	94	135	201
MIN	---	---	---	---	---	---	---	---	---	2.7	1.8	2.3
AC-FT	---	---	---	---	---	---	---	---	---	1300	1280	1290

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1998 - 1998, BY WATER YEAR (WY)

MEAN	---	---	---	---	---	---	---	---	---	21.1	20.8	21.7
MAX	---	---	---	---	---	---	---	---	---	21.1	20.8	21.7
(WY)	---	---	---	---	---	---	---	---	---	1998	1998	1998
MIN	---	---	---	---	---	---	---	---	---	21.1	20.8	21.7
(WY)	---	---	---	---	---	---	---	---	---	1998	1998	1998

e Estimated

HAWAII, ISLAND OF HAWAII

16756100 KOHAKOHAU STREAM BELOW DWS INTAKE, NEAR KAMUELA--Continued

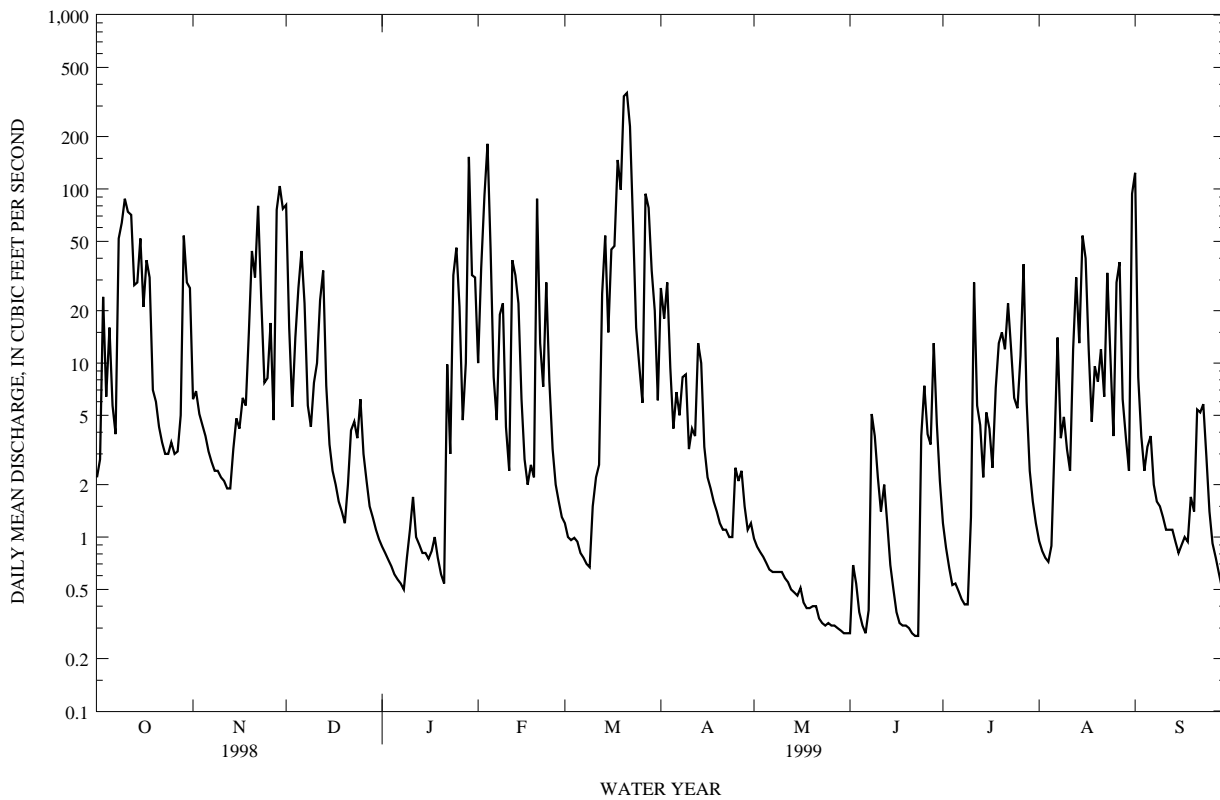
DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e2.2	e6.2	81	.88	10	1.2	27	.98	.28	1.2	.95	124
2	e2.8	e6.9	16	.81	35	1.0	18	.88	.69	.87	.83	8.3
3	e24	e5.1	5.6	.74	92	.96	29	.82	.54	.66	.76	3.8
4	e6.4	e4.4	14	.68	182	.99	9.4	.77	.37	.53	.72	2.4
5	e16	e3.8	27	.61	45	.94	4.2	.71	.31	.54	.89	3.3
6	e5.7	e3.1	44	.57	8.3	.81	6.8	.65	.28	.49	3.3	3.8
7	e3.9	e2.7	22	.54	4.7	.76	5.0	.63	.38	.44	14	2.0
8	e52	e2.4	5.7	.50	19	.70	8.3	.63	5.1	.41	3.7	1.6
9	e64	e2.4	4.3	.76	22	.67	8.6	.63	3.8	.41	4.9	1.5
10	e88	e2.2	7.7	1.1	4.3	1.5	3.2	.63	2.2	1.3	3.2	1.3
11	e74	e2.1	10	1.7	2.4	2.2	4.2	.58	1.4	29	2.4	1.1
12	e71	e1.9	23	1.0	39	2.6	3.8	.55	2.0	5.7	12	1.1
13	e28	e1.9	34	.90	32	25	13	.50	1.2	4.4	31	1.1
14	e29	e3.2	7.4	.81	22	54	10	.48	.69	2.2	13	.94
15	e52	e4.8	3.4	.81	6.2	15	3.3	.46	.50	5.2	54	.81
16	e21	e4.2	2.4	.75	2.8	45	2.2	.51	.37	4.2	40	.90
17	e39	e6.3	2.0	.83	2.0	47	1.9	.42	.32	2.5	12	1.0
18	e31	e5.7	1.6	1.0	2.6	147	1.6	.39	.31	7.2	4.6	.94
19	e7.0	e15	1.4	.76	2.2	99	1.4	.39	.31	13	9.6	1.7
20	e6.0	44	1.2	.61	88	341	1.2	.40	.30	15	7.8	1.4
21	e4.3	31	2.0	.54	13	356	1.1	.40	.28	12	12	5.4
22	e3.5	80	4.1	9.8	7.3	229	1.1	.34	.27	22	6.4	5.2
23	e3.0	24	4.6	3.0	29	63	1.0	.32	.27	12	33	5.8
24	e3.0	7.7	3.7	32	7.9	16	1.0	.31	3.8	6.3	11	2.9
25	e3.5	8.2	6.2	46	3.2	9.5	2.5	.32	7.4	5.5	3.8	1.4
26	e3.0	17	3.0	21	2.0	5.9	2.1	.31	3.9	11	29	.92
27	e3.1	4.7	2.1	4.7	1.6	94	2.4	.31	3.4	37	38	.76
28	e5.0	76	1.5	10	1.3	78	1.5	.30	13	6.0	6.2	.62
29	e54	104	1.3	153	---	34	1.1	.29	4.5	2.4	3.7	.51
30	e29	77	1.1	32	---	20	1.2	.28	2.1	1.6	2.4	.48
31	e27	---	.97	31	---	6.1	---	.28	---	1.2	94	---
TOTAL	761.4	557.9	344.27	359.40	686.8	1698.83	177.1	15.47	60.27	212.25	459.15	186.98
MEAN	24.6	18.6	11.1	11.6	24.5	54.8	5.90	.50	2.01	6.85	14.8	6.23
MAX	88	104	81	153	182	356	29	.98	13	37	94	124
MIN	2.2	1.9	.97	.50	1.3	.67	1.0	.28	.27	.41	.72	.48
AC-FT	1510	1110	683	713	1360	3370	351	31	120	421	911	371
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1998 - 1999, BY WATER YEAR (WY)												
MEAN	24.6	18.6	11.1	11.6	24.5	54.8	5.90	.50	2.01	14.0	17.8	14.0
MAX	24.6	18.6	11.1	11.6	24.5	54.8	5.90	.50	2.01	21.1	20.8	21.7
(WY)	1999	1999	1999	1999	1999	1999	1999	1999	1999	1998	1998	1998
MIN	24.6	18.6	11.1	11.6	24.5	54.8	5.90	.50	2.01	6.85	14.8	6.23
(WY)	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999

e Estimated

HAWAII, ISLAND OF HAWAII
 16756100 KOHAKOHAU STREAM BELOW DWS INTAKE, NEAR KAMUELA--Continued

SUMMARY STATISTICS	FOR 1999 WATER YEAR	WATER YEARS 1998 - 1999
ANNUAL TOTAL	5519.82	
ANNUAL MEAN	15.1	15.1
HIGHEST ANNUAL MEAN		15.1 1999
LOWEST ANNUAL MEAN		15.1 1999
HIGHEST DAILY MEAN	356 Mar 21	356 Mar 21 1999
LOWEST DAILY MEAN	.27 Jun 22	.27 Jun 22 1999
ANNUAL SEVEN-DAY MINIMUM	.29 May 26	.29 May 26 1999
ANNUAL RUNOFF (AC-FT)	10950	10960
10 PERCENT EXCEEDS	39	44
50 PERCENT EXCEEDS	3.2	4.4
90 PERCENT EXCEEDS	.50	.56



HAWAII, ISLAND OF HAWAII

16758000 WAIKOLOA STREAM AT MARINE DAM, NEAR KAMUELA

LOCATION.--Lat 20°02'48", long 155°39'58", Hydrologic Unit 20010000, on right bank 160 ft upstream from Marine Dam, 0.4 mi east of Puu Ohu, and 1.6 mi north of Kamuela.

DRAINAGE AREA.--1.18 mi².

PERIOD OF RECORD.--May 1947 to current year.

REVISED RECORDS.--WSP 1569: Drainage area. WSP 1937: 1948(M), 1949-51(P), 1952(M), 1954(M), 1955, 1956-57(P), 1958-60.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 3,460 ft above mean sea level (from topographic map).

REMARKS.--Records good. Parker Ranch diverts less than 1 ft³/s through a 6-in. pipe upstream of gage.

AVERAGE DISCHARGE.--52 years (water years 1948-99), 9.36 ft³/s (6,780 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,410 ft³/s, November 18, 1979, gage height, 6.84 ft, from rating curve extended above 120 ft³/s on the basis of computations of flow over dam at gage heights 5.46 ft and 5.96 ft; minimum, 0.34 ft³/s, June 5-6, 1992.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 180 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 21	0130	214	3.40	Apr. 3	1515	*243	*3.50

Minimum recorded discharge, 1.3 ft³/s, May 31, June 1, 21-23, July 7-9.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

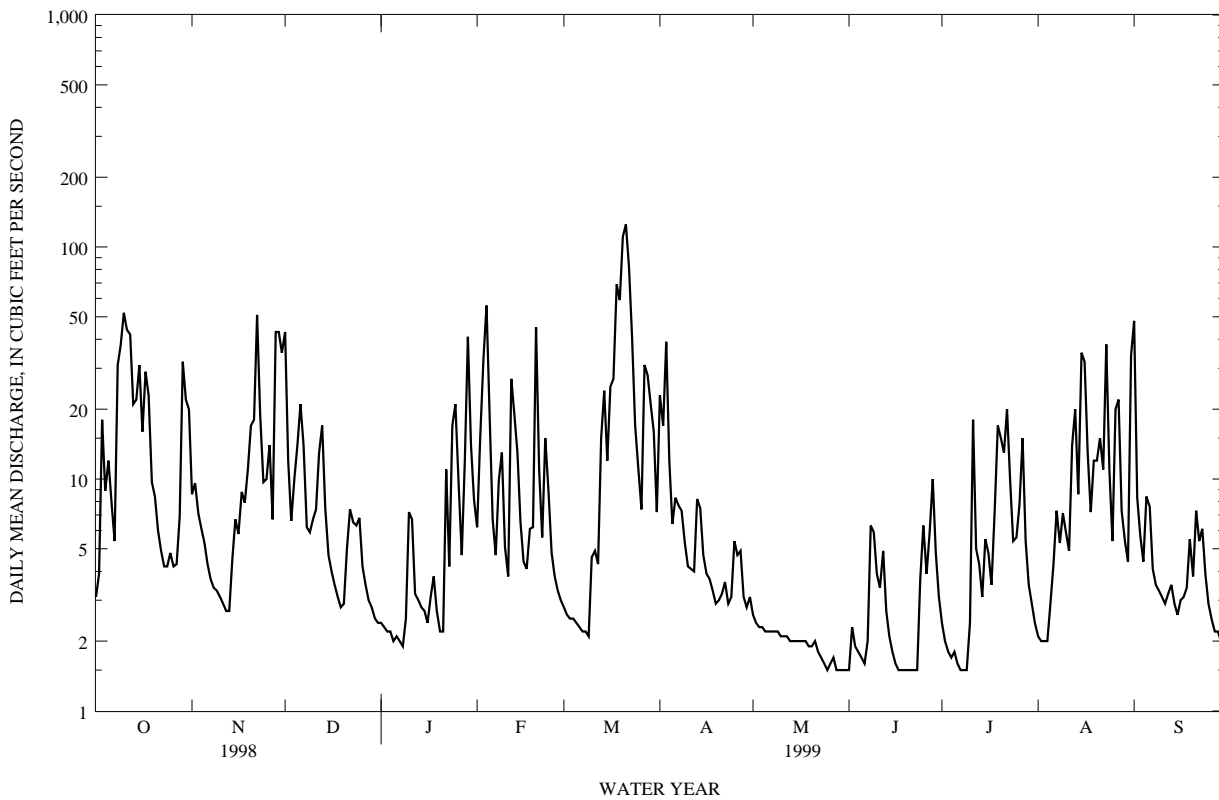
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.1	8.6	43	2.4	6.2	2.8	23	2.6	1.5	2.4	2.1	48
2	3.9	9.6	12	2.3	15	2.6	17	2.4	2.3	2.0	2.0	8.3
3	18	7.1	6.6	2.2	33	2.5	39	2.3	1.9	1.8	2.0	5.7
4	8.9	6.1	10	2.2	56	2.5	12	2.3	1.8	1.7	2.0	4.4
5	12	5.3	14	2.0	19	2.4	6.4	2.2	1.7	1.8	2.9	8.4
6	7.9	4.3	21	2.1	6.7	2.3	8.3	2.2	1.6	1.6	4.3	7.6
7	5.4	3.7	14	2.0	4.7	2.2	7.7	2.2	2.0	1.5	7.3	4.1
8	31	3.4	6.2	1.9	9.9	2.2	7.3	2.2	6.3	1.5	5.3	3.5
9	38	3.3	5.9	2.5	13	2.1	5.3	2.2	5.9	1.5	7.1	3.3
10	52	3.1	6.7	7.2	5.1	4.6	4.2	2.1	3.9	2.4	5.9	3.1
11	44	2.9	7.4	6.7	3.8	4.9	4.1	2.1	3.4	18	4.9	2.9
12	42	2.7	13	3.2	27	4.3	4.0	2.1	4.9	5.0	14	3.2
13	21	2.7	17	3.0	19	15	8.2	2.0	2.7	4.3	20	3.5
14	22	4.5	7.5	2.8	13	24	7.5	2.0	2.1	3.1	8.6	2.9
15	31	6.7	4.7	2.7	6.5	12	4.7	2.0	1.8	5.5	35	2.6
16	16	5.8	4.0	2.4	4.4	25	3.9	2.0	1.6	4.8	32	3.0
17	29	8.8	3.5	3.1	4.1	27	3.7	2.0	1.5	3.5	13	3.1
18	23	7.9	3.1	3.8	6.1	69	3.3	2.0	1.5	7.4	7.2	3.4
19	9.7	11	2.8	2.7	6.2	59	2.9	1.9	1.5	17	12	5.5
20	8.4	17	2.9	2.2	45	111	3.0	1.9	1.5	15	12	3.8
21	6.0	18	5.0	2.2	11	125	3.2	2.0	1.5	13	15	7.3
22	4.9	51	7.4	11	5.6	82	3.6	1.8	1.5	20	11	5.4
23	4.2	19	6.5	4.2	15	41	2.9	1.7	1.5	9.9	38	6.1
24	4.2	9.7	6.3	17	9.1	17	3.1	1.6	3.7	5.4	11	3.9
25	4.8	10	6.8	21	4.8	11	5.4	1.5	6.3	5.6	5.4	2.9
26	4.2	14	4.2	9.8	3.8	7.4	4.7	1.6	3.9	7.8	20	2.5
27	4.3	6.7	3.5	4.7	3.3	31	4.9	1.7	5.9	15	22	2.2
28	6.9	43	3.0	12	3.0	28	3.1	1.5	10	5.4	7.3	2.2
29	32	43	2.8	41	---	21	2.8	1.5	4.8	3.5	5.4	2.0
30	22	35	2.5	14	---	16	3.1	1.5	3.1	2.9	4.4	2.2
31	20	---	2.4	8.1	---	7.2	---	1.5	---	2.4	34	---
TOTAL	539.8	373.9	255.7	204.4	359.3	764.0	212.3	60.6	93.6	192.7	373.1	167.0
MEAN	17.4	12.5	8.25	6.59	12.8	24.6	7.08	1.95	3.12	6.22	12.0	5.57
MAX	52	51	43	41	56	125	39	2.6	10	20	38	48
MIN	3.1	2.7	2.4	1.9	3.0	2.1	2.8	1.5	1.5	1.5	2.0	2.0
AC--FT	1070	742	507	405	713	1520	421	120	186	382	740	331

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1947 - 1999, BY WATER YEAR (WY)

MEAN	5.97	8.79	9.70	8.50	7.65	10.9	13.0	9.22	9.05	12.0	11.2	5.96
MAX	18.2	43.7	31.4	38.7	23.0	52.1	43.4	22.1	28.4	21.3	33.6	24.9
(WY)	1984	1980	1958	1979	1960	1980	1986	1998	1998	1950	1958	1992
MIN	.98	1.42	1.47	1.46	1.31	2.11	1.53	1.95	2.68	3.08	2.27	.91
(WY)	1997	1963	1996	1953	1954	1983	1992	1999	1962	1961	1973	1965

HAWAII, ISLAND OF HAWAII
 16758000 WAIKOLOA STREAM AT MARINE DAM, NEAR KAMUELA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1947 - 1999	
ANNUAL TOTAL	5594.9		3596.4		9.36	
ANNUAL MEAN	15.3		9.85		17.8	
HIGHEST ANNUAL MEAN					4.49 1980	
LOWEST ANNUAL MEAN					641 Nov 18 1979	
HIGHEST DAILY MEAN	106	Apr 10	125	Mar 21	.37 Jun 3 1992	
LOWEST DAILY MEAN	1.1	Feb 17	1.5	May 25	.42 May 21 1992	
ANNUAL SEVEN-DAY MINIMUM	1.3	Feb 12	1.5	Jun 17		
ANNUAL RUNOFF (AC-FT)	11100		7130		6780	
10 PERCENT EXCEEDS	39		23		21	
50 PERCENT EXCEEDS	8.9		4.8		4.3	
90 PERCENT EXCEEDS	1.6		2.0		1.8	



HAWAII, ISLAND OF HAWAII
16759000 HAUANI GULCH NEAR KAMUELA

LOCATION.--Lat 20°02'28", long 155°39'05", Hydrologic Unit 20010000, on left bank 800 ft downstream from small tributary and 1.8 mi northeast of Kamuela.

DRAINAGE AREA.--0.47 mi².

PERIOD OF RECORD.--March 1956 to current year. Prior to July 1960, published as Hauani Stream near Kamuela.

REVISED RECORDS.--WSP 1569: Drainage area. WSP 1937: 1948(M), 1949-51(P), 1952(M), 1954(M), 1955, 1956-57(P), 1958-60.

GAGE.--Water-stage recorder. Concrete control since February 27, 1963. Elevation of gage is 3,117.42 ft above mean sea level (Hawaii County Department of Water Supply benchmark).

REMARKS.--

Water year 1992: Records computed by Dale Nishimoto. Records fair except for discharges less than 2 ft³/s which are poor. Diversion upstream for livestock and domestic use.

Water year 1993: Records computed by Dale Nishimoto. Records good. Diversion upstream for livestock and domestic use.

Water year 1994: Records computed by Dale Nishimoto. Records good. Diversion upstream for livestock and domestic use.

Water year 1995: Records computed by Dale Nishimoto. Records good. Diversion upstream for livestock and domestic use.

Water year 1996: Records computed by Dale Nishimoto. Records good. Diversion upstream for livestock and domestic use.

Water year 1997: Records computed by Dale Nishimoto. Records good except for discharges less than 2 ft³/s which are poor. Diversion upstream for livestock and domestic use.

Water year 1998: Records computed by Dale Nishimoto. Records good except for discharges less than 2 ft³/s which are poor. Diversion upstream for livestock and domestic use.

Water year 1999: Records computed by Dale Nishimoto. Records good except for discharges less than 2 ft³/s which are poor. Diversion upstream for livestock and domestic use.

AVERAGE DISCHARGE.--

Water Year 1992: 36 years (water years 1957-92), 1.67 ft³/s (1,210 acre-ft/yr).

Water Year 1993: 37 years (water years 1957-93), 1.68 ft³/s (1,220 acre-ft/yr).

Water Year 1994: 38 years (water years 1957-94), 1.72 ft³/s (1,250 acre-ft/yr).

Water Year 1995: 39 years (water years 1957-95), 1.72 ft³/s (1,240 acre-ft/yr).

Water Year 1996: 40 years (water years 1957-96), 1.70 ft³/s (1,230 acre-ft/yr).

Water Year 1997: 41 years (water years 1957-97), 1.69 ft³/s (1,220 acre-ft/yr).

Water Year 1998: 42 years (water years 1957-98), 1.74 ft³/s (1,260 acre-ft/yr).

Water Year 1999: 43 years (water years 1957-99), 1.74 ft³/s (1,260 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 822 ft³/s, November 18, 1979, gage height, 4.56 ft, from rating curve extended above 11 ft³/s on the basis of slope-conveyance study; maximum gage height, 4.65 ft, October 23, 1957; no flow at times.

EXTREMES FOR CURRENT YEAR.--

Water Year 1992: Peak discharges greater than base discharge of 78 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Oct. 15	1630	98	2.72	Sep. 14	0600	*272	*3.45
Sep. 5	2000	84	2.63	Sep. 25	2030	118	2.84

Minimum discharge, 0.03 ft³/s, June 3.

Water Year 1993: Peak discharges greater than base discharge of 78 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 6	2230	*198	*3.20	No other peak greater than base discharge.			

Minimum discharge, 0.17 ft³/s, February 28, March 1-2.

Water Year 1994: Peak discharges greater than base discharge of 78 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 25	0630	*138	*2.94	No other peak greater than base discharge.			

Minimum discharge, 0.20 ft³/s, October 20-21.

Water Year 1995: Peak discharges greater than base discharge of 78 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jul. 20	1830	*49	*2.31				

Minimum discharge, 0.06 ft³/s, March 14-18.

Water Year 1996: Peak discharges greater than base discharge of 78 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Feb. 25	0230	*84	*2.63	No other peak greater than base discharge.			
Minimum discharge, 0.01 ft ³ /s, January 14-16.							

Water Year 1997: Peak discharges greater than base discharge of 78 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan. 20	0430	*118	*2.84	Mar. 17	2200	115	2.82
Minimum discharge, 0.01 ft ³ /s, October 26-28.							

Water Year 1998: Peak discharges greater than base discharge of 78 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr. 11	0200	104	2.76	Aug. 21	1630	*130	*2.90
Minimum discharge, 0.17 ft ³ /s, March 20-22.							

Water Year 1999: Peak discharges greater than base discharge of 78 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 21	0145	*89	*2.66	Apr. 3	1515	80	2.60
Minimum discharge, 0.15 ft ³ /s, June 22-24.							

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992
DAILY MEAN VALUES

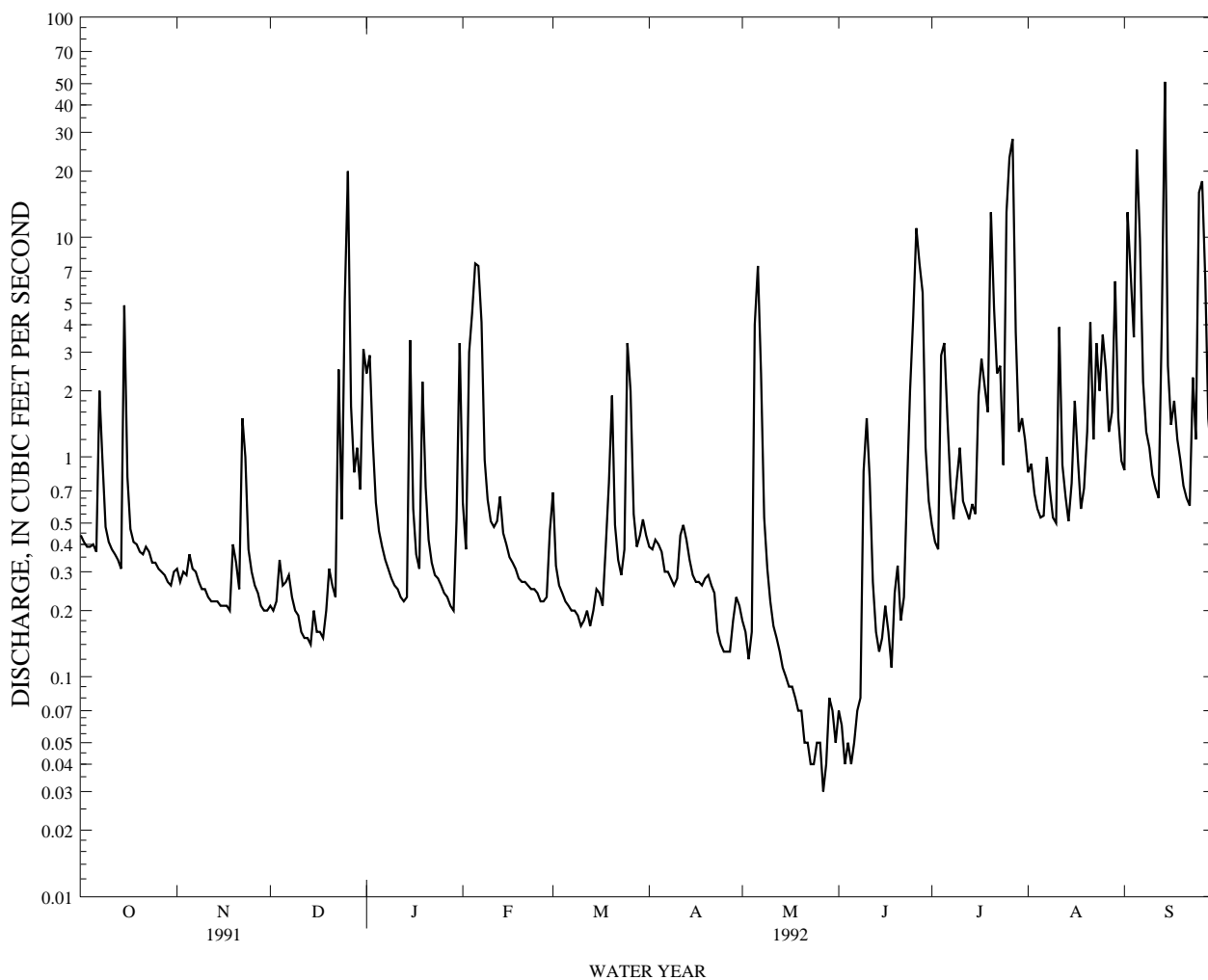
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.44	.31	.21	2.4	.62	.69	.39	.18	.07	.49	.85	.87
2	.41	.27	.20	2.9	.38	.32	.38	.16	.06	.41	.93	13
3	.39	.30	.22	1.2	3.0	.26	.42	.12	.04	.38	.68	6.8
4	.39	.29	.34	.62	4.5	.24	.40	.16	.05	2.9	.58	3.5
5	.40	.36	.26	.46	7.6	.22	.37	4.0	.04	3.3	.53	25
6	.37	.31	.27	.39	7.4	.21	.30	7.4	.05	1.5	.54	9.8
7	2.0	.30	.29	.34	4.1	.20	.30	2.4	.07	.73	1.0	2.2
8	.97	.27	.23	.31	.97	.20	.28	.53	.08	.52	.70	1.3
9	.48	.25	.20	.28	.64	.19	.26	.31	.86	.78	.53	1.1
10	.41	.25	.19	.26	.51	.17	.28	.22	1.5	1.1	.50	.83
11	.38	.23	.16	.25	.48	.18	.44	.17	.80	.63	3.9	.72
12	.36	.22	.15	.23	.51	.20	.49	.15	.27	.57	.92	.65
13	.34	.22	.15	.22	.66	.17	.42	.13	.16	.52	.66	4.0
14	.31	.22	.14	.23	.45	.20	.34	.11	.13	.61	.51	51
15	4.9	.21	.20	3.4	.40	.25	.29	.10	.15	.55	.76	2.6
16	.81	.21	.16	.58	.35	.24	.27	.09	.21	1.9	1.8	1.4
17	.47	.21	.16	.36	.33	.21	.27	.09	.16	2.8	.97	1.8
18	.41	.20	.15	.31	.31	.39	.26	.08	.11	2.1	.58	1.2
19	.40	.40	.20	2.2	.28	.76	.28	.07	.24	1.6	.72	.97
20	.37	.33	.31	.73	.27	1.9	.29	.07	.32	13	1.3	.74
21	.36	.25	.26	.42	.27	.49	.26	.05	.18	4.7	4.1	.65
22	.39	1.5	.23	.33	.26	.34	.24	.05	.23	2.4	1.2	.60
23	.37	1.0	2.5	.29	.25	.29	.16	.04	.74	2.6	3.3	2.3
24	.33	.38	.52	.28	.25	.38	.14	.04	2.0	.92	2.0	1.2
25	.33	.30	5.1	.26	.24	3.3	.13	.05	4.3	13	3.6	16
26	.31	.26	20	.24	.22	2.0	.13	.05	11	23	2.5	18
27	.30	.24	1.7	.23	.22	.55	.13	.03	7.6	28	1.3	6.4
28	.29	.21	.85	.21	.23	.39	.18	.04	5.6	3.7	1.6	1.5
29	.27	.20	1.1	.20	.46	.44	.23	.08	1.1	1.3	6.3	.99
30	.26	.20	.71	.52	---	.52	.21	.07	.63	1.5	1.5	.90
31	.30	---	3.1	3.3	---	.44	---	.05	---	1.2	.96	---
TOTAL	18.52	9.90	40.26	23.95	36.16	16.34	8.54	17.09	38.75	118.71	47.32	178.02
MEAN	.60	.33	1.30	.77	1.25	.53	.28	.55	1.29	3.83	1.53	5.93
MAX	4.9	1.5	20	3.4	7.6	3.3	.49	7.4	11	28	6.3	51
MIN	.26	.20	.14	.20	.22	.17	.13	.03	.04	.38	.50	.60
AC-FT	37	20	80	48	72	32	17	34	77	235	94	353

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1956 - 1992, BY WATER YEAR (WY)

	MEAN	MAX	(WY)	MIN	(WY)
MEAN	.98	1.47	1.79	1.78	1.41
MAX	3.86	8.31	7.01	11.9	6.69
(WY)	1984	1980	1960	1979	1980
MIN	.008	.000	.12	.046	.089
(WY)	1985	1963	1981	1962	1983

HAWAII, ISLAND OF HAWAII
 16759000 HAUANI GULCH NEAR KAMUELA--CONTINUED

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR	FOR 1992 WATER YEAR	WATER YEARS 1956 - 1992	
ANNUAL TOTAL	863.25	553.56		
ANNUAL MEAN	2.37	1.51	1.67	
HIGHEST ANNUAL MEAN			3.47	1980
LOWEST ANNUAL MEAN			.48	1981
HIGHEST DAILY MEAN	56 Aug 7	51 Sep 14	108	Mar 24 1980
LOWEST DAILY MEAN	.14 Dec 14	.03 May 27	.00	Jul 29 1961
ANNUAL SEVEN-DAY MINIMUM	.16 Dec 12	.04 May 22	.00	Sep 8 1961
ANNUAL RUNOFF (AC-FT)	1710	1100	1210	
10 PERCENT EXCEEDS	4.5	3.3	3.6	
50 PERCENT EXCEEDS	.81	.38	.50	
90 PERCENT EXCEEDS	.27	.15	.08	



HAWAII, ISLAND OF HAWAII
16759000 HAUANI GULCH NEAR KAMUELA--CONTINUED

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993
DAILY MEAN VALUES

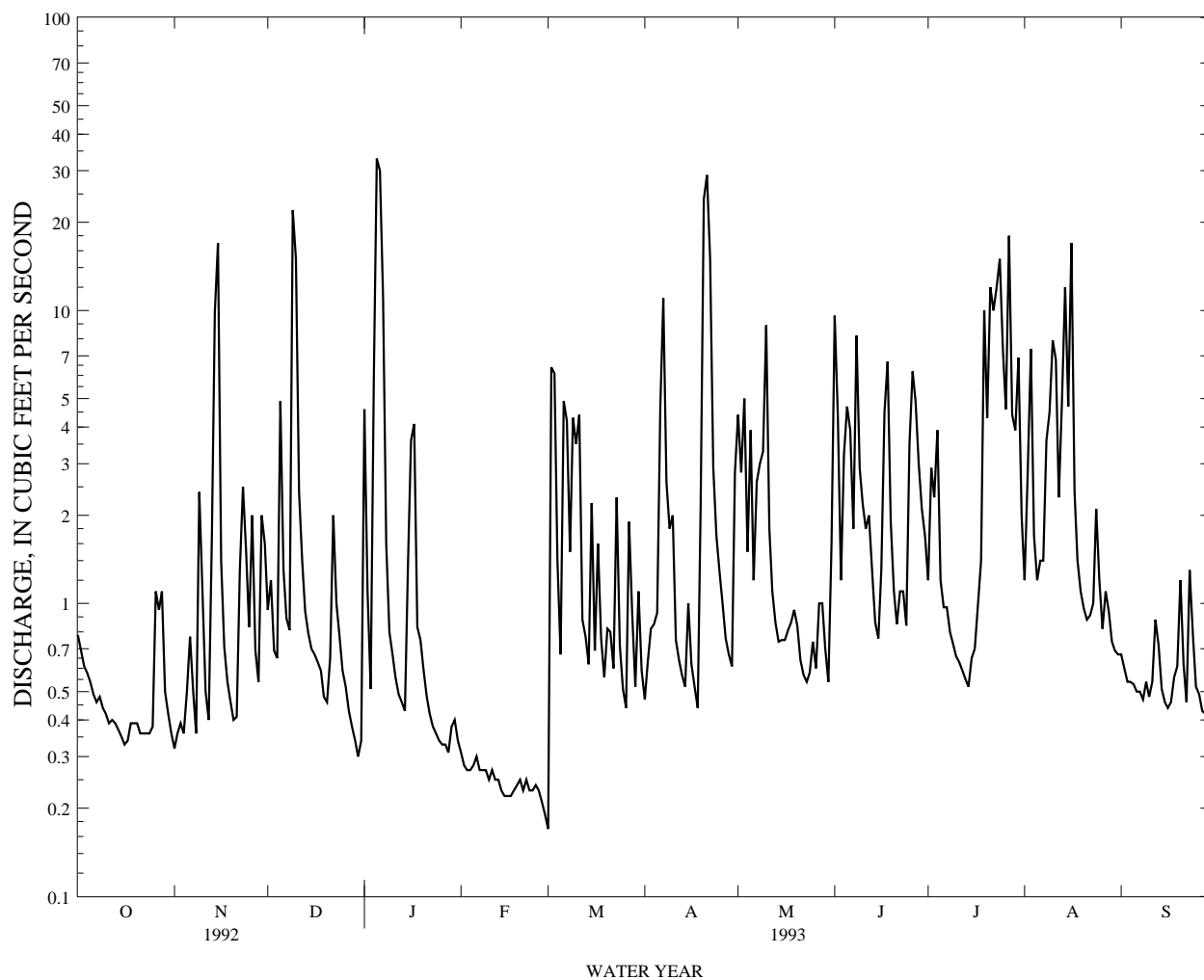
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.78	.32	.95	4.6	.31	.17	.47	4.4	9.6	1.2	1.2	.67
2	.69	.36	1.2	1.1	.28	6.4	.63	2.8	4.4	2.9	2.8	.60
3	.61	.39	.69	.51	.27	6.1	.82	5.0	1.2	2.3	7.4	.54
4	.58	.36	.65	5.9	.27	1.4	.85	1.5	3.2	3.9	1.7	.54
5	.54	.50	4.9	33	.28	.67	.93	3.9	4.7	1.2	1.2	.53
6	.49	.77	1.3	30	.30	4.9	4.7	1.2	3.9	.97	1.4	.50
7	.46	.50	.89	11	.27	4.2	11	2.6	1.8	.97	1.4	.50
8	.48	.36	.81	1.6	.27	1.5	2.6	3.0	8.2	.80	3.6	.47
9	.44	2.4	22	.80	.27	4.3	1.8	3.3	2.9	.73	4.5	.54
10	.42	1.1	15	.67	.25	3.5	2.0	8.9	2.2	.66	7.9	.48
11	.39	.50	2.4	.56	.27	4.4	.75	1.8	1.8	.63	6.8	.54
12	.40	.40	1.4	.49	.25	.88	.64	1.1	2.0	.59	2.3	.88
13	.39	1.7	.94	.46	.25	.77	.57	.86	1.3	.55	4.9	.72
14	.37	9.9	.79	.43	.23	.62	.52	.74	.86	.52	12	.51
15	.35	17	.70	1.4	.22	2.2	1.0	.75	.76	.65	4.7	.46
16	.33	1.4	.67	3.6	.22	.69	.62	.75	1.3	.70	17	.44
17	.34	.71	.63	4.1	.22	1.6	.52	.81	4.5	.99	2.4	.46
18	.39	.54	.59	.83	.23	.76	.44	.86	6.7	1.4	1.4	.56
19	.39	.46	.48	.75	.24	.56	2.2	.95	1.9	10	1.1	.61
20	.39	.40	.46	.59	.25	.82	24	.84	1.1	4.3	.96	1.2
21	.36	.41	.65	.48	.23	.80	29	.64	.85	12	.88	.62
22	.36	1.3	2.0	.42	.25	.60	15	.57	1.1	10	.91	.46
23	.36	2.5	1.0	.38	.23	2.3	2.9	.54	1.1	12	1.0	1.3
24	.36	1.5	.78	.36	.23	.72	1.7	.58	.84	15	2.1	.79
25	.38	.83	.59	.34	.24	.51	1.3	.74	3.5	7.3	1.2	.52
26	1.1	2.0	.52	.33	.23	.44	1.0	.60	6.2	4.6	.82	.49
27	.95	.69	.43	.33	.21	1.9	.76	1.0	4.9	18	1.1	.43
28	1.1	.54	.38	.31	.19	.92	.67	1.0	3.0	4.4	.94	.42
29	.50	2.0	.34	.38	---	.52	.61	.70	2.1	3.9	.74	.43
30	.42	1.6	.30	.40	---	1.1	2.8	.54	1.7	6.9	.69	.82
31	.36	---	.34	.34	---	.59	---	1.6	---	2.0	.67	---
TOTAL	15.48	53.44	64.78	106.46	6.96	56.84	112.80	54.57	89.61	132.06	97.71	18.03
MEAN	.50	1.78	2.09	3.43	.25	1.83	3.76	1.76	2.99	4.26	3.15	.60
MAX	1.1	17	22	33	.31	6.4	29	8.9	9.6	18	17	1.3
MIN	.33	.32	.30	.31	.19	.17	.44	.54	.76	.52	.67	.42
AC-FT	31	106	128	211	14	113	224	108	178	262	194	36

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1956 - 1993, BY WATER YEAR (WY)

MEAN	.97	1.48	1.80	1.83	1.38	2.14	2.67	1.47	1.32	2.12	2.10	.90
MAX	3.86	8.31	7.01	11.9	6.69	15.7	10.5	4.50	3.84	6.69	8.13	5.93
(WY)	1984	1980	1960	1979	1960	1980	1986	1990	1958	1958	1958	1992
MIN	.008	.000	.12	.046	.089	.10	.20	.20	.16	.15	.12	.000
(WY)	1985	1963	1981	1962	1983	1983	1981	1966	1981	1961	1965	1965

HAWAII, ISLAND OF HAWAII
 16759000 HAUANI GULCH NEAR KAMUELA--CONTINUED

SUMMARY STATISTICS	FOR 1992 CALENDAR YEAR	FOR 1993 WATER YEAR	WATER YEARS 1956 - 1993	
ANNUAL TOTAL	618.58	808.74		
ANNUAL MEAN	1.69	2.22	1.68	
HIGHEST ANNUAL MEAN			3.47	1980
LOWEST ANNUAL MEAN			.48	1981
HIGHEST DAILY MEAN	51 Sep 14	33 Jan 5	108	Mar 24 1980
LOWEST DAILY MEAN	.03 May 27	.17 Mar 1	.00	Jul 29 1961
ANNUAL SEVEN-DAY MINIMUM	.04 May 22	.21 Feb 23	.00	Sep 8 1961
ANNUAL RUNOFF (AC-FT)	1230	1600	1220	
10 PERCENT EXCEEDS	3.3	4.9	3.6	
50 PERCENT EXCEEDS	.50	.79	.50	
90 PERCENT EXCEEDS	.16	.34	.08	



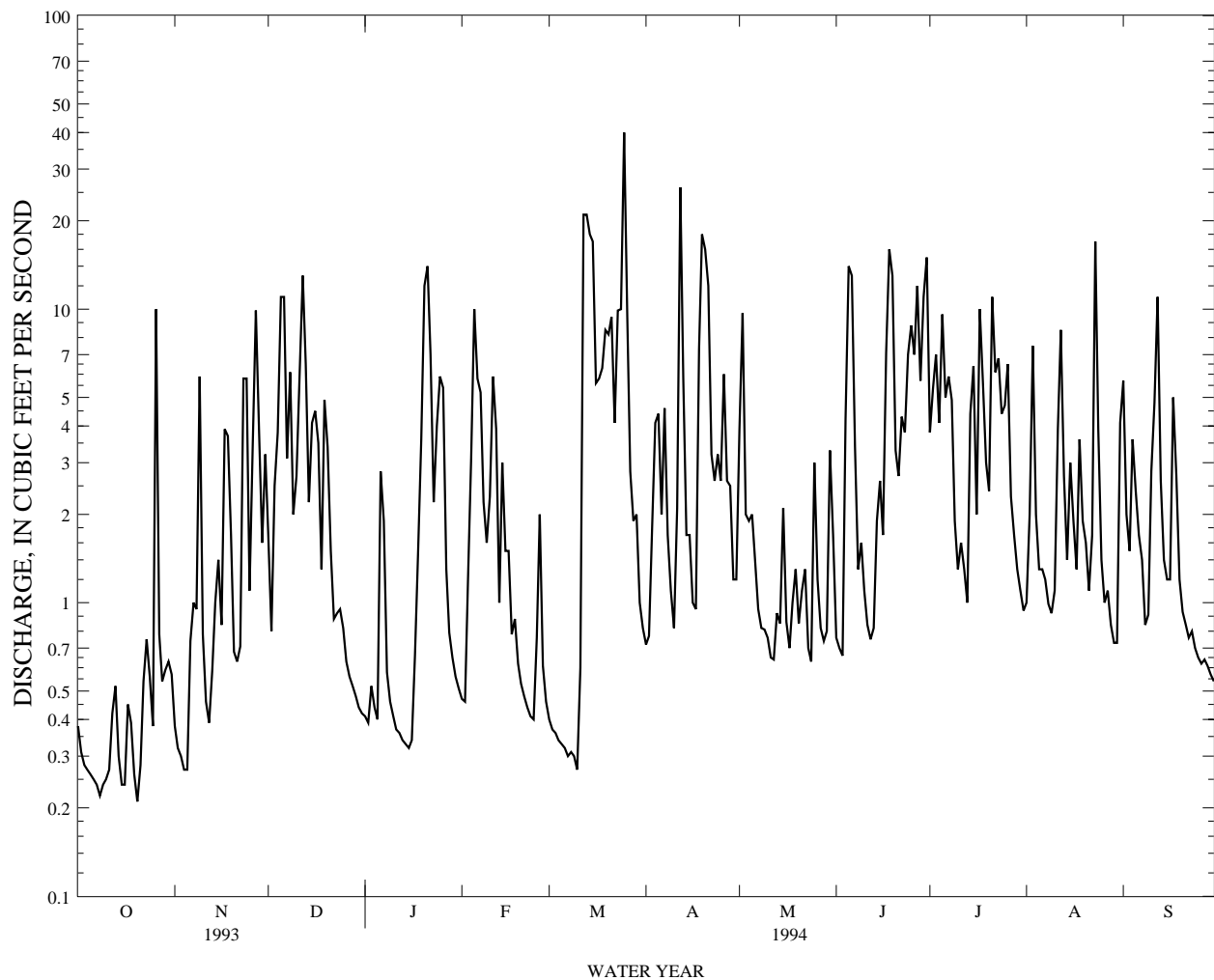
HAWAII, ISLAND OF HAWAII
16759000 HAUANI GULCH NEAR KAMUELA--CONTINUED

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.38	.38	1.7	.41	.47	.40	.72	3.9	.76	3.8	1.0	5.7
2	.31	.32	.80	.39	.46	.37	.77	9.7	.70	5.4	2.0	2.0
3	.28	.30	2.5	.52	1.2	.36	1.8	2.0	.66	7.0	7.5	1.5
4	.27	.27	3.8	.44	3.1	.34	4.1	1.9	4.2	4.1	2.0	3.6
5	.26	.27	11	.40	10	.33	4.4	2.0	14	9.6	1.3	2.4
6	.25	.74	11	2.8	5.8	.32	2.0	1.4	13	5.0	1.3	1.7
7	.24	1.0	3.1	1.9	5.2	.30	4.6	.95	3.4	5.9	1.2	1.4
8	.22	.95	6.1	.58	2.2	.31	1.7	.82	1.3	4.9	.99	.84
9	.24	5.9	2.0	.46	1.6	.30	1.1	.81	1.6	1.9	.92	.91
10	.25	.78	2.7	.41	2.3	.27	.82	.76	1.1	1.3	1.1	2.8
11	.27	.46	6.0	.37	5.9	.60	2.1	.65	.84	1.6	3.9	4.8
12	.42	.39	13	.36	3.9	21	26	.64	.75	1.3	8.5	11
13	.52	.59	6.5	.34	1.0	21	5.8	.92	.82	1.0	2.7	2.6
14	.30	1.0	2.2	.33	3.0	18	1.7	.85	1.9	4.4	1.4	1.4
15	.24	1.4	4.1	.32	1.5	17	1.7	2.1	2.6	6.4	3.0	1.2
16	.24	.84	4.5	.34	1.5	5.6	1.0	.86	1.7	2.0	1.9	1.2
17	.45	3.9	3.5	.66	.78	5.8	.95	.70	7.1	10	1.3	5.0
18	.39	3.7	1.3	1.5	.88	6.3	7.3	1.0	16	5.6	3.6	2.7
19	.26	1.7	4.9	3.6	.62	8.5	18	1.3	13	3.0	1.9	1.2
20	.21	.68	3.4	12	.53	8.2	16	.85	3.3	2.4	1.6	.93
21	.28	.63	1.5	14	.48	9.4	12	1.1	2.7	11	1.1	.84
22	.54	.71	.88	7.0	.44	4.1	3.2	1.3	4.3	6.1	1.7	.76
23	.75	5.8	.92	2.2	.41	9.9	2.6	.70	3.8	6.8	17	.80
24	.56	5.8	.95	4.0	.40	10	3.2	.63	7.0	4.4	3.9	.70
25	.38	1.1	.82	5.9	.76	40	2.6	3.0	8.8	4.7	1.4	.65
26	10	3.4	.63	5.4	2.0	9.5	6.0	1.2	7.0	6.5	1.0	.62
27	.78	9.9	.56	1.3	.61	2.8	2.6	.82	12	2.3	1.1	.64
28	.54	3.9	.52	.79	.46	1.9	2.5	.74	5.7	1.7	.84	.61
29	.59	1.6	.48	.65	---	2.0	1.2	.80	11	1.3	.73	.57
30	.63	3.2	.44	.56	---	1.0	1.2	3.3	15	1.1	.73	.54
31	.57	---	.42	.51	---	.82	---	1.7	---	.94	4.1	---
TOTAL	21.62	61.61	102.22	70.44	57.50	206.72	139.66	49.40	166.03	133.44	82.71	61.61
MEAN	.70	2.05	3.30	2.27	2.05	6.67	4.66	1.59	5.53	4.30	2.67	2.05
MAX	10	9.9	13	14	10	40	26	9.7	16	11	17	11
MIN	.21	.27	.42	.32	.40	.27	.72	.63	.66	.94	.73	.54
AC-FT	43	122	203	140	114	410	277	98	329	265	164	122
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1956 - 1994, BY WATER YEAR (WY)												
MEAN	.96	1.50	1.84	1.84	1.39	2.26	2.72	1.48	1.42	2.18	2.12	.92
MAX	3.86	8.31	7.01	11.9	6.69	15.7	10.5	4.50	5.53	6.69	8.13	5.93
(WY)	1984	1980	1960	1979	1960	1980	1986	1990	1994	1958	1958	1992
MIN	.008	.000	.12	.046	.089	.10	.20	.20	.16	.15	.12	.000
(WY)	1985	1963	1981	1962	1983	1983	1981	1966	1981	1961	1965	1965

HAWAII, ISLAND OF HAWAII
 16759000 HAUANI GULCH NEAR KAMUELA--CONTINUED

SUMMARY STATISTICS	FOR 1993 CALENDAR YEAR	FOR 1994 WATER YEAR	WATER YEARS 1956 - 1994	
ANNUAL TOTAL	860.49	1152.96		
ANNUAL MEAN	2.36	3.16	1.72	
HIGHEST ANNUAL MEAN			3.47	1980
LOWEST ANNUAL MEAN			.48	1981
HIGHEST DAILY MEAN	33 Jan 5	40 Mar 25	108	Mar 24 1980
LOWEST DAILY MEAN	.17 Mar 1	.21 Oct 20	.00	Jul 29 1961
ANNUAL SEVEN-DAY MINIMUM	.21 Feb 23	.25 Oct 4	.00	Sep 8 1961
ANNUAL RUNOFF (AC-FT)	1710	2290	1250	
10 PERCENT EXCEEDS	5.9	8.5	3.8	
50 PERCENT EXCEEDS	.84	1.4	.52	
90 PERCENT EXCEEDS	.27	.38	.08	



HAWAII, ISLAND OF HAWAII
16759000 HAUANI GULCH NEAR KAMUELA--CONTINUED

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1994 TO SEPTEMBER 1995
DAILY MEAN VALUES

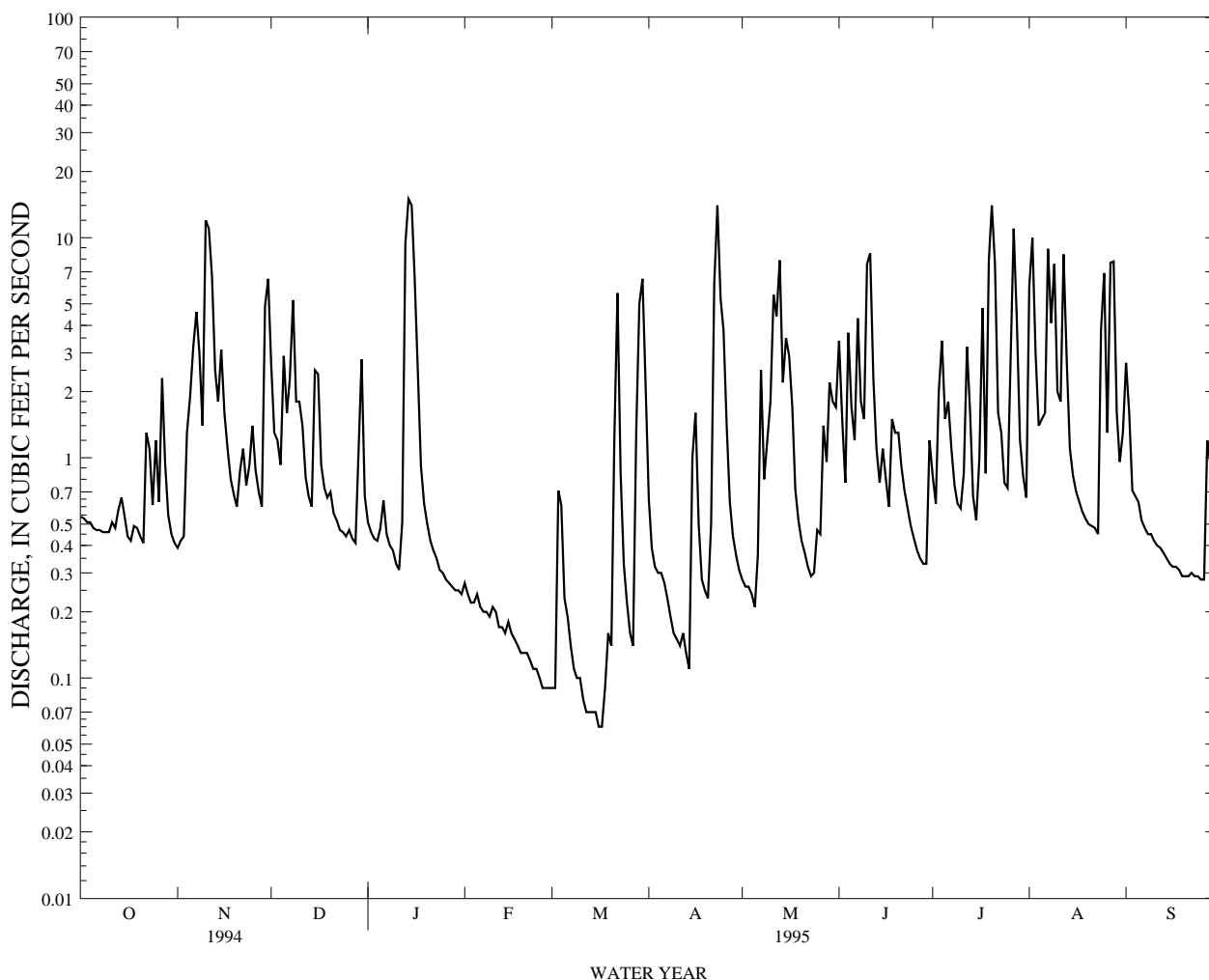
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.54	.39	2.7	.51	.27	.09	.65	.28	3.4	.83	6.0	2.7
2	.53	.42	1.3	.46	.24	.09	.39	.26	1.5	.62	10	1.6
3	.51	.44	1.2	.43	.22	.71	.32	.26	.77	2.0	3.0	.71
4	.51	1.3	.93	.42	.22	.61	.30	.24	3.7	3.4	1.4	.67
5	.48	1.9	2.9	.48	.24	.23	.30	.21	1.7	1.5	1.5	.63
6	.47	3.2	1.6	.64	.21	.19	.27	.36	1.2	1.8	1.6	.52
7	.47	4.6	2.3	.45	.20	.14	.23	2.5	4.3	1.1	8.9	.48
8	.46	3.0	5.2	.40	.20	.11	.19	.80	1.8	.75	4.1	.45
9	.46	1.4	1.8	.38	.19	.10	.16	1.2	1.5	.62	7.6	.45
10	.46	12	1.8	.33	.21	.10	.15	1.8	7.6	.59	2.0	.42
11	.51	11	1.4	.31	.20	.08	.14	5.5	8.5	.85	1.8	.40
12	.48	6.7	.82	.51	.17	.07	.16	4.4	2.3	3.2	8.4	.39
13	.58	2.5	.67	9.4	.17	.07	.13	7.9	1.1	1.6	2.8	.37
14	.66	1.8	.60	15	.16	.07	.11	2.2	.77	.67	1.1	.35
15	.54	3.1	2.5	14	.18	.07	1.0	3.5	1.1	.52	.83	.33
16	.44	1.6	2.4	6.6	.16	.06	1.6	2.9	.81	1.0	.70	.32
17	.42	1.1	.93	2.5	.15	.06	.50	1.7	.60	4.8	.63	.32
18	.49	.80	.73	.92	.14	.09	.28	.72	1.5	.85	.57	.31
19	.48	.68	.66	.62	.13	.16	.25	.52	1.3	7.9	.53	.29
20	.44	.60	.70	.50	.13	.14	.23	.42	1.3	14	.50	.29
21	.41	.87	.56	.42	.13	1.2	.50	.37	.92	7.6	.49	.29
22	1.3	1.1	.52	.38	.12	5.6	6.2	.32	.71	1.6	.48	.30
23	1.1	.75	.47	.35	.11	.85	14	.29	.59	1.3	.45	.29
24	.61	.93	.46	.31	.11	.33	5.3	.30	.49	.77	3.8	.29
25	1.2	1.4	.44	.30	.10	.22	3.8	.47	.43	.73	6.9	.28
26	.63	.88	.47	.28	.09	.16	1.4	.45	.38	2.7	1.3	.28
27	2.3	.70	.43	.27	.09	.14	.63	1.4	.35	11	7.7	1.2
28	.95	.60	.41	.26	.09	1.3	.44	.96	.33	4.2	7.8	.95
29	.55	4.9	1.1	.25	---	5.0	.36	2.2	.33	1.2	1.6	.82
30	.45	6.5	2.8	.25	---	6.5	.31	1.8	1.2	.83	.96	.73
31	.41	---	.67	.24	---	2.1	---	1.7	---	.66	1.3	---
TOTAL	19.84	77.16	41.47	58.17	4.63	26.64	40.30	47.93	52.48	81.19	96.74	17.43
MEAN	.64	2.57	1.34	1.88	.17	.86	1.34	1.55	1.75	2.62	3.12	.58
MAX	2.3	12	5.2	15	.27	6.5	14	7.9	8.5	14	10	2.7
MIN	.41	.39	.41	.24	.09	.06	.11	.21	.33	.52	.45	.28
AC-FT	39	153	82	115	9.2	53	80	95	104	161	192	35

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1956 - 1995, BY WATER YEAR (WY)

MEAN	.95	1.52	1.82	1.84	1.36	2.22	2.69	1.48	1.43	2.19	2.14	.92
MAX	3.86	8.31	7.01	11.9	6.69	15.7	10.5	4.50	5.53	6.69	8.13	5.93
(WY)	1984	1980	1960	1979	1960	1980	1986	1990	1994	1958	1958	1992
MIN	.008	.000	.12	.046	.089	.10	.20	.20	.16	.15	.12	.000
(WY)	1985	1963	1981	1962	1983	1983	1981	1966	1981	1961	1965	1965

HAWAII, ISLAND OF HAWAII
 16759000 HAUANI GULCH NEAR KAMUELA--CONTINUED

SUMMARY STATISTICS	FOR 1994 CALENDAR YEAR	FOR 1995 WATER YEAR	WATER YEARS 1956 - 1995	
ANNUAL TOTAL	1105.98	563.98		
ANNUAL MEAN	3.03	1.55	1.72	
HIGHEST ANNUAL MEAN			3.47	1980
LOWEST ANNUAL MEAN			.48	1981
HIGHEST DAILY MEAN	40 Mar 25	15 Jan 14	108	Mar 24 1980
LOWEST DAILY MEAN	.27 Mar 10	.06 Mar 16	.00	Jul 29 1961
ANNUAL SEVEN-DAY MINIMUM	.31 Mar 4	.07 Mar 11	.00	Sep 8 1961
ANNUAL RUNOFF (AC-FT)	2190	1120	1240	
10 PERCENT EXCEEDS	7.4	4.2	3.8	
50 PERCENT EXCEEDS	1.3	.61	.52	
90 PERCENT EXCEEDS	.46	.16	.08	



HAWAII, ISLAND OF HAWAII
16759000 HAUANI GULCH NEAR KAMUELA--CONTINUED

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

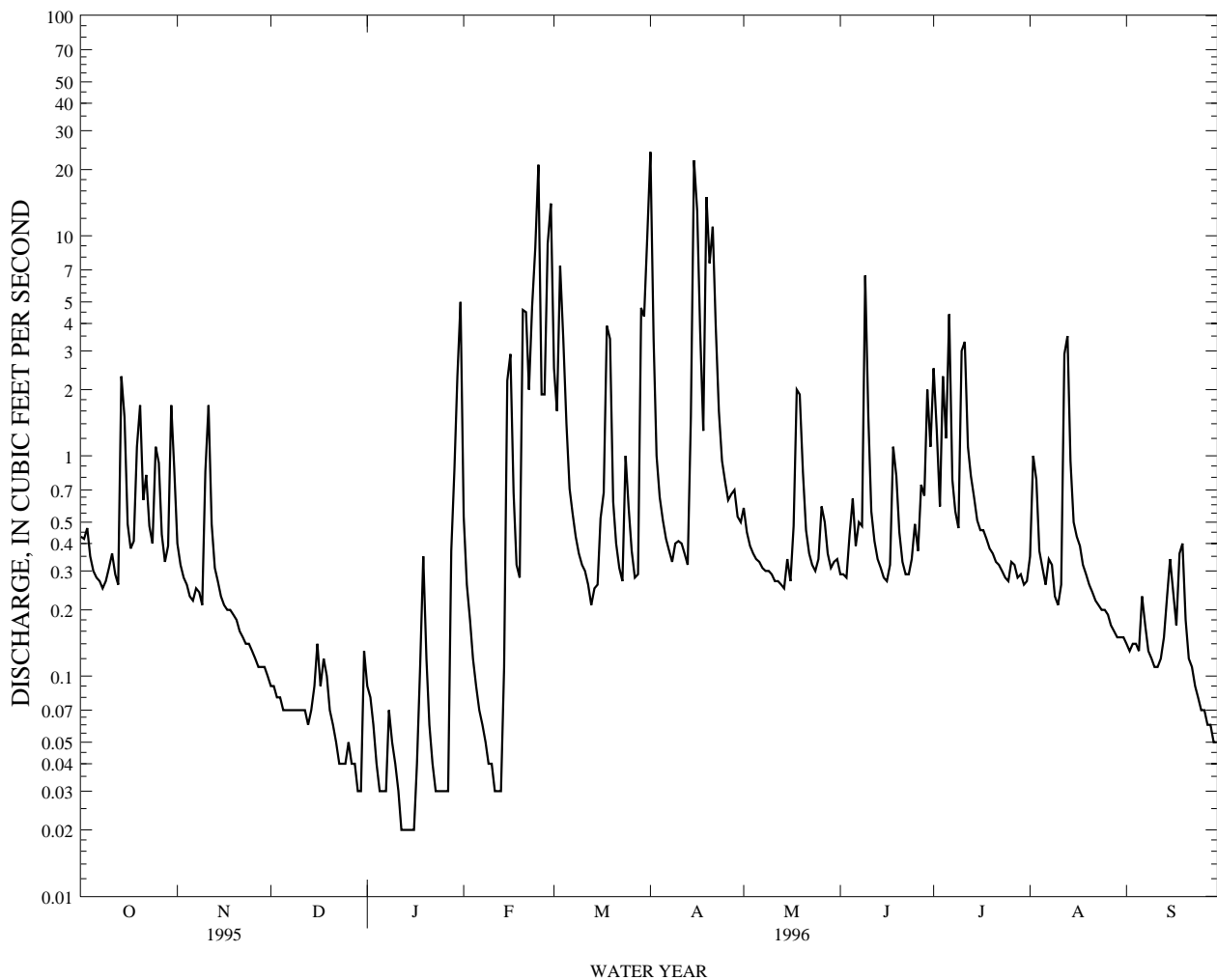
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.43	.40	.09	.09	.53	2.5	24	.58	.29	2.5	.35	.14
2	.42	.32	.09	.08	.26	1.6	3.4	.45	.29	1.3	1.0	.13
3	.47	.28	.08	.06	.18	7.3	1.0	.39	.28	.59	.78	.14
4	.35	.26	.08	.04	.12	3.4	.65	.36	.44	2.3	.37	.14
5	.30	.23	.07	.03	.09	1.4	.51	.34	.64	1.2	.31	.13
6	.28	.22	.07	.03	.07	.71	.42	.33	.39	4.4	.26	.23
7	.27	.25	.07	.03	.06	.55	.37	.31	.50	.78	.34	.17
8	.25	.24	.07	.07	.05	.43	.33	.30	.48	.56	.32	.13
9	.27	.21	.07	.05	.04	.36	.40	.30	6.6	.47	.23	.12
10	.31	.85	.07	.04	.04	.32	.41	.29	1.5	3.0	.21	.11
11	.36	1.7	.07	.03	.03	.30	.40	.27	.56	3.3	.26	.11
12	.29	.49	.07	.02	.03	.26	.36	.27	.41	1.1	2.9	.12
13	.26	.31	.06	.02	.03	.21	.32	.26	.34	.81	3.5	.15
14	2.3	.27	.07	.02	.11	.25	1.5	.25	.31	.65	.95	.23
15	1.5	.23	.09	.02	2.2	.26	22	.34	.28	.51	.50	.34
16	.49	.21	.14	.02	2.9	.52	13	.27	.27	.46	.43	.24
17	.38	.20	.09	.04	.68	.68	3.7	.48	.32	.46	.39	.17
18	.41	.20	.12	.11	.32	3.9	1.3	2.0	1.1	.42	.32	.36
19	1.1	.19	.10	.35	.28	3.4	15	1.9	.81	.38	.29	.40
20	1.7	.18	.07	.12	4.6	.62	7.5	.85	.45	.36	.26	.18
21	.63	.16	.06	.06	4.5	.40	11	.46	.33	.33	.24	.12
22	.82	.15	.05	.04	2.0	.31	3.9	.36	.29	.32	.22	.11
23	.48	.14	.04	.03	4.8	.27	1.6	.32	.29	.30	.21	.09
24	.40	.14	.04	.03	8.8	1.0	.95	.30	.34	.28	.20	.08
25	1.1	.13	.04	.03	21	.59	.76	.34	.49	.27	.20	.07
26	.93	.12	.05	.03	1.9	.37	.63	.59	.37	.33	.19	.07
27	.44	.11	.04	.03	1.9	.28	.67	.50	.74	.32	.17	.06
28	.33	.11	.04	.37	9.2	.29	.70	.36	.66	.28	.16	.06
29	.39	.11	.03	.87	14	4.7	.53	.31	2.0	.29	.15	.05
30	1.7	.10	.03	2.3	---	4.3	.50	.33	1.1	.26	.15	.05
31	.88	---	.13	5.0	---	10	---	.34	---	.27	.15	---
TOTAL	20.24	8.51	2.19	10.06	80.72	51.48	117.81	14.75	22.87	28.80	16.01	4.50
MEAN	.65	.28	.071	.32	2.78	1.66	3.93	.48	.76	.93	.52	.15
MAX	2.3	1.7	.14	5.0	21	10	24	2.0	6.6	4.4	3.5	.40
MIN	.25	.10	.03	.02	.03	.21	.32	.25	.27	.26	.15	.05
AC-FT	40	17	4.3	20	160	102	234	29	45	57	32	8.9

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1956 - 1996, BY WATER YEAR (WY)

	1956	1963	1966	1962	1983	1983	1981	1966	1981	1961	1965	1965
MEAN	.95	1.49	1.78	1.80	1.40	2.21	2.72	1.45	1.42	2.16	2.10	.90
MAX	3.86	8.31	7.01	11.9	6.69	15.7	10.5	4.50	5.53	6.69	8.13	5.93
(WY)	1984	1980	1960	1979	1960	1980	1986	1990	1994	1958	1958	1992
MIN	.008	.000	.071	.046	.089	.10	.20	.20	.16	.15	.12	.000
(WY)	1985	1963	1996	1962	1983	1983	1981	1966	1981	1961	1965	1965

HAWAII, ISLAND OF HAWAII
 16759000 HAUANI GULCH NEAR KAMUELA--CONTINUED

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1956 - 1996	
ANNUAL TOTAL	456.45	377.94		
ANNUAL MEAN	1.25	1.03	1.70	
HIGHEST ANNUAL MEAN			3.47	1980
LOWEST ANNUAL MEAN			.48	1981
HIGHEST DAILY MEAN	15 Jan 14	24 Apr 1	108	Mar 24 1980
LOWEST DAILY MEAN	.03 Dec 29	.02 Jan 12	.00	Jul 29 1961
ANNUAL SEVEN-DAY MINIMUM	.04 Dec 24	.02 Jan 10	.00	Sep 8 1961
ANNUAL RUNOFF (AC-FT)	905	750	1230	
10 PERCENT EXCEEDS	3.4	2.2	3.8	
50 PERCENT EXCEEDS	.40	.31	.51	
90 PERCENT EXCEEDS	.09	.06	.08	



HAWAII, ISLAND OF HAWAII
 16759000 HAUANI GULCH NEAR KAMUELA--CONTINUED

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
 DAILY MEAN VALUES

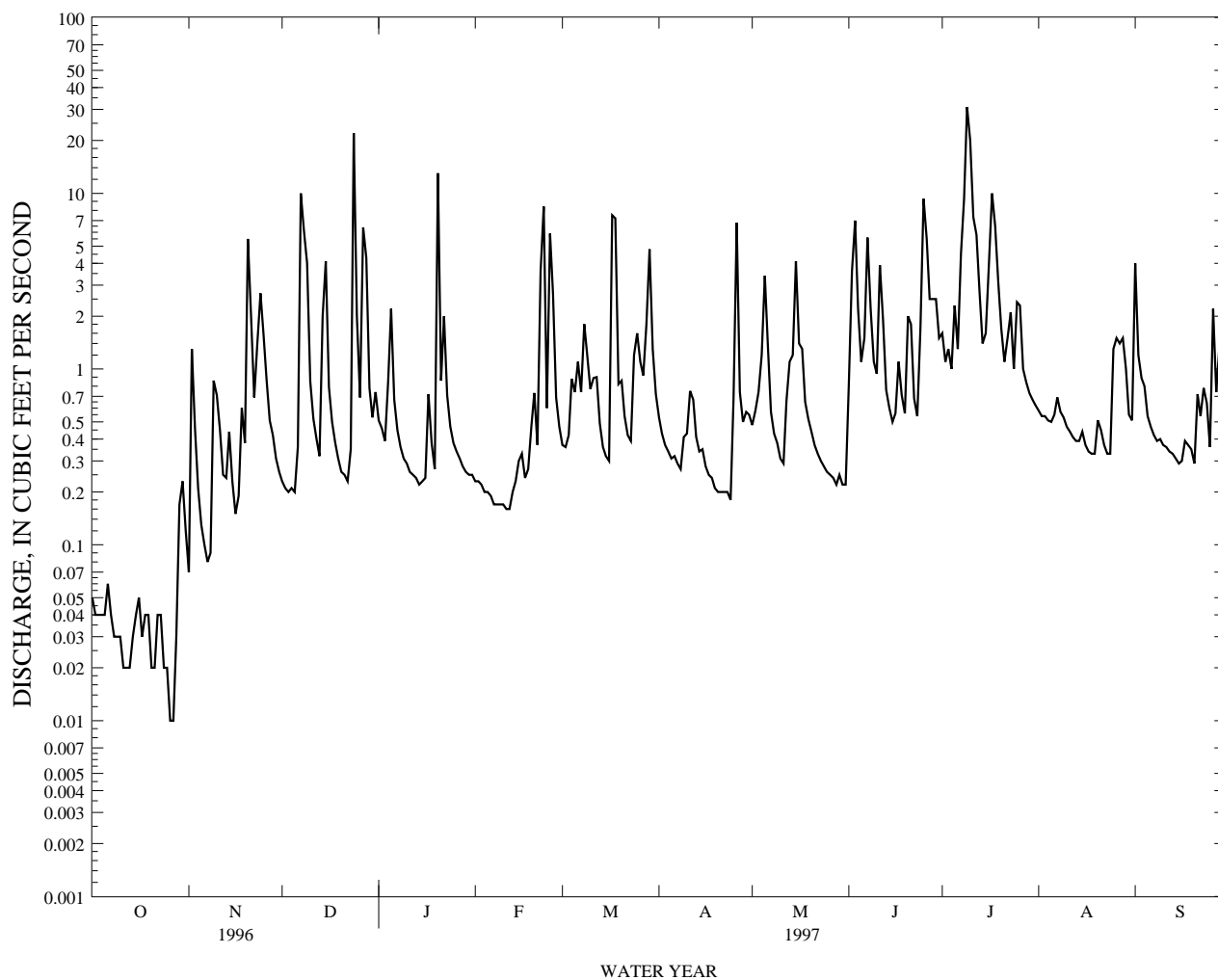
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.05	.07	.23	.51	.23	.37	.53	.48	.82	1.6	.58	4.0
2	.04	1.3	.21	.46	.23	.36	.43	.58	3.6	1.1	.54	1.2
3	.04	.46	.20	.39	.22	.42	.37	.74	7.0	1.3	.54	.89
4	.04	.21	.21	.85	.20	.88	.34	1.2	2.2	1.0	.51	.80
5	.04	.13	.20	2.2	.20	.74	.31	3.4	1.1	2.3	.50	.54
6	.06	.10	.36	.67	.19	1.1	.32	1.4	1.5	1.3	.55	.47
7	.04	.08	10	.45	.17	.74	.29	.57	5.6	4.5	.69	.42
8	.03	.09	6.1	.36	.17	1.8	.27	.43	2.2	9.3	.57	.39
9	.03	.86	4.0	.31	.17	1.2	.41	.38	1.1	31	.53	.40
10	.03	.71	.85	.29	.17	.77	.43	.31	.94	20	.47	.37
11	.02	.45	.52	.26	.16	.89	.75	.29	3.9	7.3	.44	.36
12	.02	.25	.40	.25	.16	.90	.67	.66	1.9	5.8	.41	.34
13	.02	.24	.32	.24	.20	.49	.41	1.1	.76	2.7	.39	.33
14	.03	.44	2.0	.22	.23	.36	.34	1.2	.60	1.4	.39	.31
15	.04	.23	4.1	.23	.30	.32	.35	4.1	.50	1.6	.44	.29
16	.05	.15	.79	.24	.33	.30	.28	1.4	.56	3.9	.37	.30
17	.03	.19	.50	.72	.24	7.5	.25	1.3	1.1	10	.34	.39
18	.04	.60	.38	.38	.27	7.2	.24	.65	.71	6.5	.33	.37
19	.04	.38	.31	.27	.47	.82	.21	.52	.56	3.1	.33	.35
20	.02	5.5	.26	13	.73	.86	.20	.44	2.0	1.7	.51	.29
21	.02	2.0	.25	.86	.37	.54	.20	.37	1.8	1.1	.45	.72
22	.04	.69	.23	2.0	3.6	.42	.20	.33	.68	1.5	.37	.54
23	.04	1.4	.35	.71	8.4	.39	.20	.30	.54	2.1	.33	.78
24	.02	2.7	22	.47	.60	1.2	.18	.28	1.7	1.0	.33	.64
25	.02	1.6	2.0	.38	5.9	1.6	.69	.26	9.3	2.4	1.3	.36
26	.01	.87	.69	.34	2.7	1.1	6.8	.25	5.5	2.3	1.5	2.2
27	.01	.51	6.4	.31	.69	.92	.74	.24	2.5	1.0	1.4	.74
28	.03	.42	4.3	.28	.47	1.8	.50	.22	2.5	.84	1.5	1.3
29	.17	.31	.78	.26	---	4.8	.57	.25	2.5	.73	1.0	.80
30	.23	.26	.53	.25	---	1.3	.55	.22	1.5	.67	.55	.70
31	.12	---	.74	.25	---	.72	---	.22	---	.62	.51	---
TOTAL	1.42	23.20	70.21	28.41	27.77	42.81	18.03	24.09	67.17	131.66	18.67	21.59
MEAN	.046	.77	2.26	.92	.99	1.38	.60	.78	2.24	4.25	.60	.72
MAX	.23	5.5	22	13	8.4	7.5	6.8	4.1	9.3	31	1.5	4.0
MIN	.01	.07	.20	.22	.16	.30	.18	.22	.50	.62	.33	.29
AC-FT	2.8	46	139	56	55	85	36	48	133	261	37	43

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1956 - 1997, BY WATER YEAR (WY)

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
MEAN	.93	1.48	1.79	1.78	1.39	2.19	2.67	1.44	1.44	2.21	2.07	.89
MAX	3.86	8.31	7.01	11.9	6.69	15.7	10.5	4.50	5.53	6.69	8.13	5.93
(WY)	1984	1980	1960	1979	1960	1980	1986	1990	1994	1958	1958	1992
MIN	.008	.000	.071	.046	.089	.10	.20	.20	.16	.15	.12	.000
(WY)	1985	1963	1996	1962	1983	1983	1981	1966	1981	1961	1965	1965

HAWAII, ISLAND OF HAWAII
 16759000 HAUANI GULCH NEAR KAMUELA--CONTINUED

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR		FOR 1997 WATER YEAR		WATER YEARS 1956 - 1997	
ANNUAL TOTAL	441.83		475.03			
ANNUAL MEAN	1.21		1.30		1.69	
HIGHEST ANNUAL MEAN					3.47	
LOWEST ANNUAL MEAN					.48	
HIGHEST DAILY MEAN	24	Apr 1	31	Jul 9	108	Mar 24 1980
LOWEST DAILY MEAN	.01	Oct 26	.01	Oct 26	.00	Jul 29 1961
ANNUAL SEVEN-DAY MINIMUM	.02	Oct 21	.02	Oct 21	.00	Sep 8 1961
ANNUAL RUNOFF (AC-FT)	876		942		1220	
10 PERCENT EXCEEDS	3.1		2.7		3.8	
50 PERCENT EXCEEDS	.32		.49		.51	
90 PERCENT EXCEEDS	.04		.16		.08	



HAWAII, ISLAND OF HAWAII
16759000 HAUANI GULCH NEAR KAMUELA--CONTINUED

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1997 TO SEPTEMBER 1998
DAILY MEAN VALUES

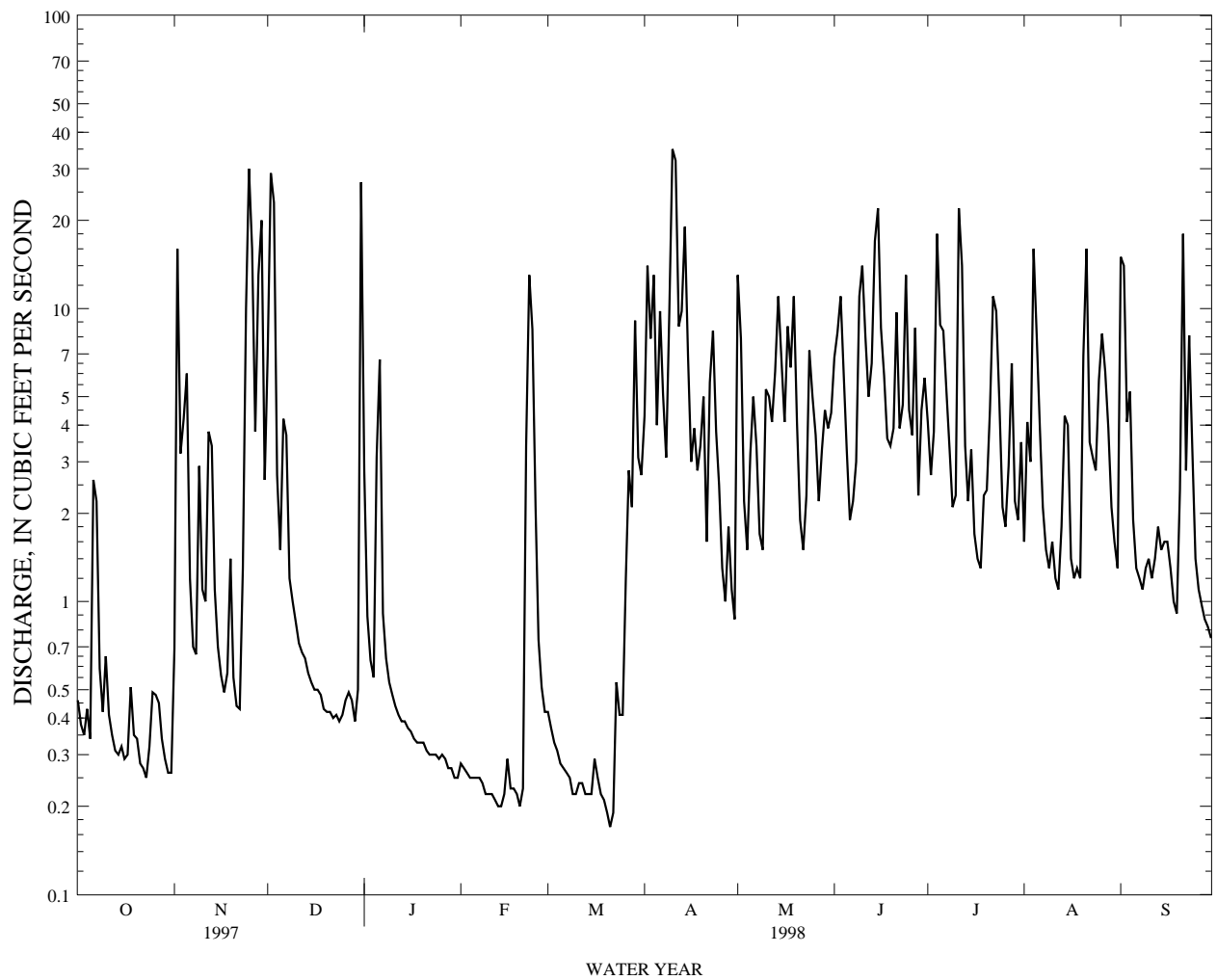
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.46	.69	6.9	2.8	.28	.42	4.3	13	6.8	4.1	1.6	15
2	.38	16	29	.89	.27	.37	14	7.9	8.3	2.7	4.1	14
3	.35	3.2	23	.63	.26	.33	7.9	2.2	11	3.8	3.0	4.1
4	.43	4.2	2.7	.55	.25	.31	13	1.5	6.1	18	16	5.2
5	.34	6.0	1.5	3.1	.25	.28	4.0	3.2	3.3	8.8	8.0	1.9
6	2.6	1.2	4.2	6.7	.25	.27	9.8	5.0	1.9	8.4	3.9	1.3
7	2.2	.70	3.7	.91	.25	.26	5.1	3.4	2.2	5.2	2.1	1.2
8	.59	.66	1.2	.64	.24	.25	3.1	1.7	3.0	3.3	1.5	1.1
9	.42	2.9	1.0	.53	.22	.22	9.7	1.5	11	2.1	1.3	1.3
10	.65	1.1	.85	.48	.22	.22	35	5.3	14	2.3	1.6	1.4
11	.41	1.0	.72	.44	.22	.24	32	5.0	8.0	22	1.2	1.2
12	.35	3.8	.67	.41	.21	.24	8.7	4.1	5.0	14	1.1	1.4
13	.31	3.4	.64	.39	.20	.22	9.8	6.1	6.5	3.4	1.8	1.8
14	.30	1.1	.57	.39	.20	.22	19	11	17	2.2	4.3	1.5
15	.32	.70	.53	.37	.22	.22	6.9	6.7	22	3.3	4.0	1.6
16	.29	.56	.50	.36	.29	.29	3.0	4.1	8.6	1.7	1.4	1.6
17	.30	.49	.50	.34	.23	.25	3.9	8.7	5.9	1.4	1.2	1.3
18	.51	.57	.48	.33	.23	.22	2.8	6.3	3.6	1.3	1.3	1.0
19	.35	1.4	.43	.33	.22	.21	3.4	11	3.4	2.3	1.2	.91
20	.34	.55	.42	.33	.20	.19	5.0	4.1	3.9	2.4	6.9	2.4
21	.28	.44	.42	.31	.23	.17	1.6	1.9	9.7	4.5	16	18
22	.27	.43	.40	.30	3.4	.19	5.6	1.5	3.9	11	3.5	2.8
23	.25	1.3	.41	.30	13	.53	8.4	2.3	4.7	9.8	3.1	8.1
24	.32	10	.39	.30	8.5	.41	3.8	7.2	13	4.8	2.8	3.3
25	.49	30	.41	.29	2.1	.41	2.5	5.0	4.5	2.1	5.7	1.4
26	.48	16	.46	.30	.74	1.2	1.3	3.7	3.7	1.8	8.2	1.1
27	.45	3.8	.49	.29	.51	2.8	1.0	2.2	8.6	2.9	6.1	.97
28	.34	13	.46	.27	.42	2.1	1.8	3.3	2.3	6.5	3.9	.87
29	.29	20	.39	.27	---	9.1	1.1	4.5	4.5	2.2	2.1	.82
30	.26	2.6	.50	.25	---	3.1	.87	3.9	5.8	1.9	1.6	.75
31	.26	---	27	.25	---	2.7	---	4.4	---	3.5	1.3	---
TOTAL	15.59	147.79	110.84	24.05	33.61	27.94	228.37	151.7	212.2	163.7	121.8	99.32
MEAN	.50	4.93	3.58	.78	1.20	.90	7.61	4.89	7.07	5.28	3.93	3.31
MAX	2.6	30	29	6.7	13	9.1	35	13	22	22	16	18
MIN	.25	.43	.39	.25	.20	.17	.87	1.5	1.9	1.3	1.1	.75
AC-FT	31	293	220	48	67	55	453	301	421	325	242	197

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1956 - 1998, BY WATER YEAR (WY)

MEAN	.92	1.56	1.83	1.75	1.38	2.16	2.78	1.52	1.57	2.28	2.11	.95
MAX	3.86	8.31	7.01	11.9	6.69	15.7	10.5	4.89	7.07	6.69	8.13	5.93
(WY)	1984	1980	1960	1979	1960	1980	1986	1998	1998	1958	1958	1992
MIN	.008	.000	.071	.046	.089	.10	.20	.20	.16	.15	.12	.000
(WY)	1985	1963	1996	1962	1983	1983	1981	1966	1981	1961	1965	1965

HAWAII, ISLAND OF HAWAII
 16759000 HAUANI GULCH NEAR KAMUELA--CONTINUED

SUMMARY STATISTICS	FOR 1997 CALENDAR YEAR	FOR 1998 WATER YEAR	WATER YEARS 1956 - 1998	
ANNUAL TOTAL	654.42	1336.91		
ANNUAL MEAN	1.79	3.66	1.74	
HIGHEST ANNUAL MEAN			3.66	1998
LOWEST ANNUAL MEAN			.48	1981
HIGHEST DAILY MEAN	31 Jul 9	35 Apr 10	108	Mar 24 1980
LOWEST DAILY MEAN	.16 Feb 11	.17 Mar 21	.00	Jul 29 1961
ANNUAL SEVEN-DAY MINIMUM	.17 Feb 6	.21 Feb 9	.00	Sep 8 1961
ANNUAL RUNOFF (AC-FT)	1300	2650	1260	
10 PERCENT EXCEEDS	3.8	9.7	3.9	
50 PERCENT EXCEEDS	.55	1.6	.51	
90 PERCENT EXCEEDS	.25	.26	.08	



HAWAII, ISLAND OF HAWAII
 16759000 HAUANI GULCH NEAR KAMUELA--CONTINUED

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
 DAILY MEAN VALUES

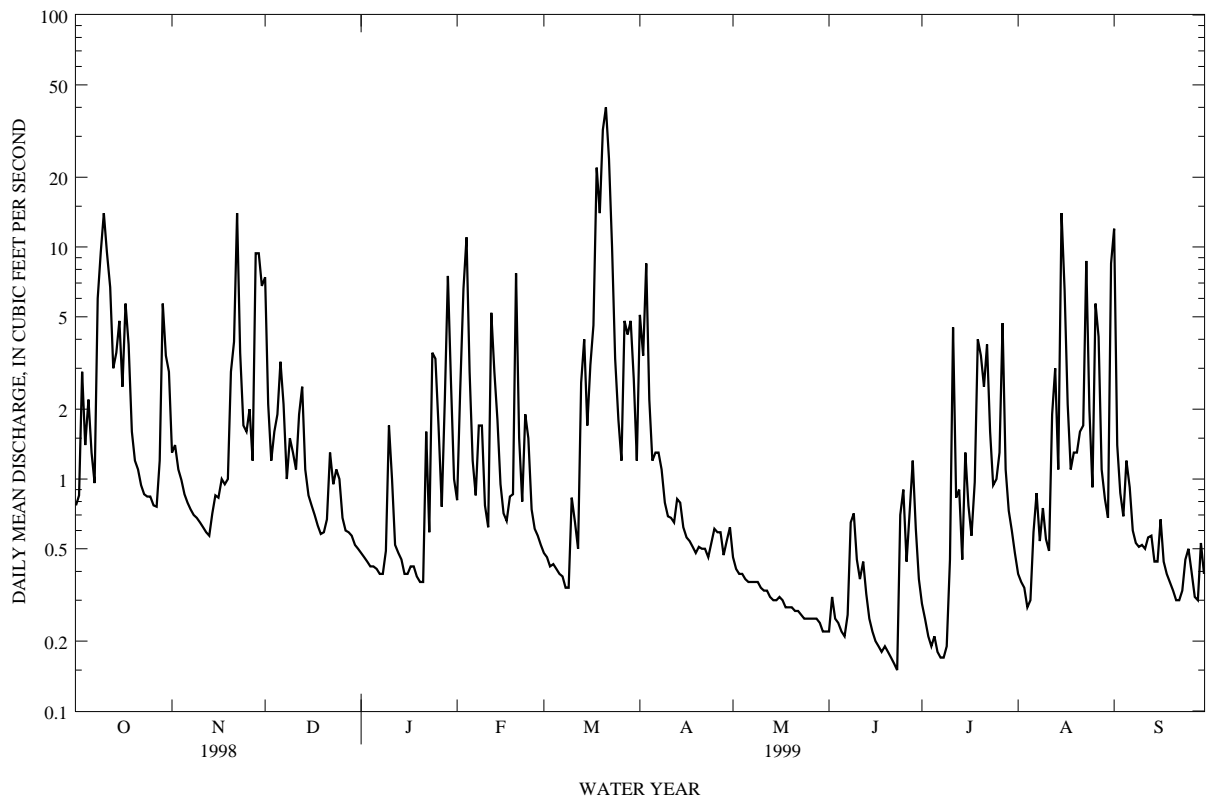
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.77	1.3	7.4	.48	.81	.48	5.1	.46	.22	.29	.39	12
2	.85	1.4	2.1	.46	2.4	.46	3.4	.41	.31	.25	.36	1.4
3	2.9	1.1	1.2	.44	6.6	.42	8.5	.39	.25	.21	.34	.87
4	1.4	.99	1.6	.42	11	.43	2.2	.39	.24	.19	.28	.69
5	2.2	.86	1.9	.42	2.9	.41	1.2	.37	.22	.21	.30	1.2
6	1.3	.79	3.2	.41	1.2	.39	1.3	.36	.21	.18	.59	.92
7	.96	.74	2.1	.39	.85	.38	1.3	.36	.26	.17	.87	.60
8	6.0	.70	1.0	.39	1.7	.34	1.1	.36	.65	.17	.54	.53
9	9.5	.68	1.5	.49	1.7	.34	.79	.36	.71	.19	.75	.51
10	14	.65	1.3	1.7	.77	.83	.69	.34	.45	.45	.55	.52
11	9.5	.62	1.1	1.0	.62	.65	.68	.33	.37	4.5	.49	.50
12	6.7	.59	1.9	.52	5.2	.50	.65	.33	.44	.83	1.9	.56
13	3.0	.57	2.5	.48	2.9	2.6	.82	.31	.32	.90	3.0	.57
14	3.5	.71	1.1	.45	1.8	4.0	.79	.30	.25	.45	1.1	.44
15	4.8	.85	.85	.39	.95	1.7	.62	.30	.22	1.3	14	.44
16	2.5	.83	.77	.39	.71	3.1	.56	.31	.20	.77	6.5	.67
17	5.7	1.0	.70	.42	.66	4.6	.54	.30	.19	.57	2.1	.44
18	3.8	.95	.63	.42	.84	22	.51	.28	.18	.97	1.1	.39
19	1.6	1.0	.58	.38	.86	14	.48	.28	.19	4.0	1.3	.36
20	1.2	2.9	.59	.36	7.7	32	.51	.28	.18	3.4	1.3	.33
21	1.1	3.9	.67	.36	1.5	40	.50	.27	.17	2.5	1.6	.30
22	.94	14	1.3	1.6	.80	24	.50	.27	.16	3.8	1.7	.30
23	.86	3.5	.95	.59	1.9	10	.46	.26	.15	1.6	8.7	.33
24	.84	1.7	1.1	3.5	1.5	3.3	.53	.25	.70	.94	2.0	.45
25	.84	1.6	1.0	3.3	.74	1.8	.61	.25	.90	1.0	.92	.50
26	.77	2.0	.68	1.7	.61	1.2	.59	.25	.44	1.3	5.7	.40
27	.76	1.2	.60	.76	.57	4.8	.59	.25	.72	4.7	4.1	.31
28	1.2	9.4	.59	2.2	.52	4.2	.47	.25	1.2	1.1	1.1	.30
29	5.7	9.4	.57	7.5	---	4.8	.54	.24	.61	.73	.82	.53
30	3.4	6.8	.52	2.6	---	2.7	.62	.22	.37	.60	.68	.39
31	2.9	---	.50	1.0	---	1.2	---	.22	---	.48	8.5	---
TOTAL	101.49	72.73	42.50	35.52	60.31	187.63	37.15	9.55	11.48	38.75	73.58	27.75
MEAN	3.27	2.42	1.37	1.15	2.15	6.05	1.24	.31	.38	1.25	2.37	.93
MAX	14	14	7.4	7.5	11	40	8.5	.46	1.2	4.7	14	12
MIN	.76	.57	.50	.36	.52	.34	.46	.22	.15	.17	.28	.30
AC-FT	201	144	84	70	120	372	74	19	23	77	146	55

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1956 - 1999, BY WATER YEAR (WY)

MEAN	.97	1.58	1.82	1.74	1.40	2.25	2.75	1.49	1.54	2.26	2.12	.95
MAX	3.86	8.31	7.01	11.9	6.69	15.7	10.5	4.89	7.07	6.69	8.13	5.93
(WY)	1984	1980	1960	1979	1960	1980	1986	1998	1998	1958	1958	1992
MIN	.008	.000	.071	.046	.089	.10	.20	.20	.16	.15	.12	.000
(WY)	1985	1963	1996	1962	1983	1983	1981	1966	1981	1961	1965	1965

HAWAII, ISLAND OF HAWAII
 16759000 HAUANI GULCH NEAR KAMUELA--CONTINUED

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR	FOR 1999 WATER YEAR	WATER YEARS 1956 - 1999	
ANNUAL TOTAL	1279.41	698.44		
ANNUAL MEAN	3.51	1.91	1.74	
HIGHEST ANNUAL MEAN			3.66	1998
LOWEST ANNUAL MEAN			.48	1981
HIGHEST DAILY MEAN	35 Apr 10	40 Mar 21	108	Mar 24 1980
LOWEST DAILY MEAN	.17 Mar 21	.15 Jun 23	.00	Jul 29 1961
ANNUAL SEVEN-DAY MINIMUM	.21 Feb 9	.17 Jun 17	.00	Sep 8 1961
ANNUAL RUNOFF (AC-FT)	2540	1390	1260	
10 PERCENT EXCEEDS	8.9	4.5	3.9	
50 PERCENT EXCEEDS	1.8	.73	.52	
90 PERCENT EXCEEDS	.27	.28	.09	



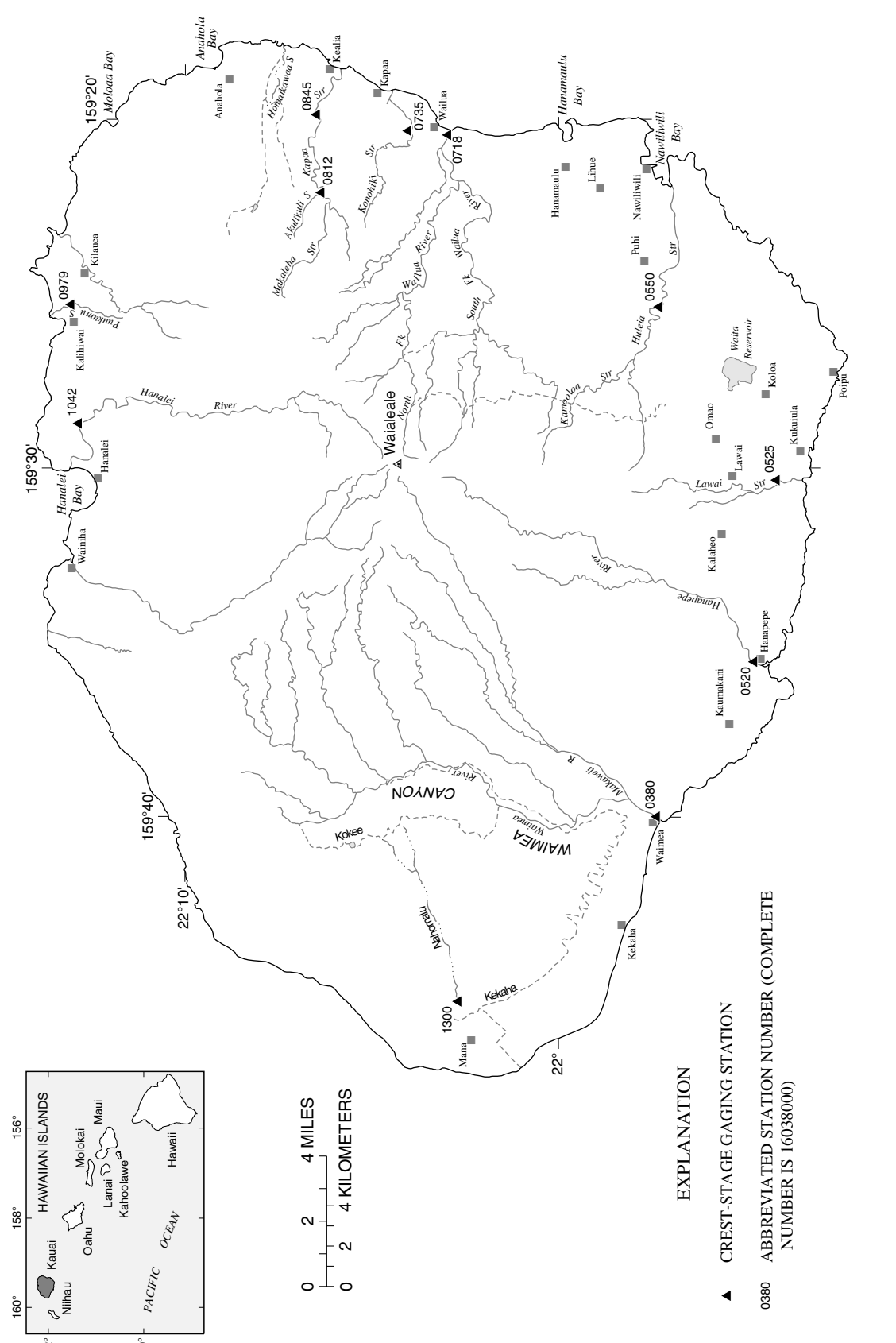


Figure 10. Locations of crest-stage gaging stations on Kauai.

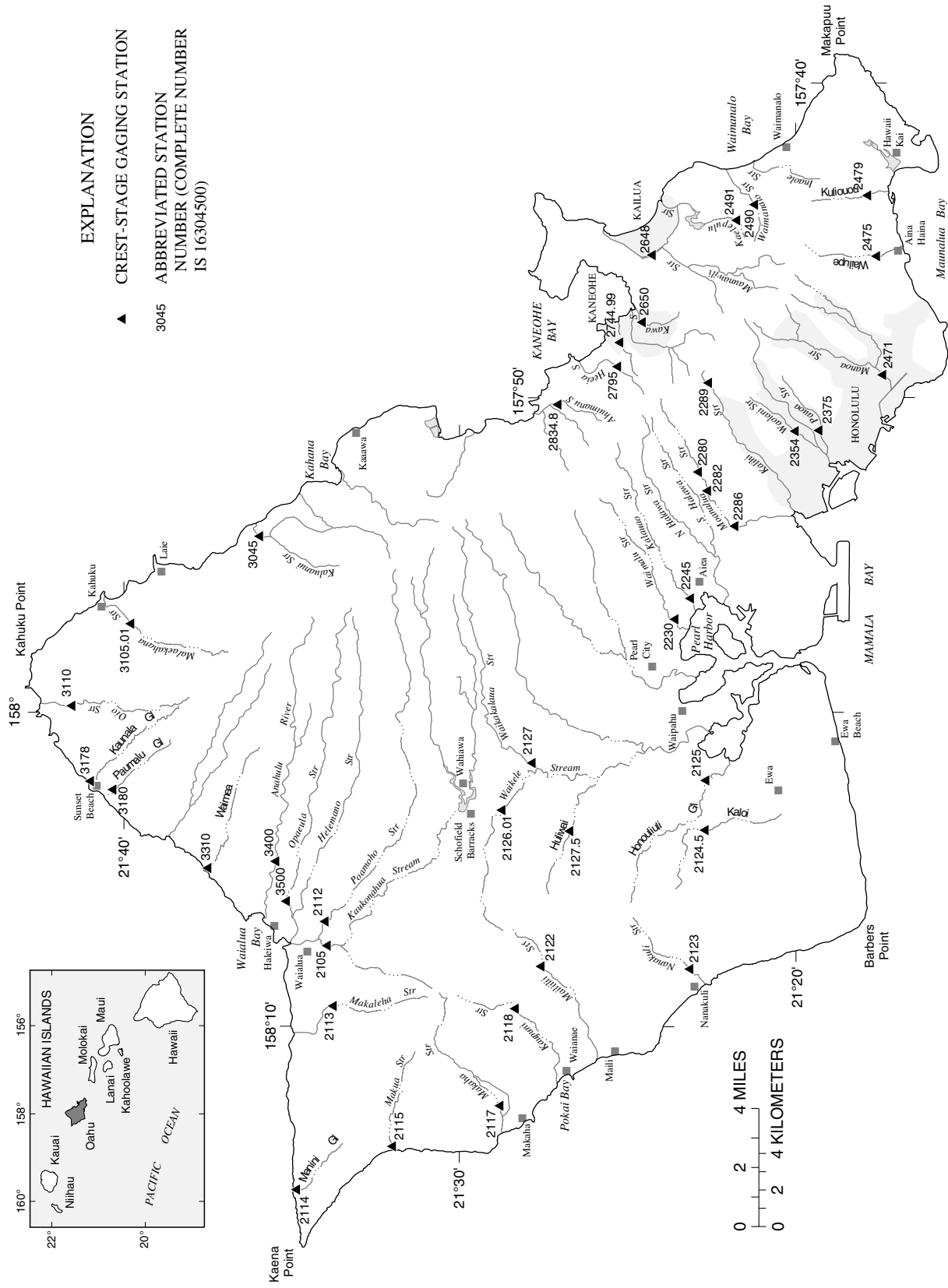


Figure 11. Locations of crest-stage gaging stations on Oahu.

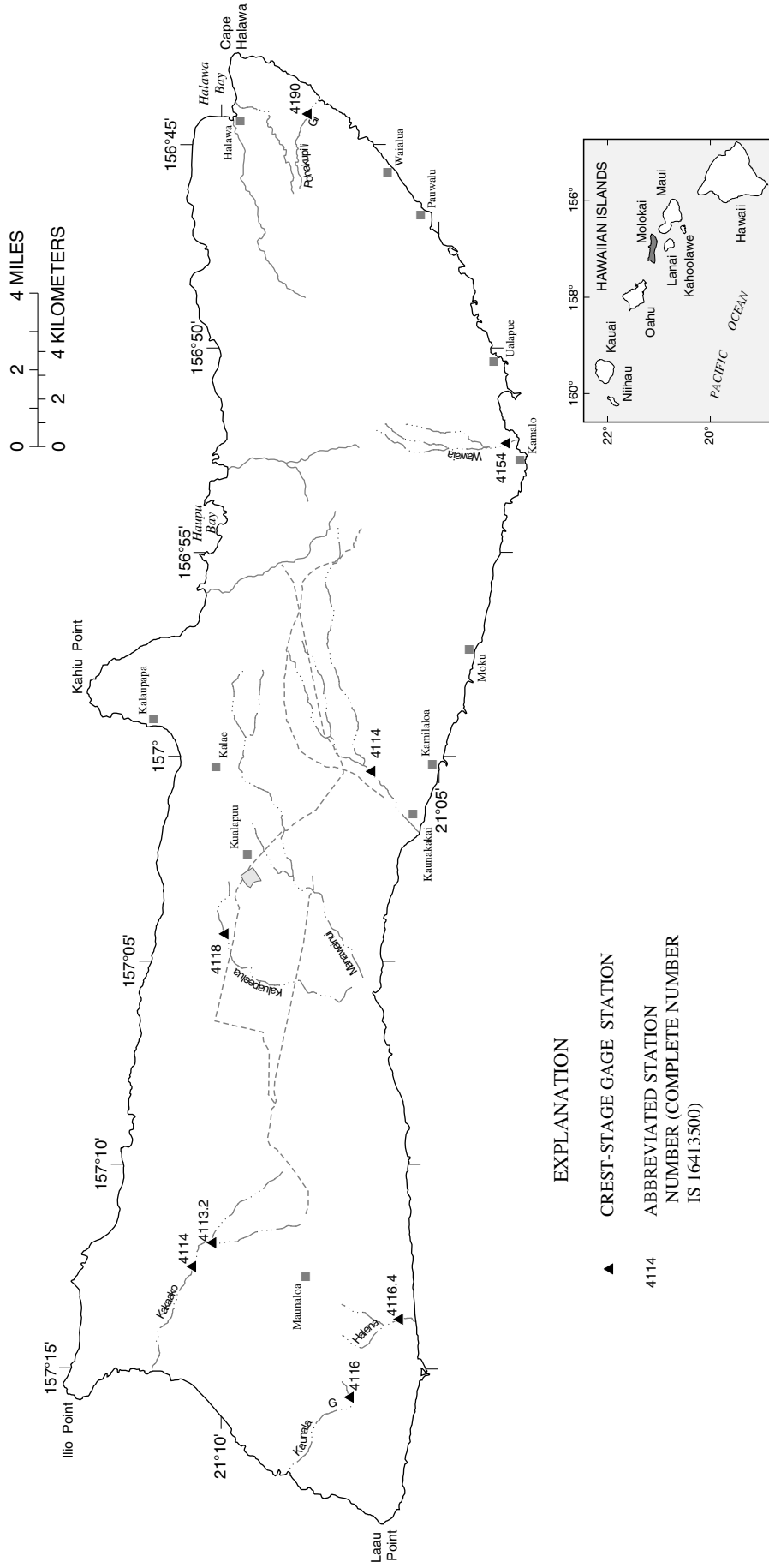


Figure 12. Locations of crest-stage gaging stations on Molokai.

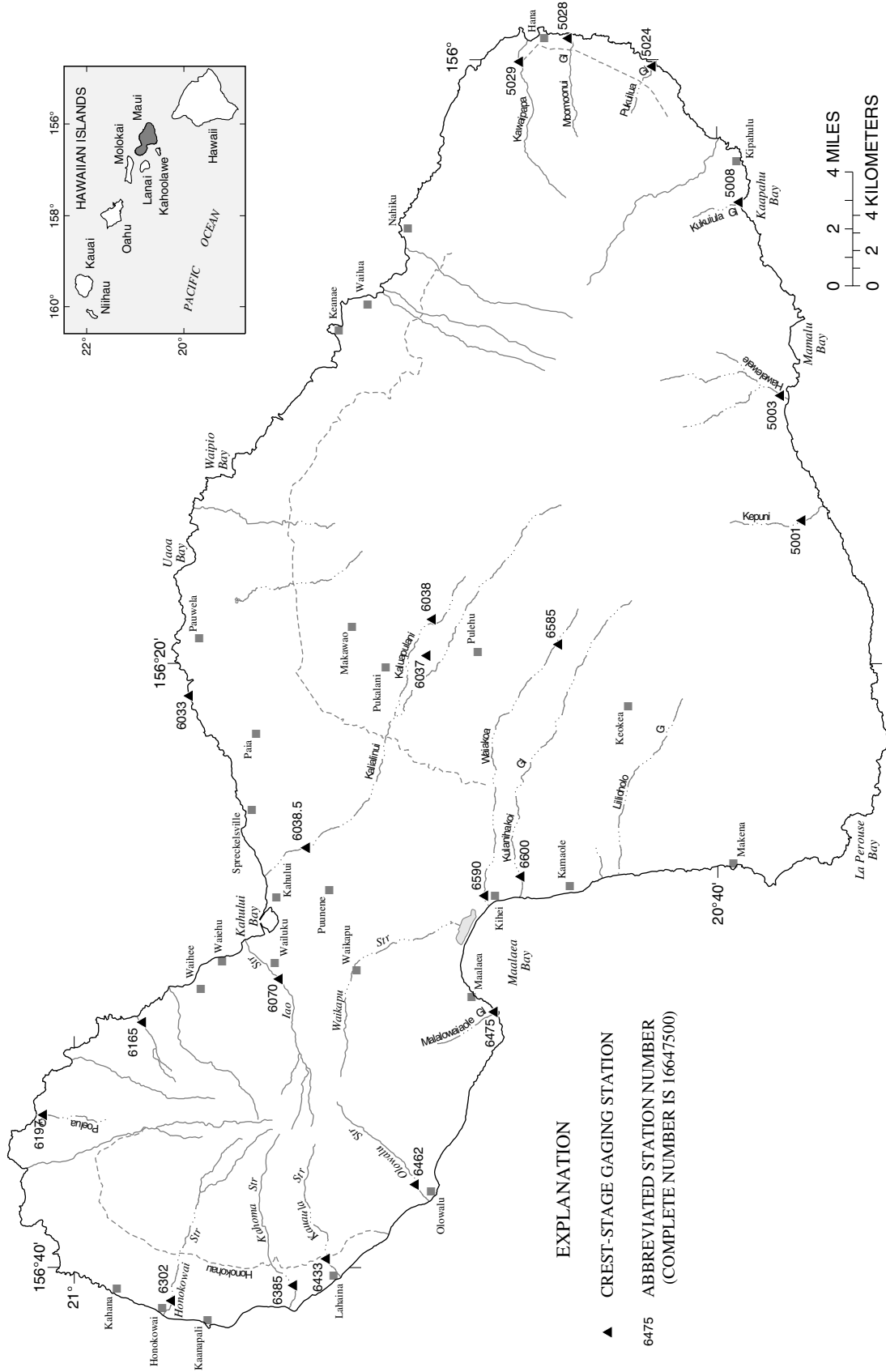


Figure 13. Locations of crest-stage gaging stations on Maui.

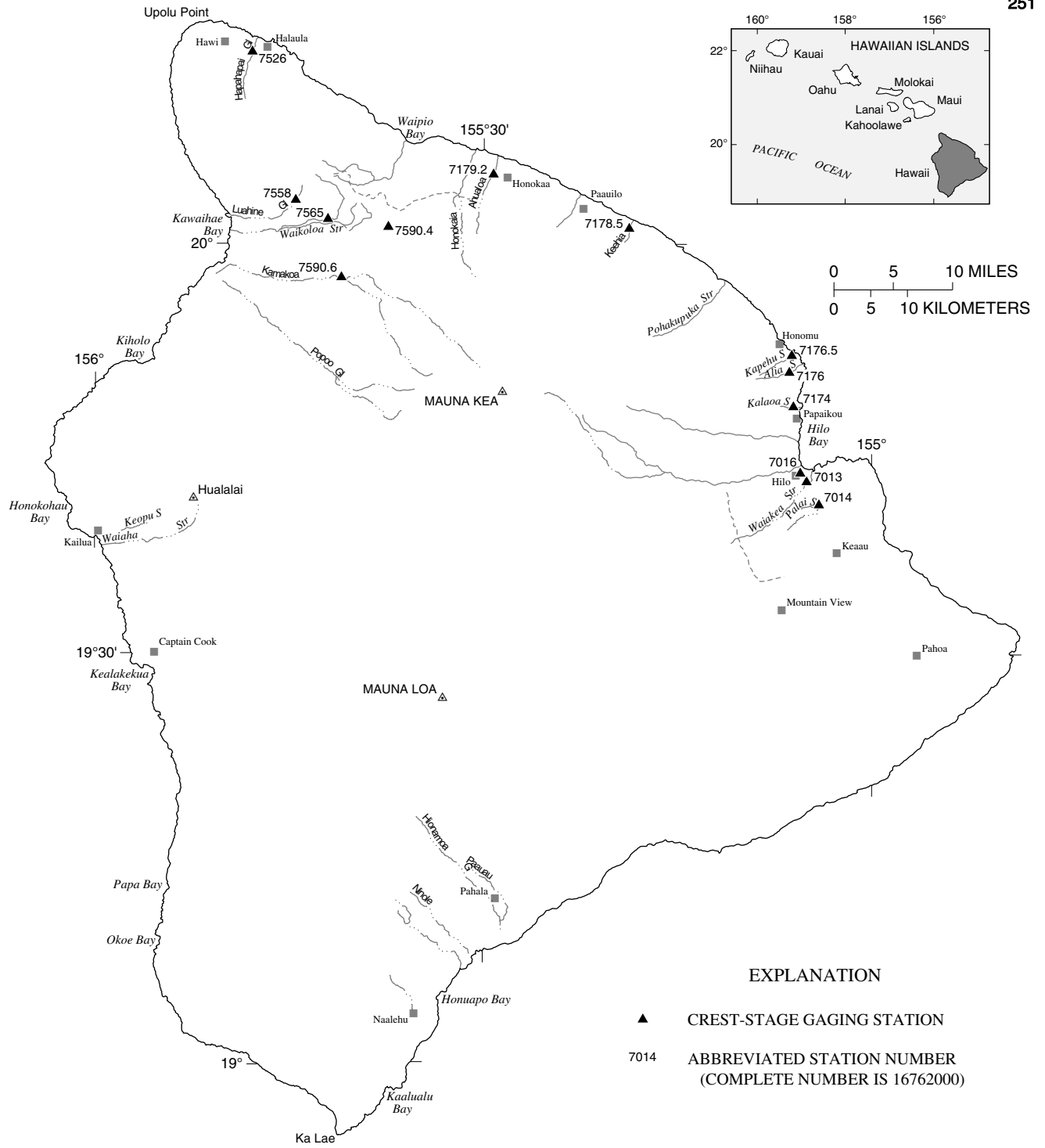


Figure 14. Locations of crest-stage gaging stations on Hawaii.

As the number of streams on which streamflow information is likely to be desired far exceeds the number of continuous-record stream-gaging stations feasible to operate at one time, the Geological Survey collects limited streamflow data at sites other than continuous-record stream-gaging stations. When limited streamflow data are collected on a systematic basis over a period of years for use in hydrologic analyses, the site at which the data are collected is called a partial-record station. Data collected at these partial-record stations are usable in low-flow or flood-flow analyses, depending on the type of data collected. In addition, discharge measurements are made at other sites not included in the partial-record program. These measurements are generally made in times of drought or flood to give better areal coverage to these events. Those measurements and others collected for some special reason are called measurements at miscellaneous sites.

Records collected at partial-record stations are presented in three tables. The first is a table of annual maximum stage and discharge at crest-stage stations, the second is a table of discharge measurements at low-flow partial-record stations, and the third is a table of discharge measurements at miscellaneous sites.

Crest-Stage Partial-Record Stations

Prior to 1973, crest-stage partial-record station records for the State of Hawaii were published in an annual progress report entitled "An Investigation of Floods in Hawaii." The following table contains annual maximum discharge for crest-stage stations. A crest-stage gage is a device which will register the peak stage occurring between inspections of the gage. A stage-discharge relation for each gage is developed from discharge measurements made by indirect measurements of peak flow or by current meter. The date of the maximum discharge is not always certain, but is usually determined by comparison with nearby continuous-record stations, weather records, or local inquiry. Only the maximum discharge for each water year is given. Information on some lower floods may have been obtained for purposes of establishing the stage-discharge relation, but these are not published herein. The years given in the period of record represent water years for which the annual maximum has been determined.

Revised and previously unpublished annual maximum discharge at crest-stage partial-record stations during water years 1966-98

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year maximum			Period of record max		
				Date	Gage height (ft)	Dis-charge (ft ³ /s)	Date	Gage height (ft)	Dis-charge (ft ³ /s)
Island of Kauai									
16073500 Konohiki Str nr Kapaa	Lat 22°04'01", long 159°20'21", at culvert on private road, 1.8 mi upstream from mouth, and 2.4 mi southwest of Kapaa High School.	3.38	1964-67, 1970-99	12-03-92	9.20	410	12-14-91	16.92	2,530
16081200 Akulikuli Str nr Kapaa	Lat 22°06'25", long 159°22'07", at Kahuna Road crossing, 800 ft upstream from mouth, and 3.5 mi northwest of Kapaa armory.	0.40	1964-99	12-03-92 10-01-93 10-03-94 11-03-95 01-19-97 12-29-97	5.72 5.28 4.73 7.55 5.56 4.44	330 284 230 544 380 204	12-14-91	11.40	1,550
Island of Hawaii									
16701300 Waiakea Str at Hilo	Lat 19°42'38", long 155°05'02", 0.3 mi upstream from Kinooole Street bridge and 1.3 mi southeast of Hilo Post Office.	35.8	1969-75, 1979, 1994-98	01-07-76 08-12-77 07-06-78 03-17-80 09-26-81 07-16-82 1983 1984 03-01-85 04-10-86 11-13-86 12-13-87 07-22-89 01-19-90	deleted deleted deleted deleted - deleted - - deleted deleted deleted deleted deleted deleted deleted	deleted deleted deleted deleted deleted deleted deleted deleted deleted deleted deleted deleted deleted deleted	08-12-94	10.90	3,670
16701400 Palai Str at Hilo	Lat 19°40'56", long 155°04'04", at Highway 11, 300 ft south of Palai Street intersection, and 3.5 mi southeast of Hilo Post Office.	5.08	1965-71, 1979-80, 1994	04-17-72 10-03-72 04-19-74 01-08-75 01-07-76 08-12-77 07-06-78 09-26-81	deleted deleted deleted deleted deleted deleted deleted deleted	deleted deleted deleted deleted deleted deleted deleted deleted	03-20-79	8.10	1,260

Revised and previously unpublished annual maximum discharge at crest-stage partial-record stations during water years 1966-98

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year maximum			Period of record max		
				Date	Gage height (ft)	Dis-charge (ft ³ /s)	Date	Gage height (ft)	Dis-charge (ft ³ /s)
Island of Hawaii--Continued									
16701400--Continued				07-16-82	deleted	deleted			
				1983	-	deleted			
				02-08-84	deleted	deleted			
				03-06-85	deleted	deleted			
				04-10-86	deleted	deleted			
				11-13-86	deleted	deleted			
				12-13-87	deleted	deleted			
				07-22-89	deleted	deleted			
				01-19-90	deleted	deleted			
16717400 Kalaoa Mauka Str nr Hilo	Lat 19°48'07", long 155°06'03", at culvert on Highway 19, 1.0 mi north of Papaikou, and 5.1 mi north of Hilo Post Office.	0.24	1963-67, 1973-76, 1978-79, 1985	11-26-67	deleted	deleted	02-20-79	20.60	400
				04-11-69	deleted	deleted			
				08-26-70	deleted	deleted			
				12-02-70	deleted	deleted			
				02-08-72	deleted	deleted			
				08-12-77	deleted	deleted			
				02-20-79	400	20.60			
				11-17-79	deleted	deleted			
				11-11-80	deleted	deleted			
				12-25-81	deleted	deleted			
				12-18-82	deleted	deleted			
				02-08-84	deleted	deleted			
				04-10-86	deleted	deleted			
				11-13-86	deleted	deleted			
				12-13-87	deleted	deleted			
				07-22-89	deleted	deleted			
				01-19-90	deleted	deleted			
16759040 Paiakuli Reser- voir tributary nr Waimea	Lat 20°02'16", long 155°38'08", at Highway 19, 2.1 mi west of Puukapu Reservoir and 2.6 mi northeast of Waimea.	0.27	1962-90, 1994-98	08-24-66	5.29	264	01-11-67	5.63	340
				03-26-71	deleted	deleted			
				03-05-72	deleted	deleted			
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				04-16-74	deleted	deleted			
				03-01-75	deleted	deleted			
				08-12-76	deleted	deleted			
				02-27-77	deleted	deleted			
				06-23-78	deleted	deleted			
				01-14-79	deleted	deleted			
				11-18-79	deleted	deleted			
				1981	-	deleted			
				02-11-82	deleted	deleted			
				12-18-82	deleted	deleted			
				12-26-83	deleted	deleted			
				12-09-84	deleted	deleted			
				04-10-86	deleted	deleted			
				01-18-87	deleted	deleted			
				11-21-87	deleted	deleted			
				04-07-89	deleted	deleted			
				09-07-90	deleted	deleted			
				03-25-94	3.31	e130			
				1995	<2.12	<57			
				06-09-96	2.56	84			
				01-20-97	3.32	e130			
				08-21-98	2.96	110			

e Estimated

< Actual value is known to be less than the value shown

Annual maximum discharge at crest-stage partial-record stations during water year 1999

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 1999 maximum			Period of record max			
				Date	Gage height (ft)	Dis-charge (ft ³ /s)	Date	Gage height (ft)	Dis-charge (ft ³ /s)	
Island of Kauai										
16038000 Waimea River at Waimea	Lat 21°57'23", long 159°39'59", 150 ft upstream from highway bridge at Waimea and 0.2 mi upstream from mouth.	86.5	1944-99b	01-22-99	5.63	-	02-07-49	11.40	-	
16052000 Hanapepe River at Hanapepe	Lat 21°54'47", long 159°35'33", 400 ft upstream from bridge on Highway 50 and 0.5 mi upstream from mouth.	26.6	1950-99b	07-02-99	3.43	-	04-15-63	11.30	-	
16052500 Lawai Str nr Koloa	Lat 21°54'11", long 159°30'21", on right bank at private road bridge, 0.9 mi upstream from mouth, and 2.4 mi southwest of Koloa.	6.62	1962-63, 1964-72≠, 1973-99	02-01-99	4.31	1,160	01-31-75	11.37	5,810	
16055000 Huleia Str nr Lihue	Lat 21°57'20", long 159°25'23", at highway bridge, 3.7 mi southwest of Lihue, and 4.5 mi upstream from mouth.	17.6	1912-15≠, 1962-67, 1968-70≠, 1971-99	01-07-99	7.11	1,030	11-28-70	22.40	26,800	
16071800 Wailua Riv nr Kapaa	Lat 22°03'00", long 159°20'26", at State park 600 ft upstream from highway bridge, 850 ft upstream from mouth, and 2.5 mi southwest of Kapaa.	52.6	1962-99b	01-07-99	5.59	-	11-26-70	8.57	-	
16073500 Konohiki Str nr Kapaa	Lat 22°04'01", long 159°20'21", at culvert on private road, 1.8 mi upstream from mouth, and 2.4 mi southwest of Kapaa High School.	3.38	1964-67, 1970-99	01-07-99	5.87	<100	12-14-91	16.92	2,530	
16081200 Akulikuli Str nr Kapaa	Lat 22°06'25", long 159°22'07", at Kahuna Road crossing, 800 ft upstream from mouth, and 3.5 mi northwest of Kapaa armory.	0.40	1964-99	01-07-99	4.28	190	12-14-91	11.40	1,550	
16084500 Kapaa Str at old highway crossing nr Kealia	Lat 22°06'28", long 159°19'52", at abutment of old highway bridge, 100 ft upstream from road crossing, 1.4 mi northwest of Kealia, and 2.1 mi upstream from mouth.	14.0	1962-99	01-07-99	9.21	2,490	12-14-91	23.11	30,330	
16097900 Puukumu Str nr Kilauea	Lat 22°13'02", long 159°25'18", at culvert on Highway 56, 0.8 mi northwest of Kilauea School, and 0.9 mi upstream from mouth.	0.91	1964-68, 1971-99	01-22-99	3.25	52	04-07-71	17.27	1,430	
16104200 Hanalei Riv at Highway 56 bridge nr Hanalei	Lat 22°12'50", long 159°28'43", at highway bridge, 1.6 mi northeast of Hanalei, and 2.4 mi upstream from mouth.	21.0	1963-99b	01-22-99	10.12	-	11-03-95	13.82	-	
16130000 Nahomalu Valley nr Mana	Lat 22°02'41", long 159°45'17", on left bank 1.1 mi northeast of Mana, and 5.3 mi northwest of Kekaha School.	3.81	1962-63, 1964-71≠, 1972-99	02-20-99	3.14	45	04-15-72	7.15	2,120	

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b Gage height only

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e Estimated

Annual maximum discharge at crest-stage partial-record stations during water year 1999--Continued

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 1999 maximum			Period of record max		
				Date	Gage height (ft)	Dis-charge (ft ³ /s)	Date	Gage height (ft)	Dis-charge (ft ³ /s)
Island of Oahu									
16210500 Kaukonahua Str at Waialua	Lat 21°33'56", long 158°07'26", 0.2 mi upstream from Highway 99, 0.4 mi southeast of Waialua High School, and 1.3 mi southwest of Weed Circle.	38.7	1963, 1968-98 1963, 1968-99	1998	<19.09	<1,820(r)	04-15-63	26.4	15,600
16211200 Poamoho Str at Waialua	Lat 21°34'00", long 158°06'40", at culvert crossing of Kaheaka Road, 0.2 mi upstream from Highway 83, and 1.1 mi east of Waialua High School.	12.7	1967-98 1967-99	1998 04-04-99	<9.17 9.42	unknown(r) unknown	04-19-74	24.0	7,340
16211300 Makaleha Str nr Waialua	Lat 21°33'49", long 158°09'21", 1.0 mi southwest of Dillingham Ranch and 1.9 mi southwest of former sugar mill at Waialua.	4.5	1958-63, 1964-65≠, 1966-99	1997 1998 04-04-99	unknown unknown 9.02	unknown(r) unknown(r) unknown	11-13-65 11-14-96	7.41 9.41	3,640 -
16211400 Manini Gulch at Kaena	Lat 21°34'50", long 158°15'12", 180 ft upstream from Highway 99, 1.7 mi west of Camp Erdman, and 2.0 mi east of Kaena Point.	1.08	1974-98 1974-99	1998 1999	<12.08 <12.08	unknown(r) unknown	01-01-88	19.61	1,000
16211500 Makua Str at Makua	Lat 21°31'59", long 158°13'49", on bridge at Farrington Highway crossing, 0.1 mi north of Makua cemetery and 4.5 mi southeast of Kaena Point lighthouse.	4.24	1958-99	11-18-98	7.34	unknown	02-07-76 11-14-96	a8.00 11.74	3,220 -
16211700 Makaha Str at Makaha	Lat 21°28'47", long 158°12'31", 0.9 mi upstream from Farrington Highway and 1.1 mi north of junction of Farrington Highway and Makaha Valley Road.	5.25	1966-99	1999	<7.74	unknown	11-14-96	17.60	e5,000
16211800 Kaupuni Str at altitude 372 ft, nr Waianae	Lat 21°28'20", long 158°09'26", at abandoned diversion dam, 2.6 mi northeast of Waianae cemetery, and 2.8 mi northeast of junction of Waianae Valley Road and Farrington Highway.	3.58	1961-72≠, 1973-99	1999	<3.38	unknown	01-06-82	7.82	3,640
16212200 Maillili Str nr Waianae	Lat 21°27'34", long 158°08'05", at bridge at Lualualei Naval Reservation and 3.4 mi east of cemetery nr Waianae.	1.51	1958-99	1997 1998 1999	unknown unknown <0.98	unknown(r) unknown(r) unknown	01-06-82	7.20	2,460
16212450 Kaloi Gulch tribu- tary nr Honouliuli	Lat 21°22'41", long 158°03'45", at culvert on private road, 1.8 mi west of Honouliuli, and 2.8 mi northwest of Ewa Post Office.	1.70	1968-99	1999	<2.42	<50	01-08-80	7.45	724
16212500 Honouliuli Str nr Waipahu	Lat 21°22'40", long 158°02'10", at bridge on Farrington Highway and 1.8 mi west of Waipahu Post Office.	11.0	1956-99	1999	<0.38	unknown	01-06-82	10.28	3,500
16212601 Waikele Str at Wheeler Field	Lat 21°28'44", long 158°03'07", at culvert 0.3 mi west of east-west runway at Wheeler Field and 1.9 mi southwest of Wahiawa Post Office.	6.35	1958, 1960-99	07-20-99	8.00	505	01-06-82	22.50	1,850

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a At old gage datum

e Estimated

Annual maximum discharge at crest-stage partial-record stations during water year 1999--Continued

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 1999 maximum			Period of record max			
				Date	Gage height (ft)	Dis-charge (ft ³ /s)	Date	Gage height (ft)	Dis-charge (ft ³ /s)	
Island of Oahu--Continued										
16212700 Waikakalaua Str nr Wahiawa	Lat 21°27'50", long 158°01'38", 0.2 mi downstream from Kame- hameha Highway and 2.4 mi south of Wahiawa Post Office.	7.49	1958-99	12-31-98	3.90	unknown	04-15-63	16.50	4,830	
16212750 Huliwai Gulch nr Kunia Camp	Lat 21°26'43", long 158°03'47", 200 ft upstream from Highway 75 and 1.2 mi south of Kunia Camp.	0.84	1974-99	07-02-99	11.79	63	02-10-79 07-02-99	a8.36 11.79	600	
16223000 Waimalu Str nr Aiea	Lat 21°23'48", long 157°56'56", 1,300 ft upstream from bridge on Moanalua Road and 1.2 mi north- west of Aiea High School.	5.97	1952-70≠, 1973-99	01-07-99	2.56	919	01-05-68	6.82	8,020	
16228000 Moanalua Str nr Honolulu	Lat 21°22'53", long 157°52'22", on left bank 1.8 mi northeast of Tripler Hospital and 5.0 mi north of Honolulu Post Office.	2.73	1927-78≠, 1979-99	04-04-99	3.52	248	11-18-30	11.58	4,580	
16228200 Moanalua Str nr Aiea	Lat 21°22'37", long 157°53'03", on right bank 1.1 mi northeast of Tripler Hospital and 2.9 mi east of Aiea sugar refinery.	3.34	1969-99	04-04-99	3.94	564	03-18-80	9.97	4,860	
16228600 Moanalua Str at Tripler Hospital	Lat 21°21'52", long 157°54'05", on right bank 0.5 mi west of Tripler Hospital and 1.6 mi northeast of Aliamanu School.	4.44	1971-99	04-04-99	13.43	unknown	03-08-80	21.0	6,200	
16228900 Kalihi Str nr Kaneohe	Lat 21°22'35", long 157°49'32", on right bank 800 ft downstream from Likelike Highway and 2.8 mi south- west of Castle High School in Kaneohe.	0.60	1967-71≠, 1972-99	1999	unknown	unknown	01-08-80	5.60	1,700	
16235400 Waolani Str at Honolulu	Lat 21°20'00", long 157°51'04", at Wyllie Street bridge and 1.8 mi northeast of Honolulu Post Office.	1.28	1958-99	07-17-99	0.34	<130	05-14-63	6.14	2,500	
16237500 Pauoa Str at Honolulu	Lat 21°19'18", long 157°51'03", at Lusitana Street bridge and 1.1 mi northeast of Honolulu Post Office.	1.43	1958-99	01-07-99	0.51	260	05-14-63	4.65	2,200	
16247100 Manoa-Palolo Drainage Canal at Moiliili	Lat 21°17'24", long 157°49'17", on left bank at Kaimuki High School, 0.3 mi downstream from confluence of Manoa and Palolo Streams, and 0.6 mi upstream from point of dis- charge into Ala Wai Canal.	10.6	1968-99	1999	<5.63	<1,470	12-18-67	12.6	10,100	
16247500 Wailupe Gulch at Aina Haina	Lat 21°17'46", long 157°45'29", at Ani Street bridge and 1.0 mi upstream from Kalaniana'ole High- way in Aina Haina.	2.35	1958-99	01-07-99	-0.71	unknown	12-18-67	5.72	3,600	
16247900 Kuliouou Valley at Kuliouou	Lat 21°17'50", long 157°43'35", at Kuliouou, 300 ft downstream from single-lane wooden bridge, and 0.6 mi upstream from Highway 72.	1.18	1958-59, 1970-99	01-07-99	27.93	302	12-31-87	36.55	4,700	

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a At old gage datum

Annual maximum discharge at crest-stage partial-record stations during water year 1999--Continued

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 1999 maximum			Period of record max		
				Date	Gage height (ft)	Dis-charge (ft ³ /s)	Date	Gage height (ft)	Dis-charge (ft ³ /s)
Island of Oahu--Continued									
16248950 Kahawai Str at Waimanalo	Lat 21°21'04", long 157°43'33", on left bank 30 ft downstream from Kalaniana'ole Highway bridge, 1.9 mi northwest of Waimanalo Post Office, and 0.75 mi southwest of Bellows Air Force Station radio towers.	1.18	1998-99	01-22-99	7.70	unknown	01-22-99	7.70	unknown
16249000 Waimanalo Str at Waimanalo	Lat 21°21'14", long 157°43'50", on right bank 260 ft downstream from Highway 72 and 2.3 mi northeast of Waimanalo Post Office.	2.16	1967-70≠, 1971-99	01-22-99	3.30	unknown	02-14-85	10.82	-
16249100 Kaelepulu Str tributary at Kailua	Lat 21°21'44", long 157°44'22", 30 ft upstream from Kalaniana'ole Highway, 1.6 mi northwest of Waimanalo School, and 2.4 mi south of Kailua Post Office.	0.16	1963-99	1999	<1.75	<34	12-31-87	7.53	467
16265000 Kawa Str at Kaneohe	Lat 21°24'32", long 157°47'36", 50 ft upstream from bridge on Kaneohe Bay Drive at Kaneohe, 0.2 mi northeast of Castle High School, and 0.6 mi upstream from mouth.	1.19	1965, 1968-74, 1977-99	01-07-99	5.70	447	02-01-69	17.90	5,290
16274499 Keaahala Str at Kamehameha Highway, at Kaneohe	Lat 21°25'12", long 157°48'15", 35 ft upstream from bridge on Kamehameha Highway at Kaneohe.	0.62	1959-99	01-07-99	3.03	665	05-02-65	11.50	2,750
16283480 Ahuimanu Str nr Kahaluu	Lat 21°27'04", long 157°50'13", at bridge on Ahuimanu Road and 0.8 mi south of Kahaluu.	2.31	1963-99	01-07-99	4.69	unknown	02-01-69	11.8	7,300
16304500 Kaluanui Stream at Hauula	Lat 21°35'57", long 157°54'24", Kaluanui on left downstream wing-wall of stream at concrete bridge, 1.2 mi southeast of cemetery in Hauula, and 1.4 mi northeast of Sacred Falls. Datum lowered 18.47 ft.	2.12	1958-99	1999	20.85	unknown	01-06-82	25.42(r)	4,920
16308500 Kahawainui Stream at Laie	Lat 21°39'25", long 157°55'57", 800 ft northeast of Zion Cemetery on upstream side of bridge at Kamehameha Highway.	4.79	1997-99	b04-02-99	20.94	-	1997	21.35	-
16310501 Malaekahana Str at altitude 30 ft, nr Kahuku	Lat 21°39'47", long 157°57'11", at abandoned plantation railroad bridge, 1.1 mi southwest of junction of plantation road and Highway 83, and 1.2 mi south of Kahuku Hospital.	4.05	1958-99	1999	<2.63	unknown	04-15-63	12.10	4,640
16317800 Kaunala Gulch nr Sunset Beach	Lat 21°40'59", long 158°02'12", on downstream left bank wingwall of road bridge on Highway 83 near Sunset Beach and 2.9 mi northeast of Waimea.	1.98	1973-98, 1973-99	01-01-98, unknown	5.00(r), 6.01	unknown, unknown	11-20-90	6.01	450

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b Gage height only

Annual maximum discharge at crest-stage partial-record stations during water year 1999--Continued

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 1999 maximum			Period of record max		
				Date	Gage height (ft)	Dis-charge (ft ³ /s)	Date	Gage height (ft)	Dis-charge (ft ³ /s)
Island of Oahu--Continued									
16318000 Paumalu Gulch at Sunset Beach	Lat 21°40'19", long 158°02'28" 0.4 mi upstream from Highway 83 at Sunset Beach and 2.2 mi northeast of Waimea.	2.59	1968-99	1999	<1.92	unknown	04-19-74 11-14-96	4.97 6.32	982 -
16331000 Waimea Gulch nr Kawailoa Camp	Lat 21°37'29", long 158°04'58", at culvert on Ashley Road, 0.1 mi upstream from Highway 83, and 1.1 mi north of Kawailoa Camp.	2.23	1968-99	1999	<1.44	<22	03-18-80	11.2	2,030
16340000 Anahulu River nr Haleiwa	Lat 21°35'28", long 158°04'45", 1.7 mi southeast of junction of Emerson Road and Kamehameha Highway and 2.5 mi east of Waialua School at Haleiwa.	13.5	1958-99	01-22-99	2.55	432	04-19-74	15.8	15,900
16350000 Opaeha Str nr Haleiwa	Lat 21°35'09", long 158°06'01", 0.6 mi upstream from Kamehameha Highway and 2.1 mi northeast of Waialua.	5.96	1956-99	01-22-99	8.59	<210	04-19-74	20.7	7,600
Island of Molokai									
16411320 Kakaako Gulch abv Kamakahi Gulch, nr Mauna Loa	Lat 21°10'11", long 157°11'56", 0.1 mi upstream from Kamakahi Gulch, 1.7 mi downstream from Highway 46, and 2.5 mi northeast of Mauna Loa.	1.40	1964-99	01-08-99	1.12	unknown	11-12-65	4.80	670
16411400 Kakaako Gulch nr Mauna Loa	Lat 21°10'39", long 157°12'31", on left bank 1.0 mi downstream from Kamakahi Gulch, and 3.0 mi north of Mauna Loa School.	5.34	1963-72≠, 1973-99	11-17-98	-	unknown	02-11-89	8.47	2,860
16411600 Kaunala Gulch nr Mauna Loa	Lat 21°07'01", long 157°15'43", at Sand Haul Road, 3.2 mi east of Laau Point lighthouse, and 3.3 mi southwest of Mauna Loa.	0.28	1964-99	01-08-99	0.86	9.4	12-25-84	3.87	151
16411640 Halena Gulch nr Mauna Loa	Lat 21°05'53", long 157°13'47", 2.7 mi southwest of Mauna Loa and 5.5 mi east of Laau Point.	2.07	1965-99	01-08-99	0.45	<135	01-11-74	8.20	2,920
16411800 Kaluapeelua Gulch at Hoolehua	Lat 21°09'55", long 157°04'22", 0.4 mi south of Hoolehua and 2.1 mi west of Kualapuu.	1.46	1964-99	No flow.			12-08-73	3.30	86
16414000 Kaunakakai Gulch at Kaunakakai	Lat 21°06'21", long 157°00'34", on left bank 0.6 mi upstream from Molokai Ranch pipeline crossing 1.3 mi northeast of Kaunakakai Post Office and 1.7 mi upstream from mouth.	6.57	1949-98≠, 1999	11-17-98	3.70	80	10-31-61	9.30	3,060
16415400 Wawaia Gulch at Kamalo	Lat 21°03'25", long 156°52'20", at Highway 45, 0.3 mi upstream from mouth, and 0.5 mi northeast of Kamalo.	2.12	1964-99	02-22-99	1.44	490	04-13-65	2.61	1,250
16419000 Pohakupili Gulch nr Halawa	Lat 21°07'59", long 156°44'15", at Highway 45, 0.5 mi upstream from mouth, and 1.9 mi south of Halawa.	0.48	1964-99	01-22-99	3.13	18	11-04-66	8.93	989

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Annual maximum discharge at crest-stage partial-record stations during water year 1999--Continued

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 1999 maximum			Period of record max		
				Date	Gage height (ft)	Dis-charge (ft ³ /s)	Date	Gage height (ft)	Dis-charge (ft ³ /s)
Island of Maui									
16500100 Kepuni Gulch nr Kahikinui House	Lat 20°37'21", long 156°15'16", on right bank 120 ft upstream from bridge on Highway 31, 400 ft upstream from Kamole Gulch, 1.1 mi east of Kahikinui House, and 8.5 mi west of Kaupo.	1.91	1963-72≠, 1973-99	No flow.			09-18-94	13.68	2,320
16500300 Hawelewele Gulch nr Kaupo	Lat 20°38'01", long 156°11'08", 700 ft upstream from Piilani Highway 31 and 3.9 mi west of Kaupo.	11.3	1967-99	11-04-99	<6.43	<600	01-08-80	15.10	13,600
16500800 Kukuuiula Gulch nr Kipahulu	Lat 20°39'18", long 156°04'44", at Highway 31, 1.3 mi west of Kipahulu, and 3.2 mi east of Kaupo.	0.76	1963-68≠, 1969-99	01-31-99	<4.50	<270	03-31-82	13.76	5,950
16502400 Pukuilua Gulch nr Hana	Lat 20°42'00", long 156°00'14", at Highway 31, 0.4 mi southwest of Puuiki and 4.0 mi south of Hana.	0.48	1963-99	01-31-99	3.72	180	01-23-65	9.30	788
16502800 Moomoonui Gulch at Hana	Lat 20°44'37", long 155°59'18", at Highway 31 just downstream from Moomooiki Gulch and 1.0 mi south of Hana.	0.90	1963-99	01-31-99	14.34	1,900	11-26-92	14.71	2,480
16502900 Kawaipapa Gulch at Hana	Lat 20°46'08", long 156°00'04", 1,000 ft upstream from Highway 36 and 0.3 mi northwest of Hana Hospital.	5.83	1965-99	01-31-99	10.74	12,400	08-01-82	11.03	16,880
16603300 Unnamed gulch at Maliko Bay	Lat 20°56'26", long 156°21'04", at Hana Highway, 0.5 mi west of Maliko Bay and 1.3 mi north of Hamakuapoko.	0.43	1963-99	No flow.			03-27-79	17.28	171
16603700 Kalialinui Gulch tributary nr Pukalani	Lat 20°49'02", long 156°19'44", at Lower Kula Road and 1.4 mi south of Pukalani.	1.17	1967-99	No flow.			01-09-80	7.35	414
16603800 Kaluapulani Gulch tributary nr Pukalani	Lat 20°48'52", long 156°18'32", at Haleakala Highway, 1.5 mi west of Olinda Prison Camp and 2.3 mi southeast of Pukalani.	0.45	1963-99	No flow.			07-23-64	9.90	306
16603850 Kalialinui Gulch nr Kahului	Lat 20°52'47", long 156°26'06", 600 ft upstream from Hansen Road, 0.5 mi northeast of Puunene Hospital and 2.5 mi southeast of Kahului Post Office.	17.9	1967-99	No flow.			01-28-71	8.33	1,330
16607000 Iao Str at Wailuku	Lat 20°53'38", long 156°30'27", 560 ft upstream from Market Street bridge at Wailuku and 1.9 mi upstream from mouth.	8.24	1951≠, 1952-99	02-19-99	4.30	2,260	12-03-50	6.21	7,540
16616500 Unnamed gulch at Maluhia Camp	Lat 20°57'26", long 156°31'41", at Kahekili Highway, 0.6 mi east of Maluhia Camp and 1.8 mi northwest of Waihee.	0.12	1964-99	No flow.			01-12-75	7.29	e97

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Annual maximum discharge at crest-stage partial-record stations during water year 1999--Continued

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 1999 maximum			Period of record max		
				Date	Gage height (ft)	Dis-charge (ft ³ /s)	Date	Gage height (ft)	Dis-charge (ft ³ /s)
Island of Maui--Continued									
16619700 Poelua Gulch nr Kahakuloa	Lat 21°00'58", long 156°34'58", at Highway 30 (bypass), 1.3 mi southeast of Nakalele Point lighthouse and 2.2 mi northwest of Kahakuloa.	1.18	1965-99	02-20-99	6.33	unknown	03-16-68	15.22	1,760
16630200 Honokowai Str at Honokowai	Lat 20°56'58", long 156°41'07", 0.5 mi southeast of Honokowai and 1.1 mi northwest of Puukolii.	5.59	1962-63, 1965-99	02-21-99	4.93	346	08-01-82	11.0	4,520
16638500 Kahoma Str at Lahaina	Lat 20°53'12", long 156°40'36", 0.2 mi west of Kelaweia, 0.6 mi northeast of Lahaina, 0.6 mi downstream from Kanaha Str and 0.9 mi upstream from mouth.	5.22	1963-89≠ 1990-99	12-31-98	-	unknown	07-11-65	11.03	2,490
16643300 Kauaula Str nr mouth, nr Lahaina	Lat 20°52'09", long 156°39'43", 0.7 mi upstream from Honoapiilani Highway (bypass) and 1.3 mi southeast of Lahaina Lighthouse.	4.12	1960,1962, 1964-99	02-20-99	3.18	187	05-13-60	7.9	2,660
16646200 Olowalu Str at Olowalu	Lat 20°49'23", long 156°37'15", on downstream side of center pier of plantation road bridge, 0.6 mi northeast of Olowalu, and 5.5 mi southeast of Lahaina.	4.08	1962-72≠, 1973-99	03-20-99	3.26	243	03-24-67	5.40	1,300
16647500 Malalowaiaole Gulch nr Maalaea	Lat 20°46'56", long 156°31'32", at Honoapiilani Highway, 200 ft upstream from mouth, 0.2 mi north of McGregor Point, and 1.2 mi southwest of Maalaea.	0.64	1964-99	12-31-98	3.47	10	01-10-80	12.95	350
16658500 Waiakoa Gulch tributary nr Waiakoa	Lat 20°44'56", long 156°19'22", at Upper Kula Road, 1.0 mi southeast of Waiakoa, and 1.0 mi northeast of junction of Lower and Upper Kula Roads.	0.98	1964-99		No flow.		01-28-71	8.23	409
16659000 Waiakoa Gulch at Kihei	Lat 20°47'14", long 156°27'41", 0.3 mi northeast of Kihei and 0.4 mi upstream from mouth.	10.1	1963-99	unknown	4.83	<34	01-28-71	9.66	1,560
16660000 Kulanihakoi Gulch nr Kihei	Lat 20°46'06", long 156°27'03", on right bank 0.5 mi northeast of Lihue Cemetery, 0.8 mi upstream from mouth, and 1.3 mi southeast of Kihei.	14.4	1963-70≠, 1971-99		No flow.		01-28-71	9.40	4,460
Island of Hawaii									
16701300 Waiakea Str at Hilo	Lat 19°42'38", long 155°05'02", 0.3 mi upstream from Kinooole Street bridge and 1.3 mi southeast of Hilo Post Office.	35.8	1968-91, 1993-99	02-02-99	4.25	360	08-12-94	10.90	3,670
16701400 Palai Str at Hilo	Lat 19°40'56", long 155°04'04", at Highway 11, 300 ft south of Palai Street intersection, and 3.5 mi southeast of Hilo Post Office.	5.08	1965-90, 1994-99			Records being reviewed.			
16701600 Alenaio Str at Hilo	Lat 19°43'10", long 155°05'27", 0.65 mi south of Hilo Post Office, 0.65 mi west of Kapiolani School, and 0.1 mi upstream from Kapiolani Street bridge.	8.62	1997-99	1999	<5.61	unknown	07-30-97	6.36	1,010

≠ Operated as a continuous-record gaging station

< Actual value is known to be less than the value shown

Annual maximum discharge at crest-stage partial-record stations during water year 1999--Continued

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 1999 maximum			Period of record max		
				Date	Gage height (ft)	Dis-charge (ft ³ /s)	Date	Gage height (ft)	Dis-charge (ft ³ /s)
Island of Hawaii--Continued									
16717600 Alia Str nr Hilo	Lat 19°50'38", long 155°06'21", on upstream right bank wingwall of culvert on Highway 19 at Pepeekeo 2.0 mi south of Honomu, and 8.0 mi north of Hilo.	0.58	1962-72≠, 1979, 1986, 1994-99	03-28-99	6.52	127	02-20-79	17.1	2,850
16717650 Kapehu Str nr Pepeekeo	Lat 19°51'52", long 155°06'11", at culvert on Highway 19, 1.0 mi southeast of Honomu, 2.2 mi north of Pepeekeo, and 9.4 mi north of Hilo.	1.09	1963-90, 1994-99						Records being reviewed.
16717850 Keehia Gulch nr Ookala	Lat 20°01'08", long 155°18'45", at culvert on Highway 19, 1.7 mi west of Ookala, and 4.1 mi southeast of Paauilo.	0.62	1963-91, 1993-99						Records being reviewed.
16717920 Ahualoa Gulch at Honokaa	Lat 20°05'12", long 155°29'17", at Highway 24, 1.1 mi northwest of Honokaa Hospital, and 1.5 mi upstream from mouth.	2.27	1963-90, 1995-99						Records being reviewed.
16752600 Hapahapai Gulch at Kapaa	Lat 20°14'00", long 155°48'00", at Highway 27, 300 ft east of Kapaa Post Office.	1.52	1963-90, 1995-99	01-26-99	e13.94	unknown	01-09-80	11.42	426
16755800 Luahine Gulch nr Waimea	Lat 20°03'11", long 155°44'35", on culvert 5.1 mi northwest of Waimea and 5.7 mi east of Kawaihae.	0.32	1963-90, 1994-99						Records being reviewed.
16756500 Keanuimano Str nr Kamuela	Lat 20°01'48", long 155°42'05", on left bank 150 ft upstream from Highway 25 at Waiaka and 2.0 mi west of Kamuela.	4.3	1964-72≠, 1973-90, 1995-99	03-21-99	5.04	506	04-20-68	10.02	3,540
16759040 Paiakuli Reservoir tributary nr Waimea	Lat 20°02'16", long 155°38'08", at Highway 19, 2.1 mi west of Puukapu Reservoir, and 2.6 mi northeast of Waimea.	0.27	1963-70, 1994-99	03-21-99	2.49	80	01-11-67	5.63	340
16759060 Kamakoa Gulch nr Waimea	Lat 19°57'32", long 155°41'02", at bridge, 1.4 mi north of Saddle Road Junction, and 4.5 mi south of Waimea.	50.6	1963-91, 1994-99						Records being reviewed.
16759300 Waiaha Str at Lauwai nr Holualoa	Lat 19°38'12", long 155°55'45", on right bank at Luawai, 1.8 mi northeast of Holualoa School and 4.2 mi southeast of Honokohau School.	8.74	1961-71≠, 1972-90, 1995-99						Records being reviewed.

≠ Operated as a continuous-record gaging station

e Estimated stage as 0.3 ft above top of 9.01 ft pipe plus base cap elevation of 4.63 ft (gage datum). Caused by debris pile at entrance of culvert.

Low-Flow Partial-Record Stations

Measurements of streamflow in the area covered by this report made at low-flow partial record stations are given in the following table. Most of these measurements were made during periods of base flow when streamflow is primarily from ground-water storage. These measurements, when correlated with the simultaneous discharge of a nearby stream where continuous records are available, will give a picture of the low-flow potential of the stream. The column headed "Period of record" shows the water years in which measurements were made at the same, or nearly the same, site.

Discharge measurements made at low-flow partial-record stations during water year 1999

Station name and number	Location	Period of record	Date	Measurement	
				Gage height (ft)	Discharge (ft ³ /s)
Island of Maui					
16588000	Lat 20°53'20", long 156°15'19", on right bank	1924-87 ≠	11-19-98	--	291
Wailoa ditch at Honopou, near Huelo	100 ft downstream from intake at Honopou Stream, 0.5 mi west of Lupi, and 2.2 mi southwest of Huelo.	1988-99	03-10-99	--	11.4
			06-01-99	--	42.5
			08-03-99	--	94.5
			08-03-99	--	93.0
			09-03-99	--	197.0
16589000	Lat 20°53'28", long 156°15'22", on right bank	1919-85 ≠	11-16-98	--	19.9
New Hamakua ditch at Honopou, near Huelo	15 ft upstream from tunnel portal, 600 ft downstream from Honopou Stream crossing and 2.1 mi southwest of Huelo.	1986-99	03-10-99	--	1.50
			06-01-99	--	0.20
			08-03-99	--	0.44
16592000	Lat 20°54'57", long 156°15'08", on left bank	1911-26 ≠	11-19-98	--	7.61
Lowrie ditch at Honopou Gulch, near Huelo	0.2 mi downstream from siphon across Honopou Stream, 1.6 mi west of Huelo, and 2.7 mi northwest of Kailua.	1931-85 ≠	02-16-99	--	15.4
		1986-99	06-08-99	--	6.30
			08-02-99	--	12.5
16594000	Lat 20°55'07", long 156°14'58", on right bank	1911 ≠ ,	11-19-98	--	56.9
Haiku ditch at Honopou Gulch, near Kailua	on west side of Honopou Gulch, 160 ft below Hana Highway, 2.5 mi northwest of Kailua, and 5.0 mi east of Haiku.	1914 ≠ ,	02-16-99	--	0.81
		1916-28 ≠ ,	06-08-99	--	1.28
		1931-85 ≠ ,	08-02-99	--	0.78
		1986-99	08-06-99	--	0.80
205915156360001	Lat 20°59'15", long 156°36'00", Honokohau	1995,	06-29-99	--	2.74
Honokohau Stream 4.0	Stream, upstream from Taro Gate release, at altitude 410 ft.	1997-99			
205928156360601	Lat 20°59'28", long 156°36'06", Honokohau	1997-99	06-29-99	--	3.92
Honokohau Stream 5.9	Stream, 350 ft upstream from dam, at altitude 350 ft.				
210128156364201	Lat 21°01'28", long 156°36'42", Honokohau	1997-99	06-29-99	--	2.47
Honokohau Stream 9.1	Stream, 100 ft downstream from Highway 340 bridge, at altitude 5 ft.				
Island of Hawaii					
194202155111501	Lat 19°42'02", long 155°11'15", at Olaa Spring	1999	08-09-99	1.89	4.07
Olaa Spring near Kaumana	near Kaumana		09-08-99	2.00	10.1

≠ Operated as a continuous-record gaging station

PEARL HARBOR SPRINGS MEASURING SITES

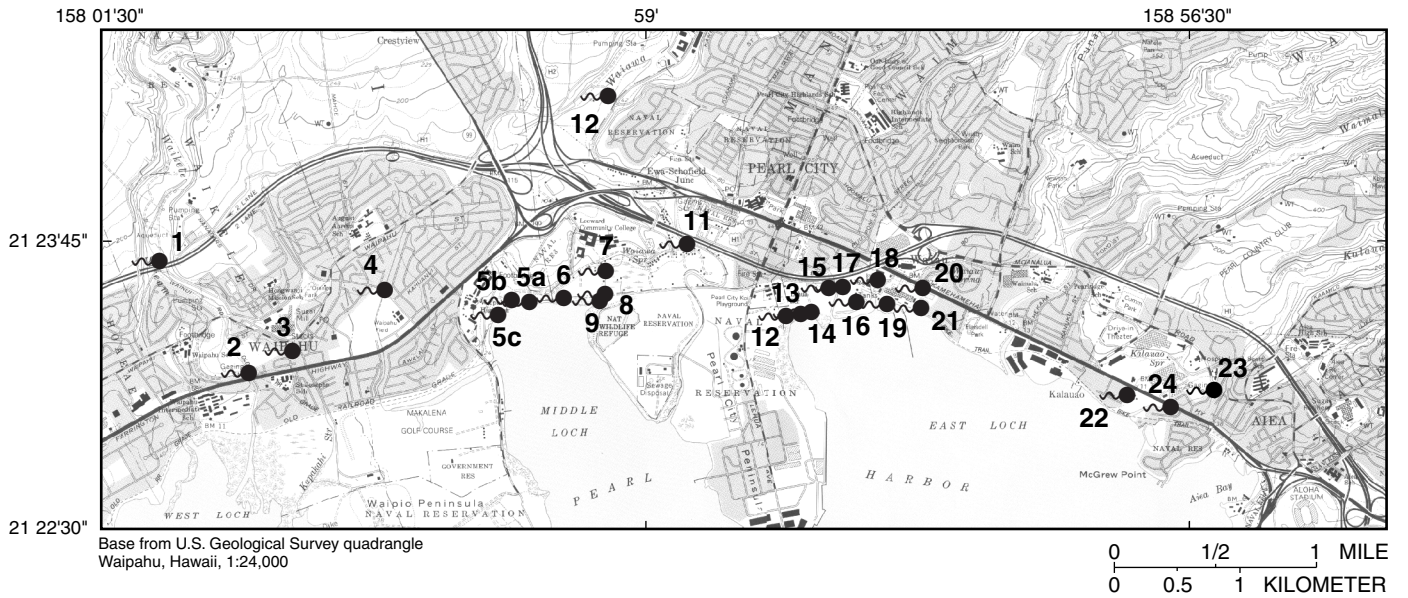


Figure 15. Locations of low-flow partial-record springflow measurement sites in the Pearl Harbor area, Oahu, Hawaii.

Discharge, specific-conductance, and water-temperature measurements at low-flow stations, Pearl Harbor Springs, Oahu

Well number (see figure 15)	Station number	Station name	Location	Time	Measurement		Specific conductance ($\mu\text{S}/\text{cm}$)	Water temperature ($^{\circ}\text{C}$)
					Date	Discharge (ft^3/s)		
1	16212950	Waialele Stream at H-1 Freeway at Waipahu	Lat 21°23'39", long 158°01'14", below H-1 Freeway, 100 ft upstream from cane haul road, 0.7 mi northwest of Waipahu Sugar Mill, and 0.7 mi upstream from gaging station 16213000.	1210	05/14/99	4.41	121	24.0
				1100	07/12/99	11.2	236	24.0
2	16213000	Waialele Stream at Waipahu	Lat 21°23'11", long 158°00'49", on left bank 300 ft upstream from bridge on Highway 90, and 0.3 mi southwest of former sugar refinery at Waipahu.	0820	05/14/99	20.5	454	22.0
				0910	07/12/99	26.2	415	22.5
3	212317158003701	Kapakahi Stream above Farrington Highway	Lat 21°23'17", long 158°00'37", upstream from two 4-ft concrete pipe culverts in parking lot of shopping center at Hanawai Circle at Waipahu, 500 ft upstream from Farrington Highway.	1300	05/12/99	1.40	567	23.5
				1210	07/12/99	1.50	564	23.5
4	212332158001201	Waipahu Drainage Canal above Paiwa Street	Lat 21°23'32", long 158°00'12", 1,500 ft upstream from Far- rington Highway and 0.5 mi east of Waipahu Sugar Mill, upstream from Paiwa Street bridge.	1005	05/12/99	2.04	607	24.5
				1215	07/12/99	2.09	626	24.5
5	212328157593601	Spring Outlet 2 West of Waiawa Spring	Lat 21°23'28", long 157°59'36", a 5x8 ft concrete box culvert 0.4 mi west of Waiawa Spring outlet and 1,200 ft east of Waipahu High School. Drains from former watercress fields (now covered) to Pearl Harbor.	0950	05/14/99	0.29	3,430	24.0
				0950	07/12/99	0.36	3,900	24.5
6	212330157592201	Spring Outlet 1 West of Waiawa Spring	Lat 21°23'30", long 157°59'22", a 12-in. concrete pipe culvert 1,000 ft west of Waiawa Spring outlet and 2,500 ft east of Waipahu High School. Drains from former watercress fields (now covered) to Pearl Harbor.	1020	05/14/99	0.65	4,850	27.0
				1050	07/12/99	0.62	4,800	27.0
7	16214000	Pearl Harbor Springs at Waiawa near Pearl City	Lat 21°23'36", long 157°59'11", near Leeward Community Col- lege, 0.7 mi west of Pearl City, and 9.8 mi northwest of Hono- lulu, about 350 ft upstream from the mouth.	0900	05/12/99	12.1	3,600	23.0
				0930	07/12/99	12.7	3,530	22.0
10	16215800	Waiawa Stream above Kamehameha Highway near Pearl City	Lat 21°24'23", long 157°59'10", 50 ft downstream from old cane haul road in Pearl City Industrial Park, 2,000 ft upstream from Kamehameha Highway, and 0.6 mi upstream from gaging station 16216000.	1330	05/13/99	0.00	--	--
				1405	07/12/99	3.84	153	24.5
11	16216100	Waiawa Stream below H-1 near Pearl City	Lat 21°23'44", long 157°58'48", below H-1 Freeway, 1,200 ft downstream from gaging station 16216000, and 2,000 ft east of Leeward Community College.	1345	05/13/99	3.86	708	23.5
				1300	07/12/99	8.16	420	23.5
12	212325157581801	Puukapu Site 3	Lat 21°23'25", long 157°58'18", at a 3-ft concrete pipe 1,000 ft west of Waimano flood channel at mouth. Drains from watercress fields to Pearl Harbor.	1025	05/13/99	1.22	1,140	21.5
				1130	07/13/99	1.26	1,160	22.0

Discharge, specific-conductance, and water-temperature measurements at low-flow stations, Pearl Harbor Springs, Oahu--Continued

Well number (see figure 15)	Station number	Station name	Location	Time	Measurement		Specific conductance ($\mu\text{S}/\text{cm}$)	Water temperature ($^{\circ}\text{C}$)
					Date	Discharge (ft^3/s)		
13	212325157581301	Puukapu Site 2	Lat 21°23'25", long 157°58'13", at two 4-ft concrete culverts on concrete roadway 100 ft north of old concrete gage house and 300 ft west of Waimano flood channel at mouth.	0947	05/13/99	2.19	1,510	22.5
				1035	07/13/99	2.05	1,460	22.0
14	212326157580901	Puukapu Site 1	Lat 21°23'26", long 157°58'09", at two 3-ft concrete pipe culverts on right bank of Waimano flood channel at mouth. Drains from watercress fields to mouth of channel.	1125	05/13/99	0.82	2,570	20.5
				0907	07/13/99	1.00	2,590	20.5
15	16216550	Waimano Flood Channel below H-1 at Pearl City	Lat 21°23'32", long 157°58'08", 100 ft below Pearl Harbor bikeway, 600 ft from mouth, and 1,600 ft west of Hawaiian Electric Co. power plant at Waiau.	1130	05/13/99	0.52	392	24.0
				1050	07/12/99	0.95	471	24.0
17	212333157580101	Kaluaooopu Spring	Lat 21°23'33", long 157°58'01", at concrete bridge on bikeway, 700 ft west of No. 1 generator in the Hawaiian Electric Co. power plant. Measures the combined flow from the watercress fields and freeway storm drain.	0910	05/13/99	7.87	918	22.0
				1000	07/13/99	7.59	970	22.0
18	16219000	Hawaiian Electric Co. Tunnel at Waiau near Pearl City	Lat 21°23'33", long 157°57'55", concrete ditch at Hawaiian Electric Co. Waiau power plant, 20 ft downstream from tunnel portal, and 0.6 mi east of Pearl City.	1415	05/12/99	2.74	926	20.5
				1130	07/13/99	2.51	920	20.5
19	212329157575001	Makai Spring at Hawaiian Electric Co. Power Plant	Lat 21°23'29", long 157°57'50", south of power plant at outlet of a 30-in. concrete pipe draining overflow from power plant and seepage from Old Rice Mill Spring into Pearl Harbor.	0950	05/13/99	0.51	1,215	20.5
				0910	07/13/99	0.54	1,230	20.5
20	212331157574101	Waiau Spring below Kamehameha Highway	Lat 21°23'31", long 157°57'41", below Kamehameha Highway and 500 ft from outlet to Pearl Harbor. Drains from Waiau Springs.	1255	05/12/99	1.85	310	22.0
				1133	07/13/99	1.68	342	21.5
22	16224000	Pearl Harbor Spring at Kaluaoo near Aiea	Lat 21°23'06", long 157°56'46", at Kamehameha Highway bridge, drains from Sumida watercress farm, 1.1 mi west of Aiea, and 7.6 mi northwest of Honolulu.	1045	05/13/99	12.6	1,640	23.5
				1012	07/29/99	11.3	--	--
23	16224500	Kaluaoo Stream at Moanalua Road at Aiea	Lat 21°23'07", long 157°56'22", at Moanalua Road bridge, 0.4 mi northwest of Aiea Post Office, and 2.3 mi southeast of Pearl City Post Office.	1145	05/13/99	0.30	787	24.0
				1040	07/13/99	0.30	814	24.0
24	16224550	Kaluaoo Stream above Kamehameha Highway at Aiea	Lat 21°23'02", long 157°56'35", above Kamehameha Highway and 1,300 ft from mouth, 1,000 ft downstream from gaging station 16224500, and 0.8 mi northwest of Aloha Stadium.	0810	05/13/99	0.62	880	23.0
				0940	07/13/99	0.56	890	24.0

Discharge measurements made at miscellaneous sites during water year 1999

Station no.	Station name	Location	Measured previously (water years)	Date	Discharge (ft ³ /s)
Island of Kauai					
215747159253402	Kokolau Tunnel site 1	Lat 21°57'47", long 159°25'34", Kokolau Tunnel, 16 ft upstream from main entrance.	--	01-07-99	1.03
215747159253403	Kokolau Tunnel site 2	Lat 21°57'47", long 159°25'34", Kokolau Tunnel, 386 ft upstream from main entrance.	--	01-07-99	0.97
215747159253404	Kokolau Tunnel site 3	Lat 21°57'47", long 159°25'34", Kokolau Tunnel, 714 ft upstream from main entrance.	--	01-07-99	1.00
215747159253405	Kokolau Tunnel site 4	Lat 21°57'47", long 159°25'34", Kokolau Tunnel, 733 ft upstream from main entrance.	--	01-07-99	0.68
215747159253406	Kokolau Tunnel site 5	Lat 21°57'47", long 159°25'34", Kokolau Tunnel, 831 ft upstream from main entrance.	--	01-07-99	0.69
215747159253407	Kokolau Tunnel site 6	Lat 21°57'47", long 159°25'34", Kokolau Tunnel, 846 ft upstream from main entrance.	--	01-07-99	0.53
215747159253408	Kokolau Tunnel site 7	Lat 21°57'47", long 159°25'34", Kokolau Tunnel, 898 ft upstream from main entrance.	--	01-07-99	0.33
215747159253409	Kokolau Tunnel site 8	Lat 21°57'47", long 159°25'34", Kokolau Tunnel, 1,050 ft upstream from main entrance.	--	01-07-99	0.36
215747159253410	Kokolau Tunnel site 9	Lat 21°57'47", long 159°25'34", Kokolau Tunnel, 154 ft from upstream end of tunnel.	--	01-07-99	0.34
215747159253411	Kokolau Tunnel site 10	Lat 21°57'47", long 159°25'34", Kokolau Tunnel, 43 ft from upstream end of tunnel.	--	01-07-99	0.09
Island of Oahu					
16238500	Waihi Stream at Honolulu	Lat 21°19'55", long 157°48'12", 100 ft upstream from bridge on Waaloa Way, 700 ft upstream from confluence with Waiakeakua Stream, and 4.2 mi northeast of Honolulu Post Office.	1913-21≠, 1925-83≠	11-10-98	1.19
16270900	Luluku Stream at alt. 220 ft near Kaneohe	Lat 21°23'42", long 157°48'44", 0.5 mi upstream from confluence with Kamooalii Stream, 1.4 mi southwest of Castle High School, and 1.9 mi south of Kaneohe Post Office.	1960-63, 1965-71≠, 1971-84*, 1984-98≠	08-30-99	0.39
16272050	Luluku Stream at confluence to Kamooalii Stream	Lat 21°23'45", long 157°48'25", at confluence to Kamooalii Stream, 1.1 mi southwest of Castle High School, and 1.8 mi south of Kaneohe Post Office.	--	08-30-99	0.42
Island of Maui					
205052156092401	Waiokamilo Stream 9	Lat 20°49'52", long 156°09'24", Waiokamilo Stream, upstream from Akeke Spring, at altitude 750 ft.	--	05-11-99	0.00
205053156092301	Waiokamilo Stream 8	Lat 20°49'53", long 156°09'23", Waiokamilo Stream, downstream from Akeke Spring, at altitude 720 ft.	--	05-11-99	5.88

Discharge measurements made at miscellaneous sites during water year 1999--Continued

Station no.	Station name	Location	Measured previously (water years)	Date	Discharge (ft ³ /s)
Island of Maui--Continued					
205016156090001	Waiokamilo Stream 7	Lat 20°50'16", long 156°09'00", Waiokamilo Stream, diversion to upper taro patch, at altitude 540 ft.	--	05-11-99	0.38
205012156090201	Waiokamilo Stream 6	Lat 20°50'12", long 156°09'02", Waiokamilo Stream, upstream from upper taro diversion, at altitude 560 ft.	--	05-11-99	5.67
205140156094401	Waiokamilo Stream 5	Lat 20°50'40", long 156°08'44", Waiokamilo Stream, upstream from Wailua taro diversion, at altitude 440 ft.	--	05-11-99	3.72
205105156082601	Waiokamilo Stream 4.1	Lat 20°51'05", long 156°08'26", Waiokamilo Stream, upstream from unnamed tributary, at altitude 240 ft.	--	05-11-99	0.36
205104156082501	Waiokamilo Stream 4.2	Lat 20°51'04", long 156°08'25", Unnamed tributary to Waiokamilo Stream, at altitude 240 ft.	--	05-11-99	1.28
205106156081901	Waiokamilo Stream 3.2	Lat 20°51'06", long 156°08'19", Waiokamilo Stream, diversion to lower taro patches, downstream from Hana Highway, at altitude 220 ft.	--	05-11-99	1.09
205107156081901	Waiokamilo Stream 3.1	Lat 20°51'07", long 156°08'19", Waiokamilo Stream, downstream from diversion to lower taro patches, downstream from Hana Highway, at altitude 210 ft.	--	05-11-99	0.55
205106156080101	Waiokamilo Stream 2	Lat 20°51'06", long 156°08'01", Waiokamilo Stream, at altitude 110 ft.	--	05-11-99	0.81
205106156085501	Waiokamilo Stream 1	Lat 20°51'06", long 156°07'55", Waiokamilo Stream, upstream from waterfall, at altitude 80 ft.	--	05-11-99	0.72

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Water-quality partial-record stations are particular sites where chemical-quality and/or sediment data are collected systematically over a period of years for use in hydrologic analyses. The data are listed in downstream order.

WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

HAWAII, ISLAND OF OAHU

16212700 - WAIKAKALAUA STREAM NEAR WAHIAWA, OAHU (LAT 21°27'50" LONG 158°01'38")

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND (00060)	OXYGEN, DIS-SOLVED (PER-CENT SATURATION) (00301)	OXYGEN, DIS-SOLVED (MG/L) (00300)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE WATER (DEG C) (00010)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNESIUM, DIS-SOLVED (MG/L AS MG) (00925)	POTASSIUM, DIS-SOLVED (MG/L AS K) (00935)
JUL 20...	1320	23	100	8.5	46	22.5	1.2	1.1	.6
DATE	TIME	ALKALINITY, DIS-SOLVED (MG/L AS NA) (00930)	BICARBONATE WATER DIS-SOLVED (MG/L AS HCO3) (00453)	CHLORIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUORIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	NITROGEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC DIS-SOLVED (MG/L AS N) (00623)
JUL 20...	5.2	6	7	8.4	<.1	3.6	1.2	<.02	.1
DATE	TIME	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITROGEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	PHOSPHORUS, PHOSPHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOSPHORUS, ORTHO, PHOSPHORUS DIS-SOLVED (MG/L AS P) (00671)	PHOSPHORUS, TOTAL PHOSPHORUS (MG/L AS P) (00665)	SOLIDS, AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	MANGANESE, DIS-SOLVED (UG/L AS MN) (01056)
JUL 20...	5.8	<.05	<.01	<.004	<.01	2.2	34	140	4
DATE	TIME	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C) (00689)	BERYLLIUM, DIS-SOLVED (UG/L AS BE) (01010)	PH WATER FILTERED FIELD (STANDARD UNITS) (99900)	PH			
JUL 20...		2.4	--	77	7.5				
DATE	TIME	ALUMINUM, DIS-SOLVED (UG/L AS AL) (01106)	ANTIMONY, DIS-SOLVED (UG/L AS SB) (01095)	ARSENIC, DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	BERYLLIUM, DIS-SOLVED (UG/L AS BE) (01010)	CADMIUM, DIS-SOLVED (UG/L AS CD) (01025)	CHROMIUM, DIS-SOLVED (UG/L AS CR) (01030)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)
JUL 20...		68	<1	<1	<1	<1	<1	<1.0	<1

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

HAWAII, ISLAND OF OAHU--CONTINUED

16212700 - WAIKAKALAUA STREAM NEAR WAHIAWA--Continued

DATE	COPPER, DIS- SOLVED (UG/L AS CU) (01040)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	URANIUM NATURAL DIS- SOLVED (UG/L AS U) (22703)		
JUL 20...	1	<1	<1	<1	<1	<1	<1	<1		
DATE	2,6-DI- ETHYL ANILINE WAT FLT 0.7 U GF, REC (82660)	ACETO- CHLOR, WATER FLTRD REC (UG/L) (49260)	ALA- CHLOR, WATER, DISS, REC, (UG/L) (46342)	ALPHA BHC DISS- SOLVED (UG/L) (34253)	ATRA- ZINE, WATER, DISS, REC (UG/L) (39632)	BEN- FLUR- ALIN WAT FLD 0.7 U GF, REC (UG/L) (82673)	BUTYL- ATE, WATER, DISS, REC (UG/L) (04028)	CAR- BARYL FURAN WATER FLTRD 0.7 U GF, REC (UG/L) (82680)	CARBO- FURAN WATER FLTRD 0.7 U GF, REC (UG/L) (82674)	CHLOR- PYRIFOS DIS- SOLVED (UG/L) (38933)
JUL 20...	<.003	<.002	<.002	<.002	<.001	<.002	<.002	<.003	<.003	<.004
DATE	CYANA- ZINE, WATER, DISS, REC (UG/L) (04041)	DCPA WATER FLTRD 0.7 U GF, REC (UG/L) (82682)	DEETHYL ATRA- ZINE, WATER, DISS, REC (UG/L) (04040)	DI- AZINON, DISS- SOLVED (UG/L) (39572)	DI- ELDRIN DISS- SOLVED (UG/L) (39381)	DISUL- FOTON WATER FLTRD 0.7 U GF, REC (UG/L) (82677)	EPTC WATER FLTRD 0.7 U GF, REC (UG/L) (82668)	ETHAL- FLUR- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82663)	ETHO- PROP WATER FLTRD 0.7 U GF, REC (UG/L) (82672)	FONOFOS WATER DISS REC (UG/L) (04095)
JUL 20...	<.004	<.002	<.002	<.002	<.001	<.017	<.002	<.004	<.003	<.003
DATE	LINDANE DIS- SOLVED (UG/L) (39341)	LIN- URON WATER FLTRD 0.7 U GF, REC (UG/L) (82666)	METHYL AZIN- PHOS WAT FLT DIS- SOLVED (UG/L) (39532)	METHYL PARA- THION WAT FLT 0.7 U GF, REC (UG/L) (82686)	METHYL PARA- THION WAT FLT 0.7 U GF, REC (UG/L) (82667)	METO- LACHLOR WATER FLTRD 0.7 U DISSOLV (UG/L) (39415)	METRI- BUZIN WATER FLTRD 0.7 U DISSOLV (UG/L) (82630)	MOL- INATE WATER FLTRD 0.7 U GF, REC (UG/L) (82671)	NAPROP- AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82684)	P,P' DDE DISSOLV (UG/L) (34653)
JUL 20...	<.004	<.002	<.005	<.001	<.006	<.002	<.004	<.004	<.003	<.006
DATE	PARA- THION, DIS- SOLVED (UG/L) (39542)	PENDI- METH- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82683)	PEB- ULATE WATER FILTRD 0.7 U GF, REC (UG/L) (82669)	PER- METHRIN CIS WAT FLT 0.7 U GF, REC (UG/L) (82687)	PHORATE WATER FLTRD 0.7 U GF, REC (UG/L) (82664)	PRO- METON, WATER, DISS, REC (UG/L) (04037)	PRON- AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82676)	PROP- CHLOR, WATER, DISS, REC (UG/L) (04024)		
JUL 20...	<.004	<.004	<.004	<.005	<.002	<.018	<.003	<.007		
DATE	PRO- PANIL WATER FLTRD 0.7 U GF, REC (UG/L) (82679)	PRO- PARGITE WATER FLTRD 0.7 U GF, REC (UG/L) (82685)	SI- MAZINE, WATER, DISS, REC (UG/L) (04035)	TEBU- THIURON WATER FLTRD 0.7 U GF, REC (UG/L) (82670)	TER- BACIL WATER FLTRD 0.7 U GF, REC (UG/L) (82665)	TER- BUFOS WATER FLTRD 0.7 U GF, REC (UG/L) (82675)	THIO- BENCARB WATER FLTRD 0.7 U GF, REC (UG/L) (82681)	TRI- FLUR- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82661)		
JUL 20...	<.004	<.013	<.005	<.010	<.007	<.013	<.002	<.002		

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

HAWAII, ISLAND OF OAHU--CONTINUED

16227100 HALAWA STR BELOW H1

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	OXYGEN, DIS-SOLVED (MG/L) (00300)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	CHLORIDE, DIS-SOLVED (MG/L) (00940)	SULFATE, DIS-SOLVED (MG/L) (00945)	NITROGEN, AMMONIA DIS-SOLVED (MG/L) (00608)	
NOV 1998	17...	1415	4.8	10	9.1	173	26.5	27.5	17	5.8	.03

DATE	TIME	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L) (00625)	NITROGEN, DIS-SOLVED (MG/L) (00631)	PHOSPHORUS TOTAL (MG/L) (00665)	OXYGEN DEMAND, CHEMICAL (HIGH LEVEL) (MG/L) (00340)	OXYGEN, DIS-SOLVED (PERCENT SATURATION) (MG/L) (00301)	ELEVATION OF SURFACE DATUM ABOVE NGVD (FT) (72000)	RESIDUE AT 105 DEG C, SUSPENDED (MG/L) (00530)	TURBIDITY (NTU) (00076)	CARBON, ORGANIC TOTAL (MG/L) (00680)	OIL AND GREASE, TOTAL RECOVERY GRAVIMETRIC (MG/L) (00556)
NOV 1998	17...	.2	<.05	<.05	<10	127	20.0	4	1.9	2.9	<1

16274100 KANEOHE STREAM BELOW KAMEHAMEHA HWY, OAHU (LAT 21°24'54" LONG 157°48'03")

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00060)	OXYGEN, DIS-SOLVED (PERCENT SATURATION) (MG/L) (00301)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE WATER (DEG C) (00010)	CALCIUM, DIS-SOLVED (MG/L) (00915)	MAGNESIUM, DIS-SOLVED (MG/L) (00925)	POTASSIUM, DIS-SOLVED (MG/L) (00935)	SODIUM, DIS-SOLVED (MG/L) (00930)		
AUG	03...	1120	6.3	124	9.5	199	29.0	9.8	7.5	.9	16

DATE	TIME	ALKALINITY WATER FIELD (MG/L) (39086)	BICARBONATE WATER FIELD (MG/L) (00453)	CARBONATE WATER FIELD (MG/L) (00452)	CHLORIDE, DIS-SOLVED (MG/L) (00940)	FLUORIDE, DIS-SOLVED (MG/L) (00950)	SILICA, DIS-SOLVED (MG/L) (00955)	SULFATE, DIS-SOLVED (MG/L) (00945)	NITROGEN, AMMONIA DIS-SOLVED (MG/L) (00608)	NITROGEN, AMMONIA + ORGANIC DIS-SOLVED (MG/L) (00623)
AUG	03...	56	44	12	20	<.1	23	5.5	<.02	.2

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

HAWAII, ISLAND OF OAHU--CONTINUED

16274100 KANEOHE STREAM BELOW KAMEHAMEHA HWY--Continued

DATE	NITRO- GEN, AM- ONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)
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AUG
03... .5 .10 <.01 .019 .02 .043 121 57 8

DATE	PH WATER SEDI- MENT, SUS- PENDE (MG/L) (80154)	FILTERED FIELD (STAND- ARD UNITS) (99900)
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AUG
03... 15 9.4

DATE	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)	ANTI- MONY, DIS- SOLVED (UG/L AS SB) (01095)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR) (01030)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)
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AUG
03... 7 <1 1 3 <1 <1 <1.0 <1

DATE	COPPER, DIS- SOLVED (UG/L AS CU) (01040)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	URANIUM DIS- SOLVED (UG/L AS U) (22703)
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AUG
03... 1 <1 <1 <1 <1 <1 <1 <1

DATE	2,6-DI- ETHYL ANILINE WAT FLT 0.7 U GF, REC (UG/L) (82660)	ACETO- CHLOR, WATER FLTRD REC (UG/L) (49260)	ALA- CHLOR, WATER, DISS, REC, (UG/L) (46342)	ALPHA BHC DIS- SOLVED (UG/L) (34253)	ATRA- ZINE, WATER, DISS, REC (UG/L) (39632)	BEN- FLUR- ALIN WAT FLD 0.7 U GF, REC (UG/L) (82673)	BUTYL- ATE, WATER, DISS, REC (UG/L) (04028)	CAR- BARYL WATER FLTRD 0.7 U GF, REC (UG/L) (82680)	CARBO- FURAN WATER FLTRD 0.7 U GF, REC (UG/L) (82674)	CHLOR- PYRIFOS DIS- SOLVED (UG/L) (38933)
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AUG
03... <.003 <.002 <.002 <.002 .0042 <.002 <.002 <.003 <.003 <.004

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

HAWAII, ISLAND OF OAHU--CONTINUED

16274100 KANEOHE STREAM BELOW KAMEHAMEHA HWY--Continued

DATE	CYANA- ZINE, WATER, DISS, REC (UG/L) (04041)	DCPA WATER FLTRD 0.7 U GF, REC (UG/L) (82682)	DEETHYL ATRA- ZINE, WATER, DISS, REC (UG/L) (04040)	DI- AZINON, DIS- SOLVED (UG/L) (39572)	DI- ELDRIN DIS- SOLVED (UG/L) (39381)	DISUL- FOTON WATER FLTRD 0.7 U GF, REC (UG/L) (82677)	EPTC WATER FLTRD 0.7 U GF, REC (UG/L) (82668)	ETHAL- FLUR- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82663)	ETHO- PROP WATER FLTRD 0.7 U GF, REC (UG/L) (82672)	FONOFOS WATER DISS REC (UG/L) (04095)
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AUG 03...	<.004	<.002	<.002	<.002	.0368	<.017	<.002	<.004	<.003	<.003
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DATE	LINDANE DIS- SOLVED (UG/L) (39341)	LIN- URON WATER FLTRD 0.7 U GF, REC (UG/L) (82666)	MALA- THION, DIS- SOLVED (UG/L) (39532)	METHYL AZIN- PHOS WAT FLT 0.7 U GF, REC (UG/L) (82686)	METHYL PARA- THION WAT FLT 0.7 U GF, REC (UG/L) (82667)	METO- LACHLOR WATER DISSOLV (UG/L) (39415)	METRI- BUZIN WATER DISSOLV (UG/L) (82630)	MOL- INATE WATER FLTRD 0.7 U GF, REC (UG/L) (82671)	NAPROP- AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82684)	P,P' DDE DISSOLV (UG/L) (34653)
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AUG 03...	<.004	<.002	<.005	<.001	<.006	<.002	<.004	<.004	<.003	<.006
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DATE	PARA- THION, DIS- SOLVED (UG/L) (39542)	PENDI- METH- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82683)	PEB- ULATE WATER FILTRD 0.7 U GF, REC (UG/L) (82669)	PER- METHRIN CIS WAT FLT 0.7 U GF, REC (UG/L) (82687)	PHORATE WATER FLTRD 0.7 U GF, REC (UG/L) (82664)	PRO- METON, WATER, DISS, REC (UG/L) (04037)	PRON- AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82676)	PROP- CHLOR, WATER, DISS, REC (UG/L) (04024)
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AUG 03...	<.004	<.004	<.004	<.005	<.002	<.018	<.003	<.007
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16274100 KANEOHE STREAM BELOW KAMEHAMEHA HWY--Continued

DATE	PRO- PANIL WATER FLTRD 0.7 U GF, REC (UG/L) (82679)	PRO- PARGITE WATER FLTRD 0.7 U GF, REC (UG/L) (82685)	SI- MAZINE, WATER, DISS, REC (UG/L) (04035)	TEBU- THIURON WATER FLTRD 0.7 U GF, REC (UG/L) (82670)	TER- BACIL WATER FLTRD 0.7 U GF, REC (UG/L) (82665)	TER- BUFOS WATER FLTRD 0.7 U GF, REC (UG/L) (82675)	THIO- BENCARB WATER FLTRD 0.7 U GF, REC (UG/L) (82681)	TRI- FLUR- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82661)
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AUG 03...	<.004	<.013	<.005	<.010	<.007	<.013	<.002	<.002
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ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS
 WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
 HAWAII, ISLAND OF OAHU--CONTINUED

212837157522001 WAIHAOLE STREAM AT ALTITUDE 210 FT NEAR WAIHAOLE, OAHU (LAT 21°28'37" LONG 157°52'20")

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND (00060)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE WATER (DEG C) (00010)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	ALKA-LINITY WAT DIS TOT IT FIELD CACO3 (39086)
JUN 24...	1120	25	114	20.0	6.2	4.2	.6	9.0	36
DATE		BICAR-BONATE WATER DIS IT FIELD (MG/L AS HCO3 (00453)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)
JUN 24...		44	11	<.1	27	1.5	<.02	E.07	E.08
DATE		NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)
JUN 24...		.11	<.01	.034	.03	.038	81	<10	<3
DATE				CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	PH WATER FILTERED FIELD (STAND-ARD UNITS) (99900)		
JUN 24...				.3	.2	2	8.0		

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS
 WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
 HAWAII, ISLAND OF MAUI

204910156081201 - Kopiliula Stream at Hwy, Maui, HI

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 10...	1615	66	21.5	8	1270

204912156081301 - Kopiliula Spring at Hwy, Maui, HI

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 10...	1630	109	20.5	12	1270

204919156100001 - Palauhulu Str at 1,000 ft, Maui, HI

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 12...	1220	44	23.0	9	1040

204948156094401 - PALAUHULU STR AT 880 FT

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 12...	1255	105	21.0	8	880

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS
 WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
 HAWAII, ISLAND OF MAUI--CONTINUED

205012156090201 - Waioakamilo 6, Maui, HI

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (99220)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 11...	1015	5.7	137	19.5	8	560

205037156100801 - Plunkett Spring, Maui, HI

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (99220)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 12...	1240	130	18.5	9	1000

205042156064701 - Makapipi Stream at bridge, Maui, HI

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (99220)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 12...	0835	64	20.5	9	80.0

205050156064801 - Makapipi Stream at coast, Maui, HI

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (99220)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 12...	0815	64	21.0	8	2.0

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS
 WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
 HAWAII, ISLAND OF MAUI--CONTINUED

205051156070701 - Moku Huki Spring at 15 ft, Maui, HI

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 10...	1436	138	22.5	22	15.0

205051156085501 - PALAUHULU STR AT 390 FT

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 12...	1325	116	24.5	9	390

205053156092301 - Waiokamilo 8, Maui, HI

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 11...	1445	5.9	147	19.0	8	720

205059156072001 - Kopiliula Spring at 110 ft, Maui, HI

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 10...	1400	107	22.0	23	110

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS
 WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
 HAWAII, ISLAND OF MAUI--CONTINUED

205059156072601 - Kopiliula Stream at 160 ft, Maui, HI

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 10...	1345	99	24.0	10	160

205104156082501 - Waiokamilo 4.2, Maui, HI

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 11...	1340	1.3	--	--	8	250
28...	1225	--	135	20.0	--	250

205105156082601 - Waiokamilo 4.1, Maui, HI

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 11...	1355	.4	--	--	9	240
28...	1215	--	123	20.0	--	240

205106156085501 - Waiokamilo 1, Maui, HI

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 11...	0830	.7		8	80.0

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS
 WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
 HAWAII, ISLAND OF MAUI--CONTINUED

205113156091101 - Piinaau Stream at 160 ft, Maui, HI

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 12...	1510	61	22.5	15	160

205133156085801 - PALAUHULU STR AT 100 FT

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 12...	1430	135	20.5	9	100

205134156085401 - Wailuanui Spring at 40 ft, Maui, HI

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 28...	1120	124	20.5	40.0

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS
 WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
 HAWAII, ISLAND OF MAUI--CONTINUED

205140156094401 - Waiokamilo 5, Maui, HI

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 11...	0830	3.7	139	19.0	8	440

205150156090401 - Unnamed Keanae Valley Stream at 420 ft, Maui, H

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 12...	1410	114	21.5	6	420

205235156090801 - Arboretum Spring, Maui, HI

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 28...	1340	148	25.0	160

205240156090201 - Piinaau Stream at highway, Maui, HI

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
MAY 1999 12...	1535	111	21.5	9	30.0

Ground-Water Station Records

GROUND-WATER LEVELS
HAWAII, ISLAND OF KAUAI

220057159210301. Local number 2-0021-01.

LOCATION.--Lat 22°00'57 " , long 159°21'03 " , Hydrologic Unit 20070000, 1.0 mi southwest of Wailua County Golf Course, and 1.3 mi north of Hanamaulu Park. Owner: State of Hawaii, DOWALD.

AQUIFER.--Waimea Canyon Basalt, Miocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 277 ft, casing diameter 8-in., cased to 196 ft.

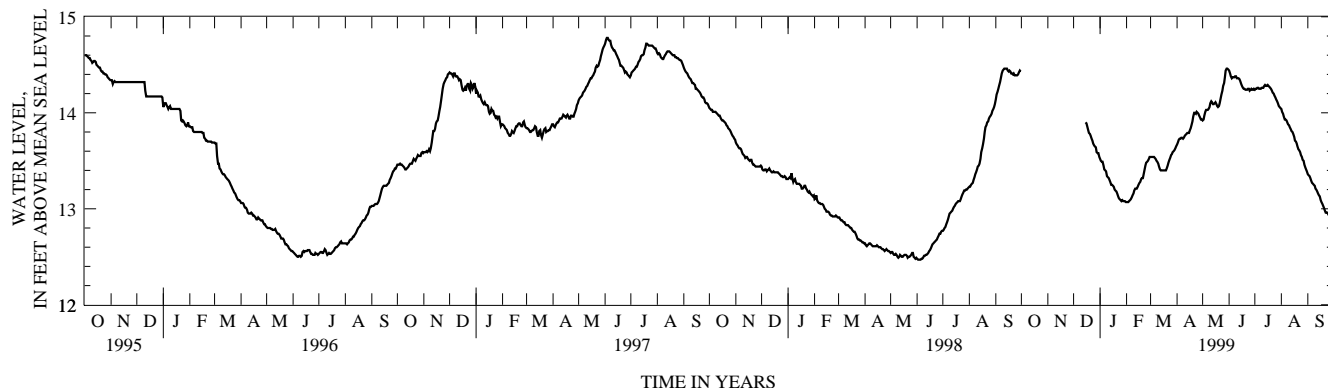
DATUM.--Elevation of land-surface datum is 166 ft. Measuring point is the top of 4-in. galvanized coupling, 166.70 ft above mean sea level.

PERIOD OF RECORD.--Occasional measurements, June 1980 to June 1993. Water-level recorder, June 1993 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 15.86 ft above mean sea level, March 3, 1995; lowest water level measured, 12.47 ft above mean sea level, June 2-5, 1998.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	13.52	13.07	13.54	13.67	13.92	14.44	14.24	14.04	13.36
2	---	---	---	13.50	13.07	13.54	13.69	13.93	14.41	14.25	14.01	13.35
3	---	---	---	13.49	13.07	13.54	13.72	13.97	14.38	14.25	13.99	13.34
4	---	---	---	13.49	13.08	13.54	13.73	14.01	14.36	14.26	13.96	13.32
5	---	---	---	13.45	13.09	13.54	13.73	14.03	14.37	14.26	13.93	13.29
6	---	---	---	13.41	13.10	13.53	13.74	14.03	14.37	14.25	13.93	13.27
7	---	---	---	13.40	13.12	13.52	13.74	14.03	14.37	14.25	13.92	13.26
8	---	---	---	13.39	13.14	13.50	13.73	14.04	14.38	14.25	13.90	13.25
9	---	---	---	13.34	13.16	13.49	13.74	14.06	14.38	14.26	13.88	13.24
10	---	---	---	13.33	13.19	13.47	13.76	14.10	14.36	14.26	13.87	13.21
11	---	---	---	13.32	13.21	13.44	13.77	14.12	14.36	14.26	13.85	13.20
12	---	---	---	13.30	13.21	13.41	13.78	14.11	14.36	14.28	13.83	13.18
13	---	---	---	13.28	13.21	13.40	13.79	14.09	14.35	14.29	13.81	13.16
14	---	---	---	13.25	13.23	13.40	13.79	14.09	14.33	14.28	13.80	13.14
15	---	---	13.90	13.25	13.25	13.40	13.79	14.10	14.30	14.28	13.78	13.13
16	---	---	13.89	13.24	13.27	13.40	13.82	14.11	14.28	14.29	13.75	13.09
17	---	---	13.86	13.23	13.28	13.40	13.84	14.09	14.26	14.28	13.71	13.07
18	---	---	13.82	13.20	13.31	13.40	13.87	14.07	14.25	14.27	13.70	13.05
19	---	---	13.79	13.19	13.32	13.40	13.91	14.06	14.25	14.26	13.68	13.03
20	---	---	13.78	13.18	13.32	13.42	13.96	14.07	14.24	14.25	13.65	13.01
21	---	---	13.76	13.16	13.36	13.45	14.00	14.10	14.24	14.23	13.62	12.98
22	---	---	13.73	13.13	13.41	13.48	14.00	14.15	14.24	14.21	13.61	12.96
23	---	---	13.71	13.11	13.45	13.51	13.99	14.19	14.25	14.20	13.59	12.96
24	---	---	13.68	13.10	13.48	13.53	14.01	14.23	14.25	14.18	13.56	12.96
25	---	---	13.66	13.09	13.49	13.56	14.00	14.28	14.23	14.16	13.54	12.94
26	---	---	13.65	13.08	13.50	13.57	13.99	14.31	14.24	14.14	13.51	12.94
27	---	---	13.64	13.09	13.52	13.59	13.97	14.37	14.25	14.12	13.50	12.94
28	---	---	13.59	13.08	13.54	13.60	13.95	14.44	14.24	14.10	13.46	12.92
29	---	---	13.58	13.08	---	13.61	13.93	14.46	14.24	14.07	13.43	12.90
30	---	---	13.58	13.08	---	13.63	13.93	14.46	14.25	14.06	13.41	12.90
31	---	---	13.54	13.07	---	13.65	---	14.45	---	14.05	13.39	---
MEAN	---	---	---	13.25	13.27	13.50	13.84	14.14	14.31	14.22	13.73	13.11
MAX	---	---	---	13.52	13.54	13.65	14.01	14.46	14.44	14.29	14.04	13.36
MIN	---	---	---	13.07	13.07	13.40	13.67	13.92	14.23	14.05	13.39	12.90



GROUND-WATER LEVELS
HAWAII, ISLAND OF KAUAI--Continued

220013159224001. Local number 2-0022-01.

LOCATION.--Lat 22°00'13", long 159°22'40", Hydrologic Unit 20070000, 3.2 mi north of Lihue, and 1.4 mi west of the nearest shoreline.
Owner: Kauai County, Department of Water.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled well, depth 700 ft; 20-in. solid casing: 0-58 ft; grouted: 0-58 ft; open hole: 58 ft to bottom.

DATUM.--Elevation of land-surface datum is 273 ft. Measuring point is the top of 4-in. stem welded to 20-in. casing, 277.67 ft above mean sea level.

PERIOD OF RECORD.--Water-level: occasional measurements, February 1997 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 251.64 ft above mean sea level, August 2, 1999; lowest water level measured, 243.65 ft above mean sea level, July 1, 1998.

REMARKS.--Well part of a network of observation wells in cooperation with the County of Kauai, Department of Water.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	248.73	JAN 5	244.28	APR 23	249.14	JUL 13	247.73	AUG 24	249.72
NOV 16	247.02	FEB 19	248.63	MAY 25	248.99	AUG 2	251.64	SEP 21	247.05
DEC 14	245.30	MAR 24	248.80	JUN 23	247.15				

220051159231801. Local number 2-0023-01.

LOCATION.--Lat 22°00'51", long 159°23'18", Hydrologic Unit 20070000, 2.5 mi northwest of Lihue, and 2.8 mi west of the nearest shoreline. Owner: U.S. Geological Survey.

AQUIFER.--Koloa Volcanics and Waimea Canyon Basalt, Miocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled well, depth 1,147 ft; 10-in. solid steel outer casing: 0-156 ft, 4-in. solid pvc casing: 0-20 ft, annular space grouted: 0-156 ft, open hole: 156 ft to bottom.

DATUM.--Elevation of land-surface datum is 319 ft. Measuring point is the top of 4-in. well casing, 319.88 ft above mean sea level.

PERIOD OF RECORD.--Water-level: occasional measurements, November 1996 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 176.77 ft above mean sea level, August 2, 1999; lowest water level measured, 163.85 ft above mean sea level, November 14, 1996.

REMARKS.--Well part of a network of observation wells in cooperation with the County of Kauai, Department of Water.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	173.29	JAN 5	174.62	MAR 24	176.05	JUN 23	175.98	AUG 24	176.63
NOV 16	174.15	FEB 19	175.22	APR 23	176.14	JUL 13	176.27	SEP 21	176.24
DEC 14	174.63	FEB 24	175.11	MAY 25	176.03	AUG 2	176.77		

GROUND-WATER LEVELS
HAWAII, ISLAND OF KAUAI--Continued

220019159444801. Local number 2-0044-14.

LOCATION.--Lat 22°00'19 " , long 159°44'48 " , Hydrologic Unit 20070000, 1.8 mi northeast of Kokole Point, and 2.8 mi northwest of Kekaha School. Owner: Kekaha Sugar Co.

AQUIFER.--Waimea Canyon Basalt, Miocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled artesian well, depth 245 ft, casing diameter 13-in., cased to 164 ft.

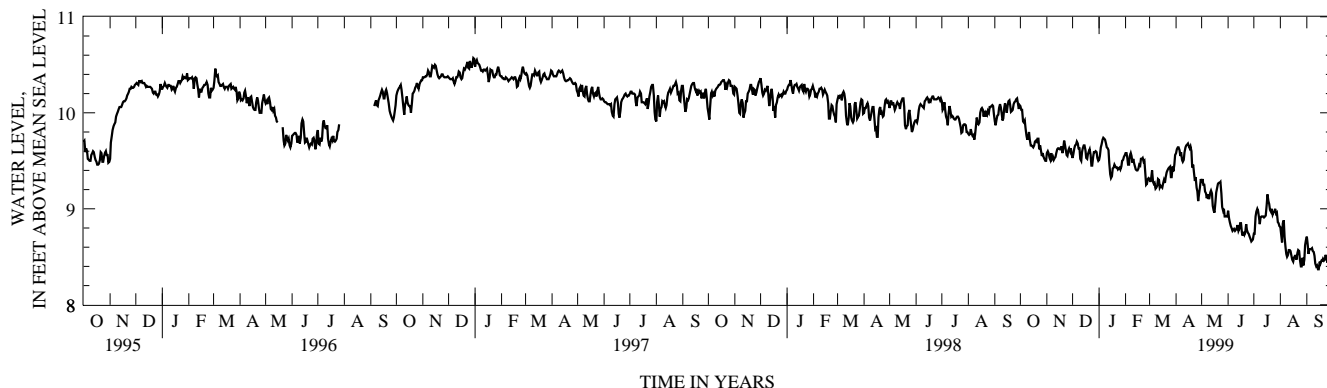
DATUM.--Elevation of land-surface datum is 8 ft. Measuring point is the top of standpipe, 11.49 ft until February 9, 1997; changed measuring point to top of recorder shelf on February 10, 1997, 11.57 ft above mean sea level. Prior to June 1979, nonrecording gage at datum 0.25 ft lower.

PERIOD OF RECORD.--Occasional measurements 1937 to 1962 (measured by Kekaha Sugar Company). Water-level recorder, June 1979 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 11.07 ft above mean sea level, December 20, 1937; lowest water level measured, 7.52 ft above mean sea level, August 15, 1947.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10.07	9.58	9.53	9.51	9.58	9.31	9.58	9.27	8.98	8.74	8.81	8.71
2	10.03	9.60	9.57	9.55	9.58	9.28	9.62	9.31	8.90	8.74	8.74	8.64
3	10.03	9.58	9.63	9.64	9.53	9.33	9.64	9.25	8.86	8.92	8.65	8.53
4	9.91	9.53	9.66	9.67	9.46	9.40	9.64	9.25	8.82	8.97	8.85	8.58
5	9.90	9.51	9.67	9.72	9.46	9.28	9.61	9.18	8.80	9.00	8.88	8.58
6	9.92	9.58	9.70	9.74	9.55	9.26	9.55	9.16	8.77	8.98	8.71	8.58
7	9.84	9.52	9.68	9.73	9.58	9.27	9.59	9.11	8.78	8.91	8.60	8.59
8	9.76	9.54	9.63	9.72	9.55	9.21	9.51	9.15	8.79	8.84	8.53	8.56
9	9.72	9.51	9.63	9.68	9.48	9.22	9.49	9.11	8.77	8.91	8.50	8.55
10	9.75	9.53	9.52	9.64	9.52	9.24	9.51	9.11	8.78	8.92	8.52	8.51
11	9.80	9.54	9.50	9.63	9.47	9.31	9.59	9.17	8.80	8.92	8.57	8.43
12	9.72	9.58	9.59	9.61	9.44	9.30	9.64	9.19	8.83	8.92	8.57	8.40
13	9.66	9.62	9.63	9.48	9.41	9.22	9.66	9.16	8.77	8.91	8.56	8.41
14	9.66	9.63	9.66	9.36	9.40	9.24	9.67	9.03	8.79	8.92	8.51	8.37
15	9.65	9.63	9.66	9.32	9.40	9.23	9.68	8.98	8.85	8.93	8.47	8.37
16	9.64	9.62	9.61	9.34	9.42	9.22	9.65	8.96	8.85	9.04	8.45	8.45
17	9.66	9.62	9.53	9.42	9.46	9.27	9.63	9.07	8.75	9.15	8.49	8.43
18	9.70	9.65	9.52	9.43	9.45	9.30	9.65	9.17	8.72	9.08	8.51	8.46
19	9.71	9.58	9.57	9.46	9.52	9.27	9.60	9.21	8.76	9.05	8.51	8.46
20	9.70	9.62	9.60	9.44	9.52	9.33	9.43	9.26	8.73	8.99	8.47	8.48
21	9.73	9.71	9.62	9.43	9.53	9.38	9.46	9.27	8.75	8.97	8.54	8.46
22	9.73	9.67	9.56	9.43	9.49	9.40	9.38	9.27	8.84	9.00	8.57	8.47
23	9.62	9.62	9.45	9.41	9.50	9.42	9.29	9.28	8.78	8.94	8.56	8.52
24	9.66	9.56	9.45	9.42	9.39	9.43	9.33	9.16	8.75	8.96	8.47	8.49
25	9.61	9.55	9.54	9.43	9.25	9.44	9.22	9.02	8.74	8.97	8.40	8.44
26	9.55	9.61	9.59	9.41	9.26	9.33	9.18	8.98	8.71	9.00	8.40	8.51
27	9.58	9.63	9.59	9.44	9.31	9.33	9.08	9.00	8.69	8.95	8.49	8.58
28	9.54	9.60	9.60	9.50	9.32	9.44	9.16	8.92	8.66	8.96	8.41	8.55
29	9.52	9.63	9.59	9.51	---	9.39	9.22	8.92	8.67	8.86	8.47	8.52
30	9.50	9.56	9.53	9.54	---	9.46	9.31	8.92	8.68	8.85	8.62	8.62
31	9.50	---	9.50	9.56	---	9.56	---	8.92	---	8.82	8.67	---
MEAN	9.72	9.59	9.58	9.52	9.46	9.32	9.49	9.12	8.78	8.94	8.56	8.51
MAX	10.07	9.71	9.70	9.74	9.58	9.56	9.68	9.31	8.98	9.15	8.88	8.71
MIN	9.50	9.51	9.45	9.32	9.25	9.21	9.08	8.92	8.66	8.74	8.40	8.37



GROUND-WATER LEVELS
HAWAII, ISLAND OF KAUAI--Continued

220134159205401. Local number 2-0120-02.

LOCATION.--Lat 22°01'34 " , long 159°20'54 " , Hydrologic unit 20070000, 0.3 mi southwest of Wailua County Golf Course, and 1.6 mi south southwest of Wailua River Mouth. Owner: State of Hawaii, DOWALD.

AQUIFER.--Waimea Canyon Basalt, Miocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled artesian well; depth 312 ft, casing diameter 6-in., cased to 60 ft.

DATUM.--Elevation of land-surface datum is 11 ft. Measuring point is the top of 10-in. plastic pipe, 11.36 ft above mean sea level. Prior to June 24, 1980 measuring point was the top of 6-in. steel casing, 11.93 ft above mean sea level.

PERIOD OF RECORD.--

Water level: occasional measurements, 1973 to 1980, 1987 to current year.

Water quality: occasional measurements, 1982 to 1987.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 11.79 ft above mean sea level, February 21, 1974; lowest water level measured, 8.08 ft above mean sea level, October 12, 1978.

REMARKS.--Water level affected by pumping of nearby well.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 15	9.76	DEC 14	10.38	FEB 8	10.04	APR 9	9.97	JUN 10	9.97	AUG 4	9.91

220131159214701. Local number, 2-0121-01.

LOCATION.--Lat 22°01'31 " , long 159°21'47 " , Hydrologic unit 20070000, 3.2 mi north of Lihue, and 1.4 mi west of the nearest shoreline. Owner: U.S. Geological Survey.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled well, depth 1,143 ft, 10-in. solid steel outer casing: 0-160 ft, 4-in. solid steel casing: 0-80 ft, 4-in. alternating perforated/solid steel casing: 80 ft to bottom, annular space grouted: 0-160 ft, annular space open: 160 ft to bottom.

DATUM.--Elevation of land-surface datum is 289 ft. Measuring point is the top of 4-in. well casing, 290.16 ft above mean sea level.

PERIOD OF RECORD.--Water level: occasional measurements, January 1997 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 40.10 ft above mean sea level, September 21, 1999; lowest water level measured, 31.11 ft above mean sea level, January 26, 1997.

REMARKS.--Well part of a network of observation wells in cooperation with the County of Kauai, Department of Water.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	38.12	JAN 5	39.18	APR 23	39.57	JUL 13	39.84	AUG 24	39.70
NOV 16	38.96	FEB 19	39.31	MAY 25	39.75	AUG 2	40.04	SEP 21	40.10
DEC 14	39.01	MAR 24	39.53	JUN 23	39.75				

GROUND-WATER LEVELS
HAWAII, ISLAND OF KAUAI--Continued

220133159242001. Local number, 2-0124-01.

LOCATION.--Lat 22°01'33 " , long 159°24'20" , Hydrologic unit 20070000, 3.7 mi northwest of Lihue, and 3.8 mi west of the nearest shoreline. Owner: U.S. Geological Survey.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled well, depth 1,047 ft, 10-in. solid steel outer casing: 0-161 ft; 4-in. solid steel casing: 0-80 ft; 4-in. alternating perforated/solid steel casing: 80-1,032 ft; annular space grouted: 0-160 ft; annular space open: 160-726 ft.

DATUM.--Elevation of land-surface datum is 466 ft. Measuring point is the top of 4-in. well casing, 467.12 ft above mean sea level.

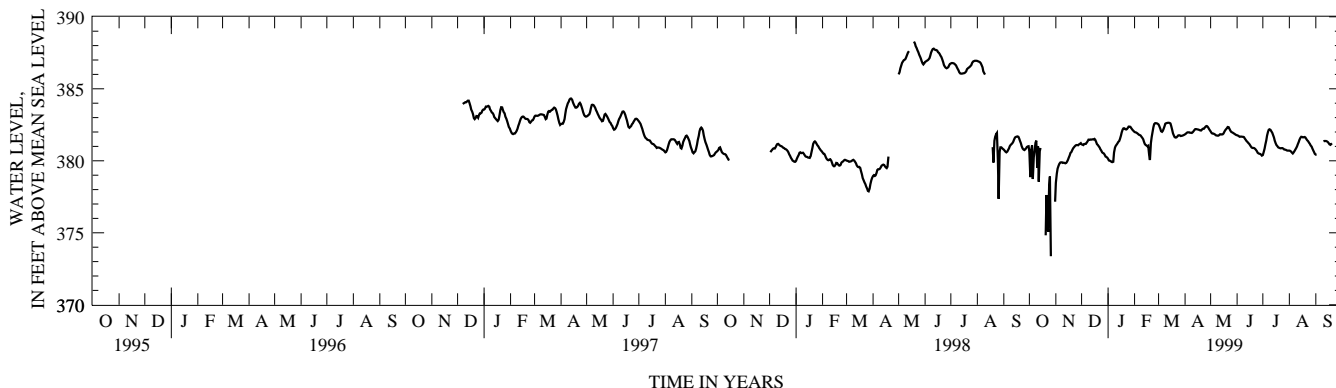
PERIOD OF RECORD.--Water level: occasional measurements, November 1996. Continuous water level recorder, December 1996 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 388.31 ft above mean sea level, May 19, 1998; lowest water level measured, 368.10 ft above mean sea level, October 27, 1998.

REMARKS.--Well part of a network of observation wells in cooperation with the County of Kauai Department of Water.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	380.63	378.47	381.15	380.13	382.00	382.52	381.84	382.04	381.78	380.40	380.71	380.43
2	378.87	379.10	381.12	380.03	381.98	382.40	381.88	381.93	381.75	380.59	380.69	380.43
3	380.70	379.45	381.09	380.00	381.96	382.22	381.95	381.89	381.71	380.84	380.64	---
4	381.07	379.65	381.16	379.98	381.92	382.06	381.98	381.89	381.67	381.12	380.57	---
5	378.74	379.79	381.17	379.92	381.87	382.01	381.98	381.87	381.68	381.43	380.51	---
6	380.24	379.88	381.17	379.91	381.81	382.08	381.97	381.83	381.68	381.75	380.57	---
7	380.68	379.90	381.27	379.94	381.79	382.21	381.95	381.78	381.67	382.01	380.68	---
8	381.26	379.89	381.35	380.57	381.76	382.40	381.94	381.76	381.67	382.16	380.77	---
9	381.40	379.85	381.47	380.92	381.67	382.57	381.93	381.74	381.64	382.19	380.86	---
10	379.50	379.86	381.45	381.04	381.60	382.61	381.99	381.75	381.55	382.15	381.00	381.35
11	381.00	379.85	381.48	381.13	381.49	382.62	382.06	381.79	381.45	382.06	381.15	381.37
12	378.55	379.82	381.47	381.21	381.32	382.64	382.15	381.84	381.38	381.95	381.30	381.38
13	380.66	379.85	381.48	381.31	381.17	382.64	382.20	381.84	381.30	381.80	381.47	381.38
14	380.89	379.94	381.50	381.37	381.10	382.62	382.20	381.83	381.24	381.61	381.60	381.35
15	---	380.07	381.48	381.52	381.06	382.59	382.18	381.84	381.17	381.40	381.67	381.31
16	---	380.21	381.52	381.75	381.00	382.40	382.17	381.89	381.09	381.22	381.66	381.23
17	---	380.38	381.46	381.98	381.04	382.13	382.16	382.03	380.99	381.10	381.63	381.14
18	---	380.54	381.30	382.17	380.39	381.90	382.14	382.12	380.92	381.01	381.64	381.11
19	---	380.62	381.16	382.26	380.05	381.74	382.11	382.19	380.90	380.94	381.66	381.16
20	374.83	380.73	381.09	382.25	381.23	381.64	382.11	382.27	380.89	380.91	381.61	381.22
21	377.62	380.86	381.01	382.20	381.64	381.61	382.18	382.35	380.88	380.88	381.51	---
22	375.63	380.94	380.92	382.17	382.02	381.63	382.22	382.33	380.83	380.87	381.43	---
23	375.07	381.00	380.80	382.20	382.33	381.70	382.23	382.23	380.76	380.88	381.36	---
24	378.24	381.06	380.72	382.27	382.55	381.76	382.29	382.10	380.67	380.88	381.27	---
25	378.91	381.09	380.59	382.38	382.61	381.78	382.38	382.01	380.56	380.84	381.17	---
26	373.37	381.09	380.54	382.37	382.61	381.76	382.42	381.97	380.51	380.79	381.07	---
27	---	381.08	380.51	382.36	382.60	381.72	382.40	381.94	380.50	380.77	380.98	---
28	---	381.14	380.42	382.28	382.58	381.73	382.32	381.91	380.46	380.76	380.85	---
29	---	381.17	380.29	382.18	---	381.75	382.22	381.87	380.43	380.72	380.71	---
30	---	381.23	380.26	382.12	---	381.78	382.12	381.83	380.36	380.70	380.60	---
31	377.16	---	380.22	382.05	---	381.80	---	381.79	---	380.70	380.48	---
MEAN	---	380.28	381.05	381.42	381.68	382.10	382.12	381.95	381.14	381.21	381.09	---
MAX	---	381.23	381.52	382.38	382.61	382.64	382.42	382.35	381.78	382.19	381.67	---
MIN	---	378.47	380.22	379.91	380.05	381.61	381.84	381.74	380.36	380.40	380.48	---



GROUND-WATER LEVELS
HAWAII, ISLAND OF KAUAI--Continued

220126159261501. Local number, 2-0126-01.

LOCATION.--Lat 22°01'26 " , long 159°26'15 " , Hydrologic unit 20070000, 5.3 northwest of Lihue, and 6.2 mi west of the nearest shoreline.
Owner: U. S. Geological Survey.

AQUIFER.--Koloa Volcanics and Waimea Canyon Basalt, Miocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled well, depth 1,004 ft, 10-in. solid steel outer casing: 0-198 ft; 4-in. solid pvc casing: 0-126 ft; 4.5-in. perforated pvc casing: 126 ft to bottom; annular space grouted: 0-198 ft; annular space open: 198 ft to bottom.

DATUM.--Elevation of land-surface datum is 678 ft. Measuring point is the top of 4-in. well casing, 679.06 ft above mean sea level.

PERIOD OF RECORD.--

Water level: occasional measurements started in November 1996.

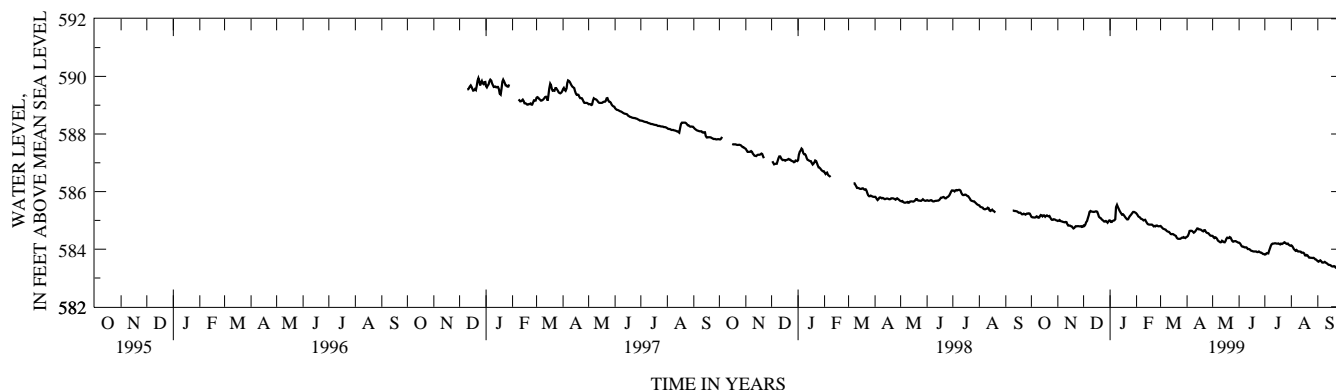
Continuous water-level recorder, December 1996 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 589.96 ft above mean sea level, December 23, 1996; lowest water level measured, 583.30 ft above mean sea level, September 23, 1999.

REMARKS.--Well part of network of observation wells in cooperation with the County of Kauai Department of Water.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	585.13	584.98	584.82	584.99	585.23	584.81	584.43	584.46	584.23	583.81	584.13	583.58
2	585.11	584.99	584.81	584.95	585.19	584.78	584.46	584.41	584.20	583.82	584.11	583.57
3	585.11	585.01	584.85	584.95	585.14	584.74	584.54	584.39	584.15	583.86	584.06	583.60
4	585.10	584.98	584.93	584.98	585.12	584.71	584.63	584.41	584.10	583.86	584.01	583.61
5	585.10	584.97	584.98	584.99	585.10	584.70	584.64	584.40	584.09	583.85	583.97	583.58
6	585.11	584.96	585.07	585.00	585.06	584.69	584.64	584.36	584.09	583.94	583.95	583.54
7	585.14	584.95	585.18	585.04	585.05	584.68	584.63	584.31	584.07	584.03	583.97	583.53
8	585.13	584.94	585.29	585.46	585.03	584.64	584.60	584.28	584.06	584.11	583.95	583.54
9	585.09	584.93	585.33	585.54	585.00	584.62	584.57	584.26	584.07	584.17	583.92	583.56
10	585.10	584.95	585.31	585.47	585.01	584.61	584.60	584.24	584.05	584.19	583.92	583.54
11	585.15	584.94	585.30	585.40	585.02	584.60	584.63	584.25	584.01	584.19	583.92	583.52
12	585.19	584.87	585.30	585.34	584.97	584.56	584.68	584.29	584.01	584.20	583.91	583.50
13	585.17	584.82	585.29	585.29	584.92	584.53	584.72	584.27	584.00	584.21	583.88	583.47
14	585.14	584.82	585.30	585.24	584.87	584.52	584.71	584.25	583.97	584.20	583.88	583.45
15	585.17	584.82	585.31	585.20	584.86	584.53	584.69	584.24	583.95	584.19	583.88	583.45
16	585.17	584.80	585.31	585.21	584.85	584.52	584.69	584.28	583.94	584.19	583.85	583.44
17	585.13	584.79	585.30	585.19	584.85	584.49	584.68	584.37	583.93	584.20	583.79	583.41
18	585.15	584.76	585.21	585.14	584.85	584.48	584.66	584.40	583.92	584.18	583.78	583.40
19	585.17	584.72	585.13	585.10	584.85	584.46	584.63	584.39	583.92	584.17	583.80	583.40
20	585.15	584.73	585.09	585.06	584.83	584.40	584.62	584.39	583.92	584.19	583.79	583.41
21	585.14	584.78	585.08	585.03	584.79	584.37	584.66	584.42	583.92	584.18	583.74	583.40
22	585.15	584.80	585.04	585.04	584.81	584.36	584.66	584.40	583.90	584.19	583.71	583.36
23	585.11	584.79	585.01	585.09	584.79	584.36	584.60	584.34	583.90	584.22	583.71	583.35
24	585.05	584.80	584.99	585.14	584.82	584.36	584.57	584.28	583.92	584.24	583.70	583.38
25	585.02	584.80	584.96	585.18	584.82	584.38	584.56	584.26	583.90	584.22	583.70	583.38
26	585.02	584.79	584.96	585.21	584.80	584.40	584.55	584.27	583.88	584.19	583.69	583.38
27	585.04	584.79	584.98	585.26	584.79	584.40	584.52	584.28	583.88	584.18	583.70	583.41
28	585.03	584.80	584.96	585.29	584.80	584.42	584.48	584.28	583.85	584.19	583.68	583.39
29	585.02	584.77	584.92	585.29	---	584.40	584.47	584.26	583.83	584.15	583.65	583.34
30	585.00	584.78	584.96	585.28	---	584.39	584.47	584.25	583.83	584.13	583.64	583.33
31	584.99	---	585.00	585.26	---	584.41	---	584.23	---	584.12	583.61	---
MEAN	585.11	584.85	585.10	585.18	584.94	584.53	584.60	584.32	583.98	584.12	583.84	583.46
MAX	585.19	585.01	585.33	585.54	585.23	584.81	584.72	584.46	584.23	584.24	584.13	583.61
MIN	584.99	584.72	584.81	584.95	584.79	584.36	584.43	584.23	583.83	583.81	583.61	583.33



GROUND-WATER LEVELS
HAWAII, ISLAND OF KAUAI--Continued

220354159205601. Local number, 2-0320-01.

LOCATION.--Lat 22°03'54 " , long 159°20'56 " , Hydrologic unit 20070000, 0.6 mi east of Sleeping Giant Mountain, and 1.3 mi northwest of Wailua River bridge. Owner: Kauai County, Department of Water.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 240 ft, 8-in. casing diameter, cased to 193 ft.

DATUM.--Elevation of land-surface datum is 155 ft. Measuring point is the top of 1-in. hole on pump base on southeast side after removing elbow and nipple, 155.98 ft above mean sea level.

PERIOD OF RECORD.--

Water level: occasional measurements, February 1960, June 1973 to current year.

Water quality: occasional measurements, 1960, 1966, 1972-80, 1985-89, 1991-94, 1997 to current year.

REVISED RECORDS.--WDR HI-94-1: 1988-93 (the minimum water level for the period of record).

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 20.04 ft above mean sea level, February 17, 1960; lowest water level measured, 2.07 ft below mean sea level, April 8, 1999.

REMARKS.--Water is used for public supply. Water level affected by pumping of nearby well.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	-1.45	NOV 25	-0.64	FEB 10	-0.42	APR 8	-2.07	JUN 16	-0.93	AUG 18	0.26

220354159205602. Local number, 2-0320-03.

LOCATION.--Lat 22°03'54 " , long 159°20'56 " , Hydrologic unit 20070000, 0.6 mi east of Sleeping Giant Mountain, and 1.3 mi northwest of Wailua River bridge. Owner: Kauai County, Department of Water.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 302 ft; 14-in. casing diameter, cased to 168 ft.

DATUM.--Elevation of land-surface datum is 156 ft. Measuring point is the top of 1-in. hole on pump base on southeast side after removing elbow and nipple, 156.94 ft above mean sea level.

PERIOD OF RECORD.--

Water level: occasional measurements, August 1976 to current year.

Water quality: occasional measurements, 1972, 1976 to current year.

REVISED RECORDS.--WDR HI-94-1: 1988-93 (the minimum water level for the period of record).

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.91 ft above mean sea level, November 19, 1982; lowest water level measured, -1.18 ft below mean sea level, October 7, 1998.

REMARKS.--Water is used for public supply. Water level affected by pumping of nearby well.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	-1.18	NOV 25	-0.34	FEB 10	-0.23	APR 8	-0.75	JUN 16	-0.68	AUG 18	0.45

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI--Continued

220825159185301. Local number 2-0818-03.

LOCATION.--Lat 22°08'25 " long 159°18'50 " Hydrologic Unit 20070000, 1.3 mi southwest of Kahala Point, and 0.2 mi south of Anahola School. Owner: Kauai County, Department of Water.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 466 ft, 12-in. casing diameter, cased to 290 ft above mean sea level.

DATUM.--Elevation of land-surface datum is 267 ft. Measuring point is the top of west side of 4 1/2-in. pipe at 268.99 ft above mean sea level.

PERIOD OF RECORD.--Occasional measurements, October 1991 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 12.64 ft above mean sea level, October 8, 1997; lowest water level measured, 7.34 ft above mean sea level, April 8, 1998.

REMARKS.--Water for future public supply. Water level affected by pumping of nearby wells.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	11.68	NOV 25	11.25	FEB 10	11.29	APR 8	11.07	JUN 16	10.85	AUG 18	10.52

221038159203801. Local number, 2-1020-03.

LOCATION.--Lat 22°10'38 " long 159°20'38 " Hydrologic Unit 20070000, 2.6 mi south of Kulikoa Point, and 2.6 mi northwest of Kuaehu Point. Owner: Amfac Properties Development Corp.

AQUIFER.--Waimea Canyon Basalt, Miocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 700 ft.

DATUM.--Elevation of land-surface datum is 358 ft. Measuring point is the top of temporary metal girder over well opening, elevation 358.52 ft above mean sea level.

PERIOD OF RECORD.--

Water level: occasional measurements, 1972 to current year.

Water quality: occasional measurements, 1972 to 1991, 1997.

REVISED RECORDS.--WRD HI-94-1: 1988-93 (the minimum water level for the period of record).

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 144.56 ft above mean sea level, March 30, 1990; lowest water level measured, 66.17 ft above mean sea level, November 6, 1973, lowest water level measured with pump on, 42.69 ft above mean sea level, October 4, 1973.

REMARKS.--Pump is in the process of being replaced. Well unused at this time.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	127.70	DEC 16	122.87	FEB 10	119.13	APR 8	115.32	JUN 18	107.66	AUG 10	105.40

GROUND-WATER LEVELS
HAWAII, ISLAND OF KAUAI--Continued

221150159264501. Local number, 2-1126-01.

LOCATION.--Lat 22°11'50", long 159°26'45 ", Hydrologic Unit 20070000, 1.2 mi south of Princeville Airport terminal, and 4.0 mi east southeast of Puupoa Point. Owner: Princeville Hanalei.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 763 ft; 14-in. casing diameter, cased to 435 ft.

DATUM.--Elevation of land-surface datum is 349 ft. Measuring point is the top of 3/4-in. pipe, in 1-in. hole on southside of pump base, after removing airline connection, 349.88 ft above mean sea level.

PERIOD OF RECORD.--

Water level: occasional measurements, 1972 to current year.

Water quality: occasional measurements, 1977 to current year.

REVISED RECORDS.--WDR HI-94-1: 1988-93 (the minimum water level for the period of record).

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 43.36 ft above mean sea level, June 3, 1974; lowest water level measured, 4.12 ft below mean sea level, November 17, 1992, lowest water level measured with pump on, 10.30 ft below mean sea level, June 2, 1983.

REMARKS.--Water used for public supply and irrigation of golf course. Water level affected by pumping of nearby well.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 8	7.60	DEC 15	8.68	FEB 12	9.17	APR 7	8.49	JUN 18	7.61	AUG 10	7.43

221247159324801. Local number, 2-1232-01.

LOCATION.--Lat 22°12'47 ", long 159°32'48 ", Hydrologic Unit 20070000, 0.9 mi southwest of Kolokoko Point, and 1.5 mi southeast of Haena Point. Owner: Kauai County, Department of Water.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 188 ft, 6-in. casing diameter, cased to 140 ft.

DATUM.--Elevation of land-surface datum is 67 ft. Measuring point was the top of 1-in. pipe 0.06 ft above flange, 66.56 ft above mean sea level. New measuring point is the top of 1-in. pipe 0.16 ft above flange, 66.68 ft above mean sea level from levels of June 16, 1999.

PERIOD OF RECORD.--

Water level: occasional measurements, 1972 to current year.

Water quality: occasional measurements, 1975 to current year.

REVISED RECORDS.--WDR HI-94-1: 1988-93 (the minimum water level for the period of record).

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 23.48 ft above mean sea level, June 3, 1974; lowest water level measured, 4.69 ft above mean sea level, August 6, 1993, lowest water level measured with pump on, 10.04 ft below mean sea level, June 9, 1975.

REMARKS.--Water used for public supply. Water level affected by pumping.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	7.28	NOV 25	6.32	FEB 10	8.86	JUN 16	7.51	AUG 18	7.37

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI--Continued

221318159335901. Local number, 2-1333-01.

LOCATION.--Lat 22°13'18", long 159°33'59", Hydrologic Unit 20070000, 0.6 mi south southwest of Haena Point, and 1.2 mi east southeast of Kailiu Point. Owner: Kauai County, Department of Water.

AQUIFER.--Waimea Canyon Basalt, Miocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 159 ft; 8-in. casing diameter, cased to 104 ft.

DATUM.--Elevation of land-surface datum is 82 ft. Measuring point is the top of airline hole after removing plug, elevation 82.05 ft above mean sea level from levels of December 12, 1995.

PERIOD OF RECORD.--

Water level: occasional measurements, 1972 to current year.

Water quality: occasional measurements, 1972 to current year.

REVISED RECORDS.--WRD HI-94-1: 1988-93 (the minimum water level for the period of record).

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 11.35 ft above mean sea level, December 8, 1989; lowest water level measured, 2.92 ft below mean sea level, August 18, 1999, lowest water level measured with pump on, 3.58 ft below mean sea level, November 30, 1977.

REMARKS.--Water used for public supply. Water level affected by pumping.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	7.92	NOV 25	8.07	FEB 10	1.72	APR 8	-1.25	JUN 16	-1.30	AUG 18	-2.92

215434159263301. Local number, 2-5426-03.

LOCATION.--Lat 21°54'34", long 159°26'33", Hydrologic Unit 20070000, 0.6 mi northeast of Koloa Mill, and 2.6 mi north of Makahuena Point. Owner: Grove Farm Co. Inc.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 318 ft, 12-in. casing diameter, cased to 176 ft.

DATUM.--Elevation of land-surface datum is 222 ft. Measuring point is the top of 1-in. hole on southwest side of flange, 222.30 ft above mean sea level.

PERIOD OF RECORD.--

Water level: occasional measurements, 1972 to current year.

Water quality: occasional measurements, 1997.

REVISED RECORDS.--WDR HI-94-1: 1988-93 (the minimum water level for the period of record).

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 34.83 ft above mean sea level, January 10, 1974; lowest water level measured, 15.48 ft above mean sea level, June 16, 1982, lowest water level measured with pump on, 5.05 ft above mean sea level, March 10, 1975.

REMARKS.--Water used for irrigation. Water level affected by pumping.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	24.48	DEC 18	24.16	MAR 1	25.58	MAR 26	25.56	JUN 18	25.36	AUG 9	25.26

GROUND-WATER LEVELS
HAWAII, ISLAND OF KAUAI--Continued

215454159274201. Local number, 2-5427-01.

LOCATION.--Lat 21°54'54", long 159°27'42", Hydrologic Unit 20070000, 0.1 mi west of the southwest corner of Waita Reservoir, and 2.7 mi northeast of Kaulala Point. Owner: Kauai County, Department of Water.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 455 ft; 12-in. casing diameter, cased to 263 ft.

DATUM.--Elevation of land-surface datum is 247 ft. Measuring point is the bottom edge of the east side opening on pump base 246.77 ft above mean sea level.

PERIOD OF RECORD.--

Water level: occasional measurements, 1972 to current year.

Water quality: occasional measurements, 1972 to current year.

REVISED RECORDS.--WDR HI-94-1: 1988-94 (the minimum water level for the period of record).

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 40.04 ft above mean sea level, July 15, 1974; lowest water level measured, 27.97 ft above mean sea level, October 6, 1988, lowest water level measured with pump on, 22.77 ft above mean sea level, March 3, 1983.

REMARKS.--Water used for public supply. Water level affected by pumping and by nearby well.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	31.98	NOV 24	34.23	FEB 3	34.42	APR 7	34.22	JUN 17	34.17	AUG 17	34.06

215536159263501. Local number, 2-5526-01.

LOCATION.--Lat 21°55'36", long 159°26'35", Hydrologic Unit 20070000, 3.7 mi north of Makahuena Point and 2.5 mi southeast of Knudsen Gap. Owner: McBryde Sugar Co.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 1,010 ft, 20 in. casing diameter, cased to 400 ft.

DATUM.--Elevation of land-surface is 355 ft. Measuring point is the top of 1-in. hole on top of pipe flange, southeast side, 355.28 ft above mean sea level.

PERIOD OF RECORD.--

Water level: occasional measurements, 1977 to 1999.

Water quality: occasional measurements, 1977 to current year.

REVISED RECORDS.--WDR HI-94-1: 1988-93 (the minimum water level for the period of record).

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 115.91 ft above mean sea level, July 13, 1999; lowest water level measured, 25.28 ft above mean sea level on April 5, 1984, lowest water level measured with pump on, 22.67 ft below mean sea level, July 27, 1978.

REMARKS.--Well was formerly used for irrigation of sugercane. Measurements discontinued after August 24, 1999.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	115.52	JUL 13	115.91	AUG 24	115.83

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI--Continued

215522159342601. Local number, 2-5534-03.

LOCATION.--Lat 21°55'22", long 159°34'26", Hydrologic Unit 20070000, 1.9 mi north from Weli Point, and 2.9 mi northeast from Puolo Point. Owner: Kauai County, Department of Water.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 109 ft; 9-in. casing diameter, cased to 109 ft.

DATUM.--Elevation of land-surface datum is 79 ft. Measuring point is the top of 3/4-in. galvanized pipe on northwest side of pump base 78.78 ft above mean sea level.

PERIOD OF RECORD.--

Water level: occasional measurements, 1972 to current year.

Water quality: occasional measurements, 1972 to current year.

REVISED RECORDS.--WDR HI-94-1: 1988-93 (the minimum water level for the period of record).

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 22.91 ft above mean sea level, February 1, 1990; lowest water level measured, 12.62 ft above mean sea level, May 20, 1986, lowest water level measured with pump on, 9.19 ft above mean sea level, October 13, 1978.

REMARKS.--Water used for public supply. Water level affected by pumping.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	15.68	NOV 24	16.06	FEB 3	17.71	APR 7	17.03	JUN 17	17.58	AUG 19	18.18

215630159265101. Local number, 2-5626-01.

LOCATION.--Lat 21°56'30", long 159°26'51", Hydrologic Unit 20070000, 5.7 mi south of Lihue, and 3.8 mi northwest of the nearest shoreline. Owner: U.S. Geological Survey.

AQUIFER.--Waimea Canyon Basalt, Miocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled well, depth 802 ft; 12.25-in. solid steel outer casing: 0-156 ft; 4-in. solid pvc casing: 0-20 ft; annular space grouted: 0-256 ft; open hole: 256 ft to bottom.

DATUM.--Elevation of land-surface is 485 ft. Measuring point is the top of 4-in. well casing, 485.40 ft above mean sea level.

PERIOD OF RECORD.--Occasional measurements, 1996 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 180.15 ft above mean sea level, December 14, 1998; lowest water level measured, 173.49 ft above mean sea level, November 8, 1996.

REMARKS.--Well part of a network of observation wells in cooperation with the County of Kauai Department of Water.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	179.99	JAN 5	180.29	APR 23	180.08	JUL 13	180.11	AUG 24	180.00
NOV 16	180.14	FEB 19	180.13	MAY 25	180.02	AUG 2	180.09	SEP 21	179.96
DEC 14	180.15	MAR 24	180.05	JUN 18	180.12				

GROUND-WATER LEVELS
HAWAII, ISLAND OF KAUAI--Continued

215607159344301. Local number 2-5634-01.

LOCATION.--Lat 21°56'07 " , long 159°34'43 " , Hydrologic Unit 20070000, 2.7 mi north of Weli Point, and 3.3 mi northeast of Puolo Point.
Owner: State of Hawaii.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 508 ft, 8-in. casing diameter, cased to 507 ft.

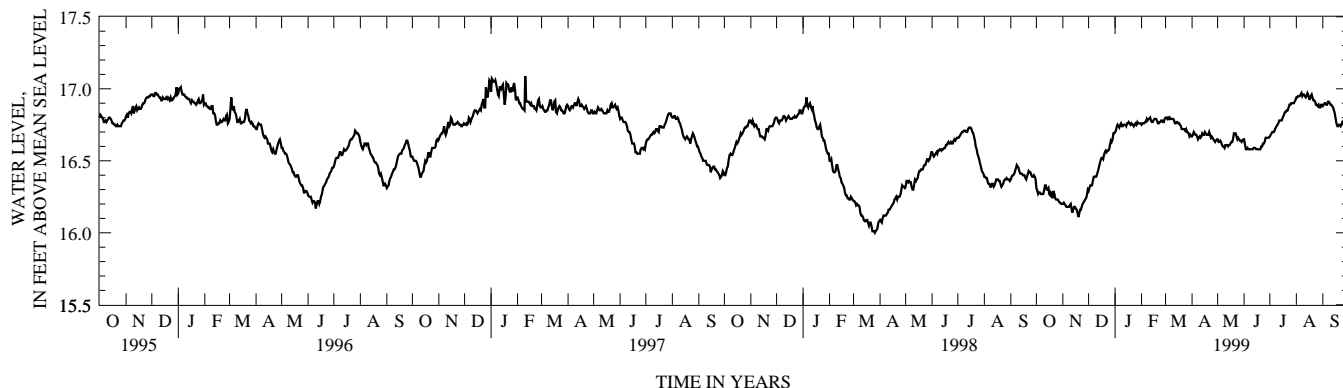
DATUM.--Elevation of land-surface datum is 439 ft. Measuring point is the top of recorder shelf 440.68 ft above mean sea level.

PERIOD OF RECORD.--Water-level recorder, February 1986 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 17.83 ft above mean sea level, January 15, 16, 1992; lowest water level measured, 15.87 ft above mean sea level, November 1, 1989.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16.31	16.20	16.29	16.70	16.75	16.80	16.67	16.65	16.65	16.67	16.94	16.88
2	16.29	16.21	16.31	16.71	16.76	16.80	16.68	16.63	16.61	16.68	16.94	16.89
3	16.27	16.20	16.33	16.74	16.76	16.79	16.70	16.63	16.58	16.69	16.95	16.90
4	16.28	16.19	16.33	16.75	16.76	16.80	16.69	16.64	16.58	16.70	16.95	16.90
5	16.28	16.18	16.33	16.74	16.77	16.79	16.68	16.63	16.59	16.70	16.95	16.89
6	16.27	16.18	16.36	16.73	16.77	16.80	16.68	16.61	16.58	16.70	16.96	16.89
7	16.27	16.18	16.39	16.75	16.79	16.79	16.67	16.60	16.58	16.72	16.97	16.91
8	16.27	16.18	16.39	16.76	16.78	16.79	16.65	16.60	16.58	16.73	16.95	16.91
9	16.27	16.19	16.39	16.74	16.79	16.79	16.66	16.59	16.58	16.74	16.96	16.90
10	16.30	16.20	16.39	16.74	16.79	16.79	16.67	16.61	16.58	16.75	16.96	16.89
11	16.33	16.17	16.41	16.75	16.80	16.78	16.66	16.61	16.58	16.76	16.95	16.89
12	16.33	16.14	16.43	16.75	16.78	16.76	16.67	16.61	16.59	16.78	16.94	16.88
13	16.30	16.16	16.45	16.75	16.77	16.76	16.69	16.60	16.59	16.78	16.95	16.87
14	16.30	16.18	16.48	16.74	16.77	16.77	16.68	16.61	16.59	16.78	16.97	16.85
15	16.31	16.18	16.50	16.76	16.78	16.77	16.68	16.61	16.58	16.78	16.96	16.83
16	16.27	16.17	16.52	16.76	16.79	16.76	16.70	16.62	16.58	16.80	16.93	16.79
17	16.26	16.16	16.52	16.77	16.79	16.76	16.69	16.63	16.58	16.81	16.93	16.76
18	16.28	16.14	16.51	16.76	16.79	16.75	16.68	16.63	16.58	16.83	16.95	16.74
19	16.27	16.11	16.54	16.75	16.78	16.74	16.68	16.65	16.58	16.84	16.96	16.74
20	16.24	16.13	16.56	16.76	16.76	16.72	16.68	16.69	16.58	16.84	16.94	16.75
21	16.29	16.16	16.57	16.75	16.76	16.72	16.70	16.69	16.60	16.85	16.92	16.75
22	16.27	16.16	16.56	16.75	16.77	16.72	16.68	16.69	16.60	16.85	16.92	16.74
23	16.24	16.18	16.57	16.74	16.77	16.72	16.66	16.67	16.62	16.87	16.91	16.75
24	16.23	16.20	16.57	16.75	16.78	16.71	16.67	16.65	16.62	16.89	16.89	16.77
25	16.23	16.21	16.58	16.76	16.78	16.72	16.66	16.66	16.63	16.89	16.89	16.76
26	16.23	16.22	16.61	16.75	16.77	16.70	16.65	16.65	16.66	16.90	16.88	16.76
27	16.22	16.23	16.64	16.77	16.77	16.70	16.64	16.64	16.66	16.90	16.89	16.78
28	16.21	16.24	16.63	16.76	16.79	16.69	16.63	16.64	16.66	16.90	16.87	16.76
29	16.21	16.26	16.65	16.76	---	16.67	16.64	16.63	16.66	16.90	16.87	16.74
30	16.20	16.30	16.69	16.76	---	16.68	16.65	16.64	16.66	16.91	16.89	16.76
31	16.20	---	16.69	16.76	---	16.67	---	16.65	---	16.92	16.89	---
MEAN	16.27	16.19	16.49	16.75	16.78	16.75	16.67	16.63	16.60	16.80	16.93	16.82
MAX	16.33	16.30	16.69	16.77	16.80	16.80	16.70	16.69	16.66	16.92	16.97	16.91
MIN	16.20	16.11	16.29	16.70	16.75	16.67	16.63	16.59	16.58	16.67	16.87	16.74



GROUND-WATER LEVELS
HAWAII, ISLAND OF KAUAI--Continued

215803159401201. Local number, 2-5840-01.

LOCATION.--Lat 21°58'03", long 159°40'12", Hydrologic Unit 20070000, 0.7 mi north of Waimea Recreational Pier State Park, and 2.4 mi east northeast of Oomano Point. Owner: Kauai County, Department of Water.

AQUIFER.--Waimea Canyon Basalt, Miocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 190 ft, 8-in. casing diameter, cased to 190 ft.

DATUM.--Elevation of land-surface datum is 168 ft. Measuring point is the top of 1-in. hole on pump base, 168.08 ft above mean sea level.

PERIOD OF RECORD.--

Water level: occasional measurements, 1973 to current year.

Water quality: occasional measurements, 1973 to current year.

REVISED RECORDS.--WDR HI-94-1: 1988-93 (the minimum water level for the period of record).

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.10 ft above mean sea level, January 26, 1989; lowest water level measured, 6.58 ft above mean sea level, July 19, 1990, lowest water level measured with pump on, 4.76 ft above mean sea level, December 8, 1980.

REMARKS.--Water used for public supply. Water level affected by pumping.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999											
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	8.73	NOV 24	8.66	FEB 3	8.82	APR 7	8.62	JUN 17	8.71	AUG 19	8.58

215857159430101. Local number, 2-5843-01.

LOCATION.--Lat 21°58'57", long 159°43'01", Hydrologic Unit 20070000, 2.7 mi east northeast from Kokole Point, and 1.4 mi north northwest of Oomano Point. Owner: Kauai County, Department of Water.

AQUIFER.--Waimea Canyon Basalt, Miocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 55 ft, 15-ft casing diameter, cased to 10 ft.

DATUM.--Elevation of land surface is 57 ft. Measuring point is the top of 1/4-in. steel plate 57.80 ft above mean sea level.

PERIOD OF RECORD.--

Water level: occasional measurements, 1972, 1985 to current year.

Water quality: occasional measurements, 1972, 1997 to current year.

REVISED RECORDS.--WDR HI-94-1: 1988-93 (the minimum water level for the period of record).

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 9.52 ft above mean sea level, February 5, 1990; lowest water level measured, 7.82 ft above mean sea level, April 25, 1988.

REMARKS.--Well used for public supply. Water level affected by pumping.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999											
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	8.76	NOV 24	8.78	FEB 3	8.88	APR 7	8.77	JUN 17	8.61	AUG 19	8.53

GROUND-WATER LEVELS
HAWAII, ISLAND OF KAUAI--Continued

215958159214301. Local number 2-5921-01.

LOCATION.--Lat 21°59'58", long 159°21'43 ", Hydrologic Unit 20070000, 1.0 mi west of Hanamaulu Beach Park, and 3.3 mi south southwest of Lydgate State Park. Owner: Kauai County, Department of Water.

AQUIFER.--Waimea Canyon Basalt, Miocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 540 ft, 14-in. casing diameter, cased to 315 ft.

DATUM.--Elevation of land-surface datum is 302 ft. Measuring point is the top of 1-in. pipe, northeast side of flange after removing the plug, elevation 302.66 above mean sea level.

PERIOD OF RECORD.--

Water level: occasional measurements, July 1980 to September 1985. Water-level recorder, October 1985 to July 1992. occasional measurements, October 1992 to current year.

Water quality: occasional measurements, 1997 to current year.

REVISED RECORDS.--WDR HI-94-1: 1988-93 (the minimum water level for the period of record).

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 17.69 ft above mean sea level, November 26, 1985; lowest water level measured, 9.41 ft above mean sea level, June 5, 1997.

REMARKS.--Water level affected by pumping.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	13.70	NOV 25	14.22	FEB 10	12.54	APR 8	12.83	JUN 16	13.68	AUG 19	13.32

215901159235201. Local number 2-5923-07.

LOCATION.--Lat 21°59'01", long 159°23'52 ", Hydrologic Unit 20070000, 4.2 mi northwest of Ninini Point and 3.4 mi west from Lihue Airport terminal. Owner: Kauai County, Department of Water.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 200 ft, 12-in. casing diameter, cased to 200 ft.

DATUM.--Elevation of land-surface datum is 364 ft. Measuring point is the top of 1-in. pump base opening, after removing copper fittings, 365.48 ft above mean sea level.

PERIOD OF RECORD.--

Water level: occasional measurements, 1985 to current year.

Water quality: occasional measurements, 1985 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 226.86 ft above mean sea level, December 8, 1989; lowest water level measured, 211.27 ft above mean sea level, August 18, 1999.

REMARKS.--Water used for public supply. Water level affected by pumping and by nearby well.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	214.40	NOV 25	213.34	FEB 10	215.88	APR 8	213.53	JUN 16	212.54	AUG 18	211.27

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI--Continued

215950159231601. Local number 2-5923-08.

LOCATION.--Lat 21°59'50", long 159°23'16 ", Hydrologic Unit 20070000, 1.5 mi northwest of Lihue, and 2.8 mi west of the nearest shoreline. Owner: U.S. Geological Survey.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled well, depth 1,002 ft, 12.75-in. solid steel outer casing: 0-124 ft; 4-in. solid pvc casing: 0-87 ft; 4-in. perforated pvc casing: 87 ft to bottom; annular space grouted: 0-124 ft; annular space gravel packed: 124 ft to bottom.

DATUM.--Elevation of land-surface datum is 272 ft. Measuring point is the top of 4-in. well casing, 273.49 ft above mean sea level.

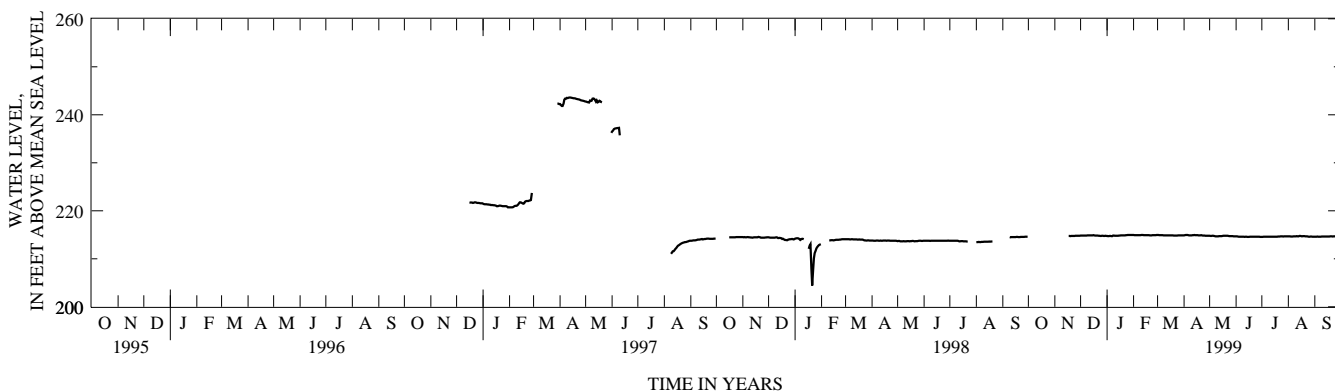
PERIOD OF RECORD.--Water-level recorder, February 1996 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 244.14 ft above mean sea level, April 10, 1997; lowest water level measured, 204.37 ft above mean sea level, January 20, 21, 1998.

REMARKS.--Well part of network of observation wells in cooperation with the County of Kauai Department of Water.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	214.84	214.75	214.94	214.96	214.90	214.81	214.69	214.56	214.70	214.58
2	---	---	214.84	214.72	214.92	214.94	214.92	214.77	214.67	214.57	214.69	214.58
3	---	---	214.84	214.73	214.91	214.93	214.95	214.78	214.64	214.58	214.67	214.61
4	---	---	214.83	214.76	214.91	214.93	214.95	214.80	214.61	214.58	214.65	214.63
5	---	---	214.83	214.74	214.91	214.93	214.94	214.79	214.62	214.58	214.64	214.61
6	---	---	214.83	214.71	214.91	214.93	214.93	214.75	214.61	214.59	214.65	214.59
7	---	---	214.84	214.71	214.92	214.93	214.90	214.72	214.59	214.60	214.69	214.60
8	---	---	214.85	214.85	214.92	214.89	214.88	214.70	214.59	214.60	214.68	214.61
9	---	---	214.86	214.83	214.91	214.89	214.87	214.67	214.60	214.61	214.68	214.64
10	---	---	214.87	214.81	214.96	214.89	214.89	214.67	214.58	214.60	214.70	214.64
11	---	---	214.87	214.81	214.98	214.89	214.91	214.68	214.57	214.59	214.71	214.65
12	---	---	214.87	214.81	214.95	214.86	214.93	214.72	214.59	214.61	214.70	214.65
13	---	---	214.87	214.82	214.93	214.86	214.94	214.72	214.58	214.62	214.70	214.65
14	---	---	214.88	214.81	214.92	214.88	214.93	214.71	214.57	214.61	214.74	214.65
15	---	---	214.89	214.83	214.92	214.88	214.91	214.71	214.56	214.60	214.75	214.65
16	---	---	214.91	214.85	214.93	214.88	214.92	214.75	214.57	214.62	214.73	214.64
17	---	214.76	214.90	214.86	214.93	214.87	214.91	214.81	214.58	214.62	214.70	214.64
18	---	214.75	214.85	214.86	214.93	214.88	214.90	214.80	214.58	214.61	214.71	214.65
19	---	214.73	214.83	214.86	214.93	214.87	214.89	214.79	214.59	214.62	214.73	214.67
20	---	214.74	214.83	214.86	214.90	214.85	214.89	214.80	214.59	214.64	214.72	214.67
21	---	214.76	214.83	214.87	214.90	214.84	214.91	214.81	214.59	214.64	214.69	214.67
22	---	214.76	214.81	214.89	214.90	214.84	214.90	214.79	214.58	214.64	214.68	214.65
23	---	214.77	214.80	214.92	214.91	214.85	214.85	214.75	214.59	214.67	214.70	214.66
24	---	214.78	214.78	214.93	214.93	214.85	214.83	214.73	214.60	214.69	214.65	214.68
25	---	214.79	214.77	214.95	214.93	214.86	214.83	214.72	214.59	214.67	214.62	214.68
26	---	214.79	214.79	214.94	214.93	214.87	214.82	214.72	214.59	214.65	214.62	214.69
27	---	214.80	214.82	214.96	214.93	214.88	214.82	214.71	214.60	214.67	214.63	214.71
28	---	214.82	214.78	214.97	214.95	214.88	214.81	214.71	214.58	214.68	214.63	214.69
29	---	214.81	214.76	214.97	---	214.87	214.80	214.69	214.57	214.66	214.61	214.66
30	---	214.82	214.79	214.97	---	214.88	214.82	214.68	214.57	214.67	214.61	214.67
31	---	---	214.78	214.95	---	214.89	---	214.67	---	214.68	214.59	---
MEAN	---	---	214.83	214.85	214.93	214.89	214.89	214.74	214.59	214.62	214.68	214.65
MAX	---	---	214.91	214.97	214.98	214.96	214.95	214.81	214.69	214.69	214.75	214.71
MIN	---	---	214.76	214.71	214.90	214.84	214.80	214.67	214.56	214.56	214.59	214.58



GROUND-WATER LEVELS
HAWAII, ISLAND OF KAUAI--Continued

215906159395601. Local number, 2-5939-01.

LOCATION.--Lat 21°59'06", long 159°39'56", Hydrologic Unit 20070000, 2.3 mi north northeast of Waimea Recreational Pier State Park, and 3.2 mi northeast from Oomano Point. Owner: Kauai County, Department of Water.

AQUIFER.--Waimea Canyon Basalt, Miocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 43 ft, 6.5-ft diameter, uncased.

DATUM.--Elevation of land surface is 42 ft. Measuring point is the top west side of concrete base 41.61 ft above mean sea level.

PERIOD OF RECORD.--

Water level: occasional measurements, 1972 to current year.

Water quality: occasional measurements, 1972 to current year.

REVISED RECORDS.--WDR HI-94-1: 1988-93 (the minimum water level for the period of record).

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 10.43 ft above mean sea level, January 14, 1988; lowest water level measured, 8.71 ft above mean sea level, March 9, 1981, lowest water level measured with pump on, 5.86 ft above mean sea level, May 7, 1975.

REMARKS.--Water is presently unused.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	9.43	NOV 24	9.70	FEB 3	9.99	MAR 26	9.55	JUN 18	9.27	AUG 9	9.32

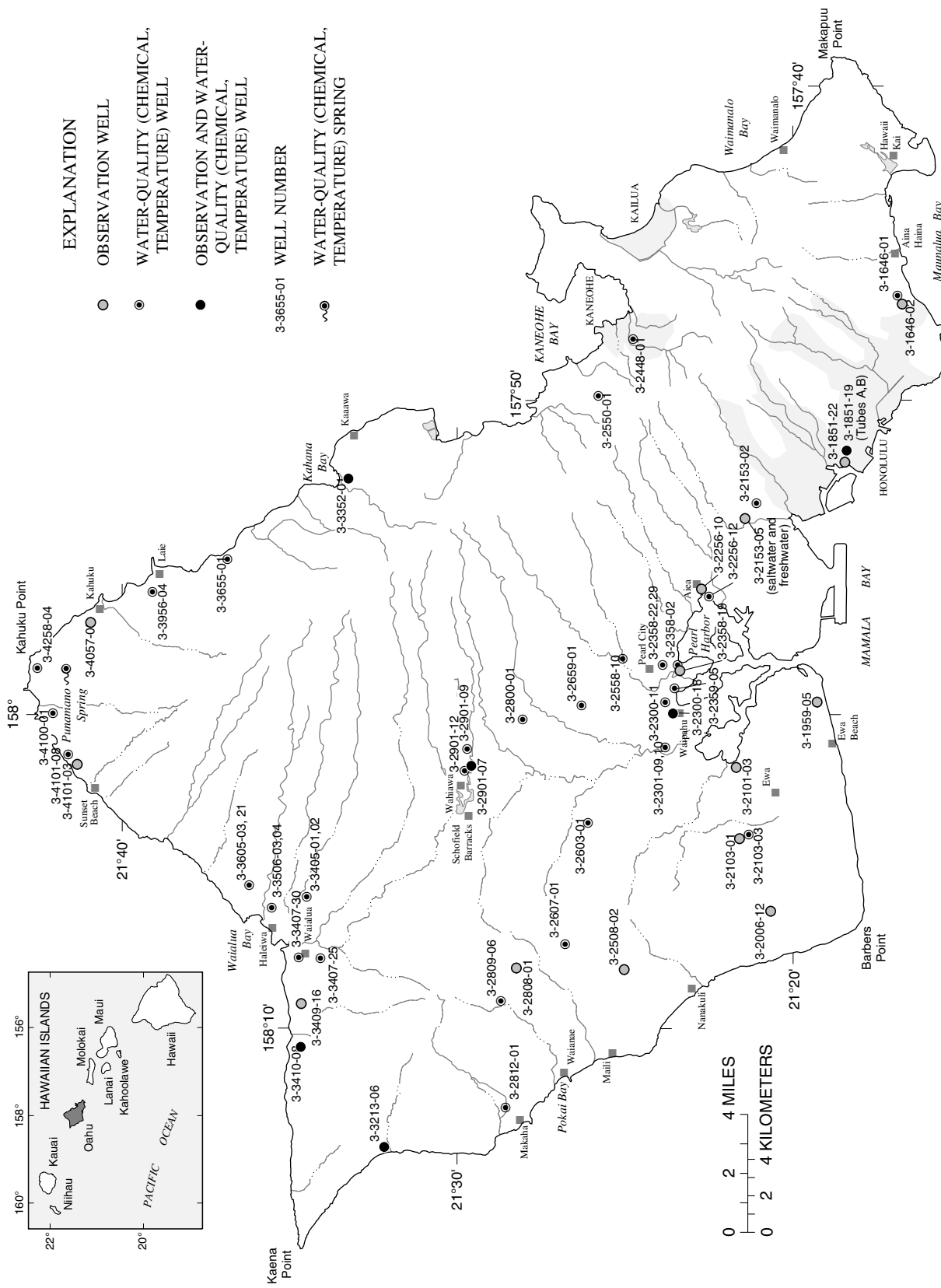


Figure 17. Locations of observation wells and ground-water quality sampling wells on Oahu.

GROUND-WATER LEVELS
HAWAII, ISLAND OF OAHU

211646157465202. Local number, 3-1646-02.

LOCATION.--Lat 21°16'46", long 157°46'52", Hydrologic Unit 20060000, at Waialae Golf Course. Owner: Bishop Estate.

AQUIFER.--Koolau Basalt, Pleistocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled well, depth 131 ft, 4-in. casing diameter, cased to 100 ft.

DATUM.--Elevation of land-surface datum is 16 ft. Measuring point is top of casing, 13.84 ft above mean sea level.

REMARKS.--Prior to October 1993, unpublished records in files of the USGS Hawaii district office.

PERIOD OF RECORD.--Occasional measurements, September 1972 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 8.63 ft above mean sea level, January 27, 1983; lowest measured, 7.00 ft above mean sea level, June 10, 1986, July 23, 1986.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 4	7.74	FEB 25	7.55	JUN 17	7.55	JUL 29	7.60	SEP 22	7.59

211832157515501. Local number, 3-1851-19 Tube A.

LOCATION.--Lat 21°18'32", long 157°51'55", Hydrologic Unit 20060000, corner of Richards and Halekauwila Streets, adjacent to Ala Moana Boulevard. Owner: Hawaiian Electric Company.

AQUIFER.--Koolau Basalt, Pleistocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled flowing artesian well, 1/2-in. galvanized pipe at 1,043 ft depth. Tube A is the pipe closer to Richards Street.

DATUM.--Elevation of land-surface datum is 6 ft. Measuring point is chiseled square inside of wooden cover of well, elevation 5.80 ft above mean sea level.

REMARKS.--Prior to October 1993, unpublished records in files of the USGS Hawaii district office. Water level affected by high salinity of water (see water-quality section).

PERIOD OF RECORD.--

Water level: occasional measurements, April 1969, March 1973 to current year.
Water quality: occasional measurements, 1973 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 20.16 ft above mean sea level, August 13, 1974; lowest measured, 5.53 ft above mean sea level, September 25, 1990.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 4	5.80	FEB 25	5.75	JUN 17	a--	AUG 2	a--	SEP 13	a--

a No flow, unable to read water level

GROUND-WATER LEVELS
HAWAII, ISLAND OF OAHU--Continued

211832157515502. Local number, 3-1851-19 Tube B.

LOCATION.--Lat 21°18'32", long 157°51'55", Hydrologic Unit 20060000, corner of Richards and Halekauwila Streets, adjacent to Ala Moana Boulevard. Owner: Hawaiian Electric Company.

AQUIFER.--Koolau Basalt, Pleistocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled flowing artesian well, 1/2-in. galvanized pipe at 988 ft depth. Tube B is the pipe furthest from Richards Street.

DATUM.--Elevation of land-surface datum is 6 ft. Measuring point is chiseled square inside of wooden cover of well, elevation 5.80 ft above mean sea level.

REMARKS.--Prior to October 1993, unpublished records in files of the USGS Hawaii district office. Water level affected by high salinity of water (see water-quality section).

PERIOD OF RECORD.--

Water level: occasional measurements, April 1969, March 1973 to current year.

Water quality: occasional measurements, 1973 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 26.16 ft above mean sea level, February 3, 1983; lowest measured, 13.08 ft above mean sea level, September 13, 1999.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999									
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 4	14.30	FEB 25	14.51	JUN 2	13.66	AUG 2	13.50	SEP 13	13.08

211828157515801. Local number, 3-1851-22.

LOCATION.--Lat 21°18'28", long 157°51'58", Hydrologic Unit 20060000, northeast corner of the mini-park at the intersection of Richards Street and Ala Moana Boulevard. Owner: State of Hawaii.

AQUIFER.--Koolau Basalt, Pleistocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled flowing artesian well, 3-in. PVC pipe casing, depth 1,142 ft, bottom 60 ft slotted.

DATUM.--Elevation of land-surface datum is 7 ft. Measuring point is northeast corner of manhole cover, 7.30 ft above mean sea level.

REMARKS.--Prior to October 1993, unpublished records in files of the USGS Hawaii district office.

PERIOD OF RECORD.--

Water level: water-level recorder, June 1983 to November 1986,

occasional measurements, December 1982 to current year.

Water quality: occasional measurements, 1982, 1987, 1998.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 22.74 ft above mean sea level, April 12, 1991; lowest measured, 15.37 ft, above mean sea level, September 24, 1999.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999									
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 4	16.08	FEB 25	16.43	JUN 2	15.86	AUG 2	15.81	SEP 24	15.37

GROUND-WATER LEVELS
HAWAII, ISLAND OF OAHU--Continued

211907157594701. Local number, 3-1959-05.

LOCATION.--Lat 21°19'06", long 157°59'46", Hydrologic Unit 20060000, 600 ft northwest of Ewa Beach Park, and 1.2 mi southeast of Campbell High School. Owner: National Oceanic and Atmospheric Administration (NOAA).

AQUIFER.--Koolau Basalt, Pleistocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 1,110 ft, 5-in. PVC casing, bottom 12 ft perforated.

DATUM.--Elevation of land-surface datum is 5 ft. Measuring point is top of 5-in. PVC casing, 6.40 ft above mean sea level.

REMARKS.--Geophysical log and water-quality records are available in files of USGS Hawaii district office.

PERIOD OF RECORD.--

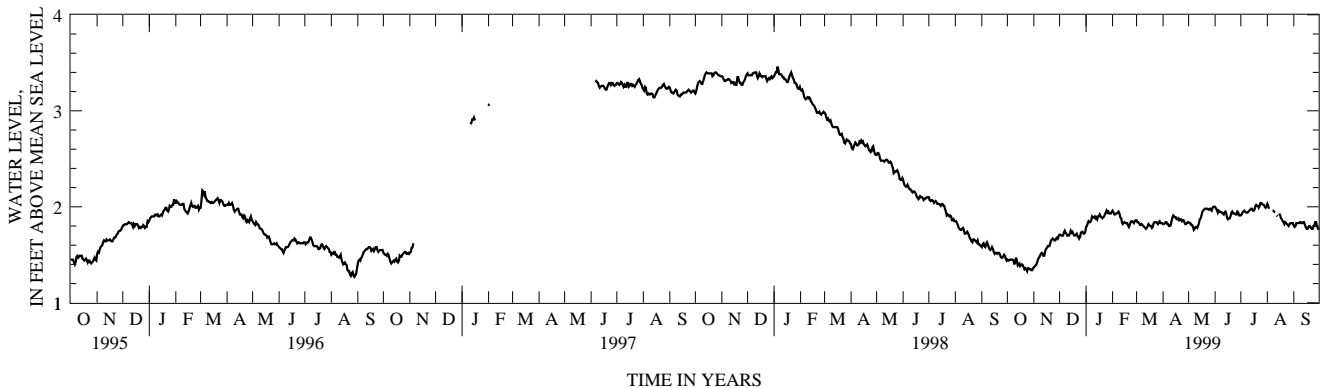
Water level: water-level recorder, December 1966 to January 1967, September 1968 to current year.
Water quality: occasional measurements, August 1965, November 1966, and December 1968.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.38 ft above mean sea level, January 17, 1969; lowest measured, 2.81 ft below mean sea level, August 25, 1977.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.45	1.37	1.71	1.79	1.96	1.86	1.82	1.84	2.00	1.91	2.03	1.80
2	1.44	1.38	1.71	1.80	1.94	1.84	1.82	1.83	1.98	1.92	2.01	1.79
3	1.44	1.39	1.70	1.83	1.92	1.84	1.83	1.83	1.97	1.94	1.98	1.80
4	1.45	1.40	1.70	1.85	1.92	1.83	1.84	1.81	1.94	1.95	---	1.83
5	1.45	1.43	1.70	1.84	1.93	1.81	1.84	1.81	1.96	1.96	---	1.83
6	1.45	1.46	1.73	1.84	1.93	1.81	1.82	1.79	1.95	1.95	---	1.83
7	1.45	1.47	1.75	1.86	1.94	1.82	1.82	1.76	1.95	1.94	1.96	1.83
8	1.44	1.49	1.73	1.90	1.95	1.81	1.80	1.77	1.94	1.94	1.96	1.84
9	1.40	1.51	1.72	1.89	1.93	1.80	1.80	1.79	1.94	1.94	1.95	1.84
10	1.43	1.52	1.70	1.89	1.89	1.79	1.81	1.79	1.93	1.95	1.94	1.83
11	1.47	1.51	1.70	1.90	1.88	1.78	1.85	1.78	1.92	1.96	---	1.83
12	1.44	1.49	1.70	1.88	1.84	1.77	1.89	1.80	1.94	1.97	1.91	1.84
13	1.39	1.49	1.72	1.89	1.82	1.78	1.91	1.83	1.95	1.98	1.90	1.84
14	1.40	1.53	1.75	1.87	1.83	1.80	1.90	1.87	1.93	1.98	---	1.81
15	1.41	1.56	1.73	1.90	1.84	1.82	1.89	1.88	1.88	1.96	1.93	1.79
16	1.38	1.57	1.74	1.90	1.83	1.81	1.89	1.91	1.87	1.96	1.91	1.77
17	1.39	1.59	1.72	1.92	1.83	1.80	1.87	1.95	1.88	1.97	1.88	1.77
18	1.40	1.59	1.70	1.90	1.83	1.80	1.87	1.96	1.88	2.01	1.87	1.79
19	1.39	1.59	1.70	1.89	1.81	1.78	1.88	1.97	1.90	2.02	1.85	1.80
20	1.37	1.62	1.71	1.88	1.79	1.79	1.86	1.98	1.94	2.01	1.84	1.80
21	1.35	1.65	1.72	1.89	1.81	1.83	1.87	1.98	1.95	2.01	1.82	1.78
22	1.36	1.66	1.69	1.90	1.84	1.84	1.87	1.98	1.93	1.99	1.84	1.77
23	1.35	1.67	1.69	1.92	1.85	1.84	1.85	1.98	1.93	2.01	1.83	1.77
24	1.33	1.66	1.67	1.94	1.85	1.84	1.86	1.97	1.93	2.04	1.82	1.80
25	1.36	1.65	1.69	1.96	1.84	1.83	1.86	1.97	1.92	2.04	1.81	1.80
26	1.36	1.65	1.73	1.94	1.83	1.82	1.84	1.98	1.92	2.03	1.80	1.84
27	1.35	1.67	1.74	1.95	1.85	1.84	1.82	1.97	1.95	2.02	1.82	1.84
28	1.35	1.68	1.74	1.93	1.86	1.85	1.82	1.96	1.94	2.02	1.83	1.80
29	1.34	1.67	1.72	1.93	---	1.83	1.83	1.99	1.91	2.00	1.83	1.78
30	1.34	1.70	1.72	1.93	---	1.83	1.84	2.00	1.91	1.99	1.83	1.76
31	1.36	---	1.74	1.95	---	1.83	---	2.00	---	2.00	1.83	---
MEAN	1.40	1.55	1.72	1.89	1.87	1.82	1.85	1.89	1.93	1.98	---	1.81
MAX	1.47	1.70	1.75	1.96	1.96	1.86	1.91	2.00	2.00	2.04	---	1.84
MIN	1.33	1.37	1.67	1.79	1.79	1.77	1.80	1.76	1.87	1.91	---	1.76

WTR YR 1999 MAX 2.19 ft on July 25; MIN 1.18 ft on October 20, November 2



GROUND-WATER LEVELS
HAWAII, ISLAND OF OAHU--Continued

212038158061501. Local number, 3-2006-12.

LOCATION.--Lat 21°20'38", long 158°06'15", Hydrologic Unit 20060000, 1.1 mi southwest of Makakilo Elementary School, 0.4 mi east of Honokai Hale, and 2.1 mi southeast of the Kahe Power Plant. Owner: Honolulu Board of Water Supply.

AQUIFER.--Waianae Volcanics, Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 150 ft, 6-in. casing, cased to 108 ft.

DATUM.--Elevation of land-surface datum is 138 ft. Measuring point is top of casing, 139.13 ft above mean sea level.

REMARKS.--Prior to October 1995, unpublished records are available in files of the USGS Hawaii district office.

PERIOD OF RECORD.--Water level: occasional measurements, March 1990 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 14.71 ft above mean sea level, February 18, 1992; lowest measured, 13.57 ft above mean sea level, May 20, 1994.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996									
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
APR 5	14.08	MAY 20	14.01	AUG 14	14.03				

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997									
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
FEB 3	14.33	JUN 19	14.21	SEP 12	14.37				

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1997 TO SEPTEMBER 1998									
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 16	14.26	MAR 13	14.03	MAY 28	13.95	AUG 6	13.84	SEP 23	13.99

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999									
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
FEB 18	13.95	MAY 25	13.91	AUG 3	13.80	SEP 17	13.93		

212154158015201. Local number, 3-2101-03.

LOCATION.--Lat 21°21'54", long 158°01'52", Hydrologic Unit 20060000, 0.4 mi southeast of Honouliuli, and 0.5 mi north of Ewa Hospital. Owner: State of Hawaii.

AQUIFER.--Koolau Basalt, Pleistocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled flowing artesian well, depth 355 ft, 6-in. PVC casing, cased to 165 ft. Well casing was modified in January 1958 and May 1982.

DATUM.--Elevation of land-surface datum is 15.38 ft. Measuring point is top of horizontal flange below petcock, 13.31 ft above mean sea level.

REMARKS.--Water-quality records for 1910-16, 1920-21, 1923-75, and 1978-81 are available in files of USGS Hawaii district office.

PERIOD OF RECORD.--Water level: occasional measurements, April 1910 to June 1921, September 1923 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 29.16 ft above mean sea level, April 1918; lowest observed, less than 11.32 ft above mean sea level (below petcock then in use), September 2, and October 19, 1977.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999									
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 2	16.85	FEB 22	17.33	JUN 4	17.42	AUG 3	17.48	SEP 1	17.26

GROUND-WATER LEVELS
HAWAII, ISLAND OF OAHU--Continued

212132158035701. Local number, 3-2103-01.

LOCATION.--Lat 21°21'32", long 158°03'57", Hydrologic Unit 20060000, 1 mi east of Makakilo, and 2 mi north of Barbers Point Naval Air Station. Owner: U.S. Navy.

AQUIFER.--Waianae Volcanics, Pliocene age.

WELL CHARACTERISTICS.--Drilled well, depth 206 ft, 6-in. casing diameter, cased to 17 ft.

DATUM.--Elevation of land-surface datum is 210 ft. Measuring point is top of 6-in. pipe, elevation 211.70 ft above mean sea level.

REMARKS.--Prior to October 1993, unpublished records in files of the USGS Hawaii district office.

PERIOD OF RECORD.--

Water level: water-level recorder, September 1966 to December 1971. Occasional measurements, August 1942 to December 1942, January 1953 to September 1967, September 1972 to current year.
Water quality: occasional measurements, 1942, 1953-68.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 18.81 ft above mean sea level, February 20, 1957; lowest measured, 14.25 ft above mean sea level, July 5, 1978, September 20, 1978.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
FEB 18	14.55	MAY 25	14.49	AUG 3	14.45	SEP 17	14.47

212133158035501. Local number, 3-2103-03.

LOCATION.--Lat 21°21'33", long 158°03'55", Hydrologic Unit 20060000, 1 mi east of Makakilo, and 2 mi north of Barbers Point Naval Air Station. Owner: U.S. Navy.

AQUIFER.--Waianae Volcanics, Pliocene age.

WELL CHARACTERISTICS.--Vertical dug shaft (6×12 ft), depth 163 ft, with three (6×15 ft) horizontal development tunnels (tunnel 1 is 200 ft long, tunnel 2 is 25 ft long, and tunnel 3 is 25 ft long) at an elevation of 5 ft above mean sea level.

DATUM.--Elevation of land-surface datum is 160 ft. Measuring point is top of concrete ledge under manhole, elevation 155.50 ft above mean sea level.

REMARKS.--Prior to October 1997, unpublished records in files of the USGS Hawaii district office.

PERIOD OF RECORD.--

Water level: occasional measurements, March 1952 to February 1953, March 1973 to current year.
Water quality: occasional measurements, May 1952 to June 1962, August 1966 to August 1968, March 1973 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 16.50 ft above mean sea level, December 8, 1982 and January 28, 1983; lowest measured, 14.25 ft above mean sea level, July 5 and September 20, 1978.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DATE	WATER LEVEL	DATE	WATER LEVEL
FEB 3	15.27	SEP 12	15.25

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1997 TO SEPTEMBER 1998

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 16	15.21	MAR 3	14.91	MAY 28	14.76	AUG 6	14.55

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
FEB 18	14.51	AUG 3	14.42	SEP 17	14.48

GROUND-WATER LEVELS
HAWAII, ISLAND OF OAHU--Continued

212106157533701. Local number, 3-2153-02.

LOCATION.--Lat 21°21'06", long 157°53'37", Hydrologic Unit 20060000, in Pineapple Place near Moanalua School. Owner: Damon Estate.

AQUIFER.--Koolau Basalt, Pleistocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled artesian well, depth 289 ft, 10-in. casing, cased to 79 ft.

DATUM.--Elevation of land-surface datum is 20 ft. Measuring point is top of 3/4-in. pipe on casing about 15 ft streamward from small pump house and elevation is 20.78 ft above mean sea level.

REMARKS.--Prior to March 1993, unpublished records in files of the USGS Hawaii district office.

PERIOD OF RECORD.--

Water level: occasional measurements, April 1910 to March 1974, December 1977 to March 1993, and June 1999 to current year.

Water quality: occasional measurements, April 1910 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 31.88 ft above mean sea level, April 1917; lowest measured, 16.39 ft above mean sea level, September 19, 1978.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JUN 2	18.37	JUL 29	18.20	SEP 13	17.96

212117157534601. Local number, 3-2153-08.

LOCATION.--Lat 21°21'17", long 157°53'46", Hydrologic Unit 20060000, 1,300 ft northwest of junction of H-1 freeway and Puuloa Road, and 0.5 mi south of Tripler Army Hospital. Owner: U.S. Army.

AQUIFER.--Koolau Basalt, Pleistocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled well, depth 306 ft, 16-in. casing diameter, cased to 57 ft.

DATUM.--Elevation of land-surface datum is 28 ft. Measuring point is top of 3/4-in. copper overflow pipe at base of pump, 33.16 ft above mean sea level.

REMARKS.--Prior to May 1998, unpublished records in files of the USGS Hawaii district office.

PERIOD OF RECORD.--Occasional measurements, April 1945 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 23.79 ft above mean sea level, April 21, 1969; lowest measured, 17.44 ft above mean sea level, October 1, 1998.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	17.44	DEC 2	17.91	MAR 31	18.23	JUN 3	18.24	AUG 3	18.05
NOV 2	17.45	FEB 5	18.33	MAY 11	17.89	JUL 1	17.99	SEP 3	17.75

GROUND-WATER LEVELS
HAWAII, ISLAND OF OAHU--Continued

212238157561101. Local number, 3-2256-10.

LOCATION.--Lat 21°22'38", long 157°56'11", Hydrologic Unit 20060000, 0.4 mi southwest of Aiea School, and 0.5 mi east of McGrew Point.
Owner: U.S. Navy.

AQUIFER.--Koolau Basalt, Pleistocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled flowing artesian well, depth 173 ft, 12-in. casing diameter, cased to 143 ft.

DATUM.--Elevation of land-surface datum is 10 ft. Measuring point is top of 10-in. stilling pipe for water-level recorder, 26.15 ft above mean sea level.

REMARKS.--Water-quality records for 1923, 1928-30, 1934-68, 1972, 1974-75 are available in files of USGS Hawaii district office.

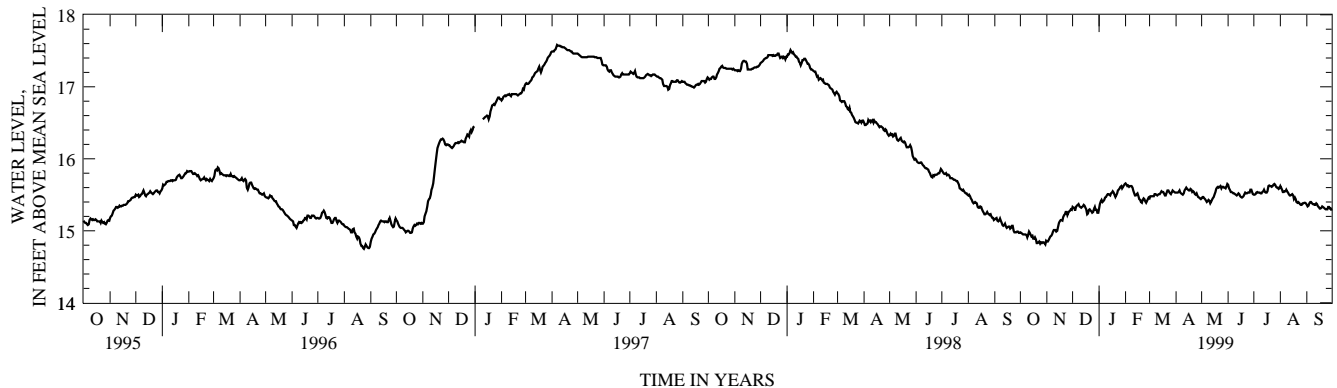
PERIOD OF RECORD.--Water level: occasional measurements, January 1928 to February 1931, September 1934 to August 1966. Water-level recorder, September 1966 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 25.90 ft above mean sea level, January 16, 1928; lowest measured, 12.97 ft above mean sea level, October 5, 1978.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14.98	14.85	15.33	15.31	15.66	15.45	15.53	15.45	15.64	15.50	15.62	15.36
2	14.97	14.85	15.32	15.37	15.64	15.48	15.53	15.47	15.59	15.50	15.60	15.34
3	14.96	14.87	15.32	15.41	15.62	15.48	15.53	15.47	15.57	15.51	15.57	15.35
4	14.95	14.90	15.28	15.43	15.63	15.48	15.54	15.45	15.54	15.53	15.54	15.38
5	14.95	14.92	15.33	15.40	15.61	15.48	15.56	15.44	15.54	15.54	15.54	15.40
6	14.95	14.93	15.35	15.41	15.62	15.48	15.53	15.42	15.53	15.53	15.55	15.40
7	14.95	14.95	15.36	15.43	15.62	15.51	15.52	15.40	15.52	15.53	15.55	15.38
8	14.94	14.99	15.37	15.46	15.62	15.51	15.51	15.41	15.52	15.53	15.57	15.37
9	14.91	15.01	15.34	15.47	15.60	15.50	15.50	15.43	15.51	15.52	15.55	15.37
10	14.95	15.01	15.33	15.49	15.56	15.49	15.52	15.42	15.50	15.52	15.53	15.36
11	14.99	15.01	15.32	15.51	15.52	15.50	15.56	15.38	15.49	15.54	15.51	15.36
12	14.97	14.99	15.33	15.51	15.49	15.51	15.58	15.40	15.50	15.55	15.49	15.38
13	14.94	15.00	15.34	15.50	15.49	15.51	15.60	15.43	15.52	15.57	15.49	15.37
14	14.92	15.05	15.36	15.49	15.51	15.53	15.58	15.45	15.51	15.54	15.50	15.34
15	14.93	15.11	15.35	15.52	15.52	15.55	15.57	15.47	15.48	15.53	15.51	15.33
16	14.89	15.13	15.32	15.53	15.48	15.54	15.56	15.50	15.47	15.53	15.49	15.31
17	14.89	15.15	15.30	15.55	15.44	15.54	15.56	15.54	15.46	15.55	15.44	15.31
18	14.91	15.15	15.23	15.53	15.43	15.52	15.58	15.58	15.47	15.62	15.46	15.32
19	14.88	15.14	15.24	15.50	15.40	15.49	15.57	15.60	15.48	15.63	15.44	15.34
20	14.83	15.19	15.29	15.47	15.39	15.49	15.54	15.61	15.51	15.62	15.40	15.33
21	14.83	15.22	15.30	15.49	15.43	15.53	15.55	15.60	15.53	15.62	15.39	15.32
22	14.84	15.23	15.28	15.52	15.45	15.56	15.54	15.61	15.52	15.61	15.40	15.31
23	14.85	15.26	15.27	15.56	15.44	15.56	15.51	15.62	15.52	15.62	15.39	15.30
24	14.82	15.26	15.25	15.57	15.41	15.54	15.50	15.59	15.53	15.64	15.37	15.30
25	14.84	15.22	15.26	15.59	15.39	15.52	15.52	15.61	15.53	15.65	15.36	15.30
26	14.83	15.25	15.30	15.61	15.41	15.51	15.49	15.61	15.53	15.64	15.36	15.33
27	14.84	15.27	15.33	15.62	15.44	15.53	15.47	15.60	15.57	15.61	15.38	15.33
28	14.84	15.28	15.29	15.59	15.46	15.56	15.46	15.60	15.57	15.60	15.38	15.31
29	14.83	15.30	15.29	15.61	---	15.55	15.45	15.59	15.54	15.60	15.39	15.31
30	14.81	15.29	15.25	15.63	---	15.54	15.44	15.61	15.51	15.58	15.39	15.28
31	14.86	---	15.25	15.65	---	15.53	---	15.65	---	15.59	15.38	---
MEAN	14.90	15.09	15.31	15.51	15.51	15.52	15.53	15.52	15.52	15.57	15.47	15.34
MAX	14.99	15.30	15.37	15.65	15.66	15.56	15.60	15.65	15.64	15.65	15.62	15.40
MIN	14.81	14.85	15.23	15.31	15.39	15.45	15.44	15.38	15.46	15.50	15.36	15.28

WTR YR 1999 MEAN 15.40 MAX 15.70, February 1; MIN 14.78, October 21-22, 24-25, 30



GROUND-WATER LEVELS
HAWAII, ISLAND OF OAHU--Continued

212238157561102. Local number, 3-2256-12.

LOCATION.--Lat 21°22'38", long 157°56'11", Hydrologic Unit 20060000, 0.4 mi southwest of Aiea School, and 0.5 mi east of McGrew Point.
Owner: U.S. Navy.

AQUIFER.--Koolau Basalt, Pleistocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled flowing artesian well, depth 182 ft, 12-in. casing diameter, cased to 139 ft.

DATUM.--Elevation of land-surface datum is 9 ft. Measuring point is corner of concrete base next to faucet, 13.18 ft above mean sea level.

REMARKS.--Prior to October 1996, unpublished water-level records are available in files of USGS Hawaii district office.

PERIOD OF RECORD.--

Water level: occasional measurements, January 1928 to December 1931, 1934, 1946-47, 1966, November 1973 to current year.

Water quality: occasional measurements, January 1928 to November 1929, 1930-31, 1934, 1947, December 1966, September 1972 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 26.07 ft above mean sea level, January 16, 1928; lowest measured, 13.15 ft above mean sea level, September 18, 1978.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 19	14.84	DEC 2	15.31	FEB 5	15.58	JUN 4	15.39	JUL 29	15.63	SEP 13	15.33

212340158001901. Local number, 3-2300-18.

LOCATION.--Lat 21°23'40", long 158°00'19", Hydrologic Unit 20060000, 700 ft south of August Ahrens School, and 1,400 ft northeast of L'Orange Park, Waipahu. Owner: Honolulu Board of Water Supply.

AQUIFER.--Koolau Basalt, Pleistocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 1,090 ft, 12-in. casing diameter, cased to 38 ft. Well was deepened May 1980 and modified February 1984. Prior to May 1980, well depth 205 ft.

DATUM.--Elevation of land-surface datum is 26 ft. Measuring point is top of casing, 27.73 ft above mean sea level.

PERIOD OF RECORD.--

Water level: water-level recorder, August 1970 to July 1983, March 1984 to November 1987.

Occasional measurements, October 1987 to current year.

Water quality: occasional measurements, 1930, 1942-45, 1947-49, 1951-54, 1968, 1983, 1985-86, 1991, 1994 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 22.40 ft above mean sea level, January 4, 1983; lowest measured, 14.01 ft above mean sea level, September 14, 1985.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 2	17.29	FEB 24	17.42	JUN 2	17.57	AUG 3	17.62	SEP 13	17.42

GROUND-WATER LEVELS
HAWAII, ISLAND OF OAHU--Continued

212318157583401. Local number, 3-2358-19.

LOCATION.--Lat 21°23'18", long 157°58'34", Hydrologic Unit 20060000, 0.3 mi southwest of Lehua Elementary School, and 0.7 mi south of Pearl City Elementary School. Owner: U.S. Navy.

AQUIFER.--Koolau Basalt, Pleistocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled flowing artesian well, depth 172 ft, 17-in. casing diameter, cased to 112 ft.

DATUM.--Elevation of land-surface datum is 13.30 ft. Measuring point is 1-in. square chiseled on concrete base wall, northeast corner, elevation is 13.30 ft above mean sea level.

REMARKS.--Prior to October 1995, unpublished records are available in files of USGS Hawaii district office.

PERIOD OF RECORD.--

Water level: occasional measurements, September 1972, November 1973 to December 1988, and March 3, 1993 to current year.
Water quality: occasional measurements, 1944, 1946, 1954, 1956-58, 1972-80.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 18.68 ft above mean sea level, December 7, 1982; lowest measured, 12.30 ft above mean sea level, September 18, 1978.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 2	14.36	FEB 25	14.48	JUN 2	14.64	JUL 29	14.76	SEP 13	14.49

212614157594301. Local number, 3-2659-01.

LOCATION.--Lat 21°26'14", long 157°59'43", Hydrologic Unit 20060000, 2.3 mi southeast of Kipapa School and 0.5 mi southwest of entrance to Mililani Memorial Park Cemetery. Owner: State of Hawaii.

AQUIFER.--Koolau Basalt, Pleistocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 1,790 ft, 9-in. casing, cased to 424 ft.

DATUM.--Elevation of land-surface datum is 412 ft. Measuring point is top of casing, elevation is 412.98 ft above mean sea level.

REMARKS.--Prior to October 1995, unpublished records in files of the USGS Hawaii district office.

PERIOD OF RECORD.--Water level: occasional measurements, October 1986 to April 1987, March 1990 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 23.74 ft above mean sea level, March 5, 1990; lowest measured, 17.23 ft above mean sea level, October 3, 1986.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
FEB 24	19.30	JUN 4	19.66	JUL 29	19.68	SEP 24	19.48

GROUND-WATER LEVELS
HAWAII, ISLAND OF OAHU--Continued

212813158080201. Local number, 3-2808-01.

LOCATION.--Lat 21°28'13", long 158°08'04", Hydrologic Unit 20060000, inside Lualualei Naval Ammunition Depot, 1,000 ft west from the intersection of Kolekole Road and Radford Street, at Building 492, and 3.3 mi north from the entrance of the depot. Owner: U.S. Navy.

AQUIFER.--Waianae Volcanics, Pliocene age.

WELL CHARACTERISTICS.--Depth 535 ft, cased to 179 ft, 12-in.-diameter steel casing to 179 ft, then 3-in. to 535 ft.

DATUM.--Elevation of land-surface datum is 435 ft. Measuring point is on pump 2 ft above base. Remove 1/2-in. nipple, elevation 437.45 ft above mean sea level.

REMARKS.--Prior to October 1993, unpublished records in files of the USGS Hawaii district office.

PERIOD OF RECORD.--

Water level: occasional measurements, June 1956 to December 1957, June 1973 to December 1984, August 1988 to current year.

Water quality: occasional measurements, October 1956 to December 1957, February 1972 to August 1988.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 441.81 ft above mean sea level, February 28, 1983; lowest measured, 420.78 ft above mean sea level, October 24, 1978.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
FEB 18	429.63	MAY 25	429.20	AUG 3	428.58	SEP 17	427.72

GROUND-WATER LEVELS
HAWAII, ISLAND OF OAHU--Continued

212927158014801. Local number, 3-2901-07.

LOCATION.--Lat 21°29'27", long 158°01'48", Hydrologic Unit 20060000, across the main gate of Wheeler Air Force Base, and 1,200 ft south of Wahiawa bridge on Kaukonohua Stream. Owner: U.S. Army.

AQUIFER.--Koolau Basalt, Pleistocene to Pliocene age.

WELL CHARACTERISTICS.--Dug high-level water-table well, size 8 ft x 8 ft, length of 30-degree inclined shaft 1,148 ft.

DATUM.--Elevation of land-surface datum is 850 ft (revised). Measuring point is top of pump chamber floor at recorder, 287.00 ft above mean sea level (revised).

PERIOD OF RECORD.--

Water level: water-level recorder, November 1938 to current year.

Water quality: occasional measurements, 1966-72, 1975 to current year.

EXTREMES FOR PERIOD OF RECORD (Non-pumping values).--Highest water level measured, 284.40 ft above mean sea level, May 12, 1969; lowest measured, 270.82 ft (revised) above mean sea level, May 1, 1985.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
MAXIMUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	274.99	274.54	273.85	274.51	274.41	274.34	274.45	274.34	--	--	274.22	273.97
10	274.67	274.61	274.42	274.41	273.83	274.34	274.30	274.14	--	--	273.50	273.46
15	274.65	274.56	274.46	274.42	274.34	274.40	274.32	274.35	--	--	273.69	273.39
20	274.57	274.47	274.41	273.87	274.34	274.33	274.35	274.41	--	--	274.07	274.02
25	274.41	274.52	274.42	274.41	274.46	274.30	274.34	274.34	--	--	273.40	273.89
EOM	274.63	274.58	274.48	274.46	274.37	274.31	274.37	274.39	--	a--	273.99	273.22

NON-PUMPING VALUES

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	274.99	DEC 2	274.59	FEB 1	274.54	APR 5	274.45	MAY 4	274.54	JUN 1	274.56
NOV 2	274.70	JAN 4	274.65	MAR 1	274.50	MAY 3	274.47	MAY 16	274.60	JUL 1	274.42

a No record June 4 to August 4, 1999, recorder stopped

Note: Water levels are measured after all pumps in the pump chamber are turned off for 2 hours

GROUND-WATER LEVELS
HAWAII, ISLAND OF OAHU--Continued

213224158135901. Local number, 3-3213-06.

LOCATION.--Lat 21°32'24", long 158°13'59", Hydrologic Unit 20060000, along Farrington Highway, 1.2 mi north of Makua Cave, and 1 mi southeast of Yokohama Bay. Owner: U.S. Air Force.

AQUIFER.--Waianae Volcanics, Pliocene age.

WELL CHARACTERISTICS.--Drilled well, depth 50 ft, cased to 21 ft with 6-in. black steel pipe.

DATUM.--Elevation of land-surface datum is 26 ft. Measuring point is top of 6-in. casing, elevation is 26.47 ft above mean sea level.

REMARKS.--Prior to October 1993, unpublished records in files of the USGS Hawaii district office.

PERIOD OF RECORD.--

Water level: occasional measurements, October 1972 to current year.

Water quality: occasional measurements, 1965, 1967, February 1972 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 7.92 ft above mean sea level, January 2, 1975; lowest measured, 6.49 ft above mean sea level, July 15, 1976.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999											
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
FEB 18	6.89	APR 12	6.77	MAY 25	6.69	JUL 1	6.66	AUG 3	6.77	SEP 13	6.87

213327157524401. Local number, 3-3352-01.

LOCATION.--Lat 21°33'27", long 157°52'43", Hydrologic Unit 20060000, at mouth of Kahana Valley, and 700 ft southwest of Kamehameha Highway, Kahana. Owner: State of Hawaii.

AQUIFER.--Koolau Basalt, Pleistocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled flowing artesian well, depth 441 ft, 10-in. casing diameter, cased to 177 ft.

DATUM.--Elevation of land-surface datum is 6 ft. Measuring point is top of "T", 7.31 ft above mean sea level.

PERIOD OF RECORD.--

Water level: occasional measurements, April 1935 to 1990, 1992 to current year.

Water quality: occasional measurements, 1935 to 1991, 1994 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 21.3 ft above mean sea level, March 29, 1966; lowest measured, 12.17 ft above mean sea level, October 4, 1984.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999							
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
FEB 1	12.74	MAY 26	12.61	JUL 30	12.39	SEP 10	12.23

GROUND-WATER LEVELS
HAWAII, ISLAND OF OAHU--Continued

213438158091101. Local number, 3-3409-16.

LOCATION.--Lat 21°34'36", long 158°09'12", Hydrologic Unit 20060000, 1.6 mi west of Waialua High School, 2.6 mi east of Mokuleia Beach Park along Farrington Highway. Owner: J. Mendonca.

AQUIFER.--Waianae Volcanics, Pliocene age.

WELL CHARACTERISTICS.--Drilled flowing artesian well, depth 518 ft, cased to 440 ft, diameter 10-in. to 396 ft, 8-in. to 440 ft.

DATUM.--Elevation of land-surface datum is 8 ft. Measuring point is chiseled 1-1/2-in. square on concrete, 3.7 ft in front of door of well shelter, elevation is 8.48 ft above mean sea level.

REMARKS.--Prior to October 1993, unpublished records in files of the USGS Hawaii district office.

PERIOD OF RECORD.--

Water level: occasional measurements, December 1924 to current year.
Water quality: occasional measurements, 1924-84.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 21.3 ft above mean sea level, January 16, 1969; lowest measured, 16.75 ft above mean sea level, August 6, 1929.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
FEB 17	17.93	MAY 24	17.69	JUL 29	17.52	SEP 22	17.64

213446158104901. Local number, 3-3410-08.

LOCATION.--Lat 21°34'46", long 158°10'49", Hydrologic Unit 20060000, 0.5 mi east of Dillingham Airfield, and 1.1 mi southeast of Mokuleia Beach Park. Owner: Waialua Sugar Company, Inc.

AQUIFER.--Waianae Volcanics, Pliocene age.

WELL CHARACTERISTICS.--Drilled flowing artesian well, depth 447 ft, 1-in. casing diameter, cased to 410 ft, perforated from 410 to 447 ft.

DATUM.--Elevation of land-surface datum is 12 ft. Measuring point is top of recorder shelf over 12-in. stilling well, 20.53 ft above mean sea level.

REMARKS.--Prior to October 1993, unpublished records in files of the USGS Hawaii district office.

PERIOD OF RECORD.--

Water level: water-level recorder, January 1963 to February 1972. Occasional measurements, January 1929 to December 1962, March 1972 to current year.
Water quality: occasional measurements, 1929 to 1985, 1989 to 1991, 1994 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 19.98 ft above mean sea level, January 5, 1969; lowest measured, 16.08 ft above mean sea level, August 6, 1929.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
FEB 17	18.29	MAY 24	18.10	JUL 29	17.98	SEP 22	17.89

GROUND-WATER LEVELS
HAWAII, ISLAND OF OAHU--Continued

214053157570401. Local number, 3-4057-05.

LOCATION.--Lat 21°40'53", long 157°57'04", Hydrologic Unit 20060000, 0.4 mi northeast of Kahuku Hospital, and 500 ft north of Kahuku High School.
AQUIFER.--Koolau Basalt, Pleistocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled flowing artesian well, depth 397 ft, 12-in. metal casing, cased to 172 ft.

DATUM.--Elevation of land-surface datum is 9 ft. Measuring point is top of 10-in. standpipe, elevation is 16.01 ft above mean sea level.

REMARKS.--Prior to October 1993, unpublished records in files of the USGS Hawaii district office.

PERIOD OF RECORD.--

Water level: water-level recorder, August 1958 to December 1990. Occasional measurements, March 1911 to May 1918, March 1921, January 1926 to August 1958, December 1990 to current year.
Water quality: occasional measurements, 1908, 1911-16, 1924-78.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 17.12 ft above mean sea level, January 1916; lowest measured, 8.00 ft above mean sea level, October 5, 1962.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JAN 29	12.35	MAY 26	12.16	JUL 30	11.94	SEP 10	11.99

214125158013401. Local number, 3-4101-03.

LOCATION.--Lat 21°41'25", long 158°01'34", Hydrologic Unit 20060000, 1,500 ft northeast of University of Hawaii agriculture experiment station in Waialeale, and 1.9 mi northeast of Sunset Beach. Owner: State of Hawaii.

AQUIFER.--Koolau Basalt, Pleistocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled artesian well, depth 61 ft, 8-in. casing diameter, cased to 36 ft.

DATUM.--Elevation of land-surface datum is 22 ft. Measuring point is top of 4-in. pipe, 21.89 ft above mean sea level.

REMARKS.--Water-quality records for 1929-74 are available in files of USGS Hawaii district office.

PERIOD OF RECORD.--Occasional measurements, February 1929 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 15.60 ft above mean sea level, November 14, 1932; lowest measured, 10.97 ft above mean sea level, July 1, 1977.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JAN 29	13.81	MAY 26	13.01	JUL 30	12.73	SEP 10	12.84

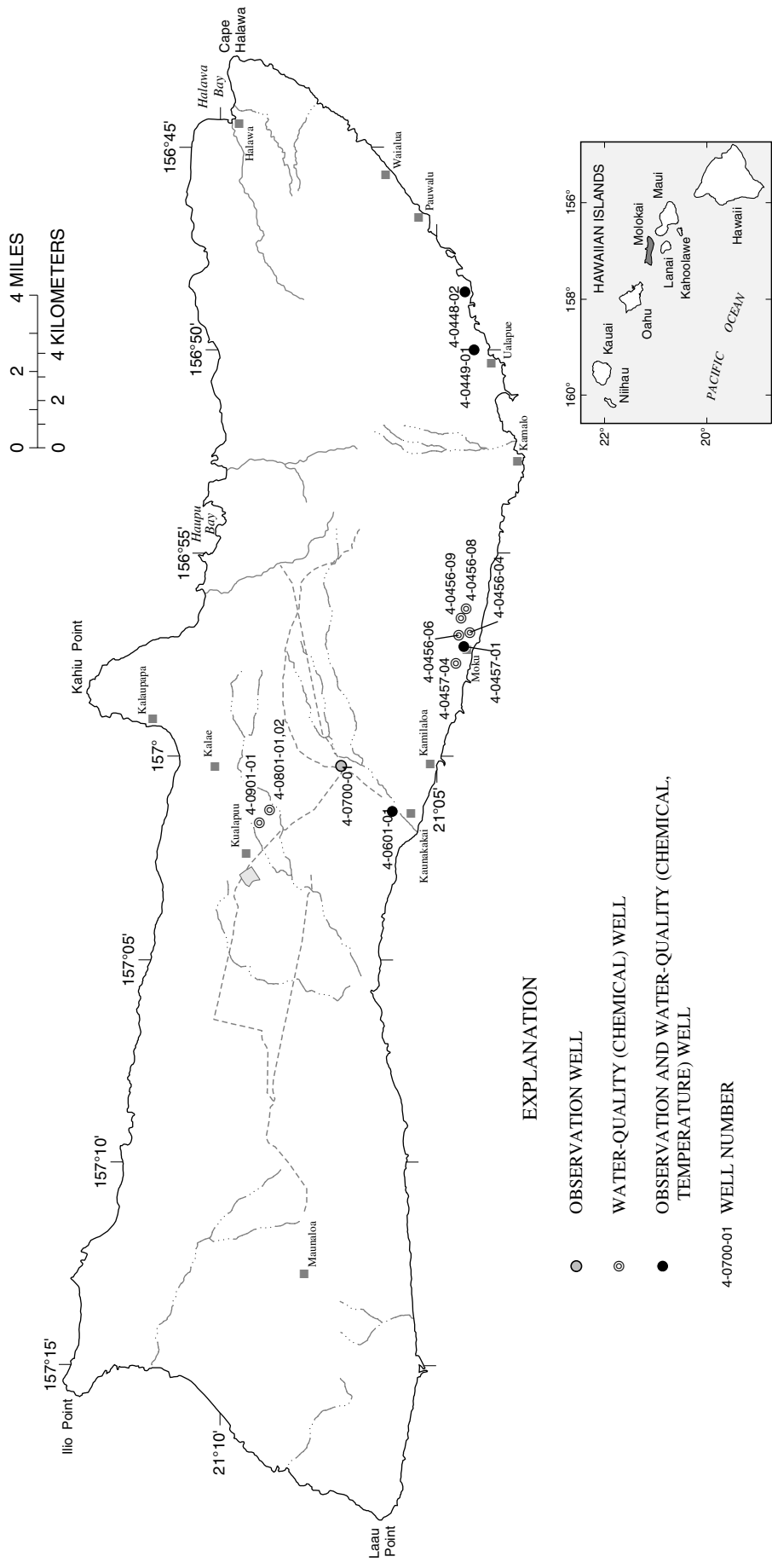


Figure 18. Locations of observation wells and ground-water quality sampling wells on Molokai.

GROUND-WATER LEVELS
HAWAII, ISLAND OF MOLOKAI

210425156483001. Local number, 4-0448-02.

LOCATION.--Lat 21°04'25", long 156°48'30 ", Hydrologic Unit 20050000, 100 ft north of Highway 45, and 0.8 mi west of Pukoo. Owner: P. Friel.

AQUIFER.--East Molokai Volcanics, Pliocene age.

WELL CHARACTERISTICS.--Dug basal water-table well, size 4 ft x 6 ft, depth 21 ft.

DATUM.--Elevation of land-surface datum is 19 ft. Measuring point is top of 2 in. x 2 in. steel plate bolted to top of concrete wall of well, 21.23 ft above mean sea level.

PERIOD OF RECORD.--

Water level: water-level recorder, August 1970 to January 1973. Occasional measurements, February 1973 to current year.
Water quality: occasional measurements, 1970-73, 1993 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 6.11 ft above mean sea level, November 26, 1970; lowest measured, 3.67 ft above mean sea level, February 8, 1977.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 16	4.05	DEC 14	4.33	FEB 1	4.31	APR 20	4.23	JUL 20	4.10

210402156495801. Local number, 4-0449-01.

LOCATION.--Lat 21°04'02", long 156°49'58 ", Hydrologic Unit 20050000, 1,800 ft north of Ualapue Fishpond, and 0.5 mi northeast of Kilohana School. Owner: County of Maui.

AQUIFER.--East Molokai Volcanics, Pliocene age.

WELL CHARACTERISTICS.--Dug basal water-table well, size 4 ft x 6 ft, depth 42 ft, lined with concrete to 42 ft; two infiltration tunnels, total length 214 ft.

DATUM.--Elevation of land-surface datum is 42 ft. Measuring point is top of steel plate, 42.42 ft above mean sea level.

REMARKS.--Water from this well is used for public supply; water level affected by pumping.

PERIOD OF RECORD.--

Water level: occasional measurements, 1938-39, 1941-63, November 1972 to current year.
Water quality: occasional measurements, 1948, 1952-56, 1970-91, 1993 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 6.05 ft above mean sea level, January 19, 1950; lowest measured, 2.09 ft above mean sea level, September 16, 1975.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 16	3.10	DEC 14	3.25	FEB 1	3.27	APR 20	3.22	JUL 21	2.99

GROUND-WATER LEVELS

HAWAII, ISLAND OF MOLOKAI--Continued

210419156570501. Local number, 4-0457-01.

LOCATION.--Lat 21°04'19", long 156°57'05", Hydrologic Unit 20050000, 0.5 mi northwest of Kakahaia Fishpond, and 0.5 mi northeast of Moku. Owner: County of Maui.

AQUIFER.--East Molokai Volcanics, Pliocene age.

WELL CHARACTERISTICS.--Dug basal water-table well, size 4 ft x 4 ft, depth 38 ft, lined with concrete to 38 ft; two infiltration tunnels, total length 229 ft.

DATUM.--Elevation of land-surface datum is 38 ft. Measuring point is top of steel plate, 37.36 ft, above mean sea level.

REMARKS.--Water from this well is used for public supply. Water level measured after pump has been turned off for 30 minutes.

PERIOD OF RECORD.--

Water level: occasional measurements, June 1947 to November 1960, January 1962 to February 1963, November 1972 to current year.

Water quality: occasional measurements, 1948, 1954-56, 1960, 1962, 1971, 1973-91, 1993 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.78 ft above mean sea level, February 5, 1991; lowest measured, 1.47 ft above mean sea level, June 24, 1955.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 16	1.88	DEC 14	2.20	FEB 1	2.22	APR 20	1.83

210605157012001. Local number, 4-0601-01.

LOCATION.--Lat 21°06'01", long 157°01'11", Hydrologic Unit 20050000, 0.6 mi north of Kaunakakai School, and 0.9 mi east of Kalaniana'ole Colony. Owner: Molokai Ranch.

AQUIFER.--East Molokai Volcanics, Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 59 ft, 12-in. casing diameter, cased to 20 ft.

DATUM.--Elevation of land-surface datum is 51 ft. Measuring point is top of 15-in. surface casing, 51.95 ft above mean sea level.

PERIOD OF RECORD.--

Water level: occasional measurements, May 1954 to current year.

Water quality: occasional measurements, 1954 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.30 ft above mean sea level, January 20, 1969; lowest measured, 1.60 ft above mean sea level, December 5, 1964.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 15	2.63	DEC 14	2.50	FEB 1	2.59	APR 20	2.51	JUL 20	2.57

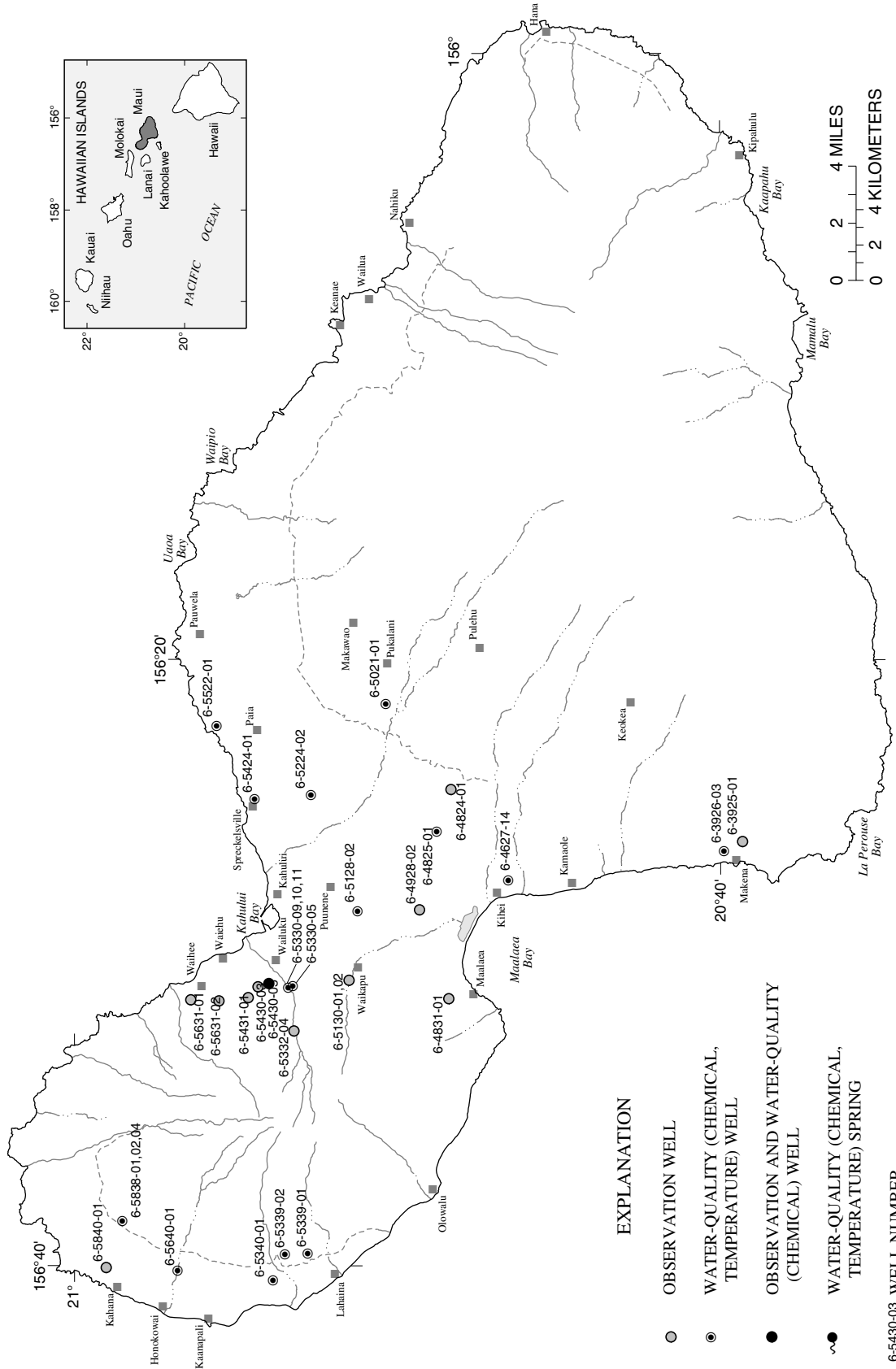


Figure 19. Locations of observation wells and ground-water quality sampling wells on Maui.

GROUND-WATER LEVELS
HAWAII, ISLAND OF MAUI

203912156255901. Local number, 6-3925-01.

LOCATION.--Lat 20°39'12", long 156°25'59"; Hydrologic Unit 20020000, 0.8 mi east of Keawalai Church, and 0.9 mi southeast of intersection of Kihei and Makena Roads. Owner: State of Hawaii.

AQUIFER.--Hana Volcanics, Pleistocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 382 ft, 8-in. casing diameter, cased to 343 ft, perforated from 343 to 363 ft.

DATUM.--Elevation of land-surface datum is 351 ft. Measuring point is top of 2-in. pipe attached to the casing cover, 352.29 ft above mean sea level.

REMARKS.--Water-quality records for 1964 are available in files of district office.

PERIOD OF RECORD.--Occasional measurements, August 1964, June 1972 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.47 ft above mean sea level, August 24, 1964; lowest measured, 0.41 ft below mean sea level, May 4, 1977.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 17	-0.04	JUN 22	-0.09	AUG 10	-0.34

204827156242201. Local number, 6-4824-01.

LOCATION.--Lat 20°48'27", long 156°24'22", Hydrologic Unit 20020000, on Waiakoa Road 1,000 ft south of intersection with Kalaloe Gulch, and 4 mi east of Kihei. Owner: State of Hawaii.

AQUIFER.--Kula Volcanics, Pleistocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 646 ft, 12-in. casing diameter, cased to 598 ft, screened from 598 to 638 ft.

DATUM.--Elevation of land-surface datum is 593 ft. Measuring point is top of 3-in. pipe attached to the steel casing cover, 594.74 ft above mean sea level.

REMARKS.--Water-quality records for 1971, 1973 are available in files of district office.

PERIOD OF RECORD.--Occasional measurements, March 1971, May 1972 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.20 ft above mean sea level, January 17, 1974; lowest measured, 3.65 ft above mean sea level, January 27, 1977.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 4	4.04	FEB 9	4.31	MAY 25	4.03	JUL 30	3.82

GROUND-WATER LEVELS
HAWAII, ISLAND OF MAUI--Continued

204818156310301. Local number, 6-4831-01.

LOCATION.--Lat 20°48'18", long 156°31'03", Hydrologic Unit 20020000, on sugar plantation road 0.7 mi north of Maalaea, and 0.9 mi southwest of intersection of Honoapiilani Highway and Kihei Road. Owner: State of Hawaii.

AQUIFER.--Wailuku Basalt, Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 219 ft, 8-in. casing diameter, cased to 187 ft.

DATUM.--Elevation of land-surface datum is 166 ft. Measuring point is top of 8-in. casing, 166.60 ft above mean sea level.

REMARKS.--Water-quality records for 1965-67 are available in files of district office.

PERIOD OF RECORD.--Water-level recorder, January to July 1974. Occasional measurements, September 1972 to December 1973, August 1974 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.76 ft above mean sea level, November 30, 1983; lowest measured, 4.74 ft above mean sea level, March 16, 1977.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 25	4.98	FEB 8	5.02	JUN 9	4.81	AUG 4	4.84

204909156281401. Local number, 6-4928-02.

LOCATION.--Lat 20°49'09", long 156°28'14", Hydrologic Unit 20020000, at Puunene Airport on Mokulele Highway 2.3 mi north of intersection with Kihei Road, Kihei. Owner: Hawaiian Commercial and Sugar Co.

AQUIFER.--Honomanu Basalt, Pliocene age.

WELL CHARACTERISTICS.--Dug basal water-table well, 6 ft x 9 ft vertical shaft, depth 52 ft.

DATUM.--Elevation of land-surface datum is 50 ft. Measuring point is top of angle iron at well, 50.08 ft above mean sea level.

REMARKS.--Water-quality records for 1973 are available in files of district office.

PERIOD OF RECORD.--Water-level recorder, March 1972 to September 1984. Occasional measurements, October 1984 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.09 ft above mean sea level, January 12, 1980; lowest measured, 3.05 ft above mean sea level, March 5, 6, 1977.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 17	3.80	FEB 8	3.80	JUN 22	3.43	AUG 10	3.46

GROUND-WATER LEVELS
HAWAII, ISLAND OF MAUI--Continued

205140156304501. Local number, 6-5130-01.

LOCATION.--Lat 20°51'40", long 156°30'45", Hydrologic Unit 20020000, 0.5 mi northwest of Waikapu, and 1.0 mi southeast of Wailuku Heights. Owner: State of Hawaii.

AQUIFER.--Wailuku Basalt, Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water table well, depth 757 ft, 8-in. casing diameter, cased to 569 ft, perforated from 569 to 609 ft.

DATUM.--Elevation of land-surface datum is 551 ft. Measuring point is top of 6-in. pipe coupling, 551.33 ft above mean sea level.

PERIOD OF RECORD.--Occasional measurements, June 1974 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 30.90 ft above mean sea level, October 13, 1982; lowest measured, 11.36 ft above mean sea level, January 27, 1976.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 1	12.82	MAR 9	12.35	MAY 19	11.65	AUG 24	12.04
JAN 5	13.62	MAR 30	12.31	JUL 2	11.68		

205154156303801. Local number, 6-5130-02.

LOCATION.--Lat 20°51'54", long 156°30'38", Hydrologic Unit 20020000, 0.6 mi northwest of Waikapu, and 1.0 mi southeast of Wailuku Heights. Owner: State of Hawaii.

AQUIFER.--Wailuku Basalt, Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 1,020 ft, 20-in. casing diameter, cased to 520 ft, perforated from 520 to 570 ft.

DATUM.--Elevation of land-surface datum is 518 ft. Measuring point is top of casing, 519.33 ft above mean sea level.

REMARKS.--Water-quality records for 1974 are available in files of district office.

PERIOD OF RECORD.--Water-level recorder, August 1983 to September 1984. Occasional measurements, October 1984 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 15.03 ft above mean sea level, July 15, 1987; lowest measured, 11.76 ft above mean sea level, July 2, 1999.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 1	12.06	MAR 9	12.21	MAY 19	12.08	AUG 24	12.11
JAN 5	12.38	MAR 30	12.23	JUL 2	11.76		

GROUND-WATER LEVELS
HAWAII, ISLAND OF MAUI--Continued

205305156304401. Local number, 6-5330-05.

LOCATION.--Lat 20°53'05", long 156°30'44", Hydrologic Unit 20020000, 1,500 ft southwest of Wailuku Elementary School, 1,500 ft southeast of Maui DWS water tank near intersection of Wailuku Heights Road and Iao Valley Road.

AQUIFER.--Wailuku Basalt, Pleistocene age.

WELL CHARACTERISTICS.--Three drilled wells in vault, at bottom of excavated inclined shaft. Vault floor about 32 ft above mean sea level, well nearest inclined shaft is measured. Depth 310 ft below vault floor, casing length unknown.

DATUM.--Elevation of land-surface datum is 401.51 ft. Datum of vault floor is 32.14 ft. Measuring point is the edge of steel plate, inside access hole cut through pump base casing, at cement floor level, 32.17 ft above mean sea level.

PERIOD OF RECORD.--Occasional measurements, February 1996 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 16.33 ft above mean sea level, April 22, 1997; lowest measured, 9.21 ft above mean sea level, October 21, 1996.

REMARKS.--Water level affected by pumping of adjacent well in shaft, and by other nearby wells.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
FEB 29	11.21	APR 2	11.55	JUN 10	10.71	JUL 22	10.14	SEPT 9	9.55

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 21	9.21	JAN 30	15.09	APR 22	16.33	JUN 12	16.35	SEPT 25	11.57
DEC 2	9.60	MAR 20	15.98	APR 24	16.28	AUG 12	15.68		

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1997 TO SEPTEMBER 1998

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 17	11.05	FEB 24	11.05	JUN 19	10.44	AUG 11	10.51	SEPT 29	10.46
JAN 7	11.22	APR 3	10.68						

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 1	10.33	MAR 5	11.05	MAY 18	10.29	JUL 1	9.55	AUG 26	13.19
JAN 5	10.83	MAR 30	10.85						

GROUND-WATER LEVELS
HAWAII, ISLAND OF MAUI--Continued

205329156305502. Local number, 6-5330-09.

LOCATION.--Lat 20°53'29", long 156°30'55", Hydrologic Unit 20020000, 05 mi northwest of Wailuku and 0.6 mi west on Mokuhau Road from Market Street. Owner: State of Hawaii.

AQUIFER.--Wailuku Basalt, Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water table well. Depth 600 ft, 18-in. casing diameter, length of casing 411 ft.

DATUM.--Elevation of land-surface datum is 354 ft. Measuring point is top of 1 1/2-in. plug, 353.79 ft above mean sea level.

PERIOD OF RECORD.--Chloride samples collected since 1972. Pump removed sometime in 1998 (Sept., Oct., Nov.). Water-level measurements began December 1, 1998.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 12.04 ft above mean sea level, March 5, 1999; lowest measured, 3.88 ft above mean sea level, August 24, 1999.

REMARKS.--Water level affected by pumping of nearby well.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 1	11.16	MAR 5	12.03	MAY 18	10.34	JUL 30	4.69	AUG 24	3.88
JAN 5	12.04	MAR 30	11.50	JUL 1	4.75	JUL 30	4.62		

205312156321402. Local number, 6-5332-04.

LOCATION.--Lat 20°53'12", long 156°32'14", Hydrologic Unit 20020000, 1.9 mi southwest of Puuohala Village, 1.9 mi west of Wailuku Elementary School, and 10 ft from well 6-5332-04. Owner: State of Hawaii.

AQUIFER.--Wailuku Basalt, Pliocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 254 ft.

DATUM.--Elevation of land-surface datum is 713 ft. Measuring point is top of 2-in. PVC pipe.

PERIOD OF RECORD.--Occasional measurements, October 1991 to current year. Prior to October 1995, unpublished records are in the files of the U.S. Geological Survey.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 39.41 ft below land-surface datum, July 1, 1996; lowest measured, 80.60 ft below land-surface datum, February 12, 1996.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 1	61.80	MAR 9	48.35	MAY 18	51.95	AUG 24	78.80
JAN 5	42.75	MAR 30	64.72	JUL 1	72.97		

GROUND-WATER LEVELS
HAWAII, ISLAND OF MAUI--Continued

205419156304401. Local number, 6-5430-03.

LOCATION.--Lat 20°54'19", long 156°30'44", Hydrologic Unit 20020000, 2,000 ft north of Puuohala Village, and 0.5 mi northwest of Wailuku Sugar Mill reservoir. Owner: Wailuku Sugar Co.

AQUIFER.--Wailuku Basalt, Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 580 ft, 1.5-in. PVC casing, cased to 400 ft, perforated from 400 to 580 ft.

DATUM.--Elevation of land-surface datum is 415 ft. Measuring point is top of 1-in. galvanized pipe, 416.75 ft above mean sea level.

PERIOD OF RECORD.--Water-level recorder, August 1982 to February 1984. Occasional measurements, March 1984 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 22.09 ft above mean sea level, December 31, 1982; lowest measured, 9.27 ft above mean sea level, August 24, 1998.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 1	12.34	MAR 9	12.97	MAY 18	11.35	AUG 24	9.27
JAN 5	12.88	MAR 30	12.55	JUL 1	10.32		

GROUND-WATER LEVELS
HAWAII, ISLAND OF MAUI--Continued

205405156305401. Local number, 6-5430-05.

LOCATION.--Lat 20°54'59", long 156°30'54", Hydrologic Unit 20020000, 1.0 mi southwest of intersection of Malaihi Road and Highway 33, and 1.2 mi south of Waihee. Owner: State of Hawaii.

AQUIFER.--Wailuku Basalt, Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 1,400 ft, 10-in. casing diameter, cased to 400 ft.

DATUM.--Elevation of land-surface datum is 380 ft. Measuring point is top of 10-in. casing, 380.84 ft above mean sea level.

PERIOD OF RECORD.--

Water level: occasional measurements, August 1983 to May 1986. Water-level recorder, June 1986 to current year.

Water quality: 1982, 1985 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 18.20 ft above mean sea level, December 14, 1989; lowest measured, 7.71 ft above mean sea level, September 28, 29, 1999.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e10.34	10.31	10.60	10.82	11.31	11.22	10.68	9.97	9.47	9.14	8.90	8.09
2	e10.35	10.32	10.63	10.91	11.30	11.20	10.62	9.94	9.50	9.07	8.86	8.08
3	e10.36	10.31	10.62	10.97	11.31	11.16	10.57	9.93	9.46	9.11	8.72	8.07
4	e10.37	10.32	10.65	11.03	11.33	11.14	10.58	9.93	9.48	9.10	8.61	8.07
5	e10.41	10.31	10.66	11.06	11.29	11.18	10.55	10.01	9.42	8.95	8.52	8.07
6	e10.38	10.32	10.57	11.01	11.30	11.14	10.50	10.03	9.38	e8.94	8.53	8.00
7	e10.36	10.33	10.57	11.04	11.32	11.16	10.44	9.93	9.35	9.03	8.59	8.02
8	10.29	10.34	10.63	11.10	11.25	11.11	10.40	9.93	9.41	9.04	8.60	8.02
9	10.33	10.37	10.68	11.14	11.25	11.05	10.36	9.95	9.49	9.00	8.60	8.02
10	10.37	10.33	10.73	11.20	11.23	11.08	10.36	9.95	9.48	9.02	8.45	7.97
11	10.37	10.34	10.71	11.26	11.22	11.06	10.33	9.96	9.37	9.03	8.38	8.01
12	10.37	10.41	10.65	11.27	11.20	11.04	10.34	9.94	9.34	9.00	8.37	8.01
13	10.38	10.46	10.66	11.27	11.18	11.00	10.31	9.81	9.31	9.01	8.35	8.01
14	10.42	10.49	10.71	11.25	11.13	10.96	10.29	9.71	9.33	9.01	8.35	7.94
15	10.44	10.52	10.73	11.24	11.07	10.91	10.27	9.63	9.44	9.00	8.39	7.94
16	10.42	10.56	10.80	11.21	11.07	10.88	10.23	9.62	9.45	8.99	8.33	7.89
17	10.43	10.58	10.81	11.21	11.04	10.86	10.21	9.67	9.39	8.95	8.29	7.88
18	10.44	10.62	10.74	11.18	11.08	10.78	10.21	9.71	9.36	8.96	8.27	7.92
19	10.43	10.61	10.68	11.17	11.07	10.70	10.17	9.68	9.39	8.98	8.24	7.89
20	10.43	10.55	10.67	11.21	11.05	10.67	10.15	9.65	9.39	8.99	8.20	7.93
21	10.42	10.51	10.68	11.17	11.09	10.65	10.17	9.59	9.33	9.00	8.20	7.92
22	10.43	10.49	10.69	11.19	11.19	10.63	10.14	9.54	9.23	8.95	8.21	7.89
23	10.41	10.49	10.67	11.17	11.23	10.60	10.12	9.51	e9.25	8.97	8.25	7.88
24	10.41	10.51	10.68	11.16	11.23	10.56	10.11	9.56	9.28	8.95	8.23	7.81
25	10.44	10.57	10.66	11.18	11.25	10.58	10.11	9.57	9.22	8.99	8.16	7.83
26	10.45	10.55	10.68	11.18	11.20	10.66	10.08	9.57	9.16	8.99	8.17	7.82
27	10.36	10.57	10.68	11.24	11.20	10.69	10.06	9.54	9.14	8.93	8.16	7.77
28	10.36	10.57	10.64	11.25	11.26	10.71	10.03	9.48	9.12	8.97	8.12	7.75
29	10.33	10.57	10.69	11.25	---	e10.70	10.02	9.45	9.09	8.94	8.14	7.79
30	10.31	10.59	10.66	11.27	---	10.70	10.00	9.42	9.13	8.91	8.11	7.81
31	10.28	---	10.70	11.28	---	10.69	---	9.42	---	8.91	8.11	---
MEAN	10.38	10.46	10.68	11.16	11.20	10.89	10.28	9.73	9.34	8.99	8.37	7.94
MAX	10.45	10.62	10.81	11.28	11.33	11.22	10.68	10.03	9.50	9.14	8.90	8.09
MIN	10.28	10.31	10.57	10.82	11.04	10.56	10.00	9.42	9.09	8.91	8.11	7.75

e Estimated

GROUND-WATER LEVELS
HAWAII, ISLAND OF MAUI--Continued

205437156310501. Local number, 6-5431-01.

LOCATION.--Lat 20°54'37", long 156°31'05", Hydrologic Unit 20020000, 0.5 mi southwest of Waiehu Village, and 1.4 mi southwest of intersection of Malaihi Road and Kahekili Highway. Owner: Wailuku Sugar Co.

AQUIFER.--Wailuku Basalt, Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 555 ft, 1.5-in. PVC casing, cased to 515 ft, perforated from 515 to 555 ft.

DATUM.--Elevation of land-surface datum is 493 ft. Measuring point is top of 1.5-in. PVC casing, 492.51 ft above mean sea level.

PERIOD OF RECORD.--Water-level recorder, August 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 19.52 ft above mean sea level, January 2, 1983; lowest measured, 6.88 ft above mean sea level, August 25, 1999.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.70	9.76	10.20	10.45	11.00	10.89	10.24	9.41	---	---	---	7.07
2	9.73	9.78	10.24	10.56	10.98	10.87	10.16	9.38	---	---	---	7.10
3	9.74	9.79	10.23	10.63	11.00	10.81	10.10	9.37	---	---	---	7.13
4	9.77	9.79	10.24	10.69	11.02	10.80	10.12	9.36	---	---	---	7.18
5	9.79	9.78	10.23	10.65	10.98	10.87	10.08	9.47	---	---	---	7.22
6	9.76	9.80	10.12	10.62	10.97	10.84	10.02	9.49	---	---	---	7.20
7	9.77	9.82	10.12	10.64	11.00	10.86	9.94	9.35	---	---	---	7.28
8	9.67	9.82	10.18	10.73	10.92	10.79	9.89	9.37	---	---	---	7.26
9	9.74	9.88	10.26	10.81	10.94	10.70	9.84	9.40	---	---	---	7.25
10	9.80	9.82	10.34	10.88	10.91	10.77	9.86	9.40	---	---	---	7.24
11	9.81	9.83	10.30	10.95	10.93	10.72	9.83	9.41	---	---	7.11	7.33
12	9.81	9.93	10.21	10.93	10.89	10.72	9.85	9.38	---	---	7.18	7.34
13	9.84	9.97	10.22	10.92	10.88	10.64	9.81	9.19	---	---	7.14	7.35
14	9.87	10.03	10.27	10.90	10.80	10.57	9.79	9.04	---	---	7.14	7.29
15	9.91	10.06	10.30	10.88	10.74	10.49	9.76	8.94	---	---	7.15	7.33
16	9.88	10.09	10.40	10.84	10.71	10.47	9.68	8.95	---	---	7.08	7.22
17	9.87	10.12	10.39	10.85	10.69	10.42	9.69	9.03	---	---	7.03	7.25
18	9.90	10.18	10.29	10.82	10.76	10.30	9.70	---	---	---	7.02	7.31
19	9.87	10.14	10.22	10.82	10.74	10.21	9.64	---	---	---	7.01	7.30
20	9.87	10.08	10.19	10.85	10.74	10.19	9.62	---	---	---	6.98	7.37
21	9.88	10.01	10.21	10.82	10.79	10.15	9.65	---	---	---	7.02	7.37
22	9.90	10.01	10.23	10.85	10.90	10.13	9.61	---	---	---	7.06	7.32
23	9.86	10.01	10.20	10.81	10.94	10.09	9.60	---	---	---	7.09	7.34
24	9.86	10.07	10.23	10.81	10.93	10.04	9.59	---	---	---	7.05	7.29
25	9.92	10.15	10.21	10.83	10.94	10.11	9.59	---	---	---	6.95	7.36
26	9.91	10.12	10.24	10.85	10.88	10.19	9.55	---	---	---	7.00	7.35
27	9.80	10.14	10.25	10.93	10.90	10.24	9.53	---	---	---	6.99	7.30
28	9.79	10.16	10.19	10.93	10.94	10.26	9.50	---	---	---	6.98	7.27
29	9.76	10.17	10.27	10.93	---	10.26	9.48	---	---	---	7.04	7.32
30	9.73	10.18	10.22	10.95	---	10.24	9.45	---	---	---	6.99	7.20
31	9.73	---	10.29	10.98	---	10.25	---	---	---	---	7.01	---
MEAN	9.81	9.98	10.24	10.81	10.89	10.48	9.77	---	---	---	---	7.27
MAX	9.92	10.18	10.40	10.98	11.02	10.89	10.24	---	---	---	---	7.37
MIN	9.67	9.76	10.12	10.45	10.69	10.04	9.45	---	---	---	---	7.07

CAL YR 1998 MEAN 10.06 MAX 10.88 MIN 9.06

GROUND-WATER LEVELS
HAWAII, ISLAND OF MAUI--Continued

205617156311101. Local number, 6-5631-01.

LOCATION.--Lat 20°56'17", long 156°31'11", Hydrologic Unit 20020000, 2,000 ft southwest of Waihee Farm, and 1.3 mi northwest of Waiehu Golf Course. Owner: Wailuku Sugar Co.

AQUIFER.--Wailuku Basalt, Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 300 ft, 1.5-in. PVC casing, cased to 260 ft, perforated from 260 to 300 ft.

DATUM.--Elevation of land-surface datum is 248 ft. Measuring point is top of 1.5-in. PVC pipe, 248.05 ft above mean sea level.

PERIOD OF RECORD.--Water-level recorder, August 1982 to September 1984. Occasional measurements, October 1984 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 18.83 ft above mean sea level, December 6, 1982; lowest measured, 11.40 ft above mean sea level, August 24, 1998.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 1	12.73	MAR 5	12.96	MAY 18	12.33	AUG 24	11.40
JAN 5	12.83	MAR 30	12.77	JUL 1	11.93		

GROUND-WATER LEVELS
HAWAII, ISLAND OF MAUI--Continued

205651156313201. Local number, 6-5631-02.

LOCATION.--Lat 20°56'51", long 156°31'32", Hydrologic Unit 20020000, 0.9 mi northwest of Waihee School, and 0.9 mi upstream from mouth of Waihee river. Owner: Hawaiian Investments.

AQUIFER.--Wailuku Basalt, Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 387 ft, 16-in. casing diameter, cased to 290 ft, perforated from 290 to 310 ft.

DATUM.--Elevation of land-surface datum is 281 ft. Measuring point is top of 16-in. casing, 285.23 ft above mean sea level (revised November 1997).

PERIOD OF RECORD.--Water-level recorder, April 1988 to January 29, 1997. Recorder removed due to installation of pump in the well. Water-level recorder reinstalled November 1997 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 12.05 ft above mean sea level, October 22, November 2, 10, 11, 1989; lowest water level measured, 7.59 ft above mean sea level, November 8, 9, 1996. Lowest water level measured after pumping resumed, 5.38 ft above mean sea level, June 22, 1999.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.68	6.54	6.50	7.60	7.93	7.71	6.82	6.65	6.98	5.90	5.70	5.57
2	6.68	6.54	6.52	8.01	7.78	7.50	6.85	6.64	7.11	6.05	5.69	5.57
3	6.69	6.56	6.53	7.65	7.93	7.64	6.85	6.59	7.66	5.88	5.69	5.56
4	6.69	6.59	e6.57	7.71	7.82	7.36	6.85	6.62	8.14	5.86	5.69	5.57
5	6.72	6.66	6.61	7.63	7.84	7.63	6.92	6.61	8.29	6.22	5.68	5.56
6	6.72	6.71	6.62	7.65	7.71	7.60	6.87	6.60	8.32	6.13	5.69	5.60
7	6.72	6.60	6.63	7.64	7.82	7.50	6.87	6.59	7.99	5.83	6.01	5.56
8	6.73	6.61	6.63	7.87	7.73	7.55	7.04	6.57	7.21	5.80	5.70	5.58
9	6.67	6.61	6.61	7.71	7.78	7.65	6.82	6.56	6.26	6.31	5.66	5.56
10	6.64	6.62	6.57	7.76	7.63	7.45	6.81	6.55	6.65	5.80	5.82	5.60
11	6.66	6.62	6.62	7.64	7.79	7.64	6.81	6.91	8.19	5.79	5.85	5.56
12	6.65	6.66	6.84	7.73	7.69	7.46	6.80	7.26	8.19	6.05	5.65	5.57
13	6.64	6.65	6.61	7.65	7.79	8.17	6.79	8.07	8.22	5.78	5.67	5.55
14	6.62	6.58	6.63	7.76	7.63	8.88	6.77	8.51	7.11	5.77	5.63	5.65
15	6.64	6.59	7.03	7.63	7.66	8.92	7.98	8.55	6.21	5.76	5.64	5.57
16	6.64	6.60	7.15	7.78	7.65	8.94	8.33	8.58	6.14	5.77	5.61	5.54
17	6.65	6.67	7.48	7.67	7.67	8.95	7.37	8.59	7.09	5.84	5.62	5.55
18	6.66	6.69	7.32	7.75	7.70	8.95	7.29	8.53	6.55	5.74	5.61	e5.52
19	6.65	6.75	7.79	7.65	8.20	8.96	7.25	8.48	6.09	5.74	5.61	5.51
20	6.64	6.83	7.43	7.71	7.55	8.97	7.48	8.47	6.05	5.93	5.61	5.52
21	6.64	6.73	7.36	7.66	7.88	8.98	7.31	8.48	6.93	5.72	5.59	5.49
22	6.71	6.82	7.31	7.90	7.74	8.93	7.13	8.54	6.76	5.72	5.60	5.51
23	6.61	6.64	7.37	7.66	7.78	9.02	7.32	7.53	6.90	5.70	5.59	5.50
24	6.61	6.53	7.34	7.92	7.63	8.92	7.41	7.15	6.77	5.97	5.57	5.50
25	6.58	6.50	7.51	7.76	7.75	8.30	7.31	7.06	6.89	5.70	5.63	5.52
26	6.60	6.50	7.46	8.14	7.62	7.55	7.04	7.04	6.75	5.69	5.55	5.50
27	6.58	6.50	7.33	7.68	7.68	7.81	7.30	6.94	6.86	6.09	5.58	5.50
28	6.54	6.50	7.40	7.96	7.86	7.69	6.66	7.00	6.69	5.69	5.57	5.49
29	6.55	6.48	7.84	7.58	---	7.79	6.66	6.93	6.36	5.69	5.56	5.47
30	6.55	6.48	7.44	7.91	---	7.53	6.66	7.00	6.03	5.69	5.58	5.51
31	6.53	---	7.76	7.72	---	6.95	---	6.88	---	5.68	5.57	---
MEAN	6.64	6.61	7.06	7.74	7.76	8.09	7.08	7.37	7.05	5.85	5.65	5.54
MAX	6.73	6.83	7.84	8.14	8.20	9.02	8.33	8.59	8.32	6.31	6.01	5.65
MIN	6.53	6.48	6.50	7.58	7.55	6.95	6.66	6.55	6.03	5.68	5.55	5.47

WTR YR 1999 MEAN 6.87 MAX 9.02 MIN 5.47

e Estimated

GROUND-WATER LEVELS
HAWAII, ISLAND OF MAUI--Continued

205856156400101. Local number, 6-5840-01.

LOCATION.--Lat 20°58'56", long 156°40'01", Hydrologic Unit 20020000, on pineapple plantation road 0.9 mi east of Kahana, and 1.5 mi southwest of Honokahua. Owner: State of Hawaii.

AQUIFER.--Honolua Volcanics, Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 274 ft, 8-in. casing diameter, cased to 264 ft, perforated from 264 to 274 ft. Hole was drilled to depth of 284 ft, but plugged back 10 ft with cement.

DATUM.--Elevation of land-surface datum is 257 ft. Measuring point is top of 9-in. casing, 257.45 ft above mean sea level. Levels of August 11, 1993.

REMARKS.--Water-quality records for 1964 and 1980 are available in files of district office.

PERIOD OF RECORD.--Occasional measurements, March 1972 to July 1975. Water-level recorder, August 1975 to June 25, 1993. Occasional measurements, July 1993 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 3.68 ft above mean sea level, September 20, 1981; lowest, 2.40 ft above mean sea level May 4, 5, 1985.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 25	2.95	FEB 18	2.93	JUN 21	2.95	AUG 12	2.97

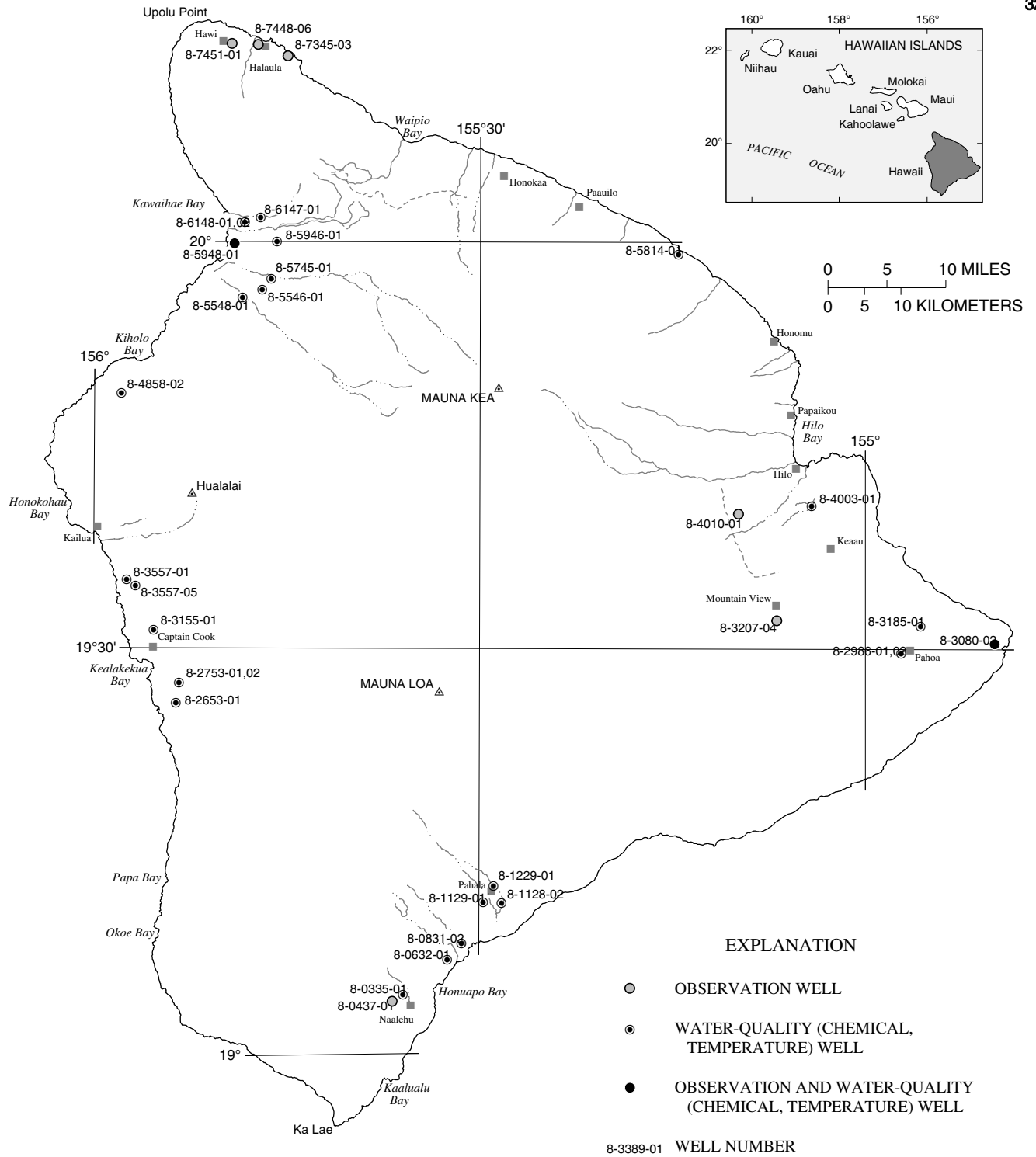


Figure 20. Locations of observation wells and ground-water quality sampling wells on Hawaii.

GROUND-WATER LEVELS
HAWAII, ISLAND OF HAWAII

190423155371501. Local number, 8-0437-01.

LOCATION.--Lat 19°04'23", long 155°37'15", Hydrologic Unit 20010000, 2,500 ft northwest of Waiohinu. Owner: U.S. Geological Survey.

AQUIFER.--Kau Basalt, Holocene and Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 972 ft, 4-in. casing diameter, cased to 240 ft, screened from 240 to 972 ft.

DATUM.--Elevation of land-surface datum is 1,299 ft. Measuring point is top of 4-in. casing, 1,299.83 ft above mean sea level.

PERIOD OF RECORD.--

Water level: occasional measurements, September 1995, September 1997 to current year.

Water quality: October 1994.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1,014.57 ft above mean sea level, September 23, 1997; lowest measured, 1,012.40 ft above mean sea level, July 16, 1999.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 9	1012.86	MAR 16	1012.45	JUL 16	1012.40
JAN 20	1012.58	MAY 20	1012.53		

190602155325901. Local number, 8-0632-01.

LOCATION.--Lat 19°06'02", long 155°32'59", Hydrologic Unit 20010000, 0.9 mi north of Whittington Park, and 3.3 mi northeast of Naalehu.
Owner: Kau Agribusiness (formerly Kau Sugar Company).

AQUIFER.--Ninole Basalt, Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 140 ft, 14-in. casing diameter, cased to 105 ft, perforated from 105 to 125 ft.

DATUM.--Elevation of land-surface datum is 102 ft. Measuring point is 0.38 ft above 1-in. hole in pump base, 103.64 ft above mean sea level.

REMARKS.--Water-quality records for 1972 and 1973 are available in files of the Hawaii District office.

PERIOD OF RECORD.--

Water level: occasional measurements, April 1972 to current year.

Water quality: occasional measurements, 1994-97.

REVISED RECORDS.--WDR HI-91-1: 1984-90 (The units of the minimum water level for the period of record).

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.39 ft above mean sea level, October 19, 1978; lowest measured, 0.15 ft above mean sea level, May 26, 1998.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 9	1.74	MAR 16	1.21	JUL 16	1.12
JAN 20	1.00	MAY 20	1.05		

GROUND-WATER LEVELS

HAWAII, ISLAND OF HAWAII--Continued

193017154502101. Local number, 8-3080-02.

LOCATION.--Lat 19°30'17", long 154°50'21", Hydrologic Unit 20010000, 0.5 mi south of intersection of Highway 132 and Highway 137 near Pahoa. Owner: County of Hawaii.

AQUIFER.--Puna Basalt, Holocene age.

WELL CHARACTERISTICS.--Dug basal water-table well, depth 46 ft, 66-in. casing diameter, with two horizontal infiltration tunnels 2 x 50 ft extending in opposite directions from 3 ft above bottom of well.

DATUM.--Elevation of land-surface datum is 39 ft. Measuring point is top of steel manhole cover at 1-in. hole, 39.50 ft above mean sea level.

REMARKS.--Water from this well is used for public supply and at times, water level is affected by pumping. Monitoring discontinued due to land subsidence.

PERIOD OF RECORD.--

Water level: occasional measurements, March 1972 to July 1999 (discontinued).

Water quality: occasional measurements, 1972-81, 1983-97.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 4.99 ft above mean sea level, May 5, 1997; lowest measured, 1.18 ft above mean sea level, June 3, 1985.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 10	4.71	MAR 17	4.83	JUL 13	4.43
JAN 20	4.46	MAY 24	4.64		

193117155550801. Local number, 8-3155-01.

LOCATION.--Lat 19°31'17", long 155°55'08", Hydrologic Unit 20010000, 0.3 mi east of Kealakekua Post Office and 0.6 mi north of Konawaena High School. Owner: U.S. Geological Survey.

AQUIFER.--Kau Basalt, Holocene and Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 1,510 ft, 4-in. casing diameter, cased to 1,500 ft perforated from 1,250 to 1,500 ft.

DATUM.--Elevation of land-surface datum is 1,745 ft. Measuring point is top of aluminum cap on 4-in. casing, 1,745.70 ft above mean sea level.

REMARKS.--Water level may be affected by pumping well 50 ft away.

PERIOD OF RECORD.--Water level: occasional measurements, April 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 469.06 ft above mean sea level, December 18, 1997; lowest measured, 467.50 ft above mean sea level, July 21, 1999.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 12	468.81	MAR 19	467.98	JUL 21	467.50
JAN 21	467.94	MAY 27	467.99		

GROUND-WATER LEVELS
HAWAII, ISLAND OF HAWAII

193251155072101. Local number, 8-3207-04.

LOCATION.--Lat 19°32'51", long 155°07'21", Hydrologic Unit 20010000, 1.4 mi southwest of Mountain View. Owner: U.S. Geological Survey.

AQUIFER.--Kau Basalt, Holocene and Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 1,143 ft, 4-in. casing and 8-in. casing diameter, from 0 to 75 ft, cased to 660 ft slotted from 660 to 1,120 ft, solid from 1,120 to 1,143 ft. Hole caved from 1,143 to 1,155 ft; hole grouted to 95 ft.

DATUM.--Elevation of land-surface datum is 1,687 ft. Measuring point is top of casing, 1,687.84 ft above mean sea level.

PERIOD OF RECORD.--Water level: occasional measurements, March 1995, December 1997 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1,013.58 ft above mean sea level, May 19, 1999; lowest measured, 982.87 ft above mean sea level, May 26, 1998.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 9	988.88	JAN 20	997.17	MAY 19	1013.58	JUL 13	1005.02
JAN 20	997.07	MAR 16	1003.48	MAY 20	1013.57		

194035155102201. Local number, 8-4010-01.

LOCATION.--Lat 19°40'35", long 155°10'22", Hydrologic Unit 20010000, 2 mi west of Kaumana at western end of Kaumana Estates subdivision. Owner: U.S. Geological Survey.

AQUIFER.--Kau Basalt, Holocene and Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 1,375 ft, 4-in. casing diameter, cased to 732 ft, screened from 732 to 1,375 ft.

DATUM.--Elevation of land-surface datum is 1,796 ft. Measuring point is top of 4-in. casing, 1,796.29 ft above mean sea level.

PERIOD OF RECORD.--Occasional measurements, February 1995, January 1998 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 980.09 ft above mean sea level, September 8, 1999; lowest measured, 962.17 ft above mean sea level, January 21, 1999.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 10	962.90	MAR 17	963.08	JUL 14	975.08	AUG 20	978.43
JAN 21	962.17	MAY 19	967.74	AUG 18	978.48	SEP 8	980.09

GROUND-WATER LEVELS

HAWAII, ISLAND OF HAWAII--Continued

194731155080401. Local number, 8-4708-02.

LOCATION.--Lat 19°47'31", long 155°08'04", Hydrologic Unit 20010000, 3.0 mi up Kaie'ie Road near DWS water tank and 2.6 mi west-northwest of Papaikou Post Office. Owner: U.S. Geological Survey.

AQUIFER.--Hamakua Volcanics, Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 1,030 ft, 4-in. casing diameter, cased to 790 ft, perforated section 790 to 1,030 ft.

DATUM.--Elevation of land-surface datum is 1,140 ft. Measuring point is top of 4-in. casing, unknown elevation above mean sea level. Data reported as feet below land-surface datum.

REMARKS.--Water levels measured when well was only open between 1,053 and 957 ft above sea level.

PERIOD OF RECORD.--

Water level: occasional measurements, June 1998 to current year.

Water quality: aquifer test, November 1997, in files of Hawaii District office.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 80.87 ft below land-surface datum, June 2, 1998; lowest measured, 89.44 ft below land-surface datum, July 12, 1999.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL
JAN 21	87.38	MAY 27	88.11
MAR 18	83.64	JUL 12	89.44

194945155534401. Local number, 8-4953-01.

LOCATION.--Lat 19°49'45", long 155°53'44", Hydrologic Unit 20010000, 2.7 mi inland from Kiholo Bay. Owner: State of Hawaii.

AQUIFER.--Hualalai Volcanics, Holocene and Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 971 ft, 12-in. casing diameter, cased to 926 ft, screened from 926 to 966 ft.

DATUM.--Elevation of land-surface datum is 931 ft. Measuring point is top of 7 1/4 in. (O.D.) casing, 932.48 ft above mean sea level.

REMARKS.--State exploratory well drilling program.

PERIOD OF RECORD.--

Water level: occasional measurements, June 1972 to current year.

Water quality: 1972.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.85 ft above mean sea level, June 6, 1972 (data from Hawaii State Department of Land and Natural Resources, Circular C63, 1973); lowest measured, 1.94 ft above mean sea level, May 29, 1998.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JAN 21	2.27	MAY 25	2.28	SEP 30	2.38
MAR 18	2.30	JUL 20	2.17		

GROUND-WATER LEVELS
HAWAII, ISLAND OF HAWAII--Continued

195947155485801. Local number, 8-5948-01.

LOCATION.--Lat 19°59'47", long 155°48'58", Hydrologic Unit 20010000, 0.7 mi east of Hapuna Beach Park, and 3.1 mi southeast of Kawaihae.
Owner: State of Hawaii.

AQUIFER.--Hamakua Volcanics, Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 268 ft, 10-in. casing diameter, cased to 246 ft, screened from 246 to 266 ft.

DATUM.--Elevation of land-surface datum is 244 ft. Measuring point is hole in pump base, 246.62 ft above mean sea level.

REMARKS.--Water from this well is used for irrigation, water level affected by pumping.

PERIOD OF RECORD.--

Water level: occasional measurements, April 1970, March 1973 to current year.

Water quality: occasional measurements, 1970, 1973 to current year.

REVISED RECORDS.--WDR HI-91-1: 1976-80 (water-level data), 1976-90 (extremes for the period of record).

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 4.83 ft above mean sea level, August 29, 1994; lowest measured, 1.38 ft above mean sea level, September 28, 1979.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 12	3.07	MAR 19	3.13	JUL 21	3.07
JAN 22	a--	MAY 25	3.25		

200132155471101. Local number, 8-6147-01.

LOCATION.--Lat 20°01'32", long 155°47'11", Hydrologic Unit 20010000, on Highway 26, 3.1 mi east of Kawaihae, and 2.8 mi northeast of Hapuna Beach Park. Owner: State of Hawaii.

AQUIFER.--Pololu Volcanics, Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 1,008 ft, 8-in. casing diameter, cased to 997 ft, perforated from 997 to 1,008 ft. Hole was drilled to 1,040 ft, but was finally plugged back to 1,008 ft.

DATUM.--Elevation of land-surface datum is 982 ft. Measuring point is top of pipe coupling on casing cover 983.08 ft (revised, November 18, 1986) above mean sea level.

REMARKS.--Water-quality records for 1963-64 are available in files of Hawaii District office.

PERIOD OF RECORD.--

Water level: occasional measurements, June to July 1963, June 1973 to current year.

Water quality: occasional measurements, 1994-97.

REVISED RECORDS.--WRD HI-91-1: 1975-90 (Station ID number).

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 6.23 ft above mean sea level, May 1, 1987; lowest measured, 4.66 ft above mean sea level, May 3, 1994.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	5.54	MAR 19	5.36	JUL 20	5.27
JAN 22	5.25	MAY 27	5.36		

a Pump found on. Sample taken but no measurement

GROUND-WATER LEVELS

HAWAII, ISLAND OF HAWAII--Continued

201307155452001. Local number, 8-7345-03.

LOCATION.--Lat 20°13'07", long 155°45'20", Hydrologic Unit 20010000. Owner: U.S. Geological Survey.

AQUIFER.--Pololu Volcanics, Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 495 ft, 8-in. casing diameter, cased to 440 ft, open hole 440 to 495 ft.

DATUM.--Elevation of land-surface datum is 396 ft. Measuring point is top of casing, 395.75 ft above mean sea level.

PERIOD OF RECORD.--Water level: occasional measurements, April 1990 to September 1995, December 1997 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 10.75 ft above mean sea level, April 25, 1990; lowest measured, 8.82 ft above mean sea level, July 1, 1992.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	9.43	MAR 19	9.10	JUL 20	8.96
JAN 22	9.11	MAY 25	9.30	SEP 17	a--

201347155470501. Local number, 8-7347-03.

LOCATION.--Lat 20°13'43", long 155°46'54", Hydrologic Unit 20010000, near intersection of Highway 270 and Kauhola Point Lighthouse Road and 40 ft north of Kohala Sugar Company Halaula well. Owner: U.S. Geological Survey.

AQUIFER.--Pololu Volcanics, Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 405 ft, 8-in. casing diameter, cased to 80 ft, open hole 80 to 405 ft.

DATUM.--Elevation of land-surface datum is 340.5 ft. Measuring point is top of casing, 340.99 ft above mean sea level.

PERIOD OF RECORD.--Water level: occasional measurements, July 1989, July 1990 to December 1990, September 1999 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 14.03 ft above mean sea level, September 10, 1990; lowest measured, 9.18 ft above mean sea level, September 17, 1999.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL
SEP 17	9.18

a Portable pump installed in well. No measurement possible.

GROUND-WATER LEVELS
HAWAII, ISLAND OF HAWAII--Continued

201429155480201. Local number, 8-7448-06.

LOCATION.--Lat 20°14'29", long 155°48'02", Hydrologic Unit 20010000. Owner: U.S. Geological Survey.

AQUIFER.--Pololu Volcanics, Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 440 ft, 8-in. casing diameter, cased to 123 ft, open hole 123 to 440 ft.

DATUM.--Elevation of land-surface datum is 411 ft. Measuring point is top of casing, 411.62 ft above mean sea level.

PERIOD OF RECORD.--Water level: occasional measurements, May 1990 to January 1991, October 1997 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 8.53 ft above mean sea level, May 25, 1999; lowest measured, 6.85 ft above mean sea level, March 23, 1998.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL
JAN 22	8.36	MAY 25	8.53
MAR 19	8.42	JUL 20	7.40

201440155510601. Local number, 8-7451-01.

LOCATION.--Lat 20°14'45", long 155°51'06", Hydrologic Unit 20010000, near Upolu Point. Owner: U.S. Geological Survey.

AQUIFER.--Pololu Volcanics, Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 632 ft, 8-in. casing diameter, cased to 100 ft, open hole 100 to 632 ft.

DATUM.--Elevation of land-surface datum is 567 ft. Measuring point is top of casing, 566.65 ft above mean sea level.

PERIOD OF RECORD.--Water level: occasional measurements, May 1990 to September 1995, October 1997 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 4.60 ft above mean sea level, September 25, 1995; lowest measured, 3.63 ft above mean sea level, May 28, 1998.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL
JAN 22	3.97	MAY 25	4.17
MAR 19	4.02	JUL 20	4.03

GROUND-WATER LEVELS

HAWAII, ISLAND OF HAWAII--Continued

201517155493701. Local number, 8-7549-03.

LOCATION.--Lat 20°15'13", long 155°49'27", Hydrologic Unit 20010000, 1.15 mi north-northeast of intersection of Highways 250 and 270 in Hawi and 0.9 mi southeast of Alanahih Point. Owner: U.S. Geological Survey.

AQUIFER.--Pololu Volcanics, Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 440 ft, 10-in. casing diameter, cased to 130 ft, open hole 130 to 440 ft.

DATUM.--Elevation of land-surface datum is 299.5 ft. Measuring point is top of casing, 300.14 ft above mean sea level.

PERIOD OF RECORD.--

Water level: occasional measurements, May 1990 to September 1995, September 1999 to current year.

Water quality: occasional measurements, March 1990.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.91 ft above mean sea level, December 10, 1991; lowest measured, 2.36 ft above mean sea level, May 10, 1995.

WATER LEVEL, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL
SEP 17	2.68

QUALITY OF GROUND WATER--WELLS
WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

HAWAII, ISLAND OF KAUAI

220136159205501 - 2-0120-01 W7 WAILUA

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998					
01...	0730	821	25.5	--	140
DEC					
21...	0730	824	25.0	--	138
FEB 1999					
22...	0800	820	25.0	850	137
MAR					
24...	0745	818	25.0	850	140
JUN					
10...	0745	--	25.0	--	139
AUG					
02...	0830	802	25.5	850	141

220530159450401 - 2-0545-01 W59 KAULAU

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998					
06...	1440	742	26.0	--	134
NOV					
24...	1200	737	24.0	--	132
FEB 1999					
03...	1145	739	23.5	--	134
MAR					
26...	1230	740	24.0	--	134
JUN					
17...	1245	740	25.0	--	132
AUG					
09...	1145	700	25.0	--	133

220354159205601 - 2-0320-01 W9-1A WAIL

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998					
07...	a0950	--	--	--	--
NOV					
25...	1000	413	24.0	--	52
APR 1999					
08...	1100	403	24.5	--	54

220621159232101 - 2-0623-04 KAPAA

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998					
07...	1045	116	23.5	--	14
NOV					
25...	1030	114	24.0	1200	15
FEB 1999					
10...	1020	118	24.0	1200	13

220354159205602 - 2-0320-03 W9-1B WAIL

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998					
07...	0935	408	24.0	--	49
NOV					
25...	a1000	--	--	--	--
FEB 1999					
10...	0920	406	24.0	800	47
APR					
08...	a0945	--	--	--	--
JUN					
16...	0945	412	25.0	800	46
AUG					
18...	1000	390	24.5	800	46

220826159185401 - 2-0818-02 W90B ANAHO

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998					
07...	a1130	--	--	--	--
NOV					
25...	1115	246	23.5	--	21
APR 1999					
08...	1150	248	23.5	190	21
AUG					
18...	1045	244	23.5	190	21

220827159185401 - 2-0818-01 W90A ANAHO

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998					
07...	1135	229	24.0	--	22
NOV					
25...	a1110	--	--	--	--
FEB 1999					
10...	1100	229	24.0	410	20
APR					
08...	a1150	--	--	--	--
JUN					
16...	1140	221	24.5	--	20

See footnotes at end of table

QUALITY OF GROUND WATER--WELLS
WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

HAWAII, ISLAND OF KAUAI--Continued

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221038159203801 - 2-1020-03 W78 MOLOAA [b]

221151159265001 - 2-1126-02 KALIHIWAI

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR-IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998	07...		1530		
DEC	16...		1420		
APR 1999	08...		1715		

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR-IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998	08...	a0755	--	--	--
DEC	15...	0815	203	22.5	1250
APR 1999	07...	0845	198	22.5	--
AUG	08...	0750	198	23.0	1250

221141159252501 - 2-1125-01 N1 KILAUEA

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR-IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998	07...	1440	176	26.0	--
NOV	25...	1430	175	23.5	--
FEB 1999	10...	1140	175	24.0	650
APR	08...	1625	176	26.0	--
AUG	18...	1425	180	29.0	--

221201159293401 - 2-1229-03 W73 HANAIE

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR-IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998	07...	1405	269	24.5	--
NOV	25...	1350	274	23.5	--
FEB 1999	10...	1355	278	23.5	--
APR	08...	1545	284	23.5	--
JUN	16...	1445	290	23.5	170
AUG	18...	1405	294	23.5	170

221141159252502 - 2-1125-02 N2 KILAUEA

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR-IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998	07...	a1445	--	--	--
NOV	25...	a1425	--	--	--
APR 1999	08...	a1625	--	--	--
JUN	18...	0850	156	24.5	650

221247159324801 - 2-1232-01 W67 WAINIH

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR-IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998	07...	1335	148	23.0	23
NOV	25...	1310	148	22.5	22
FEB 1999	10...	1330	125	22.5	23
APR	08...	b1325	--	--	--
JUN	16...	1415	132	23.0	22
AUG	18...	1325	132	23.0	21

221150159264501 - 2-1126-01 KALIHIWAI

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR-IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998	08...	0750	168	22.5	--
DEC	15...	a0800	--	--	--
FEB 1999	12...	0750	139	22.0	1450
APR	07...	a0745	--	--	--
JUN	18...	0815	147	22.5	1450

See footnotes at end of table

QUALITY OF GROUND WATER--WELLS
WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

HAWAII, ISLAND OF KAUAI--Continued

221318159335901 - 2-1333-01 W66 HAENA					215535159302601 - 2-5530-03 W22 LAWAI				
DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998					OCT 1998				
07...	1300	200	22.0	22	06...	1550	226	26.0	26
NOV					NOV				
25...	1245	206	22.0	22	24...	1415	239	24.0	28
FEB 1999					FEB 1999				
10...	1300	202	21.5	21	03...	1415	223	23.5	26
APR					MAR				
08...	1510	203	22.0	21	26...	1330	223	24.0	26
JUN									
16...	1345	204	22.0	21					
AUG									
18...	1250	205	22.0	21					
215454159274201 - 2-5427-01 W16A KOLOA					215803159401201 - 2-5840-01 W26 WAIMEA				
DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998					OCT 1998				
06...	0830	235	22.5	28	06...	1115	784	24.0	164
NOV					NOV				
24...	0810	237	22.5	27	24...	0950	532	24.0	90
APR 1999					FEB 1999				
07...	a0800	--	--	--	03...	0950	546	24.0	92
					APR				
					07...	1040	766	24.0	158
					JUN				
					17...	1040	794	24.0	165
					AUG				
					19...	0915	711	24.5	147
215455159274201 - 2-5427-02 W16B KOLOA					215857159430101 - 2-5843-01 S12 KEKAHA				
DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998					OCT 1998				
06...	a0830	--	--	--	06...	0920	545	24.5	74
NOV					NOV				
24...	a0810	--	--	--	24...	0910	570	24.0	80
FEB 1999					FEB 1999				
03...	0800	227	22.5	25	03...	0905	541	24.0	73
APR					APR				
07...	0815	226	22.5	25	07...	1000	581	24.5	82
JUN					JUN				
17...	0830	251	22.5	25	17...	0925	564	24.5	78
AUG					AUG				
17...	0755	228	22.5	26	19...	0825	535	25.0	79
215522159342601 - 2-5534-03 W25-1 HANA									
DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)					
OCT 1998									
06...	1155	424	24.0	34					
NOV									
24...	1025	417	24.0	34					
FEB 1999									
03...	1030	414	24.0	33					
APR									
07...	0910	414	23.5	34					
JUN									
17...	1110	411	23.5	32					
AUG									
09...	1315	237	25.0	28					
19...	0945	409	24.0	33					

See footnotes at end of table

QUALITY OF GROUND WATER--WELLS
 WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

HAWAII, ISLAND OF KAUAI--Continued

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215901159235201 - 2-5923-07 KILOHANA I

215901159235301 - 2-5923-01 KILOHANA A

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998						OCT 1998					
09...	0845	187	23.5	--	21	09...	1020	243	25.5	--	20
NOV						NOV					
25...	0800	185	23.0	--	21	25...	0815	240	25.0	--	20
FEB 1999						FEB 1999					
10...	0750	189	23.0	430	21	10...	0815	240	25.0	640	21
APR						APR					
08...	0830	185	23.0	430	21	08...	0850	240	25.0	640	20
JUN						JUN					
16...	0745	173	23.5	430	20	16...	0845	240	25.0	--	19
AUG						AUG					
18...	0800	183	23.5	178	20	18...	0815	237	25.0	640	19

215958159214301 - 2-5921-01 W10 HANAMA

215906159395601 - 2-5939-01 S9 WAIMEA

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998						OCT 1998					
07...	0845	497	25.5	--	55	06...	1320	302	24.0		36
NOV						NOV					
25...	0830	491	25.0	--	51	24...	1320	281	24.5		29
FEB 1999						FEB 1999					
10...	0840	503	25.0	123	59	03...	1330	261	24.5		28
APR						MAR					
08...	0920	496	25.5	123	57	26...	1040	233	24.0		23
JUN						JUN					
16...	0910	495	25.5	123	55	18...	1240	331	24.0		44
AUG						AUG					
18...	0830	491	22.5	120	59	09...	1230	292	24.0		35

QUALITY OF GROUND WATER--WELLS
WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

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HAWAII, ISLAND OF OAHU

211646157465201 - 3-1646-01 W1-B WAIAL					212133158035501 - 3-2103-03 S14 MAKAKI				
DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
SEP 1999 22...	1330	995	21.5	238	FEB 1999 18...	0908	1010	23.0	224
					MAY 25...	0859	1080	23.5	224
					AUG 03...	0925	1080	23.5	228
					SEP 17...	0920	1080	23.5	226
211832157515501 - 3-1851-19 W102 TUBEA					212238157561102 - 3-2256-12 W187-C				
DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
DEC 1998 04...	1355	33200	24.0	12500					
FEB 1999 25...	1308	34300	24.5	13000					
211832157515502 - 3-1851-19 W102 TUBEB					212332157582201 - 3-2358-02 W201				
DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
JUN 1999 02...	1416	18370	24.0	6770					
AUG 02...	1359	18300	24.5	6430					
SEP 13...	1516	18500	24.5	6490					
212106157533701 - 3-2153-02 W153 MOANA					212336157591801 - 3-2359-05 W204-11				
DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
DEC 1998 02...	0916	490	22.0	101	FEB 1999 25...	1001	1294	21.0	--
FEB 1999 25...	1056	495	22.0	102	JUN 02...	1315	1360	21.5	366
JUN 02...	0841	496	22.0	103	JUL 13...	1200	1300	21.5	350
JUL 29...	1131	495	22.0	104	29...	1358	1370	21.5	372
SEP 13...	1423	494	22.0	103	SEP 13...	1126	1370	21.5	370
					212336157591801 - 3-2359-05 W204-11				
DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
					JUN 1999 02...	1300	2780	22.0	801
					JUL 29...	1309	2750	22.0	799
					SEP 13...	0942	2730	22.0	789

See footnotes at end of table

QUALITY OF GROUND WATER--WELLS
 WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

HAWAII, ISLAND OF OAHU--Continued

212342157584301 - 3-2358-22 W204-4

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
JUN 1999				
02...	1236	1470	20.5	394
JUL				
29...	1330	1470	20.5	397
SEP				
13...	0929	1440	20.5	386

212422157485601 - 3-2448-01 W416

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
MAY 1999				
26...	0859	203	21.5	20
JUN				
25...	0900	201	20.5	20
JUL				
30...	0830	201	20.5	19
SEP				
10...	0855	200	20.5	22

212343157584701 - 3-2358-29 W204-9

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
JUN 1999				
02...	1242	3100	20.5	932
JUL				
29...	1336	3440	20.5	1030
SEP				
13...	0920	3120	20.5	874

212506157582301 - 3-2558-10 S16

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
JUN 1999				
02...	0953	245	22.0	41
AUG				
03...	1249	247	21.5	41
SEP				
24...	1309	246	21.5	43

212343158001001 - 3-2300-11 W238 WAIPH

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
JUN 1999				
02...	1109	575	22.0	124
AUG				
03...	0943	575	22.0	121
SEP				
13...	1005	575	22.0	121

212556157500301 - 3-2550-01 W407-16

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
FEB 1999				
04...	1436	135	23.0	19
MAY				
26...	1509	136	23.5	19
JUL				
30...	1445	137	23.5	19
SEP				
10...	1445	140	23.0	19

212358158010901 - 3-2301-09,10 W247-IJ

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
JUN 1999				
17...	1010	677	22.0	145
JUL				
12...	0940	643	22.0	133
AUG				
05...	0835	682	22.0	145
SEP				
24...	0835	680	22.0	145

212617158033801 - 3-2603-01 W330-8

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
FEB 1999				
22...	1006	338	22.0	47
AUG				
05...	0910	337	22.5	45
SEP				
28...	0840	338	22.5	47

QUALITY OF GROUND WATER--WELLS
WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

HAWAII, ISLAND OF OAHU--Continued

212656158071801 - 3-2607-01 W277-97

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
FEB 1999				
18...	1015	418	25.0	--
MAY				
25...	1013	425	24.5	62
AUG				
03...	1110	429	25.0	70
SEP				
17...	1050	427	25.0	62

212927158014801 - 3-2901-07 S4

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998				
21...	0937	165	21.5	19
FEB 1999				
05...	1230	167	22.0	19
JUN				
04...	1022	171	22.0	--
AUG				
04...	0907	172	22.0	19
23...	0850	175	22.5	20

212803158000701 - 3-2800-01 W250-4A

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
JUL 1999				
29...	1450	145	22.0	17
SEP				
24...	1100	142	22.0	17

212945158014301 - 3-2901-09 W330-6

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
MAY 1999				
24...	0831	200	22.0	22
JUL				
29...	0841	200	22.0	21
SEP				
22...	1507	201	22.0	22

212828158092001 - 3-2809-06 TU WAIANAE

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
JAN 1999				
28...	1055	405	22.5	--
APR				
12...	1400	408	23.0	--
MAY				
25...	1455	415	22.5	35
AUG				
03...	1200	409	22.5	34
SEP				
17...	1210	417	22.5	38

213224158135901 - 3-3213-06 W277-101

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
FEB 1999				
18...	1255	870	23.5	194
APR				
12...	1250	868	23.5	193
MAY				
25...	1225	863	23.5	194
JUL				
01...	1425	864	23.5	194
AUG				
03...	1310	864	23.5	193
SEP				
13...	1451	866	23.5	192

212859158124301 - 3-2812-01 S1

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
JAN 1999				
28...	1120	757	25.0	--
APR				
12...	1225	750	25.5	--
MAY				
25...	1307	762	25.5	148
JUL				
01...	1355	763	25.5	149
SEP				
13...	1431	751	26.0	149

213327157524401 - 3-3352-01 W405

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
FEB 1999				
01...	1435	253	22.5	35
MAY				
26...	1410	255	23.0	34
JUL				
30...	1400	255	23.0	36
SEP				
10...	1400	256	22.5	35

See footnotes at end of table

QUALITY OF GROUND WATER--WELLS
 WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

HAWAII, ISLAND OF OAHU--Continued

213411158074501 - 3-3407-25 W320

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
JUN 1999				
17...	0900	1500	23.0	369
JUL				
29...	0912	1490	23.0	370
SEP				
22...	0915	1520	23.0	377

213656157550401 - 3-3655-01 W394

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
FEB 1999				
01...	1400	233	21.5	33
MAY				
26...	1358	232	21.5	32
JUL				
30...	1340	230	21.0	33
SEP				
10...	1340	230	22.0	32

213429158055501 - 3-3405-01 W323-1

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
JUN 1999				
04...	1128	359	22.5	50
JUL				
29...	1428	355	23.0	48
SEP				
22...	1447	351	22.5	48

214131158011601 - 3-4101-08 W337-6

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
JAN 1999				
29...	1400	221	20.5	33
MAY				
26...	1258	221	20.5	33
JUL				
30...	1225	220	20.5	33
SEP				
10...	1200	221	20.5	35

213446158104901 - 3-3410-08 W286

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
MAY 1999				
24...	1313	695	23.0	143
JUL				
29...	1105	644	23.0	140
SEP				
22...	1035	693	22.0	141

214157158000101 - 3-4100-01 W338

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
JAN 1999				
29...	1044	297	20.5	50
MAY				
26...	1059	300	21.0	53
JUL				
30...	1035	310	20.5	52
SEP				
10...	1045	318	21.0	54

213512158061601 - 3-3506-03 TO 04 W329 A-B WSCO P8 A-C OAHU

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
MAY 1999				
24...	1145	416	22.5	68
JUL				
29...	0935	415	22.5	66
SEP				
22...	0856	423	22.0	70

214233157583501 - 3-4258-04 W345

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
JAN 1999				
29...	1115	1420	24.0	422
MAY				
26...	1019	1410	24.0	423
JUL				
30...	0940	1410	24.5	422
SEP				
10...	1005	1560	24.0	438

See footnotes at end of table

QUALITY OF GROUND WATER--WELLS
 WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

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HAWAII, ISLAND OF MOLOKAI

210402156495801 - 4-0449-01 S6

210419156570501 - 4-0457-01 S4

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998					OCT 1998				
16...	0910	339	20.5	65	16...	0945	556	24.0	129
DEC					DEC				
14...	1425	332	20.5	63	14...	1235	536	23.5	126
FEB 1999					FEB 1999				
01...	1330	328	20.5	64	01...	1355	509	23.5	118
APR					APR				
20...	1200	323	21.0	61	20...	1335	395	24.0	83
JUL					JUL				
21...	0815	343	21.0	65	20...	0955	330	24.0	69

210414156565601 - 4-0456-04 KAWELA PLANTATION SH-5 [c]

210425156483001 - 4-0448-02 S8

DATE	TIME	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998			OCT 1998				
05...	1311	232	16...	0855	345	24.0	25
NOV			DEC				
05...	1255	53	14...	1410	352	24.5	73
DEC			FEB 1999				
01...	0858	55	01...	1315	347	24.5	25
JAN 1999			APR				
07...	0845	55	20...	1220	339	24.0	21
FEB			JUL				
02...	0805	56	20...	1150	331	24.5	22
MAR							
03...	0820	100					
APR							
01...	1105	19					
MAY							
03...	1025	19					

210426156563509 - 4-0456-09 KAWELA PLANTATION DW-2 [c]

210419156562108 - 4-0456-08 KAWELA PLANTATION DW-1 [c]

DATE	TIME	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	DATE	TIME	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998			OCT 1998		
05...	1238	118	05...	1248	160
NOV			NOV		
05...	1053	482	05...	1109	161
DEC			DEC		
01...	0813	115	01...	0824	162
JAN 1999			JAN 1999		
07...	0750	112	07...	0805	156
FEB			FEB		
02...	0710	438	02...	0725	159
MAR			MAR		
03...	0745	110	03...	0735	157
APR			APR		
01...	1030	108	01...	1040	154
MAY			MAY		
03...	0950	106	03...	1010	153

See footnotes at end of table

QUALITY OF GROUND WATER--WELLS
 WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

HAWAII, ISLAND OF MOLOKAI--Continued

210429156565106 - 4-0456-06 KAWELA PLANTATION DW-3 [c]

210856157011201 - 4-0801-01 DHHL 1, Kualapuu, Molokai, HI [f]

DATE	TIME	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	DATE	TIME	FLOW RATE (G/M) (00059)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998 05...	1258	82	OCT 1998 03...	1430	--	105
NOV 05...	1115	78	NOV 09...	1100	--	105
DEC 01...	0840	76	DEC 10...	0737	555	129
JAN 1999 07...	0815	70	APR 1999 12...	0820	--	123
FEB 02...	0735	69	MAY 13...	0750	--	118
MAR 03...	0730	66	AUG 26...	0750	--	144
APR 01...	1055	65	SEP 07...	0820	--	137
MAY 03...	1020	60				

210857156010701 - 4-0801-02 [f]

210433156574201 - 4-0457-04 KAWELA PLANTATION AG-1 [c]

DATE	TIME	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	DATE	TIME	FLOW RATE (G/M) (00059)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998 05...	1327	342	OCT 1998 01...	0745	--	75
NOV 05...	1126	342	NOV 02...	1115	--	77
DEC 01...	0926	339	DEC 10...	0725	736	73
JAN 1999 07...	0900	334	APR 1999 12...	0815	--	74
FEB 02...	0825	342	MAY 13...	0745	--	72
MAR 03...	0900	341	AUG 26...	0735	--	77
APR 01...	1015	345	SEP 07...	0803	--	74
MAY 03...	1045	343				

210903157013001 - 4-0901-01 W17 [g]

210605157012001 - 4-0601-01 W11

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	DATE	TIME	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
OCT 1998 15...	1155	335	24.5	35	OCT 1998 01...	0820	51
DEC 14...	1045	240	24.5	21	NOV 01...	0830	51
FEB 1999 01...	1520	276	24.0	23	DEC 01...	0920	52
APR 20...	1045	259	24.0	18	JAN 1999 01...	0915	53
JUL 20...	1520	297	24.0	23			

QUALITY OF GROUND WATER--WELLS
 WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

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HAWAII, ISLAND OF MAUI

203835156065001 - 6-3806-01 PUNAHOU SPRINGS [b]

204812156062001 - East Makapipi Tunnel, Maui, HI

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
JAN 1999				
08...	1250			
MAR				
01...	1320			
JUN				
24...	1245			
AUG				
11...	1300			
MAY 1999				
12...	0955	49	18.5	9

203947156261201 - 6-3926-03 WAILEA 8

204845156255001 - 6-4825-01 S15 [b]

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
NOV 1998				
17...	1115	3030	19.5	828
FEB 1999				
08...	1250	3520	20.0	974
JUN				
22...	1305	3740	19.0	1030
AUG				
30...	1000	3870	19.5	1080

204635156270101 - 6-4627-14 W226

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
NOV 1998				
17...	1000	1430	23.5	211
FEB 1999				
08...	1105	1420	23.5	214
JUN				
22...	0955	1400	23.5	202
AUG				
10...	1316	1370	23.5	201

204810156062001 - 6-4806-48 KUHIWA

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
MAY 1999				
12...	0930	940	18.5	7

205243156243201 - 6-5224-02 S22

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
DEC 1998				
04...	b1325	--	--	--
MAY 1999				
25...	b1330	--	--	--
JUL				
30...	1200	1330	24.0	265

See footnotes at end of table

QUALITY OF GROUND WATER--WELLS
 WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

HAWAII, ISLAND OF MAUI--Continued

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205320156394501 - 6-5339-02 W292

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
NOV 1998				
18...	0945	505	21.5	71
FEB 1999				
18...	b1230	--	--	--
JUN				
21...	1020	662	21.0	128
AUG				
12...	b0940	--	--	--

205343156401101 - 6-5340-01 S5

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
NOV 1998				
18...	b1030	--	--	--
FEB 1999				
18...	1210	691	21.5	145
JUN				
21...	b1100	--	--	--
AUG				
12...	b1020	--	--	--

205322156394501 - 6-5339-01 W291

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
NOV 1998				
18...	0940	484	21.5	63
FEB 1999				
18...	b1235	--	--	--
JUN				
21...	1025	578	21.0	102
AUG				
12...	0940	566	23.0	103

205405156305401 - 6-5430-05 Waiehu Monitor, Maui, HI

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	SAMPLE DEPTH DIS- TANCE BELOW MSL FEET (78890)
NOV 1998					
18...	0940	484	21.5	63	
FEB 1999					
18...	b1235	--	--	--	
JAN 1999					
04...	1020	213	22.0	17	200
04...	1035	417	22.0	92	400
04...	1055	477	22.0	109	600
04...	1120	2170	22.0	620	650
04...	1145	4020	22.0	1210	675
04...	1210	14800	22.0	5150	700
04...	1235	36000	22.0	13500	725
04...	1300	44200	22.0	16300	750
04...	1330	48100	22.5	17700	800
04...	1400	50100	22.5	18400	1000
MAR					
29...	0945	205	22.5	14	200
29...	1000	412	22.0	92	400
29...	1023	480	21.5	111	600
29...	1045	2350	22.0	682	650
29...	1112	4290	22.0	1310	675
29...	1207	16200	22.0	5690	700
29...	1232	36900	22.0	13900	725
29...	1257	44400	22.0	16600	750
29...	1322	48000	22.0	17900	800
29...	1350	50300	22.0	18800	1000
JUL					
06...	0930	210	23.0	14	245
06...	0950	208	22.5	13	400
06...	1010	553	22.0	134	600
06...	1035	2750	22.5	806	650
06...	1055	4850	22.0	1500	675
06...	1120	17900	23.0	6480	700
06...	1145	37800	22.5	14300	725
06...	1210	44800	22.5	17000	750
06...	1240	48300	23.0	18100	800
06...	1310	49800	23.0	18900	1000

205329156305501 - 6-5330-10 Mokuhau Pump 1, Maui, HI

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
DEC 1998				
01...	b1050	--	--	--
FEB 1999				
09...	1110	510	22.0	97
MAY				
25...	b1010	--	--	--
JUL				
01...	1450	554	22.0	110
30...	0930	649	22.0	137

205330156305401 - 6-5330-11 W15F

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
DEC 1998				
01...	b1055	--	--	--
FEB 1999				
09...	b1115	--	--	--
MAY				
25...	1005	512	22.5	96
JUL				
01...	1453	564	22.5	108
30...	0940	507	22.5	92

205416156244301 - 6-5424-01 S24 [b]

DATE	TIME
DEC 1998	
04...	1320
MAY 1999	
25...	1320
JUL	
30...	1145

See footnotes at end of table

QUALITY OF GROUND WATER--WELLS
 WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

HAWAII, ISLAND OF MAUI--Continued

205511156222101 - 6-5522-01 S31

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
DEC 1998 04...	b1305	--	--	--
MAY 1999 25...	1300	1200	22.0	263
JUL 30...	1130	1280	22.0	290

205838156383101 - 6-5838-02 NAPILI B

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
NOV 1998 25...	1140	308	20.0	62
FEB 1999 18...	1000	325	20.0	68
JUN 21...	1250	362	20.0	77
AUG 12...	1230	362	20.0	76

205651156401001 - 6-5640-01 S36 [b]

DATE	TIME
NOV 1998 18...	1105
FEB 1999 18...	1150
JUN 21...	1115
AUG 12...	1045

205848156383601 - 6-5838-04 NAPILI [b]

DATE	TIME
NOV 1998 25...	1130
FEB 1999 18...	0955
JUN 21...	1300
AUG 12...	1235

205837156384601 - 6-5838-01 NAPILI A [b]

DATE	TIME
NOV 1998 25...	1155
FEB 1999 18...	1010
JUN 21...	1230
AUG 12...	1215

QUALITY OF GROUND WATER--WELLS
 WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

HAWAII, ISLAND OF HAWAII

190347155354301 - 8-0335-01 NAALEHU W1

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
NOV 1998	09...	--	--	--	--
JAN 1999	20...	170	19.5	445	12
MAR	16...	173	20.5	--	12
MAY	20...	165	19.5	435	13
JUL	16...	160	20.0	435	13

190832155310901 - 8-0831-02 NINOLE A

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
NOV 1998	09...	--	--	--	--
JAN 1999	20...	785	19.5	1240	196
MAR	16...	812	19.0	1330	202

191108155281701 - 8-1128-02 PALIMA

190423155371501 - 8-0437-01 WAOHINU EXP [b]

DATE	TIME
NOV 1998	09...
JAN 1999	20...
MAR	16...
MAY	20...

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
NOV 1998	09...	133	20.0	2050	15
JAN 1999	20...	134	19.0	1250	16
MAR	16...	135	19.0	2250	16
MAY	20...	144	20.0	2250	19
JUL	16...	144	20.0	1980	22

190602155325901 - 8-0632-01 W10-1 [b]

DATE	TIME
NOV 1998	09...
JAN 1999	20...
MAR	16...
MAY	20...

191114155294801 - 8-1129-01

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
NOV 1998	09...	95	20.0	--	5
JAN 1999	20...	94	18.5	1300	5
MAR	16...	95	18.5	1300	5
MAY	20...	94	19.0	475	5
JUL	16...	90	19.5	1980	4

190832155310801 - 8-0831-01 NINOLE TH1

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
MAY 1999	20...	1315	819	19.0
JUL	16...	1010	798	19.0

191219155291601 - 8-1229-01 PAHALA

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
NOV 1998	09...	99	18.0	380	5
JAN 1999	20...	98	17.5	400	5
MAR	16...	--	--	--	--
MAY	20...	--	--	--	--
JUL	16...	94	18.0	390	4

See footnotes at end of table

QUALITY OF GROUND WATER--WELLS
WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

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HAWAII, ISLAND OF HAWAII--Continued

192646155532001 - 8-2653-01 KEEI C

192924154564701 - 8-2986-01 W9-5B

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)	DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
NOV 1998						NOV 1998				
12...	b1020	--	--	--	--	10...	b0945	--	--	--
JAN 1999						JAN 1999				
21...	1530	230	20.0	--	38	20...	1655	143	21.5	9
MAR						MAR				
19...	b0850	--	--	--	--	17...	1030	135	22.5	7
MAY						MAY				
26...	b0850	--	--	--	--	24...	b1100	--	--	--
JUL						JUL				
21...	1650	230	20.0	575	38	13...	1040	134	24.0	8

192731155534101 - 8-2753-02 W12-8 [b]

193017154502101 - 8-3080-02 S9 [b]

DATE	TIME
NOV 1998	
12...	1010
JAN 1999	
21...	1525
MAR	
19...	0845
MAY	
26...	1100
JUL	
21...	1645

DATE	TIME
NOV 1998	
10...	1010
JAN 1999	
20...	1630
MAR	
17...	1100
MAY	
24...	1130

193113154555801 - 8-3185-01 W9-11 HAWN SHORES

192738155534201 - 8-2753-01 W12-4 [b]

DATE	TIME
NOV 1998	
12...	1000
JAN 1999	
21...	1515
MAR	
19...	0840
MAY	
26...	0840
JUL	
20...	1635

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
NOV 1998				
10...	1140	130	22.0	17
JAN 1999				
20...	1600	127	21.5	--
MAR				
17...	1135	124	21.5	16
MAY				
24...	1200	127	21.0	15
JUL				
13...	1130	125	21.5	16

192923154564701 - 8-2986-02 W9-5A

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
NOV 1998				
10...	b0950	--	--	--
JAN 1999				
20...	1650	135	27.0	7
MAR				
17...	1040	134	23.0	7
MAY				
24...	b1105	--	--	--
JUL				
13...	1050	130	24.0	7

193117155550801 - 8-3155-01 USGS KONA EX1D

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
NOV 1998					
12...	1045	126	21.0	740	6
JAN 1999					
21...	b1610	--	--	--	--
MAR					
19...	b0940	--	--	--	--
MAY					
27...	b1400	--	--	--	--

See footnotes at end of table

QUALITY OF GROUND WATER--WELLS
 WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

HAWAII, ISLAND OF HAWAII--Continued

193251155072101 - 8-3207-04 OLAA [b]

194035155102201 - 8-4010-01 KAUMANA EST EX [b]

DATE	TIME	DATE	TIME
NOV 1998		NOV 1998	
09...	0900	10...	1345
JAN 1999		JAN 1999	
20...	1000	21...	0745
20...	1510	MAR	
MAR		17...	1315
16...	1040	MAY	
MAY		19...	1240
19...	1350		
20...	0925		

194037155035301 - 8-4003-01 W8-3

193502155572301 - 8-3557-05 KAH SHAFT

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE WATER (DEG C) (00010)	CHLOR-IDE WATER UNFLTRD (MG/L) (99220)	DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR-IDE WATER UNFLTRD (MG/L) (99220)
NOV 1998					NOV 1998					
12...					10...	b0845	--	--	--	--
JAN 1999					JAN 1999					
21...	1215	1110	20.5	289	21...	b0700	--	--	--	--
MAR					MAR					
19...	1735	1030	20.5	262	17...	1215	88	20.5	1680	6
MAY					MAY					
27...	0740	1340	20.0	349	24...	0930	89	20.5	1720	7
JUL					JUL					
20...	1320	1040	20.0	281	13...	1430	85	21.5	1650	6
	1545	1110	20.0	289						

194040155035201 - 8-4003-02 PANAWEA 2

193505155570701 - 8-3557-04 KAHALUU D

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR-IDE WATER UNFLTRD (MG/L) (99220)	DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE WATER (DEG C) (00010)	CHLOR-IDE WATER UNFLTRD (MG/L) (99220)
JAN 1999						JAN 1999				
21...	1705	734	20.0	1050	175	21...	0700	86	20.5	7

194818155582301 - 8-4858-02 KONA VILLAGE

193510155570801 - 8-3557-01 W12-5

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE WATER (DEG C) (00010)	FLOW RATE (G/M) (00059)	CHLOR-IDE WATER UNFLTRD (MG/L) (99220)	DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE WATER (DEG C) (00010)	CHLOR-IDE WATER UNFLTRD (MG/L) (99220)
NOV 1998						NOV 1998				
12...						12...	1415	2530	21.0	588
JAN 1999						JAN 1999				
21...	b1210	--	--	--	--	22...	b0750	--	--	--
MAR						MAR				
19...	1655	457	21.0	--	108	19...	1110	2550	21.0	580
MAY						MAY				
27...	0800	379	20.5	800	75	27...	1155	2470	21.0	561
JUL						JUL				
21...	1300	427	20.5	800	92	21...	0905	2480	21.0	564
	1450	417	20.5	800	88					

QUALITY OF GROUND WATER--WELLS
 WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

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HAWAII, ISLAND OF HAWAII--Continued

194945155534401 - 8-4953-01 Kiholo, HI [b]

195857155142301 - 8-5814-01 LAUPAHOEHO

DATE TIME
 NOV 1998 13... 0815
 JAN 1999 21... 1340
 MAR 18... 1615
 MAY 25... 0940

SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)
 TEMPER- ATURE WATER RATE (DEG C) (G/M) (00010) (00059)
 CHLOR- IDE WATER UNFLTRD (MG/L) (99220)

DATE TIME
 NOV 1998 20... b1200 -- -- -- --
 JAN 1999 21... b1000 -- -- -- --
 MAR 18... 1040 380 19.5 1250 79
 MAY 27... b0830 -- -- -- --
 JUL 19... 1300 370 20.5 1220 78

195546155462001 - 8-5546-01 WAIKOLOA WATER WELL 2

DATE TIME SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095) TEMPER- ATURE WATER RATE (DEG C) (00010) FLOW RATE (G/M) (00059) CHLOR- IDE WATER UNFLTRD (MG/L) (99220)

195912155464201 - 8-5946-02 LALAMILO B

NOV 1998 13... 1040 628 28.5 1000 111
 JAN 1999 21... b1130 -- -- -- --
 MAR 18... b1510 -- -- -- --
 MAY 25... 1120 640 28.5 1000 111
 JUL 20... 1345 642 28.0 1000 114

DATE TIME SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095) TEMPER- ATURE WATER RATE (DEG C) (00010) FLOW RATE (G/M) (00059) CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
 JAN 1999 22... 0845 370 26.0 900 52

195546155480301 - 8-5548-01 PARKER 1

195929155462501 - 8-5946-01 LALAMILO A

DATE TIME SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095) TEMPER- ATURE WATER RATE (DEG C) (00010) FLOW RATE (G/M) (00059) CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
 NOV 1998 13... b1010 -- -- -- --
 JAN 1999 21... b1225 -- -- -- --
 MAR 18... 1330 2430 28.5 660 639
 MAY 25... 1100 2430 28.0 680 651
 JUL 20... 1320 2420 28.0 660 635

DATE TIME SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095) TEMPER- ATURE WATER RATE (DEG C) (00010) FLOW RATE (G/M) (00059) CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
 NOV 1998 12... b1610 -- -- -- --
 JAN 1999 22... b0830 -- -- -- --
 MAR 19... 1200 490 26.0 650 86
 MAY 25... 1300 506 26.5 620 92
 JUL 20... 0955 501 26.0 650 91

195724155455301 - 8-5745-01 PARKER 5

195947155485801 - 8-5948-01 HAPUNA PRK

DATE TIME SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095) TEMPER- ATURE WATER RATE (DEG C) (00010) FLOW RATE (G/M) (00059) CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
 NOV 1998 13... b1100 -- -- -- --
 JAN 1999 21... 1155 307 26.5 800 32
 MAR 18... b1415 -- -- -- --
 MAY 25... 1145 292 26.0 800 28
 JUL 20... 1415 284 27.0 800 28

DATE TIME SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095) TEMPER- ATURE WATER RATE (DEG C) (00010) FLOW RATE (G/M) (00059) CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
 NOV 1998 12... 1525 1900 26.0 325 618
 JAN 1999 22... 0920 1900 25.5 330 512
 MAR 19... 1240 1920 25.0 330 514
 MAY 25... 1400 1880 26.0 315 511
 JUL 21... 1055 1880 26.0 320 504

See footnotes at end of table

QUALITY OF GROUND WATER--WELLS
 WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

HAWAII, ISLAND OF HAWAII--Continued

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200121155480801 - 8-6148-02 W14B [b]

DATE	TIME
NOV 1998	
13...	1230
JAN 1999	
22...	1020
MAR	
19...	1330
MAY	
27...	1015
JUL	
20...	0705

201308155451901 - 8-7345-03 MAKAPALA [b]

DATE	TIME
NOV 1998	
13...	1500
JAN 1999	
22...	1230
MAR	
19...	1550
MAY	
25...	1555

201429155480201 - 8-7448-06 HONOPUEO OBV. WELL [b]

200122155480901 - 8-6148-01 W14

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
NOV 1998				
13...	b1225	--	--	--
JAN 1999				
22...	1015	126	26.0	18
MAR				
19...	1330	143	34.0	20
MAY				
27...	b1010	--	--	--
JUL				
20...	b0700	--	--	--

DATE	TIME
NOV 1998	
13...	1545
JAN 1999	
22...	1315
MAR	
19...	1510
MAY	
25...	1545

201440155510601 - 8-7451-01 TEST WELL-J OBV., KOHALA [b]

DATE	TIME
NOV 1998	
13...	1330
JAN 1999	
22...	1100
MAR	
19...	1430
MAY	
25...	1515

200132155471101 - 8-6147-01 W16 [b]

DATE	TIME
NOV 1998	
13...	1240
MAR 1999	
19...	1310
MAY	
27...	1045

- > Actual value is known to be greater than the value shown
- < Actual value is known to be less than the value shown
- a Sampling alternated with a nearby well
- b Unable to sample, pump off, locked, or inoperable
- c Sampled by Kawela Plantation Homeowners Association
- d Laboratory specific conductance
- f Sampled by Hawaii Department of Hawaiian Home Lands
- g Sampled by Kukui, Inc.

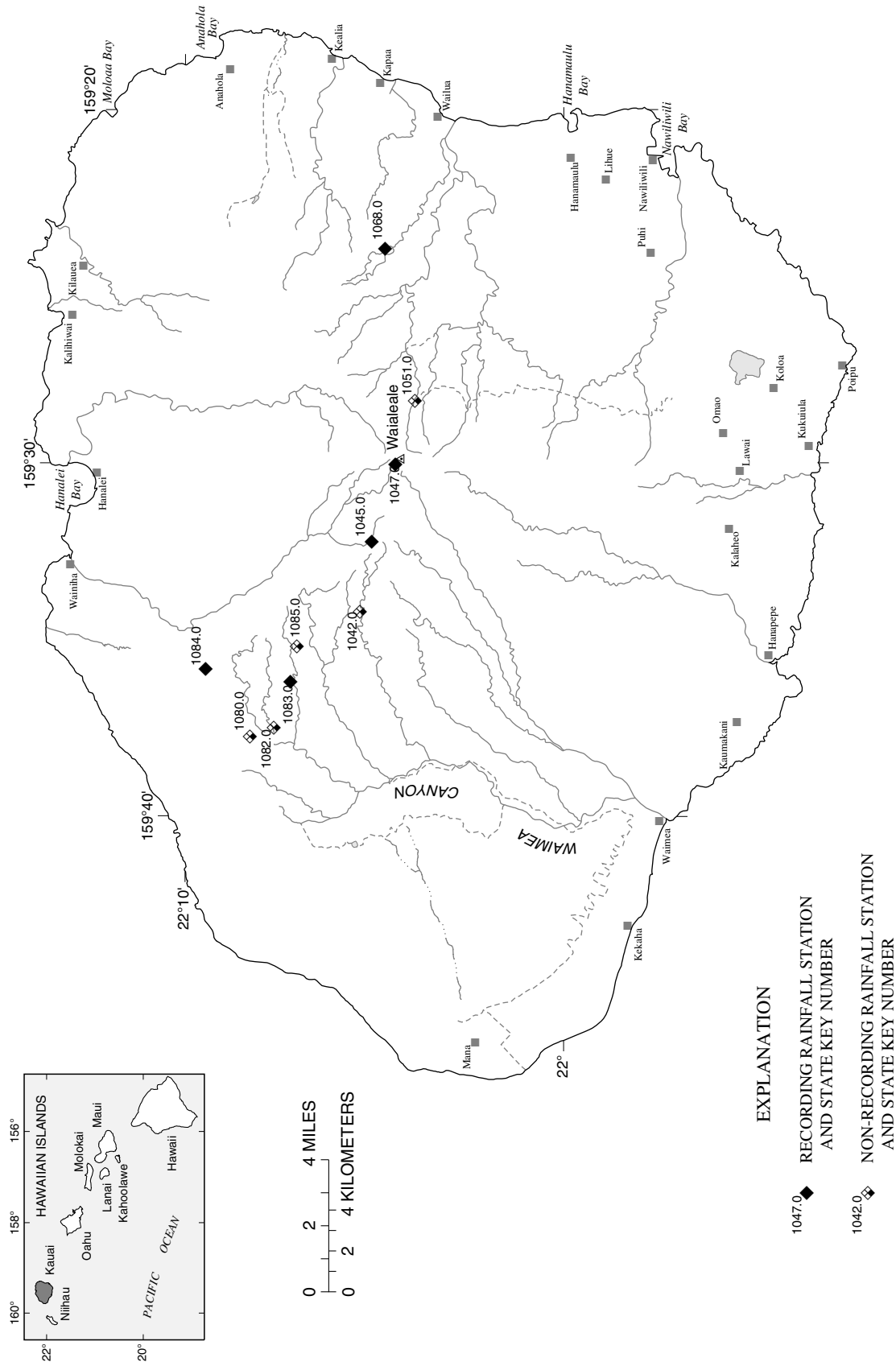


Figure 21. Locations of rainfall stations on Kauai.

RAINFALL RECORDS
HAWAII, ISLAND OF KAUAI

220523159341201. State Key Number 1042.0 Waialae rain gage near Waimea, Kauai.

LOCATION.--Lat 22°05'23", long 159°34'12", Hydrologic Unit 20070000, on ridge 6.4 mi southeast of Kokee Lodge, and 11.0 mi northeast of Waimea.

PERIOD OF RECORD.--1911 to current year. Prior to October 1992, unpublished records are in files of the U.S. Geological Survey and at the National Weather Service.

GAGE.--Standard 8-in. National Weather Service accumulation rain gage with a custom made reduced 1 to 2 ratio rain-gage catchment. Elevation of gage is 4,000 ft (from topographic map).

REMARKS.--Records fair. Cumulative rainfall read in nearest tenths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
INTERMITTENT READINGS

Period	Rainfall
Oct. 01 to Oct. 23	4.1 estimated (a)
Oct. 23 to Dec. 31	22.1 estimated (b)
Jan. 01 to Jan. 20	0.9 estimated (b)
Jan. 20 to Apr. 20	29.2
Apr. 20 to Aug. 03	19.0
Aug. 03 to Sep. 30	8.2 estimated (c)

CAL YR 1998 Total 75.1

WTR YR 1999 Total 83.5

- (a) Estimated values based on accumulation rain can reading of 11.0 inches from Aug. 19 to Oct. 23
 (b) Estimated values based on accumulation rain can reading of 23.0 inches from Oct. 23 to Jan. 20
 (c) Estimated values based on accumulation rain can reading of 14.4 inches from Aug. 03 to Oct. 26

RAINFALL RECORDS
HAWAII, ISLAND OF KAUAI--Continued

220504159321401. State Key Number 1045.0 Waialeale Trail rain gage near Lihue, Kauai.

LOCATION.--Lat 22°05'04", long 159°32'14", Hydrologic Unit 20070000, 14.0 mi west of Kapaa Beach Park and 8.4 mi south of Hanalei Bay.

PERIOD OF RECORD.--1962 to current year. Prior to October 1992, unpublished records are in files of the U.S. Geological Survey and at the National Weather Service.

GAGE.--Electronic data logger with a tipping bucket catchment (0.01 in. per tip). Elevation of gage is 4,560 ft (from topographic map).

REMARKS.--Records good. Recording rainfall in hundredths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.23	.07	.14	.01	2.10	.11	.32	.01	.01	.25	.20	.01
2	.46	.53	.98	.01	.37	.00	.10	.00	.02	.88	.03	.35
3	.86	.57	4.03	.00	.61	.01	.38	.01	.25	.11	.00	.72
4	.22	.05	3.79	.05	.22	.00	.25	.00	.08	.00	.05	.20
5	.30	.03	3.87	.16	1.27	.27	.14	.00	.19	1.05	.31	.08
6	.57	.06	1.60	.01	.18	.24	1.45	.00	.45	1.57	.07	.00
7	1.23	.01	.82	.21	.25	.02	.16	.01	.20	.80	.18	.07
8	.34	.00	.14	.54	.04	.03	1.69	.01	.45	1.42	.01	.31
9	.24	.01	.27	.14	.09	.18	1.13	.12	.40	.23	.02	.05
10	.37	.00	.13	.00	.00	.05	1.74	.07	.03	.42	.08	.10
11	.06	1.23	.33	.00	.64	.10	2.01	.12	.02	.30	.45	.07
12	.16	1.18	.24	.00	.05	.24	1.90	.56	.00	.33	.81	.10
13	1.21	.84	.15	.00	.00	1.12	.15	.07	.02	.17	.58	.40
14	.08	.67	.01	.33	.00	.32	.30	.01	.01	.91	.01	.23
15	.27	.26	.16	.02	.00	.16	.00	.26	.00	.36	.12	.27
16	.67	1.23	.00	.01	.00	.40	.01	1.50	.33	.61	1.51	.14
17	.31	1.10	.00	.00	.00	.66	.11	.96	.44	.93	.04	.36
18	.28	.77	.00	.00	.01	.75	.84	.89	.31	.24	.05	.79
19	.01	1.07	.01	.00	.04	.12	.12	.15	.24	.26	.08	.73
20	.00	1.18	.00	.01	6.96	.34	.18	.07	.25	1.78	.08	.20
21	.01	.82	.03	.54	.84	.16	.16	.06	.64	.13	.01	.35
22	.00	.64	.13	6.89	1.12	.04	.00	.00	.36	.25	.00	.11
23	.00	.04	.09	1.31	.03	.01	.02	.00	1.34	.11	.05	.29
24	.00	.11	.07	3.83	.00	.00	.00	.01	1.19	.09	.84	.09
25	.01	.09	.92	1.69	.00	.01	.03	.12	.27	.12	.67	.40
26	.06	1.10	.01	1.57	.19	1.09	.09	.19	.00	.03	.03	.04
27	.19	2.20	.03	.23	.54	3.51	.12	.03	.05	.10	.36	.03
28	.13	.24	.04	.66	.05	2.06	.00	.04	.16	.81	.72	.01
29	.11	1.23	.02	.76	---	.88	.00	.01	.32	.44	.22	.00
30	.03	1.00	2.10	.96	---	.40	.03	.07	.33	.16	.48	.01
31	.03	---	.10	1.09	---	.83	---	.04	---	.01	.52	---
TOTAL	8.44	18.33	20.21	21.03	15.60	14.11	13.43	5.39	8.36	14.87	8.58	6.51

CAL YR 1998 Total 134.64
WTR YR 1999 Total 154.86

RAINFALL RECORDS
HAWAII, ISLAND OF KAUAI--Continued

220427159300201. State Key Number 1047.0 Mount Waialeale rain gage near Lihue, Kauai.

LOCATION.--Lat 22°04'27", long 159°30'02", Hydrologic Unit 20070000, 3/4 mi north of Kawaikini summit (5,240 ft).

PERIOD OF RECORD.--1910 to current year. Prior to October 1992, unpublished records are in files of the U.S. Geological Survey and at the National Weather Service.

GAGE.--Electronic data logger with a tipping bucket catchment (0.01 in. per tip). Elevation of gage is 5,150 ft (from topographic map).

REMARKS.--Records good. Recorded rainfall read in hundredths of an inch. Accumulated rainfall read in tenths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.40	.27	.38	.01	3.93	.09	.65	.01	.63	.60	.57	.51
2	1.00	1.55	1.65	.00	.91	.01	.70	.51	1.39	3.79	.11	.58
3	2.52	4.46	3.96	.00	.91	.00	1.21	.12	.53	.29	.03	.94
4	.43	1.17	3.13	.04	.45	.00	.93	.01	.34	.08	.88	.51
5	.52	.27	5.15	.21	1.48	2.34	.86	.24	.53	2.67	2.64	.88
6	1.05	.96	2.27	.03	.68	.83	3.51	.03	1.02	3.52	.25	.00
7	1.96	.11	5.02	1.24	1.12	2.31	1.55	.59	.43	2.80	.69	.32
8	.97	.06	2.53	.61	.16	.24	2.72	.37	.70	3.63	.13	1.19
9	1.68	.34	.85	.27	.38	1.58	.93	.57	1.45	1.58	.16	.38
10	1.17	.16	.34	.02	.00	.48	1.55	.58	.78	.87	.17	.34
11	.23	1.24	1.15	.00	1.21	.46	1.93	1.04	.36	.97	.58	.37
12	.51	2.46	.50	.00	1.39	.60	2.84	1.17	.00	.79	1.88	.36
13	1.93	2.16	.64	.01	.03	1.05	1.17	.63	.07	.50	1.70	.52
14	.35	2.09	.00	.88	.02	1.48	1.09	.24	.03	2.98	.40	.54
15	1.47	.70	.14	.30	.02	.44	.00	.36	.03	2.03	.66	.45
16	1.98	3.77	.00	.03	.00	1.96	.27	2.89	1.07	1.73	3.79	.42
17	.66	1.09	.00	.01	.00	1.58	.33	4.22	1.51	3.23	1.35	.75
18	1.04	1.80	.01	.04	.01	1.48	1.83	2.20	1.17	.88	.51	1.73
19	.10	1.56	.00	.00	.67	.33	.52	.66	1.40	.81	.57	2.49
20	.00	1.27	.03	.00	7.26	.30	.77	1.34	1.67	3.61	.89	.81
21	.00	1.39	.59	1.60	4.71	.20	.96	.53	1.66	2.54	.01	.63
22	.00	1.72	.79	8.19	3.14	.22	.07	.06	.76	2.61	.21	.53
23	.06	.12	1.28	1.84	.10	.08	.68	.16	2.00	.40	.89	.72
24	.01	.70	.24	3.97	.00	.03	.07	.26	2.52	.38	1.14	.16
25	.12	.36	1.81	2.22	.00	.19	.17	1.14	.78	.69	1.14	1.57
26	.32	2.09	.20	2.88	.15	2.23	.68	.87	.04	.99	.13	.77
27	.69	3.03	.16	.59	.67	3.48	1.12	.18	.40	1.09	.49	.42
28	.79	.59	.04	1.30	.05	3.29	.47	.66	.35	1.52	.98	.05
29	.48	1.46	.67	.70	---	1.07	.01	.10	1.43	.92	.31	.06
30	.37	.99	2.44	1.74	---	1.04	.17	.27	1.67	.49	.96	.02
31	.53	---	.07	2.33	---	1.30	---	.41	---	.41	.76	---
TOTAL	23.34	39.94	36.04	31.06	29.45	30.69	29.76	22.42	26.72	49.40	24.98	19.02

CAL YR 1998 Total 344.83
WTR YR 1999 Total 362.82

RAINFALL RECORDS
HAWAII, ISLAND OF KAUAI--Continued

220356159281401. State Key Number 1051.0 North Wailua ditch rain gage near Lihue, Kauai.

LOCATION.--Lat 22°03'56", long 159°28'14", Hydrologic Unit 20070000, 4.0 mi west of Wailua Reservoir and 2.0 mi east southeast of Waialeale rain gage.

PERIOD OF RECORD.--1928 to current year. Prior to October 1992, unpublished records are in files of the U.S. Geological Survey and at the National Weather Service.

GAGE.--Standard 8-in. National Weather Service non-recording rain gage. Elevation of gage is 1,110 ft (from topographic map).

REMARKS.--Records good. Cumulative rainfall read in nearest hundredths of an inch. Can readings are made by East Kauai Water Company.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
INTERMITTENT READINGS

Period	Rainfall	Period	Rainfall
Oct. 01 to Oct. 05	1.62 estimated (a)	Mar. 29 to Apr. 05	2.83
Oct. 05 to Oct. 12	3.46	Apr. 05 to Apr. 12	6.00
Oct. 12 to Oct. 19	4.14	Apr. 12 to Apr. 19	2.28
Oct. 19 to Oct. 26	0.16	Apr. 19 to Apr. 26	1.65
Oct. 26 to Nov. 02	1.23	Apr. 26 to May 03	0.95
Nov 02 to Nov. 09	4.26	May 03 to May 10	0.69
Nov. 09 to Nov. 16	4.10	May 10 to May 17	4.98
Nov. 16 to Nov. 23	4.00	May 17 to May 24	2.95
Nov. 23 to Nov. 30	0.92	May 24 to May 31	1.00
Nov. 30 to Dec. 07	10.26	May 31 to Jun. 07	1.94
Dec. 07 to Dec. 14	4.38	Jun. 07 to Jun. 14	1.68
Dec. 14 to Dec. 21	0.23	Jun. 14 to Jun. 21	2.65
Dec. 21 to Dec. 28	1.95	Jun. 21 to Jun. 28	2.42
Dec. 28 to Dec. 31	3.06 estimated (b)	Jun. 28 to Jul. 05	4.55
Jan. 01 to Jan. 04	0.06 estimated (b)	Jul. 05 to Jul. 12	3.70
Jan. 04 to Jan. 11	3.94	Jul. 12 to Jul. 19	3.45
Jan. 11 to Jan. 18	0.67	Jul. 19 to Jul. 26	3.48
Jan. 18 to Jan. 25	9.70	Jul. 26 to Aug. 02	2.63
Jan. 25 to Feb. 01	6.20	Aug. 02 to Aug. 09	1.88
Feb. 01 to Feb. 08	2.20	Aug. 09 to Aug. 16	2.83
Feb. 08 to Feb. 16	1.10	Aug. 16 to Aug. 23	1.80
Feb. 16 to Feb. 23	1.84	Aug. 23 to Aug. 30	2.35
Feb. 23 to Mar. 01	1.20	Aug. 30 to Sep. 07	1.86
Mar. 01 to Mar. 08	2.76	Sep. 07 to Sep. 13	1.36
Mar. 08 to Mar. 15	2.31	Sep. 13 to Sep. 20	2.00
Mar. 15 to Mar. 22	2.24	Sep. 20 to Sep. 27	0.93
Mar. 22 to Mar. 29	3.15	Sep. 27 to Sep. 30	0.29 estimated (c)

CAL YR 1998 Total 126.73

WTR YR 1999 Total 146.27

- (a) Estimated value based on accumulation rain can reading of 2.16 inches from Sep. 28 to Oct. 05
 (b) Estimated value based on accumulation rain can reading of 3.12 inches from Dec. 28 to Jan. 04
 (c) Estimated value based on accumulation rain can reading of 1.46 inches from Sep. 27 to Oct. 04

RAINFALL RECORDS
HAWAII, ISLAND OF KAUAI--Continued

220443159235601. State Key Number 1068.0 Left Branch Opaeka rain gage near Kapaa, Kauai.

LOCATION.--Lat 22°04'43", long 159°23'56", Hydrologic Unit 20070000, in USGS stream-gaging station 16071500 on left bank, 5.0 mi west of Kapaa Beach Park and 0.7 mi northeast of Wailua Reservoir.

PERIOD OF RECORD.--1960 to current year. Prior to October 1992, unpublished records are in files of the U.S. Geological Survey and at the National Weather Service.

GAGE.--Electronic data logger with a tipping bucket catchment (0.01 in. per tip). Elevation of gage is 470 ft (from topographic map).

REMARKS.--Records good. Recorded rainfall read in hundredths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.09	.07	.00	.00	.30	.00	.12	.03	.10	.12	.05	.14
2	.17	.53	.68	.00	.09	.00	.14	.00	.12	.78	.05	.22
3	.14	.27	.81	.00	.22	.01	.92	.02	.01	.66	.00	.39
4	.02	.36	.25	.01	.07	.02	.11	.00	.00	.25	.08	.29
5	.19	.62	.53	.02	.39	.83	.05	.01	.08	.82	.29	.17
6	.23	.00	.37	.05	.09	.00	.21	.00	.26	.76	.03	.00
7	.73	.11	.52	4.20	.11	.03	.02	.05	.09	.52	.30	.14
8	.05	.02	.23	.48	.00	.00	.09	.01	.15	.57	.10	.21
9	.51	.06	.22	.04	.14	.25	.18	.00	.40	.17	.04	.04
10	.29	.01	.06	.00	.19	.01	.18	.03	.10	.13	.13	.04
11	.11	.10	.22	.00	.14	.03	.59	.15	.02	.20	.21	.06
12	.11	.57	.04	.06	.11	.07	.35	.92	.01	.04	.58	.41
13	.14	.28	.06	.00	.01	.21	.09	.07	.02	.06	.64	.08
14	.07	.08	.01	.09	.00	.27	.01	.00	.01	.58	.02	.03
15	.10	.16	.00	.01	.00	.10	.00	.62	.00	.24	.02	.10
16	.39	.11	.00	.45	.00	.48	.08	1.80	.14	.13	.41	.21
17	.29	.21	.00	.01	.01	.51	.08	1.33	.27	.53	.15	.10
18	.14	.48	.01	.02	.00	.30	.36	.04	.17	.25	.03	.30
19	.03	.30	.00	.00	.11	.03	.01	.03	.10	.39	.08	.53
20	.00	.46	.00	.00	.36	.00	.04	.00	.56	.73	.34	.13
21	.00	.31	.08	.23	.50	.01	.63	.04	.37	.58	.01	.20
22	.00	.35	.12	2.51	.05	.01	.00	.00	.08	.35	.00	.13
23	.00	.02	.03	.57	.02	.00	.04	.01	.60	.01	.08	.04
24	.01	.06	.05	.54	.00	.02	.03	.05	.51	.09	.19	.00
25	.05	.06	.16	.19	.00	.02	.03	.06	.29	.02	.12	.22
26	.06	.30	.02	.54	.06	.58	.14	.07	.00	.11	.02	.19
27	.08	.47	.20	.23	.16	.58	.00	.00	.09	.12	.30	.30
28	.14	.12	.09	.26	.09	.68	.00	.00	.02	.25	.67	.01
29	.05	.19	.17	.17	---	.19	.00	.14	.09	.05	.11	.05
30	.13	.16	.67	.29	---	.17	.04	.00	.09	.21	.18	.01
31	.03	---	.11	.24	---	.19	---	.61	---	.04	.05	---
TOTAL	4.35	6.84	5.71	11.21	3.22	5.60	4.54	6.09	4.75	9.76	5.28	4.74

CAL YR 1998 TOTAL 57.84

WTR YR 1999 TOTAL 72.09

RAINFALL RECORDS
HAWAII, ISLAND OF KAUAI--Continued

220817159374401. State Key Number 1080.0 Paukahana rain gage near Waimea, Kauai.

LOCATION.--Lat 22°08'17", long 159°37'44", Hydrologic Unit 20070000, 2.0 mi east of Kokee lodge and 7.0 mi south southwest of Kailiu Point.
PERIOD OF RECORD.--1910 to current year. Prior to October 1992, unpublished records are in files of the U.S. Geological Survey and at the National Weather Service.

GAGE.--Standard 8-in. National Weather Service accumulation rain gage. Elevation of gage is 3,700 ft (from topographic map).

REMARKS.--Records fair. Cumulative rainfall read in nearest tenths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
INTERMITTENT READINGS

Period	Rainfall
Oct. 01 to Oct. 13	1.4 estimated (a)
Oct. 13 to Nov. 23	8.7
Nov. 23 to Dec. 31	7.1 estimated (b)
Jan. 01 to Feb. 01	5.5 estimated (b)
Feb. 01 to Apr. 08	5.5
Apr. 08 to Jun. 15	6.8
Jun. 15 to Aug. 06	6.7
Aug. 06 to Sep. 30	5.1 estimated (c)

CAL YR 1998 TOTAL 57.1

WTR YR 1999 TOTAL 46.8

220739159373001. State Key Number 1082.0 Waiakoali rain gage near Waimea, Kauai.

LOCATION.--Lat 22°07'39", long 159°37'30", Hydrologic Unit 20070000, 2.4 mi east southeast of Kokee Lodge and 7.4 mi south southwest of Kailiu Point.

PERIOD OF RECORD.--1910 to current year. Prior to October 1992, unpublished records are in files of the U.S. Geological Survey and at the National Weather Service.

GAGE.--Standard 8-in. National Weather Service accumulation rain gage with a custom made reduced 1 to 2 ratio rain-gage catchment. Elevation of gage is 3,420 ft (from topographic map).

REMARKS.--Records good. Cumulative rainfall read in nearest tenths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
INTERMITTENT READINGS

Period	Rainfall
Oct. 01 to Oct. 13	1.7 estimated (d)
Oct. 13 to Nov. 23	7.8
Nov. 23 to Dec. 31	8.0 estimated (e)
Jan. 01 to Feb. 01	6.2 estimated (e)
Feb. 01 to Apr. 08	5.8
Apr. 08 to Jun. 15	6.6
Jun. 15 to Aug. 06	6.2
Aug. 06 to Sep. 30	4.6 estimated (f)

CAL YR 1998 TOTAL 56.0

WTR YR 1999 TOTAL 46.9

- (a) Estimated values based on accumulation rain can reading of 6.0 inches from Aug. 11 to Oct. 13
- (b) Estimated values based on accumulation rain can reading of 12.6 inches from Nov. 23 to Feb. 01
- (c) Estimated values based on accumulation rain can reading of 6.4 inches from Aug. 06 to Oct. 15
- (d) Estimated values based on accumulation rain can reading of 7.6 inches from Aug. 11 to Oct. 13
- (e) Estimated values based on accumulation rain can raading of 14.2 inches from Nov. 23 to Feb. 01
- (f) Estimated values based on accumulation rain can reading of 5.8 inches from Aug. 06 to Oct. 15

RAINFALL RECORDS
HAWAII, ISLAND OF KAUAI--Continued

220713159361201. State Key Number 1083.0 Mohihi crossing rain gage near Waimea, Kauai.

LOCATION.--Lat 22°07'13", long 159°36'12", Hydrologic Unit 20070000, 3.8 mi east of Kokee Lodge and 7.5 mi south of Kailiu Point.

PERIOD OF RECORD.--1910 to current year. Prior to October 1992, unpublished records are in files of the U.S. Geological Survey and at the National Weather Service.

GAGE.--Electronic data logger with a tipping bucket catchment (0.01 in. per tip). Elevation of gage is 3,420 ft (from topographic map).

REMARKS.--Records good for period of daily record and fair for period of accumulated totals. Accumulated rainfall recorded in tenths of an inch and recording rainfall recorded in hundredths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.08	.04	.05	.01	---	---	---	.00	.00	.07	.03	.00
2	.01	.08	.26	.00	---	---	---	.00	.00	.73	.02	.07
3	.10	.19	1.14	.00	---	---	---	.00	.02	.00	.00	.61
4	.03	.01	.93	.09	---	---	---	.00	.01	.00	.01	.08
5	.06	.00	.70	.08	---	---	---	.00	.02	.62	.08	.00
6	.40	.00	.12	.02	---	---	---	.00	.19	.36	.04	.00
7	.80	.00	.06	.23	---	---	---	.00	.11	.18	.18	.06
8	.20	.00	.02	.57	---	---	a9.30	.00	.35	.29	.01	.18
9	.06	.00	.12	.17	---	---	.40	.00	.22	.07	.00	.01
10	.21	.00	.03	.01	---	---	.74	.02	.00	.03	.05	.01
11	.02	1.09	.21	.00	---	---	.86	.00	.01	.08	.17	.00
12	.10	.81	.14	.00	---	---	.50	.34	.00	.20	.22	.16
13	.09	.50	.01	.00	---	---	.06	.04	.01	.13	.21	.33
14	.01	.32	.01	.01	---	---	.00	.01	.00	.18	.00	.12
15	.01	.49	.12	.00	---	---	.00	.50	.00	.11	.03	.07
16	.00	1.02	.00	.00	---	---	.00	1.66	.07	.08	.17	.03
17	.02	1.01	.00	.00	---	---	.07	1.65	.10	---	.00	.08
18	.05	.67	.00	.00	---	---	.10	.04	.16	---	.00	.43
19	.01	.70	.00	.00	---	---	.01	.01	.12	---	.03	.20
20	.00	.56	.00	.00	---	---	.03	.00	.16	---	.00	.03
21	.00	.47	.00	.71	---	---	.10	.01	.35	---	.00	.12
22	.00	.47	.00	3.63	---	---	.00	.02	.23	---	.00	.01
23	.00	.01	.01	.21	---	---	.00	.00	.65	---	.00	.13
24	.00	.10	.00	1.20	---	---	.00	.00	.39	---	.35	.01
25	.00	.03	.20	.17	---	---	.02	.02	.09	b1.25	.25	.10
26	.00	.68	.00	.24	---	---	.01	.08	.00	.00	.03	.03
27	.02	.39	.00	.12	---	---	.02	.01	.03	.02	.27	.12
28	.02	.05	.00	.07	---	---	.00	.02	.00	.43	.75	.01
29	.01	.77	.00	.05	---	---	.01	.00	.13	.39	.18	.00
30	.01	.25	3.12	.04	---	---	.27	.00	.04	.02	.23	.00
31	.00	---	.09	.03	---	---	---	.00	---	.00	.13	---
TOTAL	2.32	10.71	7.34	7.66	---	---	---	4.43	3.46	5.24	3.44	3.00

CAL YR 1998 Total 65.12

WTR YR 1999 Total 60.10

(a) Catchment plugged. Used adjacent accumulation can reading of 8.3 inches from Feb. 01 (1230) to Apr. 08 (1115)
(b) No daily record for Jul. 17 (0001) to Jul. 25 (2400). Total accumulated rainfall for the period is 1.25 inches

RAINFALL RECORDS
HAWAII, ISLAND OF KAUAI--Continued

220927159355001. State Key Number 1084.0 Kilohana rain gage near Hanalei, Kauai.

LOCATION.--Lat 22°09'27", long 159°35'50", Hydrologic Unit 20070000, 4.1 mi east southeast of Kalalau Beach and 4.9 mi south southwest of Kailiu Point.

PERIOD OF RECORD.--1910 to current year. Prior to October 1992, unpublished records are in files of the U.S. Geological Survey and at the National Weather Service.

GAGE.--Electronic data logger with a tipping bucket catchment (0.01 in. per tip). Elevation of gage is 4,000 ft (from topographic map).

REMARKS.--Records good. Recording rainfall in hundredths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.12	.07	.06	.05	.21	.18	.10	.03	.00	.59	.04	.01
2	.00	.09	.48	.00	.16	.01	.03	.00	.00	.90	.05	.29
3	.13	.28	1.89	.00	.73	.00	.23	.03	.08	.01	.00	1.16
4	.12	.01	.70	.01	.29	.00	.11	.00	.06	.00	.05	.13
5	.10	.01	.98	.11	1.00	.00	.00	.00	.12	1.78	.17	.05
6	.64	.05	.26	.01	.02	.02	.32	.00	.67	.92	.06	.00
7	1.15	.00	.10	.09	.38	.17	.01	.00	.11	1.08	.13	.07
8	.20	.61	.02	.42	.03	.00	.86	.00	.66	.85	.00	.22
9	.05	.00	.18	.48	.01	.03	.60	.00	1.22	.52	.01	.12
10	.43	.00	.07	.02	.00	.01	1.08	.01	.09	.03	.09	.03
11	.02	1.49	.33	.00	1.04	.01	2.13	.00	.02	.11	.87	.00
12	.10	3.60	.20	.00	.29	.88	1.85	.06	.01	.37	.65	.26
13	.26	1.35	.01	.00	.00	.85	.06	.02	.24	.77	.38	.21
14	.02	1.03	.00	.03	.00	.17	.00	.12	.01	.81	.04	.09
15	.08	.78	.15	.00	.09	.09	.01	.76	.01	.74	.16	.10
16	.06	.96	.01	.01	.00	.36	.00	.66	.29	.25	.74	.10
17	.06	2.08	.00	.00	.03	.63	.10	.79	.32	.49	.07	.15
18	.18	1.14	.00	.00	.02	1.34	.42	.07	.40	.15	.05	.76
19	.04	1.80	.00	.01	.00	.20	.03	.09	.18	.27	.11	.32
20	.12	1.15	.00	.02	1.27	.17	.02	.03	.21	.52	.01	.05
21	.01	.81	.01	.59	.03	.15	.13	.01	.34	.14	.00	.15
22	.01	.60	.00	4.13	.19	.11	.00	.02	.70	.58	.00	.01
23	.01	.02	.01	.05	.01	.03	.00	.01	1.19	.58	.09	.18
24	.01	.24	.01	1.95	.00	.01	.01	.00	.61	.05	.42	.02
25	.02	.07	.29	.76	.00	.00	.07	.26	.28	.01	.56	.03
26	.02	.59	.00	1.30	.50	.34	.00	.19	.00	.01	.27	.17
27	.04	.86	.00	.15	.82	1.45	.02	.04	.12	.08	.53	.23
28	.03	.02	.61	.29	.05	.63	.00	.02	.01	.88	1.33	.00
29	.02	.80	.00	.74	---	.44	.00	.00	.31	.96	.48	.00
30	.00	.58	1.82	.13	---	.32	.09	.00	.42	.15	.51	.02
31	.00	---	.29	.20	---	.16	---	.00	---	.03	.35	---
TOTAL	4.05	21.09	8.48	11.55	7.17	8.76	8.28	3.22	8.68	14.63	8.22	4.93

CAL YR 1998 Total 147.48

WTR YR 1999 Total 109.06

RAINFALL RECORDS
HAWAII, ISLAND OF KAUAI--Continued

220703159351201. State Key Number 1085.0 Mohihi-Koaie divide rain gage near Waimea, Kauai.

LOCATION.--Lat 22°07'03", long 159°35'12", Hydrologic Unit 20070000, 5.0 mi east of Kokee Lodge and 7.5 mi south of Kailiu Point.

PERIOD OF RECORD.--1910 to current year. Prior to October 1992, unpublished records are in files of the U.S. Geological Survey and at the National Weather Service.

GAGE.--Standard 8-in. National Weather Service accumulation rain gage. Elevation of gage is 4,000 ft (from topographic map).

REMARKS.--Records good. Cumulative rainfall read in nearest tenths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
INTERMITTENT READINGS

Period	Rainfall
Oct. 01 to Oct. 23	3.6 estimated (a)
Oct. 23 to Dec. 31	22.8 estimated (b)
Jan. 01 to Jan. 20	1.0 estimated (b)
Jan. 20 to Apr. 15	25.0
Apr. 15 to Aug. 03	15.2
Aug. 03 to Sep. 30	8.2 estimated (c)

CAL YR 1998 Total 77.7

WTR YR 1999 Total 75.8

- (a) Estimated values based on accumulation rain can reading of 9.8 inches from Aug. 19 to Oct. 23
 (b) Estimated values based on accumulation rain can reading of 23.8 inches from Oct. 23 to Jan. 20
 (c) Estimated values based on accumulation rain can reading of 10.2 inches from Aug. 03 to Oct. 14

RAINFALL RECORDS
HAWAII, ISLAND OF OAHU--Continued

212428157511201. State Key Number 771.11 North Halawa Valley rain gage at tunnel portal near Kaneohe, Oahu.

LOCATION.--Lat 21°24'28", long 157°51'12", Hydrologic Unit 20060000, on roof of Halawa portal control center, 3.2 mi west of Kaneohe Post Office and 2.4 mi southwest of Ahuimanu School.

PERIOD OF RECORD.--Continuous-record station, July 15, 1998 to current year.

GAGE.--Standard 8-in. National Weather Service collector attached to a 7 5/16-in. rain can with float-type recorder system. Elevation of the gage is 1,100 ft above mean sea level (from topographic map).

REMARKS.--Records good. Rainfall read in nearest tenths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.10	.10	.00	.00	.10	.00	.30	.10	.00	.70	.00	.20
2	.40	1.80	1.10	.00	.20	.00	.20	.10	.20	.60	.00	.00
3	.20	.60	.80	.00	.20	.00	.50	.00	.00	.00	.00	.20
4	.10	.70	.40	.00	.60	.30	.50	.00	.00	.00	.40	.30
5	.10	.80	.70	.50	.40	.00	.00	.00	.10	.20	.80	.00
6	.00	.00	.60	.20	.20	.60	1.60	.00	.20	.60	.10	.00
7	.10	1.40	1.00	2.80	.20	.10	.00	.20	.30	.10	.20	.00
8	.80	.20	1.50	.30	.10	.00	.20	.00	.10	.10	.00	.30
9	.50	.50	.00	.00	.00	.50	.30	.00	.60	.60	.00	.20
10	.30	.00	.10	.00	.00	.60	.80	.30	.10	.10	.30	.60
11	.00	.10	.30	.00	.30	.30	1.10	.20	.00	.60	.50	.60
12	1.10	.10	.40	.00	.20	.10	2.00	.40	.00	.20	.50	.20
13	.50	2.10	.10	.00	.00	.40	.40	.00	.00	.30	.70	.00
14	.50	.70	.10	.20	.60	1.00	.20	.00	.00	.40	.40	.00
15	.00	.10	.10	.30	.60	1.70	.00	.10	1.40	.80	.40	.00
16	.50	1.40	.00	.40	.00	1.20	.00	2.20	.10	.60	.90	.30
17	.00	.70	.00	.10	.00	.40	1.10	.20	.30	.90	.00	.10
18	.10	1.90	.00	.00	.60	.20	.60	.10	.00	.20	.00	.00
19	.10	.70	.00	.10	.20	.30	.00	.00	.40	.80	.30	.60
20	.00	.50	.00	.10	1.20	.70	.60	.60	.20	1.10	.00	.40
21	.00	.60	.00	.00	1.10	.50	.10	.00	.10	.20	.00	.30
22	.00	.40	.50	2.20	.70	.00	.60	.00	.40	.30	.00	.20
23	.00	.00	.20	.00	.10	.10	.00	.00	1.00	.70	.10	.00
24	.00	.00	.30	.70	.00	.00	.00	.10	.90	.20	.00	.10
25	.60	.00	.80	1.00	.10	.00	.00	.70	.00	.40	.00	1.10
26	.60	.20	.40	1.20	.00	.40	.80	.20	.10	.20	.70	.20
27	.20	.70	.00	.00	.00	.80	.30	.10	.40	.50	.20	.00
28	.20	.00	2.10	.50	.00	.90	.00	.20	.10	.70	.10	.00
29	.00	.40	.00	.00	---	.50	.00	.00	.20	.10	.10	.10
30	.10	.70	.10	1.00	---	.30	.10	.30	.40	.20	.40	.00
31	.10	---	2.00	2.10	---	.40	---	.00	---	.00	.40	---
TOTAL	7.20	17.40	13.60	13.70	7.70	12.30	12.30	6.10	7.60	12.40	7.50	6.00

WTR YR 1999 TOTAL 123.8

RAINFALL RECORDS
HAWAII, ISLAND OF OAHU

212304157542201. State Key Number 771.9 North Halawa rain gage near Honolulu, Oahu.

LOCATION.--Lat 21°23'04", long 157°54'22". (Waipahu quadrangle, 1983, 1:24000) Hydrologic Unit 20060000, in USGS stream-gaging station 16226200, on right bank, 0.6 mi north of Oahu Prison, 1.0 mi south of Keiwa Heiau, and 1.7 mi east of Aiea High School.

PERIOD OF RECORD.--Continuous-record station, May 1, 1983 to current year. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey.

GAGE.--Standard 8-in. National Weather Service rain gage receiver and 7 5/16-in. rain can with float-type system attached to an electronic data logger. Elevation of gage is 160 ft above mean sea level (from topographic map).

REMARKS.--Records good. Rainfall read in 0.1-inch increments, at intervals of 30 minutes from October 1 to September 2, and 15 minutes from September 2--30.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.0	.0	.0	.0	.1	.0	.1	.0	.0	.2	.0	.0
2	.1	.0	.2	.0	.1	.0	.0	.0	.0	.0	.0	.0
3	.0	.0	.3	.0	.1	.0	.0	.0	.0	.0	.0	.1
4	.0	.2	.2	.0	.3	.0	.5	.0	.0	.0	.1	.1
5	.0	.2	.5	.1	.0	.0	.1	.0	.0	.1	.1	.0
6	.0	---	.0	.2	.1	.0	.1	.0	.0	.2	.1	.0
7	.0	---	.2	.0	.0	.0	.3	.0	.1	.0	.0	.0
8	.0	---	.2	.2	.0	.0	.3	.0	.0	.0	.0	.1
9	.0	---	.3	.1	.0	.0	.1	.0	.0	.1	.0	.0
10	.0	---	.0	.0	.0	.0	.4	.0	.0	.0	.0	.1
11	.0	---	.0	.0	.0	.1	1.1	.1	.0	.0	.1	.0
12	.0	---	.0	.0	.1	.1	1.0	.2	.0	.1	.1	.2
13	.1	a---	.0	.0	.0	.2	.1	.0	.0	.1	.0	.0
14	.0	---	.0	.0	.0	.1	.0	.0	.0	.1	.0	.0
15	.0	---	.0	.0	.0	.2	.0	.1	.1	.0	.0	.1
16	.0	---	.0	.0	.0	.2	.0	1.7	.0	.1	.1	.0
17	.0	---	.0	.0	.0	.1	.1	.3	.0	.3	.0	.0
18	.0	b---	.0	.0	.0	.0	.2	.0	.0	.0	.0	.1
19	.0	.4	.0	.0	.0	.1	.0	.0	.1	.1	.0	.0
20	.0	.8	.0	.0	.4	.7	.1	.0	.1	.2	.0	.0
21	.0	.1	.0	.0	1.0	.3	.0	.0	.1	.0	.0	.0
22	.0	.2	.0	1.2	.3	.0	.0	.0	.2	.1	.0	.0
23	.0	.0	.0	.0	.0	.0	.0	.0	.3	.3	.0	.0
24	.0	.0	.0	.6	.0	.0	.0	.0	.4	.0	.0	.0
25	.0	.0	.2	.3	.0	.0	.0	.0	.0	.0	.0	.1
26	.0	.0	.0	.3	.0	.1	.1	.1	.0	.0	.2	.0
27	.1	.0	.0	.0	.0	.5	.0	.0	.1	.1	.0	.0
28	.0	.0	.0	.2	.0	.3	.0	.0	.0	.3	.0	.0
29	.0	.2	.0	.0	---	.1	.0	.0	.0	.0	.0	.0
30	.0	.2	.0	.2	---	.2	.0	.0	.0	.0	.1	.0
31	.1	---	1.0	.8	---	.1	---	.0	---	.0	.0	---
TOTAL	0.4	---	3.1	4.2	2.5	3.4	4.6	2.5	1.5	2.4	0.9	0.9
CAL YR 1998	TOTAL 23.4											
WTR YR 1999	TOTAL 31.8											

a Cumulative reading November 6 (1700) to November 13 (0930) is 0.1.

b Cumulative reading November 13 (1000) to November 18 (1200) is 3.0.

RAINFALL RECORDS
HAWAII, ISLAND OF OAHU--Continued

212253157522201. State Key Number 772.0 Moanalua rain gage near Honolulu, Oahu.

LOCATION.--Lat 21°22'53", long 157°52'22", Hydrologic Unit 20060000, 1.8 mi northeast of Tripler Hospital, and 5.0 mi north of Honolulu Post Office.

PERIOD OF RECORD.--Accumulated-rainfall station, June 1926 (revised) to December 8, 1964. Continuous-record station, December 8, 1964 to current year. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey.

GAGE.--Standard 8-in. National Weather Service collector attached to a 7 5/16-in. rain can with float-type recorder system. An electronic data logger was installed on February 6, 1997 replacing the digital recorder. Housed with recording crest-gage. Elevation of the gage is 340 ft above mean sea level (from topographic map).

REMARKS.--Records good. Rainfall read in nearest tenths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.1	.1	.1	.1	.3	.0	.2	.1	.0	.3	.0	.0
2	.2	.5	.8	.0	.2	.0	.0	.0	.1	.1	.0	.0
3	.1	.1	1.1	.0	.2	.0	.0	.0	.1	.0	.0	.3
4	.0	.4	.4	.0	.4	.0	1.9	.0	.3	.0	.3	.5
5	.2	.5	1.0	.3	.1	.0	.3	.0	.0	.0	.4	.0
6	.1	.1	.2	.1	.3	.4	.7	.0	.2	.4	.0	.0
7	.0	.0	1.0	.3	.1	.0	.1	.0	.2	.1	.0	.0
8	.3	.2	.8	.2	.0	.0	.6	.0	.1	.2	.0	.2
9	.1	.1	.3	.0	.0	.1	.3	.0	.1	.1	.0	.1
10	.1	.0	.0	.0	.1	.7	1.0	.2	.0	.2	.2	.2
11	.0	.0	.1	.0	.1	.2	1.4	.1	.0	.3	.3	.1
12	.3	.0	.2	.0	.2	.1	1.6	.3	.0	.2	.3	.2
13	.7	1.3	.1	.0	.0	.5	.2	.0	.0	.3	.2	.0
14	.1	.7	.0	.2	.2	.4	.2	.0	.0	.2	.1	.0
15	.2	.0	.0	.0	.0	1.1	.0	.0	.3	.3	.2	.1
16	.2	.5	.0	.3	.0	1.1	.0	1.6	.2	.2	.3	.1
17	.1	.8	.0	.0	.0	.4	.6	.3	.0	.6	.0	.1
18	.1	1.3	.0	.0	.0	.0	.4	.0	.0	.1	.0	.1
19	.0	.7	.0	.0	.0	.2	.1	.0	.2	.4	.0	.1
20	.0	1.1	.0	.0	1.4	1.1	.1	.2	.1	.5	.0	.2
21	.0	.5	.0	.0	1.3	.5	.0	.0	.0	.1	.0	.3
22	.0	.3	.3	2.1	.8	.0	.0	.0	.5	.2	.0	.1
23	.0	.0	.1	.0	.1	.0	.0	.0	.6	.4	.0	.0
24	.0	.0	.1	1.1	.0	.0	.0	.0	.7	.2	.0	.1
25	.2	.0	.9	1.0	.0	.0	.0	.3	.0	.0	.0	.3
26	.1	.1	.1	1.0	.0	.3	.5	.1	.1	.1	.4	.0
27	.1	.4	.0	.3	.0	1.0	.0	.0	.2	.2	.1	.0
28	.1	.0	.1	.4	.0	.6	.0	.1	.1	.6	.0	.1
29	.0	.4	.0	.1	---	.4	.0	.0	.0	.0	.1	.0
30	.1	.3	.1	.6	---	.2	.3	.0	.2	.2	.3	.0
31	.0	---	2.5	1.9	---	.4	---	.0	---	.0	.2	---
TOTAL	3.5	10.4	10.3	10.0	5.8	9.7	10.5	3.3	4.3	6.5	3.4	3.2
CAL YR 1998	TOTAL 62.7											
WTR YR 1999	TOTAL 80.9											

RAINFALL RECORDS
HAWAII, ISLAND OF OAHU--Continued

212346157533701. State Key Number 772.1 North Halawa rain gage near Aiea, Oahu.

LOCATION.--Lat 21°23'46" (revised), long 157°53'37", Hydrologic Unit 20060000, 2.7 mi above confluence with South Halawa Stream, 2.7 mi northeast of Aiea Post Office, and 6.5 mi northwest of Honolulu.

PERIOD OF RECORD.--Continuous-record station, August 6, 1929 to June 30, 1933, June 3, 1953 to current year. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey.

GAGE.--A 12-in. collector and 10-in. storage tank with float-type recorder system. Elevation of gage is 320 ft above mean sea level (from topographic map).

REMARKS.--Records good. Rainfall recorded in 0.083-inch increments.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	---	.00	.00	.08	.00	.00	.00	.00	.25	.00	.00
2	.00	---	.42	.00	.08	.00	.00	.00	.08	.00	.00	.00
3	.00	---	.58	.00	.00	.00	.00	.00	.00	.00	.00	.25
4	---	---	.25	.00	.00	.00	.00	.00	.08	.00	.08	.08
5	---	---	.67	.17	.00	.00	.00	.00	.00	.08	.08	.00
6	---	---	.17	.17	.00	.00	.42	.00	.00	.25	.08	.00
7	---	---	.58	.08	.00	.00	.17	.08	.50	.00	.08	.00
8	.33	---	.25	.17	.00	.00	.17	.00	.00	.08	.00	.08
9	---	---	.17	.08	.00	.00	.25	.00	.08	.08	.00	.08
10	---	---	.00	.00	.00	.00	.67	.08	.00	.00	.00	.08
11	---	---	.08	.00	.00	.00	1.17	.08	.00	.17	.17	.00
12	---	---	.08	.00	.00	.00	1.17	.17	.00	.08	.33	.08
13	---	---	.08	.00	.00	.00	.17	.00	.00	.17	.00	.00
14	---	---	.00	.00	.00	.00	.08	.00	.00	.08	.00	.00
15	.00	---	.00	.00	.00	.00	.00	.00	.33	.08	.00	.00
16	---	---	.00	.08	.00	.00	.00	1.42	.08	.25	.17	.00
17	---	---	.00	.00	.00	.00	.25	.25	.08	.42	.00	.00
18	.00	a--	.00	.00	.00	.00	.42	.00	.00	.08	.00	.08
19	.00	.58	.00	.00	.00	.00	.00	.00	.08	.25	.00	.00
20	---	.58	.00	.00	.00	.00	.08	.00	.17	.50	.00	.00
21	.00	.33	.00	.00	.00	.00	.00	.00	.08	.00	.00	.17
22	.00	.17	.00	1.42	.00	.00	.00	.00	.25	.08	.00	.00
23	---	.00	.08	.00	.00	.00	.00	.00	.42	.42	.00	.00
24	---	.00	.00	.67	.00	.00	.00	.00	.67	.00	.00	.00
25	---	.00	.50	.58	.00	.00	.00	.17	.00	.08	.00	.42
26	---	.00	.00	.58	.00	.00	.25	.08	.00	.00	.17	.00
27	---	.25	.08	.08	.00	.00	.00	.00	.08	.00	.00	.00
28	---	.00	.00	.25	.00	.00	.00	.00	.08	.42	.00	.00
29	---	.25	.00	.00	---	.00	.00	.00	.00	.00	.08	.08
30	---	.33	.00	.17	---	.00	.08	.00	.08	.00	.08	.00
31	---	---	1.17	.25	---	.00	---	.00	---	.00	.08	---
TOTAL	---	---	5.16	4.75	0.16	0.00	5.35	2.33	3.14	3.82	1.40	1.40

CAL YR 1998 TOTAL 33.84
WTR YR 1999 TOTAL 35.90

a Cumulative reading October 1 to November 18, 1998 is 5.90.

RAINFALL RECORDS
HAWAII, ISLAND OF OAHU--Continued

212359157502601. State Key Number 772.3 Moanalua rain gage no. 1 at altitude 1,000 ft near Honolulu, Oahu.

LOCATION.--Lat 21°23'59", long 157°50'26", (Kaneohe quadrangle, 1959, 1:24000) Hydrologic Unit 20060000, 2.7 mi southwest of Kaneohe Post Office, and 4.2 mi northeast of Tripler Hospital.

PERIOD OF RECORD.--Continuous-record station, June 25, 1968 to current year. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey.

GAGE.--Standard 8-in. National Weather Service collector and 7 5/16-in. rain can with recorder. An electronic data logger was installed on February 5, 1997 replacing the digital recorder. Elevation of gage is 1,000 ft above mean sea level (from topographic map).

REMARKS.--Records good except for periods of no record, May 17-20 and August 5 to September 30, which are considered poor. Rainfall recorded in tenths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.0	.0	.0	.0	.1	.0	.2	.0	.0	.3	.0	.0
2	.4	1.9	.8	.0	.1	.0	.0	.0	.1	.3	.0	.0
3	.1	.6	.9	.0	.2	.0	.2	.0	.0	.0	.0	.1
4	.0	1.0	.2	.0	.4	.0	.7	.0	.1	.0	.3	.3
5	.2	.7	.5	.2	.2	.1	.0	.0	.0	.1	.2	.0
6	.2	.1	.3	.2	.4	.7	1.6	.0	.2	.6	.0	.0
7	.0	1.2	1.0	3.2	.1	.0	.0	.2	.2	.0	.0	.0
8	.4	.4	2.4	.2	.1	.0	.0	.0	.2	.2	.0	.0
9	.2	.3	.1	.0	.0	.3	.3	.0	.5	.5	.0	.0
10	.1	.0	.0	.1	.1	.4	.7	.1	.1	.2	.0	.5
11	.1	.0	.1	.0	.3	.1	1.4	.1	.0	.8	.0	.2
12	.7	.1	.2	.0	.1	.1	2.2	.1	.0	.1	.3	.0
13	.6	1.8	.0	.0	.0	.2	.2	.0	.0	.5	.2	.0
14	.4	.3	.0	.1	.3	.6	.1	.0	.0	.2	.4	.0
15	.1	.0	.2	.0	.4	1.5	.0	.0	.9	.7	.4	.0
16	.4	.5	.0	.6	.0	1.5	.0	1.7	.2	.3	.4	.1
17	.1	1.2	.0	.1	.0	.5	.9	---	.2	1.1	.0	.0
18	.2	1.1	.0	.0	.5	.1	.2	---	.0	.1	.0	.0
19	.2	.6	.0	.0	.1	.1	.1	---	.3	.6	.1	.2
20	.0	.7	.0	.1	1.5	.7	.3	a.7	.2	1.2	.0	.5
21	.0	.5	.0	.0	1.0	.6	.1	.0	.0	.2	.0	.2
22	.0	.2	.2	2.1	.5	.0	.6	.0	.3	.2	.0	.1
23	.0	.0	.2	.0	.1	.0	.0	.0	.7	.4	.0	.0
24	.0	.0	.0	.7	.0	.0	.0	.0	.6	.1	.0	.0
25	.8	.0	.9	.9	.0	.0	.0	.6	.0	.3	.0	.9
26	.2	.3	.2	.9	.0	.3	.2	.2	.2	.2	.3	.0
27	.3	.6	.0	.1	.0	.5	.3	.1	.2	.5	.0	.0
28	.1	.0	.7	.3	.0	.9	.0	.2	.1	.5	.1	.0
29	.1	.4	.0	.1	---	.6	.0	.0	.3	.0	.0	.0
30	.0	.3	.1	.6	---	.1	.6	.5	.4	.1	.1	.0
31	.0	---	2.2	1.7	---	.3	---	.0	---	.0	.1	---
TOTAL	5.9	14.8	11.2	12.2	6.5	10.2	10.9	5.2	6.0	10.3	2.9	3.1
CAL YR 1998	TOTAL 90.2											
WTR YR 1999	TOTAL 99.2											

a Partial day total, 1130-2400 hours. No record May 17 (0015 hrs) to May 20 (1100 hrs). Accumulated total is 0.7 inch.

RAINFALL RECORDS
HAWAII, ISLAND OF OAHU--Continued

212329157510501. State Key Number 772.6 Moanalua rain gage near Kaneohe, Oahu.

LOCATION.--Lat 21°23'29" N, long 157°51'05" W (Kaneohe quadrangle, 1959, 1:24000) Hydrologic Unit 20060000, in USGS stream-gaging station 16227500, on left bank 3.3 mi northeast of Tripler Hospital, and 3.6 mi southwest of Kaneohe Post Office.

PERIOD OF RECORD.--Continuous-record station, August 29, 1968 to current year. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey.

GAGE.--Standard 8-in. National Weather Service collector attached to 7 5/16-in. rain can with a digital recorder. An electronic data logger was installed on February 5, 1997 replacing the digital recorder. Elevation of gage is 660 ft above mean sea level (from topographic map).

REMARKS.--Records good except for periods of no record, January 1 to 15 and April 22 to May 20, which are poor. Rainfall recorded in tenths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.0	.0	.1	---	.4	.0	.2	---	.0	.3	.0	.2
2	.3	1.7	1.2	---	.1	.0	.0	---	.2	.2	.0	.0
3	.1	.5	1.0	---	.2	.0	.2	---	.0	.0	.0	.3
4	.0	.8	.5	---	.5	.2	3.9	---	.2	.0	.3	.7
5	.3	.6	.8	---	.1	.1	.0	---	.0	.0	.5	.0
6	.1	.1	.3	---	.4	.8	.6	---	.2	.7	.0	.0
7	.0	.7	1.2	---	.2	.1	.0	---	.2	.1	.0	.0
8	.5	.4	2.0	---	.0	.0	.0	---	.3	.2	.0	.2
9	.1	.2	.1	---	.0	.2	.0	---	.5	.4	.0	.2
10	.3	.0	.0	---	.2	.8	.2	---	.0	.2	.6	.5
11	.0	.0	.2	---	.3	.2	.6	---	.1	.7	.5	.2
12	.7	.2	.3	---	.2	.1	1.1	---	.0	.3	.5	.1
13	.9	1.9	.1	---	.0	.3	.2	---	.0	.4	.2	.0
14	.3	.6	.0	---	.3	.7	.0	---	.0	.3	.4	.0
15	.2	.0	.0	a--	.2	1.8	.0	---	.9	.6	.5	.0
16	.4	.6	.0	.4	.0	1.8	.0	---	.1	.3	.6	.1
17	.2	1.2	.1	.0	.0	.6	.1	---	.2	1.0	.0	.2
18	.2	1.1	.0	.1	.1	.1	.0	---	.0	.2	.0	.1
19	.1	.7	.0	.0	.2	.2	.0	---	.3	.7	.2	.1
20	.0	1.0	.0	.0	1.9	.9	.0	b--	.1	1.4	.0	.5
21	.0	.5	.0	.0	1.2	.6	.0	.0	.1	.2	.0	.3
22	.0	.4	.4	2.4	.8	.0	---	.0	.3	.3	.0	.2
23	.0	.0	.2	.0	.1	.0	---	.0	.9	.5	.1	.0
24	.0	.0	.0	.9	.0	.0	---	.0	.8	.1	.0	.1
25	.9	.0	1.5	1.1	.0	.0	---	.6	.0	.2	.1	.8
26	.2	.3	.1	1.2	.0	.3	---	.2	.0	.2	.5	.1
27	.2	.6	.0	.3	.0	.8	---	.1	.3	.5	.2	.0
28	.2	.1	.8	.3	.0	1.0	---	.1	.1	.6	.1	.1
29	.0	.5	.0	.1	---	.7	---	.0	.3	.1	.1	.0
30	.0	.4	.1	.8	---	.3	---	.3	.4	.1	.4	.1
31	.2	---	2.4	2.0	---	.3	---	.0	---	.0	.3	---
TOTAL	6.4	15.1	13.4	9.5	7.4	12.9	7.1	---	6.5	10.8	6.1	5.1

a Total accumulated rainfall from January 1 to 15 is 1.5 inches.

b Total accumulated rainfall from April 22 to May 20 is greater than 0.1 inches.

RAINFALL RECORDS
HAWAII, ISLAND OF OAHU--Continued

212029157523601. State Key Number 773.3 Kalihi rain gage at Kalihi, Oahu.

LOCATION.--Lat 21°20'29" long 157°52'36", Hydrologic Unit 20060000, in USGS stream-gaging station 16229300 on left bank, 0.4 mi northwest of Bishop Museum, and 2.4 mi northwest of Honolulu Post Office.

PERIOD OF RECORD.--Continuous-record station, July 1962 to current year. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey.

GAGE.--Standard 8-in. National Weather Service rain gage with tipping-bucket attachment. An electronic data logger records rainfall at 15-minute intervals. Elevation of gage is 70 ft above mean sea level (from topographic map).

REMARKS.--Records fair. Rainfall recorded in tenths of an inch. For the periods October 1-6 and April 5-June 28, rainfall was adjusted by the ratio of rain can readings divided by the total tips of the tipping bucket.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.10	.00	.00	.00	.00	.00	.00	.00
2	.00	.00	.20	.00	.10	.00	.00	.00	.00	.00	.00	.00
3	.00	.10	.30	.00	.10	.00	.00	.00	.00	.00	.00	.00
4	.00	.20	.00	.00	.10	.00	.00	.00	.00	.00	.10	.00
5	.10	.00	.30	.60	.00	.00	.00	.00	.00	.00	.00	.00
6	.10	.10	.10	.20	.00	.00	.10	.00	.00	.00	.10	.00
7	.00	.00	.20	.00	.00	.00	.10	.00	.00	.00	.00	.00
8	.30	.00	.10	.10	.10	.00	.20	.00	.00	.00	.00	.00
9	.00	.00	.20	.00	.00	.00	.10	.00	.00	.10	.00	.10
10	.00	.00	.00	.00	.00	.00	.30	.00	.00	.00	.00	.00
11	.00	.00	.00	.00	.10	.10	.00	.00	.00	.00	.00	.00
12	.00	.00	.10	.00	.00	.00	.00	.00	.00	.10	.00	.00
13	.10	.80	.00	.00	.00	.20	.00	.10	.00	.20	.00	.10
14	.00	.40	.00	.10	.00	.10	.00	.00	.00	.00	.00	.00
15	.00	.00	.00	.00	.00	.10	.00	.00	.00	.00	.00	.00
16	.00	.20	.00	.00	.00	.10	.00	.20	.00	.10	.00	.00
17	.00	.30	.00	.00	.00	.10	.00	.10	.00	.30	.00	.00
18	.00	.60	.00	.00	.00	.00	.10	.00	.00	.00	.00	.10
19	.00	.30	.00	.00	.00	.10	.00	.00	.00	.10	.00	.00
20	.00	.50	.00	.00	.50	.30	.00	.00	.00	.00	.00	.00
21	.00	.10	.00	.00	1.50	.10	.00	.00	.10	.10	.00	.10
22	.00	.10	.00	.80	.20	.00	.00	.00	.10	.10	.00	.00
23	.00	.00	.00	.00	.00	.00	.00	.00	.10	.00	.00	.00
24	.00	.00	.10	.20	.00	.00	.00	.00	.10	.00	.00	.00
25	.00	.00	.20	.20	.00	.00	.00	.00	.00	.00	.00	.10
26	.20	.00	.00	.20	.00	.10	.00	.00	.00	.00	.00	.00
27	.00	.10	.00	.10	.00	.40	.00	.00	.00	.00	.00	.10
28	.00	.00	.00	.20	.00	.10	.00	.00	.00	.20	.00	.00
29	.00	.10	.00	.00	---	.10	.00	.00	.00	.00	.10	.00
30	.00	.00	.00	.20	---	.00	.00	.00	.00	.00	.00	.00
31	.10	---	1.20	.40	---	.10	---	.00	---	.00	.00	---
TOTAL	0.90	3.90	3.00	3.30	2.80	2.00	0.90	0.40	0.40	1.30	0.30	0.60

CAL YR 1998 TOTAL 18.0
WTR YR 1999 TOTAL 19.8

RAINFALL RECORDS
HAWAII, ISLAND OF OAHU--Continued

212114157435001. State Key Number 794.3 Waimanalo rain gage at Waimanalo, Oahu.

LOCATION.--Lat 21°21'14", long 157°43'50", Hydrologic Unit 20060000, in USGS stream-gaging station 16249000, 260 ft downstream from Kalaniana'ole Highway, and 2.3 mi northwest of Waimanalo Post Office.

PERIOD OF RECORD.--Continuous-record station, January 1967 to current year. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey.

GAGE.--Standard 8-in. National Weather Service rain gage collector and 8-in. diameter rain can, 2 ft tall, with a float system attached to a data logger. On July 21, the rain can was changed to a 7 5/16-in. diameter can, 4 ft tall. Elevation of gage is 20 ft above mean sea level (from topographic map).

REMARKS.--Records are good except for period of no record (January 7 to April 19), which is poor. Rainfall recorded in 0.12-inch increments from October 1 to July 21 (1030 hrs) and in 0.10-inch increments from July 21 (1100 hrs) to the end of the year.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00
2	.00	.36	.12	.00	---	---	---	.00	.00	.00	.00	.00
3	.00	.00	.12	.00	---	---	---	.00	.00	.00	.00	.00
4	.00	.36	.00	.00	---	---	---	.00	.00	.00	.00	.00
5	.00	.00	.00	1.32	---	---	---	.00	.00	.00	.00	.00
6	.00	.00	.00	.00	---	---	---	.00	.00	.12	.00	.00
7	.00	.00	.00	a.00	---	---	---	.00	.00	.12	.10	.00
8	.00	.12	.00	---	---	---	---	.00	.00	.00	.00	.00
9	.00	.00	.00	---	---	---	---	.00	.00	.12	.00	.00
10	.12	.00	.00	---	---	---	---	.00	.00	.00	.00	.00
11	.00	.00	.00	---	---	---	---	.00	.00	.12	.00	.10
12	.00	.00	.12	---	---	---	---	.00	.00	.00	.00	.00
13	.00	.72	.00	---	---	---	---	.00	.00	.12	.00	.00
14	.12	.00	.00	---	---	---	---	.00	.00	.00	.00	.00
15	.00	.24	1.44	---	---	---	---	.00	.00	.12	.00	.00
16	.00	.12	.00	---	---	---	---	2.76	.00	.24	.20	.00
17	.00	.60	.00	---	---	---	---	.36	.00	.72	.00	.00
18	.00	.12	.00	---	---	---	---	.00	.00	.12	.00	.00
19	.00	.12	.00	---	---	---	b.00	.00	.12	.00	.00	.20
20	.00	.24	.00	---	---	---	.00	.00	.12	.36	.00	.10
21	.00	.48	.00	---	---	---	.00	.00	.00	.00	.00	.20
22	.00	.24	.00	---	---	---	.00	.00	.00	.00	.00	.00
23	.00	.00	.00	---	---	---	.00	.00	.24	.00	.00	.00
24	.00	.00	.00	---	---	---	.00	.00	.12	.00	.00	.00
25	.60	.00	.24	---	---	---	.00	.12	.00	.10	.00	.00
26	.00	.12	.00	---	---	---	.00	.00	.00	.00	.00	.00
27	.00	.12	.00	---	---	---	.00	.00	.36	.10	.10	.00
28	.00	.00	1.92	---	---	---	.00	.00	.00	.20	.10	.00
29	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
30	.00	.00	.24	---	---	---	.00	.00	.00	.00	.00	.00
31	.00	---	1.56	---	---	---	---	.00	---	.00	.00	---
TOTAL	0.84	3.96	5.76	---	---	---	---	3.24	0.96	2.56	0.50	0.60

a Partial daily record from 0001 hrs to 1300 hrs.

b Partial daily record from 1530 hrs to 2400 hrs. No record from January 7 (1330 hrs) to April 19 (1500 hrs).

RAINFALL RECORDS
HAWAII, ISLAND OF OAHU--Continued

212813157574001. State Key Number 832.2 Kipapa rain gage near Wahiawa, Oahu.

LOCATION.--Lat 21°28'13" long 157°57'40", Hydrologic Unit 20060000, on left bank of stream 1,700 ft below Forest Reserve Boundary, 4.9 mi southeast of Wahiawa Post Office, and 6.3 mi northeast of Waipahu. The rain gage is housed in the same shelter with USGS stream-gaging station 16212800.

PERIOD OF RECORD.--Continuous-record station, January 2, 1957 to current year. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey.

GAGE.--Standard 8-in. National Weather Service collector and 7 5/16-in. storage can with a float-type recorder system. Elevation of gage is 690 ft above mean sea level (from topographic map).

REMARKS.--Records good. Rainfall recorded in tenths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.1	.1	.1	.1	.1	.0	.2	.0	.0	.1	.0	.0
2	.1	.3	.5	.0	.3	.0	.0	.0	.2	.0	.0	.0
3	.0	.1	1.2	.0	.3	.0	.0	.0	.2	.0	.0	.3
4	.2	.1	.6	.0	.2	.0	1.4	.0	.2	.1	.4	.1
5	.1	.2	1.4	.1	.1	.0	.3	.0	.0	.2	.4	.0
6	.1	.1	.1	.1	.1	.1	.4	.0	.1	.8	.0	.0
7	.1	.0	.4	.5	.1	.0	.5	.0	.3	.2	.0	.0
8	.1	.0	.3	.1	.1	.0	.6	.0	.0	.4	.0	.1
9	.0	.3	.8	.1	.0	.0	.4	.0	.0	.4	.0	.1
10	.1	.0	.0	.0	.0	.6	1.0	.2	.1	.0	.1	.2
11	.0	.0	.1	.0	.3	.2	1.2	.4	.0	.2	.1	.1
12	.4	.0	.2	.0	.1	.1	.5	.7	.0	.2	.6	.2
13	.3	1.8	.1	.0	.0	.6	.2	.0	.0	.2	.0	.1
14	.1	1.3	.0	.2	.1	.4	.0	.1	.0	.1	.0	.0
15	.1	.0	.2	.0	.1	.6	.0	.1	.4	.1	.0	.1
16	.1	1.1	.0	.2	.0	.1	.0	2.4	.1	.3	.3	.0
17	.0	.7	.0	.1	.0	.6	.2	.2	.0	.5	.0	.0
18	.0	1.1	.0	.0	.0	.0	.9	.0	.0	.0	.0	.2
19	.0	1.0	.1	.0	.0	.4	.0	.0	.4	.4	.0	.0
20	.0	1.4	.1	.0	1.0	1.3	.1	.1	.2	.6	.0	.1
21	.0	.3	.0	.1	1.4	.2	.0	.0	.1	.0	.0	.1
22	.0	.1	.1	1.4	.5	.0	.0	.0	.5	.4	.0	.1
23	.0	.0	.1	.0	.0	.0	.1	.0	.7	.3	.0	.0
24	.0	.0	.2	1.2	.0	.0	.0	.0	1.0	.1	.1	.0
25	.0	.0	.3	1.2	.0	.0	.0	.3	.1	.1	.0	1.0
26	.1	.2	.2	.8	.0	.5	.3	.2	.0	.0	.4	.0
27	.2	.5	.0	.3	.0	1.2	.3	.0	.3	.1	.0	.0
28	.3	.1	.1	.3	.0	.5	.0	.0	.1	.8	.1	.0
29	.0	.5	.0	.3	---	.5	.0	.0	.1	.1	.0	.0
30	.1	.6	.6	.4	---	.3	.0	.0	.1	.1	.1	.0
31	.2	---	2.9	1.1	---	.2	---	.0	---	.0	.2	---
TOTAL	2.8	11.9	10.7	8.6	4.8	8.4	8.6	4.7	5.2	6.8	2.8	2.8

CAL YR 1998 TOTAL 59.4
WTR YR 1999 TOTAL 78.1

RAINFALL RECORDS
HAWAII, ISLAND OF OAHU--Continued

213016158105901. State Key Number 842.1 Makaha rain gage near Makaha, Oahu.

LOCATION.--Lat 21°30'16", long 158°10'59", Hydrologic Unit 20060000, in USGS stream-gaging station 16211600, on right bank, 1.5 mi northeast of Kaneaki Heiau, and 3.4 mi northeast of Makaha.

PERIOD OF RECORD.--Continuous-record station, July 1959 to current year. Prior to October 1992, unpublished records in files of the U.S. Geological Survey.

GAGE.--Standard 8-in. National Weather Service collector and 7 5/16-in., 4-ft tall rain can with a float-type system attached to an electronic data logger. Readings are taken at 15-minute intervals. Elevation of gage is 957 ft above mean sea level (from topographic map).

REMARKS.--Records good. Rainfall recorded in tenths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.0	.0	.0	.1	.0	.0	.0	.0	.0	.1	.8	.0
2	.0	.1	.0	.0	.0	.0	.0	.0	.1	.5	.0	.0
3	.0	.0	.0	.0	.1	.0	.3	.0	.0	.0	.0	.0
4	.0	.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
5	.1	.2	.1	.4	.0	.1	.0	.0	.0	.1	.0	.0
6	.0	.0	.0	.1	.0	.0	.1	.0	.0	.2	.0	.0
7	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
8	.0	.0	.0	1.0	.0	.0	.1	.0	.0	.0	.0	.1
9	.0	.0	.2	.0	.0	.0	.1	.0	.1	.0	.0	.0
10	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
11	.0	.0	.0	.0	.2	.0	.1	.2	.0	.0	.1	.1
12	.0	.2	.0	.0	.1	.0	.0	.2	.0	.1	.0	.0
13	.0	.4	.0	.0	.0	.0	.0	.4	.0	.0	.0	.0
14	.0	.6	.0	.0	.0	.1	.0	.0	.0	.0	.0	.0
15	.0	.0	.3	.0	.0	.2	.0	.4	.4	.1	.0	.0
16	.0	.1	.0	.0	.0	.0	.0	3.5	.0	.0	.0	.0
17	.0	.2	.0	.0	.0	.1	.0	.3	.0	.0	.0	.1
18	.0	.4	.0	.0	.0	.0	.1	.0	.0	.0	.0	.0
19	.0	.1	.0	.0	.0	.2	.0	.0	.1	.1	.0	.0
20	.0	.2	.0	.0	.2	1.0	.0	.0	.0	.3	.0	.0
21	.0	.1	.0	.0	.4	.0	.0	.0	.0	.0	.0	.0
22	.0	.1	.0	.1	.0	.0	.9	.0	.0	.1	.0	.0
23	.0	.0	.0	.0	.0	.0	.0	.0	.1	.0	.0	.0
24	.0	.0	.0	.0	.0	.0	.0	.0	.1	.0	.0	.0
25	.0	.0	.1	.0	.0	.0	.0	.1	.0	.0	.0	.0
26	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.2	.1
27	.1	.1	.0	.0	.0	.1	.0	.0	.1	.0	.0	.0
28	.0	.0	.4	.0	.0	.2	.0	.0	.0	.0	.0	.0
29	.0	.1	.0	.0	---	.0	.0	.0	.0	.0	.0	.0
30	.0	.0	.0	.0	---	.1	.0	.0	.0	.0	.1	.0
31	.0	---	1.6	.0	---	.1	---	.0	---	.0	.0	---
TOTAL	0.2	3.2	2.7	1.7	1.0	2.2	1.7	5.1	1.0	1.6	1.2	0.4

CAL YR 1998 TOTAL 21.20
WTR YR 1999 TOTAL 22.0

RAINFALL RECORDS
HAWAII, ISLAND OF OAHU--Continued

213205157571001. State Key Number 882.3 Poamoho rain gage no. 3 near Wahiawa, Oahu.

LOCATION.--Lat 21°32'05", long 157°57'10", Hydrologic Unit 20060000, on right side of Poamoho Trail, and 0.2 mi northeast from trail marker.

PERIOD OF RECORD.--Accumulated-rainfall station, July 12, 1967 to current year. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey.

GAGE.--A 3-in. diameter, 5-ft tall aluminum non-recording gage. Elevation of gage is 1,800 ft above mean sea level (from topographic map).

REMARKS.--Record good. Cumulative rainfall read in nearest tenths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
INTERMITTENT READINGS

Period	Rainfall
Aug. 05 to Dec. 14	44.6
Dec. 14 to Apr. 16	52.9
Apr. 16 to Aug. 09	28.9
Aug. 09 to Nov. 17	23.9

RAINFALL RECORDS
HAWAII, ISLAND OF OAHU--Continued

213211157562400. State Key Number 882.4 Poamoho rain gage no. 2 near Wahiawa, Oahu.

LOCATION.--Lat 21°32'11" N, long 157°56'24" W, Hydrologic Unit 20060000, on Poamoho trail 1.0 mi west of junction with Koolau Summit Trail, and 5.3 mi northeast of Leilehua High School in Wahiawa.

PERIOD OF RECORD.--Continuous-record station, June 8, 1967 to current year. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey.

GAGE.--Standard 8-in. National Weather Service collector on a 10-in. storage can with a float-type system attached to an electronic data logger. Elevation of gage is 1,960 ft above mean sea level (from topographic map).

REMARKS.--Record good for periods when logger was operational and poor when it malfunctioned. Rainfall recorded in 0.188-inch increments.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.19	.19	---	.00	.94	.00	.00	.19	.19	.19	.00	.00
2	.75	1.69	---	.00	.19	.00	.38	.19	.19	.56	.00	.19
3	.19	.56	---	.00	.38	.00	.56	.19	.00	.19	.00	.38
4	.00	1.50	---	.00	.19	.38	5.63	.00	.19	.00	.38	.00
5	.19	.75	---	.00	.19	.19	.75	.00	.00	.19	.75	.00
6	.19	.75	---	.19	.37	.75	2.63	.00	.19	.37	.00	.00
7	.00	.75	---	1.31	.19	.38	.19	.37	.38	.19	.19	.00
8	1.13	.38	---	.56	.19	.19	.75	.19	.38	.19	.00	.38
9	.56	.19	---	.19	.00	.19	.19	.00	.75	.56	.00	.00
10	.56	.00	---	.19	.00	.75	1.12	.38	.00	.19	.38	.38
11	.00	.00	---	.00	.75	.38	.75	.75	.00	.38	.56	.38
12	.94	.00	---	.00	.56	.19	1.13	.19	.00	.19	.38	.00
13	.94	2.81	---	.00	.00	.56	.75	.19	.00	.19	.75	.19
14	.19	1.13	b.00	.19	.19	.38	.00	.00	.00	.56	.00	.00
15	.38	.00	.00	.00	.38	1.31	.00	.19	.94	.75	.56	.19
16	.56	.56	.00	1.12	.00	.75	.00	2.06	.38	.75	.56	.19
17	.19	1.13	.00	.00	.00	.94	.37	1.31	.00	.56	.19	.00
18	.75	2.06	.00	.00	.00	.19	.75	.19	.00	.19	.00	.56
19	.00	.56	.00	.00	.56	.56	.19	.00	.37	.38	.38	.75
20	.00	.56	.00	.00	3.19	1.13	.19	.94	.19	2.44	.00	.38
21	.00	a.38	.00	.00	2.44	.56	.19	.19	.00	.19	.00	.75
22	.00	---	1.50	2.25	1.31	.00	.19	.00	.38	.56	.00	.38
23	.00	---	.19	.00	.19	.00	.00	.19	.56	.19	.19	.00
24	.00	---	.75	1.12	.00	.00	.00	.00	1.31	.19	.00	.00
25	.56	---	1.50	1.31	.00	.00	.00	.56	.00	.94	.00	2.62
26	.00	---	.56	1.69	.00	.56	1.31	.19	.19	.00	.56	.38
27	.00	---	.19	.38	.00	1.88	.75	.00	.56	.38	.00	.00
28	.37	---	.38	.56	.00	.75	.00	.56	.19	.94	.38	.19
29	.19	---	.00	.00	---	.94	.00	.37	.00	.00	.19	.00
30	.00	---	.19	1.31	---	.38	.37	.56	.56	.00	.56	.00
31	.19	---	.94	1.69	---	.38	---	.19	---	.19	.38	---
TOTAL	9.02	---	---	14.06	12.21	14.67	19.14	10.14	7.90	12.60	7.34	8.29

CAL YR 1998 TOTAL 124.21

WTR YR 1999 TOTAL 151.02

a Partial day total from 0030 to 0800 hrs

b No record November 21 (0800 hrs) to December 14 (1000 hrs); total accumulated rainfall for period is 13.5 inches.

Partial day total, 1100 to 2400 hrs

RAINFALL RECORDS
HAWAII, ISLAND OF OAHU--Continued

213215157552800. State Key Number 883.12 Poamoho rain gage no. 1 near Wahiawa, Oahu.

LOCATION.--Lat 21°32'15" long 157°55'28", Hydrologic Unit 20060000, at junction of Poamoho and Koolau summit trails, and 6.2 mi northeast of Leilehua High School in Wahiawa.

PERIOD OF RECORD.--Continuous-record station, June 1967 to current year. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey.

GAGE.--Standard 8-in. National Weather Service collector on a 10-in. storage can with a float-type system attached to an electronic data logger. Elevation is 2,480 ft above mean sea level (from topographic map).

REMARKS.--Records good. Rainfall recorded in 0.188-inch increments.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.38	.00	.19	.00	.19	.00	.00	.19
2	.75	2.06	.75	.00	.19	.00	.94	.56	.19	.75	.19	.19
3	.00	.94	.56	.00	.19	.00	.94	.19	.00	.00	.19	.19
4	.00	2.44	.38	.00	.19	.56	1.31	.00	.00	.00	.38	.19
5	.19	1.50	.75	.00	.00	.19	.38	.00	.00	.19	.38	.19
6	.19	.94	.56	.19	.19	.56	2.44	.00	.19	.37	.00	.00
7	.00	1.50	1.31	2.44	.19	.75	.00	.56	.19	.38	.00	.00
8	.75	.56	1.13	1.12	.00	.00	.38	.00	.38	.00	.00	.19
9	.56	.56	.38	.19	.00	.38	.19	.00	.75	.37	.00	.00
10	.37	.00	.00	.19	.19	.37	.56	.38	.19	.00	.19	.37
11	.00	.00	.00	.00	.56	.19	.38	.94	.00	.56	.56	.38
12	1.13	.00	.19	.00	.00	.38	1.13	.00	.00	.19	.00	.38
13	.94	1.88	.19	.00	.00	.19	.56	.38	.00	.19	.75	.00
14	.00	.75	.00	.00	.56	.38	.00	.19	.00	.56	.00	.00
15	.38	.00	.19	.00	.75	1.13	.00	.00	.75	.75	.38	.19
16	.38	.56	.00	.75	.19	.56	.00	2.25	.19	.56	.75	.19
17	.19	.94	.00	.00	.00	.56	.19	1.13	.00	.56	.00	.00
18	.94	1.31	.00	.00	.19	.37	.38	.00	.19	.19	.19	.56
19	.00	.19	.00	.00	.56	.19	.19	.19	.38	.37	.94	1.12
20	.00	.56	.00	.38	1.50	.56	.56	.94	.00	2.06	.19	.38
21	.00	.19	.00	.00	1.88	.19	.94	.00	.19	.38	.19	.56
22	.19	.00	.94	1.88	.75	.00	.00	.19	.00	.56	.00	.00
23	.00	.19	.38	.00	.19	.00	.00	.00	.56	.00	.00	.00
24	.00	.00	.56	.56	.00	.00	.00	.00	.94	.19	.00	.00
25	.56	.00	1.13	.75	.00	.00	.00	.38	.00	.94	.00	2.25
26	.00	.00	.56	1.13	.00	.38	.94	.38	.00	.00	.56	.94
27	.00	1.12	.19	.19	.00	1.31	.56	.00	.56	.37	.00	.19
28	.38	.38	1.69	.38	.00	.56	.00	.56	.19	.38	.38	.00
29	.00	.37	.19	.00	---	.56	.00	.56	.00	.19	.19	.00
30	.19	.38	.19	.75	---	.38	.19	1.31	.56	.00	.38	.00
31	.19	---	1.13	.94	---	.19	---	.56	---	.19	.00	---
TOTAL	8.28	19.32	13.35	11.84	8.65	10.89	13.35	11.65	6.59	11.25	6.79	8.65

CAL YR 1998 TOTAL 118.07
WTR YR 1999 TOTAL 130.61

RAINFALL RECORDS
HAWAII, ISLAND OF OAHU--Continued

213221157541501. State Key Number 884.3 Punaluu rain gage near Punaluu, Oahu.

LOCATION.--Lat 21°32'21", long 157°54'15", Hydrologic Unit 20060000, 4.9 mi south of Hauula School, and 1.5 mi south of USGS stream-gaging station on Punaluu Ditch 16302000.

PERIOD OF RECORD.--Accumulated-rainfall station, July 14, 1967 to current year. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey.

GAGE.--Standard 8-in. National Weather Service collector with standard 8-in. can, and an auxiliary 3-in. diameter, 5-ft tall measuring can. Elevation of gage is 750 ft above mean sea level (from topographic map).

REMARKS.--Records poor. Cumulative rainfall read in nearest tenths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
INTERMITTENT READINGS

Period	Rainfall
Oct. 14 to Feb. 4	36.2
Feb. 4 to May 10	a--
May 10 to Aug. 4	18.5
Aug. 4 to Sep. 9	5.5
Sep. 9 to Oct. 22	8.4

a No data, station vandalized

RAINFALL RECORDS
HAWAII, ISLAND OF OAHU--Continued

213237157530701. State Key Number 886.4 Kahana rain gage at altitude 95 ft near Kahana, Oahu.

LOCATION.--Lat 21°32'37", long 157°53'07". Hydrologic Unit 20060000, on right bank, 600 ft upstream from Kawa Stream, about 40 ft bankward from USGS stream-gaging station 16296500, 1.1 mi southwest of Kahana, and 2.2 mi southwest of Swanzy Beach Park in Kaaawa.

PERIOD OF RECORD.--Accumulated-rainfall station, December 23, 1958 to May 11, 1961, February 19, 1990 to June 17, 1994. Continuous-record station, May 11, 1961 to February 19, 1990, June 17, 1994 to current year. Prior to October 1992, unpublished records in files of the U.S. Geological Survey.

GAGE.--An electronic data logger with a float system using an 8-in. receiver and 7 5/16-in. diameter rain can, 4-ft tall. Readings are taken at 30-minute intervals. Recording interval was changed to 15 minutes on August 31, 1999. Elevation of gage is 95 ft above mean sea level (from topographic map).

REMARKS.--Records good.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.10	.10	.00	.00	.00	.00	.00	.00	.10	.10	.00
2	.30	1.50	.60	.00	.00	.00	3.60	.10	.00	.50	.00	.10
3	.00	.30	.50	.00	.20	.00	.80	.00	.00	.00	.00	.10
4	.10	1.00	.30	.00	.10	.00	.10	.00	.00	.00	.20	.10
5	.00	1.40	.50	.00	.00	.10	.00	.00	.00	.10	.20	.00
6	.00	.30	.40	.00	.30	.40	.90	.00	.00	.30	.00	.00
7	.10	.20	.70	3.60	.20	.10	.00	.00	.20	.10	.10	.00
8	.60	1.20	1.70	1.40	.00	.00	.10	.00	.10	.00	.00	.00
9	.40	.10	.10	.00	.00	.30	.00	.00	.60	.40	.00	.00
10	.30	.00	.00	.00	.00	.10	.10	.00	.20	.10	.40	.20
11	.00	.00	.10	.00	.30	.00	.30	.60	.00	.30	.10	.20
12	.50	.10	.10	.00	.10	.00	.20	.00	.00	.10	.10	.40
13	.30	.90	.10	.00	.00	.10	.30	.10	.00	.00	.20	.00
14	.10	.20	.00	.00	.20	.30	.00	.10	.00	.50	.00	.00
15	.10	.00	.30	.00	.70	.50	.00	.10	.40	.60	.10	.10
16	.20	.10	.00	.20	.00	.10	.00	2.40	.20	.30	.70	.00
17	.00	.80	.00	.00	.00	.20	.10	.20	.30	.20	.00	.10
18	.40	1.20	.00	.00	1.30	.30	.20	.00	.00	.10	.00	.30
19	.00	.20	.00	.00	.50	.00	.10	.00	.20	.20	1.10	.80
20	.00	.20	.00	.00	.70	.30	.70	.20	.10	.60	.10	.40
21	.00	.20	.10	.00	1.60	.10	2.20	.10	.00	.10	.00	.70
22	.00	.00	.10	2.20	.30	.00	.00	.00	.00	.30	.00	.00
23	.00	.10	.10	.00	.00	.00	.00	.00	.20	.00	.00	.00
24	.00	.00	.10	.20	.10	.00	.00	.00	.40	.00	.00	.00
25	.30	.00	.50	.60	.00	.00	.00	.30	.10	.30	.00	.10
26	.00	.30	.10	.70	.00	.10	.10	.20	.00	.00	.10	.10
27	.10	.70	.30	.10	.00	.60	.10	.00	.40	.30	.10	.00
28	.30	.10	.80	.20	.00	.50	.00	.00	.00	.10	.10	.10
29	.00	.70	.10	.00	---	.40	.00	.30	.10	.10	.00	.00
30	.00	.20	.30	.10	---	.20	.10	.70	.20	.00	.40	.00
31	.00	---	1.40	.50	---	.30	---	.10	---	.00	.10	---
TOTAL	4.10	12.10	9.40	9.80	6.60	5.00	10.00	5.50	3.70	5.70	4.20	3.80
WTR YR 1999	TOTAL 79.9											

RAINFALL RECORDS
HAWAII, ISLAND OF OAHU--Continued

213000157515401. State Key Number 886.6 Waikane rain gage at altitude 75 ft at Waikane, Oahu.

LOCATION.--Lat 21°30'00", long 157°51'54", Hydrologic Unit 20060000, in USGS stream-gaging station 16294900, 0.3 mi downstream from Waikēkee Stream, 0.7 mi west of Waikane, and 1.2 mi northwest of Waiahole School.

PERIOD OF RECORD.--Continuous-record station, February 18, 1960 to October 2, 1985, May 17, 1994 to current year. Accumulated-rainfall station, October 2, 1985 to May 17, 1994. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey.

GAGE.--Standard 8-in. National Weather Service collector and 7 5/16-in., 4-ft tall rain can with a float-type system attached to an electronic data logger. Readings are taken at 15-minute intervals. Elevation of gage is 75 ft above mean sea level (from topographic map).

REMARKS.--Records good. The maximum daily was 2.7 in. on May 16, 1999. Daily record read in nearest tenths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.10	.00	.00	.00	.00	.00	.00	.00
2	.10	1.00	.30	.00	.10	.00	1.00	.10	.00	.30	.10	.10
3	.00	.30	.30	.00	.00	.00	.70	.00	.00	.00	.10	.00
4	.00	.60	.00	.00	.10	.00	.10	.00	.00	.00	.00	.00
5	.00	.40	.10	.00	.00	.00	.00	.00	.00	.00	.00	.00
6	.00	.40	.10	.00	.10	.20	.30	.00	.00	.30	.10	.00
7	.00	.00	.00	.50	.00	.00	.10	.00	.00	.00	.00	.00
8	.10	.30	.50	.50	.00	.00	.40	.00	.00	.00	.00	.00
9	.00	.10	.10	.00	.00	.00	.00	.00	.20	.00	.10	.00
10	.10	.40	.00	.00	.00	.10	.10	.00	.00	.00	.30	.00
11	.00	.00	.00	.00	.10	.00	.10	.20	.00	.10	.10	.30
12	.20	.10	.00	.00	.10	.00	.50	.00	.00	.10	.10	.00
13	.30	.50	.00	.00	.00	.00	.10	.20	.00	.00	.00	.00
14	.00	.10	.00	.00	.00	.00	.00	.90	.00	.10	.10	.00
15	.00	.10	.60	.00	.00	.20	.00	.00	.30	.40	.10	.10
16	.10	.50	.00	.00	.10	.00	.00	2.70	.10	.20	.10	.00
17	.00	.20	.00	.00	.00	.10	.00	.20	.00	.10	.00	.00
18	.00	.60	.00	.00	.10	.00	.20	.00	.00	.20	.00	.10
19	.10	.40	.00	.00	.10	.00	.00	.00	.20	.20	.00	.20
20	.00	.40	.00	.00	.40	.10	.00	.00	.00	.10	.00	.30
21	.10	.00	.00	.00	.60	.10	.10	.00	.00	.10	.00	.30
22	.00	.00	.00	1.50	.00	.00	.00	.00	.00	.10	.00	.00
23	.00	.00	.00	.00	.00	.00	.00	.00	.10	.00	.00	.00
24	.10	.10	.00	.10	.00	.00	.00	.00	.30	.00	.00	.00
25	.20	.00	.00	.20	.00	.00	.00	.20	.00	.20	.00	.00
26	.00	.10	.00	.10	.00	.20	.00	.10	.00	.10	.10	.00
27	.00	.30	.10	.00	.00	.40	.10	.00	.20	.10	.00	.30
28	.10	.00	.50	.10	.00	.20	.00	.00	.00	.20	.10	.40
29	.00	.30	.20	.00	---	.20	.00	.00	.00	.00	.10	.00
30	.00	.00	.30	.10	---	.10	.30	.20	.10	.00	.10	.00
31	.00	---	2.20	.10	---	.10	---	.00	---	.00	.00	---
TOTAL	1.50	7.20	5.30	3.20	1.90	2.00	4.10	4.80	1.50	2.90	1.60	2.10

WTR YR 1999 TOTAL 38.1

RAINFALL RECORDS
HAWAII, ISLAND OF OAHU--Continued

213725158010401. State Key Number 897.1 Kamananui rain gage at Pupukea Military Road near Maunawai, Oahu.

LOCATION.--Lat 21°37'25 " long 158°01'04", Hydrologic Unit 20060000, on left bank, at USGS stream-gaging station 16325000, 75.0 ft upstream from Pupukea Military Road, and 3.5 mi southeast of Maunawai.

PERIOD OF RECORD.--Continuous-record station, July 1, 1963 to current year. Prior to October 1992, unpublished records are in the files of the Geological Survey.

GAGE.--Standard 8-in. National Weather Service collector and 8-in. rain can attached to a tipping-bucket counter. An electronic data logger was installed on March 26, 1996 to record rainfall at 15-minute intervals. Elevation of gage is 590 ft above mean sea level (from topographic map).

REMARKS.--Records good, except for the period September 14-16 which was fair. Rainfall recorded in tenths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.10	.00	.00	.10	.00	.00	.10	.00	.00	.20	.10	.00
2	.10	.50	.20	.00	.10	.00	.00	.00	.10	.00	.00	.00
3	.00	.10	.20	.00	.20	.00	.00	.00	.00	.00	.00	.00
4	.30	.00	.10	.00	.10	.00	.20	.00	.10	.10	.20	.10
5	.00	.00	.40	.00	.10	.00	.10	.00	.00	.30	.20	.00
6	.00	.00	.00	.00	.10	.10	.10	.00	.10	.30	.00	.00
7	.00	.10	.20	1.00	.00	.00	.00	.00	.10	.10	.10	.00
8	.10	.00	.40	.80	.00	.00	.10	.00	.20	.00	.00	.00
9	.10	.00	.10	.00	.00	.00	.10	.00	.00	.50	.00	.00
10	.20	.00	.00	.00	.00	.00	.70	.10	.00	.00	.00	.30
11	.00	.00	.00	.00	.40	.10	.30	.10	.00	.10	.50	.00
12	.20	.10	.10	.00	.10	.10	.00	.10	.00	.20	.40	.00
13	.20	1.30	.10	.00	.00	.20	.10	.00	.00	.10	.10	.00
14	.00	.50	.00	.10	.00	.20	.00	.00	.00	.30	.10	e.00
15	.00	.10	.40	.00	.00	.20	.00	.00	.80	.00	.10	e.10
16	.00	.10	.00	.10	.00	.40	.00	1.70	.10	.00	.30	e.00
17	.00	.40	.10	.00	.00	.20	.20	.00	.00	.10	.00	.10
18	.10	.60	.00	.00	.00	.10	.30	.00	.00	.00	.00	.00
19	.00	.00	.00	.00	.00	.10	.00	.00	.20	.40	.00	.10
20	.00	.20	.00	.00	.30	.40	.00	.00	.00	.20	.00	.10
21	.00	.00	.00	.00	.30	.00	.00	.00	.00	.10	.00	.10
22	.00	.10	.10	1.00	.30	.00	.00	.00	.20	.30	.00	.00
23	.00	.00	.00	.00	.00	.00	.00	.00	.70	.20	.00	.00
24	.00	.00	.20	.30	.00	.00	.00	.00	.80	.00	.10	.00
25	.10	.00	.40	.40	.00	.00	.10	.20	.00	.20	.00	.00
26	.10	.10	.10	.30	.00	.10	.10	.10	.00	.10	.30	.10
27	.10	.40	.00	.10	.00	.60	.00	.00	.20	.00	.00	.10
28	.10	.10	2.60	.10	.00	.10	.00	.00	.00	.80	.00	.10
29	.10	.20	.00	.00	---	.30	.00	.10	.10	.00	.00	.00
30	.00	.00	.00	.10	---	.10	.10	.00	.10	.10	.20	.00
31	.40	---	1.40	.20	---	.20	---	.00	---	.00	.10	---
TOTAL	2.30	4.90	7.10	4.60	2.00	3.50	2.60	2.40	3.80	4.70	2.80	1.20

e Estimated

CAL YR 1998 TOTAL 46.0

WTR YR 1999 TOTAL 41.9

RAINFALL RECORDS
HAWAII, ISLAND OF OAHU--Continued

213608158011101. State Key Number 897.9 Pupukea Road rain gage at altitude 1,160 ft near Haleiwa, Oahu (formerly published as Pupukea Road rain gage at altitude 1,600 ft near Haleiwa, Oahu).

LOCATION.--Lat 21°36'08", long 158°01'11", Hydrologic Unit 20060000, 4.3 mi southeast of Maunawai, 5.5 mi east of Haleiwa Beach Park, and 400 ft left of the road on the ridge.

PERIOD OF RECORD.--Continuous-record station, November 1, 1967 to current year. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey.

GAGE.--Standard 8-in. National Weather Service rain collector attached to 8-in. storage can with a recording float-type system. On January 23, an electronic data logger was installed to replace the recorder. Elevation of gage is 1,160 ft above mean sea level (from topographic map).

REMARKS.--Records good except for the period of no record October 2, 1998 to January 21, 1999, which is poor. Rainfall recorded in 0.12-inch increments.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.12	---	---	---	.00	.00	.36	.00	.00	.36	.00	.00
2	---	---	---	---	.12	.00	.00	.00	.12	.24	.00	.12
3	---	---	---	---	.36	.00	.00	.00	.00	.00	.00	.12
4	---	---	---	---	.12	.00	.84	.00	.00	.00	.12	.24
5	---	---	---	---	.36	.00	.24	.00	.12	.36	.48	.00
6	---	---	---	---	.12	.00	.24	.00	.24	.12	.12	.00
7	---	---	---	---	.24	.00	.12	.00	.36	.12	.00	.00
8	---	---	---	---	.00	.00	.72	.00	.12	.00	.00	.00
9	---	---	---	---	.00	.00	.24	.00	.00	.72	.00	.24
10	---	---	---	---	.00	.36	1.20	.12	.00	.00	.00	.24
11	---	---	---	---	.60	.24	.60	.00	.00	.12	.24	.00
12	---	---	---	---	.24	.36	.36	.12	.00	.24	.36	.00
13	---	---	---	---	.00	.48	.12	.00	.00	.12	.12	.00
14	---	---	---	---	.00	.36	.00	.00	.00	.48	.00	.00
15	---	---	---	---	.00	.72	.00	.00	.72	.12	.12	.12
16	---	---	---	---	.00	.24	.00	2.16	.24	.48	.48	.00
17	---	---	---	---	.00	.60	.24	.24	.00	.24	.00	.00
18	---	---	---	---	.00	.00	.72	.00	.00	.00	.00	.00
19	---	---	---	---	.00	.24	.12	.00	.12	.60	.00	.12
20	---	---	---	---	.48	.60	.00	.00	.12	.48	.00	.12
21	---	---	---	a.00	1.08	.12	.00	.00	.12	.00	.00	.24
22	---	---	---	.60	.72	.00	.00	.00	.24	.36	.00	.12
23	---	---	---	.12	.12	.00	.00	.00	.72	.24	.00	.00
24	---	---	---	.84	.00	.00	.00	.00	1.32	.12	.00	.00
25	---	---	---	.84	.00	.00	.12	.36	.12	.12	.00	.24
26	---	---	---	.72	.00	.36	.12	.00	.00	.00	.36	.00
27	---	---	---	.12	.00	.96	.12	.00	.36	.00	.00	.00
28	---	---	---	.36	.00	.36	.00	.00	.12	.84	.12	.00
29	---	---	---	.00	---	.48	.00	.00	.12	.12	.12	.00
30	---	---	---	.24	---	.36	.12	.12	.24	.12	.24	.00
31	---	---	---	.72	---	.12	---	.00	---	.00	.12	---
TOTAL	---	---	---	---	4.56	6.96	6.60	3.12	5.52	6.72	3.00	1.92

a No record October 2, 1998 (1400 hrs) to January 21, 1999 (1430 hrs), partial day record January 21, 1999 (1500 to 2400 hrs)

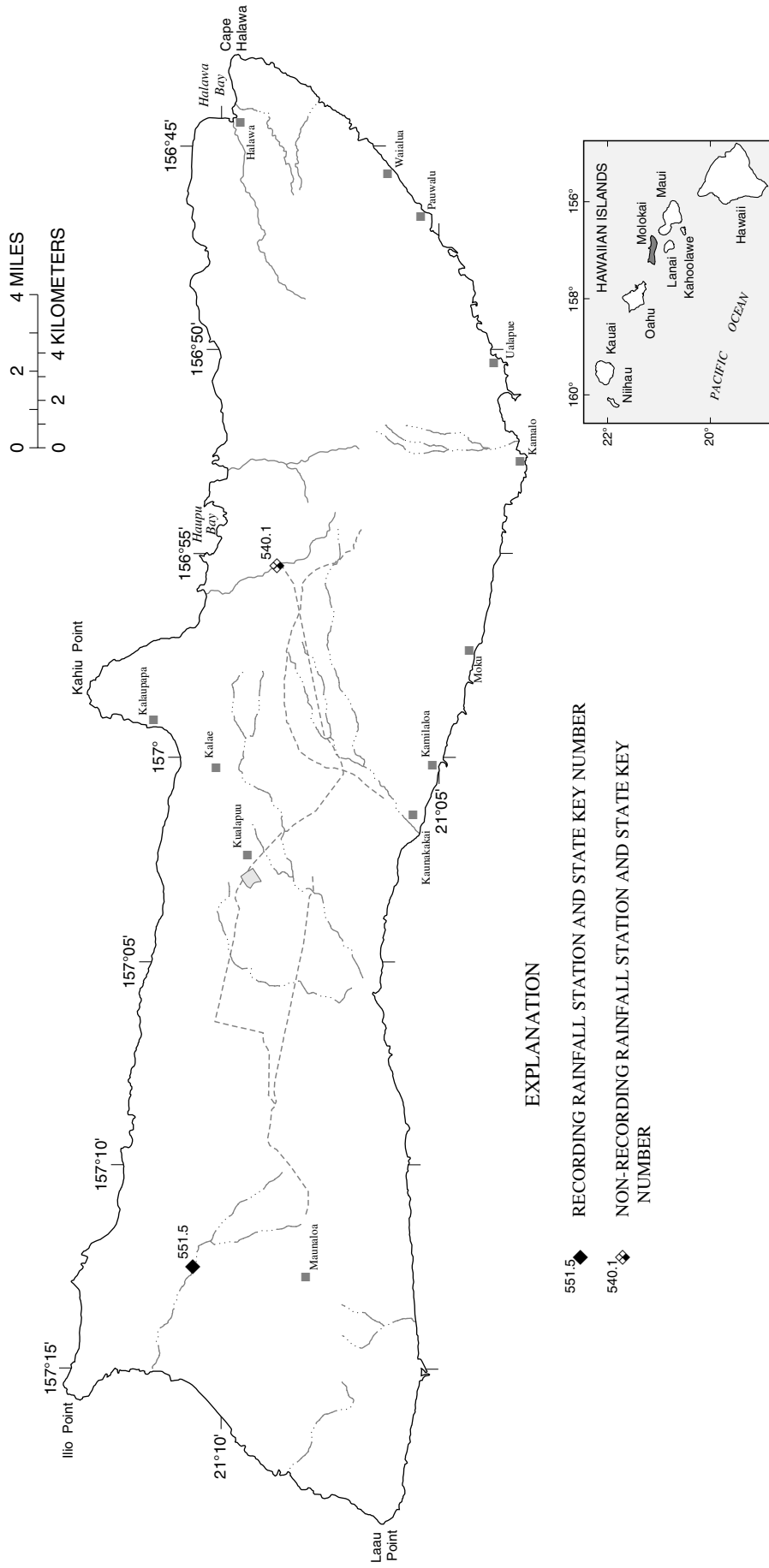


Figure 23. Locations of rainfall stations on Molokai.

RAINFALL RECORDS
HAWAII, ISLAND OF MOLOKAI

210843156551801. State Key Number 540.1 Waikolu rain gage at altitude 900 ft, near Kalaupapa, Molokai.

LOCATION.--Lat 21°08'43", long 156°55'18", Hydrologic Unit 20050000, on left bank near USGS stream-gaging station 16405500, 1.8 mi southwest of Haupu Bay, 2.3 mi upstream from mouth, and 5.2 mi southeast of Kalaupapa.

PERIOD OF RECORD.--1957 to current year. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey and at the National Weather Service.

GAGE.--Standard rain gage with reduced 1:2 catchment. On August 9, 1999, a tipping bucket raingage with data logger was installed. Elevation of gage is 900 ft (from topographic map).

REMARKS.--Records good. Cumulative rainfall read in nearest tenths of an inch. After August 9, 1999, rainfall recorded in nearest hundredths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	---	---	---	---	---	.00
2	---	---	a--	---	---	---	---	---	---	---	---	.00
3	---	---	---	---	---	---	---	---	---	---	---	.22
4	---	---	---	---	---	---	---	---	---	---	---	.01
5	---	---	---	---	---	---	---	---	---	---	---	.00
6	---	---	---	---	---	---	---	---	---	---	---	.00
7	---	---	---	---	---	---	---	---	---	---	---	.00
8	---	---	---	---	---	b--	---	---	---	---	---	.18
9	---	---	---	---	---	---	---	---	---	---	---	.06
10	---	---	---	---	---	---	---	---	---	---	---	.01
11	---	---	---	---	---	---	---	---	---	---	d--	.06
12	---	---	---	---	---	---	---	---	---	---	.28	.12
13	---	---	---	---	---	---	---	---	---	---	.44	.01
14	---	---	---	---	---	---	---	---	---	---	.15	.02
15	---	---	---	---	---	---	---	---	---	---	.55	.01
16	---	---	---	---	---	---	---	---	---	---	.10	.07
17	---	---	---	---	---	---	---	---	---	---	.00	.01
18	---	---	---	---	---	---	---	---	---	---	.00	.14
19	---	---	---	---	---	---	---	---	---	---	.01	.07
20	---	---	---	---	---	---	---	---	---	---	.00	.02
21	---	---	---	---	---	---	---	---	---	---	.00	.18
22	---	---	---	---	---	---	---	---	---	---	.00	.02
23	---	---	---	---	---	---	---	---	---	---	.09	.01
24	---	---	---	---	---	---	---	c--	---	---	.02	.00
25	---	---	---	---	---	---	---	---	---	---	.00	.00
26	---	---	---	---	---	---	---	---	---	---	.31	.00
27	---	---	---	---	---	---	---	---	---	---	.16	.01
28	---	---	---	---	---	---	---	---	---	---	.02	.00
29	---	---	---	---	---	---	---	---	---	---	.13	.15
30	---	---	---	---	---	---	---	---	---	---	.09	.01
31	---	---	---	---	---	---	---	---	---	---	.38	---
TOTAL	---	---	---	---	---	---	---	---	---	---	---	1.39

(a) Total accumulated rainfall of 41.6 inches from Jun. 16, 1998 to Dec. 2, 1998

(b) Total accumulated rainfall of 4.4 inches from Dec. 2 (0850) to Mar. 8 (0945)

(c) Total accumulated rainfall of 16.6 inches from Mar. 8 (0945) to May 24 (1000)

(d) Total accumulated rainfall of 8.11 inches from May 24 (1000) to Aug. 11 (1000)

RAINFALL RECORDS
HAWAII, ISLAND OF MOLOKAI--Continued

211039157123101. State Key Number 551.5 Kakaako rain gage near Mauna Loa, Molokai.

LOCATION.--Lat 21°10'39" long 157°12'31", Hydrologic Unit 20050000, in the USGS stream-gaging station 16411400 on left bank, 1.0 mi downstream of Kamakahi Gulch, and 3.0 mi north of Mauna Loa school.

PERIOD OF RECORD.--1964 to current year. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey and at the National Weather Service.

GAGE.--Data logger with a .01-in. tipping bucket attachment and an 8-in. National Weather Service rain gage used as a backup accumulation can. Elevation of gage is 380 ft (from topographic map).

REMARKS.--Records good. Rainfall recorded in hundredths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.02	.00	.36	.04	.03	.00	.00	.00	.02	.00	.00
2	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00
3	.00	.00	.00	.00	.02	.00	.29	.00	.00	.00	.00	.00
4	.00	.01	.00	.00	.02	.02	.00	.00	.00	.00	.00	.00
5	.00	.04	.00	.00	.00	.00	.00	.00	.00	.02	.00	.00
6	.00	.00	.00	.00	.00	.01	.05	.00	.01	.03	.00	.00
7	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.06	.00
8	.00	.00	.00	1.38	.00	.00	.00	.00	.00	.00	.00	.03
9	.00	.00	.05	.13	.00	.05	.01	.00	.00	.00	.00	.17
10	.00	.00	.15	.00	.00	.00	.00	.00	.00	.01	.00	.00
11	.00	.00	.04	.00	.04	.00	.06	.15	.00	.01	.00	.00
12	.12	.00	.07	.00	.14	.00	.07	.44	.00	.07	.00	.00
13	.01	.56	.00	.00	.00	.05	.00	.00	.00	.20	.00	.00
14	.00	.08	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00
15	.00	.08	.11	.00	.00	.03	.00	.00	.04	.09	.00	.00
16	.00	.37	.00	.00	.00	.00	.00	.38	.00	.03	.00	.00
17	.00	.87	.00	.00	.00	.11	.07	.08	.00	.03	.00	.00
18	.00	.14	.00	.00	.00	.00	.36	.00	.00	.03	.00	.04
19	.00	.33	.00	.00	.01	.01	.02	.00	.01	.30	.00	.00
20	.00	.22	.00	.00	.00	.07	.00	.00	.01	.00	.00	.00
21	.00	.07	.00	.01	.21	.20	.00	.01	.00	.00	.00	.00
22	.00	.12	.00	.48	.01	.00	.00	.00	.06	.07	.00	.00
23	.00	.00	.00	.00	.00	.02	.00	.00	.07	.00	.00	.00
24	.01	.00	.00	.23	.00	.00	.00	.00	.04	.00	.00	.00
25	.20	.01	.01	.01	.00	.00	.06	.04	.00	.02	.00	.00
26	.06	.00	.00	.00	.00	.07	.00	.04	.19	.00	.01	.00
27	.00	.09	.00	.00	.00	.02	.00	.00	.01	.00	.01	.00
28	.00	.00	.11	.00	.08	.00	.00	.02	.00	.00	.06	.00
29	.00	.08	.00	.00	---	.01	.03	.00	.00	.00	.01	.00
30	.00	.00	.00	.15	---	.00	.08	.00	.00	.00	.01	.00
31	.00	---	.53	.05	---	.00	---	.00	---	.00	.03	---
TOTAL	0.40	3.09	1.08	2.81	0.57	0.70	1.10	1.16	0.44	0.93	0.19	0.24

WTR YR 1999 TOTAL 12.71

RAINFALL RECORDS
HAWAII, ISLAND OF MAUI

203721156151601. State Key Number 255.0 Kepuni Gulch rain gage near Kaupo, Maui.

LOCATION.--Lat 20°37'21", long 156°15'16", Hydrologic Unit 20020000, next to the discontinued USGS stream-gaging station 16500100 on right bank, 120 ft upstream from bridge on Highway 31, 400 ft upstream from Kamole Gulch, 1.1 mi east of Kahikinui house, and 8.5 mi west of Kaupo.

PERIOD OF RECORD.--1964 to current year. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey and at the National Weather Service.

GAGE.--Standard 10-in. National Weather Service rain gage with recording 0.1-in. tipping bucket attachment through July 14, 1999. Data logger with a .01-in. tipping bucket attachment after July 14, 1999. The National Weather Service rain gage was converted to a backup accumulation can. Elevation of gage is 740 ft (from topographic map).

REMARKS.--Records good. Rainfall recorded in tenths of an inch through July 14, 1999 and hundredths of an inch for the remainder of the year.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.1	.00	.00	.1	.00	.00	.00	.00
2	.00	.00	.00	.00	.00	.00	.4	.00	.00	.00	.00	.00
3	.00	.2	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
4	.00	.5	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
5	.00	.2	.1	.00	.00	.00	.00	.6	.00	.00	.00	.00
6	.00	.00	.00	.00	.00	.00	.1	.00	.00	.00	.00	.00
7	.00	.00	.00	.00	.00	.1	.00	.00	.00	.00	.00	.00
8	.00	.00	.1	.4	.00	.00	.00	.00	.00	.00	.00	.00
9	.00	.1	.00	.6	.00	.00	.00	.00	.00	.00	.00	.00
10	.00	.00	.00	.00	.1	.00	.00	.00	.00	.00	.00	.00
11	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
12	.00	.1	.00	.00	.00	.00	.00	.2	.00	.00	.00	.00
13	.2	.00	.00	.00	.00	.00	.00	.2	.00	.00	.00	.00
14	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
15	.00	.00	.00	.00	.00	.00	.00	.3	.00	.00	.00	.00
16	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
17	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
18	.2	.3	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
19	.00	.00	.00	.00	.00	.00	.00	.00	.00	.02	.00	.00
20	.00	.00	.00	.00	.2	.00	.00	.00	.00	.00	.00	.00
21	.00	.00	.00	.00	.1	.00	.00	.00	.00	.00	.00	.00
22	.00	.00	.2	.00	.00	.00	.00	.00	.00	.00	.00	.02
23	.00	.00	.3	.00	.00	.00	.00	.00	.00	.00	.00	.00
24	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00
25	.00	.00	.1	.1	.00	.00	.00	.00	.00	.00	.00	.00
26	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
27	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
28	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
29	.00	.00	.00	.00	---	.00	.00	.00	.00	.00	.00	.00
30	.00	.00	.00	.00	---	.00	.00	.00	.00	.00	.00	.00
31	.00	---	.3	.6	---	.00	---	.00	---	.00	.00	---
TOTAL	0.40	1.40	1.10	1.70	0.50	0.10	0.50	1.40	0.00	0.03	0.00	0.02

CAL YR 1998 TOTAL 5.1
WTR YR 1999 TOTAL 7.15

RAINFALL RECORDS
HAWAII, ISLAND OF MAUI--Continued

204923156371501. State Key Number 297.0 Olowalu rain gage at Olowalu, Maui.

LOCATION.--Lat 20°49'23 " long 156°37'15", Hydrologic Unit 20020000, in USGS stream-gaging station 16646200 on downstream side of center pier of plantation road bridge, 0.6 mi northeast of Olowalu, and 5.5 mi southeast of Lahaina.

PERIOD OF RECORD.--1964 to current year. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey and at the National Weather Service.

GAGE.--Standard 8-in. National Weather Service rain gage with recording tipping bucket attachment. Elevation of gage is 130 ft (from topographic map).

REMARKS.--Records good except for estimated record which is poor. Rainfall recorded in tenths of an inch October 1 to February 8. From February 8, rainfall recorded in hundredths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	---	---	---	---	.00	.00	.00	.00	.00
2	.00	.00	.00	---	---	---	b--	.00	.00	.00	.00	.00
3	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
4	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
5	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
6	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
7	.00	.00	.00	---	---	---	.00	.00	.00	.00	.01	.00
8	.00	.00	.00	---	a--	---	.00	.00	.00	.00	.00	.00
9	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
10	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
11	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
12	.00	.00	.00	---	---	---	.16	.00	.00	.00	.00	.00
13	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
14	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
15	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
16	.00	.00	.00	---	---	---	.00	.43	.00	.00	.00	.00
17	.00	.00	.00	---	---	---	.00	.20	.00	.00	.00	.00
18	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
19	.00	.1	.00	---	---	---	.00	.00	.00	.00	.00	.00
20	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
21	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
22	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
23	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
24	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
25	.1	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
26	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
27	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
28	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
29	.00	.00	.00	---	---	---	.00	.00	.00	.00	.00	.00
30	.00	.00	---	---	---	---	.00	.00	.00	.00	.00	.00
31	.00	---	---	---	---	---	---	.00	---	.00	.00	---
TOTAL	0.10	0.10	---	---	---	---	---	0.63	0.00	0.00	0.01	0.00

e Estimated

CAL YR 1998 TOTAL 2.16
WTR YR 1999 TOTAL 5.47

(a) Accumulation rainfall of 3.0 inches from Dec. 29 (1040) to Feb. 8 (1210)
(b) Accumulation rainfall of 0.42 inches from Feb. 8 (1210) to Apr. 2 (0800)

RAINFALL RECORDS
HAWAII, ISLAND OF MAUI--Continued

204606156270301. State Key Number 311.3 Kulanihako rain gage near Kihei, Maui.

LOCATION.--Lat 20°46'06" long 156°27'03", Hydrologic Unit 20020000, in USGS stream-gaging station 16660000 on right bank, 0.5 mi northeast of Lihue Cemetery, 0.8 mi upstream from mouth, and 1.3 mi southeast of Kihei.

PERIOD OF RECORD.--1963 to current year. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey and at the National Weather Service.

GAGE.--Standard 8-in. National Weather Service rain gage with recording tipping bucket attachment through June 22, 1999. Data logger with a .01-in. tipping bucket attachment after June 22, 1999. The National Weather Service rain gage was converted to a backup accumulation can. Elevation of gage is 35 ft (from topographic map).

REMARKS.--Records good. Rainfall recorded in tenths of an inch through June 22, 1999 and hundredths of an inch for the remainder of the year.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.10	.00	.00	.00	---	.00	.00	.00
2	.00	.00	.00	.00	.00	.00	.00	.00	---	.00	.00	.00
3	.00	.00	.00	.00	.00	.00	.00	.00	---	.00	.00	.00
4	.00	.00	.00	.00	.00	.00	.00	.00	---	.00	.00	.00
5	.00	.00	.00	.00	.00	.00	.00	.00	---	.00	.00	.00
6	.00	.00	.00	.00	.00	.00	.00	.00	---	.00	.00	.00
7	.00	.00	.00	.00	.00	.00	.00	.00	---	.00	.00	.00
8	.00	.00	.00	.30	.00	.00	.00	.00	---	.00	.00	.00
9	.00	.00	.00	.80	.00	.00	.00	.00	---	.00	.00	.00
10	.00	.00	.00	.00	.00	.00	.00	.00	---	.00	.00	.00
11	.00	.00	.00	.00	.00	.00	.00	.00	---	.00	.00	.00
12	.1	.00	.00	.00	.00	.00	.00	.00	---	.00	.00	.00
13	.00	.00	.00	.00	.00	.00	.00	.00	---	.00	.00	.00
14	.00	.00	.00	.00	.00	.00	.00	.00	---	.00	.00	.00
15	.00	.00	.10	.00	.00	.00	.00	---	---	.00	.00	.00
16	.00	.00	.60	.00	.00	.00	.00	---	---	.00	.00	.00
17	.00	.00	.00	.00	.00	.00	.00	---	---	.00	.00	.00
18	.00	.00	.00	.00	.00	.00	.00	---	---	.00	.00	.00
19	.00	.00	.00	.00	.00	.00	.00	---	---	.00	.00	.00
20	.00	.00	.00	.00	.10	.00	.00	---	---	.00	.00	.00
21	.00	.00	.00	.00	.10	.00	.00	---	---	.00	.00	.00
22	.00	.00	.00	.00	.00	.00	.00	---	a--	.00	.00	.00
23	.00	.00	.00	.00	.00	.00	.00	---	.00	.00	.00	.00
24	.00	.00	.00	.00	.00	.00	.00	---	.00	.00	.00	.00
25	.00	.00	.00	.00	.00	.00	.00	---	.00	.00	.00	.00
26	.00	.00	.00	.00	.00	.00	.00	---	.00	.00	.00	.00
27	.00	.00	.00	.00	.00	.00	.00	---	.00	.00	.00	.00
28	.00	.00	.00	.00	.00	.00	.00	---	.00	.00	.00	.00
29	.00	.00	.00	.00	---	.00	.00	---	.00	.00	.00	.00
30	.00	.00	.00	.00	---	.00	.00	---	.00	.00	.00	.00
31	.00	---	2.20	.00	---	.00	---	---	---	.00	.00	---
TOTAL	0.10	0.00	2.90	1.10	0.30	0.00	0.00	---	---	0.00	0.00	0.00

CAL YR 1998 TOTAL 3.40

WTR YR 1999 TOTAL 5.00 (estimated)

(a) Estimated rainfall of 0.60 inches from May 15 (0000) to June 22 (2400)

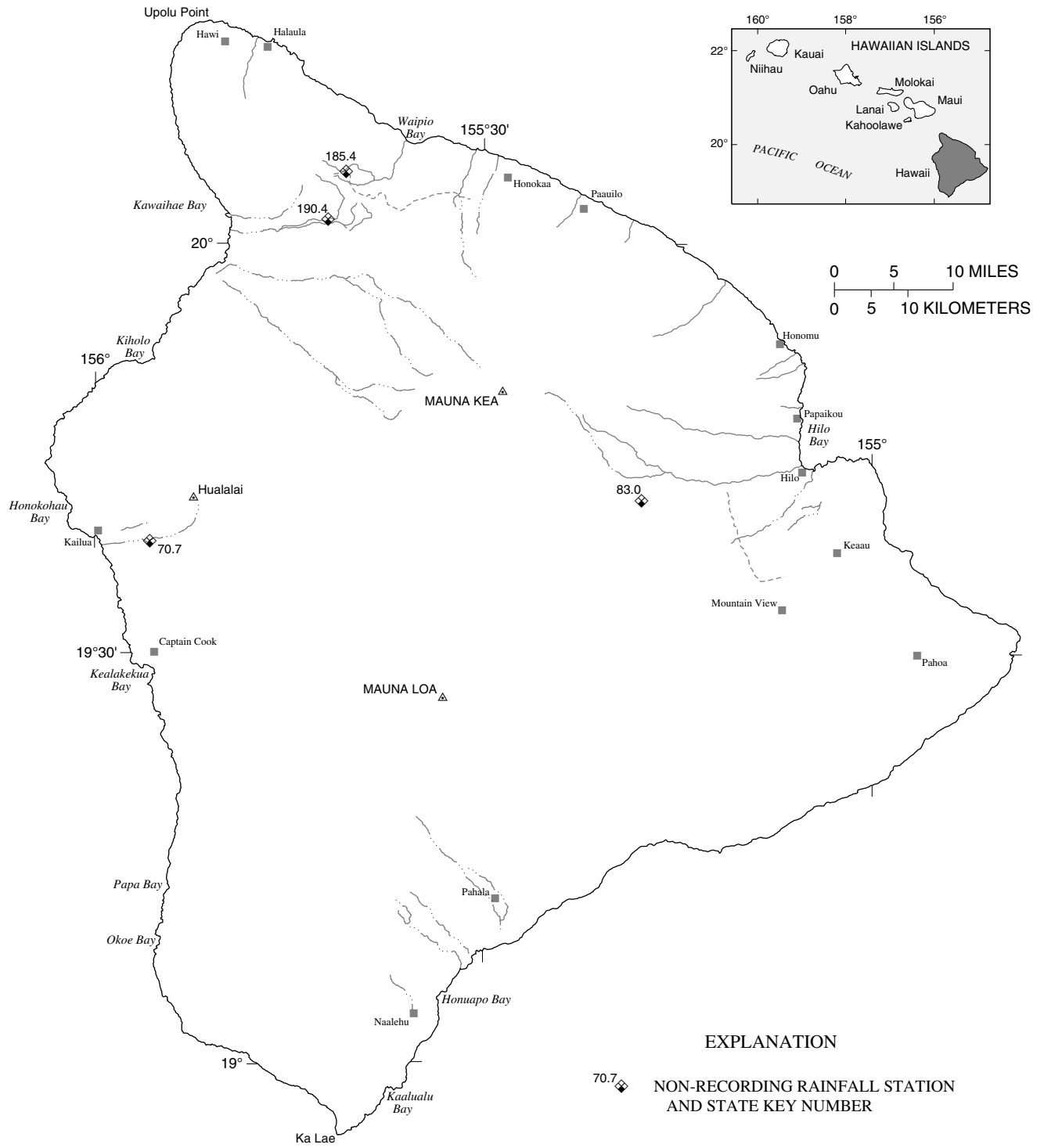


Figure 25. Locations of rainfall stations on Hawaii.

RAINFALL RECORDS
HAWAII, ISLAND OF HAWAII

194117155174801. State Key Number 83.0 Quarry at Saddle Road rain gage, Hawaii.

LOCATION.--Lat 19°41'17", long 155°17'48", Hydrologic Unit 20010000, 200 ft north of 16 mi marker on Saddle Road west of Hilo, at old quarry site.

PERIOD OF RECORD.--1967 to current year. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey.

GAGE.--Standard 8-in. National Weather Service nonrecording rain gage. Elevation of gage is 4,140 ft (from topographic map).

REMARKS.--Records poor. Cumulative rainfall read in nearest tenths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
INTERMITTENT READINGS

Period	Rainfall
Jul. 28 to Oct. 05	21.5
Oct. 05 to Nov. 24	22.3
Nov. 24 to Jan. 27	23.8
Jan. 27 to Mar. 01	>3.9 a
Mar. 01 to Mar. 23	>.4 a
Mar. 23 to May 19	>.6 a
May 19 to Jul. 14	>.2 a
Jul. 14 to Nov. 02	>.4 a

200515155404201. State Key Number 185.4 Upper Hamakua Ditch rain gage below Kawaiki Stream near Kamuela, Hawaii.

LOCATION.--Lat 20°05'15", long 155°40'42", Hydrologic Unit 20010000, 15 ft from USGS stream-gaging station 16720500 on right bank, and 800 ft downstream of Kawaiki Stream.

PERIOD OF RECORD.--1964 to current year. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey.

GAGE.--Standard 8-in. National Weather Service nonrecording rain gage. Elevation of gage is 4,020 ft (from topographic map).

REMARKS.--Records fair. Cumulative rainfall read in nearest tenths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
INTERMITTENT READINGS

Period	Rainfall
Oct. 01 to Nov. 18	38.4 estimate b
Nov. 18 to Dec. 31	20.0 estimate c
Jan. 01 to Jan. 14	2.0 estimate c
Jan. 14 to Mar. 10	27.6
Mar. 10 to May 12	30.9
May 12 to Jul. 27	>21.5
Jul. 27 to Sep. 30	18.5 estimate d

CAL YR 1998 TOTAL 241.5
WTR YR 1999 TOTAL >158.9

> Actual value is known to be greater than value shown.

a Accumulated rainfall reduced by leak through hole in collector. Actual value is known to be greater than value shown.

b Estimated value based on accumulated reading of 43.4 inches from Sep. 23 to Nov. 18, 1998

c Estimated value based on accumulated reading of 22.0 inches from Nov. 18, 1998 to Jan. 14, 1999

d Estimated value based on accumulated reading of 21.5 inches from Jul. 27 to Oct. 21, 1999

RAINFALL RECORDS
HAWAII, ISLAND OF HAWAII--Continued

200148155420501. State Key Number 190.4 Keanuimano rain gage near Kamuela, Hawaii.

LOCATION.--Lat 20°01'48", long 155°42'05", Hydrologic Unit 20010000, in USGS stream-gaging station 16756500 on left bank, 150 ft upstream from junction of State Highways 19 and 250, and 2.0 mi west of Kamuela.

PERIOD OF RECORD.--1963 to current year. Prior to October 1992, unpublished records are in the files of the U.S. Geological Survey.

GAGE.--Standard 8-in. National Weather Service nonrecording rain gage. Elevation of gage is 2,410 ft (from topographic map).

REMARKS.--Records fair. Cumulative rainfall read in nearest tenths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
INTERMITTENT READINGS

Period	Rainfall
Oct. 01 to Oct. 01	.1 estimate a
Oct. 01 to Nov. 19	1.3
Nov. 19 to Dec. 31	3.6 estimate b
Jan. 01 to Jan. 19	.3 estimate b
Jan. 19 to Mar. 12	3.4
Mar. 12 to May 14	5.2
May 14 to Jul. 30	.5
Jul. 30 to Sep. 01	1.3
Sep. 01 to Sep. 30	.3 estimate c

CAL YR 1998 TOTAL 26.2
WTR YR 1999 TOTAL 16.0

- (a) Estimated value based on accumulated reading of 2.0 inches from Jul. 27 to Oct. 01, 1998, 1:15 pm
 (b) Estimated value based on accumulated reading of 3.9 inches from Nov. 19, 1998 to Jan 19, 1999
 (c) Estimated value based on accumulated reading of 0.5 inches from Sep. 01 to Oct. 28, 1999

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