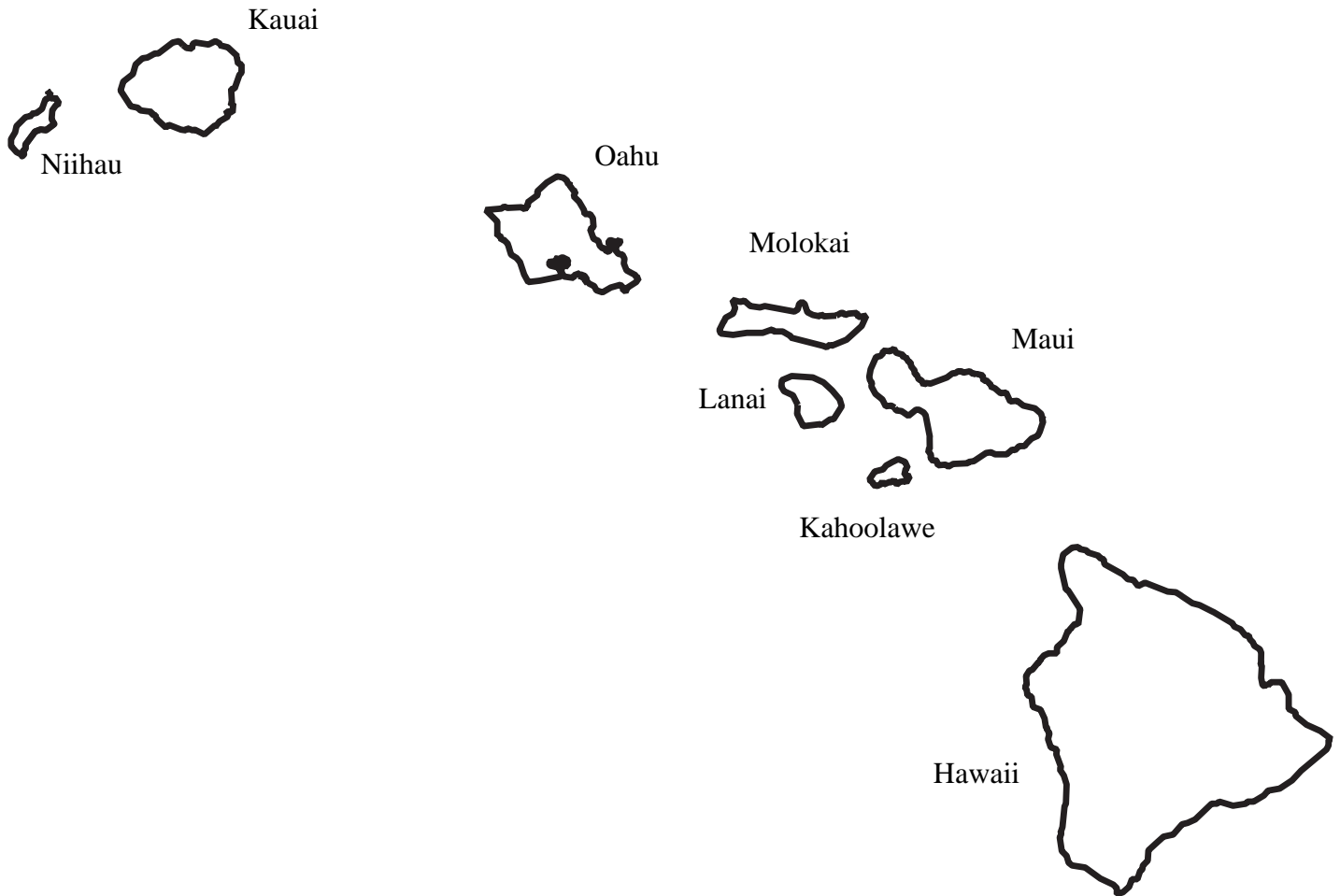
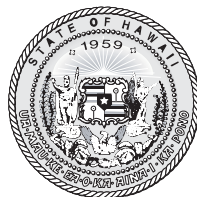


Prepared in cooperation with the State of Hawaii Department of Land and Natural Resources,
Commission on Water Resource Management and with other agencies

Water Resources Data Hawaii and other Pacific Areas Water Year 2003



Water-Data Report HI-03-1
Volume 1. Hawaii



CALENDAR FOR WATER YEAR 2003

2002

OCTOBER							NOVEMBER							DECEMBER						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
		1	2	3	4	5						1	2	1	2	3	4	5	6	7
6	7	8	9	10	11	12	3	4	5	6	7	8	9	8	9	10	11	12	13	14
13	14	15	16	17	18	19	10	11	12	13	14	15	16	15	16	17	18	19	20	21
20	21	22	23	24	25	26	17	18	19	20	21	22	23	22	23	24	25	26	27	28
27	28	29	30	31			24	25	26	27	28	29	30	29	30	31				

2003

JANUARY							FEBRUARY							MARCH						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
			1	2	3	4							1							1
5	6	7	8	9	10	11	2	3	4	5	6	7	8	2	3	4	5	6	7	8
12	13	14	15	16	17	18	9	10	11	12	13	14	15	9	10	11	12	13	14	15
19	20	21	22	23	24	25	16	17	18	19	20	21	22	16	17	18	19	20	21	22
26	27	28	29	30	31		23	24	25	26	27	28		23	24	25	26	27	28	29
														30	31					

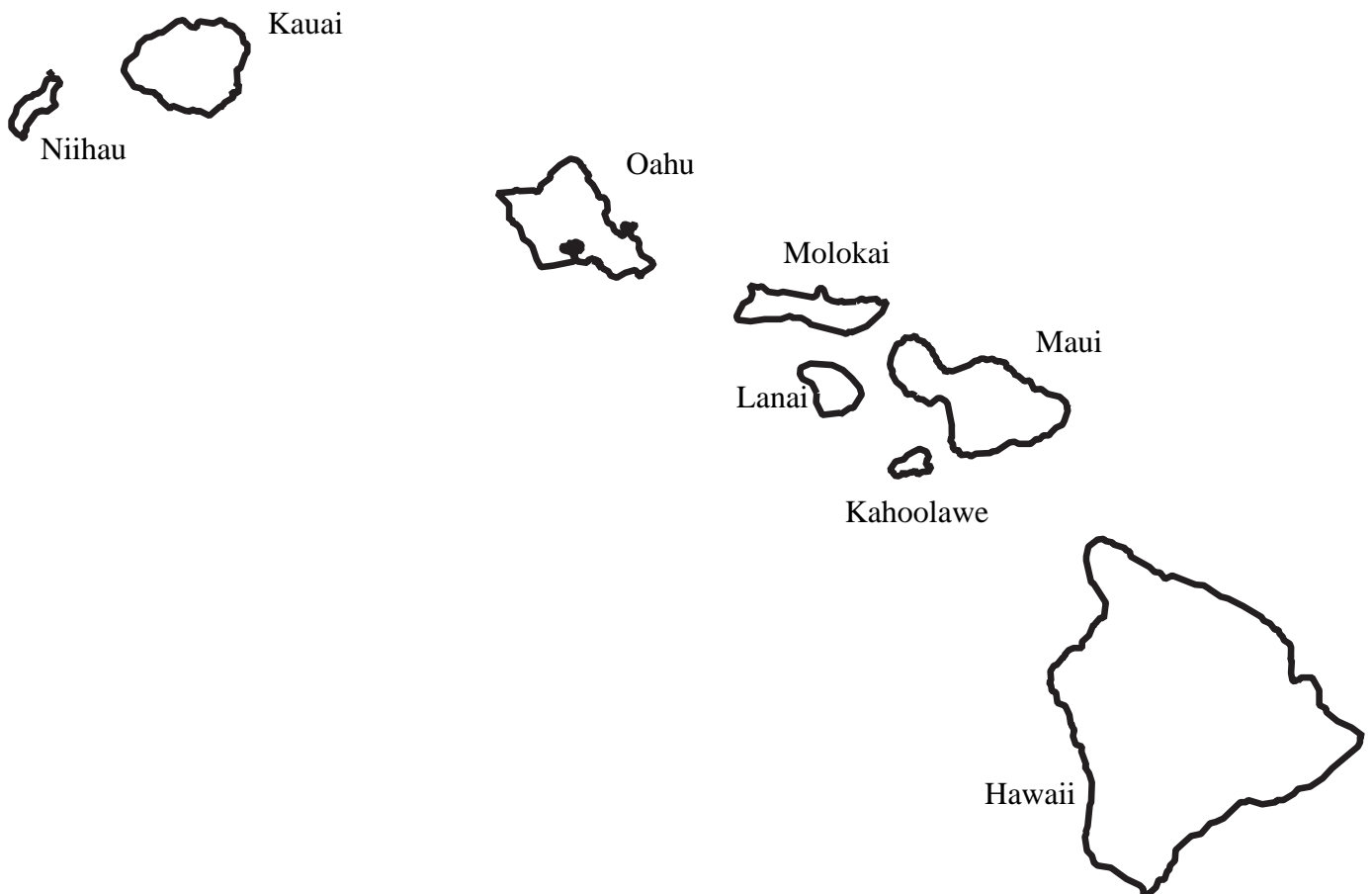
APRIL							MAY							JUNE						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
			1	2	3	4					1	2	3	1	2	3	4	5	6	7
6	7	8	9	10	11	12	4	5	6	7	8	9	10	8	9	10	11	12	13	14
13	14	15	16	17	18	19	11	12	13	14	15	16	17	15	16	17	18	19	20	21
20	21	22	23	24	25	26	18	19	20	21	22	23	24	22	23	24	25	26	27	28
27	28	29	30				25	26	27	28	29	30	31	29	30					

JULY							AUGUST							SEPTEMBER						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
			1	2	3	4						1	2		1	2	3	4	5	6
6	7	8	9	10	11	12	3	4	5	6	7	8	9	7	8	9	10	11	12	13
13	14	15	16	17	18	19	10	11	12	13	14	15	16	14	15	16	17	18	19	20
20	21	22	23	24	25	26	17	18	19	20	21	22	23	21	22	23	24	25	26	27
27	28	29	30	31			24	25	26	27	28	29	30	28	29	30				

Water Resources Data Hawaii and other Pacific Areas Water Year 2003

By P.C. Teeters, R.I. Taogoshi, D.C. Nishimoto, and B.H. Shimizu

Water-Data Report HI-03-1
Volume 1. Hawaii



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

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

U.S. Department of the Interior

Gale A. Norton, Secretary

U.S. Geological Survey

Charles G. Groat, Director

2005

U.S. Geological Survey
677 Ala Moana Blvd., Suite 415
Honolulu, HI 96813
(808) 587-2400

Information about the USGS, Hawaii District is available on the Internet at <http://hi.water.usgs.gov>

Information about all USGS reports and products is available by calling 1-888-ASK-USGS or on the Internet via the World Wide Web at <http://www.usgs.gov/>

Additional earth science information is available by accessing the USGS home page at <http://www.usgs.gov/>

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, Richard Fontaine, and Stephen Gingerich, reviewed and verified the data, and the following individuals contributed significantly to the collection, processing, and tabulation of the data:

Island of Kauai

Clayton H. Yoshida

Island of Hawaii

Gary A. Sanchez

Islands of Maui and Molokai

Matt A.T. Wong

Island of Oahu

Vaughn E. Kunishige

Jill D. Nishimura

Marcael T.J. Ball

Stacie T.M. Young

Heather A. Jeppesen

Michael F. Wong

Luis E. Menoyo

Rachel S. Ross

Kenneth N. Natividad

Barry R. Hill

This report was prepared in cooperation with the State of Hawaii, and with other local and Federal agencies under the general supervision of Gordon Tribble, District Chief, Hawaii.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE April 30, 2005	3. REPORT TYPE AND DATES COVERED Annual 1 Oct 2002 - 30 Sept 2003	
4. TITLE AND SUBTITLE Water Resources Data, Hawaii Water Year 2003			5. FUNDING NUMBERS	
6. AUTHOR(S) P.C. Teeters, R.I. Taogoshi, D.C. Nishimoto, and B.H. Shimizu				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Geological Survey, Water Resources Division Hawaii District 677 Ala Moana Blvd., Suite 415 Honolulu, Hawaii 96813			8. PERFORMING ORGANIZATION REPORT NUMBER USGS-WDR-HI-03-1	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Geological Survey, Water Resources Division Hawaii District 677 Ala Moana Blvd., Suite 415 Honolulu, Hawaii 96813			10. SPONSORING / MONITORING AGENCY REPORT NUMBER USGS-WDR-HI-03-1	
11. SUPPLEMENTARY NOTES Prepared in cooperation with the State of Hawaii and other State, local, and Federal agencies.				
12a. DISTRIBUTION / AVAILABILITY STATEMENT This report may be purchased from: U.S. Department of Commerce, NTIS 5285 Port Royal Road Springfield, VA 22161			12b. DISTRIBUTION CODE No restrictions on distribution	
13. ABSTRACT (Maximum 200 words) Water resources data for the 2003 water year for Hawaii consist of records of stage, discharge, and water quality of streams and springs; water levels and quality of water wells; and rainfall totals. <ul style="list-style-type: none"> ● Water discharge for 70 gaging stations on streams, springs, and ditches. ● Discharge data for 97 crest-stage partial-record stations. ● Water-quality data for 6 streams, and 28 partial-record stations, and 10 wells. ● Water levels for 88 observation wells. ● Rainfall data for 38 rainfall stations. <p>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.</p>				
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 390	
17. SECURITY CLASSIFICATION OF REPORT Unclassified			16. PRICE CODE	
18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified		19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified		20. LIMITATION OF ABSTRACT Unlimited

CONTENTS

PREFACE

LIST OF SURFACE-WATER STATIONS, IN DOWNSTREAM ORDER, FOR WHICH RECORDS
ARE PUBLISHED IN THIS VOLUME

LIST OF GROUND-WATER WELLS, BY COUNTY, FOR WHICH RECORDS ARE PUBLISHED IN THIS VOLUME

LIST OF RAINFALL STATIONS, BY COUNTY, FOR WHICH RECORDS ARE PUBLISHED IN THIS VOLUME

LIST OF DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE-ONLY STATIONS

LIST OF DISCONTINUED SURFACE-WATER-QUALITY STATIONS

INTRODUCTION

COOPERATION

SUMMARY OF HYDROLOGIC CONDITIONS

Surface Water

Ground Water

Rainfall

SPECIAL NETWORKS AND PROGRAMS

EXPLANATION OF THE RECORDS

Station Identification Numbers

Downstream Order System

Latitude-Longitude System

Local Identifier Well-Numbering System

Local State Key Numbering System

Records of Stage and Water Discharge

Data Collection and Computation

Data Presentation

Station Manuscript

Data Table of Daily Mean Values

Statistics of Monthly Mean Data

Summary Statistics

Identifying Estimated Daily Discharge

Accuracy of the Records

Other Records Available

Records of Surface-Water Quality

Classification of Records

Arrangement of Records

On-Site Measurements and Sample Collection

Water Temperature

Sediment

Laboratory Measurements

Data Presentation

Remark Codes

Dissolved Trace-Element Concentrations

Change in National Trends Network Procedures

Records of Ground-Water Levels

Data Collection and Computation

Data Presentation

ACCESS TO USGS WATER DATA

DEFINITION OF TERMS

PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS

STATION RECORDS, SURFACE WATER

Discharge at partial-record stations

Crest-stage partial-record stations

Low-flow partial-record stations

STATION RECORDS, GROUND WATER

Ground-water levels

Quality of ground water

STATION RECORDS, RAINFALL

INDEX

ILLUSTRATIONS

- Figure 1. Graphs showing discharge during 2003 water year compared with median discharge for four representative gaging stations
- 2–3. Sketches showing:
 2. System for numbering wells and miscellaneous sites
 3. Local well-numbering system
 - 4–25. Maps showing:
 4. Island of Hawaii and system for determining local well numbers
 5. Gaging stations on Kauai
 6. Gaging and water-quality stations on Oahu
 7. Gaging stations on Molokai
 8. Gaging stations on Maui
 9. Gaging stations on Hawaii
 10. Crest-stage gaging stations on Kauai
 11. Crest-stage gaging stations on Oahu
 12. Crest-stage gaging stations on Molokai
 13. Crest-stage gaging stations on Maui
 14. Crest-stage gaging stations on Hawaii
 15. Locations of Pearl Harbor Springs measuring sites, Oahu
 16. Observation wells and ground-water quality sampling wells on Kauai
 17. Observation wells and ground-water quality sampling wells on Oahu
 18. Observation wells and ground-water quality sampling wells on Molokai
 19. Observation wells and ground-water quality sampling wells on Maui
 20. Observation wells and ground-water quality sampling wells on Hawaii
 21. Rainfall stations on Kauai
 22. Rainfall stations on Oahu
 23. Rainfall stations on Molokai
 24. Rainfall stations on Maui
 25. Rainfall stations on Hawaii

TABLES

- Table 1. Comparison of peak discharge for 2003 water year with the peak discharge for the period of record at four representative stations

SURFACE-WATER STATIONS, IN DOWNSTREAM ORDER, FOR WHICH
RECORDS ARE PUBLISHED IN THIS VOLUME

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
ISLAND OF KAUAI	
Kawaikoi Stream (head of Waimea River) near Waimea (d)	16010000
Waimea River:	
Waialae Stream at altitude 3,820 ft, near Waimea (d)	16019000
Makaweli River near Waimea (d)	16036000
Hanapepe River below Manuahi Stream, near Eleele (d)	16049000
Wailua River:	
South Fork Wailua River near Lihue (d)	16060000
North Fork Wailua River:	
East Branch of North Fork Wailua River near Lihue (d)	16068000
North Fork Wailua River near Kapaa (d)	16071000
Opaekaa Stream:	
Left Branch Opaekaa Stream near Kapaa (d)	16071500
Kilauea Stream:	
Halaulani Stream at altitude 400 ft, near Kilauea (d)	16097500
Hanalei River near Hanalei (d)	16103000
Wainiha River near Hanalei (d)	16108000
Limahuli Stream near Wainiha (d)	16114000
 ISLAND OF OAHU	
Kaukonahua Stream (head of Kiikii Stream):	
North Fork Kaukonahua Stream above Right Branch, near Wahiawa (d)	16200000
South Fork Kaukonahua Stream at East Pump Reservoir, near Wahiawa (d)	16208000
Makaha Stream near Makaha (d)	16211600
Waikele Stream:	
Kipapa Stream near Wahiawa (d)	16212800
Waikele Stream at Waipahu (d)	16213000
Waiawa Stream near Pearl City (d)	16216000
Halawa Stream:	
North Halawa Stream near Aiea (d, c, t)	16226000
North Halawa Stream at Bridge 8 near Halawa (c, t)	212356157531801
North Halawa Valley Highway Storm drain C near Aiea (d, c, t)	212353157533001
North Halawa Stream near Honolulu (d, c, t)	16226200
North Halawa Stream near Quarantine Station at Halawa(d, c, t)	16226400
North Halawa Stream below H-1 (c, t)	16227100
Kalihi Stream:	
Near Honolulu (d)	16229000
At Kalihi (d)	16229300
Waiakeakua Stream (head of Manoa Stream) at Honolulu (d)	16240500
Manoa Stream at Kanewai Field (d)	16242500
Pukele Stream near Honolulu (d)	16244000
Manoa-Palolo Drainage Canal (d)	16247100

SURFACE-WATER STATIONS, IN DOWNSTREAM ORDER, FOR WHICH
RECORDS ARE PUBLISHED IN THIS VOLUME

	Station number
ISLAND OF OAHU--Continued	
Maunawili Stream:	
Makawao Stream near Kailua (d)	16254000
Kaneohe Stream:	
Kamooalii Stream below Luluku Stream, near Kaneohe (d)	16272200
Haiku Stream near Heeia (d)	16275000
Kahaluu Stream near Ahuimanu (d)	16283200
Waihee Stream near Kahaluu (d)	16284200
Waiahole Tunnel Wasteway at Intake 31, near Waiahole (d)	16286000
Waiahole Tunnel at North Portal, near Waiahole (d)	16287000
Waiahole Tunnel at Adit 8, near Waipahu (d)	16287200
Waiahole Stream above Kamehameha Highway (d)	16294100
Waikane Stream at altitude 75 ft, at Waikane (d)	16294900
Hakipuu Stream near Waikane (d)	16295300
Kahana Stream at altitude 30 ft, near Kahana (d)	16296500
Punaluu Stream:	
Punaluu ditch near Punaluu (d)	16302000
Punaluu Stream near Punaluu (d)	16303000
Kaluanui Stream near Punaluu (d)	16304200
Waimea River:	
Kamananui Stream at Maunawai (d)	16330000
Paukauila Stream:	
Opaepala Stream near Wahiawa (d)	16345000
 ISLAND OF MOLOKAI	
Halawa Stream near Halawa (d)	16400000
Waikolu Stream:	
Molokai tunnel at west portal (d)	16405300
Waikolu Stream at altitude 900 ft, near Kalaupapa (d)	16405500
Kaunakakai Gulch at 75 ft (d)	16414200
Papio Gulch at Halawa (d)	16419500
 ISLAND OF MAUI	
Oheo Gulch at Dam near Kipahulu (d)	16501200
Hanawi Stream:	
near Nahiku (d)	16508000
West Wailuaiki Stream near Keanae (d)	16518000
Honopou Stream near Huelo (d)	16587000
Kakipi Gulch:	
Opana Gulch:	
Opana tunnel at Kailiili (d)	16599500
Iao Stream at Kepaniwai Park, near Wailuku (d)	16604500
Waihee River at dam, near Waihee (d)	16614000
Kahakuloa Stream near Honokohau (d)	16618000
Honokohau Stream near Honokohau (d)	16620000
 ISLAND OF HAWAII	
Wailuku River at Piihonua (d)	16704000
Honolii Stream near Papaikou (d)	16717000
Kawainui Stream (head of Wailoa Stream) near Kamuela (d)	16720000

SURFACE-WATER STATIONS, IN DOWNSTREAM ORDER, FOR WHICH
RECORDS ARE PUBLISHED IN THIS VOLUME

	Station number
ISLAND OF HAWAII--Continued	
Waipio Stream (continuation of Kawainui Stream):	
Alakahi Stream near Kamuela (d)	16725000
Upper Hamakua ditch above Waimea Reservoir diversion, near Kamuela (d)	16726000
Lower Hamakua Ditch above main weir (d)	16732800
Kohakohau Stream below DWS intake, near Kamuela (d)	16756100
Waikoloa Stream at Marine Dam, near Kamuela (d)	16758000
Hauani Gulch (head of Lanimaumau Stream) near Kamuela (d)	16759000
Waiaha Stream at Holualoa (d)	16759600
Paauau Gulch at Pahala (d)	16770500

DISCHARGE AT PARTIAL-RECORD STATIONS

Crest-stage partial-record stations	
Low-flow partial-record stations	

GROUND-WATER WELLS, BY COUNTY, FOR WHICH RECORDS
ARE PUBLISHED IN THIS VOLUME

Letters after well number designate type of data: (c) chemical, (t) water temperature, (w) water level

HAWAII

ISLAND OF KAUAI

(2-0020-03)	220008159204701	(w)	.....
(2-0021-01)	220057159210301	(w)	.....
(2-0022-01)	220013159224001	(w)	.....
(2-0023-01)	220051159231801	(w)	.....
(2-0044-14)	220019159444801	(w)	.....
(2-0124-01)	220133159242001	(w)	.....
(2-0126-01)	220126159261501	(w)	.....
(2-0320-03)	220354159205602	(w)	.....
(2-0818-03)	220825159185301	(w)	.....
(2-1020-03)	221038159203801	(w)	.....
(2-1126-01)	221150159264501	(w)	.....
(2-1232-01)	221247159324801	(w)	.....
(2-1333-01)	221318159335901	(w)	.....
(2-5426-03)	215434159263301	(w)	.....
(2-5427-01)	215454159274201	(w)	.....
(2-5534-03)	215522159342601	(w)	.....
(2-5534-06)	215509159340401	(w)	.....
(2-5626-01)	215630159265101	(w)	.....
(2-5634-01)	215607159344301	(w)	.....
(2-5824-02)	215856159243201	(w)	.....
(2-5824-08)	215858159243601	(w)	.....
(2-5840-01)	215803159401201	(w)	.....
(2-5843-01)	215857159430101	(w)	.....
(2-5921-01)	215958159214301	(w)	.....
(2-5923-07)	215901159235201	(w)	.....
(2-5923-08)	215950159231601	(w)	.....
(2-5939-01)	215906159395601	(w)	.....

ISLAND OF OAHU

(3-1851-19A)	211832157515501	(c, t, w)	.....
(3-1851-19B)	211832157515502	(c, t, w)	.....
(3-1851-22)	211828157515801	(w)	.....
(3-1959-05)	211907157594701	(w)	.....
(3-2053-08)	212010157531501	(w)	.....
(3-2053-10)	212046157531401	(w)	.....
(3-2101-03)	212154158015201	(w)	.....
(3-2103-01)	212132158035701	(w)	.....
(3-2153-02)	212106157533701	(w)	.....
(3-2153-08)	212117157534601	(w)	.....
(3-2256-10)	212238157561101	(w)	.....
(3-2256-12)	212238157561102	(w)	.....
(3-2358-19)	212318157583401	(w)	.....
(3-2358-22)	212342157584301	(c, t)	.....
(3-2703-02)	212738158034301	(w)	.....
(3-2808-01)	212813158080201	(w)	.....
(3-2901-07)	212927158014801	(w)	.....
(3-2959-01)	212934157592301	(w)	.....
(3-3213-06)	213224158135901	(w)	.....
(3-3407-37)	213430158071601	(w)	.....
(3-3409-16)	213438158091101	(w)	.....
(3-3410-08)	213446158104901	(c, t, w)	.....

GROUND-WATER WELLS, BY COUNTY, FOR WHICH RECORDS
ARE PUBLISHED IN THIS VOLUME

ISLAND OF OAHU--Continued

(3-3604-01)	213626158044601	(c, t, w)	.....
(3-4057-05)	214053157570401	(w)	.....
(3-4101-03)	214125158013401	(w)	.....

ISLAND OF MOLOKAI

(4-0448-02)	210425156483001	(w)	.....
(4-0449-01)	210402156495801	(w)	.....
(4-0457-01)	210419156570501	(w)	.....
(4-0601-01)	210605157012001	(c, t, w)	.....
(4-0800-01)	210825157004301	(c, t)	.....
(4-0801-01)	210856157011201	(c)	.....
(4-0801-02)	210857156010701	(c)	.....

ISLAND OF MAUI

(6-3925-01)	203912156255901	(w)	.....
(6-4422-01)	204407156215501	(w)	.....
(6-4824-01)	204827156242201	(w)	.....
(6-4831-01)	204818156310301	(w)	.....
(6-4928-02)	204909156281401	(w)	.....
(6-5130-01)	205140156304501	(w)	.....
(6-5130-02)	205154156303801	(w)	.....
(6-5330-05)	205305156304401	(w)	.....
(6-5330-09)	205329156305502	(w)	.....
(6-5332-04)	205312156321402	(w)	.....
(6-5430-03)	205419156304401	(w)	.....
(6-5430-05)	205405156305401	(c, t, w)	.....
(6-5431-01)	205437156310501	(w)	.....
(6-5631-01)	205617156311101	(w)	.....
(6-5731-05)	205705156312401	(w)	.....
(6-5840-01)	205856156400101	(w)	.....

ISLAND OF HAWAII

(8-0437-01)	190423155371501	(w)	.....
(8-0632-01)	190602155325901	(w)	.....
(8-3155-01)	193122155551701	(w)	.....
(8-3207-04)	193251155072101	(w)	.....
(8-4010-01)	194035155102201	(w)	.....
(8-4708-02)	194731155080401	(w)	.....
(8-4953-01)	194945155534401	(w)	.....
(8-5946-01)	195929155462501	(w)	.....
(8-5948-01)	195947155485801	(w)	.....
(8-6141-01)	200143155414201	(w)	.....
(8-6147-01)	200132155471101	(w)	.....
(8-7347-03)	201347155470501	(w)	.....
(8-7445-01)	201406155454401	(w)	.....
(8-7448-06)	201429155480201	(w)	.....
(8-7451-02)	201441155510701	(w)	.....
(8-7549-03)	201517155493701	(w)	.....

RAINFALL STATIONS, BY COUNTY, FOR WHICH RECORDS
ARE PUBLISHED IN THIS VOLUME

Letters after station number designate type of station: (r) recording, and (n) non-recording

HAWAII

ISLAND OF KAUAI

(1042.0)	220523159341201	(r)	.....
(1045.0)	220504159321401	(r)	.....
(1047.0)	220427159300201	(r)	.....
(1051.0)	220356159281401	(r)	.....
(1068.0)	220443159235601	(r)	.....
(1080.0)	220817159374401	(r)	.....
(1082.0)	220739159373001	(r)	.....
(1083.0)	220713159361201	(r)	.....
(1084.0)	220927159355001	(r)	.....
(1085.0)	220703159351201	(r)	.....
(1131.7)	221101159280801	(r)	.....

ISLAND OF OAHU

(711.6)	211747157485601	(r)	.....
(771.11)	212428157511201	(r)	.....
(771.9)	212304157542201	(r)	.....
(772.1)	212346157533701	(r)	.....
(772.3)	212359157502601	(r)	.....
(773.3)	212029157523601	(r)	.....
(794.3)	212114157435001	(r)	.....
(832.2)	212813157574001	(r)	.....
(842.1)	213016158105901	(r)	.....
(882.3)	213205157571001	(n)	.....
(882.4)	213211157562400	(r)	.....
(883.12)	213215157552800	(r)	.....
(886.4)	213237157530701	(r)	.....
(886.6)	213000157515401	(r)	.....
(897.1)	213725158010401	(r)	.....
(897.9)	213608158011101	(r)	.....

ISLAND OF MOLOKAI

(540.1)	210843156551801	(r)	.....
(551.5)	211039157123101	(r)	.....

ISLAND OF MAUI

(255.0)	203721156151601	(r)	.....
(280.1)	204017156031701	(r)	.....
(297.0)	204923156371501	(r)	.....
(311.3)	204606156270301	(r)	.....
(348.5)	204916156083701	(r)	.....

ISLAND OF HAWAII

(83.0)	194117155174801	(r)	.....
(92.5)	194945155534402	(r)	.....
(185.7)	200518155405801	(r)	.....
(190.4)	200148155420501	(n)	.....

WATER RESOURCES DATA FOR HAWAII, 2003
DISCONTINUED SURFACE-WATER OR STAGE-ONLY STATIONS

xiii

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	Hiloa 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 Puhi	--	1963-71
16053600	Lower Haiku Ditch nr Puhi	--	1963-71
16053800	Kamooloa Str nr Puhi	5.79	1963-70
16054000	Kuia Str nr Puhi	0.40	1939-41
16054200	Koloa Ditch nr Koloa	--	1964-71
16054400	Koloa tunnel nr Koloa	--	1966-71
16054500	Kuia Str nr Puhi	5.09	1963-66
16056000	Hanamaulu Str at Kapaia nr Lihue	6.41	1911-13
16056800	Waiahi-Kuia aqueduct nr Puhi	--	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, 2003
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	Lumamai 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	Hanakoa 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

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

Station number	Station name	Drainage area (mi ²)	Period of record
ISLAND OF OAHU--Continued			
16217000	Pearl Harbor Spr at Puukapu nr Pearl City	--	1931-35
16218000	Pearl Harbor Springs at Loko Kukona	--	1931-35, 1936-45
16218500	Pearl Harbor Spr at Kaluaopu nr Pearl City	--	1931-37
16219000	Hawn Elec. Co. tunnel at Waiau nr Pearl City	--	1939-42
16220000	Hawn Elec. Co. wasteway at Waiau nr Pearl City	--	1953-59
16222000	Pearl Harbor Springs at Waiau	--	1913-39, 1942-47
16224000	Pearl Harbor Springs at Kalauoa	--	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
16225800	North Halawa Stream near Kaneohe	1.64	1991-99
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
16249900	Maunawili Ditch abv Anianinui Tunnel nr Waimanalo	--	1990-2000
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

WATER RESOURCES DATA FOR HAWAII, 2003
DISCONTINUED SURFACE-WATER OR STAGE-ONLY STATIONS--Continued

Station number	Station name	Drainage area (mi ²)	Period of record
ISLAND OF OAHU--Continued			
16272000	Luluku Str nr Kaneohe	0.46	1914-16
16273000	Young Mau Ditch nr Kaneohe	--	1914-16
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
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
16325000	Kamananui Str at Pupukeya Military Rd nr Maunawai	3.13	1963-2001
16329000	Kaiwikoele Str tributary nr Maunawai	0.97	1967-71
16340500	Anahulu River tributary nr Haleiwa	0.83	1967-71
16343000	Helemanu 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
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 Kuelo	--	1911-13
16530000	Spreckels Ditch at station 3 nr Kuelo	--	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

WATER RESOURCES DATA FOR HAWAII, 2003
DISCONTINUED SURFACE-WATER OR STAGE-ONLY STATIONS--Continued

Station number	Station name	Drainage area (mi ²)	Period of record
ISLAND OF MAUI--Continued			
16553000	Waikamoi Str bl res at Kula pl intake nr Olinda	2.52	1945-49
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 Puuomalei 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

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

Station number	Station name	Drainage area (mi ²)	Period of record
ISLAND OF MAUI--Continued			
16610000	South Waiehu Str nr Wailuku	0.70	1910-17
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 Honolua 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 Honolua Ranch nr Honokahau	3.96	1911
16627000	Kapalooa Str at weir 1 nr Lahaina	1.00	1901
16628000	Kapalooa 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 Piipihonua	--	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 Piipihonua 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

WATER RESOURCES DATA FOR HAWAII, 2003
DISCONTINUED SURFACE-WATER OR STAGE-ONLY STATIONS--Continued

Station number	Station name	Drainage area (mi ²)	Period of record
ISLAND OF HAWAII--Continued			
16717500	Kawainui Str nr Pepeekeo	9.20	1912
16717820	Manowaiopae Str nr Laupahoehoe	1.04	1965-71
16718000	Upper Hamakua Ditch at Puualala nr Kukuihaele	--	1913-20
16720300	Kawaiki Stream near Kamuela	0.45	1968-99
16720500	Upper Hamakua Ditch below Kawaiki Str nr Kamuela	--	1964-79, 1980-2002
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
16724800	Upper Hamakua Ditch abv Alakahi Str nr Kamuela	--	1968-2000
16727000	Upper Hamakua Ditch abv Puukapu Res nr Kamuela	--	1977-2000
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

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

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 1999-01
			S	1972-93
16227500	Moanalua Str nr Kaneohe	0.94	S	1971-78
16242500	Manoa Str at Kanewai Field	5.99	C,T	1999-01
16270500	Kamooalii Str blw Kuou Str nr Kaneohe	3.21	S	1972-76
16284200	Waihee Str nr Kahaluu	0.97	C,T	1999-01
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

WATER RESOURCES DATA FOR HAWAII, 2003
DISCONTINUED SURFACE-WATER OR STAGE-ONLY STATIONS--Continued

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 71 stream-gaging stations and 93 crest-stage partial-record streamflow stations; (2) water-quality records for 5 streamflow-gaging stations, and 28 partial-record streamflow stations; (3) water-level records for 83 observation wells; (4) water-quality records for 65 observation wells; and (5) accumulated rainfall records for 38 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-02-1." 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 agreements with the USGS are:

Hawaii Department of Land and Natural Resources, Commission on Water Resource Management, Dean Nakano, Acting Deputy Director.
Hawaii Department of Land and Natural Resources, Engineering Division, Eric Hirano, Chief Engineer.
Hawaii Department of Land and Natural Resources, Land Division, Dierdre Mamiya, Administrator.
Hawaii Department of Transportation, Rodney Haraga, Director.
Hawaii Department of Agriculture, Agricultural Resources Division, Brian Kau, 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, Eric Crispin, Director and Chief Engineer.
City and County of Honolulu, Department of Environmental Services, Frank Doyle, Director.
National Tropical Botanical Garden, Charles Wichman Jr., Assistant Director.
Maui County Board of Water Supply, George Tengan, Director.
Kauai County Department of Water, Edward Tschupp, Director.
Hawaii County Department of Water Supply, Milton Pavao, P.E., Manager.
Hawaii Agribusiness Development Corporation, Alfredo Lee, Administrator.
Assistance in the form of funds or services was given by the U.S. Army Corps of Engineers, U.S. Army Hawaii Garrison, National Weather Service, and Hawaii County Department of Public Works.

The following organization aided in collecting records: East Maui Irrigation Co., Ltd.

SUMMARY OF HYDROLOGIC CONDITIONS

In general, the 2003 water year was much drier than the previous year. No major floods affected the state during the year.

Surface water

Substantial variations of stream flow during the 2003 water year were recorded at four index stations (figure 1). These stations are all on streams that are undiverted or unregulated, so that increases or decreases in stream flow can be considered primarily the result of rainfall fluctuations. Annual mean discharges for the 2003 water year at stations 16068000, 16229000, 16587000 and 16717000 were 65 percent, 37 percent, 58 percent and 61 percent of the long-term (1961-2000 water years for all stations except 16717000; 1967-2000 for station 16717000) median annual mean discharges at these stations respectively (figure 1).

Monthly mean flows at the four index stations indicate persistent dry conditions across the state for most of the year. An exception was the month of September, when 3 of the 4 stations had monthly means

WATER RESOURCES DATA FOR HAWAII, 2003

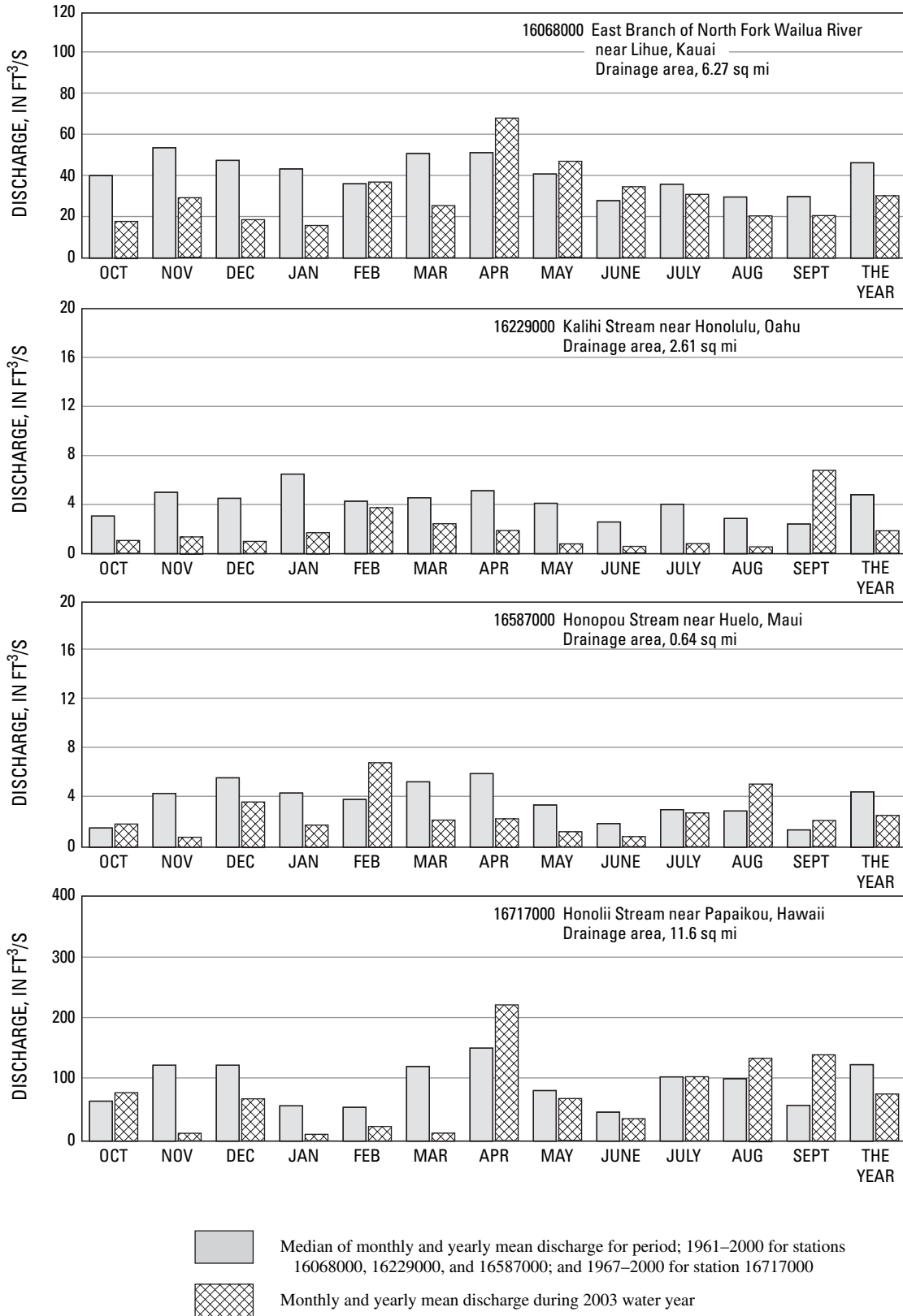


Figure 1. Discharge during 2003 water year compared with median discharge for four representative gaging stations.

flows in the upper 50% of the long-term records for that month. Streamflow at station 16068000 on Kauai exceeded the long-term median monthly mean streamflow in February, April, May, and June. Streamflow at station 16229000 on Oahu exceeded the long-term median monthly mean only in September. Streamflow at station 16587000 on Maui exceeded the long-term median monthly mean in October, February, August, and September. Streamflow at station 16717000 on Hawaii exceeded the long-term median monthly mean in October, April, August, and September.

Instantaneous peak flows at stations 16068000, 16229000, 16587000 and 16717000 were much lower than the peak flows for the period of record at these stations (table 1).

Table 1.--Comparison of peak discharge for 2003 water year with the peak discharge for the period of record at four representative station

Station Number	Station name	Water year 2003		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	July 26	4,760	Nov. 12, 1955	18,400
16229000	Kalihi Stream near Honolulu, Oahu	Sept. 11	864	Nov. 18, 1930	12,400
16587000	Honopou Stream near Huelo, Maui	Dec. 10	534	Nov. 18, 1930	5,710
16717000	Honolii Stream near Papaikou, Hawaii	Sept. 1	6,530	May 23, 1978	22,600

Ground water

Ground-water level 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 fluctuated throughout the year, but were generally lower than in water year 2002.

Water levels at well 2-5634-01 (station number 215607159344301) near Hanapepe on Kauai were below water levels recorded the previous year except during October. Water levels at this well were highest in October and lowest in September. Water levels at well 3-2256-10 (station number 212238157561101) near Pearl Harbor on Oahu were higher than 2002 water levels between October and December, but dropped below 2002 levels between January and September. Water levels at this well were highest in November and lowest in September. Water levels at well 6-5431-01 (station number 20543715631050) near Wailuku, Maui increased rapidly in October and remained above 2002 water levels until the end of December. Water levels at this well peaked in February, and the lowest recorded water levels were measured in October.

Rainfall

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

In water year 2003, rainfall amounts were below long-term normal amounts. Rainfall at the USGS-National Weather Service gage on Mount Waialeale totaled 263.64 inches or about 61 percent of the mean annual rainfall of 433 inches per year. The Kepuni Gulch rain gage on the leeward side of Haleakala on Maui recorded 22.39 inches, about 75 percent of the mean annual rainfall of approximately 30 inches.

DOWNSTREAM ORDER AND STATION NUMBER

Since October 1, 1950, hydrologic-station records in USGS reports have been listed in order of downstream direction along the main stream. All stations on a tributary entering upstream from a main-stream station are listed before that station. A station on a tributary entering between two main-stream stations is listed between those stations. A similar order is followed in listing stations on first rank, second rank, and other ranks of tributaries. The rank of any tributary on which a station is located with respect to the stream to which it is immediately tributary is indicated by an indentation in that list of stations in the front of this report. Each indentation represents one rank. This downstream order and system of indentation indicates which stations are on tributaries between any two stations and the rank of the tributary on which each station is located.

As an added means of identification, each hydrologic station and partial-record station has been assigned a station number. These station numbers are in the same downstream order used in this report. In assigning a station number, 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 composed of both types of stations. Gaps are consecutive. The complete 8-digit number for each station such as 16200000, which appears just to the left of the station name, includes a 2-digit part number "16" plus the 6-digit (or 8-digit) downstream order number "200000". The stations are numbered in downstream order as described above between stations of consecutive 8-digit numbers.

NUMBERING SYSTEM FOR WELLS AND MISCELLANEOUS SITES

The USGS well and miscellaneous site-numbering system is based on the grid system of latitude and longitude. The system provides the geographic location of the well or miscellaneous site and a unique number for each site. The number consists of 15 digits. The first 6 digits denote the degrees, minutes, and seconds of latitude, and the next 7 digits denote degrees, minutes, and seconds of longitude; the last 2 digits are a sequential number for wells within a 1-second grid. In the event that the latitude-longitude coordinates for a well and miscellaneous site are the same, a sequential number such as "01," "02," and so forth, would be assigned as one would for wells (see fig. 2). The 8-digit, downstream order station numbers are not assigned to wells and miscellaneous sites where only random water-quality samples or discharge measurements are taken.

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.

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

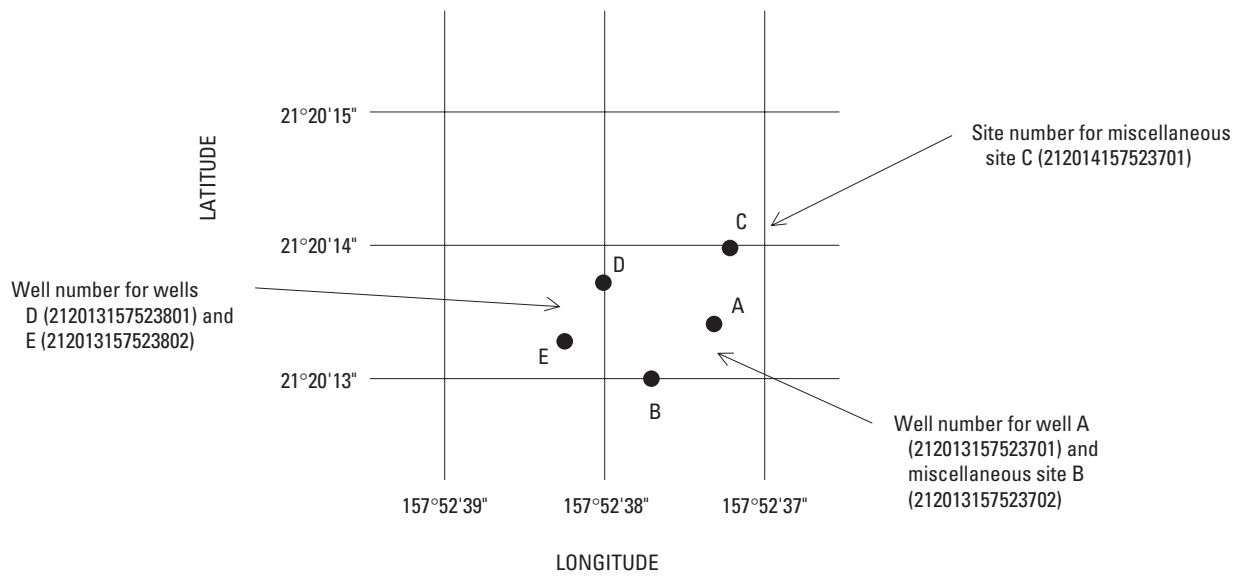


Figure 2. System for numbering wells and miscellaneous sites.

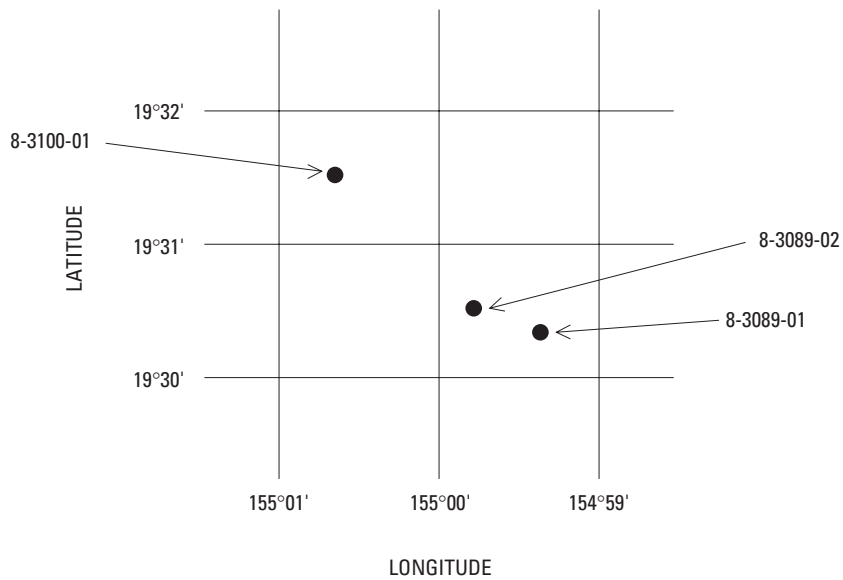


Figure 3. Local well numbering system.

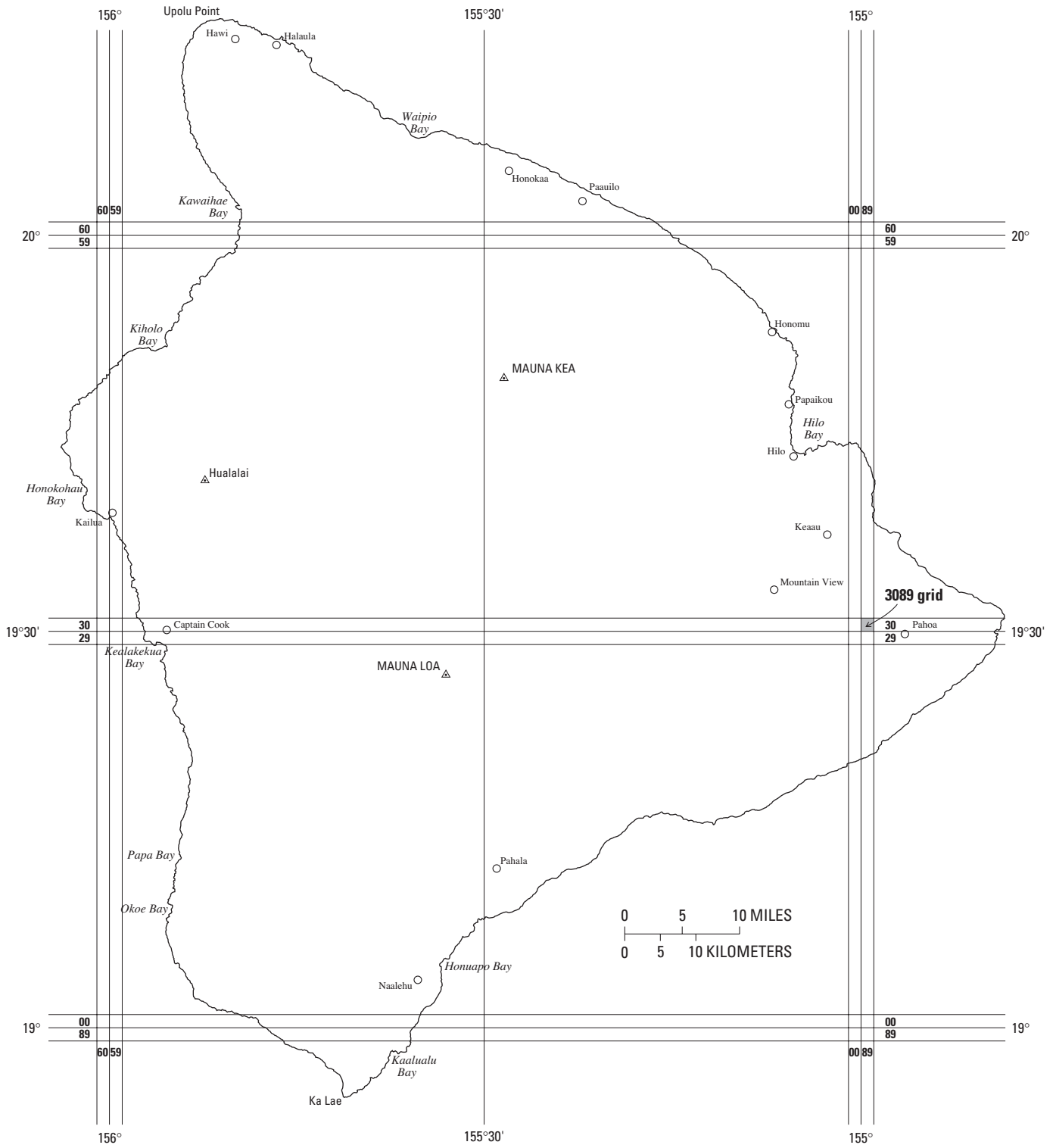


Figure 4. Map of Hawaii showing system for determining local well numbers.

SPECIAL NETWORKS AND PROGRAMS

Hydrologic Benchmark Network is a network of 61 sites in small drainage basins in 39 States that was established in 1963 to provide consistent streamflow data representative of undeveloped watersheds nationwide, and from which data could be analyzed on a continuing basis for use in comparison and contrast with conditions observed in basins more obviously affected by human activities. At selected sites, water-quality information is being gathered on major ions and nutrients, primarily to assess the effects of acid deposition on stream chemistry. Additional information on the Hydrologic Benchmark Program may be accessed from <http://water.usgs.gov/hbn/>.

National Stream-Quality Accounting Network (NASQAN) is a network of sites used to monitor the water quality of large rivers within the Nation's largest river basins. From 1995 through 1999, a network of approximately 40 stations was operated in the Mississippi, Columbia, Colorado, and Rio Grande River basins. For the period 2000 through 2004, sampling was reduced to a few index stations on the Colorado and Columbia Rivers so that a network of 5 stations could be implemented on the Yukon River. 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 (NAWQA) Program; (3) to characterize processes unique to large-river systems such as storage and remobilization 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. Additional information about the NASQAN Program may be accessed from <http://water.usgs.gov/nasqan/>.

The National Atmospheric Deposition Program/National Trends Network (NADP/NTN) is a network of monitoring sites that provide continuous measurement and assessment of the chemical constituents in precipitation throughout the United States. As the lead Federal agency, the USGS works together with over 100 organizations to provide a long-term, spatial and temporal record of atmospheric deposition generated from this network of 250 precipitation-chemistry monitoring sites. The USGS supports 74 of these 250 sites. This long-term, nationally consistent monitoring program, coupled with ecosystem research, provides critical information toward a national scorecard to evaluate the effectiveness of ongoing and future regulations intended to reduce atmospheric emissions and subsequent impacts to the Nation's land and water resources. Reports and other information on the NADP/NTN Program, as well as data from the individual sites, may be accessed from <http://bqs.usgs.gov/acidrain/>.

The USGS National Water-Quality Assessment (NAWQA) Program 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; to provide an improved understanding of the primary natural and human factors affecting these observed conditions and trends; and to provide information that supports development and evaluation of management, regulatory, and monitoring decisions by other agencies.

Assessment activities are being conducted in 42 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 is 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 water-resources managers to use in making decisions 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 may be accessed from <http://water.usgs.gov/nawqa/>.

The USGS National Streamflow Information Program (NSIP) is a long-term program with goals to provide framework streamflow data across the Nation. Included in the program are creation of a permanent Federally funded streamflow network, research on the nature of streamflow, regional assessments of streamflow data and databases, and upgrades in the streamflow information delivery systems. Additional information about NSIP may be accessed from <http://water.usgs.gov/nsip/>.

EXPLANATION OF STAGE- AND WATER-DISCHARGE RECORDS

Data Collection and Computation

The base data collected at gaging stations consist of records of stage and measurements of discharge of streams or canals, and stage, surface area, and volume of lakes or reservoirs. In addition, observations of factors affecting the stage-discharge relation or the stage-capacity relation, weather records, and other information are used to supplement base data in determining the daily flow or volume of water in storage. Records of stage are obtained from a water-stage recorder that is either downloaded electronically in the field to a laptop computer or similar device or is transmitted using telemetry such as GOES satellite, land-line or cellular-phone modems, or by radio transmission. Measurements of discharge are made with a current meter or acoustic Doppler current profiler, using the general methods adopted by the USGS. These methods are described in standard textbooks, USGS Water-Supply Paper 2175, and the Techniques of Water-Resources Investigations of the United States Geological Survey (TWRIs), Book 3, Chapters A1 through 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).

For stream-gaging stations, discharge-rating tables for any stage are prepared from stage-discharge curves. If extensions to the rating curves are necessary to express discharge greater than measured, the extensions are made on the basis of indirect measurements of peak discharge (such as slope-area or contracted-opening measurements, or computation of flow over dams and weirs), step-backwater techniques, velocity-area studies, and logarithmic plotting. The daily mean discharge is computed from gage heights and rating tables, then the monthly and yearly mean discharges are computed from the daily values. If the stage-discharge relation is subject to change because of frequent or continual change in the physical features of the stream channel, the daily mean discharge is computed by the shifting-control method in which correction factors based on individual discharge measurements and notes by engineers and observers are used when applying the gage heights to the rating tables. If the stage-discharge relation for a station is temporarily changed by the presence of aquatic growth or debris on the controlling section, the daily mean discharge is computed by the shifting-control method.

The stage-discharge relation at some stream-gaging stations is affected by backwater from reservoirs, tributary streams, or other sources. Such an occurrence 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 at some distance from the base gage.

An index velocity is measured using ultrasonic or acoustic instruments at some stream-gaging stations and this index velocity is used to calculate an average velocity for the flow in the stream. This average velocity along with a stage-area relation is then used to calculate average discharge.

At some stations, 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.

At some stream-gaging stations in the northern United States, the stage-discharge relation is affected by ice in the winter; therefore, computation of the discharge in the usual manner is impossible. Discharge for periods of ice effect is computed on the basis of gage-height record and occasional winter-discharge measurements. Consideration is given to the available information on temperature and precipitation, notes by gage observers and hydrologists, and comparable records of discharge from other stations in the same or nearby basins.

For a lake or reservoir station, capacity tables giving the volume or contents for any stage are prepared from stage-area relation curves defined by surveys. The application of the stage to the capacity table gives the contents, from which the daily, monthly, or yearly changes are computed.

If the stage-capacity curve is subject to changes because of deposition of sediment in the reservoir, periodic resurveys of the reservoir are necessary to define new stage-capacity curves. During the period between reservoir surveys, the computed contents may be increasingly in error due to the gradual accumulation of sediment.

For some stream-gaging stations, periods of time occur when no gage-height record is obtained or the recorded gage height is faulty and cannot be used to compute daily discharge or contents. Such a situation can happen when the recorder stops or otherwise fails to operate properly, the intakes are plugged, the float is frozen in the well, or for various other reasons. For such periods, the daily discharges are estimated on the basis of recorded range in stage, prior and subsequent records, discharge measurements, weather records, and comparison with records from other stations in the same or nearby basins. Likewise, lake or reservoir volumes may be estimated on the basis of operator's log, prior and subsequent records, inflow-outflow studies, and other information.

Data Presentation

The records published for each continuous-record surface-water discharge station (stream-gaging station) consist of five parts: (1) the station manuscript or description; (2) the data table of daily mean values of discharge for the current water year with summary data; (3) a tabular statistical summary of monthly mean flow data for a designated period, by water year; (4) a summary statistics table that includes statistical data of annual, daily, and instantaneous flows as well as data pertaining to annual runoff, 7-day low-flow minimums, and flow duration; and (5) a hydrograph of discharge.

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. Comments follow that clarify information presented under the various headings of the station description.

LOCATION.—Location information is obtained from the most accurate maps available. The location of the gaging station 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. River mileages, given for only a few stations, were determined by methods given in “River Mileage Measurement,” Bulletin 14, Revision of October 1968, prepared by the Water Resources Council or were provided by the U.S. Army Corps of Engineers.

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 term indicates the time period for which records have been published 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 its flow reasonably can be considered equivalent to flow at the present station.

REVISED RECORDS.—If a critical error in published records is discovered, a revision is included in the first report published following discovery of the error.

GAGE.—The type of gage in current use, the datum of the current gage referred to a standard datum, and a condensed history of the types, locations, and datums of previous gages are given under this heading.

REMARKS.—All periods of estimated daily discharge either will be identified by date in this paragraph of the station description for water-discharge stations or flagged in the daily discharge table. (See section titled Identifying Estimated Daily Discharge.) Information is presented relative to the accuracy of the records, to special methods of computation, and to conditions that affect natural flow at the station. In addition, information may be presented pertaining to average discharge data for the period of record; to extremes data for the period of record and the current year; and, possibly, to other pertinent items. For reservoir stations, information is given on the dam forming the reservoir, the capacity, the outlet works and spillway, and the purpose and use of the reservoir.

COOPERATION.—Records provided by a cooperating organization or obtained for the USGS by a cooperating organization are identified here.

EXTREMES OUTSIDE PERIOD OF RECORD.—Information here documents 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 USGS.

REVISIONS.—Records are revised if errors in published records are discovered. Appropriate updates are made in the USGS distributed data system, NWIS, and subsequently to its Web-based National data system, NWISWeb (<http://water.usgs.gov/nwis/nwis>). Users are encouraged to obtain all required data from NWIS or NWISWeb to ensure that they have the most recent data updates. Updates to NWISWeb are made on an annual basis.

Although rare, occasionally the records of a discontinued gaging station may need revision. Because no current or, possibly, future station manuscript would be published for these stations 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 revised after the station was discontinued. If, however, the data for a discontinued station were obtained by computer retrieval, the data would be current. 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 stage-capacity table when daily volumes are given.

Peak Discharge Greater than Base Discharge

Tables of peak discharge above base discharge are included for some stations where secondary instantaneous peak discharge data are used in flood-frequency studies of highway and bridge design, flood-control structures, and other flood-related projects. The base discharge value is selected so an average of three peaks a year will be reported. This base discharge value has a recurrence interval of approximately 1.1 years or a 91-percent chance of exceedence in any 1 year.

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 arithmetic average flow in cubic feet per second for the month; and the lines headed MAX and MIN give the maximum and minimum daily mean discharges, respectively, for each month. Discharge for the month is expressed in cubic feet per second per square mile (line headed CFSM); or in inches (line headed IN); or in acre-feet (line headed AC-FT). Values for cubic feet per second per square mile and runoff in inches or in acre-feet may be omitted if extensive regulation or diversion is in effect or if the drainage area includes large noncontributing areas. At some stations, monthly and (or) yearly observed discharges are adjusted for reservoir storage or diversion, or diversion data or reservoir volumes are given. These values are identified by a symbol and a corresponding footnote.

Statistics of Monthly Mean Data

A tabular summary of the mean (line headed MEAN), maximum (MAX), and minimum (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 values. The designated period will be expressed as FOR WATER YEARS __-__, 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. The designated period will consist of all of the station record within the specified water years, including complete months of record for partial water years, and may coincide with the period of record for the station. The water years for which the statistics are computed are 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 records within the specified water years, including complete months of record for partial water years, and may coincide with the period of record for the station. The water years for which the statistics are computed are 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 heading. When the dates of occurrence do not fall within the selected water years listed in the heading, it will be noted in the REMARKS paragraph or in footnotes. Selected streamflow duration-curve statistics and runoff data also are given. Runoff data may be omitted if extensive regulation or diversion of flow is in effect in the drainage basin.

The following summary statistics data are provided with each continuous record of discharge. Comments that 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 for 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.

MAXIMUM PEAK FLOW.—The maximum instantaneous peak discharge occurring for the water year or designated period. Occasionally the maximum flow for a year may occur at midnight at the beginning or end of the year, on a recession from or rise toward a higher peak in the adjoining year. In this case, the maximum peak flow is given in the table and the maximum flow may be reported in a footnote or in the REMARKS paragraph in the manuscript.

MAXIMUM PEAK STAGE.—The maximum instantaneous peak stage occurring for the water year or designated period. Occasionally the maximum stage for a year may occur at midnight at the beginning or end of the year, on a recession from or rise toward a higher peak in the adjoining year. In this case, the maximum peak stage is given in the table and the maximum stage may be reported in the REMARKS paragraph in the manuscript or in a footnote. If the dates of occurrence of the maximum peak stage and maximum peak flow are different, 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 square mile (CFSM) 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.

Inches (INCHES) indicate 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.

Data collected at partial-record stations follow the information for continuous-record sites. Data for partial-record discharge stations are presented in two tables. The first table lists annual maximum stage and discharge at crest-stage stations, and the second table lists discharge measurements at low-flow partial-record stations. The tables of partial-record stations are followed by a listing of discharge measurements made at sites other than continuous-record or partial-record stations. These measurements are often made in times of drought or flood to give better areal coverage to those events. Those measurements and others collected for a special reason are called measurements at miscellaneous sites.

Identifying Estimated Daily Discharge

Estimated daily-discharge values published in the water-discharge tables of annual State data reports are identified. This identification is shown either by flagging individual daily values with the letter “e” and noting in a table footnote, “e—Estimated,” or by listing the dates of the estimated record in the REMARKS paragraph of the station description.

Accuracy of Field Data and Computed Results

The accuracy of streamflow data 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 observations of stage, measurements of discharge, and interpretations of records.

The degree of accuracy of the records is stated in the REMARKS in the station description. "Excellent" indicates that about 95 percent of the daily discharges are within 5 percent of the true value; "good" within 10 percent; and "fair," within 15 percent. "Poor" indicates that daily discharges have less than "fair" accuracy. Different accuracies may be attributed to different parts of a given record.

Values of daily mean discharge in this report are shown to the nearest hundredth of a cubic foot per second for discharges of less than 1 ft³/s; to the nearest tenths between 1.0 and 10 ft³/s; to whole numbers between 10 and 1,000 ft³/s; and to 3 significant figures above 1,000 ft³/s. The number of significant figures used is based solely on the magnitude of the discharge value. The same rounding rules apply to discharge values listed for partial-record stations.

Discharge at many stations, as indicated by the monthly mean, may not reflect natural runoff due to the effects of diversion, consumption, regulation by storage, increase or decrease in evaporation due to artificial causes, or to other factors. For such stations, values 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 of 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 Data Records Available

Information of a more detailed nature than that published for most of the stream-gaging stations such as discharge measurements, gage-height records, and rating tables is available from the District office. Also, most stream-gaging station records are available in computer-usable form and many statistical analyses have been made.

Information on the availability of unpublished data or statistical analyses may be obtained from the District office (see address that is shown on the back of the title page of this report).

EXPLANATION OF PRECIPITATION RECORDS

Data Collection and Computation

Rainfall data generally are collected using electronic data loggers that measure the rainfall in 0.01-inch increments every 15 minutes using either a tipping-bucket rain gage or a collection well gage. Twenty-four hour rainfall totals are tabulated and presented. A 24-hour period extends from just past midnight of the previous day to midnight of the current day. Missing values are indicated by the symbol "---" in the table.

Data Presentation

Precipitation records collected at surface-water gaging stations are identified with the same station number and name as the stream-gaging station. Where a surface-water daily-record station is not available, the precipitation record is published with its own name and latitude-longitude identification number.

Information pertinent to the history of a precipitation station is provided in descriptive headings preceding the tabular data. These descriptive headings give details regarding location, period of record, and general remarks.

The following information is provided with each precipitation station. Comments that follow clarify information presented under the various headings of the station description.

LOCATION.—See Data Presentation in the EXPLANATION OF STAGE- AND WATER-DISCHARGE RECORDS section of this report (same comments apply).

PERIOD OF RECORD.—See Data Presentation in the EXPLANATION OF STAGE- AND WATER-DISCHARGE RECORDS section of this report (same comments apply).

INSTRUMENTATION.—Information on the type of rainfall collection system is given.

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

EXPLANATION OF WATER-QUALITY RECORDS

Collection and Examination of Data

Surface-water samples for analysis usually are collected at or near stream-gaging stations. The quality-of-water records are given immediately following the discharge records at these stations.

The descriptive heading for water-quality records gives the period of record for all water-quality data; the period of daily record for parameters that are measured on a daily basis (specific conductance, water temperature, sediment discharge, and so forth); extremes for the current year; and general remarks.

For ground-water records, no descriptive statements are given; however, the well number, depth of well, sampling date, or other pertinent data are given in the table containing the chemical analyses of the ground water.

Water Analysis

Most of the methods used for collecting and analyzing water samples are described in the TWRIs. A list of TWRIs is provided in this report.

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 at several verticals to obtain a representative sample needed for an accurate mean concentration and for use in calculating load.

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 measurement 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 and minimum values (and sometimes mean or median values) for each constituent measured, and are based on 15-minute or 1-hour intervals of recorded data beginning at 0000 hours and ending at 2400 hours for the day of record.

SURFACE-WATER-QUALITY RECORDS

Records of surface-water quality ordinarily are obtained at or near stream-gaging stations because discharge data is useful in the interpretation of surface-water quality. Records of surface-water quality in this report 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 *continuous-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 continuous- or partial-record station, where 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 *continuous records* as used in this report and *continuous recordings* that refer to a continuous graph or a series of discrete values recorded at short intervals. 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.

Accuracy of the Records

One of four accuracy classifications is applied for measured physical properties at continuous-record stations on a scale ranging from poor to excellent. The accuracy rating is based on data values recorded before any shifts or corrections are made. Additional consideration also is given to the amount of publishable record and to the amount of data that have been corrected or shifted.

Rating classifications for continuous water-quality records

[\leq , less than or equal to; \pm , plus or minus value shown; $^{\circ}\text{C}$, degree Celsius; $>$, greater than; %, percent; mg/L, milligram per liter; pH unit, standard pH unit]

Measured physical property	Rating			
	Excellent	Good	Fair	Poor
Water temperature	$\leq \pm 0.2^{\circ}\text{C}$	$> \pm 0.2$ to 0.5°C	$> \pm 0.5$ to 0.8°C	$> \pm 0.8^{\circ}\text{C}$
Specific conductance	$\leq \pm 3\%$	$> \pm 3$ to 10%	$> \pm 10$ to 15%	$> \pm 15\%$
Dissolved oxygen	$\leq \pm 0.3$ mg/L	$> \pm 0.3$ to 0.5 mg/L	$> \pm 0.5$ to 0.8 mg/L	$> \pm 0.8$ mg/L
pH	$\leq \pm 0.2$ unit	$> \pm 0.2$ to 0.5 unit	$> \pm 0.5$ to 0.8 unit	$> \pm 0.8$ unit
Turbidity	$\leq \pm 5\%$	$> \pm 5$ to 10%	$> \pm 10$ to 15%	$> \pm 15\%$

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, a major concern is assuring that the data obtained represent the naturally occurring quality of the water. To ensure this, certain measurements, such as water temperature, pH, and dissolved oxygen, must be made on site when the samples are taken. To assure that measurements made in the laboratory also represent the naturally occurring water, carefully prescribed procedures must be followed in collecting the samples, in treating the samples to prevent changes in quality pending analysis, and in shipping the samples to the laboratory. Procedures for on-site measurements and for collecting, treating, and shipping samples are given in TWRIs Book 1, Chapter D2; Book 3, Chapters A1, A3, and A4; and Book 9, Chapters A1-A9. These TWRIs are listed in this report. Also, detailed information on collecting, treating, and shipping samples can be obtained from the USGS District office (see address that is shown on the back of title page in this report).

Water Temperature

Water temperatures are measured at most of the water-quality stations. In addition, water temperatures are taken at the time of discharge measurements 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, either mean temperatures or maximum and minimum temperatures for each day are published. Water temperatures measured at the time of water-discharge measurements are on file in the District office.

Sediment

Suspended-sediment concentrations are determined from samples collected by using depth-integrating samplers. Samples usually are obtained at several verticals in the cross section, or a single sample may be obtained at a fixed point and a coefficient applied to determine the mean concentration in the cross section.

During periods of rapidly changing flow or rapidly changing concentration, samples may be 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.

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

In addition to the records of suspended-sediment discharge, records of the periodic measurements of the particle-size distribution of the suspended sediment and bed material are included for some stations.

Laboratory Measurements

Samples for biochemical oxygen demand (BOD) and indicator bacteria are analyzed locally. All other samples are analyzed in the USGS laboratory in Lakewood, Colorado, unless otherwise noted. Methods used in analyzing sediment samples and computing sediment records are given in TWRI, Book 5, Chapter C1. Methods used by the USGS laboratories are given in the TWRI, Book 1, Chapter D2; Book 3, Chapter C2; and Book 5, Chapters A1, A3, and A4. These methods are consistent with ASTM standards and generally follow ISO standards.

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 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 information in the EXPLANATION OF STAGE- AND WATER-DISCHARGE RECORDS section of this report (same comments apply).

DRAINAGE AREA.—See Data Presentation information in the EXPLANATION OF STAGE- AND WATER-DISCHARGE RECORDS section of this report (same comments apply).

PERIOD OF RECORD.—This indicates the time periods for which published water-quality records for the station are available. 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 temperature record, 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 USGS by a cooperating organization are identified here.

EXTREMES.—Maximums and minimums are given only for parameters measured daily or more frequently. For parameters measured weekly or less frequently, true maximums or minimums may not have been obtained. Extremes, when given, are provided for both the period of record and for the current water year.

REVISIONS.—Records are revised if errors in published water-quality records are discovered. Appropriate updates are made in the USGS distributed data system, NWIS, and subsequently to its Web-based National data system, NWISWeb (<http://waterdata.usgs.gov/nwis>). Users of USGS water-quality data are encouraged to obtain all required data from NWIS or NWISWeb to ensure that they have the most recent updates. Updates to the NWISWeb are made on an annual basis.

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 for 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 water-quality data in this section:

Printed Output	Remark
E or 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.

Water-Quality Control Data

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-MDLs) and laboratory reporting levels (LRLs). 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. 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 less than LRL for samples in which the analyte was either not detected or did not pass identification. Analytes detected at concentrations between the LT-MDL and the 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.

Data generated from quality-control (QC) samples are a requisite for evaluating the quality of the sampling and processing techniques as well as data from the actual samples themselves. Without QC data, environmental sample data cannot be adequately interpreted because the errors associated with the sample data are unknown. The various types of QC samples collected by this District office are described in the following section. Procedures have been established for the storage of water-quality-control data within the USGS. These procedures allow for storage of all derived QC data and are identified so that they can be related to corresponding environmental samples. These data are not presented in this report but are available from the District office.

Blank Samples

Blank samples are collected and analyzed to ensure that environmental samples have not been contaminated in the overall data-collection process. The blank solution used to develop specific types of blank samples is a solution that is free of the analytes of interest. Any measured value signal in a blank

sample for an analyte (a specific component measured in a chemical analysis) that was absent in the blank solution is believed to be due to contamination. Many types of blank samples are possible; each is designed to segregate a different part of the overall data-collection process. The types of blank samples collected in this district are:

Field blank—A blank solution that is subjected to all aspects of sample collection, field processing, preservation, transportation, and laboratory handling as an environmental sample.

Trip blank—A blank solution that is put in the same type of bottle used for an environmental sample and kept with the set of sample bottles before and after sample collection.

Equipment blank—A blank solution that is processed through all equipment used for collecting and processing an environmental sample (similar to a field blank but normally done in the more controlled conditions of the office).

Sampler blank—A blank solution that is poured or pumped through the same field sampler used for collecting an environmental sample.

Filter blank—A blank solution that is filtered in the same manner and through the same filter apparatus used for an environmental sample.

Splitter blank—A blank solution that is mixed and separated using a field splitter in the same manner and through the same apparatus used for an environmental sample.

Preservation blank—A blank solution that is treated with the sampler preservatives used for an environmental sample.

Reference Samples

Reference material is a solution or material prepared by a laboratory. The reference material composition is certified for one or more properties so that it can be used to assess a measurement method. Samples of reference material are submitted for analysis to ensure that an analytical method is accurate for the known properties of the reference material. Generally, the selected reference material properties are similar to the environmental sample properties.

Replicate Samples

Replicate samples are a set of environmental samples collected in a manner such that the samples are thought to be essentially identical in composition. Replicate is the general case for which a duplicate is the special case consisting of two samples. Replicate samples are collected and analyzed to establish the amount of variability in the data contributed by some part of the collection and analytical process. Many types of replicate samples are possible, each of which may yield slightly different results in a dynamic hydrologic setting, such as a flowing stream. The types of replicate samples collected in this district are:

Concurrent samples—A type of replicate sample in which the samples are collected simultaneously with two or more samplers or by using one sampler and alternating the collection of samples into two or more compositing containers.

Sequential samples—A type of replicate sample in which the samples are collected one after the other, typically over a short time.

Split sample—A type of replicate sample in which a sample is split into subsamples, each subsample contemporaneous in time and space.

Spike Samples

Spike samples are samples to which known quantities of a solution with one or more well-established analyte concentrations have been added. These samples are analyzed to determine the extent of matrix interference or degradation on the analyte concentration during sample processing and analysis.

EXPLANATION OF GROUND-WATER-LEVEL RECORDS

Generally, only ground-water-level data from selected wells with continuous recorders from a basic network of observation wells are published in this report. This basic network contains observation wells located so that the most significant data are obtained from the fewest wells in the most important aquifers.

Site Identification Numbers

Each well is identified by means of (1) a 15-digit number that is based on latitude and longitude and (2) a local number that is produced for local needs. (See NUMBERING SYSTEM FOR WELLS AND MISCELLANEOUS SITES in this report for a detailed explanation)

Data Collection and Computation

Measurements are made in many types of wells, under varying conditions of access and at different temperatures; hence, neither the method of measurement nor the equipment can be standardized. At each observation well, however, the equipment and techniques used are those that will ensure that measurements at each well are consistent.

Most methods for collecting and analyzing water samples are described in the TWRIs referred to in the On-site Measurements and Sample Collection and the Laboratory Measurements sections in this report. In addition, TWRI Book 1, Chapter D2, describes guidelines for the collection and field analysis of ground-water samples for selected unstable constituents. Procedures for on-site measurements and for collecting, treating, and shipping samples are given in TWRIs Book 1, Chapter D2; Book 3, Chapters A1, A3, and A4; and Book 9, Chapters A1 through A9. The values in this report represent water-quality conditions at the time of sampling, as much as possible, and that are consistent with available sampling techniques and methods of analysis. These methods are consistent with ASTM standards and generally follow ISO standards. Trained personnel collected all samples. The wells sampled were pumped long enough to ensure 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.

Water-level measurements in this report are given in feet with reference to land-surface datum (lsd). Land-surface datum is a datum plane that is approximately at land surface at each well. If known, the elevation of the land-surface datum above 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 for every fifth day and the end of each month (EOM).

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 of 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

Water-level data are presented in alphabetical order by county. The primary identification number for a given well is the 15-digit site identification number that appears in the upper left corner of the table. The secondary identification number is the local or county well number.

Each well record consists of three parts: the well description, the data table of water levels observed during the water year, and, for most wells, a hydrograph following the data table. Well descriptions are presented in the headings preceding the tabular data.

The following comments clarify information presented in these various headings.

LOCATION.—This paragraph follows the well-identification number and reports the hydrologic-unit number and a geographic point of reference. Latitudes and longitudes used in this report are reported as North American Datum of 1927 unless otherwise specified.

AQUIFER.—This entry designates by name and geologic age the aquifer that the well taps.

WELL CHARACTERISTICS.—This entry describes the well in terms of depth, casing diameter and depth or screened interval, method of construction, use, and 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 continuous, monthly, or some other frequency of measurement.

DATUM.—This entry describes both the measuring point and the land-surface elevation at the well. The altitude of the land-surface datum is described in feet above the altitude datum; it is reported with a precision depending on the method of determination. The measuring point is described physically (such as top of casing, top of instrument shelf, and so forth), and in relation to land surface (such as 1.3 ft above land-surface datum). The elevation of the land-surface datum is described in feet above National Geodetic Vertical Datum of 1929 (NGVD 29); 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, when various methods of measurement were begun, and the network (climatic, terrane, local, or areal effects) or the special project to which the well belongs.

PERIOD OF RECORD.—This entry indicates the time period for which records are published for the well, the month and year at the start of publication of water-level records by the USGS, and the words “to current year” if the records are to be continued into the following year. Time periods for which water-level records are available, but are not published by the USGS, may be noted.

EXTREMES FOR PERIOD OF RECORD.—This entry contains the highest and lowest instantaneously recorded or measured water levels of the period of published record, with respect to land-surface datum or sea level, and the dates of occurrence.

Water-Level Tables

A table of water levels follows the well description for each well. Water-level measurements in this report are given in feet with reference to either sea level or land-surface datum (lsl). Missing records are indicated by dashes in place of the water-level value.

For wells not equipped with recorders, water-level measurements were obtained periodically by steel or electric tape. Tables of periodic water-level measurements in these wells show the date of measurement and the measured water-level value.

Hydrographs

Hydrographs are a graphic display of water-level fluctuations over a period of time. In this report, current water year and, when appropriate, period-of-record hydrographs are shown. Hydrographs that display periodic water-level measurements show points that may be connected with a dashed line from one measurement to the next. Hydrographs that display recorder data show a solid line representing the mean water level recorded for each day. Missing data are indicated by a blank space or break in a hydrograph. Missing data may occur as a result of recorder malfunctions, battery failures, or mechanical problems related to the response of the recorder's float mechanism to water-level fluctuations in a well.

GROUND-WATER-QUALITY DATA

Data Collection and Computation

The ground-water-quality data in this report were obtained as a part of special studies in specific areas. Consequently, a number of chemical analyses are presented for some wells within a county but not for others. As a result, the records for this year, by themselves, do not provide a balanced view of ground-water quality Statewide.

Most methods for collecting and analyzing water samples are described in the TWRI. Procedures for on-site measurements and for collecting, treating, and shipping samples are given in TWRI, Book 1, Chapter D2; Book 3, Chapter C2; and Book 5, Chapters A1, A3, and A4. Also, detailed information on collecting, treating, and shipping samples may be obtained from the USGS District office (see address shown on back of title page in this report).

Laboratory Measurements

Analysis for sulfide and measurement of alkalinity, pH, water temperature, specific conductance, and dissolved oxygen are performed on site. All other sample analyses are performed at the USGS laboratory in Lakewood, Colorado, unless otherwise noted. Methods used by the USGS laboratory are given in TWRI, Book 1, Chapter D2; Book 3, Chapter C2; and Book 5, Chapters A1, A3, and A4.

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

Water-quality data and ground-water data also are available through the WWW. In addition, data can be provided in various machine-readable formats on various media. Information about the availability of specific types of data or products, and user charges, can be obtained locally from each Water Discipline District Office (See address that is shown on the back of the title page of this report.)

DEFINITION OF TERMS

Specialized technical terms related to streamflow, water-quality, and other hydrologic data, as used in this report, are defined below. Terms such as algae, water level, and precipitation are used in their common everyday meanings, definitions of which are given in standard dictionaries. Not all terms defined in this alphabetical list apply to every State. See also table for converting English units to International System (SI) Units. Other glossaries that also define water-related terms are accessible from <http://water.usgs.gov/glossaries.html>.

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 a unit of volume, commonly used to measure quantities of water used or stored, equivalent to the volume of water required to cover 1 acre to a depth of 1 foot and equivalent to 43,560 cubic feet, 325,851 gallons, or 1,233 cubic meters. (See also “Annual runoff”)

Adenosine triphosphate (ATP) is an organic, phosphate-rich compound important in the transfer of energy in organisms. Its central role in living cells makes ATP 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.

Adjusted discharge is discharge data that have been mathematically adjusted (for example, to remove the effects of a daily tide cycle or reservoir storage).

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. (See also “Biomass” and “Dry weight”)

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 that is discharged (“runs off”) from a drainage basin in a year. Data reports may present annual runoff data as volumes in acre-feet, as discharges per unit of drainage area in cubic feet per second per square mile, or as depths of water on the drainage basin in inches.

Annual 7-day minimum is the lowest mean value for any 7-consecutive-day period in a year. Annual 7-day minimum values are reported herein for the calendar year and the water year (October 1 through September 30). Most low-flow frequency analyses use a climatic year (April 1–March 31), which tends to prevent the low-flow period from being artificially split between adjacent years. 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.)

Aroclor is the registered trademark for a group of polychlorinated biphenyls that were manufactured by the Monsanto Company prior to 1976. Aroclors are assigned specific 4-digit reference numbers dependent upon molecular type and degree of substitution of the biphenyl ring hydrogen atoms by chlorine atoms. The first two digits of a numbered aroclor represent the molecular type, and the last two digits represent the percentage weight of the hydrogen-substituted chlorine.

Artificial substrate is a device that purposely is 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 collected. Examples of artificial substrates are basket samplers (made of wire cages filled with clean streamside rocks) and multi-plate samplers (made of hardboard) for benthic organism collection, and plexiglass strips for periphyton collection. (See also “Substrate”)

Ash mass is the mass or amount of residue present after the residue from a 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). (See also “Biomass” and “Dry mass”)

Aspect is the direction toward which a slope faces with respect to the compass.

Bacteria are microscopic unicellular organisms, typically spherical, rodlike, or spiral and threadlike in shape, often clumped into colonies. Some bacteria cause disease, whereas 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.

Bankfull stage, as used in this report, is the stage at which a stream first overflows its natural banks formed by floods with 1- to 3-year recurrence intervals.

Base discharge (for peak discharge) is a discharge value, determined for selected stations, above which peak discharge data are published. The base discharge at each

station is selected so that an average of about three peak flows per year will be published. (See also “Peak flow”)

Base flow is sustained flow of a stream in the absence of direct runoff. It includes natural and human-induced streamflows. Natural base flow is sustained largely by ground-water discharge.

Bed material is the sediment mixture of which a streambed, lake, pond, reservoir, or estuary bottom is composed. (See also “Bedload” and “Sediment”)

Bedload is material in transport that primarily is supported by the streambed. In this report, bedload is considered to consist of particles in transit from the bed to the top of the bedload sampler nozzle (an elevation ranging from 0.25 to 0.5 foot). These particles are retained in the bedload sampler. A sample collected with a pressure-differential bedload sampler also may contain a component of the suspended load.

Bedload discharge (tons per day) is the rate of sediment moving as bedload, reported as dry weight, that passes through a cross section in a given time. NOTE: Bedload discharge values in this report may include a component of the suspended-sediment discharge. A correction may be necessary when computing the total sediment discharge by summing the bedload discharge and the suspended-sediment discharge. (See also “Bedload,” “Dry weight,” “Sediment,” and “Suspended-sediment discharge”)

Benthic organisms are the group of organisms 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.

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

Blue-green algae (*Cyanophyta*) are a group of phytoplankton and periphyton organisms with a blue pigment in addition to a green pigment called chlorophyll. Blue-green algae can cause nuisance water-quality conditions in lakes and slow-flowing rivers; however, they are found commonly in streams throughout the year. The abundance of blue-green algae in phytoplankton samples is expressed as the number of cells per milliliter (cells/mL) or biovolume

in cubic micrometers per milliliter ($\mu\text{m}^3/\text{mL}$). The abundance of blue-green algae in periphyton samples is given in cells per square centimeter (cells/cm²) or biovolume per square centimeter ($\mu\text{m}^3/\text{cm}^2$). (See also “Phytoplankton” and “Periphyton”)

Bottom material (See “Bed material”)

Bulk electrical conductivity is the combined electrical conductivity of all material within a doughnut-shaped volume surrounding an induction probe. Bulk conductivity is affected by different physical and chemical properties of the material including the dissolved-solids content of the pore water, and the lithology and porosity of the rock.

Canadian Geodetic Vertical Datum 1928 is a geodetic datum derived from a general adjustment of Canada’s first order level network in 1928.

Cell volume (biovolume) determination is one of several common methods used to estimate biomass of algae in aquatic systems. Cell members of algae are used frequently in aquatic surveys as an indicator of algal production. However, cell numbers alone cannot represent true biomass because of considerable cell-size variation among the algal species. Cell volume (μm^3) is determined by obtaining critical cell measurements or cell dimensions (for example, length, width, height, or radius) for 20 to 50 cells of each important species to obtain an average biovolume per cell. Cells are categorized according to the correspondence of their cellular shape to the nearest geometric solid or combinations of simple solids (for example, spheres, cones, or cylinders). Representative formulae used to compute biovolume are as follows:

$$\text{sphere } \frac{4}{3} \pi r^3 \quad \text{cone } \frac{1}{3} \pi r^2 h \quad \text{cylinder } \pi r^2 h.$$

pi (π) is the ratio of the circumference to the diameter of a circle; $\pi = 3.14159\dots$

From cell volume, total algal biomass expressed as biovolume ($\mu\text{m}^3/\text{mL}$) is thus determined by multiplying the number of cells of a given species by its average cell volume and then summing these volumes for all species.

Cells/volume refers to the number of cells of any organism that is counted by using a microscope and grid or counting cell. Many planktonic organisms are multicelled and are counted according to the number of contained cells per sample volume, and generally are reported as cells or units per milliliter (mL) or liter (L).

Cfs-day (See “Cubic foot per second-day”)

Channel bars, as used in this report, are the lowest prominent geomorphic features higher than the channel bed.

Chemical oxygen demand (COD) is a measure of the chemically oxidizable material in the water and furnishes an approximation of the amount of organic and reducing material present. The determined value may correlate with BOD or with carbonaceous organic pollution from sewage or industrial wastes. [See also “Biochemical oxygen demand (BOD)”]

***Clostridium perfringens* (*C. perfringens*)** is a spore-forming bacterium that is common in the feces of human and other warmblooded animals. Clostridial spores are being used experimentally as an indicator of past fecal contamination and the presence of microorganisms that are resistant to disinfection and environmental stresses. (See also “Bacteria”)

Coliphages are viruses that infect and replicate in coliform bacteria. They are indicative of sewage contamination of water and of the survival and transport of viruses in the environment.

Color unit is produced by 1 milligram per liter of platinum in the form of the chloroplatinate ion. Color is expressed in units of the platinum-cobalt scale.

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 where data are collected with sufficient frequency to define daily mean values and variations within a day.

Control designates a feature in the channel that physically affects the water-surface elevation and thereby determines the stage-discharge relation at the gage. 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 or approximately 449 gallons per minute, or 0.02832 cubic meters per second. The term “second-foot”

sometimes is used synonymously with “cubic foot per second” but is now obsolete.

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, 1.98347 acre-feet, 646,317 gallons, or 2,446.6 cubic meters. The daily mean discharges reported in the daily value data tables numerically are equal to the daily volumes in cfs-days, and the totals also represent volumes in cfs-days.

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. (See also “Annual runoff”)

Daily mean suspended-sediment concentration is the time-weighted mean concentration of suspended sediment passing a stream cross section during a 24-hour day. (See also “Sediment” and “Suspended-sediment concentration”)

Daily record station is a site where data are collected with sufficient frequency to develop a record of one or more data values per day. The frequency of data collection can range from continuous recording to data collection on a daily or near-daily basis.

Data collection platform (DCP) is an electronic instrument that collects, processes, and stores data from various sensors, and transmits the data by satellite data relay, line-of-sight radio, and/or landline telemetry.

Data logger is a microprocessor-based data acquisition system designed specifically to acquire, process, and store data. Data usually are downloaded from onsite data loggers for entry into office data systems.

Datum is a surface or point relative to which measurements of height and/or horizontal position are reported. A vertical datum is a horizontal surface used as the zero point for measurements of gage height, stage, or elevation; a horizontal datum is a reference for positions given in terms of latitude-longitude, State Plane coordinates, or Universal Transverse Mercator (UTM) coordinates. (See also “Gage datum,” “Land-surface datum,” “National Geodetic Vertical Datum of 1929,” and “North American Vertical Datum of 1988”)

Diatoms (*Bacillariophyta*) are unicellular or colonial algae with a siliceous cell wall. The abundance of diatoms in phytoplankton samples is expressed as the number of cells per milliliter (cells/mL) or biovolume in cubic micrometers per milliliter ($\mu\text{m}^3/\text{mL}$). The abundance of diatoms in periphyton samples is given in cells per square centimeter

(cells/cm²) or biovolume per square centimeter (µm³/cm²). (See also “Phytoplankton” and “Periphyton”)

Diel is of or pertaining to a 24-hour period of time; a regular daily cycle.

Discharge, or flow, is the rate that matter passes through a cross section of a stream channel or other water body per unit of time. The term commonly refers to the volume of water (including, unless otherwise stated, any sediment or other constituents suspended or dissolved in the water) that passes a cross section in a stream channel, canal, pipeline, and so forth, within a given period of time (cubic feet per second). Discharge also can apply to the rate at which constituents, such as suspended sediment, bedload, and dissolved or suspended chemicals, pass through a cross section, in which cases the quantity is expressed as the mass of constituent that passes the cross section in a given period of time (tons per day).

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 and State agencies that collect water-quality data. Determinations of “dissolved” constituent concentrations are made on sample water that has been filtered.

Dissolved oxygen (DO) is the molecular oxygen (oxygen gas) dissolved in water. The concentration in water 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 concentration. Photosynthesis and respiration by plants commonly cause diurnal variations in dissolved-oxygen concentration in water from some streams.

Dissolved solids concentration in water is the quantity of dissolved material in a sample of water. It 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 the analytical determination, the bicarbonate (generally a major dissolved component of water) is converted to carbonate. In the mathematical calculation, the bicarbonate value, in milligrams per liter, is multiplied by 0.4926 to convert it to carbonate. Alternatively, alkalinity concentration (as mg/L CaCO₃) can be converted to carbonate concentration by multiplying by 0.60.

Diversity index (H) (Shannon index) is a numerical expression of evenness of distribution of aquatic organisms. The formula for diversity index is:

$$\bar{d} = - \sum_{i=1}^s \frac{n_i}{n} \log_2 \frac{n_i}{n},$$

where n_i is the number of individuals per taxon, n is the total number of individuals, and s is the total number of taxa in the sample of the community. Index values range from zero, when all the organisms in the sample are the same, to some positive number, when some or all of the organisms in the sample are different.

Drainage area of a stream at a specific location is that area upstream from the location, measured in a horizontal plane, that has a common outlet at the site for its surface runoff from precipitation that normally drains by gravity into a stream. Drainage areas 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 contains a drainage system with a common outlet for its surface runoff. (See “Drainage area”)

Dry mass refers to the mass of residue present after drying in an oven at 105 °C, until the mass remains unchanged. This mass represents the total organic matter, ash and sediment, in the sample. Dry-mass values are expressed in the same units as ash mass. (See also “Ash mass,” “Biomass,” and “Wet mass”)

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. (See also “Wet weight”)

Embeddedness is the degree to which gravel-sized and larger particles are surrounded or enclosed by finer-sized particles. (See also “Substrate embeddedness class”)

Enterococcus bacteria commonly are found in the feces of humans and other warmblooded 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 (nutrient medium for bacterial growth) and subsequent transfer to EIA medium. Enterococci include *Streptococcus feacalis*, *Streptococcus feacium*, *Streptococcus avium*, and their variants. (See also “Bacteria”)

EPT Index is the total number of distinct taxa within the insect orders Ephemeroptera, Plecoptera, and Trichoptera. This index summarizes the taxa richness within the aquatic insects that generally are considered pollution sensitive; the index usually decreases with pollution.

Escherichia coli (*E. coli*) are bacteria present in the intestine and feces of warmblooded 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 (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample. (See also “Bacteria”)

Estimated (E) value of a concentration is reported when an analyte is detected and all criteria for a positive result are met. If the concentration is less than the method detection limit (MDL), an E code will be reported with the value. If the analyte is identified qualitatively as present, but the quantitative determination is substantially more uncertain, the National Water Quality Laboratory will identify the result with an E code even though the measured value is greater than the MDL. A value reported with an E code should be used with caution. When no analyte is detected in a sample, the default reporting value is the MDL preceded by a less than sign (<). For bacteriological data, concentrations are reported as estimated when results are based on non-ideal colony counts.

Euglenoids (*Euglenophyta*) are a group of algae that usually are free-swimming and rarely creeping. They have the ability to grow either photosynthetically in the light or heterotrophically in the dark. (See also “Phytoplankton”)

Extractable organic halides (EOX) are organic compounds that contain halogen atoms such as chlorine. These organic compounds are semivolatile and extractable by ethyl acetate from air-dried streambed sediment. The ethyl acetate extract is combusted, and the concentration is determined by microcoulometric determination of the halides formed. The concentration is reported as micrograms of chlorine per gram of the dry weight of the streambed sediment.

Fecal coliform bacteria are present in the intestines or feces of warmblooded animals. They often are 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. (See also “Bacteria”)

Fecal streptococcal bacteria are present in the intestines of warmblooded animals and are ubiquitous in the environment. 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. (See also “Bacteria”)

Fire algae (*Pyrrhophyta*) are free-swimming unicells characterized by a red pigment spot. (See also “Phytoplankton”)

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 a horizontal surface used as a zero point for measurement of stage or gage height. This surface usually is located slightly below the lowest point of the stream bottom such that the gage height is usually slightly greater than the maximum depth of water. Because the gage datum is not an actual physical object, the datum is usually defined by specifying the elevations of permanent reference marks such as bridge abutments and survey monuments, and the gage is set to agree with the reference marks. Gage datum is a local datum that is maintained independently of any national geodetic datum. However, if the elevation of the gage datum relative to the national datum (North American Vertical Datum of 1988 or National Geodetic Vertical Datum of 1929) has been determined, then the gage readings can be converted to elevations above the national datum by adding the elevation of the gage datum to the gage reading.

Gage height (G.H.) is the water-surface elevation, in feet above the gage datum. If the water surface is below the gage datum, the gage height is negative. Gage height often is used interchangeably with the more general term “stage,” although gage height is more appropriate when used in reference to a reading on a gage.

Gage values are values that are recorded, transmitted, and/or computed from a gaging station. Gage values typically are collected at 5-, 15-, or 30-minute intervals.

Gaging station is a site on a stream, canal, lake, or reservoir where systematic observations of stage, discharge, or other hydrologic data are obtained.

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.

Geomorphic channel units, as used in this report, are fluvial geomorphic descriptors of channel shape and stream velocity. Pools, riffles, and runs are types of geomorphic channel units considered for National Water-Quality Assessment (NAWQA) Program habitat sampling.

Green algae (*Chlorophyta*) are unicellular or colonial algae with chlorophyll pigments similar to those in terrestrial green plants. Some forms of green algae produce mats or floating “moss” in lakes. The abundance of green algae in phytoplankton samples is expressed as the number of cells per milliliter (cells/mL) or biovolume in cubic micrometers per milliliter ($\mu\text{m}^3/\text{mL}$). The abundance of green algae in periphyton samples is given in cells per square centimeter (cells/cm^2) or biovolume per square centimeter ($\mu\text{m}^3/\text{cm}^2$). (See also “Phytoplankton” and “Periphyton”)

Habitat, as used in this report, includes all nonliving (physical) aspects of the aquatic ecosystem, although living components like aquatic macrophytes and riparian vegetation also are usually included. Measurements of habitat typically are made over a wider geographic scale than are measurements of species distribution.

Habitat quality index is the qualitative description (level 1) of instream habitat and riparian conditions surrounding the reach sampled. Scores range from 0 to 100 percent with higher scores indicative of desirable habitat conditions for aquatic life. Index only applicable to wadable streams.

Hardness of water is a physical-chemical characteristic that commonly is recognized by the increased quantity of soap required to produce lather. It is computed as the sum of equivalents of polyvalent cations (primarily 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>

Hilsenhoff’s Biotic Index (HBI) is an indicator of organic pollution that uses tolerance values to weight taxa abundances; usually increases with pollution. It is calculated as follows:

$$HBI = \frac{\sum(n)(a)}{N},$$

where n is the number of individuals of each taxon, a is the tolerance value of each taxon, and N is the total number of organisms in the sample.

Horizontal datum (See “Datum”)

Hydrologic index stations referred to in this report are continuous-record gaging stations that have been selected as representative of streamflow patterns for their respective regions. Station locations are shown on index maps.

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 USGS. Each hydrologic unit is identified by an 8-digit number.

Inch (IN., in.), in reference to streamflow, 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 distributed uniformly on it. (See also “Annual runoff”)

Instantaneous discharge is the discharge at a particular instant of time. (See also “Discharge”)

International Boundary Commission Survey Datum refers to a geodetic datum established at numerous monuments along the United States-Canada boundary by the International Boundary Commission.

Island, as used in this report, is a mid-channel bar that has permanent woody vegetation, is flooded once a year, on average, and remains stable except during large flood events.

Laboratory reporting level (LRL) generally is equal to twice the yearly determined long-term method detection level (LT-MDL). The LRL controls false negative error. The probability of falsely reporting a nondetection for a sample that contained an analyte at a concentration equal to or greater than the LRL is predicted to be less than or equal to 1 percent. The value of the LRL will be reported with a “less than” (<) remark code for samples in which the analyte was not detected. The National Water Quality Laboratory (NWQL) collects quality-control data from selected analytical methods on a continuing basis to determine LT-MDLs and to establish LRLs. These values are reevaluated annually on the basis of the most current quality-control data and, therefore, may change. The LRL replaces the term ‘non-detection value’ (NDV).

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

Latent heat flux (often used interchangeably with latent heat-flux density) is the amount of heat energy that converts water from liquid to vapor (evaporation) or from vapor to liquid (condensation) across a specified cross-sectional area per unit time. Usually expressed in watts per square meter.

Light-attenuation coefficient, also known as the extinction coefficient, is a measure of water clarity. Light is attenuated according to the Lambert-Beer equation:

$$I = I_o e^{-\lambda L},$$

where I_o is the source light intensity, I is the light intensity at length L (in meters) from the source, λ is the light-attenuation coefficient, and e is the base of the natural logarithm. The light-attenuation coefficient is defined as

$$\lambda = -\frac{1}{L} \log_e \frac{I}{I_o}.$$

Lipid is any one of a family of compounds that are insoluble in water and that make up one of the principal components of living cells. Lipids include fats, oils, waxes, and steroids. Many environmental contaminants such as organochlorine pesticides are lipophilic.

Long-term method detection level (LT-MDL) is a detection level derived by determining the standard deviation of a minimum of 24 method detection limit (MDL) spike-sample measurements over an extended period of time. LT-MDL data are collected on a continuous basis to assess year-to-year variations in the LT-MDL. The LT-MDL controls false positive error. The chance of falsely reporting a concentration at or greater than the LT-MDL for a sample that did not contain the analyte is predicted to be less than or equal to 1 percent.

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>

Macrophytes are the macroscopic plants in the aquatic environment. The most common macrophytes are the rooted vascular plants that usually are arranged in zones in aquatic ecosystems and restricted in the area by the extent of illumination through the water and sediment deposition along the shoreline.

Mean concentration of suspended sediment (Daily mean suspended-sediment concentration) is the time-weighted concentration of suspended sediment passing a stream cross section during a given time period. (See also “Daily mean suspended-sediment concentration” and “Suspended-sediment concentration”)

Mean discharge (MEAN) is the arithmetic mean of individual daily mean discharges during a specific period. (See also “Discharge”)

Mean high or low tide is the average of all high or low tides, respectively, over a specific period.

Mean sea level is a local tidal datum. It is the arithmetic mean of hourly heights observed over the National Tidal Datum Epoch. Shorter series are specified in the name; for

example, monthly mean sea level and yearly mean sea level. In order that they may be recovered when needed, such datums are referenced to fixed points known as benchmarks. (See also “Datum”)

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.

Megahertz is a unit of frequency. One megahertz equals one million cycles per second.

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

Metamorphic stage refers to the stage of development that an organism exhibits during its transformation from an immature form to an adult form. This developmental process exists for most insects, and the degree of difference from the immature stage to the adult form varies from relatively slight to pronounced, with many intermediates. Examples of metamorphic stages of insects are egg-larva-adult or egg-nymph-adult.

Method detection limit (MDL) is the minimum concentration of a substance that can be measured and reported with 99-percent confidence that the analyte concentration is greater than zero. It is determined from the analysis of a sample in a given matrix containing the analyte. At the MDL concentration, the risk of a false positive is predicted to be less than or equal to 1 percent.

Method of Cubatures is a method of computing discharge in tidal estuaries based on the conservation of mass equation.

Methylene blue active substances (MBAS) indicate the presence of detergents (anionic surfactants). The determination depends on the formation of a blue color when methylene blue dye reacts with synthetic anionic detergent compounds.

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. One microgram per liter is equivalent to 1 part per billion.

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 milligrams per liter and is based on the mass of dry sediment per liter of water-sediment mixture.

Minimum reporting level (MRL) is the smallest measured concentration of a constituent that may be reliably reported by using a given analytical method.

Miscellaneous site, miscellaneous station, or miscellaneous sampling site is a site where streamflow, sediment, and/or water-quality data or water-quality or sediment samples are collected once, or more often on a random or discontinuous basis to provide better areal coverage for defining hydrologic and water-quality conditions over a broad area in a river basin.

Most probable number (MPN) is an index of the number of coliform bacteria that, more probably than any other number, would give the results shown by the laboratory examination; it is not an actual enumeration. MPN is determined from the distribution of gas-positive cultures among multiple inoculated tubes.

Multiple-plate samplers are artificial substrates of known surface area used for obtaining benthic invertebrate samples. They consist of a series of spaced, hardboard plates on an eyebolt.

Nanograms per liter (NG/L, ng/L) is a unit expressing the concentration of chemical constituents in solution as mass (nanograms) of solute per unit volume (liter) of water. One million nanograms per liter is equivalent to 1 milligram per liter.

National Geodetic Vertical Datum of 1929 (NGVD 29) is a fixed reference adopted as a standard geodetic datum for elevations determined by leveling. It formerly was called "Sea Level Datum of 1929" or "mean sea level." Although the datum was derived from the mean sea level at 26 tide stations, it does not necessarily represent local mean sea level at any particular place. *See NOAA Web site: [*\[www.ngs.noaa.gov/faq.shtml#WhatVD29VD88\]\(http://www.ngs.noaa.gov/faq.shtml#WhatVD29VD88\)* \(See "North American Vertical Datum of 1988"\)](http://</i></p>
</div>
<div data-bbox=)*

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

Nekton are the consumers in the aquatic environment and consist of large, free-swimming organisms that are capable of sustained, directed mobility.

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.

North American Datum of 1927 (NAD 27) is the horizontal control datum for the United States that was defined by a location and azimuth on the Clarke spheroid of 1866.

North American Datum of 1983 (NAD 83) is the horizontal control datum for the United States, Canada, Mexico, and Central America that is based on the adjustment of 250,000 points including 600 satellite Doppler stations that constrain the system to a geocentric origin. NAD 83 has been officially adopted as the legal horizontal datum for the United States by the Federal government.

North American Vertical Datum of 1988 (NAVD 88) is a fixed reference adopted as the official civilian vertical datum for elevations determined by Federal surveying and mapping activities in the United States. This datum was established in 1991 by minimum-constraint adjustment of the Canadian, Mexican, and United States first-order terrestrial leveling networks.

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 sediment. May be reported as dissolved organic carbon (DOC), particulate organic carbon (POC), or total organic carbon (TOC).

Organic mass or **volatile mass** of a 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. (See also "Ash mass," "Biomass," and "Dry mass")

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.

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

Classification	Size (mm)	Method of analysis
Clay	>0.00024 - 0.004	Sedimentation
Silt	>0.004 - 0.062	Sedimentation
Sand	>0.062 - 2.0	Sedimentation/sieve
Gravel	>2.0 - 64.0	Sieve
Cobble	>64 - 256	Manual measurement
Boulder	>256	Manual measurement

The particle-size distributions given in this report are not necessarily representative of all particles in transport in the stream. For the sedimentation method, 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.

Peak flow (peak stage) is an instantaneous local maximum value in the continuous time series of streamflows or

stages, preceded by a period of increasing values and followed by a period of decreasing values. Several peak values ordinarily occur in a year. The maximum peak value in a year is called the annual peak; peaks lower than the annual peak are called secondary peaks. Occasionally, the annual peak may not be the maximum value for the year; in such cases, the maximum value occurs at midnight at the beginning or end of the year, on the recession from or rise toward a higher peak in the adjoining year. If values are recorded at a discrete series of times, the peak recorded value may be taken as an approximation of the true peak, which may occur between the recording instants. If the values are recorded with finite precision, a sequence of equal recorded values may occur at the peak; in this case, the first value is taken as the peak.

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, mass, or volume.

Percent shading is a measure of the amount of sunlight potentially reaching the stream. A clinometer is used to measure left and right bank canopy angles. These values are added together, divided by 180, and multiplied by 100 to compute percentage of shade.

Periodic-record station is a site where stage, discharge, sediment, chemical, physical, 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. Although 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 7.0 standard units are termed "acidic," and solutions with a pH greater than 7.0 are termed "basic." Solutions with a pH of 7.0 are neutral. The presence and concentration of many dissolved chemical constituents found in water are affected, in part, by the hydrogen-ion activity of water. Biological processes including growth, distribution of organisms, and toxicity of the water to organisms also are affected, in part, by the hydrogen-ion activity of water.

Phytoplankton is the plant part of the plankton. They usually are 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 commonly are known as algae. (See also “Plankton”)

Picocurie (PC, pCi) is one-trillionth (1×10^{-12}) of the amount of radioactive nuclide represented by a curie (Ci). A curie is the quantity of radioactive nuclide that yields 3.7×10^{10} radioactive disintegrations per second (dps). A picocurie yields 0.037 dps, or 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.

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

Polychlorinated naphthalenes (PCNs) are industrial chemicals that are mixtures of chlorinated naphthalene compounds. They have properties and applications similar to polychlorinated biphenyls (PCBs) and have been identified in commercial PCB preparations.

Pool, as used in this report, is a small part of a stream reach with little velocity, commonly with water deeper than surrounding areas.

Primary productivity is a measure of the rate at which new organic matter is formed and accumulated through photosynthetic and chemosynthetic activity of producer organisms (chiefly, green plants). The rate of primary production is estimated by measuring the amount of oxygen released (oxygen method) or the amount of carbon assimilated (carbon method) by the plants.

Primary productivity (carbon method) is expressed as milligrams of carbon per area per unit time [$\text{mg C}/(\text{m}^2/\text{time})$] for periphyton and macrophytes or per volume [$\text{mg C}/(\text{m}^3/\text{time})$] for phytoplankton. The carbon method defines the amount of carbon dioxide consumed as measured by radioactive carbon (carbon-14). The carbon-14 method is of greater sensitivity than the oxygen light- and dark-bottle method and is preferred for use with unenriched water samples. Unit time may be either the hour or day, depending on the incubation period. (See also “Primary productivity”)

Primary productivity (oxygen method) is expressed as milligrams of oxygen per area per unit time [$\text{mg O}/(\text{m}^2/\text{time})$] for periphyton and macrophytes or per volume [$\text{mg O}/(\text{m}^3/\text{time})$] for phytoplankton. The oxygen method

defines production and respiration rates as estimated from changes in the measured dissolved-oxygen concentration. The oxygen light- and dark-bottle method is preferred if the rate of primary production is sufficient for accurate measurements to be made within 24 hours. Unit time may be either the hour or day, depending on the incubation period. (See also “Primary productivity”)

Radioisotopes are isotopic forms of elements that exhibit radioactivity. Isotopes are varieties of a chemical element that differ in atomic weight but are very nearly alike in chemical properties. The difference arises because the atoms of the isotopic forms of an element differ in the number of neutrons in the nucleus; for example, ordinary chlorine is a mixture of isotopes having atomic weights of 35 and 37, and the natural mixture has an atomic weight of about 35.453. Many of the elements similarly exist as mixtures of isotopes, and a great many new isotopes have been produced in the operation of nuclear devices such as the cyclotron. There are 275 isotopes of the 81 stable elements, in addition to more than 800 radioactive isotopes.

Reach, as used in this report, is a length of stream that is chosen to represent a uniform set of physical, chemical, and biological conditions within a segment. It is the principal sampling unit for collecting physical, chemical, and biological data.

Recoverable from bed (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. (See also “Bed material”)

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 nonexceedance 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 nonexceedances of the $7Q_{10}$ occur less than 10 years after the previous nonexceedance, half occur less than 7 years after, and about one-eighth occur more than 20 years after the previous nonexceedance. 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.

Return period (See “Recurrence interval”)

Riffle, as used in this report, is a shallow part of the stream where water flows swiftly over completely or partially submerged obstructions to produce surface agitation.

River mileage is the curvilinear distance, in miles, measured upstream from the mouth along the meandering path of a stream channel in accordance with Bulletin No. 14 (October 1968) of the Water Resources Council and typically is used to denote location along a river.

Run, as used in this report, is a relatively shallow part of a stream with moderate velocity and little or no surface turbulence.

Runoff is the quantity of water that is discharged (“runs off”) from a drainage basin during a given time period. Runoff data may be presented as volumes in acre-feet, as mean discharges per unit of drainage area in cubic feet per second per square mile, or as depths of water on the drainage basin in inches. (See also “Annual runoff”)

Sea level, as used in this report, refers to one of the two commonly used national vertical datums (NGVD 1929 or NAVD 1988). See separate entries for definitions of these datums.

Sediment is solid material that originates mostly from disintegrated rocks; when transported by, suspended in, or deposited from water, it is referred to as “fluvial sediment.” Sediment 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 affected by environmental and land-use factors. Some major factors are topography, soil

characteristics, land cover, and depth and intensity of precipitation.

Sensible heat flux (often used interchangeably with latent sensible heat-flux density) is the amount of heat energy that moves by turbulent transport through the air across a specified cross-sectional area per unit time and goes to heating (cooling) the air. Usually expressed in watts per square meter.

Seven-day, 10-year low flow ($7Q_{10}$) is the discharge below which the annual 7-day minimum flow falls in 1 year out of 10 on the long-term average. The recurrence interval of the $7Q_{10}$ is 10 years; the chance that the annual 7-day minimum flow will be less than the $7Q_{10}$ is 10 percent in any given year. (See also “Annual 7-day minimum” and “Recurrence interval”)

Shelves, as used in this report, are streambank features extending nearly horizontally from the flood plain to the lower limit of persistent woody vegetation.

Sodium adsorption ratio (SAR) is the expression of relative activity of sodium ions in exchange reactions within soil and is an index of sodium or alkali hazard to the soil. Sodium hazard in water is an index that can be used to evaluate the suitability of water for irrigating crops.

Soil heat flux (often used interchangeably with soil heat-flux density) is the amount of heat energy that moves by conduction across a specified cross-sectional area of soil per unit time and goes to heating (or cooling) the soil. Usually expressed in watts per square meter.

Soil-water content is the water lost from the soil upon drying to constant mass at 105 °C; expressed either as mass of water per unit mass of dry soil or as the volume of water per unit bulk volume of soil.

Specific electrical conductance (conductivity) is a measure of the capacity of water (or other media) to conduct an electrical current. It is expressed in microsiemens per centimeter at 25 °C. Specific electrical conductance is a function of the types and quantity of dissolved substances in water 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.

Stable isotope ratio (per MIL) is a unit expressing the ratio of the abundance of two radioactive isotopes. Isotope ratios are used in hydrologic studies to determine the age or source of specific water, to evaluate mixing of different

water, as an aid in determining reaction rates, and other chemical or hydrologic processes.

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.

Substrate embeddedness class is a visual estimate of riffle streambed substrate larger than gravel that is surrounded or covered by fine sediment (<2 mm, sand or finer). Below are the class categories expressed as the percentage covered by fine sediment:

0	no gravel or larger substrate	3	26-50 percent
1	> 75 percent	4	5-25 percent
2	51-75 percent	5	< 5 percent

Surface area of a lake is that area (acres) encompassed by the boundary of the lake as shown on USGS topographic maps, or other available maps or photographs. Because surface area changes with lake stage, surface areas listed in this report represent those determined for the stage at the time the maps or photographs were obtained.

Surficial bed material is the upper surface (0.1 to 0.2 foot) of the bed material that is sampled using U.S. Series Bed-Material Samplers.

Surrogate is an analyte that behaves similarly to a target analyte, but that is highly unlikely to occur in a sample. A surrogate is added to a sample in known amounts before extraction and is measured with the same laboratory procedures used to measure the target analyte. Its purpose is to monitor method performance for an individual sample.

Suspended (as used in tables of chemical analyses) refers to the amount (concentration) of undissolved material in a water-sediment mixture. It is defined operationally as 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 water-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 directly analyzing the suspended material collected on the filter or, more commonly, by difference, on the basis of determinations of (1) dissolved and (2) total recoverable concentrations of the constituent. (See also “Suspended”)

Suspended sediment is the sediment maintained in suspension by the upward components of turbulent currents or that exists in suspension as a colloid. (See also “Sediment”)

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 foot above the bed) expressed as milligrams of dry sediment per liter of water-sediment mixture (mg/L). The analytical technique uses the mass of all of the sediment and the net weight of the water-sediment mixture in a sample to compute the suspended-sediment concentration. (See also “Sediment” and “Suspended sediment”)

Suspended-sediment discharge (tons/d) is the rate of sediment transport, as measured by dry mass or volume, that passes a cross section in a given time. It is calculated in units of tons per day as follows: concentration (mg/L) x discharge (ft³/s) x 0.0027. (See also “Sediment,” “Suspended sediment,” and “Suspended-sediment concentration”)

Suspended-sediment load is a general term that refers to a given characteristic of the material in suspension that passes a point during a specified period of time. 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. (See also “Sediment”)

Suspended solids, total residue at 105 °C concentration is the concentration of inorganic and organic material retained on a filter, expressed as milligrams of dry material per liter of water (mg/L). An aliquot of the sample is used for this analysis.

Suspended, total is the total amount of a given constituent in the part of a water-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 directly analyzing portions of the suspended material collected on the filter or, more commonly, by difference, on the basis of determinations of (1) dissolved and (2) total concentrations of the constituent. (See also “Suspended”)

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.

Taxa (Species) richness is the number of species (taxa) present in a defined area or sampling unit.

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>

Thalweg is the line formed by connecting points of minimum streambed elevation (deepest part of the channel).

Thermograph is an instrument that continuously records variations of temperature on a chart. The more general term “temperature recorder” is used in the table descriptions and refers to any instrument that records temperature whether on a chart, a tape, or any other medium.

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 resulting from the mixing of flow proportionally to the duration of the concentration.

Tons per acre-foot (T/acre-ft) is the dry mass (tons) of a constituent per unit volume (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 a common chemical or sediment discharge unit. It is the quantity of a substance in solution, in suspension, or as bedload that passes a stream section during a 24-hour period. It is equivalent to 2,000 pounds per day, or 0.9072 metric ton per day.

Total is the amount of a given constituent in a representative whole-water (unfiltered) 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 water-suspended sediment mixture and that the analytical method determined at least 95 percent of the constituent in the sample.)

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 warmblooded 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 milliliters of sample. (See also “Bacteria”)

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 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 length (fish) is the straight-line distance from the anterior point of a fish specimen's snout, with the mouth closed, to the posterior end of the caudal (tail) fin, with the lobes of the caudal fin squeezed together.

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

Total organism count is the number of organisms collected and enumerated in any particular sample. (See also "Organism count/volume")

Total recoverable is the amount of a given constituent in a whole-water sample after a 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 for whole-water samples, equivalent digestion procedures are required of all laboratories performing such analyses because different digestion procedures may produce different analytical results.

Total sediment discharge is the mass of suspended-sediment plus bed-load transport, measured as dry weight, that passes a cross section in a given time. It is a rate and is reported as tons per day. (See also "Bedload," "Bedload discharge," "Sediment," "Suspended sediment," and "Suspended-sediment concentration")

Total sediment load or **total load** is the sediment in transport as bedload and suspended-sediment load. The term may be qualified, such as "annual suspended-sediment load" or "sand-size suspended-sediment load," and so on. It differs from total sediment discharge in that load refers to the material, whereas discharge refers to the quantity of material, expressed in units of mass per unit time. (See also "Sediment," "Suspended-sediment load," and "Total load")

Transect, as used in this report, is a line across a stream perpendicular to the flow and along which measurements are taken, so that morphological and flow characteristics along the line are described from bank to bank. Unlike a cross section, no attempt is made to determine known elevation points along the line.

Turbidity is the reduction in the transparency of a solution because of the presence of suspended and some dissolved substances. The measurement technique records the collective optical properties of the solution that cause light to be scattered and attenuated rather than transmitted in straight lines; the higher the intensity of scattered or attenuated light, the higher the value of the turbidity. Turbidity is

expressed in nephelometric turbidity units (NTU). Depending on the method used, the turbidity units as NTU can be defined as the intensity of light of a specified wavelength scattered or attenuated by suspended particles or absorbed at a method specified angle, usually 90 degrees, from the path of the incident light. Currently approved methods for the measurement of turbidity in the USGS include those that conform to USEPA Method 180.1, ASTM D1889-00, and ISO 7027. Measurements of turbidity by these different methods and different instruments are unlikely to yield equivalent values.

Ultraviolet (UV) absorbance (absorption) at 254 or 280 nanometers is a measure of the aggregate concentration of the mixture of UV absorbing organic materials dissolved in the analyzed water, such as lignin, tannin, humic substances, and various aromatic compounds. UV absorbance (absorption) at 254 or 280 nanometers is measured in UV absorption units per centimeter of path length of UV light through a sample.

Unconfined aquifer is an aquifer whose upper surface is a water table free to fluctuate under atmospheric pressure. (See "Water-table aquifer")

Vertical datum (See "Datum")

Volatile organic compounds (VOCs) 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 VOCs are human-made chemicals that are used and produced in the manufacture of paints, adhesives, petroleum products, pharmaceuticals, and refrigerants. They often are 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.

Water table is that surface in a ground-water body at which the water pressure is equal to the atmospheric pressure.

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

Water year in USGS 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, 2002, is called the "2002 water year."

Watershed (See "Drainage basin")

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.

Wet mass is the mass of living matter plus contained water. (See also “Biomass” and “Dry mass”)

Wet weight refers to the weight of animal tissue or other substance including its contained water. (See also “Dry weight”)

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

Zooplankton is the animal part of the plankton. Zooplankton are capable of extensive movements within the water column and often are 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. (See also “Plankton”)

Techniques of Water-Resources Investigations of the U.S. Geological Survey

The USGS publishes a series of manuals, the Techniques of Water-Resources Investigations, 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.

Reports in the Techniques of Water-Resources Investigations series, which are listed below, are online at <http://water.usgs.gov/pubs/twri/>. Printed copies are for sale by the USGS, Information Services, Box 25286, Federal Center, Denver, Colorado 80225 (authorized agent of the Superintendent of Documents, Government Printing Office), telephone 1-888-ASK-USGS. Please telephone 1-888-ASK-USGS for current prices, and refer to the title, book number, chapter number, and mention the "U.S. Geological Survey Techniques of Water-Resources Investigations." Products can then be ordered by telephone, or online at <http://www.usgs.gov/sales.html>, or by FAX to (303)236-469 of an order form available online at <http://mac.usgs.gov/isb/pubs/forms/>. Prepayment by major credit card or by a check or money order payable to the "U.S. Geological Survey" is required.

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, chap. D1. 1975. 65 p.

1–D2. *Guidelines for collection and field analysis of ground-water samples for selected unstable constituents*, by W.W. Wood: USGS–TWRI book 1, chap. D2. 1976. 24 p.

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, chap. D1. 1974. 116 p.

2–D2. *Application of seismic-refraction techniques to hydrologic studies*, by F.P. Haeni: USGS–TWRI book 2, chap. D2. 1988. 86 p.

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, chap. E1. 1971. 126 p.

2–E2. *Borehole geophysics applied to ground-water investigations*, by W.S. Keys: USGS–TWRI book 2, chap. E2. 1990. 150 p.

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, chap. F1. 1989. 97 p.

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, chap. A1. 1967. 30 p.
- 3–A2. *Measurement of peak discharge by the slope-area method*, by Tate Dalrymple and M.A. Benson: USGS–TWRI book 3, chap. A2. 1967. 12 p.
- 3–A3. *Measurement of peak discharge at culverts by indirect methods*, by G.L. Bodhaine: USGS–TWRI book 3, chap. A3. 1968. 60 p.
- 3–A4. *Measurement of peak discharge at width contractions by indirect methods*, by H.F. Matthai: USGS–TWRI book 3, chap. A4. 1967. 44 p.
- 3–A5. *Measurement of peak discharge at dams by indirect methods*, by Harry Hulsing: USGS–TWRI book 3, chap. A5. 1967. 29 p.
- 3–A6. *General procedure for gaging streams*, by R.W. Carter and Jacob Davidian: USGS–TWRI book 3, chap. A6. 1968. 13 p.
- 3–A7. *Stage measurement at gaging stations*, by T.J. Buchanan and W.P. Somers: USGS–TWRI book 3, chap. A7. 1968. 28 p.
- 3–A8. *Discharge measurements at gaging stations*, by T.J. Buchanan and W.P. Somers: USGS–TWRI book 3, chap. A8. 1969. 65 p.
- 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, chap. A9. 1989. 27 p.
- 3–A10. *Discharge ratings at gaging stations*, by E.J. Kennedy: USGS–TWRI book 3, chap. A10. 1984. 59 p.
- 3–A11. *Measurement of discharge by the moving-boat method*, by G.F. Smoot and C.E. Novak: USGS–TWRI book 3, chap. A11. 1969. 22 p.
- 3–A12. *Fluorometric procedures for dye tracing*, Revised, by J.F. Wilson, Jr., E.D. Cobb, and F.A. Kilpatrick: USGS–TWRI book 3, chap. A12. 1986. 34 p.
- 3–A13. *Computation of continuous records of streamflow*, by E.J. Kennedy: USGS–TWRI book 3, chap. A13. 1983. 53 p.
- 3–A14. *Use of flumes in measuring discharge*, by F.A. Kilpatrick and V.R. Schneider: USGS–TWRI book 3, chap. A14. 1983. 46 p.
- 3–A15. *Computation of water-surface profiles in open channels*, by Jacob Davidian: USGS–TWRI book 3, chap. A15. 1984. 48 p.
- 3–A16. *Measurement of discharge using tracers*, by F.A. Kilpatrick and E.D. Cobb: USGS–TWRI book 3, chap. A16. 1985. 52 p.
- 3–A17. *Acoustic velocity meter systems*, by Antonius Laenen: USGS–TWRI book 3, chap. A17. 1985. 38 p.
- 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, chap. A18. 1989. 52 p.
- 3–A19. *Levels at streamflow gaging stations*, by E.J. Kennedy: USGS–TWRI book 3, chap. A19. 1990. 31 p.
- 3–A20. *Simulation of soluble waste transport and buildup in surface waters using tracers*, by F.A. Kilpatrick: USGS–TWRI book 3, chap. A20. 1993. 38 p.
- 3–A21. *Stream-gaging cableways*, by C. Russell Wagner: USGS–TWRI book 3, chap. A21. 1995. 56 p.

Section B. Ground-Water Techniques

- 3–B1. *Aquifer-test design, observation, and data analysis*, by R.W. Stallman: USGS–TWRI book 3, chap. B1. 1971. 26 p.
- 3–B2. *Introduction to ground-water hydraulics, a programed text for self-instruction*, by G.D. Bennett: USGS–TWRI book 3, chap. B2. 1976. 172 p.
- 3–B3. *Type curves for selected problems of flow to wells in confined aquifers*, by J.E. Reed: USGS–TWRI book 3, chap. B3. 1980. 106 p.
- 3–B4. *Regression modeling of ground-water flow*, by R.L. Cooley and R.L. Naff: USGS–TWRI book 3, chap. B4. 1990. 232 p.

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, chap. B4. 1993. 8 p.

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, chap. B5. 1987. 15 p.

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, chap. B6. 1987. 28 p.

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, chap. B7. 1992. 190 p.

3–B8. *System and boundary conceptualization in ground-water flow simulation*, by T.E. Reilly: USGS–TWRI book 3, chap. B8. 2001. 29 p.

Section C. Sedimentation and Erosion Techniques

3–C1. *Fluvial sediment concepts*, by H.P. Guy: USGS–TWRI book 3, chap. C1. 1970. 55 p.

3–C2. *Field methods for measurement of fluvial sediment*, by T.K. Edwards and G.D. Glysson: USGS–TWRI book 3, chap. C2. 1999. 89 p.

3–C3. *Computation of fluvial-sediment discharge*, by George Porterfield: USGS–TWRI book 3, chap. C3. 1972. 66 p.

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, chap. A1. 1968. 39 p.

4–A2. *Frequency curves*, by H.C. Riggs: USGS–TWRI book 4, chap. A2. 1968. 15 p.

4–A3. *Statistical methods in water resources*, by D.R. Helsel and R.M. Hirsch: USGS–TWRI book 4, chap. A3. 1991. Available only online at <http://water.usgs.gov/pubs/twri/twri4a3/>. (Accessed August 30, 2002.)

Section B. Surface Water

4–B1. *Low-flow investigations*, by H.C. Riggs: USGS–TWRI book 4, chap. B1. 1972. 18 p.

4–B2. *Storage analyses for water supply*, by H.C. Riggs and C.H. Hardison: USGS–TWRI book 4, chap. B2. 1973. 20 p.

4–B3. *Regional analyses of streamflow characteristics*, by H.C. Riggs: USGS–TWRI book 4, chap. B3. 1973. 15 p.

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, chap. D1. 1970. 17 p.

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, chap. A1. 1989. 545 p.

5–A2. *Determination of minor elements in water by emission spectroscopy*, by P.R. Barnett and E.C. Mallory, Jr.: USGS–TWRI book 5, chap. A2. 1971. 31 p.

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, chap. A3. 1987. 80 p.

41 Publications on Techniques of Water Resources Investigations—Continued

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, chap. A4. 1989. 363 p.

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, chap. A5. 1977. 95 p.

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, chap. A6. 1982. 181 p.

Section C. Sediment Analysis

5–C1. *Laboratory theory and methods for sediment analysis*, by H.P. Guy: USGS–TWRI book 5, chap. C1. 1969. 58 p.

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, chap. A1. 1988. 586 p.

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, chap. A2. 1991. 68 p.

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, chap. A3. 1993. 136 p.

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, chap. A4. 1992. 108 p.

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, chap. A5. 1993. 243 p.

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, chap. A6. 1996. 125 p.

6–A7. *User's guide to SEAWAT: A computer program for simulation of three-dimensional variable-density ground-water flow*, by Weixing Guo and Christian D. Langevin: USGS–TWRI book 6, chap. A7. 2002. 77 p.

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, chap. C1. 1976. 116 p.

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, chap. C2. 1978. 90 p.

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, chap. C3. 1981. 110 p.

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, chap. A1. 1968. 23 p.

8–A2. *Installation and service manual for U.S. Geological Survey manometers*, by J.D. Craig: USGS–TWRI book 8, chap. A2. 1983. 57 p.

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, chap. B2. 1968. 15 p.

Book 9. Handbooks for Water-Resources Investigations

Section A. National Field Manual for the Collection of Water-Quality Data

9–A1. *National field manual for the collection of water-quality data: Preparations for water sampling*, by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS–TWRI book 9, chap. A1. 1998. 47 p.

9–A2. *National field manual for the collection of water-quality data: Selection of equipment for water sampling*, edited by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS–TWRI book 9, chap. A2. 1998. 94 p.

9–A3. *National field manual for the collection of water-quality data: Cleaning of equipment for water sampling*, edited by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS–TWRI book 9, chap. A3. 1998. 75 p.

9–A4. *National field manual for the collection of water-quality data: Collection of water samples*, edited by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS–TWRI book 9, chap. A4. 1999. 156 p.

9–A5. *National field manual for the collection of water-quality data: Processing of water samples*, edited by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS–TWRI book 9, chap. A5. 1999. 149 p.

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, chap. A6. 1998. Variously paginated.

9–A7. *National field manual for the collection of water-quality data: Biological indicators*, edited by D.N. Myers and F.D. Wilde: USGS–TWRI book 9, chap. A7. 1997 and 1999. Variously paginated.

9–A8. *National field manual for the collection of water-quality data: Bottom-material samples*, by D.B. Radtke: USGS–TWRI book 9, chap. A8. 1998. 48 p.

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, chap. A9. 1998. 60 p.

Surface-Water Station Records
for Kauai

HAWAII, ISLAND OF KAUAI

16010000 KAWAIKOI STREAM NEAR WAIMEA

LOCATION.--Lat 22°08'09", long 159°37'22". Old Hawaiian Datum, 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.--86 years (water years 1912, 1914, 1920-2003), 34.1 ft³/s (24,740 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 discharges greater than base discharge of 2,100 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Nov 15	0415	*1,810	*7.35

Minimum discharge, 1.8 ft³/s, Nov 10, gage height 1.82 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.4	6.0	9.5	4.6	15	18	106	9.5	4.8	12	6.8	2.6
2	2.4	3.6	21	6.4	11	9.9	17	9.4	4.7	14	6.5	2.5
3	2.4	3.0	11	4.8	8.9	8.2	13	8.9	4.4	14	6.0	2.6
4	2.2	2.8	8.4	4.8	8.1	7.7	91	8.3	5.7	14	7.9	7.3
5	2.4	2.4	7.4	7.7	7.5	7.0	23	7.8	15	7.9	5.3	5.1
6	2.5	2.2	82	5.0	28	28	29	8.5	73	6.4	4.1	4.5
7	2.2	2.0	28	4.2	11	19	21	11	21	6.0	3.4	4.0
8	2.2	1.9	11	3.8	8.0	9.3	39	15	9.8	5.6	3.1	3.2
9	2.1	1.9	8.5	3.6	6.9	7.6	25	9.9	23	6.5	3.1	3.3
10	2.0	1.9	7.5	4.8	6.3	6.8	44	39	26	12	2.9	2.8
11	3.2	54	6.9	47	6.0	6.3	47	16	15	9.3	2.9	2.6
12	6.7	7.3	6.6	9.2	15	5.9	276	11	11	6.8	2.8	2.5
13	4.1	146	6.4	5.6	365	5.7	35	15	16	5.5	11	2.3
14	3.4	223	8.6	4.6	279	5.4	20	26	13	5.0	7.0	28
15	3.7	742	6.6	139	120	5.3	16	10	27	4.8	5.7	11
16	3.3	330	5.9	15	27	8.7	15	9.9	30	4.6	5.1	4.2
17	2.7	120	5.6	7.9	18	6.4	31	37	19	4.4	3.9	3.1
18	2.7	77	5.9	6.6	15	7.9	21	69	17	4.2	3.4	2.8
19	2.7	34	5.7	27	12	6.0	24	17	12	3.9	5.1	2.5
20	2.4	28	5.2	188	11	5.3	45	13	31	16	4.0	2.3
21	2.1	17	4.8	20	14	5.0	35	8.5	11	20	14	2.3
22	2.0	13	4.6	11	27	4.6	160	7.3	18	6.7	7.7	2.2
23	1.9	12	4.8	8.9	14	4.4	32	6.7	19	5.3	39	2.1
24	1.9	10	4.7	309	25	4.3	26	6.2	11	4.5	9.4	2.3
25	4.1	47	4.4	36	14	4.2	26	6.0	8.0	5.4	5.3	3.5
26	3.9	25	4.3	18	10	4.4	16	5.7	6.9	10	4.0	2.9
27	2.7	14	35	14	9.8	21	13	5.4	9.7	6.3	3.5	2.5
28	10	30	25	11	23	9.1	12	5.2	7.9	4.7	3.3	2.3
29	40	42	11	11	---	5.8	11	5.1	11	4.0	3.0	2.1
30	6.8	13	6.5	39	---	30	9.8	5.1	10	3.6	3.0	1.9
31	13	---	5.1	49	---	95	---	5.0	---	5.2	2.8	---
TOTAL	146.1	2,012.0	367.9	1,026.5	1,115.5	372.2	1,278.8	417.4	490.9	238.6	195.0	123.3
MEAN	4.71	67.1	11.9	33.1	39.8	12.0	42.6	13.5	16.4	7.70	6.29	4.11
MAX	40	742	82	309	365	95	276	69	73	20	39	28
MIN	1.9	1.9	4.3	3.6	6.0	4.2	9.8	5.0	4.4	3.6	2.8	1.9
AC-FT	290	3,990	730	2,040	2,210	738	2,540	828	974	473	387	245

16010000 KAWAIKOI STREAM NEAR WAIMEA—Continued

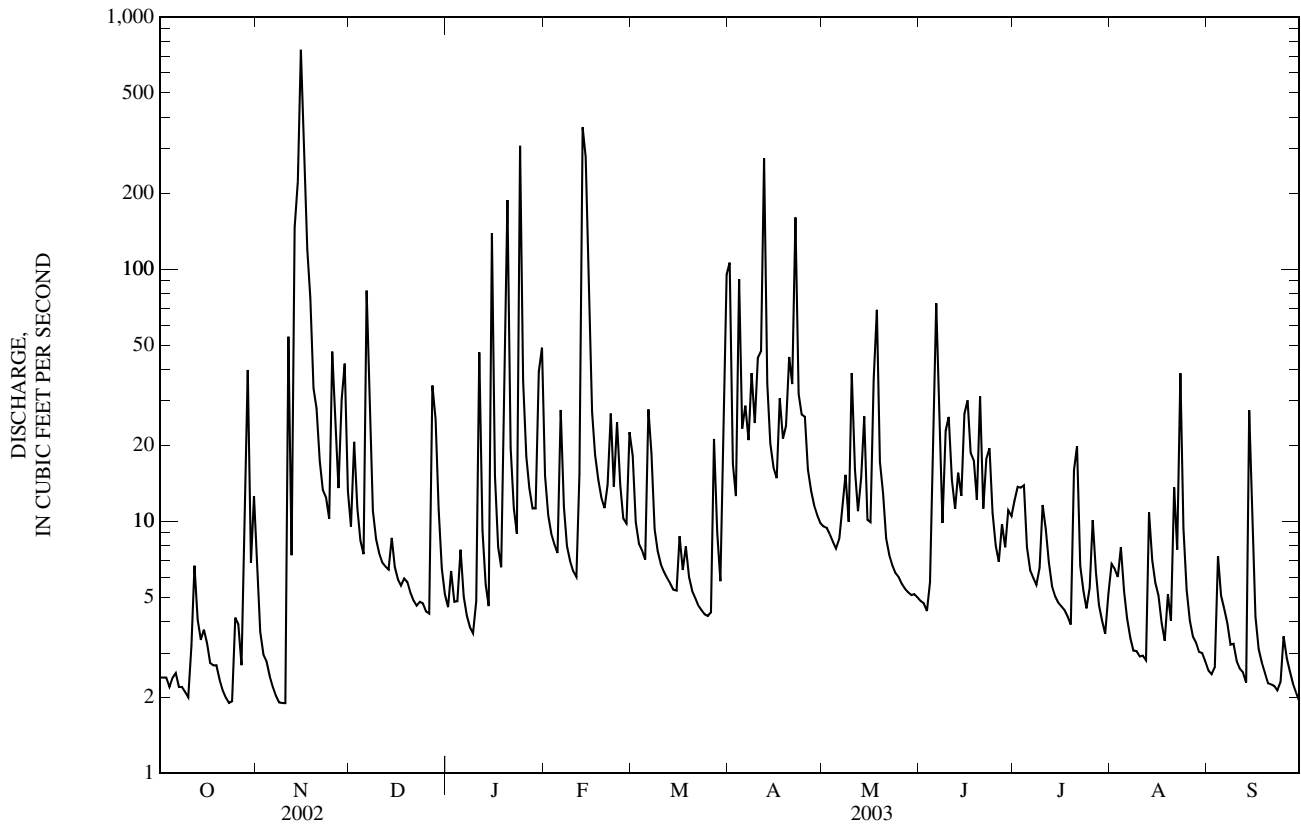
DISCHARGE, CUBIC FEET PER SECOND—CONTINUED
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1911 - 2003, BY WATER YEAR (WY)

MEAN	21.4	44.9	52.9	53.2	41.6	48.0	45.8	27.0	17.1	23.1	21.2	14.2
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)	(2003)	(1945)	(1945)	(1926)	(1992)	(1966)	(1951)	(1922)	(1984)	(1953)

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1911 - 2003	
ANNUAL TOTAL	9,191.3		7,784.2			
ANNUAL MEAN	25.2		21.3		34.1	
HIGHEST ANNUAL MEAN					60.7	
LOWEST ANNUAL MEAN					15.3	
HIGHEST DAILY MEAN	742	Nov 15	742	Nov 15	2,620	Jan 15, 1921
LOWEST DAILY MEAN	1.9	Oct 23	1.9	Oct 23	1.1	Sep 21, 1953
ANNUAL SEVEN-DAY MINIMUM	2.2	Nov 4	2.2	Nov 4	1.2	Sep 17, 1953
ANNUAL RUNOFF (AC-FT)	18,230		15,440		24,740	
10 PERCENT EXCEEDS	44		35		74	
50 PERCENT EXCEEDS	8.8		7.7		13	
90 PERCENT EXCEEDS	3.3		2.6		4.3	



HAWAII, ISLAND OF KAUAI

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

LOCATION.--Lat 22°05'20", long 159°34'18", Old Hawaiian Datum, 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.--62 years (water years 1921-31, 1953-2003), 21.3 ft³/s (15,400 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 discharges greater than base discharge of 1,300 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr 12	1015	*1,110	*4.21

Minimum discharge, 1.8 ft³/s, Sep. 22, 23, 30, gage height, 0.77 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

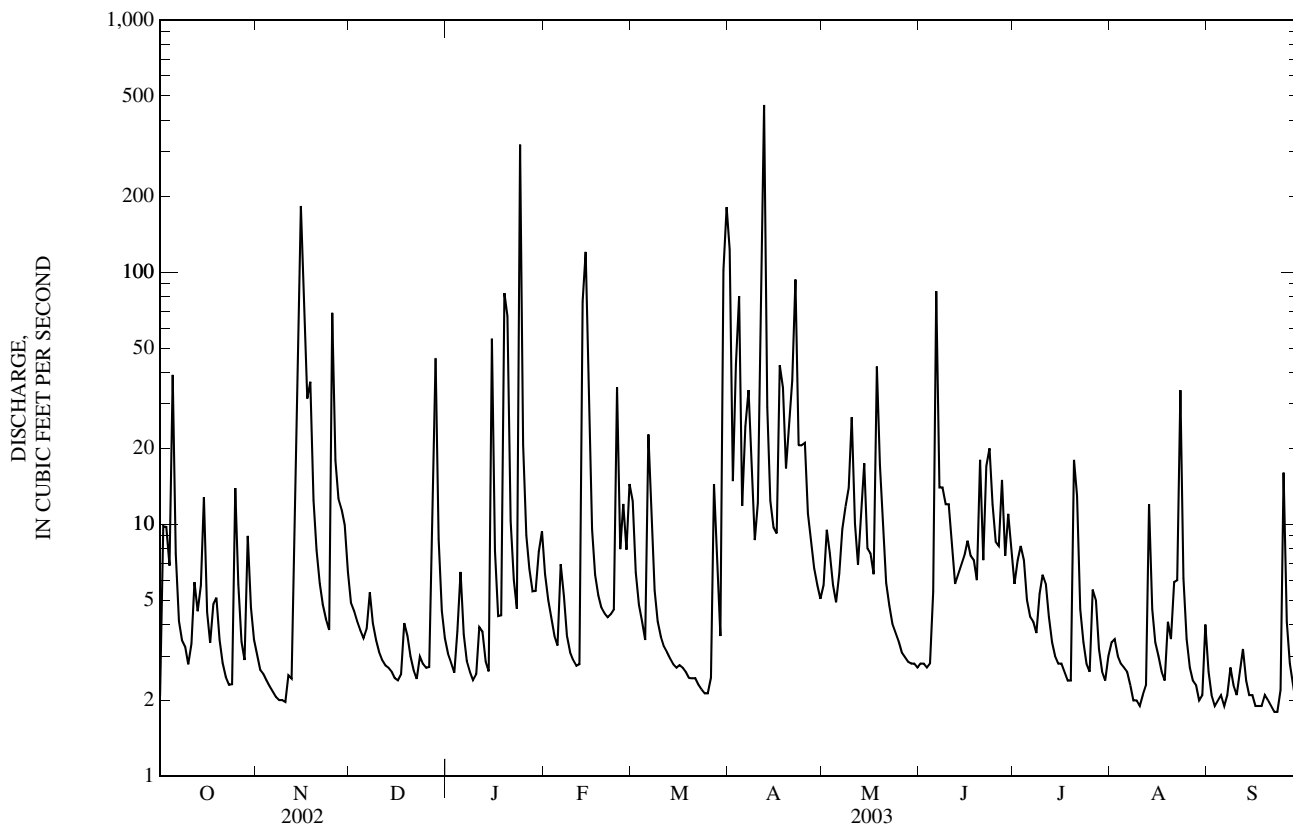
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.1	3.0	4.9	3.1	6.3	12	123	5.7	2.8	5.8	3.4	2.6
2	9.8	2.6	4.5	2.8	5.0	6.4	15	9.5	2.8	7.2	3.5	2.1
3	9.8	2.5	4.1	2.6	4.2	4.8	43	7.7	2.7	8.2	3.0	1.9
4	6.8	2.4	3.8	3.8	3.6	4.1	80	5.7	2.8	7.2	2.8	2.0
5	39	2.3	3.5	6.5	3.3	3.5	12	4.9	5.4	5.0	2.7	2.1
6	7.6	2.2	3.8	3.7	6.9	23	24	6.4	84	4.3	2.6	1.9
7	4.1	2.1	5.4	2.9	5.2	11	34	9.6	14	4.1	2.3	2.1
8	3.5	2.0	4.0	2.6	3.6	5.5	15	12	14	3.7	2.0	2.7
9	3.3	2.0	3.5	2.4	3.1	4.1	8.7	14	12	5.3	2.0	2.3
10	2.8	2.0	3.1	2.5	2.9	3.6	12	27	12	6.3	1.9	2.1
11	3.4	2.5	2.9	3.9	2.7	3.3	76	10	8.4	5.8	2.1	2.6
12	5.9	2.4	2.8	3.7	2.8	3.1	460	6.9	5.8	4.3	2.3	3.2
13	4.5	12	2.7	2.9	77	2.9	29	11	6.3	3.4	12	2.4
14	5.7	52	2.6	2.6	120	2.8	12	17	6.9	3.0	4.6	2.1
15	13	183	2.5	54	37	2.7	9.7	8.0	7.5	2.8	3.4	2.1
16	4.5	90	2.4	7.9	9.5	2.8	9.2	7.7	8.6	2.8	3.0	1.9
17	3.4	32	2.5	4.3	6.3	2.7	43	6.3	7.5	2.6	2.6	1.9
18	4.8	37	4.1	4.4	5.2	2.6	35	42	7.2	2.4	2.4	1.9
19	5.1	12	3.6	83	4.7	2.5	17	17	6.0	2.4	4.1	2.1
20	3.5	7.9	3.0	67	4.4	2.4	24	9.6	18	18	3.5	2.0
21	2.8	5.8	2.6	10	4.3	2.5	37	5.8	7.2	13	5.9	1.9
22	2.5	4.8	2.4	6.0	4.4	2.3	93	4.7	17	4.6	6.0	1.8
23	2.3	4.2	3.0	4.6	4.6	2.2	21	4.0	20	3.4	34	1.8
24	2.3	3.8	2.8	320	35	2.1	21	3.7	12	2.8	6.1	2.2
25	14	69	2.7	21	8.0	2.1	21	3.4	8.5	2.6	3.5	16
26	5.8	18	2.7	9.0	12	2.5	11	3.1	8.2	5.5	2.7	4.1
27	3.4	13	8.3	6.7	7.9	14	8.5	3.0	15	5.0	2.4	2.8
28	2.9	11	45	5.4	14	7.5	6.7	2.9	7.5	3.2	2.3	2.3
29	9.0	9.9	8.7	5.4	---	3.6	5.7	2.8	11	2.6	2.0	1.9
30	4.7	6.5	4.5	7.8	---	102	5.1	2.8	7.8	2.4	2.1	1.8
31	3.5	---	3.5	9.4	---	181	---	2.7	---	3.0	4.0	---
TOTAL	195.8	599.9	155.9	671.9	403.9	427.6	1,311.6	276.9	348.9	152.7	137.2	80.6
MEAN	6.32	20.0	5.03	21.7	14.4	13.8	43.7	8.93	11.6	4.93	4.43	2.69
MAX	39	183	45	320	120	181	460	42	84	18	34	16
MIN	2.1	2.0	2.4	2.4	2.7	2.1	5.1	2.7	2.7	2.4	1.9	1.8
AC-FT	388	1,190	309	1,330	801	848	2,600	549	692	303	272	160

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1920 - 2003, BY WATER YEAR (WY)

MEAN	15.6	32.5	33.6	33.1	26.8	27.2	25.0	13.3	10.1	15.3	12.1	10.7
MAX	52.1	105	106	166	155	106	92.4	45.3	39.4	58.0	44.9	56.0
(WY)	(1995)	(1965)	(1968)	(1921)	(1956)	(1982)	(1974)	(1965)	(1978)	(1989)	(1959)	(1922)
MIN	2.49	5.58	4.16	3.63	2.44	2.15	1.87	1.81	1.89	2.56	2.86	1.67
(WY)	(1927)	(1927)	(1923)	(2001)	(1983)	(1926)	(1966)	(1966)	(1975)	(1984)	(1952)	(1975)

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

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1920 - 2003	
ANNUAL TOTAL	5,546.6		4,762.9		21.3	
ANNUAL MEAN	15.2		13.0		40.9	
HIGHEST ANNUAL MEAN					8.94	
LOWEST ANNUAL MEAN					1926	
HIGHEST DAILY MEAN	507	Mar 25	460	Apr 12	1,440	Dec 1, 1957
LOWEST DAILY MEAN	2.0	Sep 24	1.8	Sep 22	0.99	May 17, 1966
ANNUAL SEVEN-DAY MINIMUM	2.1	Nov 4	1.9	Sep 17	1.1	May 26, 1966
ANNUAL RUNOFF (AC-FT)	11,000		9,450		15,400	
10 PERCENT EXCEEDS	26		22		45	
50 PERCENT EXCEEDS	4.7		4.4		6.4	
90 PERCENT EXCEEDS	2.6		2.3		2.6	



HAWAII, ISLAND OF KAUAI

16036000 MAKAWELI RIVER NEAR WAIMEA

LOCATION.--Lat 21°58'31", long 159°38'55", Old Hawaiian Datum, Hydrologic Unit 20070000, on left bank 0.7 mi upstream from mouth, 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. WRD HI-01-01 1991-2000 (P)

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.--60 years (water years 1944-2003), 84.4 ft³/s (61,180 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, 3.15 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)
Apr 12	1230	*3,720	*8.38

Minimum discharge, 7.3 ft³/s, Aug. 8, gage height, 2.48 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

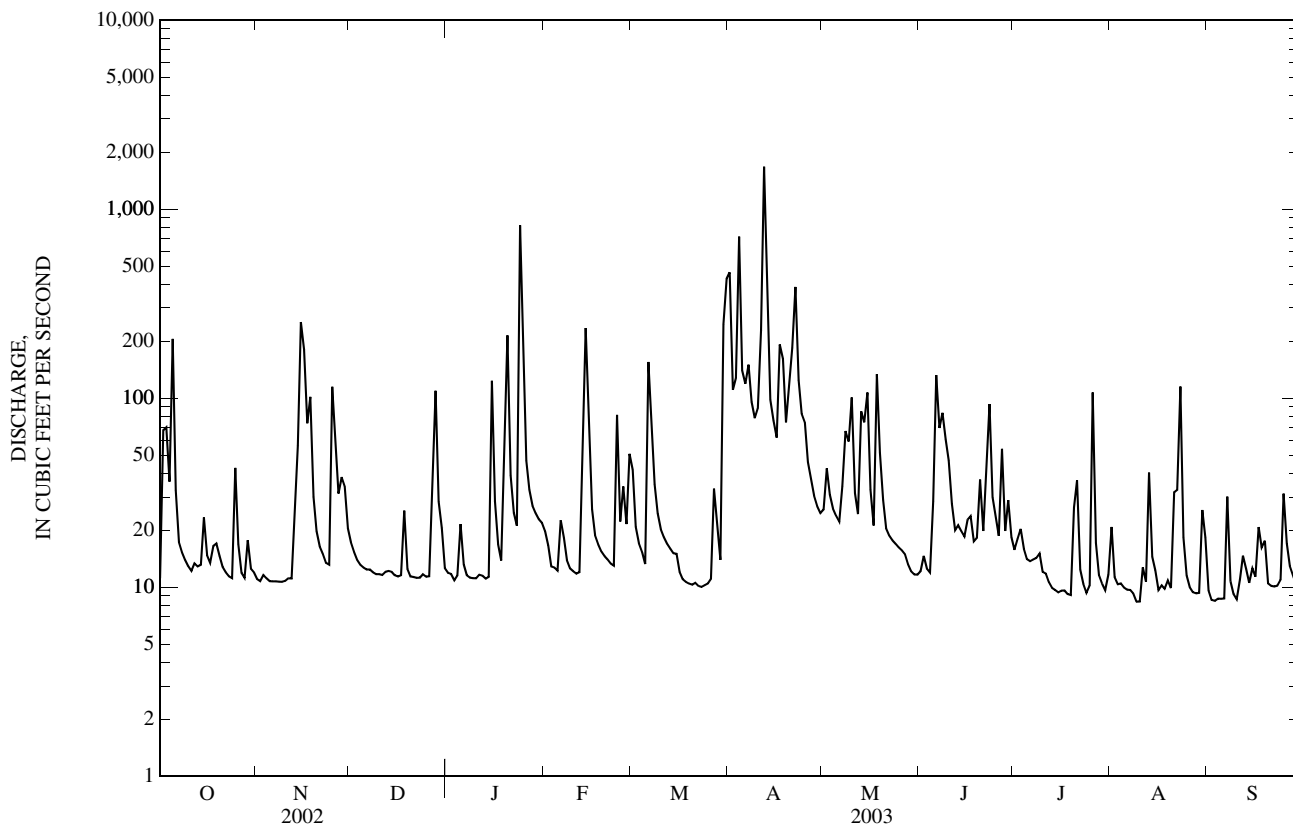
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	11	17	12	20	42	463	26	12	16	21	9.6
2	68	11	15	12	17	21	111	43	15	18	11	8.6
3	70	12	14	11	13	17	128	31	13	20	10	8.5
4	36	11	13	12	13	15	715	26	12	16	10	8.7
5	206	11	13	22	12	13	140	24	29	14	10	8.7
6	33	11	12	13	23	155	119	22	132	14	9.7	8.7
7	17	11	12	12	18	79	150	34	70	14	9.7	30
8	15	11	12	11	14	35	96	67	84	14	9.3	11
9	14	11	12	11	13	25	78	59	61	15	8.4	9.2
10	13	11	12	11	12	20	88	101	47	12	8.4	8.6
11	12	11	12	12	12	18	229	31	28	12	13	11
12	13	11	12	12	12	17	1,680	24	20	11	11	15
13	13	26	12	11	42	16	261	85	21	9.9	40	12
14	13	56	12	11	235	15	98	75	20	9.7	15	11
15	23	252	12	123	79	15	76	107	19	9.4	12	13
16	15	181	11	29	26	12	62	33	23	9.6	9.7	11
17	13	74	12	17	19	11	192	21	24	9.6	10	21
18	17	102	25	14	17	11	161	134	17	9.2	9.8	16
19	17	30	13	80	15	10	75	52	18	9.1	11	18
20	15	20	11	215	15	10	123	29	37	26	9.9	10
21	13	16	11	39	14	11	185	20	20	37	32	10
22	12	15	11	25	13	10	387	19	43	12	33	10
23	11	13	11	21	13	10	124	18	93	10	115	10
24	11	13	12	820	81	10	83	17	30	9.3	18	11
25	43	115	11	139	22	10	74	16	24	10	12	31
26	17	58	11	47	34	11	46	16	19	107	10	17
27	12	31	44	33	22	33	37	15	54	17	9.4	13
28	11	38	110	27	51	21	30	13	20	12	9.3	12
29	18	34	28	25	---	14	27	12	29	10	9.3	10
30	13	20	21	23	---	247	25	12	18	9.7	26	9.2
31	12	---	13	22	---	428	---	12	---	12	18	---
TOTAL	807	1,227	547	1,872	877	1,362	6,063	1,194	1,052	514.5	540.9	382.8
MEAN	26.0	40.9	17.6	60.4	31.3	43.9	202	38.5	35.1	16.6	17.4	12.8
MAX	206	252	110	820	235	428	1,680	134	132	107	115	31
MIN	11	11	11	11	12	10	25	12	12	9.1	8.4	8.5
AC-FT	1,600	2,430	1,080	3,710	1,740	2,700	12,030	2,370	2,090	1,020	1,070	759

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1943 - 2003, BY WATER YEAR (WY)

MEAN	58.3	121	138	128	113	124	98.9	56.8	38.6	52.0	49.8	35.8
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	17.6	9.49	12.0	10.6	11.6	13.2	9.56	10.0	14.2	9.54
(WY)	(1960)	(1951)	(2003)	(1945)	(1978)	(1959)	(1992)	(2000)	(1951)	(1984)	(1944)	(1962)

16036000 MAKAWELI RIVER NEAR WAIMEA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1943 - 2003	
ANNUAL TOTAL	26,240		16,439.2		84.4	
ANNUAL MEAN	71.9		45.0		204	
HIGHEST ANNUAL MEAN					1982	
LOWEST ANNUAL MEAN					31.1	
HIGHEST DAILY MEAN	2,140	Mar 25	1,680	Apr 12	5,170	Dec 1, 1957
LOWEST DAILY MEAN	10	Aug 2	8.4	Aug 9	4.3	Jul 19, 1951
ANNUAL SEVEN-DAY MINIMUM	11	Jul 31	9.4	Aug 4	5.7	Oct 21, 1944
ANNUAL RUNOFF (AC-FT)	52,050		32,610		61,180	
10 PERCENT EXCEEDS	133		99		169	
50 PERCENT EXCEEDS	20		16		26	
90 PERCENT EXCEEDS	11		10		12	



HAWAII, ISLAND OF KAUAI

16049000 HANAPEPE RIVER BELOW MANUAHI STREAM, NEAR ELEELE

LOCATION.--Lat 21°57'29", long 159°33'13", Old Hawaiian Datum, 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.--79 years (water years 1918-20, 1928-2003), 83.0 ft³/s (60,120 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)
Apr 3	2245	*4,660	*6.68	No other peak greater than base discharge.			

Minimum discharge, 12 ft³/s, on many days, gage height, 1.14 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

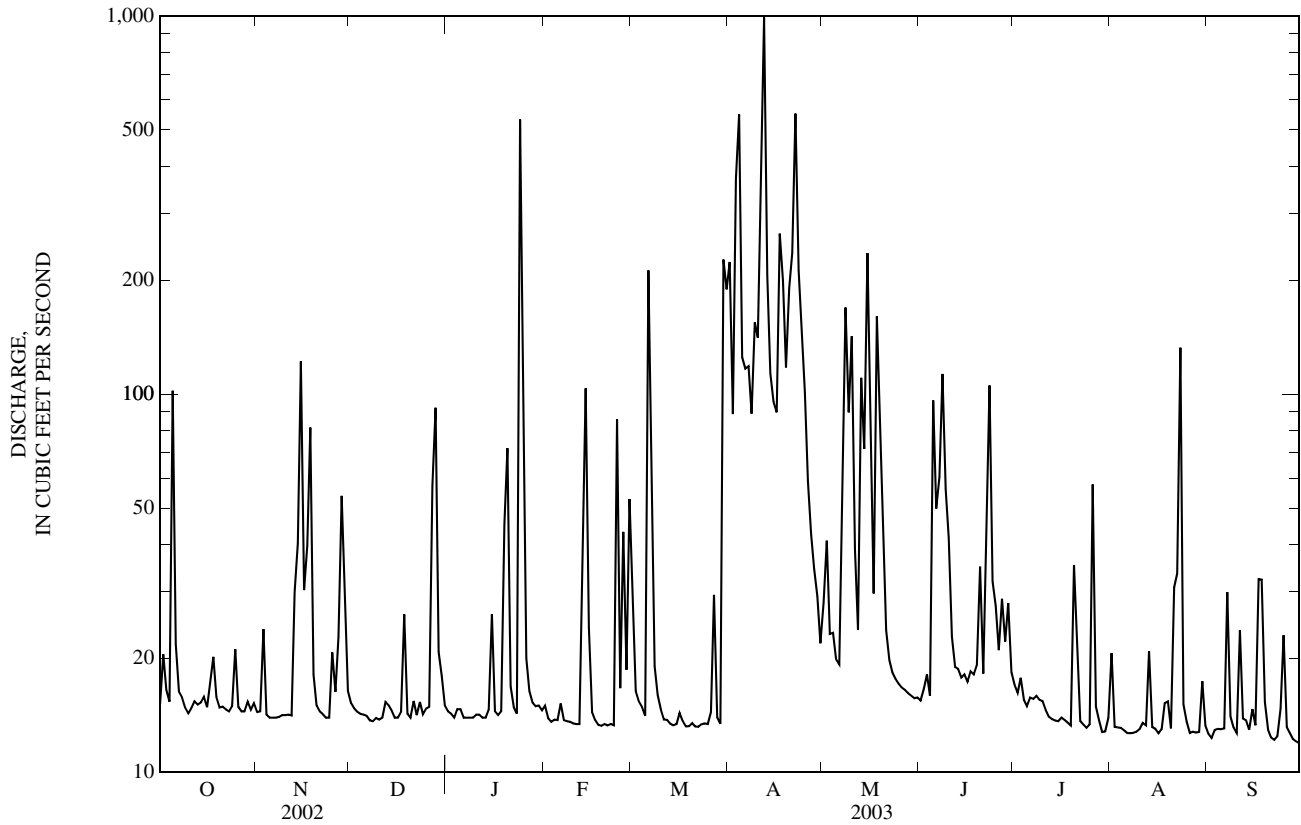
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15	14	15	14	15	25	224	28	15	17	21	13
2	21	14	15	14	14	16	89	41	17	16	13	12
3	17	24	14	14	14	15	371	23	18	18	13	13
4	15	14	14	15	14	15	549	23	16	16	13	13
5	102	14	14	15	14	14	125	20	96	15	13	13
6	22	14	14	14	15	212	117	19	50	16	13	13
7	16	14	14	14	14	42	119	59	60	16	13	30
8	16	14	14	14	14	19	89	169	113	16	13	14
9	15	14	14	14	14	16	155	89	56	16	13	13
10	14	14	14	14	13	15	141	142	42	15	13	13
11	15	14	14	14	13	14	329	39	23	15	14	24
12	15	14	15	14	13	14	991	24	19	14	13	14
13	15	30	15	14	26	13	206	111	19	14	21	14
14	15	40	15	15	104	13	114	72	18	14	13	13
15	16	122	14	26	24	13	96	236	18	14	13	15
16	15	30	14	14	14	14	90	72	17	14	13	13
17	17	40	14	14	14	14	266	30	18	14	13	32
18	20	82	26	14	13	13	200	160	18	14	15	32
19	16	18	14	45	13	13	118	88	19	13	15	15
20	15	15	14	72	13	13	191	39	35	35	13	13
21	15	14	15	17	13	13	236	24	18	23	31	12
22	15	14	14	15	13	13	552	20	34	14	34	12
23	14	14	15	14	13	13	213	18	105	13	133	12
24	15	14	14	532	86	13	145	18	32	13	15	15
25	21	21	15	56	17	13	101	17	27	13	14	23
26	15	16	15	20	43	14	59	17	21	58	13	13
27	14	23	57	16	19	29	43	17	29	15	13	13
28	14	54	92	15	53	14	34	16	22	14	13	12
29	15	28	21	15	---	13	29	16	28	13	13	12
30	15	16	18	15	---	227	22	16	18	13	17	12
31	15	---	15	15	---	189	---	16	---	14	13	---
TOTAL	580	769	588	1,114	645	1,074	6,014	1,679	1,021	525	590	468
MEAN	18.7	25.6	19.0	35.9	23.0	34.6	200	54.2	34.0	16.9	19.0	15.6
MAX	102	122	92	532	104	227	991	236	113	58	133	32
MIN	14	14	14	14	13	13	22	16	15	13	13	12
AC-FT	1,150	1,530	1,170	2,210	1,280	2,130	11,930	3,330	2,030	1,040	1,170	928

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1917 - 2003, BY WATER YEAR (WY)

MEAN	60.4	103	113	108	96.9	112	93.9	66.9	52.4	71.1	69.6	51.6
MAX	240	430	720	578	657	803	470	249	175	202	222	190
(WY)	(1995)	(1991)	(1920)	(1920)	(1932)	(1918)	(1963)	(2002)	(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)

16049000 HANAPEPE RIVER BELOW MANUAHI STREAM, NEAR ELEELE—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1917 - 2003	
ANNUAL TOTAL	29,005		15,067		83.0	
ANNUAL MEAN	79.5		41.3		182	
HIGHEST ANNUAL MEAN					1918	
LOWEST ANNUAL MEAN					30.6	
HIGHEST DAILY MEAN	1,660	Mar 25	991	Apr 12	10,900	Dec 3, 1919
LOWEST DAILY MEAN	12	Jan 15	12	Sep 2	5.3	May 21, 1954
ANNUAL SEVEN-DAY MINIMUM	13	Jan 11	13	Aug 31	6.4	May 10, 1954
ANNUAL RUNOFF (AC-FT)	57,530		29,890		60,120	
10 PERCENT EXCEEDS	142		98		170	
50 PERCENT EXCEEDS	18		15		29	
90 PERCENT EXCEEDS	14		13		15	



HAWAII, ISLAND OF KAUAI

16060000 SOUTH FORK WAILUA RIVER NEAR LIHUE

LOCATION.--Lat 22°02'24", long 159°22'58", Old Hawaiian Datum, 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.--86 years (water years 1913-18, 1920, 1922-24, 1926-56, 1959-2003), 117 ft³/s (84,700 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)
Apr 4	0000	*8,310	*15.44				

No other peak greater than base discharge.

Minimum discharge, 7.3 ft³/s, July 24, gage height, 1.75 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

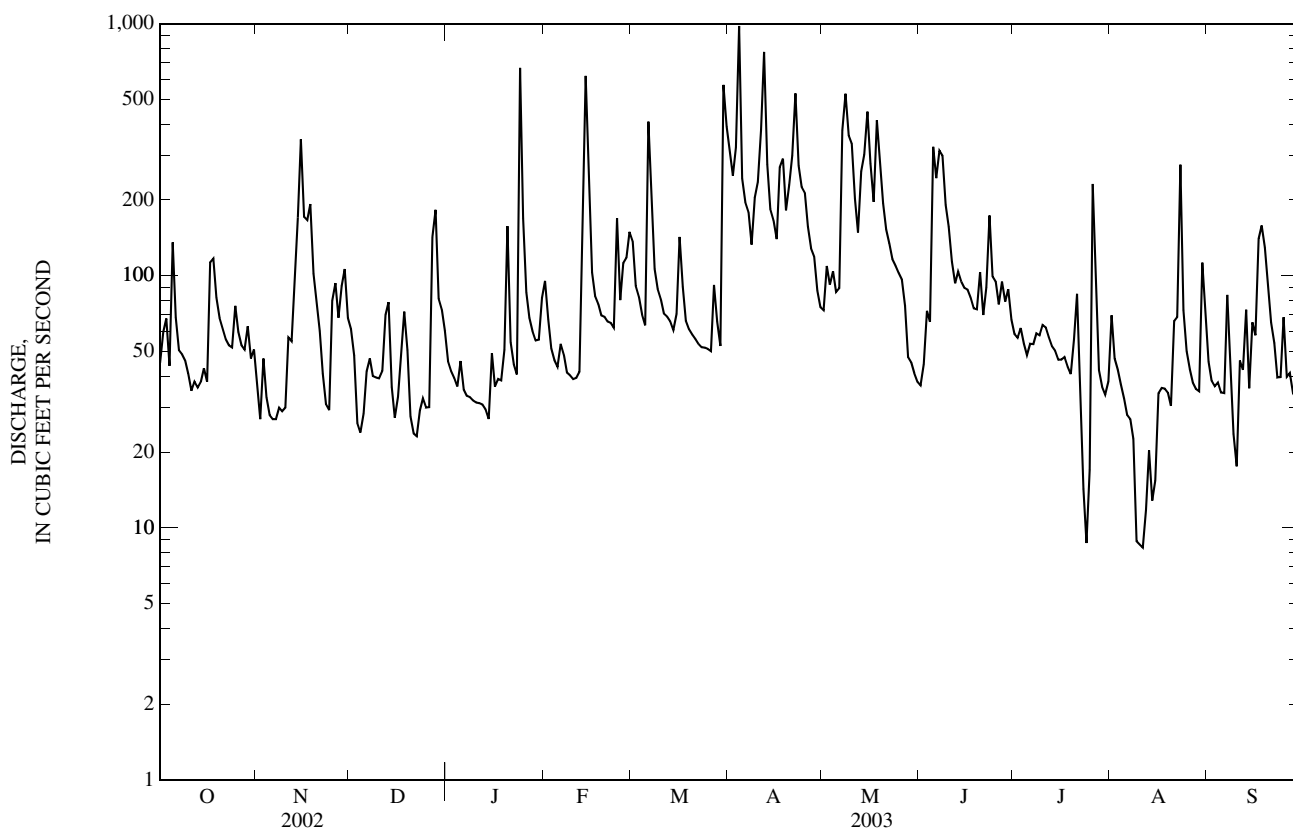
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	45	36	62	46	95	137	315	73	37	59	70	46
2	60	27	48	42	67	91	250	109	45	57	47	38
3	68	47	26	39	52	82	323	92	73	62	42	36
4	44	33	24	36	46	70	980	104	66	54	37	38
5	136	28	28	46	44	64	243	86	325	48	33	34
6	68	27	42	35	54	409	196	89	244	54	28	34
7	51	27	47	33	49	199	179	378	314	54	27	84
8	49	30	40	33	41	106	133	527	300	59	23	41
9	46	29	39	32	40	89	204	361	191	58	8.9	24
10	41	30	39	31	39	81	235	335	156	64	8.6	18
11	35	57	42	31	39	71	379	202	114	62	8.4	46
12	38	55	70	31	42	69	773	149	93	57	12	42
13	36	103	79	29	153	66	277	259	104	52	20	73
14	38	170	36	27	620	61	184	302	95	50	13	36
15	43	348	27	49	233	71	166	448	90	47	15	65
16	38	172	33	36	103	143	140	279	88	47	34	58
17	113	166	48	39	83	90	269	197	82	48	36	140
18	117	192	72	38	77	66	292	414	74	44	36	158
19	82	102	51	51	70	61	182	287	74	41	34	129
20	68	80	28	157	69	58	229	194	103	56	30	89
21	62	60	24	55	66	56	300	153	70	85	66	65
22	56	41	23	45	65	54	529	134	90	35	69	54
23	53	31	29	41	62	52	273	116	174	14	276	40
24	52	29	33	668	169	52	225	110	99	8.7	73	40
25	76	80	30	169	80	51	213	103	95	17	50	68
26	60	93	30	86	112	50	157	97	77	231	43	40
27	53	68	142	68	118	92	128	76	95	114	38	41
28	51	91	183	60	149	66	119	48	79	42	36	34
29	63	106	81	55	---	53	87	45	88	36	35	33
30	47	68	73	56	---	572	75	41	67	34	113	31
31	51	---	61	82	---	391	---	38	---	38	72	---
TOTAL	1,840	2,426	1,590	2,246	2,837	3,573	8,055	5,846	3,602	1,727.7	1,433.9	1,675
MEAN	59.4	80.9	51.3	72.5	101	115	268	189	120	55.7	46.3	55.8
MAX	136	348	183	668	620	572	980	527	325	231	276	158
MIN	35	27	23	27	39	50	75	38	37	8.7	8.4	18
AC-FT	3,650	4,810	3,150	4,450	5,630	7,090	15,980	11,600	7,140	3,430	2,840	3,320

16060000 SOUTH FORK WAILUA RIVER NEAR LIHUE—Continued

DISCHARGE, CUBIC FEET PER SECOND—CONTINUED
 WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
 DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1912 - 2003, BY WATER YEAR (WY)												
MEAN	92.7	171	170	174	125	148	136	102	59.8	77.9	83.9	76.1
MAX	339	866	696	1,485	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)

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1912 - 2003	
ANNUAL TOTAL	59,429		36,851.6		117	
ANNUAL MEAN	163		101		284	
HIGHEST ANNUAL MEAN					1982	
LOWEST ANNUAL MEAN					17.3	
HIGHEST DAILY MEAN	3,250	Mar 25	980	Apr 4	13,800	Jan 16, 1921
LOWEST DAILY MEAN	23	Dec 22	8.4	Aug 11	1.8	Sep 17, 1953
ANNUAL SEVEN-DAY MINIMUM	28	Dec 20	12	Aug 9	1.8	Sep 16, 1953
ANNUAL RUNOFF (AC-FT)	117,900		73,100		84,700	
10 PERCENT EXCEEDS	295		232		265	
50 PERCENT EXCEEDS	82		62		42	
90 PERCENT EXCEEDS	41		31		4.8	



HAWAII, ISLAND OF KAUAI

16068000 EAST BRANCH OF NORTH FORK WAILUA RIVER NEAR LIHUE

LOCATION.--Lat 22°04'19", long 159°25'05", Old Hawaiian Datum, 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.--88 years (water years 1913-14, 1916-17, 1920-2003), 47.8 ft³/s (34,640 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 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)
Jul 26	0215	*4,760	*7.68	No other peak greater than base discharge.			

Minimum discharge, 11 ft³/s, Feb. 10, 11, 12, gage height, 0.97 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

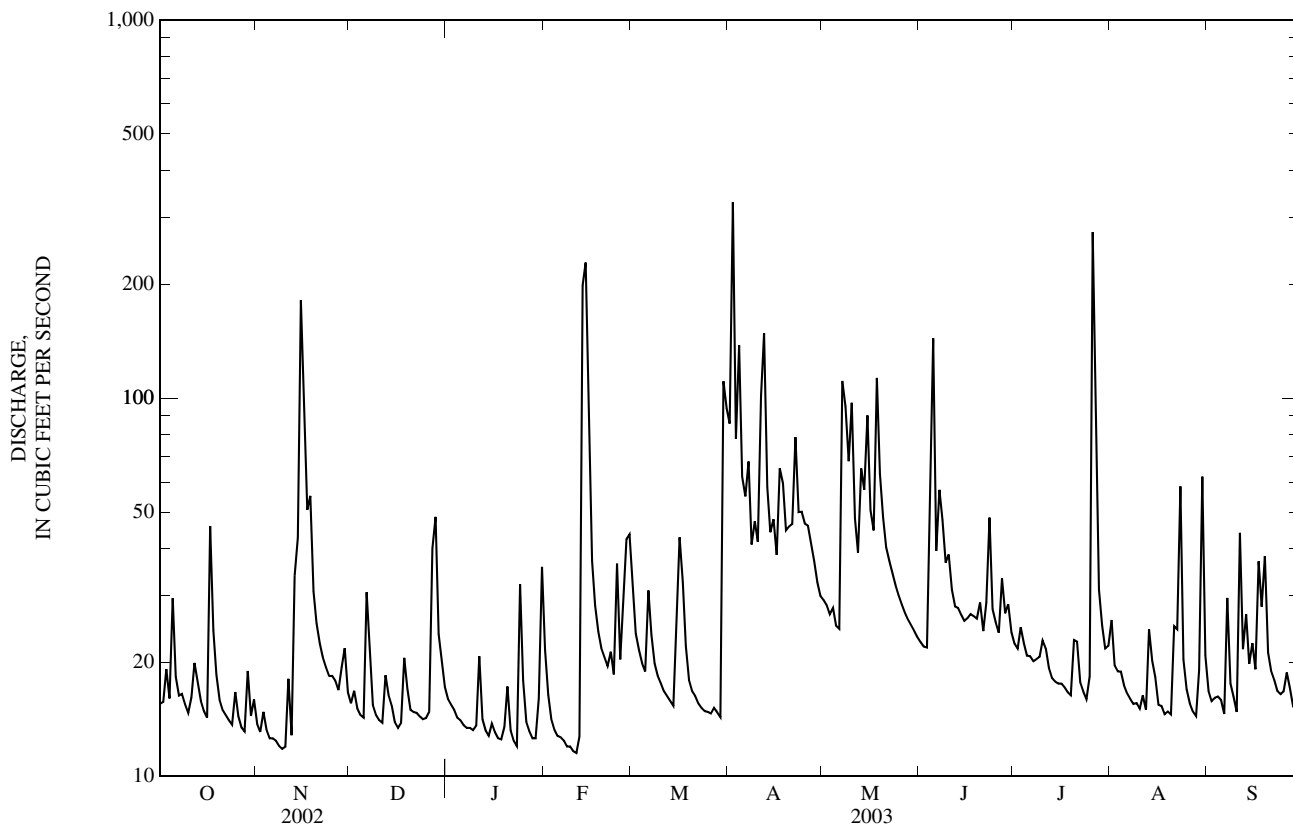
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	14	16	16	22	32	86	29	23	22	26	17
2	16	13	17	15	16	24	330	28	22	22	20	16
3	19	15	15	15	14	22	78	27	22	25	19	16
4	16	13	15	14	13	20	138	28	43	22	19	16
5	30	13	14	14	13	19	62	25	144	21	17	16
6	18	13	31	14	13	31	55	25	39	21	17	15
7	16	12	22	13	12	24	68	111	57	20	16	30
8	17	12	15	13	12	20	41	95	48	20	16	18
9	15	12	15	13	12	18	47	68	37	21	16	16
10	15	12	14	14	12	18	42	97	39	23	15	15
11	16	18	14	21	12	17	101	48	31	22	16	44
12	20	13	19	14	13	16	148	39	28	19	15	22
13	18	34	16	13	199	16	58	65	28	18	24	27
14	16	43	15	13	228	15	44	57	27	18	20	20
15	15	181	14	14	82	25	48	90	26	18	18	22
16	14	105	13	13	37	43	39	51	26	18	15	19
17	46	51	14	13	28	33	65	45	27	17	15	37
18	24	55	21	13	24	22	60	113	27	17	15	28
19	19	31	17	14	22	18	45	63	26	16	15	38
20	16	25	15	17	21	17	46	48	29	23	15	21
21	15	22	15	13	20	16	46	40	24	23	25	19
22	15	21	15	12	21	16	79	37	29	18	24	18
23	14	19	14	12	19	15	50	34	48	17	58	17
24	14	18	14	32	36	15	50	32	28	16	20	17
25	17	18	14	18	20	15	47	30	26	18	17	17
26	14	18	15	14	29	15	46	28	24	275	16	19
27	13	17	40	13	42	15	41	27	33	92	15	17
28	13	19	49	13	44	15	37	26	27	31	14	15
29	19	22	24	13	---	14	33	25	29	25	19	15
30	14	17	20	16	---	111	30	24	24	22	62	14
31	16	---	17	36	---	94	---	23	---	22	21	---
TOTAL	546	876	569	478	1,036	791	2,060	1,478	1,041	962	640	621
MEAN	17.6	29.2	18.4	15.4	37.0	25.5	68.7	47.7	34.7	31.0	20.6	20.7
MAX	46	181	49	36	228	111	330	113	144	275	62	44
MIN	13	12	13	12	12	14	30	23	22	16	14	14
AC-FT	1,080	1,740	1,130	948	2,050	1,570	4,090	2,930	2,060	1,910	1,270	1,230

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1912 - 2003, BY WATER YEAR (WY)

MEAN	41.1	60.2	59.2	58.6	47.7	55.5	56.3	46.9	33.1	38.4	39.2	36.5
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	11.8
(WY)	(1954)	(1934)	(1964)	(1986)	(1986)	(1970)	(1926)	(1926)	(1969)	(1926)	(1984)	(1953)

16068000 EAST BRANCH OF NORTH FORK WAILUA RIVER NEAR LIHUE—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1912 - 2003	
ANNUAL TOTAL	15,857		11,098		47.8	
ANNUAL MEAN	43.4		30.4		95.5	
HIGHEST ANNUAL MEAN					21.3	
LOWEST ANNUAL MEAN					1984	
HIGHEST DAILY MEAN	980	Mar 25	330	Apr 2	2,570	Feb 13, 1994
LOWEST DAILY MEAN	12	Nov 7	12	Nov 7	7.0	Jul 8, 1926
ANNUAL SEVEN-DAY MINIMUM	12	Nov 4	12	Feb 5	8.2	Mar 5, 1986
ANNUAL RUNOFF (AC-FT)	31,450		22,010		34,640	
10 PERCENT EXCEEDS	68		53		84	
50 PERCENT EXCEEDS	24		20		31	
90 PERCENT EXCEEDS	15		14		16	



HAWAII, ISLAND OF KAUAI

16071000 NORTH FORK WAILUA RIVER NEAR KAPAA

LOCATION.--Lat 22°03'08", long 159°22'22", Old Hawaiian Datum, 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 September 2003 (discontinued).

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 in vicinities of Kapaa and Wailua.

AVERAGE DISCHARGE.--51 years (water years 1953-2003), 116 ft³/s (84,340 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 discharges 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)
Jul 26	0245	*7,850	*9.42	No other peak greater than base discharge.			

Minimum discharge, 9.2 ft³/s, Feb. 9, 10, 11, 12, gage height, 1.24 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

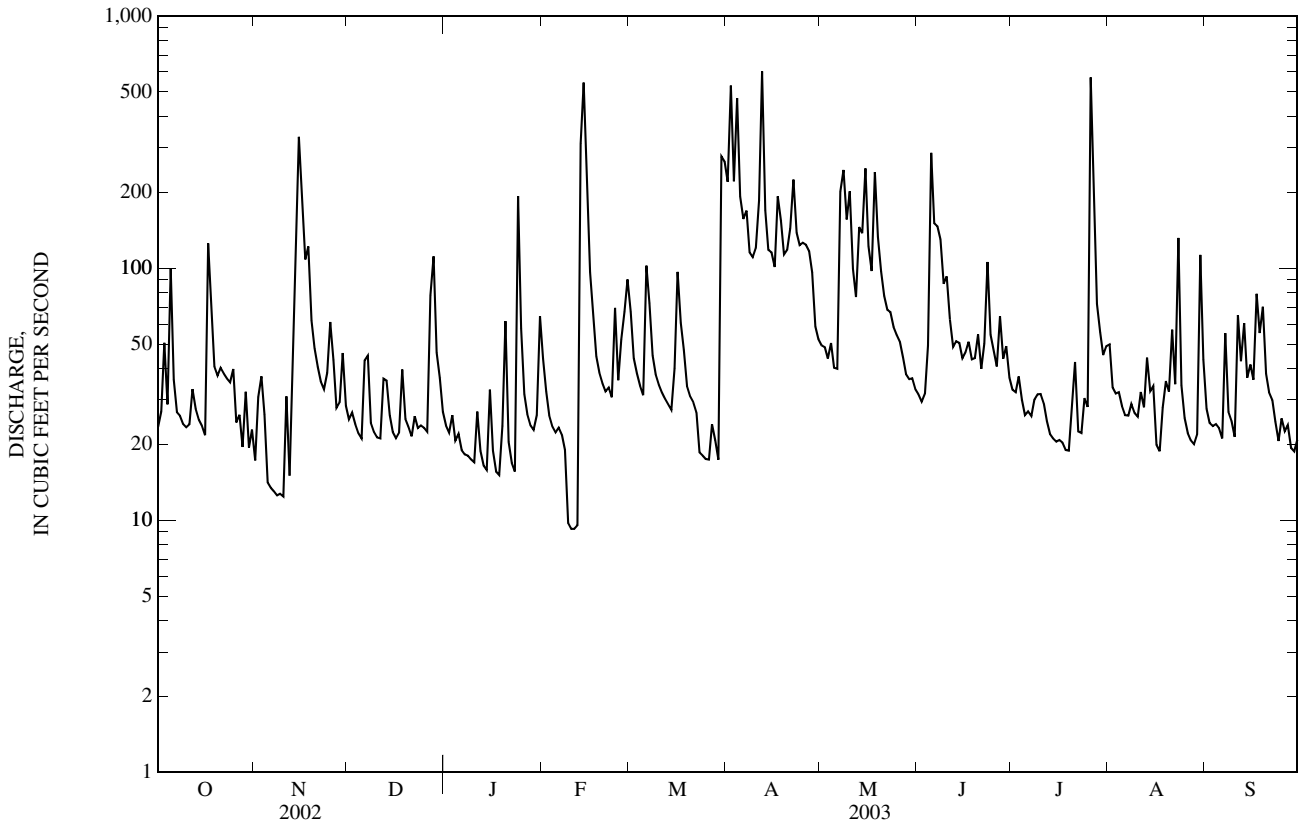
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	23	17	25	24	44	67	220	49	32	33	50	28
2	27	31	27	22	32	44	530	49	30	32	34	24
3	51	37	24	26	26	38	221	44	32	37	32	24
4	29	26	22	21	23	34	473	50	49	30	32	24
5	100	14	21	22	22	31	192	40	287	26	28	23
6	36	13	43	19	23	102	157	40	151	27	26	21
7	27	13	45	18	22	73	169	201	147	26	26	55
8	26	13	24	18	19	45	115	245	130	30	29	27
9	24	13	22	17	9.7	38	110	156	87	32	27	25
10	23	12	21	17	9.2	34	120	202	93	32	26	21
11	24	31	21	27	9.2	32	185	99	62	29	32	65
12	33	15	36	19	9.5	30	603	77	49	25	28	43
13	28	39	36	16	311	29	170	145	51	22	44	61
14	25	90	26	16	544	27	118	138	50	21	32	37
15	24	332	22	33	205	40	116	249	44	20	34	41
16	22	205	21	19	96	97	101	122	46	21	20	36
17	125	108	22	16	65	61	193	97	51	20	19	79
18	65	122	40	15	45	47	154	240	43	19	28	55
19	41	62	25	24	39	34	113	133	44	19	36	70
20	37	48	23	62	35	31	118	97	55	30	32	38
21	40	41	21	20	32	29	144	78	40	42	57	32
22	38	36	26	17	34	27	224	68	50	23	35	30
23	36	33	23	16	31	19	138	67	106	22	132	25
24	35	38	24	193	70	18	123	58	54	31	34	21
25	40	61	23	58	36	18	126	54	47	28	25	25
26	24	43	22	32	52	17	124	51	41	571	22	23
27	26	28	78	26	67	24	117	44	64	190	21	24
28	20	29	111	24	90	21	96	38	44	72	20	19
29	32	46	46	23	---	17	59	36	49	56	22	19
30	19	28	37	26	---	277	52	37	37	45	113	21
31	23	---	27	64	---	264	---	33	---	49	43	---
TOTAL	1,123	1,624	984	950	2,000.6	1,665	5,381	3,037	2,065	1,660	1,139	1,036
MEAN	36.2	54.1	31.7	30.6	71.5	53.7	179	98.0	68.8	53.5	36.7	34.5
MAX	125	332	111	193	544	277	603	249	287	571	132	79
MIN	19	12	21	15	9.2	17	52	33	30	19	19	19
AC-FT	2,230	3,220	1,950	1,880	3,970	3,300	10,670	6,020	4,100	3,290	2,260	2,050

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 2003, BY WATER YEAR (WY)

MEAN	95.2	178	159	143	126	139	146	115	63.4	86.7	82.8	62.3
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	7.45	5.78	5.22	5.80	3.17
(WY)	(1954)	(1977)	(1984)	(1986)	(1978)	(1978)	(1966)	(2000)	(1957)	(1953)	(1984)	(1953)

16071000 NORTH FORK WAILUA RIVER NEAR KAPAA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1952 - 2003	
ANNUAL TOTAL	39,013		22,664.6			
ANNUAL MEAN	107		62.1		116	
HIGHEST ANNUAL MEAN					262	1982
LOWEST ANNUAL MEAN					25.7	1984
HIGHEST DAILY MEAN	2,540	Mar 25	603	Apr 12	7,350	Jan 25, 1956
LOWEST DAILY MEAN	12	Nov 10	9.2	Feb 10	2.2	Oct 21, 1953
ANNUAL SEVEN-DAY MINIMUM	15	Nov 4	15	Feb 6	2.4	Oct 20, 1953
ANNUAL RUNOFF (AC-FT)	77,380		44,960		84,340	
10 PERCENT EXCEEDS	201		135		245	
50 PERCENT EXCEEDS	47		34		64	
90 PERCENT EXCEEDS	24		19		8.9	



HAWAII, ISLAND OF KAUAI

16071500 LEFT BRANCH OPAEKAA STREAM NEAR KAPAA

LOCATION.--Lat 22°04'44", long 159°23'55", Old Hawaiian Datum, 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.--43 years (water years 1961-2003), 2.51 ft³/s (1,820 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)
Oct 17	1345	*98	*2.59	Apr 2	0345	96	2.57

Minimum discharge, 0.46 ft³/s, on several days, gage height, 0.76 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

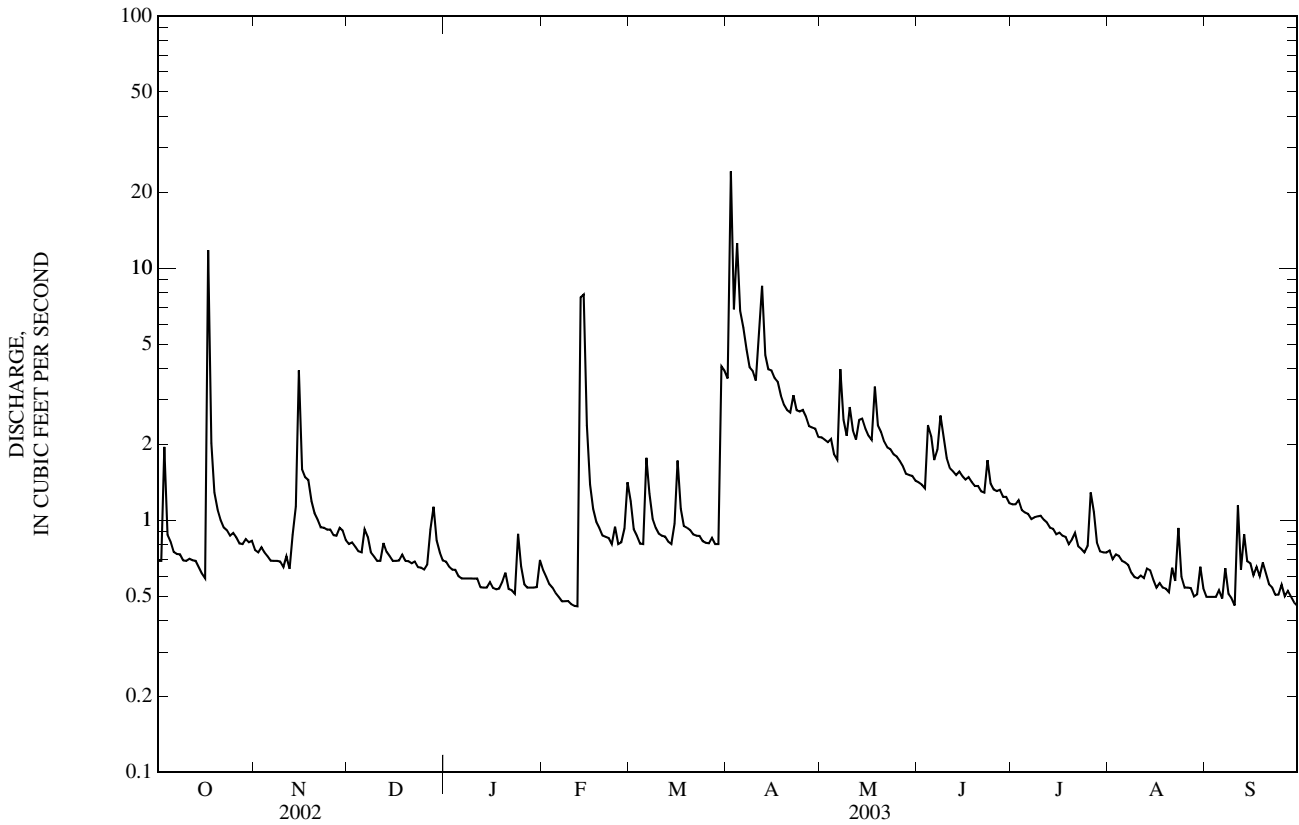
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.69	0.76	0.80	0.68	0.64	1.2	3.6	2.1	1.4	1.2	0.76	0.50
2	0.69	0.75	0.82	0.65	0.60	0.92	24	2.1	1.4	1.2	0.70	0.50
3	2.0	0.78	0.78	0.64	0.56	0.87	6.9	2.0	1.3	1.2	0.73	0.50
4	0.88	0.75	0.75	0.64	0.54	0.81	13	2.1	2.4	1.1	0.72	0.50
5	0.82	0.72	0.75	0.60	0.51	0.80	6.8	1.8	2.2	1.1	0.69	0.53
6	0.75	0.69	0.92	0.59	0.50	1.8	5.8	1.7	1.7	1.1	0.68	0.49
7	0.73	0.69	0.86	0.59	0.48	1.3	4.8	4.0	1.9	1.0	0.66	0.64
8	0.73	0.69	0.75	0.59	0.48	1.0	4.0	2.5	2.6	1.0	0.62	0.51
9	0.69	0.69	0.72	0.59	0.48	0.94	3.9	2.2	2.1	1.0	0.59	0.49
10	0.69	0.65	0.69	0.59	0.46	0.88	3.6	2.8	1.8	1.0	0.59	0.46
11	0.70	0.72	0.69	0.59	0.46	0.87	5.4	2.3	1.6	1.0	0.60	1.1
12	0.69	0.64	0.81	0.54	0.46	0.86	8.5	2.1	1.6	0.98	0.59	0.64
13	0.69	0.88	0.75	0.54	7.7	0.82	4.5	2.5	1.5	0.93	0.64	0.88
14	0.65	1.1	0.72	0.54	7.9	0.80	4.0	2.5	1.6	0.92	0.63	0.69
15	0.61	3.9	0.69	0.57	2.4	0.97	3.9	2.3	1.5	0.88	0.58	0.68
16	0.59	1.6	0.69	0.54	1.4	1.7	3.7	2.2	1.5	0.89	0.54	0.60
17	12	1.5	0.69	0.53	1.1	1.1	3.5	2.1	1.5	0.87	0.56	0.65
18	2.0	1.4	0.73	0.54	0.99	0.95	3.1	3.4	1.4	0.86	0.54	0.60
19	1.3	1.2	0.69	0.57	0.93	0.93	2.9	2.4	1.4	0.80	0.53	0.68
20	1.1	1.1	0.69	0.62	0.87	0.91	2.7	2.2	1.4	0.84	0.52	0.62
21	1.0	1.0	0.68	0.53	0.86	0.88	2.7	2.1	1.3	0.89	0.65	0.56
22	0.93	0.94	0.69	0.53	0.85	0.87	3.1	1.9	1.3	0.79	0.57	0.54
23	0.91	0.93	0.65	0.51	0.80	0.87	2.7	1.9	1.7	0.77	0.93	0.51
24	0.87	0.92	0.65	0.88	0.94	0.83	2.7	1.8	1.4	0.75	0.60	0.51
25	0.89	0.92	0.64	0.66	0.80	0.81	2.7	1.8	1.3	0.79	0.54	0.55
26	0.85	0.87	0.67	0.56	0.82	0.81	2.6	1.7	1.3	1.3	0.54	0.50
27	0.81	0.87	0.92	0.54	0.93	0.85	2.4	1.6	1.3	1.1	0.54	0.52
28	0.80	0.93	1.1	0.54	1.4	0.80	2.3	1.5	1.2	0.81	0.50	0.50
29	0.84	0.91	0.83	0.54	---	0.80	2.3	1.5	1.2	0.75	0.51	0.47
30	0.82	0.83	0.75	0.54	---	4.1	2.1	1.5	1.2	0.75	0.65	0.46
31	0.83	---	0.69	0.70	---	3.9	---	1.4	---	0.74	0.54	---
TOTAL	38.55	30.33	23.26	18.27	36.86	35.95	144.2	66.0	47.0	29.31	19.04	17.38
MEAN	1.24	1.01	0.75	0.59	1.32	1.16	4.81	2.13	1.57	0.95	0.61	0.58
MAX	12	3.9	1.1	0.88	7.9	4.1	24	4.0	2.6	1.3	0.93	1.1
MIN	0.59	0.64	0.64	0.51	0.46	0.80	2.1	1.4	1.2	0.74	0.50	0.46
AC-FT	76	60	46	36	73	71	286	131	93	58	38	34

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1960 - 2003, BY WATER YEAR (WY)

MEAN	2.13	3.71	3.61	3.10	2.50	2.75	3.11	2.73	1.78	1.64	1.57	1.49
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)	(1964)	(1992)	(1989)	(1994)	(1982)	(1982)	(1965)	(1980)	(1989)	(1982)	(1980)
MIN	0.42	0.59	0.56	0.58	0.50	0.50	0.73	0.62	0.29	0.59	0.36	0.38
(WY)	(1985)	(1964)	(1963)	(1977)	(1986)	(1978)	(1998)	(1966)	(1968)	(1968)	(1984)	(1975)

16071500 LEFT BRANCH OPAEKAA STREAM NEAR KAPAA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1960 - 2003	
ANNUAL TOTAL	804.99		506.15		2.51	
ANNUAL MEAN	2.21		1.39		5.72	
HIGHEST ANNUAL MEAN					1982	
LOWEST ANNUAL MEAN					1984	
HIGHEST DAILY MEAN	40	Mar 25	24	Apr 2	218	Dec 14, 1991
LOWEST DAILY MEAN	0.59	Oct 16	0.46	Feb 10	0.09	Sep 28, 1968
ANNUAL SEVEN-DAY MINIMUM	0.66	Oct 10	0.47	Feb 6	0.10	Jun 6, 1968
ANNUAL RUNOFF (AC-FT)	1,600		1,000		1,820	
10 PERCENT EXCEEDS	4.1		2.5		4.3	
50 PERCENT EXCEEDS	1.2		0.85		1.6	
90 PERCENT EXCEEDS	0.73		0.54		0.67	



HAWAII, ISLAND OF KAUAI

16097500 HALAULANI STREAM AT ALTITUDE 400 FT, NEAR KILAUEA

LOCATION.--Lat 22°10'54", long 159°25'17", Old Hawaiian Datum, 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.

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.--45 years (water years 1959-2003), 11.7 ft³/s (8,470 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 discharges 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)
Feb 13	1715	*1,380	*6.26	Jul 26	0200	610	4.50

Minimum discharge, 3.9 ft³/s, Sept. 28, 29, 30, gage height, 0.77 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

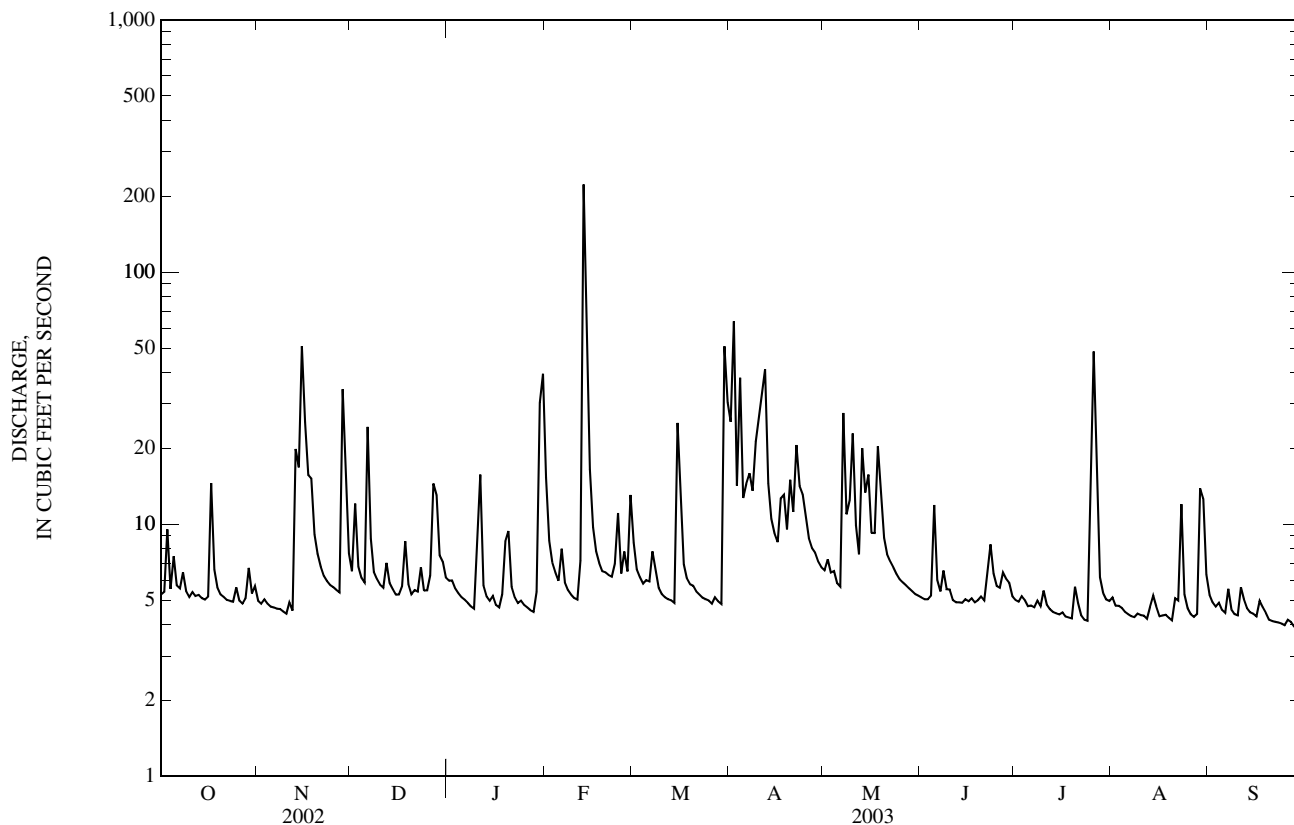
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.3	5.0	6.5	6.0	15	8.4	25	6.6	5.1	5.0	5.1	5.3
2	5.4	4.8	12	6.0	8.6	6.6	64	7.2	5.0	4.9	4.8	4.9
3	9.6	5.0	6.8	5.6	7.1	6.2	14	6.4	5.0	5.2	4.7	4.7
4	5.5	4.8	6.1	5.3	6.4	5.8	38	6.5	5.2	5.0	4.7	4.9
5	7.5	4.7	5.9	5.1	6.0	6.0	13	5.9	12	4.7	4.5	4.6
6	5.7	4.7	24	5.0	8.0	5.9	14	5.7	6.0	4.8	4.4	4.5
7	5.6	4.6	8.8	4.9	5.9	7.8	16	28	5.4	4.7	4.3	5.5
8	6.4	4.6	6.5	4.7	5.5	6.6	14	11	6.5	5.0	4.3	4.6
9	5.4	4.5	6.0	4.6	5.3	5.6	21	12	5.5	4.7	4.4	4.4
10	5.1	4.4	5.8	9.4	5.1	5.3	26	23	5.5	5.5	4.4	4.3
11	5.4	4.9	5.6	16	5.0	5.1	33	9.9	5.0	4.8	4.3	5.6
12	5.2	4.5	7.0	5.7	7.2	5.0	41	7.6	4.9	4.6	4.2	5.0
13	5.2	20	5.9	5.2	222	5.0	15	20	4.9	4.5	4.7	4.6
14	5.1	17	5.5	5.0	63	4.9	11	13	4.9	4.4	5.2	4.5
15	5.0	51	5.3	5.2	17	25	9.2	16	5.0	4.4	4.7	4.4
16	5.2	25	5.3	4.8	9.7	14	8.5	9.2	4.9	4.5	4.3	4.3
17	15	16	5.7	4.7	7.8	6.9	13	9.2	5.1	4.3	4.3	5.0
18	6.6	15	8.6	5.3	7.0	6.1	13	20	4.9	4.3	4.4	4.7
19	5.6	9.1	5.8	8.6	6.5	5.8	9.6	13	5.0	4.2	4.3	4.5
20	5.3	7.6	5.3	9.4	6.4	5.7	15	8.8	5.2	5.6	4.2	4.2
21	5.1	6.8	5.5	5.6	6.3	5.4	11	7.6	5.0	4.9	5.1	4.1
22	5.0	6.2	5.4	5.1	6.2	5.3	21	7.1	6.3	4.3	5.0	4.1
23	5.0	6.0	6.8	4.9	7.0	5.1	14	6.7	8.3	4.2	12	4.1
24	4.9	5.7	5.5	5.0	11	5.0	13	6.3	6.4	4.1	5.3	4.0
25	5.6	5.6	5.5	4.8	6.4	5.0	11	6.0	5.7	11	4.6	4.0
26	5.0	5.5	6.3	4.7	7.8	4.8	8.8	5.9	5.6	48	4.4	4.2
27	4.8	5.4	15	4.6	6.5	5.1	8.0	5.7	6.4	15	4.3	4.1
28	5.1	34	13	4.5	13	4.9	7.7	5.6	6.1	6.2	4.4	3.9
29	6.7	18	7.5	5.4	---	4.8	7.1	5.4	5.9	5.3	14	3.9
30	5.3	7.7	7.1	30	---	51	6.8	5.3	5.2	5.0	13	3.9
31	5.7	---	6.2	39	---	30	---	5.2	---	5.0	6.3	---
TOTAL	183.3	318.1	232.2	240.1	488.7	274.1	521.7	305.8	171.9	208.1	168.6	134.8
MEAN	5.91	10.6	7.49	7.75	17.5	8.84	17.4	9.86	5.73	6.71	5.44	4.49
MAX	15	51	24	39	222	51	64	28	12	48	14	5.6
MIN	4.8	4.4	5.3	4.5	5.0	4.8	6.8	5.2	4.9	4.1	4.2	3.9
AC-FT	364	631	461	476	969	544	1,030	607	341	413	334	267

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1958 - 2003, BY WATER YEAR (WY)

MEAN	10.1	16.1	13.7	11.7	11.3	13.1	14.8	12.0	8.46	11.0	10.1	8.22
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	4.38	4.27	5.05	3.95	3.93
(WY)	(1985)	(1977)	(1986)	(1986)	(1986)	(1995)	(1992)	(2000)	(1959)	(1975)	(1973)	(1975)

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

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1958 - 2003	
ANNUAL TOTAL	3,843.7		3,247.4			
ANNUAL MEAN	10.5		8.90		11.7	
HIGHEST ANNUAL MEAN					19.6	1982
LOWEST ANNUAL MEAN					7.01	1984
HIGHEST DAILY MEAN	179	May 12	222	Feb 13	879	Feb 13, 1994
LOWEST DAILY MEAN	4.4	Jan 17	3.9	Sep 28	1.9	Sep 5, 1968
ANNUAL SEVEN-DAY MINIMUM	4.6	Jan 12	4.0	Sep 24	2.4	Sep 2, 1968
ANNUAL RUNOFF (AC-FT)	7,620		6,440		8,470	
10 PERCENT EXCEEDS	16		15		20	
50 PERCENT EXCEEDS	6.4		5.5		7.3	
90 PERCENT EXCEEDS	5.0		4.4		4.6	



HAWAII, ISLAND OF KAUAI

16103000 HANAIEI RIVER NEAR HANAIEI

LOCATION.--Lat 22°11'01", long 159°28'08", Old Hawaiian Datum, Hydrologic Unit 20070000, on right bank 2.6 mi southeast of Hanalei School, and 4.9 mi upstream from mouth.

DRAINAGE AREA.--18.7 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. WDR HI-00-1: Drainage area.

GAGE.--Water stage recorder and crest-stage gage. Datum of gage is 60.0 ft above mean sea level (from topographic map). January 1, 1912 to November 20, 1919, nonrecording gage at site 0.3 mi downstream at different datum. January 26 to December 26, 1962, crest-stage gage at site 0.5 mi downstream at different datum. Water-stage recorder and crest-stage at site 0.5 mi downstream at different datum from December 27, 1962 to May 10, 2000.

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

AVERAGE DISCHARGE (since diversion to Hanalei tunnel ended).--11 years (water years 1993-2003), 199 ft³/s (144,100 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 26,600 ft³/s; minimum, 31 ft³/s, September 30, October 1, 2, 5, 12, 13, November 3, 1975.

EXTREMES FOR CURRENT YEAR.--Peak discharges 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)
Jul 26	0145	*24,600	*13.13	No other peak greater than base discharge.			

Minimum discharge, 62 ft³/s, Sept. 29, 30, gage height, 1.95 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

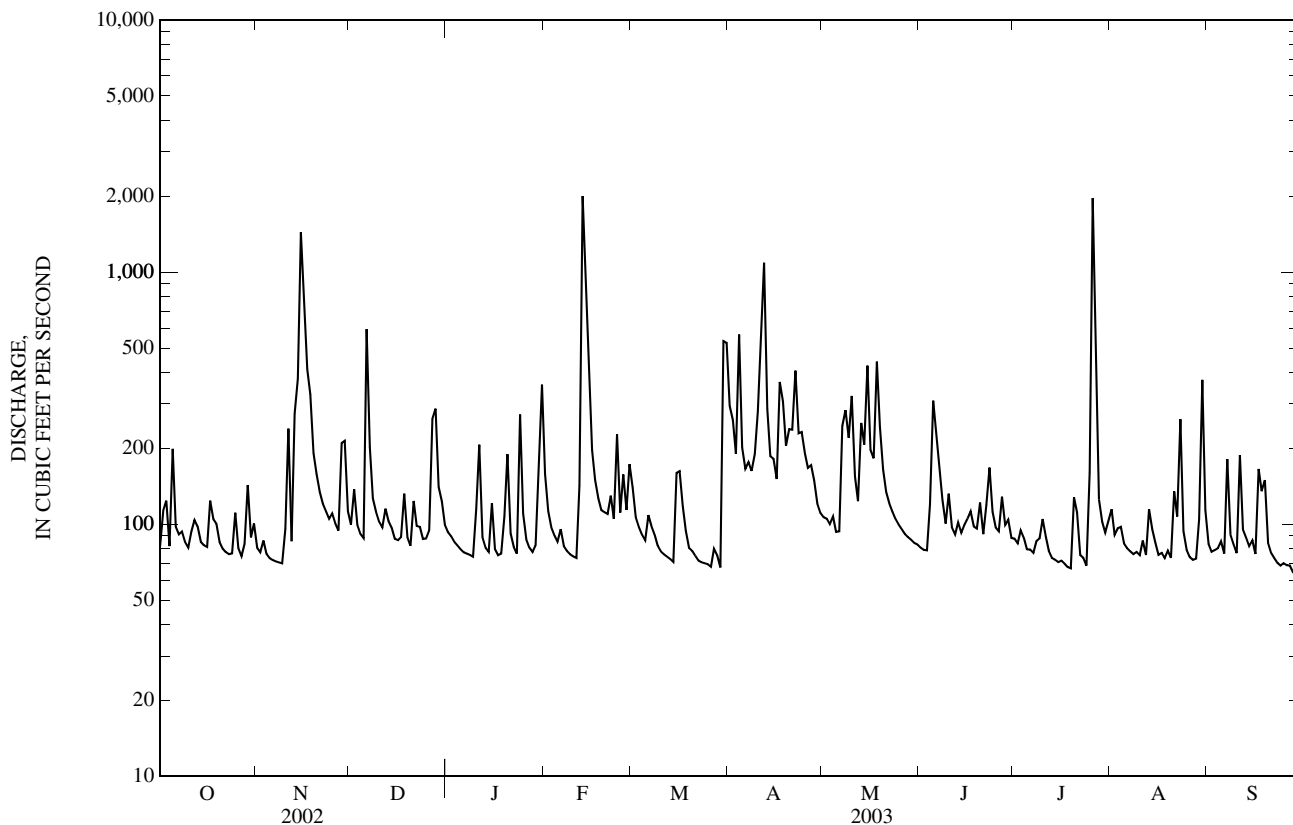
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	82	81	100	93	159	139	295	107	81	88	115	84
2	113	77	138	90	113	107	259	105	79	84	91	78
3	124	86	99	85	97	97	190	100	79	95	96	79
4	82	76	92	82	90	91	565	107	120	88	98	80
5	199	73	88	80	85	86	201	93	309	79	84	85
6	98	72	594	77	96	109	166	94	236	79	80	77
7	91	71	202	76	82	98	176	246	173	77	78	181
8	94	71	127	76	78	91	163	283	125	86	76	91
9	85	70	112	74	76	82	190	220	101	88	78	83
10	81	96	102	115	75	78	280	323	132	105	75	77
11	94	239	97	207	73	76	590	155	97	89	86	188
12	104	86	115	89	142	74	1,090	123	91	78	75	95
13	98	275	103	81	2,000	73	288	252	102	74	115	88
14	85	378	97	78	1,100	71	186	207	93	72	96	82
15	83	1,440	88	121	436	160	182	426	99	71	85	86
16	81	835	86	80	197	163	151	198	105	72	76	76
17	124	411	89	75	150	118	367	183	112	70	77	165
18	105	327	132	76	127	94	307	441	98	68	73	135
19	101	191	89	107	114	81	205	244	96	67	79	149
20	85	158	82	190	112	78	238	165	122	128	74	84
21	80	134	124	92	110	75	237	134	91	111	135	77
22	78	121	98	81	130	72	407	121	119	75	107	73
23	76	113	97	76	105	71	229	112	168	73	261	70
24	77	105	87	272	227	70	232	105	112	68	94	69
25	111	111	88	110	111	69	191	100	97	161	79	70
26	81	101	94	87	157	68	167	95	94	1,960	74	69
27	75	94	261	81	114	80	171	91	129	311	72	69
28	84	210	287	78	173	75	149	89	99	125	73	65
29	143	214	141	82	---	67	121	87	104	102	105	63
30	89	113	123	188	---	533	111	84	88	93	374	63
31	101	---	100	358	---	525	---	83	---	103	114	---
TOTAL	3,004	6,429	4,132	3,457	6,529	3,671	8,104	5,173	3,551	4,840	3,195	2,751
MEAN	96.9	214	133	112	233	118	270	167	118	156	103	91.7
MAX	199	1,440	594	358	2,000	533	1,090	441	309	1,960	374	188
MIN	75	70	82	74	73	67	111	83	79	67	72	63
AC-FT	5,960	12,750	8,200	6,860	12,950	7,280	16,070	10,260	7,040	9,600	6,340	5,460

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1993 - 2003, BY WATER YEAR (WY)

MEAN	191	273	236	222	199	176	236	180	160	180	151	185
MAX	304	599	459	458	392	439	370	418	251	247	199	523
(WY)	(1995)	(1996)	(1993)	(2002)	(1994)	(2002)	(1997)	(1997)	(1994)	(2000)	(1995)	(1994)
MIN	96.9	143	133	80.9	79.8	88.0	76.6	84.6	71.5	127	103	77.5
(WY)	(2003)	(1993)	(2003)	(2001)	(2000)	(1993)	(1993)	(1995)	(1993)	(2002)	(2003)	(1993)

16103000 HANAIEI RIVER NEAR HANAIEI—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1993 - 2003	
ANNUAL TOTAL	77,896		54,836		199	
ANNUAL MEAN	213		150		258	
HIGHEST ANNUAL MEAN					150	1997
LOWEST ANNUAL MEAN					7,100	2003
HIGHEST DAILY MEAN	4,880	Mar 25	2,000	Feb 13	54	Nov 9, 1995
LOWEST DAILY MEAN	70	Nov 9	63	Sep 29	57	Jul 8, 1993
ANNUAL SEVEN-DAY MINIMUM	74	Nov 3	67	Sep 24	57	Jul 3, 1993
ANNUAL RUNOFF (AC-FT)	154,500		108,800		144,100	
10 PERCENT EXCEEDS	339		248		360	
50 PERCENT EXCEEDS	122		97		129	
90 PERCENT EXCEEDS	86		74		79	



HAWAII, ISLAND OF KAUAI

16108000 WAINIHA RIVER NEAR HANAIEI

LOCATION.--Lat 22°08'20", long 159°33'38", Old Hawaiian Datum, 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. WRD HI-00-1: 1953-99 (P).

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.--48 years (water years 1953-55, 1959-2003), 137 ft³/s (99,330 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 20,200 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 discharges greater than base discharge of 3,600 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr 12	1100	*2,890	*5.09

Minimum discharge, 35 ft³/s, Mar. 14, 26, Sept. 29, 30, gage height, 1.08 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

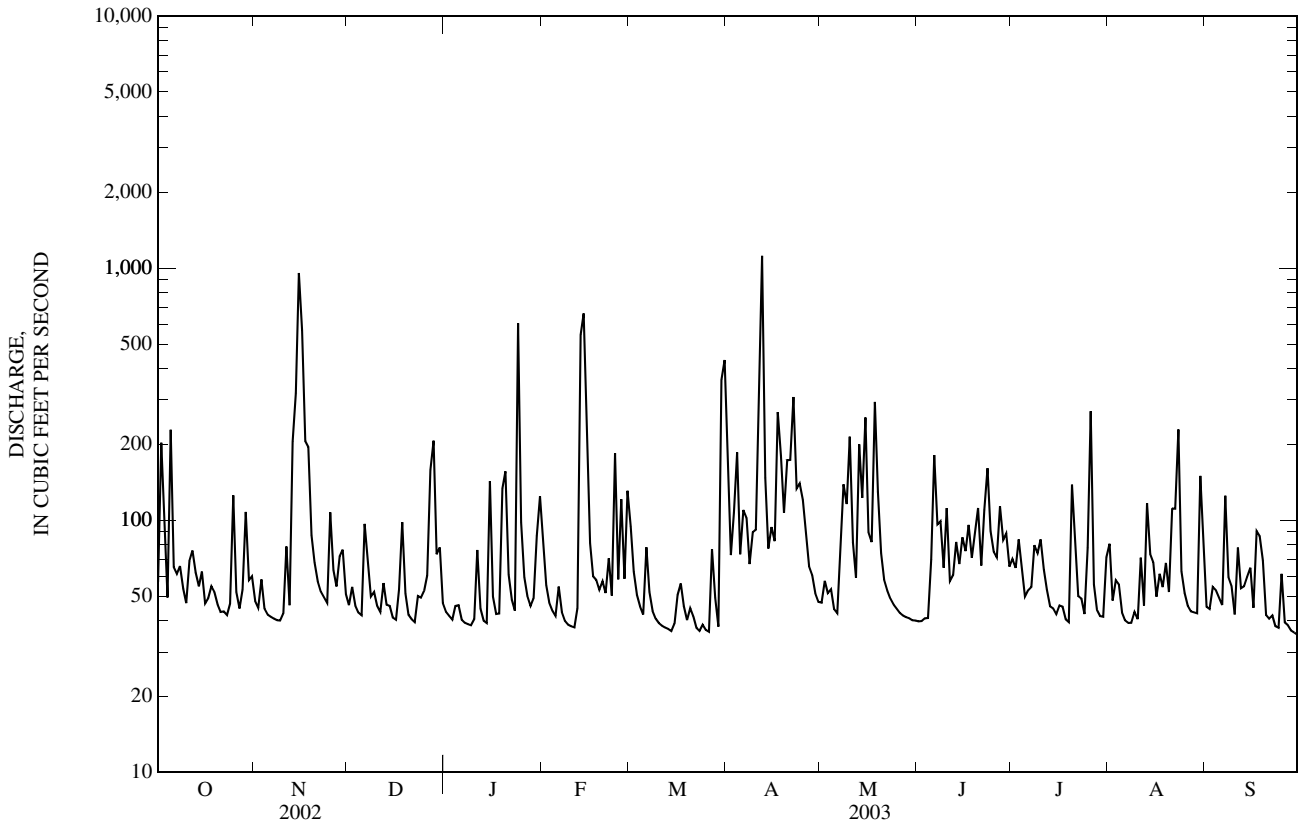
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	57	48	46	43	80	94	215	47	40	70	81	45
2	203	45	54	42	55	62	73	57	40	65	48	44
3	93	58	46	40	47	51	107	51	41	84	58	54
4	49	45	43	46	44	45	186	53	41	63	56	53
5	228	42	42	46	42	42	73	44	70	50	43	49
6	65	41	97	40	55	78	110	43	181	53	40	46
7	61	41	70	39	43	52	102	82	96	54	39	125
8	66	40	50	39	40	44	67	139	99	80	39	59
9	54	40	52	38	39	41	90	116	65	74	43	55
10	47	43	46	40	38	39	92	214	112	84	41	42
11	69	79	43	76	38	38	289	81	57	64	71	78
12	76	46	56	45	45	38	1,120	59	61	53	46	54
13	62	205	46	40	543	37	147	200	82	46	117	55
14	55	319	46	39	660	36	77	123	67	45	73	60
15	63	956	41	143	258	39	94	256	85	42	68	65
16	47	567	40	50	81	51	83	90	75	46	50	45
17	49	206	53	42	60	56	269	82	96	45	61	91
18	55	195	98	43	58	46	180	295	71	40	54	87
19	52	87	51	134	53	40	107	130	89	39	68	69
20	46	68	42	156	57	45	173	74	112	138	52	42
21	43	57	40	61	51	42	174	58	66	91	111	41
22	43	52	39	48	71	37	308	53	110	50	111	42
23	42	49	50	44	50	36	133	49	161	49	229	38
24	47	47	49	604	184	38	140	46	91	42	63	37
25	125	107	53	98	58	37	120	45	75	78	51	61
26	52	63	60	59	121	36	90	43	71	271	46	39
27	45	55	158	50	59	77	66	42	114	56	43	38
28	53	72	207	46	131	49	61	41	83	44	43	37
29	108	76	73	49	---	38	51	41	89	42	43	36
30	58	51	78	87	---	360	47	40	65	41	150	35
31	60	---	47	124	---	432	---	40	---	71	76	---
TOTAL	2,173	3,800	1,916	2,451	3,061	2,156	4,844	2,734	2,505	2,070	2,114	1,622
MEAN	70.1	127	61.8	79.1	109	69.5	161	88.2	83.5	66.8	68.2	54.1
MAX	228	956	207	604	660	432	1,120	295	181	271	229	125
MIN	42	40	39	38	38	36	47	40	40	39	39	35
AC-FT	4,310	7,540	3,800	4,860	6,070	4,280	9,610	5,420	4,970	4,110	4,190	3,220

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 2003, BY WATER YEAR (WY)

MEAN	114	185	165	144	142	164	175	122	102	130	113	94.2
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	62.9	44.0
(WY)	(1985)	(1964)	(1984)	(1986)	(1978)	(1970)	(1992)	(1966)	(1993)	(1984)	(1971)	(1993)

16108000 WAINIHA RIVER NEAR HANAIEI—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1952 - 2003	
ANNUAL TOTAL	39,997		31,446			
ANNUAL MEAN	110		86.2		137	
HIGHEST ANNUAL MEAN					243	1982
LOWEST ANNUAL MEAN					84.8	1984
HIGHEST DAILY MEAN	1,240	Mar 25	1,120	Apr 12	3,650	Nov 21, 1974
LOWEST DAILY MEAN	39	Dec 22	35	Sep 30	32	Oct 22, 1984
ANNUAL SEVEN-DAY MINIMUM	42	Nov 4	38	Mar 9	33	Oct 16, 1984
ANNUAL RUNOFF (AC-FT)	79,330		62,370		99,330	
10 PERCENT EXCEEDS	204		148		259	
50 PERCENT EXCEEDS	63		55		79	
90 PERCENT EXCEEDS	46		40		49	



HAWAII, ISLAND OF KAUAI

16114000 LIMAHULI STREAM NEAR WAINIHA

LOCATION.--Lat 22°13'15", long 159°34'48", Old Hawaiian Datum, 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 200 ft above mean sea level, by altimeter.

REMARKS.--Records computed by Clayton Yoshida. Records good except for discharge above 200 cfs which are poor. Limahuli Gardens diverts water through a 4-inch pipe, upstream of station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 985 ft³/s, December 11, 2000, gage height, 5.24 ft; minimum, 3.4 ft³/s, September 27-30, 2003.

EXTREMES FOR CURRENT YEAR.--Peak discharges 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)
Feb 13	1745	*450	*3.88	Apr 12	1030	392	3.68

Minimum discharge, 3.3 ft³/s, Sept. 8, 27, 28, 29, 30, gage height, 0.35 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

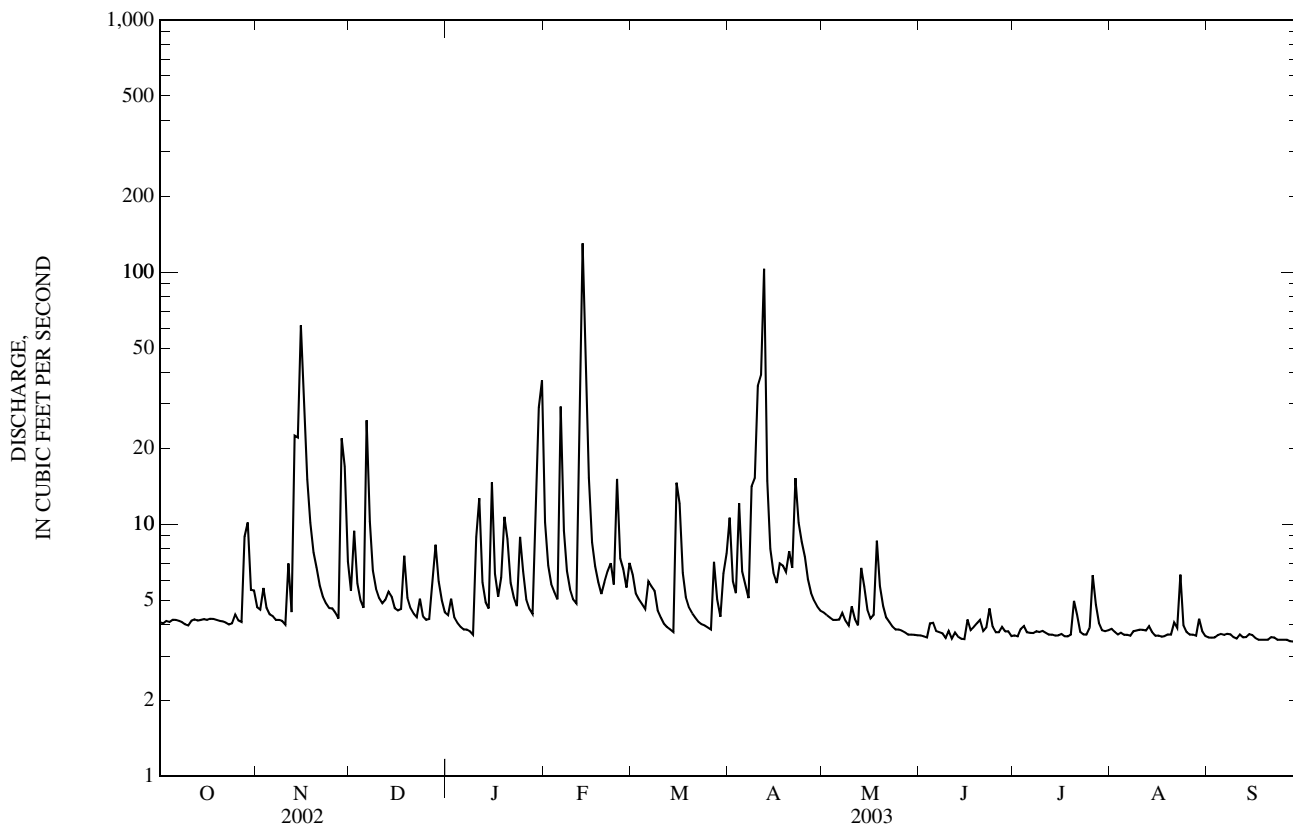
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.1	4.7	5.4	4.4	10	6.3	11	4.5	3.6	3.6	3.8	3.6
2	4.0	4.6	9.4	5.1	6.8	5.3	5.9	4.4	3.6	3.6	3.7	3.5
3	4.1	5.6	5.8	4.3	5.8	5.0	5.3	4.3	3.6	3.8	3.7	3.6
4	4.1	4.7	5.0	4.1	5.4	4.8	12	4.2	4.0	3.9	3.7	3.6
5	4.2	4.4	4.7	3.9	5.0	4.6	6.5	4.2	4.1	3.7	3.6	3.7
6	4.2	4.3	26	3.8	29	5.9	5.7	4.2	3.8	3.7	3.6	3.6
7	4.1	4.2	10	3.8	9.4	5.7	5.1	4.5	3.7	3.7	3.6	3.7
8	4.1	4.2	6.5	3.8	6.5	5.4	14	4.1	3.7	3.8	3.8	3.7
9	4.0	4.1	5.5	3.6	5.5	4.6	15	4.0	3.5	3.7	3.8	3.6
10	4.0	4.0	5.1	8.9	5.0	4.3	35	4.7	3.8	3.8	3.8	3.5
11	4.1	7.0	4.9	13	4.9	4.0	39	4.2	3.5	3.7	3.8	3.6
12	4.2	4.5	5.0	5.9	20	3.9	103	4.0	3.7	3.6	3.8	3.6
13	4.2	22	5.4	4.9	130	3.8	15	6.7	3.6	3.6	3.9	3.6
14	4.2	22	5.2	4.6	45	3.7	8.0	5.7	3.5	3.6	3.7	3.7
15	4.2	62	4.6	15	15	15	6.4	4.6	3.5	3.6	3.6	3.6
16	4.2	31	4.6	6.4	8.5	12	5.8	4.2	4.2	3.7	3.6	3.5
17	4.2	15	4.6	5.2	6.8	6.4	7.0	4.4	3.8	3.6	3.6	3.5
18	4.2	10	7.5	6.1	5.9	5.1	6.8	8.6	3.9	3.6	3.6	3.5
19	4.2	7.7	5.1	11	5.3	4.7	6.5	5.7	4.0	3.7	3.7	3.5
20	4.1	6.7	4.7	8.7	5.9	4.4	7.8	4.7	4.2	5.0	3.6	3.5
21	4.1	5.7	4.4	5.9	6.5	4.3	6.7	4.3	3.8	4.4	4.1	3.6
22	4.1	5.2	4.3	5.1	7.0	4.1	15	4.1	3.9	3.7	3.9	3.6
23	4.0	4.9	5.1	4.7	5.8	4.0	10	3.9	4.6	3.7	6.3	3.5
24	4.0	4.6	4.3	8.9	15	4.0	8.5	3.8	3.9	3.6	4.0	3.5
25	4.4	4.6	4.2	6.5	7.3	3.9	7.4	3.8	3.7	3.9	3.7	3.5
26	4.2	4.5	4.2	5.0	6.6	3.8	6.1	3.8	3.7	6.3	3.6	3.5
27	4.1	4.2	5.9	4.6	5.6	7.1	5.3	3.7	3.9	4.8	3.6	3.4
28	8.9	22	8.3	4.4	7.0	5.0	5.0	3.6	3.8	4.1	3.6	3.4
29	10	17	5.9	10	---	4.3	4.7	3.6	3.8	3.8	4.2	3.4
30	5.5	7.1	5.0	29	---	6.4	4.5	3.6	3.6	3.8	3.8	3.4
31	5.5	---	4.5	37	---	7.7	---	3.6	---	3.8	3.6	---
TOTAL	141.5	312.5	191.1	247.6	396.5	169.5	394.0	137.7	114.0	120.9	118.4	106.5
MEAN	4.56	10.4	6.16	7.99	14.2	5.47	13.1	4.44	3.80	3.90	3.82	3.55
MAX	10	62	26	37	130	15	103	8.6	4.6	6.3	6.3	3.7
MIN	4.0	4.0	4.2	3.6	4.9	3.7	4.5	3.6	3.5	3.6	3.6	3.4
AC-FT	281	620	379	491	786	336	781	273	226	240	235	211

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1995 - 2003, BY WATER YEAR (WY)

MEAN	6.67	9.32	10.7	9.95	9.16	7.63	13.2	9.19	6.86	7.13	6.77	6.19
MAX	9.62	12.5	14.5	23.8	14.2	15.7	32.6	22.4	12.2	9.28	9.84	9.32
(WY)	(1996)	(1996)	(2001)	(1997)	(2003)	(1997)	(1997)	(1997)	(1996)	(1998)	(1995)	(1996)
MIN	4.56	6.26	6.16	4.34	4.64	4.22	5.31	4.44	3.80	3.90	3.82	3.55
(WY)	(2003)	(2000)	(2003)	(2001)	(2000)	(2001)	(2002)	(2003)	(2003)	(2003)	(2003)	(2003)

16114000 LIMAHULI STREAM NEAR WAINIHA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1995 - 2003	
ANNUAL TOTAL	2,375.0		2,450.2		8.56	
ANNUAL MEAN	6.51		6.71		13.5	
HIGHEST ANNUAL MEAN					6.65	
LOWEST ANNUAL MEAN					202	
HIGHEST DAILY MEAN	62	Nov 15	130	Feb 13	238	Jan 4, 1997
LOWEST DAILY MEAN	3.9	Jun 29	3.4	Sep 27	3.4	Sep 27, 2003
ANNUAL SEVEN-DAY MINIMUM	4.0	Aug 15	3.4	Sep 24	3.4	Sep 24, 2003
ANNUAL RUNOFF (AC-FT)	4,710		4,860		6,200	
10 PERCENT EXCEEDS	11		9.6		13	
50 PERCENT EXCEEDS	4.6		4.3		6.1	
90 PERCENT EXCEEDS	4.1		3.6		4.2	



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", Old Hawaiian Datum, 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 H.A. Jeppesen. Records good.

AVERAGE DISCHARGE.--80 years (water years 1914-24, 1927-52, 1961-2003), 16.1 ft³/s (11,660 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)
Jul 26	0645	*1,360	*7.62	No other peak greater than base discharge.			

Minimum discharge, 0.38 ft³/s, Jan. 29, 30, Feb. 10, 11, gage height, 1.42 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

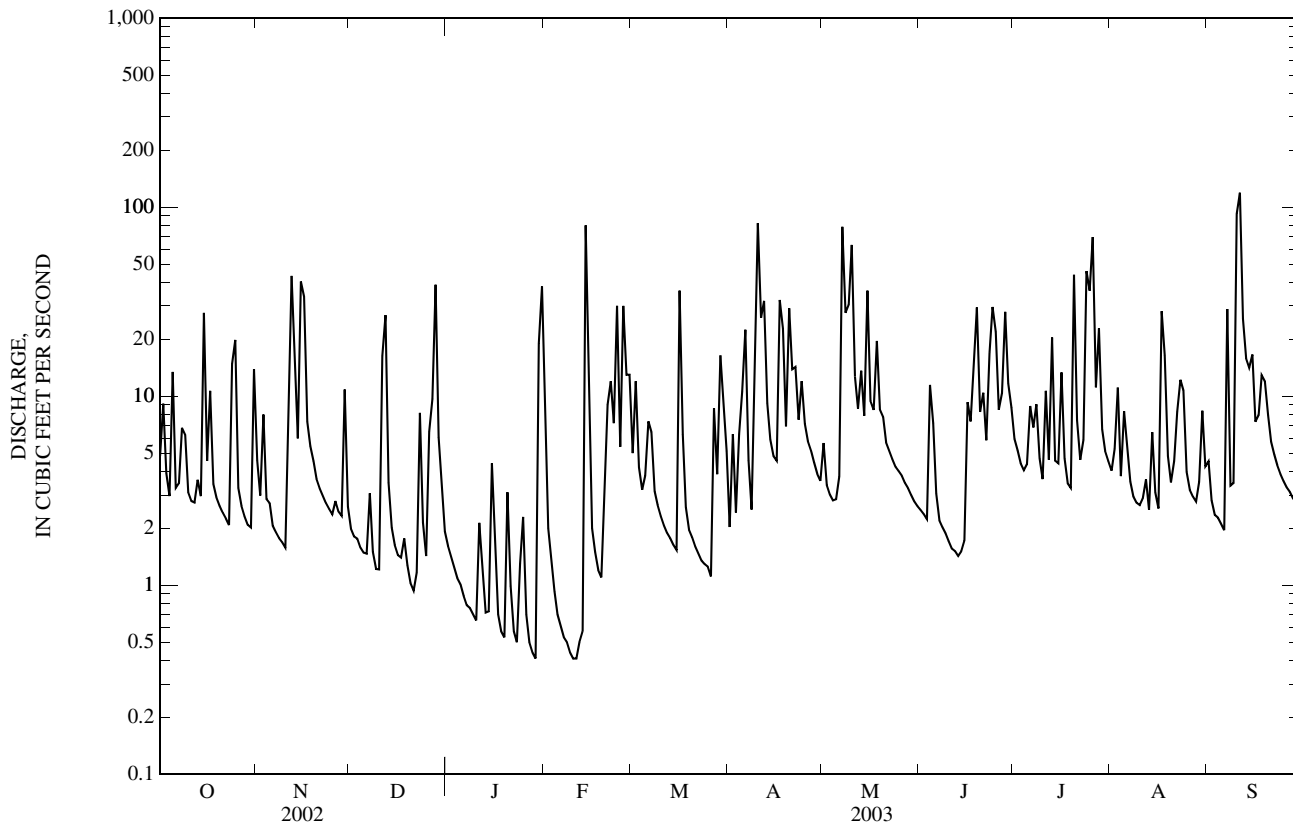
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.8	4.6	2.0	1.6	6.5	5.0	2.0	5.7	2.5	6.0	4.0	4.5
2	9.1	3.0	1.8	1.4	2.0	12	6.3	3.4	2.4	5.2	5.3	2.8
3	3.9	8.0	1.8	1.2	1.4	4.2	2.4	3.0	2.2	4.4	11	2.4
4	3.0	2.9	1.6	1.1	0.93	3.2	6.3	2.8	11	4.1	3.8	2.3
5	13	2.7	1.5	1.0	0.70	3.8	11	2.8	7.2	4.4	8.3	2.1
6	3.3	2.1	1.5	0.88	0.61	7.4	22	3.8	3.1	8.9	5.4	2.0
7	3.5	1.9	3.1	0.78	0.53	6.5	4.6	79	2.2	6.8	3.5	29
8	6.8	1.8	1.5	0.76	0.50	3.1	2.5	28	2.0	9.1	2.9	3.4
9	6.3	1.7	1.2	0.70	0.44	2.7	24	30	1.9	4.7	2.7	3.5
10	3.1	1.6	1.2	0.65	0.41	2.3	82	63	1.7	3.6	2.7	92
11	2.8	4.9	16	2.1	0.41	2.1	26	13	1.6	11	2.9	119
12	2.7	43	27	1.3	0.50	1.9	32	8.6	1.5	4.6	3.6	26
13	3.6	15	3.5	0.72	0.57	1.8	9.2	14	1.4	20	2.5	16
14	3.0	6.0	2.0	0.73	80	1.6	5.9	7.9	1.5	4.6	6.5	14
15	28	40	1.6	4.4	20	1.5	4.8	36	1.7	4.4	3.1	17
16	4.5	34	1.4	1.8	2.0	36	4.6	9.4	9.3	13	2.5	7.3
17	11	7.3	1.4	0.70	1.5	6.3	32	8.5	7.4	4.7	28	7.9
18	3.4	5.4	1.8	0.57	1.2	2.6	23	20	14	3.5	16	13
19	2.9	4.5	1.3	0.53	1.1	2.0	6.9	8.5	29	3.3	4.8	12
20	2.6	3.6	1.0	3.1	3.5	1.8	29	7.8	8.2	44	3.5	7.9
21	2.4	3.2	0.94	0.99	9.0	1.6	14	5.7	10	7.5	4.5	5.7
22	2.3	3.0	1.2	0.57	12	1.5	14	5.1	5.8	4.6	8.3	4.9
23	2.1	2.7	8.2	0.50	7.2	1.4	7.5	4.6	17	5.9	12	4.3
24	15	2.5	2.1	1.3	30	1.3	12	4.2	30	46	11	3.9
25	20	2.4	1.4	2.3	5.4	1.3	7.1	4.0	22	36	4.0	3.6
26	3.3	2.8	6.5	0.70	30	1.1	5.8	3.8	8.5	69	3.2	3.3
27	2.6	2.5	9.7	0.50	13	8.6	5.1	3.5	10	11	2.9	3.1
28	2.3	2.3	39	0.44	13	3.9	4.4	3.3	28	23	2.8	2.9
29	2.1	11	6.1	0.41	---	16	3.9	3.0	12	6.7	3.5	2.7
30	2.0	2.6	3.1	19	---	9.1	3.6	2.8	8.7	5.1	8.4	2.6
31	14	---	1.9	38	---	5.1	---	2.6	---	4.5	4.3	---
TOTAL	189.4	229.0	154.34	90.73	244.40	158.7	413.9	397.8	263.8	389.6	187.9	421.1
MEAN	6.11	7.63	4.98	2.93	8.73	5.12	13.8	12.8	8.79	12.6	6.06	14.0
MAX	28	43	39	38	80	36	82	79	30	69	28	119
MIN	2.0	1.6	0.94	0.41	0.41	1.1	2.0	2.6	1.4	3.3	2.5	2.0
AC-FT	376	454	306	180	485	315	821	789	523	773	373	835

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1913 - 2003, BY WATER YEAR (WY)

MEAN	13.1	17.3	14.9	14.5	12.5	18.4	19.6	16.2	13.4	18.3	17.9	15.0
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	0.36	0.40	0.28	1.39	0.67	2.63	4.22	1.81	1.95
(WY)	(1985)	(1934)	(1990)	(1986)	(1986)	(1983)	(1966)	(1992)	(1951)	(1951)	(1971)	(1975)

16200000 NORTH FORK KAUKONAHUA STREAM ABOVE RIGHT BRANCH, NEAR WAHIAWA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1913 - 2003	
ANNUAL TOTAL	5,199.74		3,140.67		16.1	
ANNUAL MEAN	14.2		8.60		8.60	
HIGHEST ANNUAL MEAN					29.5	1932
LOWEST ANNUAL MEAN					8.60	2003
HIGHEST DAILY MEAN	583	May 6	119	Sep 11	975	Feb 27, 1935
LOWEST DAILY MEAN	0.94	Dec 21	0.41	Jan 29	0.12	Mar 13, 1941
ANNUAL SEVEN-DAY MINIMUM	1.2	Apr 10	0.48	Feb 7	0.13	Mar 5, 1986
ANNUAL RUNOFF (AC-FT)	10,310		6,230		11,660	
10 PERCENT EXCEEDS	32		22		36	
50 PERCENT EXCEEDS	5.4		3.8		7.1	
90 PERCENT EXCEEDS	1.9		1.2		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", Old Hawaiian Datum, 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 H.A. Jeppesen. Records good except for estimated day which is poor. Prior to 1960, water was diverted from reservoirs upstream of station for use at Schofield Barracks.

AVERAGE DISCHARGE.--41 years (water years 1961-62, 1965-2003), 20.8 ft³/s (15,030 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)
Sep 11	0500	*888	*4.62

Minimum discharge, 0.00 ft³/s, Feb. 12, 13, gage height, 1.03 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.9	7.9	2.3	1.0	14	6.2	2.5	3.6	1.0	11	5.8	3.6
2	2.7	2.9	1.8	0.79	4.0	3.2	1.1	4.6	1.1	8.4	5.2	4.7
3	2.5	7.0	1.5	0.64	1.8	4.4	0.73	3.2	1.1	6.9	11	3.0
4	2.9	3.9	1.3	0.55	1.0	2.0	2.4	2.7	7.0	6.0	6.7	2.6
5	3.7	3.0	1.2	0.50	0.67	2.8	2.7	2.3	21	5.3	4.6	3.3
6	3.8	2.0	1.1	0.45	0.49	4.0	22	3.2	6.0	9.9	14	4.0
7	2.0	1.3	1.8	0.41	0.36	13	9.6	20	3.0	7.2	4.8	44
8	2.6	1.1	2.3	0.30	0.26	5.5	2.2	23	9.2	13	3.9	8.2
9	2.6	0.92	1.3	0.29	0.20	2.4	7.7	13	3.7	10	3.9	3.9
10	2.1	0.81	1.0	0.30	0.12	1.4	99	52	1.5	6.6	3.7	3.2
11	1.5	0.93	0.92	0.33	0.07	1.0	41	11	1.0	5.2	3.7	251
12	1.5	24	7.6	0.28	0.01	0.81	20	5.3	1.3	6.6	3.3	38
13	1.6	43	5.1	0.24	0.00	0.68	11	4.2	1.3	17	3.2	26
14	1.4	6.6	1.8	0.66	129	0.63	4.7	4.1	1.1	7.6	15	22
15	41	65	1.1	1.2	18	0.52	3.5	10	2.3	5.4	9.0	12
16	5.7	79	0.84	4.6	4.0	23	3.4	7.0	18	9.3	4.6	9.6
17	8.4	14	0.78	1.2	2.0	15	13	3.5	e13	8.4	24	8.4
18	4.1	8.1	0.90	0.63	1.3	2.7	22	8.2	21	4.3	29	9.7
19	2.4	6.4	0.80	0.44	0.89	1.5	7.9	4.6	18	3.5	8.7	13
20	1.8	4.9	0.68	1.9	1.1	0.90	52	3.1	17	39	5.3	9.3
21	1.4	3.9	0.58	2.8	7.1	0.69	22	2.2	9.2	16	7.4	7.7
22	1.6	3.3	0.51	0.99	12	0.55	25	1.7	9.1	6.2	7.9	6.2
23	1.6	2.9	9.5	0.58	4.7	0.42	13	1.5	11	4.7	14	5.0
24	6.0	2.6	3.6	0.47	23	0.37	15	1.3	26	4.2	18	4.7
25	21	2.3	1.4	1.1	5.4	0.34	11	1.2	24	75	8.0	4.1
26	3.9	3.8	0.92	1.9	8.3	0.29	7.4	1.1	10	94	5.2	3.8
27	2.1	4.4	24	0.78	7.2	5.6	6.1	0.97	11	16	4.4	4.0
28	1.6	2.8	28	0.45	11	6.0	5.1	0.87	42	31	3.9	4.6
29	1.2	9.5	7.1	0.30	---	7.0	4.4	0.82	23	12	3.5	4.7
30	1.1	4.4	2.6	0.26	---	14	3.9	0.83	20	7.2	4.7	4.6
31	11	---	1.5	102	---	7.2	---	0.83	---	6.5	4.0	---
TOTAL	148.7	322.66	115.83	128.34	257.97	134.10	441.33	201.92	333.9	463.4	250.4	528.9
MEAN	4.80	10.8	3.74	4.14	9.21	4.33	14.7	6.51	11.1	14.9	8.08	17.6
MAX	41	79	28	102	129	23	99	52	42	94	29	251
MIN	1.1	0.81	0.51	0.24	0.00	0.29	0.73	0.82	1.0	3.5	3.2	2.6
AC-FT	295	640	230	255	512	266	875	401	662	919	497	1,050

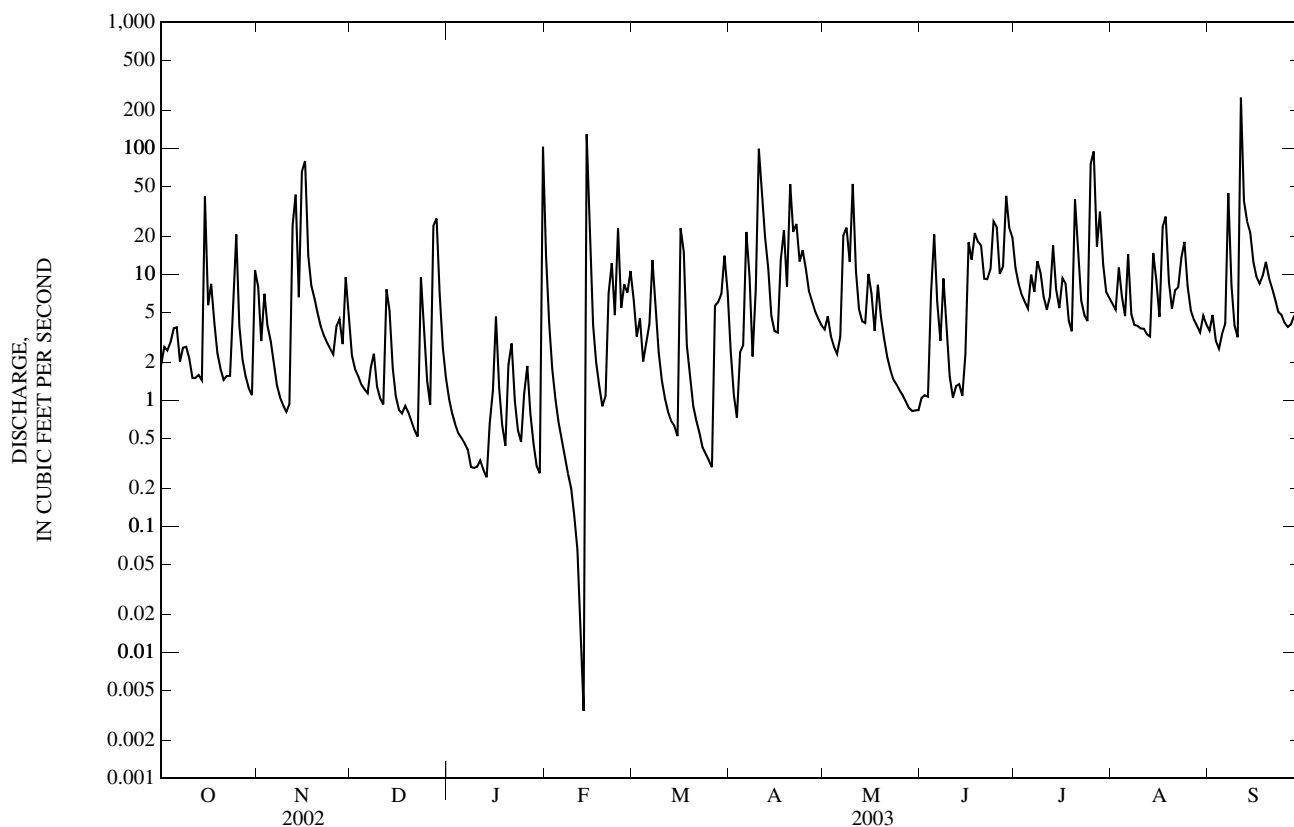
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1961 - 2003, BY WATER YEAR (WY)

MEAN	16.9	27.0	21.6	20.0	16.2	24.9	29.0	20.5	16.8	25.2	17.9	14.4
MAX	38.0	107	61.7	55.2	99.7	104	90.1	64.9	46.1	60.9	53.7	35.7
(WY)	(1967)	(1966)	(1988)	(1989)	(1969)	(1980)	(1963)	(1963)	(1987)	(1989)	(1967)	(1990)
MIN	0.32	3.54	2.07	0.38	0.11	0.66	2.45	0.51	3.40	4.25	3.04	1.43
(WY)	(1985)	(1963)	(1990)	(1986)	(1986)	(1983)	(1992)	(1992)	(1968)	(1968)	(1971)	(1975)

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

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1961 - 2003	
ANNUAL TOTAL	6,015.49		3,327.45			
ANNUAL MEAN	16.5		9.12		20.8	
HIGHEST ANNUAL MEAN					37.2	1982
LOWEST ANNUAL MEAN					9.12	2003
HIGHEST DAILY MEAN	942	May 6	251	Sep 11	1,050	Feb 1, 1969
LOWEST DAILY MEAN	0.51	Dec 22	0.00	Feb 13	0.00	Dec 24, 1960
ANNUAL SEVEN-DAY MINIMUM	0.73	Dec 16	0.15	Feb 7	0.00	Jan 19, 1977
ANNUAL RUNOFF (AC-FT)	11,930		6,600		15,030	
10 PERCENT EXCEEDS	32		21		47	
50 PERCENT EXCEEDS	5.1		4.0		8.8	
90 PERCENT EXCEEDS	1.7		0.67		1.8	

e Estimated



HAWAII, ISLAND OF OAHU

16211600 MAKAHA STREAM NEAR MAKAHA

LOCATION.--Lat 21°30'16", long 158°10'59", Old Hawaiian Datum, Hydrologic Unit 20060000, on right bank, 0.8 mi northeast of Kaneaki Heiau, and 2.9 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 V.E. Kunishige. Records good, except for estimated days 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.--44 years (water years 1960-2003), 1.70 ft³/s (1,230 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)
Feb 14	0500	*73	*2.28

Minimum discharge, no flow on many days.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	0.00	0.39	0.00	5.5	0.52	4.3	0.23	0.00	0.00	0.00	0.00
2	0.00	0.00	0.89	0.00	2.9	0.50	2.6	0.25	0.00	0.00	0.00	0.00
3	0.00	0.00	0.66	0.00	1.7	0.47	1.7	0.22	0.00	0.00	0.00	0.00
4	0.00	0.00	0.41	0.00	1.2	0.41	4.3	0.20	0.00	0.00	0.00	0.00
5	0.00	0.00	0.34	0.00	1.0	0.36	2.8	0.16	0.00	0.00	0.00	0.00
6	0.00	0.00	0.25	0.00	0.94	0.35	3.1	0.14	0.00	0.00	0.00	0.00
7	0.00	0.00	0.11	0.00	0.97	0.30	4.9	0.11	0.00	0.00	0.00	0.00
8	0.00	0.00	0.02	0.00	0.85	0.28	2.9	0.09	0.00	0.00	0.00	0.00
9	0.00	0.00	0.02	0.00	0.75	0.45	2.1	0.10	0.00	0.00	0.00	0.00
10	0.00	0.00	0.04	0.00	0.62	0.35	1.8	0.09	0.00	0.00	0.00	0.00
11	0.00	0.00	0.02	1.6	0.48	0.27	1.7	0.09	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.84	0.40	0.19	1.5	0.08	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.76	0.37	0.14	1.4	0.07	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	4.4	14	0.11	1.2	0.05	0.00	0.00	0.00	0.00
15	0.00	2.8	0.00	10	6.2	0.10	1.0	0.04	0.00	0.00	0.00	0.00
16	0.00	5.8	0.00	3.6	3.2	0.09	0.93	0.03	0.00	0.00	0.00	0.00
17	0.17	1.5	0.00	1.8	1.8	0.32	0.83	0.03	0.00	0.00	0.00	0.00
18	0.00	0.89	0.00	1.1	1.2	0.48	0.76	0.02	0.00	0.00	0.00	0.00
19	0.00	0.73	0.00	0.95	0.96	0.50	0.74	0.02	0.00	0.00	0.00	0.00
20	0.00	0.65	0.00	4.3	0.88	0.54	0.70	0.01	0.00	0.00	0.00	0.00
21	0.00	0.55	0.00	e2.7	0.83	0.47	0.59	0.00	0.00	0.00	0.00	0.00
22	0.00	0.39	0.00	e1.7	1.5	0.38	0.56	0.00	0.00	0.00	0.00	0.00
23	0.02	0.24	0.00	e1.3	0.92	0.28	0.57	0.00	0.00	0.00	0.00	0.00
24	0.00	0.07	0.00	e1.1	0.76	0.22	0.61	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	e2.3	0.71	0.19	0.53	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	e1.6	0.65	0.16	0.47	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	e1.2	0.55	1.4	0.41	0.00	0.00	0.00	0.00	0.00
28	0.00	1.1	0.00	e0.97	0.50	2.7	0.37	0.00	0.00	0.00	0.00	0.00
29	0.00	3.9	0.00	e0.81	---	1.2	0.33	0.00	0.00	0.00	0.00	0.00
30	0.00	0.63	0.00	4.8	---	11	0.28	0.00	0.00	0.00	0.00	0.00
31	0.00	---	0.00	12	---	9.5	---	0.00	---	0.00	0.00	---
TOTAL	0.19	19.25	3.15	59.83	52.34	34.23	45.98	2.03	0.00	0.00	0.00	0.00
MEAN	0.006	0.64	0.10	1.93	1.87	1.10	1.53	0.065	0.000	0.000	0.000	0.000
MAX	0.17	5.8	0.89	12	14	11	4.9	0.25	0.00	0.00	0.00	0.00
MIN	0.00	0.00	0.00	0.00	0.37	0.09	0.28	0.00	0.00	0.00	0.00	0.00
AC-FT	0.4	38	6.2	119	104	68	91	4.0	0.00	0.00	0.00	0.00

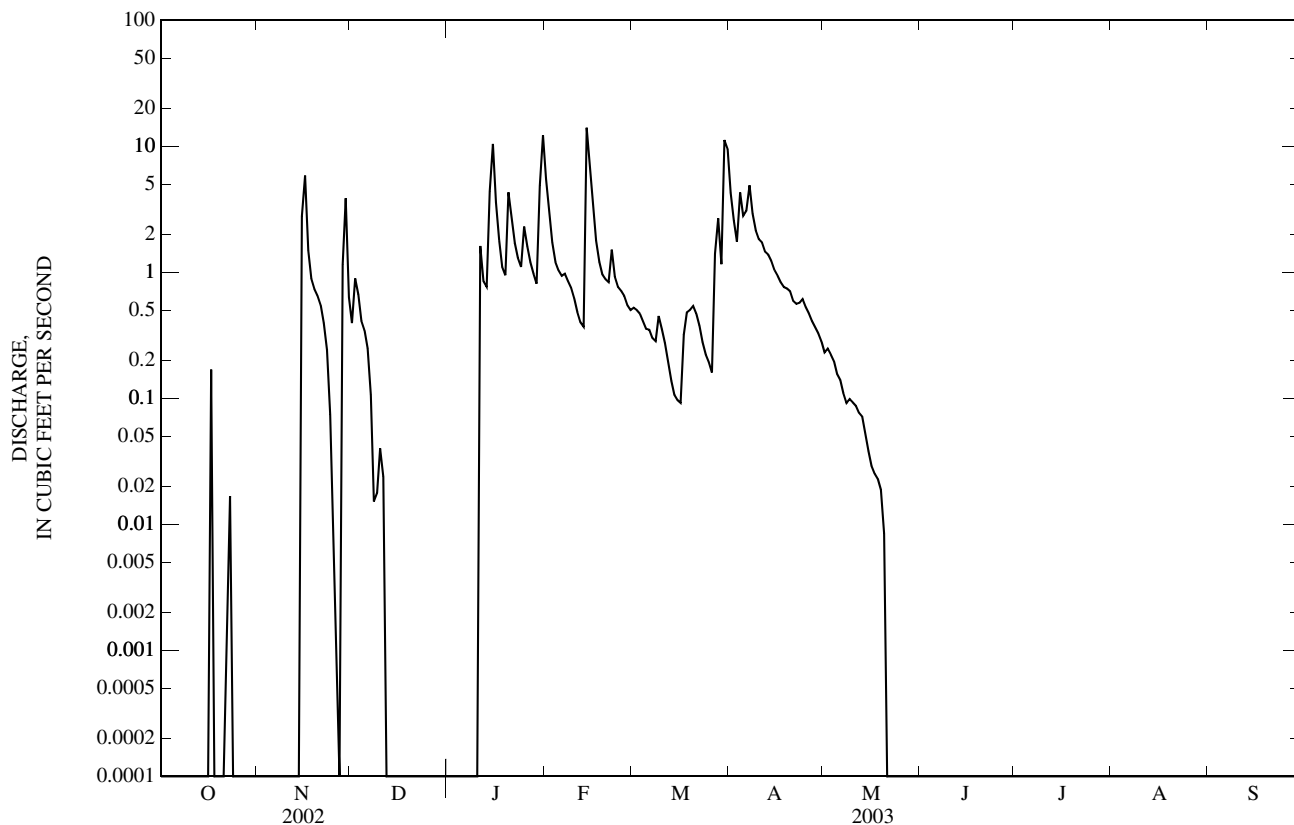
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1960 - 2003, BY WATER YEAR (WY)

MEAN	0.66	1.82	2.67	3.93	3.06	2.96	2.42	1.32	0.56	0.44	0.30	0.33
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	0.000	0.000	0.038	0.002	0.000	0.11	0.13	0.065	0.000	0.000	0.000	0.000
(WY)	(1976)	(1995)	(1995)	(2001)	(2001)	(2001)	(1993)	(2003)	(2000)	(2000)	(1995)	(1961)

16211600 MAKAHA STREAM NEAR MAKAHA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1960 - 2003	
ANNUAL TOTAL	264.92		217.00			
ANNUAL MEAN	0.73		0.59		1.70	
HIGHEST ANNUAL MEAN					4.58 1997	
LOWEST ANNUAL MEAN					0.073 2001	
HIGHEST DAILY MEAN	80	Mar 17	14	Feb 14	283	Feb 7, 1976
LOWEST DAILY MEAN	0.00	Jan 20	0.00	Oct 1	0.00	Sep 25, 1960
ANNUAL SEVEN-DAY MINIMUM	0.00	May 26	0.00	Oct 1	0.00	Aug 28, 1961
ANNUAL RUNOFF (AC-FT)	525		430		1,230	
10 PERCENT EXCEEDS	1.1		1.5		3.3	
50 PERCENT EXCEEDS	0.00		0.00		0.50	
90 PERCENT EXCEEDS	0.00		0.00		0.00	

e Estimated



HAWAII, ISLAND OF OAHU

16212800 KIPAPA STREAM NEAR WAHIAWA

LOCATION.--Lat 21°28'13", long 157°57'40", Old Hawaiian Datum, 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 V.E. Kunishige. Records good except for estimated period which is 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.--46 years (water years 1958-2003), 10.4 ft³/s (7,560 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)
Jul 25	0030	*1,830	*8.59	Jul 26	0745	980	7.00

Minimum discharge, 0.01 ft³/s, Nov. 10, gage height, 1.83 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.39	2.8	0.99	0.45	e5.0	e1.3	e3.5	2.6	0.20	1.2	1.6	0.26
2	0.58	0.90	0.60	0.32	e2.0	e1.0	e2.1	2.1	0.22	0.77	1.2	0.22
3	0.77	0.65	0.48	0.24	e1.0	e0.80	e1.7	1.0	0.24	0.58	1.6	0.44
4	1.2	0.43	0.38	0.21	e0.80	e0.90	e2.5	0.77	1.1	0.53	2.1	0.26
5	0.67	0.25	0.27	0.20	e0.70	e1.0	e2.5	0.67	6.1	0.43	1.0	0.21
6	0.43	0.16	0.25	0.21	e0.60	e8.0	e1.9	0.72	1.3	0.57	6.3	0.24
7	0.44	0.12	2.9	0.22	e0.70	e7.5	e10	1.5	1.7	0.59	1.5	7.2
8	0.28	0.10	1.3	0.14	e0.70	e3.0	2.8	5.4	1.3	0.51	0.81	2.6
9	0.21	0.06	0.50	0.09	e0.60	e1.7	15	3.6	0.65	0.43	0.71	0.84
10	0.13	0.02	0.28	0.08	e0.50	e1.2	63	15	0.42	0.43	0.69	4.4
11	0.13	0.05	0.23	0.12	e0.50	e1.1	27	4.3	0.32	0.26	0.68	177
12	0.11	19	12	0.13	e0.60	e1.0	27	1.9	0.28	0.23	0.70	18
13	0.13	22	3.9	0.26	e0.50	e1.0	11	1.3	0.28	0.37	0.60	13
14	0.13	3.0	1.1	0.35	e45	e1.0	5.3	1.2	0.34	0.19	0.50	5.7
15	52	25	0.57	3.4	e10	e0.90	3.7	4.9	0.39	0.25	0.84	4.9
16	3.0	40	0.36	3.2	e3.5	e6.0	3.1	3.3	0.30	0.17	0.99	3.0
17	8.1	7.7	0.30	0.78	e1.8	e13	4.4	1.3	0.35	0.24	0.72	2.2
18	2.2	3.6	0.44	0.41	e1.0	e2.8	4.3	0.97	2.4	0.50	1.2	2.1
19	1.0	2.3	0.41	0.25	e0.60	e1.6	2.5	0.83	2.3	0.20	1.7	2.6
20	0.62	1.6	0.27	1.7	e0.40	e1.1	9.6	0.65	2.3	9.2	0.93	1.4
21	0.39	1.1	0.21	1.6	e0.50	e1.1	8.2	0.54	1.4	4.4	0.74	1.6
22	0.26	0.81	0.19	e0.20	e0.70	e1.0	8.8	0.44	0.81	1.1	2.0	1.5
23	0.21	0.63	0.37	e0.30	e1.2	e0.90	5.2	0.39	0.61	0.49	2.9	1.4
24	0.36	0.52	0.54	e1.7	e0.80	e1.0	4.3	0.36	1.2	0.32	2.1	0.99
25	2.9	0.48	0.45	e0.60	e1.1	e0.90	3.0	0.34	2.8	84	1.7	0.72
26	1.4	5.6	0.44	e0.50	e1.6	e0.90	2.2	0.32	2.2	86	0.71	0.55
27	0.54	3.0	2.2	e0.60	e1.9	e8.0	1.7	0.27	1.0	16	0.43	0.48
28	0.28	1.3	18	e0.40	e1.6	e4.0	1.4	0.24	4.8	20	0.26	0.47
29	0.17	7.5	4.1	e0.30	---	e2.3	1.3	0.21	7.0	6.5	0.19	0.41
30	0.12	2.6	1.4	e0.30	---	e17	1.1	0.21	2.2	3.1	0.20	0.34
31	0.95	---	0.70	e18	---	e6.5	---	0.20	---	2.1	0.31	---
TOTAL	80.10	153.28	56.13	37.26	85.90	99.50	240.1	57.53	46.51	241.66	37.91	255.03
MEAN	2.58	5.11	1.81	1.20	3.07	3.21	8.00	1.86	1.55	7.80	1.22	8.50
MAX	52	40	18	18	45	17	63	15	7.0	86	6.3	177
MIN	0.11	0.02	0.19	0.08	0.40	0.80	1.1	0.20	0.20	0.17	0.19	0.21
AC-FT	159	304	111	74	170	197	476	114	92	479	75	506

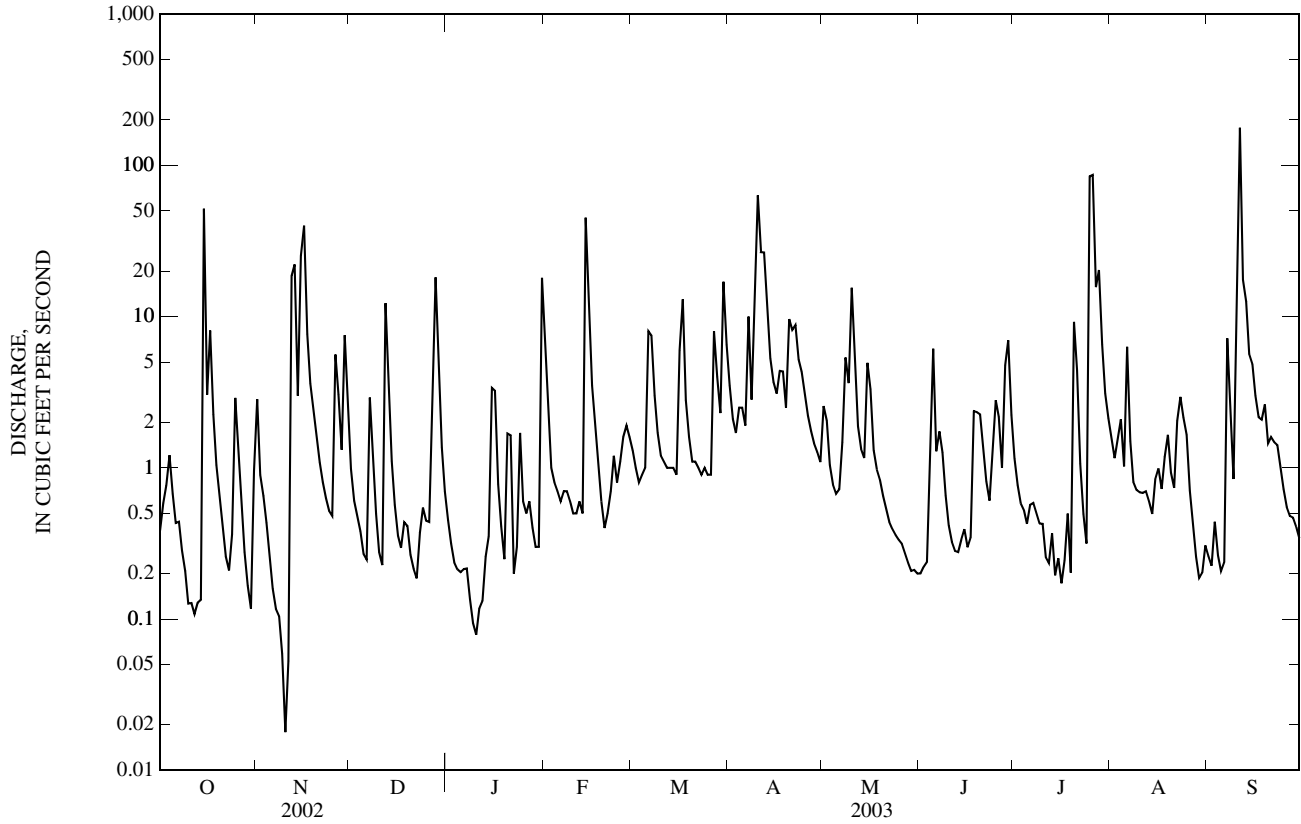
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1957 - 2003, BY WATER YEAR (WY)

MEAN	9.53	14.4	12.1	11.2	9.61	15.2	14.5	9.27	5.54	9.58	7.86	5.86
MAX	49.6	61.8	42.2	32.1	54.4	98.4	60.9	39.4	21.9	28.1	37.5	23.6
(WY)	(1982)	(1966)	(1988)	(1989)	(1969)	(1991)	(1963)	(2002)	(1978)	(1989)	(1958)	(1994)
MIN	0.84	0.23	0.83	0.17	0.19	0.021	0.33	0.39	0.16	0.47	0.30	0.49
(WY)	(1958)	(1963)	(1990)	(1977)	(1978)	(1983)	(1966)	(1992)	(1959)	(1968)	(1971)	(1998)

16212800 KIPAPA STREAM NEAR WAHIAWA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1957 - 2003	
ANNUAL TOTAL	3,554.53		1,390.91			
ANNUAL MEAN	9.74		3.81		10.4	
HIGHEST ANNUAL MEAN					25.2	1982
LOWEST ANNUAL MEAN					3.81	2003
HIGHEST DAILY MEAN	750	May 6	177	Sep 11	852	Apr 15, 1963
LOWEST DAILY MEAN	0.02	Nov 10	0.02	Nov 10	0.00	Jun 18, 1959
ANNUAL SEVEN-DAY MINIMUM	0.11	Nov 5	0.11	Nov 5	0.00	Jun 18, 1959
ANNUAL RUNOFF (AC-FT)	7,050		2,760		7,560	
10 PERCENT EXCEEDS	16		7.3		23	
50 PERCENT EXCEEDS	1.8		0.93		2.8	
90 PERCENT EXCEEDS	0.37		0.22		0.36	

e Estimated



HAWAII, ISLAND OF OAHU

16213000 WAIKELE STREAM AT WAIPAHU

LOCATION.--Lat 21°23'11", long 158°00'49", Old Hawaiian Datum, 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 V.E. Kunishige. Records poor. Water is diverted from gage pool for irrigation.

AVERAGE DISCHARGE.--50 years (water years 1953-59, 1961-2003), 39.4 ft³/s (28,540 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)
Oct 15	0154	2,290	5.79	Jun 8	1515	*2,940	*6.43
Apr 10	2145	1,580	5.06				

Minimum discharge, 5.7 ft³/s, Jan. 13, gage height, 1.62 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

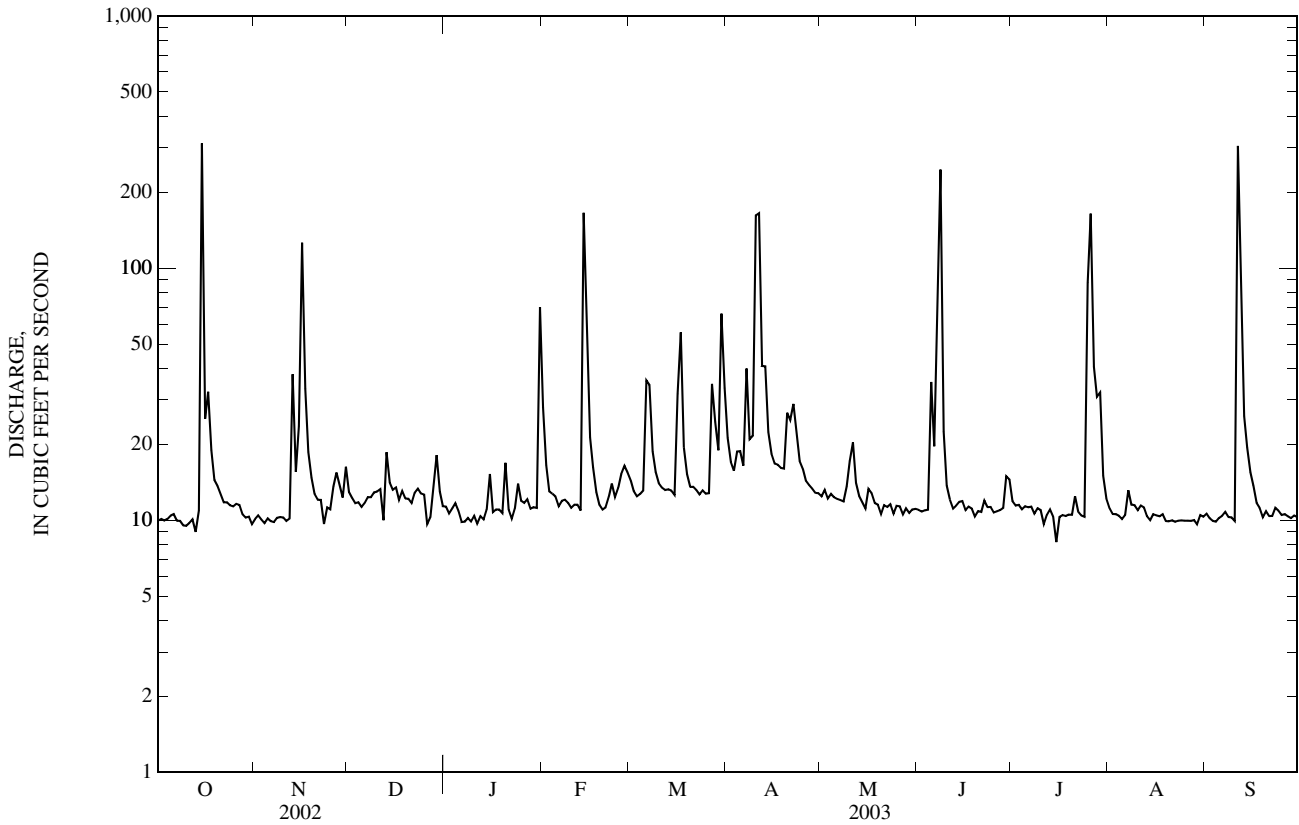
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	10	13	11	28	14	21	12	11	12	11	11
2	10	10	12	11	17	13	17	13	11	11	11	10
3	10	10	12	11	13	12	16	12	11	12	11	9.9
4	10	9.7	12	12	13	13	19	13	11	11	10	9.9
5	10	10	11	11	12	13	19	12	35	11	10	10
6	11	9.9	12	9.8	11	36	16	12	20	11	10	10
7	10	9.8	12	9.9	12	34	40	12	51	11	13	11
8	9.9	10	12	10	12	19	21	12	246	11	12	10
9	9.5	10	13	9.9	12	16	22	14	22	11	11	10
10	9.5	10	13	10	11	14	162	17	14	11	11	10
11	9.8	9.9	13	9.7	12	13	165	20	12	9.6	11	305
12	10	10	10	10	12	13	41	14	11	10	11	67
13	9.0	38	19	10	11	13	41	12	11	11	10	26
14	11	16	14	11	166	13	22	12	12	10	10	19
15	313	24	13	15	46	13	18	11	12	8.2	11	15
16	25	126	13	11	21	32	17	13	11	10	10	14
17	32	33	12	11	16	56	17	13	11	10	10	12
18	19	19	13	11	13	19	16	12	11	10	11	11
19	14	15	12	11	12	15	16	12	10	11	9.9	10
20	14	13	12	17	11	14	27	11	11	11	9.9	11
21	13	12	12	11	11	14	25	11	11	12	10	10
22	12	12	13	10	12	13	29	11	12	11	9.9	10
23	12	9.7	13	11	14	13	22	12	11	10	10	11
24	11	11	13	14	12	13	17	11	11	10	10	11
25	11	11	13	12	13	13	16	11	11	87	10	10
26	12	14	9.6	12	15	13	14	11	11	165	10	11
27	11	15	10	12	16	35	14	11	11	41	9.9	10
28	11	14	14	11	16	25	13	11	11	31	10	10
29	10	12	18	11	---	19	13	11	15	32	9.6	10
30	10	16	13	11	---	66	13	11	15	15	10	10
31	9.7	---	11	70	---	33	---	11	---	12	10	---
TOTAL	679.4	530.0	392.6	407.3	570	642	909	381	663	638.8	323.2	694.8
MEAN	21.9	17.7	12.7	13.1	20.4	20.7	30.3	12.3	22.1	20.6	10.4	23.2
MAX	313	126	19	70	166	66	165	20	246	165	13	305
MIN	9.0	9.7	9.6	9.7	11	12	13	11	10	8.2	9.6	9.9
AC-FT	1,350	1,050	779	808	1,130	1,270	1,800	756	1,320	1,270	641	1,380

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1953 - 2003, BY WATER YEAR (WY)

MEAN	32.1	48.8	48.0	58.6	51.9	52.1	48.1	33.3	23.8	28.7	25.4	22.2
MAX	97.8	198	146	222	179	195	235	115	51.5	76.8	90.0	68.1
(WY)	(1992)	(1966)	(1966)	(1969)	(1955)	(1991)	(1963)	(2002)	(1980)	(1989)	(1958)	(1994)
MIN	7.22	12.2	12.7	13.1	7.72	6.13	15.5	12.3	10.6	9.08	7.50	6.28
(WY)	(1978)	(1954)	(2003)	(2003)	(1978)	(1978)	(2002)	(2003)	(1981)	(1985)	(1984)	(1975)

16213000 WAIKELE STREAM AT WAIPAHU—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1953 - 2003	
ANNUAL TOTAL	12,377.4		6,831.1			
ANNUAL MEAN	33.9		18.7		39.4	
HIGHEST ANNUAL MEAN					77.3	1969
LOWEST ANNUAL MEAN					18.5	1954
HIGHEST DAILY MEAN	2,200	May 6	313	Oct 15	2,590	Mar 21, 1991
LOWEST DAILY MEAN	8.2	Mar 5	8.2	Jul 15	0.61	Feb 25, 1978
ANNUAL SEVEN-DAY MINIMUM	9.5	Apr 12	9.7	Oct 7	2.5	Feb 24, 1978
ANNUAL RUNOFF (AC-FT)	24,550		13,550		28,540	
10 PERCENT EXCEEDS	34		25		62	
50 PERCENT EXCEEDS	13		12		23	
90 PERCENT EXCEEDS	10		10		12	



HAWAII, ISLAND OF OAHU

16216000 WAIAWA STREAM NEAR PEARL CITY

LOCATION.--Lat 21°23'57", long 157°58'51", Old Hawaiian Datum, 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 V.E. Kunishige. Records poor. Occasional small irrigation diversion and return flow upstream.

AVERAGE DISCHARGE.--51 years (water years 1953-2003), 32.4 ft³/s (23,440 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, e0.75 ft³/s, July 15, 2003.

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)
Oct 15	0400	2,360	10.44	Sep 11	0615	3,340	11.77
Apr 10	2130	*4,220	*12.78				

Minimum daily discharge, 0.75 ft³/s, July 15 (estimated)

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.4	2.4	1.6	1.4	17	e2.4	9.6	1.7	1.5	e1.2	1.7	0.95
2	1.4	2.4	1.6	1.4	4.7	e2.0	5.8	1.6	1.5	e1.1	1.5	1.3
3	1.4	2.4	1.5	1.4	2.3	e1.6	4.1	1.6	1.5	e1.2	1.5	1.0
4	1.4	2.3	1.5	1.5	2.0	e1.7	6.3	1.6	1.5	e1.1	1.4	1.1
5	1.4	2.3	1.6	1.4	1.8	e1.8	5.4	1.6	1.5	e1.1	1.4	1.1
6	1.4	2.3	1.6	1.4	1.8	e1.8	9.6	1.6	2.0	e1.1	1.4	1.1
7	1.4	2.3	1.6	1.4	1.8	e9.3	8.3	1.5	2.5	e1.1	1.3	1.1
8	1.4	2.3	1.5	1.4	1.8	e4.4	4.6	1.5	21	e0.99	1.3	1.1
9	1.4	2.3	1.5	1.4	1.8	e2.1	13	1.5	2.4	e1.1	1.3	1.0
10	1.4	2.3	1.5	1.4	1.7	e1.7	396	1.5	e2.0	e1.1	1.2	1.1
11	1.4	2.3	1.5	1.4	1.7	e1.6	99	1.5	e1.7	e0.82	1.3	688
12	1.4	2.3	1.5	1.4	1.7	e1.5	38	1.5	e1.5	e0.96	1.3	44
13	1.4	21	2.2	1.4	1.7	e1.5	22	1.5	e1.3	e1.1	1.3	46
14	6.2	4.5	1.8	1.5	296	e1.5	9.1	1.5	e1.4	e0.94	1.3	36
15	366	48	1.6	2.4	34	e1.4	5.4	1.5	e1.4	e0.75	1.3	12
16	6.3	75	1.4	1.4	8.2	e91	3.7	1.5	e1.3	e0.93	1.3	6.9
17	8.9	15	1.4	1.4	5.4	31	4.3	1.5	e1.2	e0.96	1.2	4.2
18	4.5	5.9	1.4	1.4	e3.7	5.9	9.1	1.5	e1.1	e0.96	1.2	e1.1
19	2.8	2.9	1.4	1.6	e2.7	2.6	4.5	1.5	e1.1	e0.97	1.2	e0.92
20	2.5	1.9	1.4	1.8	e2.3	2.1	13	1.5	e1.1	e0.97	1.2	e1.0
21	2.5	1.7	1.4	1.4	e2.0	2.0	15	1.5	1.1	e1.3	1.1	e0.95
22	2.5	1.7	1.4	1.4	e2.2	2.0	12	1.5	1.1	e1.0	1.1	e0.95
23	2.5	1.6	1.4	1.4	e2.9	2.0	11	1.5	1.2	e0.95	1.1	e1.1
24	2.5	1.6	1.4	3.3	e2.0	1.9	5.8	1.5	1.1	e0.93	1.1	e1.0
25	2.4	1.6	1.4	1.4	e2.3	1.9	4.3	1.5	1.1	59	1.1	e0.97
26	2.4	2.1	1.4	1.5	e3.0	1.9	3.1	1.5	1.1	233	1.1	e0.98
27	2.4	1.6	1.4	1.5	e3.7	30	e2.0	1.5	1.1	23	1.1	e0.94
28	2.4	1.5	1.4	1.5	e2.8	12	e1.8	1.5	1.1	13	1.1	e0.91
29	2.4	2.0	1.4	1.4	---	56	e1.7	1.5	e1.9	10	1.1	e0.95
30	2.4	2.2	1.4	1.4	---	49	e1.6	1.5	e1.8	3.1	1.1	e0.93
31	2.4	---	1.4	88	---	23	---	1.5	---	1.9	1.0	---
TOTAL	442.2	219.7	46.5	134.0	415.0	366.8	729.1	47.2	63.1	367.63	38.6	860.65
MEAN	14.3	7.32	1.50	4.32	14.8	11.8	24.3	1.52	2.10	11.9	1.25	28.7
MAX	366	75	2.2	88	296	91	396	1.7	21	233	1.7	688
MIN	1.4	1.5	1.4	1.4	1.7	1.4	1.6	1.5	1.1	0.75	1.0	0.91
AC-FT	877	436	92	266	823	728	1,450	94	125	729	77	1,710

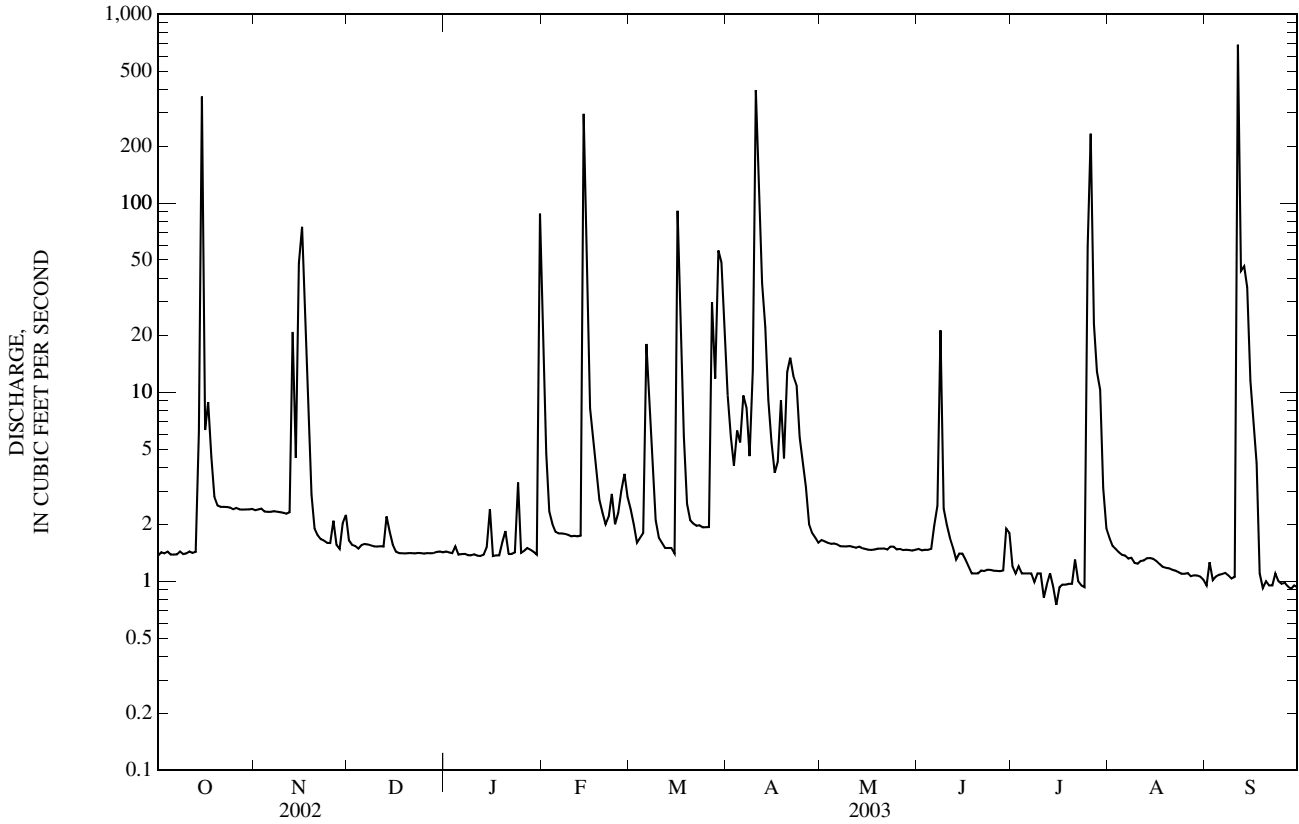
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 2003, BY WATER YEAR (WY)

MEAN	27.6	51.4	42.3	44.5	35.5	49.4	39.3	23.7	14.6	25.4	20.2	14.0
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	1.50	1.39	1.66	1.43	1.75	1.44	1.43	1.40	1.25	1.28
(WY)	(1985)	(1990)	(2003)	(2001)	(1986)	(2000)	(1992)	(2000)	(1984)	(1984)	(2003)	(1984)

16216000 WAIAWA STREAM NEAR PEARL CITY—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1952 - 2003	
ANNUAL TOTAL	8,699.4		3,730.48			
ANNUAL MEAN	23.8		10.2		32.4	
HIGHEST ANNUAL MEAN					80.8	1982
LOWEST ANNUAL MEAN					7.56	1984
HIGHEST DAILY MEAN	2,380	May 6	688	Sep 11	5,150	Mar 24, 1994
LOWEST DAILY MEAN	1.1	Jun 28	0.75	Jul 15	0.75	Jul 15, 2003
ANNUAL SEVEN-DAY MINIMUM	1.1	Jul 12	0.92	Jul 11	0.92	Jul 11, 2003
ANNUAL RUNOFF (AC-FT)	17,260		7,400		23,440	
10 PERCENT EXCEEDS	12		10		46	
50 PERCENT EXCEEDS	1.8		1.5		6.1	
90 PERCENT EXCEEDS	1.2		1.1		1.8	

e Estimated



HAWAII, ISLAND OF OAHU

16226000 NORTH HALAWA STREAM NEAR AIEA

LOCATION.--Lat 21°23'46", long 157°53'37", Old Hawaiian Datum, 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 S.T.M. Young. Records poor. Recording rain gage located at station.

AVERAGE DISCHARGE.--53 years (water years 1930-32, 1954-2003), 5.09 ft³/s (3,690 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 430 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Feb 14	0400	554	8.78	Sep 11	0230	*822	*9.59

Minimum discharge, no flow on many days.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

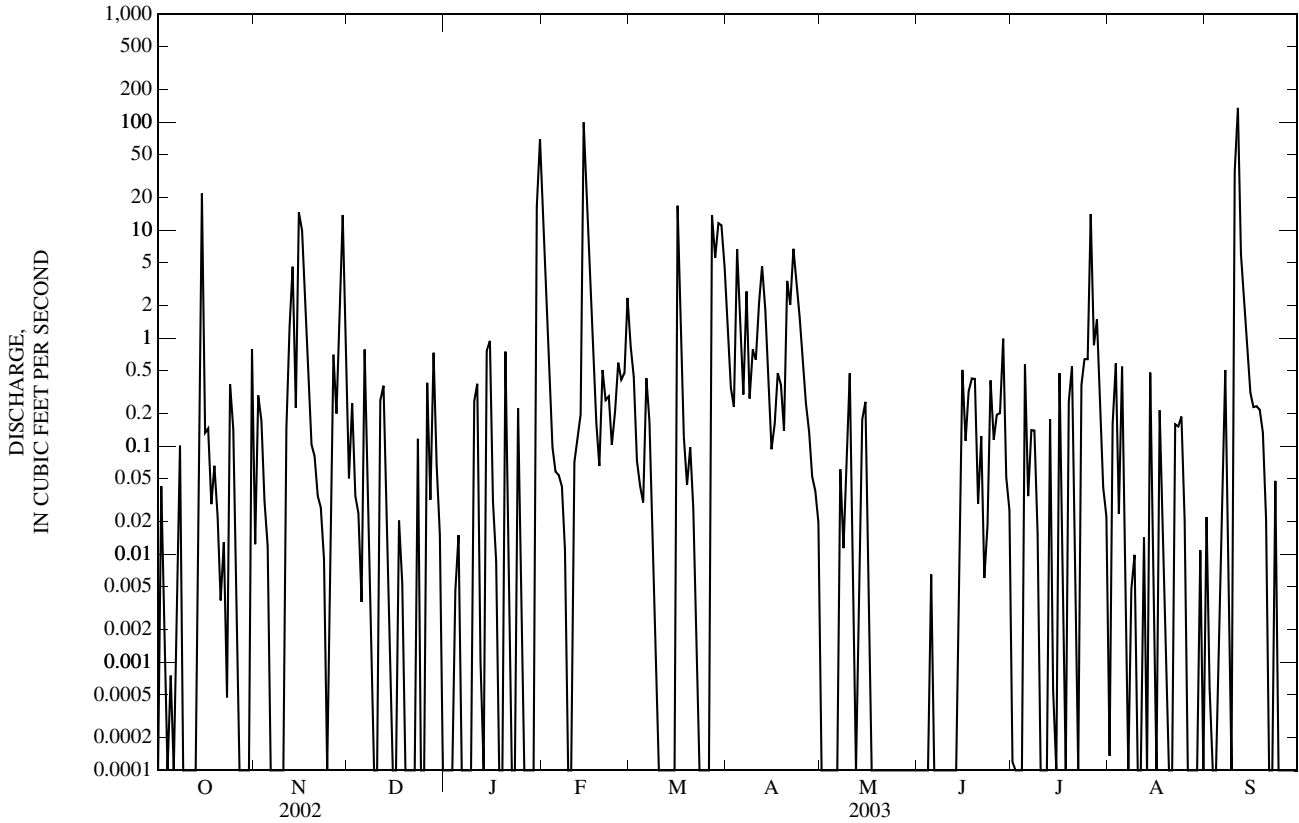
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	0.01	0.05	0.00	6.9	0.83	1.2	0.00	0.00	0.00	0.00	0.02
2	0.04	0.29	0.25	0.00	1.4	0.44	0.35	0.00	0.00	0.00	0.16	0.00
3	0.01	0.17	0.03	0.00	0.31	0.07	0.23	0.00	0.00	0.00	0.58	0.00
4	0.00	0.03	0.02	0.00	0.10	0.04	6.7	0.00	0.00	0.00	0.02	0.00
5	0.00	0.01	0.00	0.02	0.06	0.03	1.6	0.00	0.01	0.57	0.54	0.00
6	0.00	0.00	0.78	0.00	0.05	0.43	0.30	0.00	0.00	0.03	0.02	0.04
7	0.00	0.00	0.03	0.00	0.04	0.17	2.7	0.06	0.00	0.14	0.00	0.51
8	0.10	0.00	0.00	0.00	0.01	0.03	0.28	0.01	0.00	0.14	0.00	0.01
9	0.00	0.00	0.00	0.00	0.00	0.00	0.79	0.06	0.00	0.02	0.01	0.00
10	0.00	0.00	0.00	0.26	0.00	0.00	0.63	0.47	0.00	0.00	0.00	35
11	0.00	0.15	0.27	0.38	0.07	0.00	2.1	0.02	0.00	0.00	0.00	135
12	0.00	1.3	0.36	0.00	0.12	0.00	4.7	0.00	0.00	0.00	0.01	6.0
13	0.00	4.6	0.02	0.00	0.20	0.00	1.9	0.02	0.00	0.18	0.00	2.2
14	0.17	0.23	0.00	0.76	99	0.00	0.35	0.18	0.02	0.00	0.48	0.89
15	22	15	0.00	0.94	14	0.00	0.09	0.26	0.51	0.00	0.01	0.31
16	0.13	9.9	0.00	0.03	2.9	17	0.16	0.01	0.11	0.47	0.00	0.23
17	0.15	2.1	0.02	0.01	0.74	2.3	0.47	0.00	0.32	0.00	0.21	0.23
18	0.03	0.46	0.01	0.00	0.16	0.12	0.37	0.00	0.42	0.00	0.04	0.22
19	0.07	0.10	0.00	0.00	0.07	0.04	0.14	0.00	0.42	0.26	0.00	0.13
20	0.02	0.08	0.00	0.75	0.51	0.10	3.4	0.00	0.03	0.55	0.00	0.02
21	0.00	0.03	0.00	0.00	0.27	0.03	2.0	0.00	0.12	0.02	0.00	0.00
22	0.01	0.03	0.00	0.00	0.29	0.00	6.7	0.00	0.01	0.00	0.16	0.00
23	0.00	0.01	0.12	0.00	0.10	0.00	3.1	0.00	0.02	0.37	0.15	0.05
24	0.37	0.00	0.00	0.22	0.21	0.00	1.6	0.00	0.41	0.64	0.19	0.00
25	0.14	0.02	0.00	0.01	0.59	0.00	0.57	0.00	0.11	0.64	0.02	0.00
26	0.01	0.70	0.39	0.00	0.41	0.00	0.25	0.00	0.20	14	0.00	0.00
27	0.00	0.20	0.03	0.00	0.47	14	0.14	0.00	0.20	0.86	0.00	0.00
28	0.00	1.2	0.73	0.00	2.4	5.6	0.05	0.00	0.99	1.5	0.00	0.00
29	0.00	14	0.07	0.00	---	12	0.04	0.00	0.05	0.20	0.00	0.00
30	0.00	0.45	0.02	17	---	11	0.02	0.00	0.03	0.04	0.01	0.00
31	0.79	---	0.00	69	---	4.5	---	0.00	---	0.02	0.00	---
TOTAL	24.04	51.07	3.20	89.38	131.38	68.73	42.93	1.09	3.98	20.65	2.61	180.86
MEAN	0.78	1.70	0.10	2.88	4.69	2.22	1.43	0.035	0.13	0.67	0.084	6.03
MAX	22	15	0.78	69	99	17	6.7	0.47	0.99	14	0.58	135
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
AC-FT	48	101	6.3	177	261	136	85	2.2	7.9	41	5.2	359

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1929 - 2003, BY WATER YEAR (WY)

MEAN	3.33	7.51	7.24	6.52	7.30	7.58	6.75	4.59	1.78	3.43	3.43	2.14
MAX	16.3	50.6	35.0	26.0	76.3	37.8	33.3	30.1	7.86	23.0	21.6	17.1
(WY)	(1959)	(1966)	(1930)	(1988)	(1932)	(1968)	(1932)	(1965)	(1932)	(1954)	(1982)	(1931)
MIN	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
(WY)	(1933)	(1954)	(1990)	(1977)	(1931)	(1931)	(1931)	(1931)	(1931)	(1953)	(1962)	(1953)

16226000 NORTH HALAWA STREAM NEAR AIEA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1929 - 2003	
ANNUAL TOTAL	1,155.96		619.92			
ANNUAL MEAN	3.17		1.70		5.09	
HIGHEST ANNUAL MEAN					15.7	1932
LOWEST ANNUAL MEAN					1.41	1984
HIGHEST DAILY MEAN	224	May 6	135	Sep 11	956	Nov 18, 1930
LOWEST DAILY MEAN	0.00	Jan 3	0.00	Oct 1	0.00	Sep 14, 1929
ANNUAL SEVEN-DAY MINIMUM	0.00	Jan 3	0.00	Mar 9	0.00	Sep 14, 1929
ANNUAL RUNOFF (AC-FT)	2,290		1,230		3,690	
10 PERCENT EXCEEDS	3.3		1.5		11	
50 PERCENT EXCEEDS	0.07		0.02		0.35	
90 PERCENT EXCEEDS	0.00		0.00		0.00	



NORTH HALAWA STREAM AT BRIDGE 8 NEAR HALAWA, OAHU, HI

212356157531801

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Station number	Date	Time	Sample type	Instantaneous discharge, cfs (00061)	Sampling method, code (82398)	pH, water, unfltrd field, std units (00400)	pH, water, unfltrd lab, std units (00403)	Specif. conductance, wat unfl lab, uS/cm 25 degC (90095)	Specif. conductance, wat unfl uS/cm 25 degC (00095)	Temperature, water, deg C (00010)	Residue on evap. at 180degC wat flt mg/L (70300)
JAN 31...	212356157531801	20030131	1040	9	43	10	--	7.9	134	126	20.0	81
FEB 14...	212356157531801	20030214	1000	9	47	30	5.8	7.3	78	76	17.9	47
JUL 26...	212356157531801	20030726	1015	9	31	10	6.0	6.9	71	--	22.5	45

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Residue total at 105 deg. C, suspended, mg/L (00530)	Ammonia + org-N, water, unfltrd mg/L as N (00625)	Ammonia water, fltrd, mg/L as N (00608)	Nitrite + nitrate water, fltrd, mg/L as N (00631)	Nitrite water, fltrd, mg/L as N (00613)	Phosphorus, water, fltrd, mg/L (00666)	Phosphorus, water, unfltrd mg/L (00665)	COD, high level, water, unfltrd mg/L (00340)	Cadmium water, unfltrd ug/L (01027)	Copper, water, unfltrd recover -able, ug/L (01042)	Lead, water, unfltrd recover -able, ug/L (01051)	Zinc, water, unfltrd recover -able, ug/L (01092)	Oil and grease, water, unfltrd freon extract mg/L (00556)
JAN 31...	<10	0.24	<0.04	0.20	<0.008	<0.04	0.04	<10	<0.04	2.1	0.07	4	<7
FEB 14...	46	0.33	<0.04	0.12	<0.008	<0.04	0.10	<10	<0.04	5.3	0.25	7	<7
JUL 26...	54	0.45	<0.04	E.06	<0.008	<0.04	0.07	E30	<0.04	4.3	0.28	5	<7

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

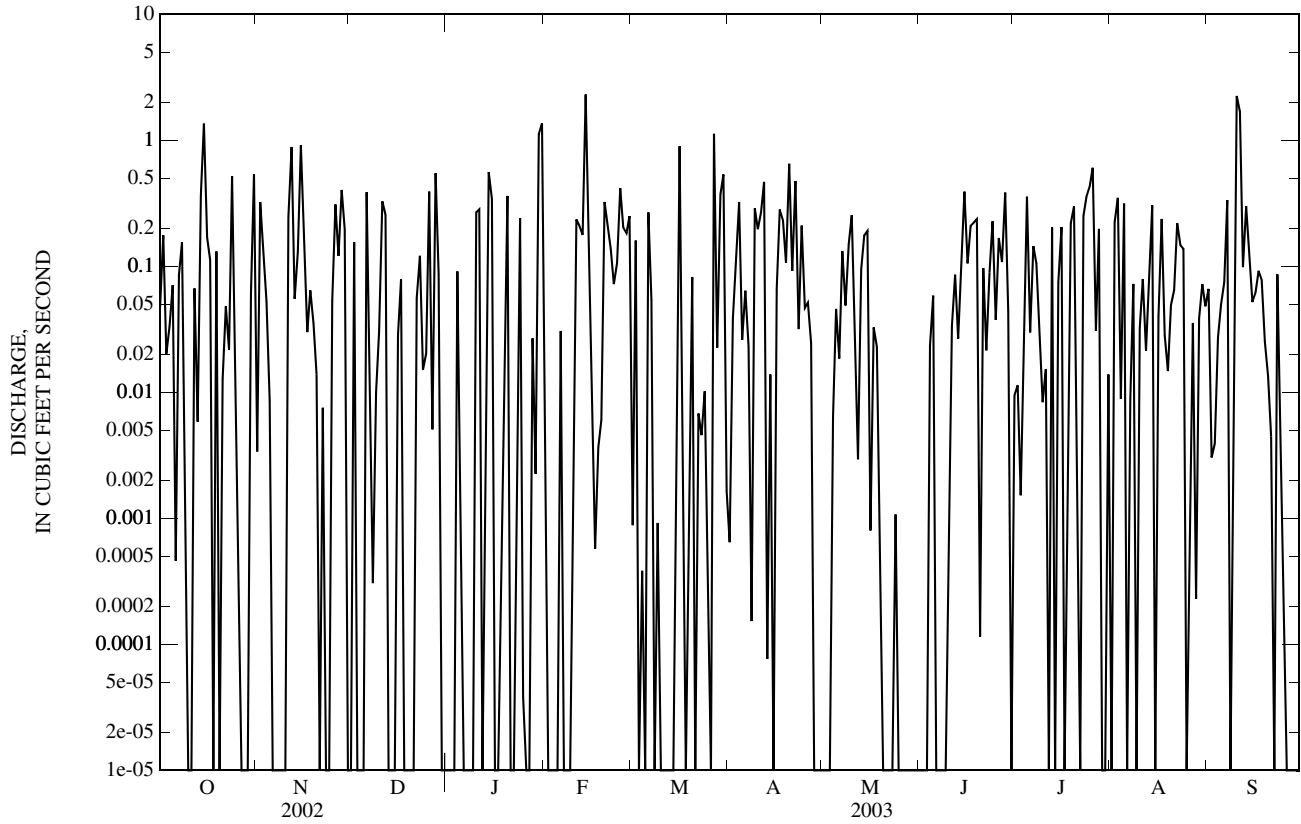
Date	Petroleum hydrocarbons wat unfltrd ext mg/L (45501)
JAN 31...	<2
FEB 14...	<2
JUL 26...	3

Remark codes used in this table:
 < -- Less than
 E -- Estimated value

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

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1998 - 2003	
ANNUAL TOTAL	59.44		43.32		0.17	
ANNUAL MEAN	0.16		0.12		0.21	
HIGHEST ANNUAL MEAN					0.12	
LOWEST ANNUAL MEAN					0.00	
HIGHEST DAILY MEAN	3.5	May 6	2.3	Feb 14	3.5	May 6, 2002
LOWEST DAILY MEAN	0.00	Jan 1	0.00	Oct 6	0.00	Sep 23, 1998
ANNUAL SEVEN-DAY MINIMUM	0.00	Jan 8	0.00	Mar 8	0.00	Feb 24, 1999
ANNUAL RUNOFF (AC-FT)	118		86		122	
10 PERCENT EXCEEDS	0.42		0.32		0.44	
50 PERCENT EXCEEDS	0.04		0.02		0.05	
90 PERCENT EXCEEDS	0.00		0.00		0.00	

e Estimated



WATER QUALITY DATA

HALAWA VALLEY HIGHWAY STORM DRAIN C NEAR AIEA
212353157533001

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Station number	Date	Time	Sample type	Dis-charge, cfs (00060)	Instan-taneous dis-charge, cfs (00061)	Sam-pling method, code (82398)	pH, water, unfltrd field, std units (00400)	pH, water, unfltrd lab, std units (00403)	Specif. conduc-tance, wat unfl lab, uS/cm 25 degC (90095)	Specif. conduc-tance, wat unfl uS/cm 25 degC (00095)	Temper-ature, water, deg C (00010)
OCT												
14...	212353157533001	20021014	1607	H	7.4	--	50	--	7.7	90	--	--
15...	212353157533001	20021015	0020	H	17	--	50	--	7.6	40	--	--
JAN												
15...	212353157533001	20030115	0654	H	--	8.2	50	--	7.2	75	--	--
15...	212353157533001	20030115	1027	9	--	3.0	70	--	7.1	66	--	21.1
30...	212353157533001	20030130	2147	9	--	4.2	50	--	7.8	68	--	--
31...	212353157533001	20030131	0247	H	7.2	--	50	--	7.6	55	--	--
31...	212353157533001	20030131	1100	9	--	0.04	70	--	8.1	125	--	20.9
FEB												
14...	212353157533001	20030214	0311	H	9.4	--	50	--	7.6	36	--	17.2
14...	212353157533001	20030214	1038	9	--	0.56	70	6.9	7.7	85	89	19.5
MAR												
16...	212353157533001	20030316	1613	9	--	6.4	50	6.6	7.2	46	39	21.5
JUL												
26...	212353157533001	20030726	0605	9	--	6.6	50	--	6.8	44	--	--
26...	212353157533001	20030726	1100	9	--	0.88	70	6.7	6.8	103	102	24.0

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Residue on evap. at 180degC wat flt mg/L (70300)	Residue total at 105 deg. C, sus-pended, mg/L (00530)	Ammonia + org-N, water, unfltrd mg/L as N (00625)	Ammonia water, fltrd, mg/L as N (00608)	Nitrite + nitrate water, fltrd, mg/L as N (00631)	Nitrite water, fltrd, mg/L as N (00613)	Phos-phorus, water, fltrd, mg/L (00666)	Phos-phorus, water, unfltrd mg/L (00665)	COD, high level, water, unfltrd mg/L (00340)	Cadmium water, unfltrd ug/L (01027)	Copper, water, unfltrd recover-able, ug/L (01042)	Lead, water, unfltrd recover-able, ug/L (01051)	Zinc, water, unfltrd recover-able, ug/L (01092)
OCT													
14...	40	86	1.1	E.03	0.13	0.014	<0.04	0.24	80	0.44	53.9	14.4	227
15...	16	26	0.21	E.04	E.05	<0.008	E.03	0.08	<10	0.11	17.2	4.06	67
JAN													
15...	30	87	1.4	0.05	E.06	0.008	<0.04	0.24	E20	0.53	53.7	19.7	251
15...	36	20	0.46	E.03	E.05	E.007	<0.04	0.07	<10	0.20	16.1	5.63	83
30...	33	<10	0.16	E.04	E.04	<0.008	<0.04	E.03	<10	<0.04	2.2	0.49	58
31...	31	<10	E.09	<0.04	E.04	<0.008	<0.04	E.02	<10	0.29	3.7	0.92	21
31...	75	<10	0.24	<0.04	0.16	0.010	<0.04	0.04	10	0.08	8.0	2.32	60
FEB													
14...	16	13	0.25	E.03	<0.06	<0.008	<0.04	E.04	<10	0.06	9.5	2.47	38
14...	56	<10	0.12	<0.04	0.12	E.007	E.03	E.04	<10	E.03	5.7	1.10	27
MAR													
16...	22	23	--	--	--	--	--	--	--	0.16	20.2	6.52	100
JUL													
26...	19	18	0.43	<0.04	E.03	<0.008	<0.04	0.07	E20	0.27	14.4	4.37	72
26...	62	21	0.53	<0.04	0.11	0.013	<0.04	0.07	E40	0.21	20.2	6.14	114

HALAWA VALLEY HIGHWAY STORM DRAIN C NEAR AIEA
212353157533001

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Oil and grease, water, unfltrd freon extract mg/L (00556)	Petrol- eum hydro- carbons wat unf frn ext mg/L (45501)
OCT		
14...	--	--
15...	--	--
JAN		
15...	E5n	4
15...	--	--
30...	<7	<2
31...	--	--
31...	--	--
FEB		
14...	--	--
14...	<7	<2
MAR		
16...	--	--
JUL		
26...	<7	<2
26...	8	2

Remark codes used in this table:

< -- Less than
E -- Estimated value

Value qualifier codes used in this
table:

n -- Below the NDV

HAWAII, ISLAND OF OAHU

16226200 NORTH HALAWA STREAM NEAR HONOLULU

LOCATION.--Lat 21°23'04", long 157°54'22", Old Hawaiian Datum, 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 fair, except for estimated days which are poor.

AVERAGE DISCHARGE.--20 years (water years 1984-2003), 4.70 ft³/s (3,410 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 450 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Feb 14	0405	554	9.87	Sep 11	0245	*917	*10.74

Minimum discharge, no flow on many days.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	0.06	0.14	0.01	5.8	0.68	2.0	0.04	0.00	0.00	0.08	0.00
2	0.01	0.08	0.13	0.01	1.1	0.32	0.48	0.03	0.00	0.00	0.04	0.00
3	0.01	0.20	0.15	e0.01	0.22	0.11	0.29	0.02	0.00	0.00	0.39	0.00
4	0.00	0.06	0.15	e0.01	0.09	0.08	6.3	0.02	0.00	0.00	0.06	0.00
5	0.00	0.04	0.10	0.00	0.07	0.05	2.1	0.02	0.00	0.00	0.20	0.00
6	0.00	0.03	0.34	0.00	0.07	0.20	0.40	0.02	0.00	0.00	0.12	0.00
7	0.00	0.02	e0.21	0.00	0.03	0.37	2.6	0.03	0.00	0.00	0.04	0.00
8	0.00	0.02	e0.05	0.00	0.02	0.06	0.51	0.02	0.00	0.00	0.03	0.00
9	0.00	0.02	0.03	0.00	0.02	0.05	0.58	0.02	0.00	0.00	0.03	0.00
10	0.00	0.01	e0.02	0.00	0.02	0.03	0.54	0.07	0.00	0.00	0.02	25
11	0.00	0.10	0.02	0.00	0.02	0.02	1.9	0.02	0.00	0.00	0.02	134
12	0.00	0.40	0.02	0.00	0.02	0.02	3.8	0.01	0.00	0.00	0.02	8.5
13	0.00	3.6	0.02	0.00	0.06	0.02	1.9	0.01	0.00	0.00	0.01	3.1
14	0.00	e0.18	0.02	0.25	88	0.02	0.36	0.01	0.00	0.00	0.00	0.90
15	23	e12	0.02	0.66	13	0.02	0.14	0.00	0.00	0.00	0.01	0.36
16	e0.18	e10	0.01	0.10	2.8	15	0.13	0.00	0.00	0.00	0.00	0.14
17	e0.13	e2.1	0.02	0.03	0.65	2.3	0.35	0.00	0.00	0.00	0.00	0.07
18	e0.06	e0.44	0.02	0.02	0.16	0.14	0.23	0.00	0.00	0.00	0.00	0.05
19	e0.05	e0.19	0.01	0.03	0.08	0.06	0.29	0.00	0.00	0.00	0.00	0.05
20	0.03	e0.11	0.01	0.53	0.15	0.05	3.5	0.00	0.00	0.00	0.00	0.02
21	0.02	e0.07	0.02	0.02	0.27	0.02	2.5	0.00	0.00	0.00	0.00	0.02
22	0.02	e0.06	0.02	0.01	0.17	0.02	7.1	0.00	0.00	0.00	0.00	0.02
23	0.02	0.06	0.03	0.01	0.07	0.02	4.0	0.00	0.00	0.00	0.00	0.02
24	0.12	0.04	0.01	0.03	0.10	0.02	2.2	0.00	0.00	0.00	0.00	0.02
25	0.25	0.08	0.01	0.02	0.14	0.02	0.61	0.00	0.00	0.00	0.00	0.01
26	0.02	e0.68	0.01	0.01	0.42	0.02	0.23	0.00	0.00	14	0.00	0.00
27	0.02	e0.18	0.03	0.01	0.16	13	0.15	0.00	0.00	1.5	0.00	0.00
28	0.01	e0.08	0.27	0.01	1.7	6.0	0.12	0.00	0.00	1.4	0.00	0.00
29	0.01	8.6	0.02	0.01	---	12	0.08	0.00	0.00	0.51	0.00	0.00
30	0.01	0.74	0.01	13	---	13	0.06	0.00	0.00	0.15	0.00	0.00
31	0.35	---	0.01	65	---	6.0	---	0.00	---	0.11	0.00	---
TOTAL	24.32	40.25	1.93	79.79	115.41	69.72	45.45	0.34	0.00	17.67	1.07	172.28
MEAN	0.78	1.34	0.062	2.57	4.12	2.25	1.51	0.011	0.000	0.57	0.035	5.74
MAX	23	12	0.34	65	88	15	7.1	0.07	0.00	14	0.39	134
MIN	0.00	0.01	0.01	0.00	0.02	0.02	0.06	0.00	0.00	0.00	0.00	0.00
AC-FT	48	80	3.8	158	229	138	90	0.7	0.00	35	2.1	342

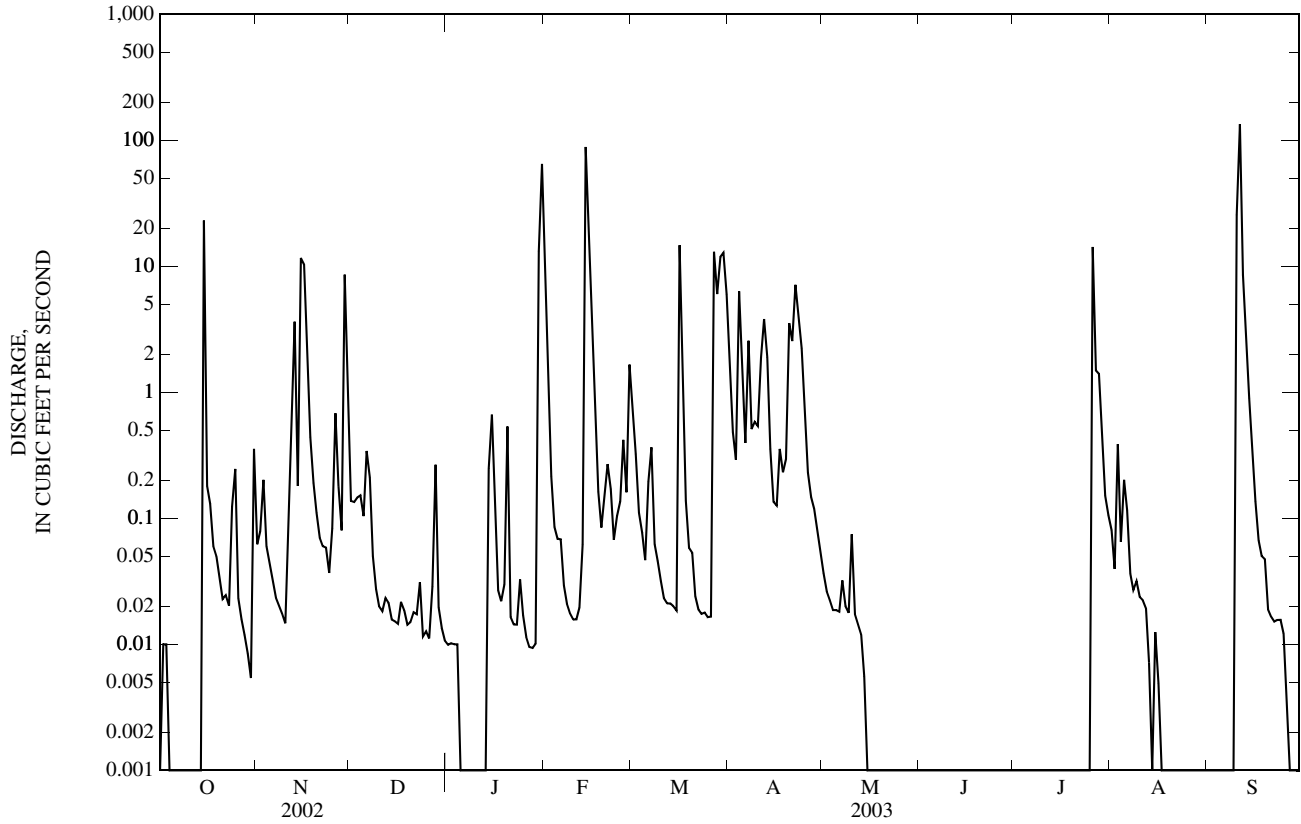
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1983 - 2003, BY WATER YEAR (WY)

MEAN	3.37	7.05	7.19	6.89	3.97	7.04	5.94	3.03	1.82	3.60	2.50	2.76
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	0.000	0.059	0.008	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
(WY)	(1985)	(1990)	(1990)	(1986)	(1983)	(1983)	(1983)	(1992)	(1984)	(1984)	(1984)	(1984)

16226200 NORTH HALAWA STREAM NEAR HONOLULU—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1983 - 2003	
ANNUAL TOTAL	1,464.37		568.23			
ANNUAL MEAN	4.01		1.56		4.70	
HIGHEST ANNUAL MEAN					10.1	1988
LOWEST ANNUAL MEAN					1.43	1984
HIGHEST DAILY MEAN	226	May 6	134	Sep 11	476	Mar 24, 1994
LOWEST DAILY MEAN	0.00	Jan 14	0.00	Oct 1	0.00	Feb 1, 1983
ANNUAL SEVEN-DAY MINIMUM	0.00	Oct 4	0.00	Oct 4	0.00	Feb 1, 1983
ANNUAL RUNOFF (AC-FT)	2,900		1,130		3,410	
10 PERCENT EXCEEDS	5.6		1.8		9.8	
50 PERCENT EXCEEDS	0.05		0.02		0.36	
90 PERCENT EXCEEDS	0.00		0.00		0.00	

e Estimated



WATER QUALITY DATA
NORTH HALAWA STREAM NEAR HONOLULU
16226200

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Station number	Date	Time	Sample type	Dis-charge, cfs (00060)	Instan-taneous dis-charge, cfs (00061)	Sam-pling method, code (82398)	pH, water, unfltrd field, std units (00400)	pH, water, unfltrd lab, std units (00403)	Specif. conduc-tance, wat unfl lab, uS/cm 25 degC (90095)	Specif. conduc-tance, wat unfl uS/cm 25 degC (00095)	Temper-ature, water, deg C (00010)
OCT 15...	16226200	20021015	0253	H	76	--	50	--	7.4	75	--	--
JAN 31...	16226200	20030131	0019	H	94	--	50	--	7.8	75	--	--
JAN 31...	16226200	20030131	1232	9	--	29	10	--	7.9	138	--	20.5
FEB 14...	16226200	20030214	0358	H	265	--	50	6.3	6.9	50	43	20.3
FEB 14...	16226200	20030214	1145	9	--	79	30	6.7	7.7	88	86	18.3
MAR 16...	16226200	20030316	1908	H	82	--	50	6.5	7.3	55	52	21.2
MAR 17...	16226200	20030317	1020	9	--	2.0	10	7.1	7.4	131	129	22.1
JUL 26...	16226200	20030726	0945	9	--	52	50	--	6.9	73	--	--
JUL 26...	16226200	20030726	1454	9	--	11	10	7.2	6.9	102	102	24.5

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Residue on evap. at 180degC wat flt mg/L (70300)	Residue total at 105 deg. C, sus-pended, mg/L (00530)	Ammonia + org-N, water, unfltrd mg/L as N (00625)	Ammonia water, fltrd, mg/L as N (00608)	Nitrite + nitrate water fltrd, mg/L as N (00631)	Nitrite water, fltrd, mg/L as N (00613)	Phos-phorus, water, fltrd, mg/L (00666)	Phos-phorus, water, unfltrd mg/L (00665)	COD, high level, water, unfltrd mg/L (00340)	Cadmium water, unfltrd ug/L (01027)	Copper, water, unfltrd recover-able, ug/L (01042)	Lead, water, unfltrd recover-able, ug/L (01051)	Zinc, water, unfltrd recover-able, ug/L (01092)
OCT 15...	43	536	4.5	<0.04	<0.06	<0.008	<0.04	0.91	190	0.23	52.8	6.31	86
JAN 31...	51	46	0.74	<0.04	0.08	<0.008	E.02	0.12	10	<0.04	9.0	1.48	24
JAN 31...	85	<10	0.18	<0.04	0.18	<0.008	E.02	E.03	<10	<0.04	1.7	0.12	4
FEB 14...	32	692	3.4	E.03	0.09	<0.008	E.03	1.12	160	0.25	67.8	6.03	91
FEB 14...	60	30	0.27	<0.04	0.14	<0.008	<0.04	0.06	10	<0.04	4.6	0.43	6
MAR 16...	40	208	--	--	--	--	--	--	--	0.06	18.4	1.69	28
MAR 17...	76	<10	--	--	--	--	--	--	--	<0.04	1.7	0.09	E1
JUL 26...	54	135	1.2	<0.04	0.07	<0.008	E.02	0.23	E80	0.06	15.3	1.76	29
JUL 26...	68	<10	0.25	<0.04	0.08	<0.008	<0.04	E.04	E20	<0.04	3.1	0.20	5

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Oil and grease, water, unfltrd freon extract mg/L (00556)	Petrol-eum hydrocarbons wat unfltrd frn ext mg/L (45501)
OCT 15...	--	--
JAN 31...	--	--
JAN 31...	<7	<2
FEB 14...	--	--
FEB 14...	<7	<2
MAR 16...	--	--
MAR 17...	<7	<2
JUL 26...	--	--
JUL 26...	<7	<2

Remark codes used in this table:
< -- Less than
E -- Estimated value

HAWAII, ISLAND OF OAHU

16226400 NORTH HALAWA STREAM NEAR QUARANTINE STATION AT HALAWA

LOCATION.--Lat 21°22'28", long 157°54'59", Old Hawaiian Datum, Hydrologic Unit 20060000, on left bank, 0.9 mi west of Oahu Prison, 1.4 mi north of Salt Lake Elementary School, and 1.2 mi northeast of Radford High School.

DRAINAGE AREA.--4.68 mi².

PERIOD OF RECORD.--October 2001 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 60 ft above mean sea level (from topographic map).

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

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,250 ft³/s, January 26, 2002, gage height, 9.10 ft; no flow on many days.

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)
Sep 11	0018	*1,600	*8.25

No other peak greater than base discharge.

Minimum discharge, no flow on many days.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	0.00	0.00	0.00	7.0	0.09	0.81	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	1.0	0.00	0.03	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	4.0	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	1.6	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.19	0.05	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.20	1.6	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26
11	0.00	0.00	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00	122
12	0.00	0.00	0.00	0.00	0.00	0.00	3.0	0.00	0.00	0.00	0.00	6.1
13	0.00	1.8	0.00	0.00	0.00	0.00	1.3	0.00	0.00	0.00	0.00	1.1
14	0.26	0.00	0.00	0.00	35	0.00	0.04	0.00	0.00	0.00	0.00	0.12
15	25	12	0.00	0.00	11	0.00	0.00	0.00	0.00	0.00	0.00	0.02
16	0.00	10	0.00	0.00	2.2	9.3	0.00	0.00	0.00	0.00	0.00	0.01
17	0.01	2.1	0.00	0.00	0.24	1.5	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.10	0.00	0.00	2.9	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.02	0.00	0.00	0.00	1.4	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	6.0	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	2.5	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	1.0	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00
26	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.5	0.00	0.00
27	0.00	0.00	0.00	0.00	0.00	9.4	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.34	4.7	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	11	0.00	0.00	---	7.0	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.24	0.00	7.2	---	12	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00	---	0.00	38	---	4.1	---	0.00	---	0.00	0.00	---
TOTAL	25.27	37.96	0.02	45.30	56.79	48.48	27.39	0.00	0.00	6.50	0.00	155.35
MEAN	0.82	1.27	0.001	1.46	2.03	1.56	0.91	0.000	0.000	0.21	0.000	5.18
MAX	25	12	0.02	38	35	12	6.0	0.00	0.00	6.5	0.00	122
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AC-FT	50	75	0.04	90	113	96	54	0.00	0.00	13	0.00	308

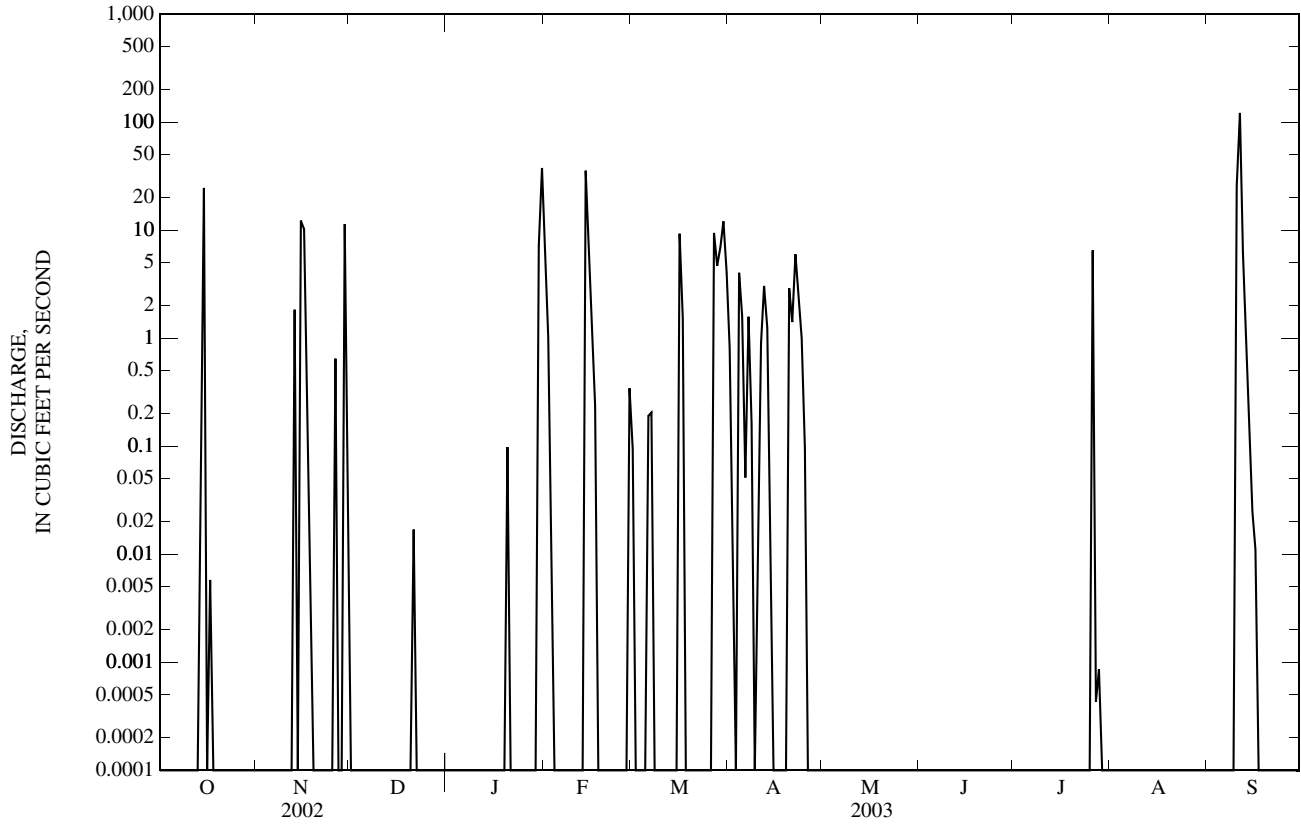
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 2002 - 2003, BY WATER YEAR (WY)

	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
MEAN	2.77	3.75	1.32	14.3	5.11	6.49	0.91	9.40	0.000	0.16	0.044	2.67
MAX	4.73	6.24	2.63	27.1	8.18	11.4	0.91	18.8	0.000	0.21	0.087	5.18
(WY)	(2002)	(2002)	(2002)	(2002)	(2002)	(2002)	(2002)	(2002)	(2002)	(2003)	(2002)	(2003)
MIN	0.82	1.27	0.001	1.46	2.03	1.56	0.90	0.000	0.000	0.12	0.000	0.16
(WY)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)	(2002)	(2003)	(2002)	(2002)	(2003)	(2002)

16226400 NORTH HALAWA STREAM NEAR QUARANTINE STATION AT HALAWA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 2002 - 2003	
ANNUAL TOTAL	2,107.03		403.06			
ANNUAL MEAN	5.77		1.10		3.92	
HIGHEST ANNUAL MEAN					6.74	2002
LOWEST ANNUAL MEAN					1.10	2003
HIGHEST DAILY MEAN	324	May 6	122	Sep 11	324	May 6, 2002
LOWEST DAILY MEAN	0.00	Jan 1	0.00	Oct 1	0.00	Oct 3, 2001
ANNUAL SEVEN-DAY MINIMUM	0.00	Jan 1	0.00	Oct 1	0.00	Oct 16, 2001
ANNUAL RUNOFF (AC-FT)	4,180		799		2,840	
10 PERCENT EXCEEDS	8.7		0.85		5.4	
50 PERCENT EXCEEDS	0.00		0.00		0.00	
90 PERCENT EXCEEDS	0.00		0.00		0.00	

e Estimated



WATER QUALITY DATA

NORTH HALAWA STREAM NEAR QUARANTINE STATION AT HALAWA
16226400

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Station number	Date	Time	Sample type	Dis-charge, cfs (00060)	Instan-taneous dis-charge, cfs (00061)	Sam-pling method, code (82398)	pH, water, unfltrd field, std units (00400)	pH, water, unfltrd lab, std units (00403)	Specif. conduc-tance, wat unfl lab, uS/cm 25 degC (90095)	Specif. conduc-tance, wat unfl 25 degC (00095)	Temper-ature, water, deg C (00010)
OCT 15...	16226400	20021015	0219	H	96	--	50	--	7.4	118	--	--
JAN 31...	16226400	20030131	0106	H	61	--	50	--	7.7	85	--	--
JAN 31...	16226400	20030131	1055	9	--	37	10	7.4	7.8	138	133	22.4
FEB 14...	16226400	20030214	0540	H	49	--	50	--	7.3	55	--	19.7
FEB 14...	16226400	20030214	1035	9	--	51	70	7.5	7.5	84	78	18.3
MAR 16...	16226400	20030316	1906	H	65	--	50	--	7.5	65	--	21.7
MAR 17...	16226400	20030317	0915	9	--	0.78	70	--	7.5	145	--	21.5
JUL 26...	16226400	20030726	1400	9	--	11	10	7.3	6.7	108	106	24.0

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Residue on evap. at 180degC wat flt mg/L (70300)	Residue total at 105 deg. C, sus-pended, mg/L (00530)	Ammonia + org-N, water, unfltrd mg/L as N (00625)	Ammonia water, fltrd, mg/L as N (00608)	Nitrite + nitrate water fltrd, mg/L as N (00631)	Nitrite water, fltrd, mg/L as N (00613)	Phos-phorus, water, fltrd, mg/L (00666)	Phos-phorus, water, unfltrd mg/L (00665)	COD, high level, water, unfltrd mg/L (00340)	Cadmium water, unfltrd ug/L (01027)	Copper, water, unfltrd recover-able, ug/L (01042)	Lead, water, unfltrd recover-able, ug/L (01051)	Zinc, water, unfltrd recover-able, ug/L (01092)
OCT 15...	60	548	4.1	<0.04	0.28	0.016	E.04	0.93	120	0.30	54.4	12.8	99
JAN 31...	52	162	1.6	<0.04	0.09	<0.008	E.03	0.35	60	0.10	26.8	5.43	81
JAN 31...	81	20	0.34	<0.04	0.20	<0.008	E.02	0.05	<10	<0.04	2.8	0.29	5
FEB 14...	37	760	3.3	<0.04	0.10	E.004	<0.04	1.07	40	0.17	58.4	5.59	85
FEB 14...	53	65	0.43	<0.04	0.13	E.007	<0.04	0.13	10	0.04	7.6	0.68	14
MAR 16...	40	248	--	--	--	--	--	--	--	0.11	33.6	4.91	59
MAR 17...	83	<10	--	--	--	--	--	--	--	<0.04	2.1	0.09	E2
JUL 26...	70	<10	0.40	<0.04	0.17	<0.008	E.03	0.06	E20	0.08	4.6	0.40	7

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Oil and grease, water, unfltrd freon extract mg/L (00556)	Petrol-eum hydro-carbons wat unfl frn ext mg/L (45501)
OCT 15...	--	--
JAN 31...	--	--
JAN 31...	<7	<2
FEB 14...	--	--
FEB 14...	<7	<2
MAR 16...	--	--
MAR 17...	<7	E4
JUL 26...	<7	<2

Remark codes used in this table:
 < -- Less than
 E -- Estimated value

HALAWA STREAM BELOW H-1, OAHU, HI

16227100

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Station number	Date	Time	Sample type	Instantaneous discharge, cfs (00061)	Sampling method, code (82398)	pH, water, unfltrd field, std units (00400)	pH, water, unfltrd lab, std units (00403)	Specif. conductance, wat unfl lab, uS/cm 25 degC (90095)	Specif. conductance, wat unfl 25 degC (00095)	Temperature, water, deg C (00010)	Residue on evap. at 180degC wat flt mg/L (70300)
JAN 31...	16227100	20030131	0920	9	60	70	7.0	7.8	134	128	21.6	82
FEB 14...	16227100	20030214	0930	9	235	70	7.2	7.6	78	74	19.5	54

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Residue total at 105 deg. C, suspended, mg/L (00530)	Ammonia + org-N, water, unfltrd mg/L as N (00625)	Ammonia water, fltrd, mg/L as N (00608)	Nitrite + nitrate water, fltrd, mg/L as N (00631)	Nitrite water, fltrd, mg/L as N (00613)	Phosphorus, water, fltrd, mg/L (00666)	Phosphorus, water, unfltrd mg/L (00665)	COD, high level, water, unfltrd mg/L (00340)	Cadmium water, unfltrd ug/L (01027)	Copper, water, unfltrd recover-able, ug/L (01042)	Lead, water, unfltrd recover-able, ug/L (01051)	Zinc, water, unfltrd recover-able, ug/L (01092)	Oil and grease, water, unfltrd freon extract mg/L (00556)
JAN 31...	33	0.53	<0.04	0.28	<0.008	E.02	0.09	10	<0.04	4.6	0.54	9	<7
FEB 14...	91	0.59	<0.04	0.18	E.005	0.04	0.19	10	<0.04	13.1	2.85	28	<7

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Petroleum hydrocarbons wat unfl frn ext mg/L (45501)
JAN 31...	<2
FEB 14...	3

Remark codes used in this table:
 < -- Less than
 E -- Estimated value

HAWAII, ISLAND OF OAHU

16229000 KALIHI STREAM NEAR HONOLULU

LOCATION.--Lat 21°21'59", long 157°50'49", Old Hawaiian Datum, 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 M.F. Wong. Records fair.

AVERAGE DISCHARGE.--89 years (water years 1915-2003), 6.31 ft³/s (4,570 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 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)
Sep 11	0145	*864	*7.73	No other peak greater than base discharge.			

Minimum discharge, 0.20 ft³/s, Sept. 5, 6, 7, 9, 10, gage height, 2.00 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

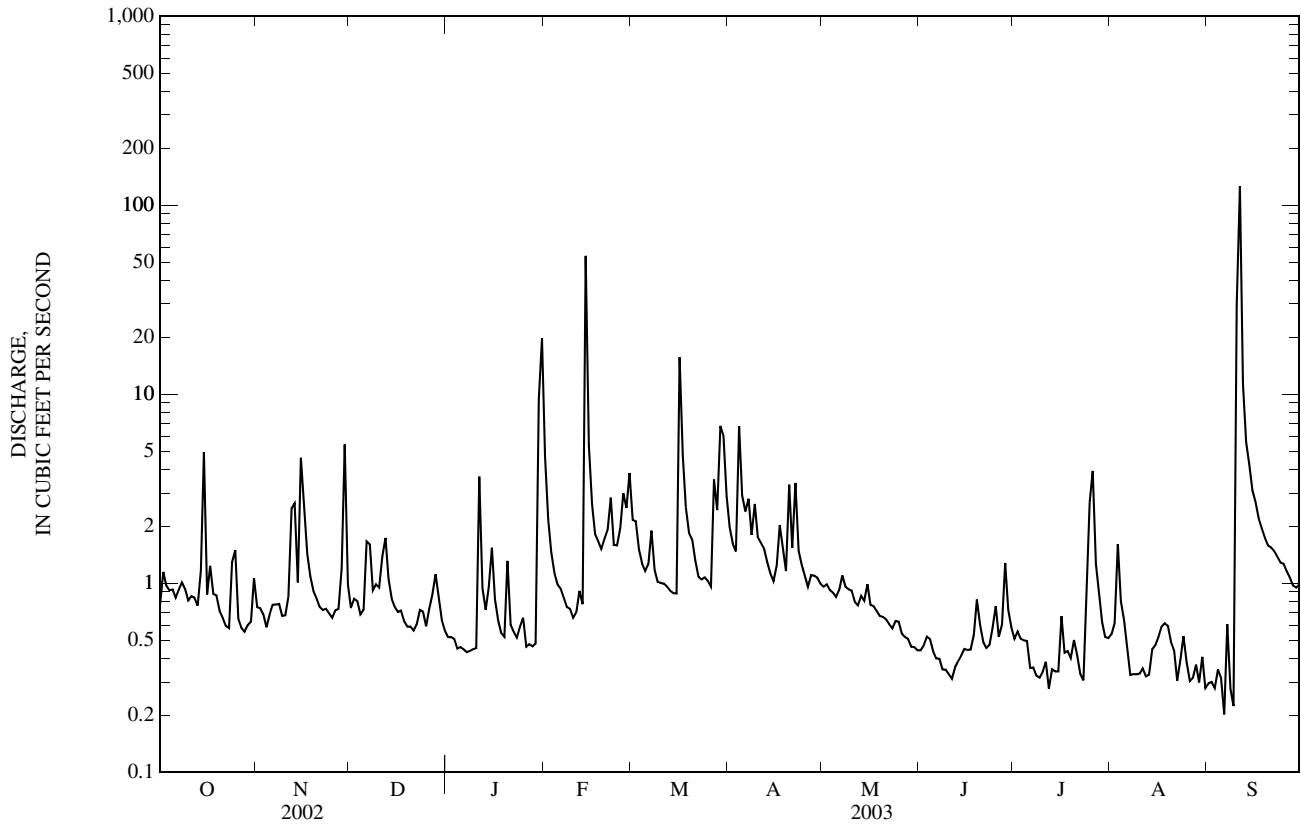
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.77	0.75	0.74	0.52	4.7	2.2	2.0	0.96	0.44	0.51	0.54	0.30
2	1.1	0.74	0.83	0.52	2.2	2.1	1.6	0.99	0.47	0.55	0.62	0.30
3	0.97	0.68	0.80	0.51	1.5	1.5	1.5	0.92	0.52	0.51	1.6	0.28
4	0.92	0.58	0.68	0.45	1.1	1.3	6.8	0.89	0.51	0.50	0.80	0.35
5	0.93	0.68	0.72	0.46	0.99	1.2	2.9	0.85	0.44	0.50	0.64	0.32
6	0.84	0.77	1.7	0.45	0.94	1.3	2.4	0.93	0.40	0.36	0.46	0.20
7	0.93	0.77	1.6	0.43	0.83	1.9	2.8	1.1	0.40	0.36	0.33	0.61
8	1.0	0.78	0.92	0.44	0.75	1.2	1.8	0.96	0.35	0.33	0.33	0.28
9	0.93	0.67	0.99	0.45	0.73	1.0	2.6	0.93	0.35	0.32	0.33	0.22
10	0.81	0.68	0.95	0.45	0.66	1.0	1.7	0.91	0.33	0.34	0.33	30
11	0.85	0.85	1.4	3.7	0.70	1.00	1.6	0.80	0.31	0.38	0.35	125
12	0.84	2.5	1.7	0.94	0.91	0.96	1.5	0.76	0.36	0.28	0.32	11
13	0.76	2.6	1.1	0.72	0.78	0.91	1.3	0.86	0.39	0.35	0.33	5.6
14	1.2	1.0	0.83	0.95	54	0.89	1.1	0.81	0.42	0.34	0.45	4.3
15	4.9	4.6	0.75	1.5	5.3	0.88	1.0	0.99	0.45	0.34	0.47	3.1
16	0.87	2.7	0.70	0.82	2.6	16	1.2	0.77	0.44	0.67	0.52	2.7
17	1.2	1.4	0.72	0.64	1.8	4.7	2.0	0.76	0.45	0.43	0.59	2.2
18	0.88	1.1	0.63	0.55	1.7	2.5	1.5	0.71	0.53	0.44	0.61	2.0
19	0.86	0.91	0.59	0.52	1.5	1.8	1.2	0.67	0.82	0.40	0.59	1.7
20	0.71	0.83	0.59	1.3	1.7	1.7	3.3	0.66	0.60	0.50	0.49	1.6
21	0.66	0.75	0.56	0.60	1.9	1.3	1.5	0.64	0.49	0.42	0.44	1.5
22	0.60	0.72	0.61	0.55	2.8	1.1	3.4	0.61	0.46	0.33	0.31	1.5
23	0.58	0.73	0.72	0.52	1.6	1.0	1.5	0.58	0.47	0.31	0.39	1.4
24	1.3	0.69	0.71	0.59	1.6	1.1	1.3	0.63	0.58	0.72	0.52	1.3
25	1.5	0.66	0.59	0.66	2.0	1.0	1.1	0.63	0.76	2.7	0.38	1.3
26	0.65	0.72	0.73	0.46	3.0	0.96	0.96	0.54	0.52	3.9	0.30	1.2
27	0.58	0.73	0.87	0.48	2.5	3.5	1.1	0.52	0.60	1.3	0.32	1.1
28	0.55	1.2	1.1	0.46	3.8	2.4	1.1	0.51	1.3	0.91	0.37	0.97
29	0.60	5.4	0.84	0.48	---	6.8	1.1	0.46	0.72	0.62	0.30	0.95
30	0.63	0.98	0.64	9.4	---	6.1	1.00	0.46	0.58	0.52	0.41	0.99
31	1.1	---	0.56	20	---	2.9	---	0.44	---	0.51	0.28	---
TOTAL	31.02	38.17	26.87	50.52	104.59	74.20	55.86	23.25	15.46	20.65	14.72	204.27
MEAN	1.00	1.27	0.87	1.63	3.74	2.39	1.86	0.75	0.52	0.67	0.47	6.81
MAX	4.9	5.4	1.7	20	54	16	6.8	1.1	1.3	3.9	1.6	125
MIN	0.55	0.58	0.56	0.43	0.66	0.88	0.96	0.44	0.31	0.28	0.28	0.20
AC-FT	62	76	53	100	207	147	111	46	31	41	29	405

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1914 - 2003, BY WATER YEAR (WY)

MEAN	4.48	7.17	8.16	8.93	7.02	8.31	8.13	6.37	3.63	4.40	4.89	4.46
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	0.29	0.46	0.74	0.50	0.34	0.74	0.63	0.27	0.32	0.60	0.43	0.30
(WY)	(1985)	(1954)	(1977)	(1977)	(1978)	(1926)	(1926)	(1926)	(1966)	(1984)	(1984)	(1984)

16229000 KALIHI STREAM NEAR HONOLULU—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1914 - 2003	
ANNUAL TOTAL	1,933.20		659.58		6.31	
ANNUAL MEAN	5.30		1.81		13.5	
HIGHEST ANNUAL MEAN					1.81	1923
LOWEST ANNUAL MEAN						2003
HIGHEST DAILY MEAN	162	May 6	125	Sep 11	951	Jan 19, 1923
LOWEST DAILY MEAN	0.55	Oct 28	0.20	Sep 6	0.11	Jul 29, 1966
ANNUAL SEVEN-DAY MINIMUM	0.62	Dec 19	0.29	Aug 31	0.15	May 15, 1926
ANNUAL RUNOFF (AC-FT)	3,830		1,310		4,570	
10 PERCENT EXCEEDS	7.5		2.5		11	
50 PERCENT EXCEEDS	1.9		0.78		2.8	
90 PERCENT EXCEEDS	0.74		0.37		0.93	



HAWAII, ISLAND OF OAHU

16229300 KALIHI STREAM AT KALIHI

LOCATION.--Lat 21°20'29", long 157°52'36", Old Hawaiian Datum, 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.

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 M.T.J. Ball. Records poor.

AVERAGE DISCHARGE.--41 years (water years 1963-2003), 9.64 ft³/s (6,990 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, 0.00 ft³/s, October 13-14, 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 and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Sep 11	0145	*813	*3.68

Minimum daily discharge, 0.40 ft³/s (estimated) on many days.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.7	1.3	1.4	0.65	7.2	3.0	2.7	1.9	0.71	e0.73	e0.77	e0.42
2	3.4	1.4	1.4	0.58	3.7	3.1	2.5	1.7	0.46	e0.80	e0.89	e0.43
3	2.2	1.5	1.4	0.58	3.0	2.5	2.2	1.5	0.48	e0.73	e2.3	e0.40
4	1.8	0.96	0.96	0.53	2.6	2.2	7.1	1.5	0.53	e0.72	e1.2	e0.50
5	2.0	0.99	0.94	0.51	2.3	2.1	3.7	1.5	0.60	e0.71	e0.92	0.59
6	1.6	0.79	1.2	0.51	2.4	6.1	4.4	1.0	0.60	e0.51	e0.67	0.45
7	1.7	0.69	3.7	0.57	2.2	5.6	3.5	1.3	e0.57	e0.51	e0.47	1.3
8	1.4	0.69	1.2	0.61	2.2	2.4	2.7	1.2	e0.50	e0.47	e0.47	0.69
9	1.2	0.70	1.3	0.66	2.0	2.2	3.9	1.2	e0.50	e0.45	e0.47	0.48
10	0.92	0.71	1.1	0.67	1.8	2.1	4.1	1.8	e0.47	e0.49	e0.48	17
11	3.4	1.4	1.2	4.1	1.9	2.3	3.1	1.0	e0.45	e0.55	e0.51	154
12	1.7	2.5	2.2	1.6	3.0	2.5	3.3	1.1	e0.52	e0.40	e0.46	15
13	1.5	4.5	1.5	1.0	2.7	2.5	2.0	1.5	e0.55	e0.50	e0.47	6.8
14	3.9	1.5	1.0	1.5	61	2.4	1.2	1.7	e0.60	e0.49	e0.64	5.4
15	17	10	0.95	3.4	8.7	2.6	0.75	2.1	e0.65	e0.49	e0.67	4.0
16	2.7	5.5	1.0	1.5	4.6	16	2.1	1.1	e0.64	e0.97	e0.75	3.4
17	5.6	2.8	1.3	0.98	4.5	6.0	4.8	1.2	e0.64	e0.62	e0.85	2.7
18	2.6	2.4	0.87	1.4	4.2	3.4	3.1	1.0	e0.77	e0.63	e0.88	2.9
19	2.4	1.7	0.76	2.2	2.3	2.6	2.6	1.3	e1.2	e0.58	e0.85	2.2
20	1.7	1.4	0.70	3.4	2.8	2.5	8.5	0.94	e0.87	e0.72	e0.71	2.7
21	1.6	1.2	0.68	1.1	3.3	2.1	4.5	1.1	e0.70	e0.60	e0.63	2.6
22	1.8	1.0	0.70	0.82	3.9	1.9	8.1	0.90	e0.65	e0.48	e0.44	2.4
23	2.7	0.79	2.2	0.89	3.0	1.8	3.4	0.69	e0.68	e0.44	e0.56	2.4
24	4.0	0.82	1.1	1.7	3.3	1.6	3.5	0.67	e0.84	e1.0	e0.75	2.2
25	3.8	0.95	1.1	1.3	2.2	1.6	2.3	0.72	e1.1	e3.9	e0.55	2.2
26	1.6	0.91	1.00	0.72	4.4	1.4	1.9	0.94	e0.75	e5.7	e0.44	2.0
27	1.1	3.1	1.4	0.70	3.0	6.3	1.7	1.2	e0.87	e1.8	e0.45	1.9
28	0.92	1.2	2.3	0.74	4.9	4.1	1.7	0.81	e1.9	e1.3	e0.53	2.2
29	1.2	6.6	1.0	0.68	---	6.2	2.1	0.52	e1.0	e0.90	e0.43	1.6
30	1.2	2.1	0.81	6.4	---	13	1.8	0.62	e0.84	e0.75	e0.59	1.4
31	2.8	---	0.63	26	---	4.3	---	0.54	---	e0.74	e0.40	---
TOTAL	84.14	62.10	39.00	68.00	153.1	118.4	99.25	36.25	21.64	29.68	21.20	242.26
MEAN	2.71	2.07	1.26	2.19	5.47	3.82	3.31	1.17	0.72	0.96	0.68	8.08
MAX	17	10	3.7	26	61	16	8.5	2.1	1.9	5.7	2.3	154
MIN	0.92	0.69	0.63	0.51	1.8	1.4	0.75	0.52	0.45	0.40	0.40	0.40
AC-FT	167	123	77	135	304	235	197	72	43	59	42	481

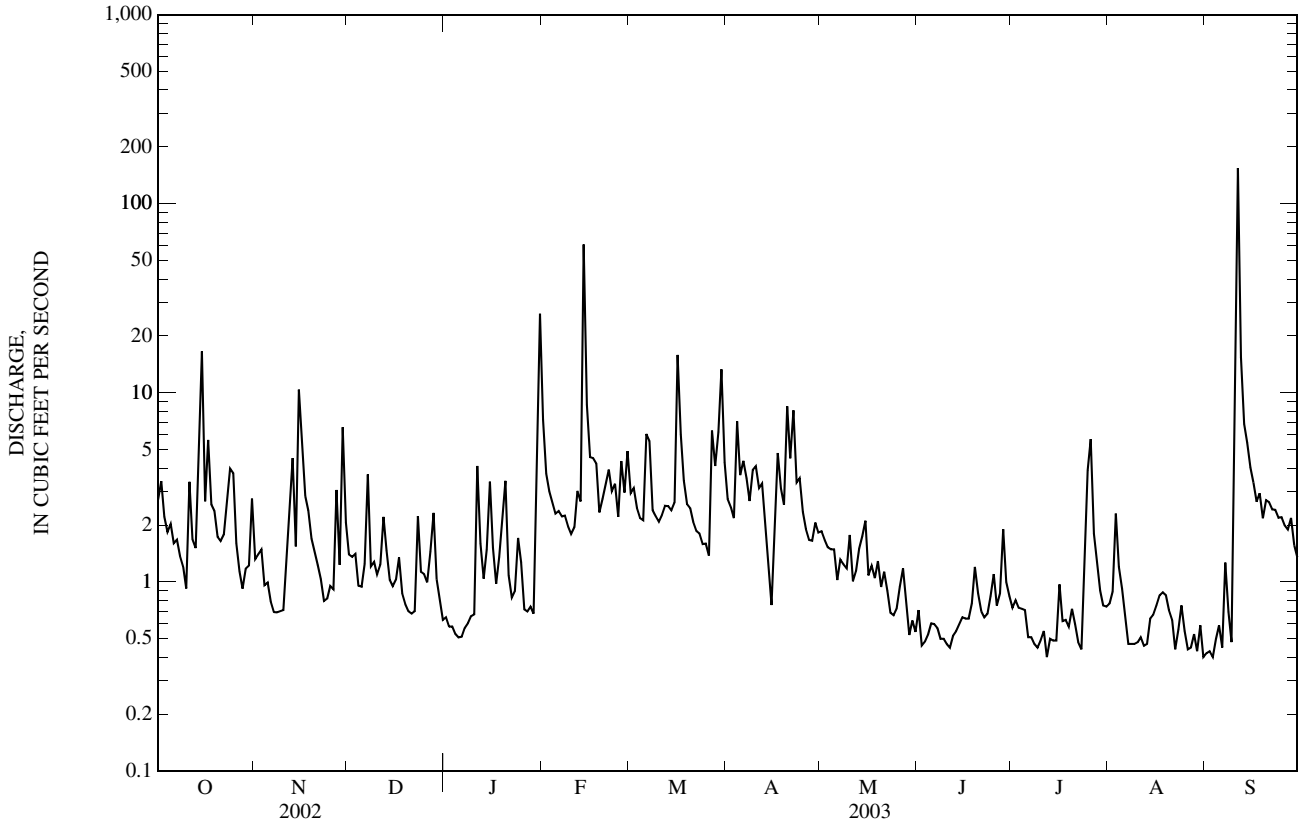
16229300 KALIHI STREAM AT KALIHI—Continued

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1962 - 2003, BY WATER YEAR (WY)												
MEAN	6.45	13.1	13.8	13.3	10.4	14.5	12.6	9.09	5.09	7.25	5.63	4.64
MAX (WY)	22.2 (1964)	49.2 (1966)	56.6 (1988)	45.8 (1982)	60.3 (1969)	73.2 (1968)	57.6 (1989)	40.9 (1965)	19.5 (1980)	29.3 (1970)	35.7 (1982)	20.4 (1992)
MIN (WY)	0.95 (1985)	2.07 (2003)	1.15 (1977)	0.82 (1977)	0.78 (1978)	1.15 (1983)	1.65 (1992)	1.17 (2003)	0.72 (2003)	0.96 (2003)	0.68 (2003)	0.64 (1984)

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1962 - 2003	
ANNUAL TOTAL	2,884.75		975.02			
ANNUAL MEAN	7.90		2.67		9.64	
HIGHEST ANNUAL MEAN					21.3 1982	
LOWEST ANNUAL MEAN					2.67 2003	
HIGHEST DAILY MEAN	237	Jan 26	154	Sep 11	781	Feb 1, 1969
LOWEST DAILY MEAN	0.63	Dec 31	0.40	Jul 12	0.05	Oct 14, 1999
ANNUAL SEVEN-DAY MINIMUM	0.79	Nov 4	0.45	Aug 29	0.36	Oct 14, 1984
ANNUAL RUNOFF (AC-FT)	5,720		1,930		6,990	
10 PERCENT EXCEEDS	12		4.1		17	
50 PERCENT EXCEEDS	2.8		1.3		3.6	
90 PERCENT EXCEEDS	1.1		0.51		1.2	

e Estimated



HAWAII, ISLAND OF OAHU

16240500 WAIAKEAKUA STREAM AT HONOLULU

LOCATION.--Lat 21°19'52", long 157°48'08", Old Hawaiian Datum, 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 B.H. Shimizu. Records fair except for estimated days, which are poor. 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.--85 years (water years 1914-20, 1926-2003), 4.82 ft³/s (3,490 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)
Sep 11	0230	*987	*4.13	No other peaks greater than base discharge			

Minimum discharge, 0.67 ft³/s, Sept. 6, gage height, 0.16 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.0	e2.1	1.5	1.3	2.6	2.3	1.5	1.3	1.0	1.2	1.0	0.92
2	2.5	e3.6	1.9	1.3	1.6	2.7	1.4	1.3	0.95	1.2	0.92	0.86
3	2.0	e2.5	1.9	1.3	1.4	1.9	1.3	1.3	0.99	1.1	2.0	0.83
4	1.7	e2.1	1.6	1.3	1.3	1.6	1.6	1.3	1.0	1.1	1.1	0.81
5	1.8	e1.9	1.5	1.3	1.3	1.6	1.3	1.3	1.0	1.3	1.2	0.81
6	1.8	e1.8	2.8	1.3	1.6	2.1	1.3	1.3	1.0	1.2	1.1	0.74
7	1.8	e1.7	2.0	1.3	1.3	4.2	2.7	2.3	1.0	1.0	0.95	1.7
8	e1.8	e1.5	1.4	1.3	1.3	1.7	1.4	1.8	1.0	0.97	0.94	0.85
9	e1.6	e1.5	1.3	1.3	1.3	1.8	3.0	1.7	1.0	0.91	0.96	0.75
10	e1.5	e1.4	1.3	1.3	1.3	1.5	2.8	2.0	1.0	1.0	0.91	14
11	e1.9	e3.6	2.1	3.1	1.4	1.5	1.8	1.5	1.0	1.2	0.91	72
12	e1.5	e4.4	2.7	1.4	1.6	1.4	1.6	1.4	1.0	1.1	0.90	3.0
13	e1.4	e3.2	1.6	1.3	1.6	1.3	1.4	1.4	1.0	1.8	0.95	3.4
14	e2.8	e2.2	1.3	1.4	25	1.3	1.3	1.4	1.1	1.2	1.3	2.5
15	e10	e8.7	1.2	2.4	2.7	1.3	1.4	1.9	1.1	1.3	0.95	1.9
16	e2.3	e4.4	1.1	1.4	1.5	18	1.4	1.4	1.2	3.3	0.85	1.7
17	e4.9	e2.8	1.0	1.3	1.3	2.5	2.3	1.3	1.3	1.5	0.88	1.6
18	e2.7	e2.5	1.0	1.3	1.2	1.5	1.5	1.3	1.2	1.3	0.88	1.7
19	e2.4	e2.5	0.91	1.3	1.3	1.3	1.6	1.3	1.5	1.4	0.83	1.5
20	e2.0	e2.0	0.91	1.6	1.5	1.5	3.5	1.2	1.2	2.8	0.93	1.4
21	e1.9	1.8	1.0	1.3	1.7	1.4	1.6	1.1	1.0	1.8	0.90	1.5
22	e1.7	1.8	1.1	1.3	2.5	1.3	1.7	1.2	1.0	1.4	1.2	1.3
23	e1.7	1.7	1.3	1.3	1.6	1.3	1.6	1.2	1.1	1.3	1.3	1.1
24	e3.6	1.6	1.2	1.3	1.8	1.3	1.9	1.1	1.5	1.5	2.4	1.1
25	e3.6	1.6	1.1	1.3	2.2	1.2	1.6	1.2	1.8	4.2	1.2	1.0
26	e2.1	1.4	2.0	1.3	2.8	1.2	1.5	1.1	1.2	5.9	0.98	1.1
27	e1.9	1.4	1.5	1.3	4.5	3.9	1.4	1.1	1.4	2.7	0.92	0.96
28	e1.7	3.4	1.5	1.3	3.8	2.2	1.4	1.1	2.2	1.6	0.95	0.91
29	e1.7	4.3	1.4	1.3	---	1.5	1.4	1.0	1.7	1.3	0.88	0.91
30	e1.7	1.7	1.3	5.4	---	4.1	1.3	1.0	1.4	1.1	1.1	0.87
31	e4.1	---	1.3	9.1	---	1.8	---	1.0	---	1.0	0.89	---
TOTAL	76.1	77.1	45.72	55.7	75.0	74.2	51.5	41.8	35.84	51.68	33.18	123.72
MEAN	2.45	2.57	1.47	1.80	2.68	2.39	1.72	1.35	1.19	1.67	1.07	4.12
MAX	10	8.7	2.8	9.1	25	18	3.5	2.3	2.2	5.9	2.4	72
MIN	1.4	1.4	0.91	1.3	1.2	1.2	1.3	1.0	0.95	0.91	0.83	0.74
AC-FT	151	153	91	110	149	147	102	83	71	103	66	245

16240500 WAIAKEAKUA STREAM AT HONOLULU—Continued

DISCHARGE, CUBIC FEET PER SECOND—CONTINUED
 WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
 DAILY MEAN VALUES

DAY OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1913 - 2003, BY WATER YEAR (WY)

MEAN	4.14	5.19	5.24	4.90	4.42	5.32	5.56	5.06	4.11	4.85	4.74	4.14
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	0.87	1.19	0.87	1.07	1.27
(WY)	(1946)	(1934)	(1920)	(1977)	(1920)	(1926)	(1926)	(1926)	(2003)	(1926)	(2003)	(1984)

SUMMARY STATISTICS

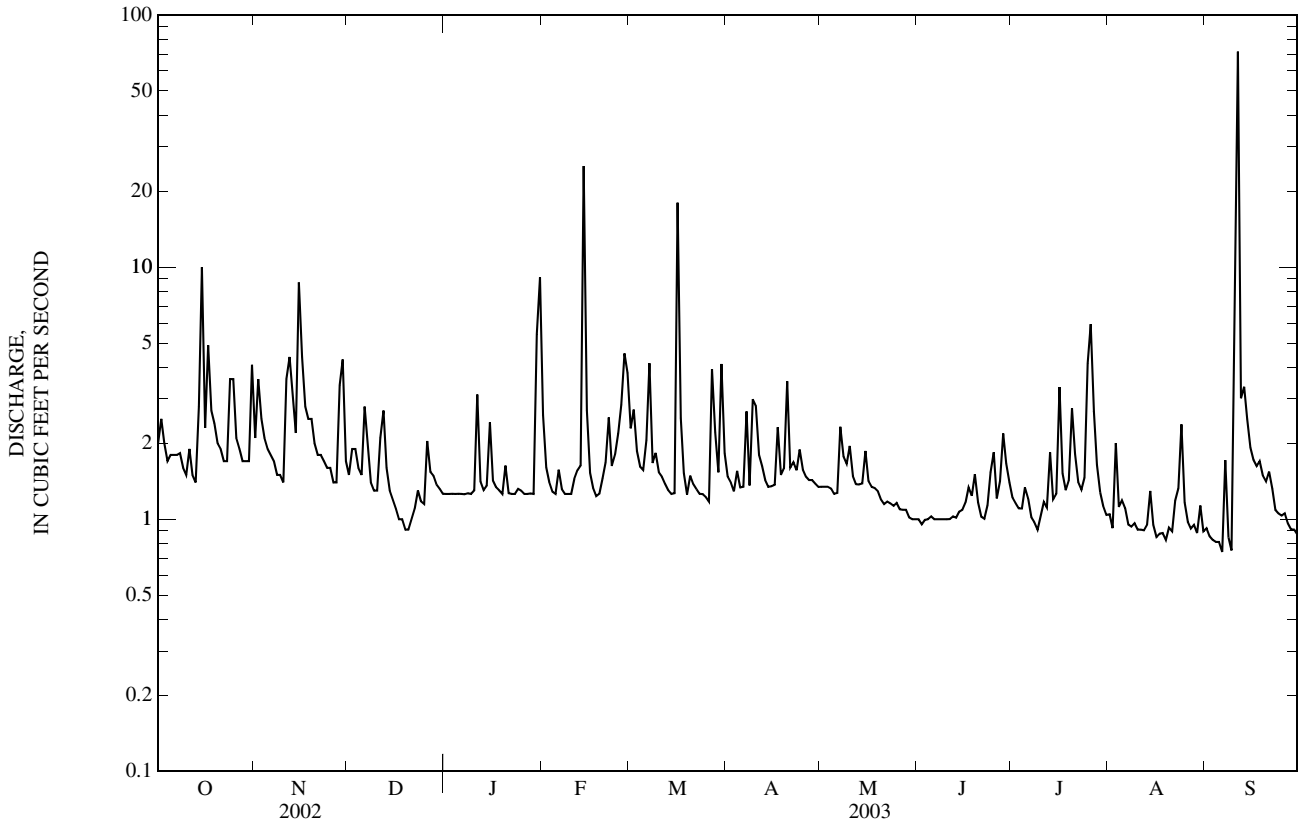
FOR 2002 CALENDAR YEAR

FOR 2003 WATER YEAR

WATER YEARS 1913 - 2003

ANNUAL TOTAL	1,394.52		741.54			
ANNUAL MEAN	3.82		2.03		4.82	
HIGHEST ANNUAL MEAN					8.23	
LOWEST ANNUAL MEAN					1.94	
HIGHEST DAILY MEAN	80	Jan 29	72	Sep 11	183	Mar 24, 1994
LOWEST DAILY MEAN	0.91	Dec 19	0.74	Sep 6	0.62	Feb 26, 1920
ANNUAL SEVEN-DAY MINIMUM	1.0	Dec 16	0.84	Aug 31	0.75	May 23, 1926
ANNUAL RUNOFF (AC-FT)	2,770		1,470		3,490	
10 PERCENT EXCEEDS	5.2		2.8		8.0	
50 PERCENT EXCEEDS	2.6		1.4		3.5	
90 PERCENT EXCEEDS	1.7		0.98		1.7	

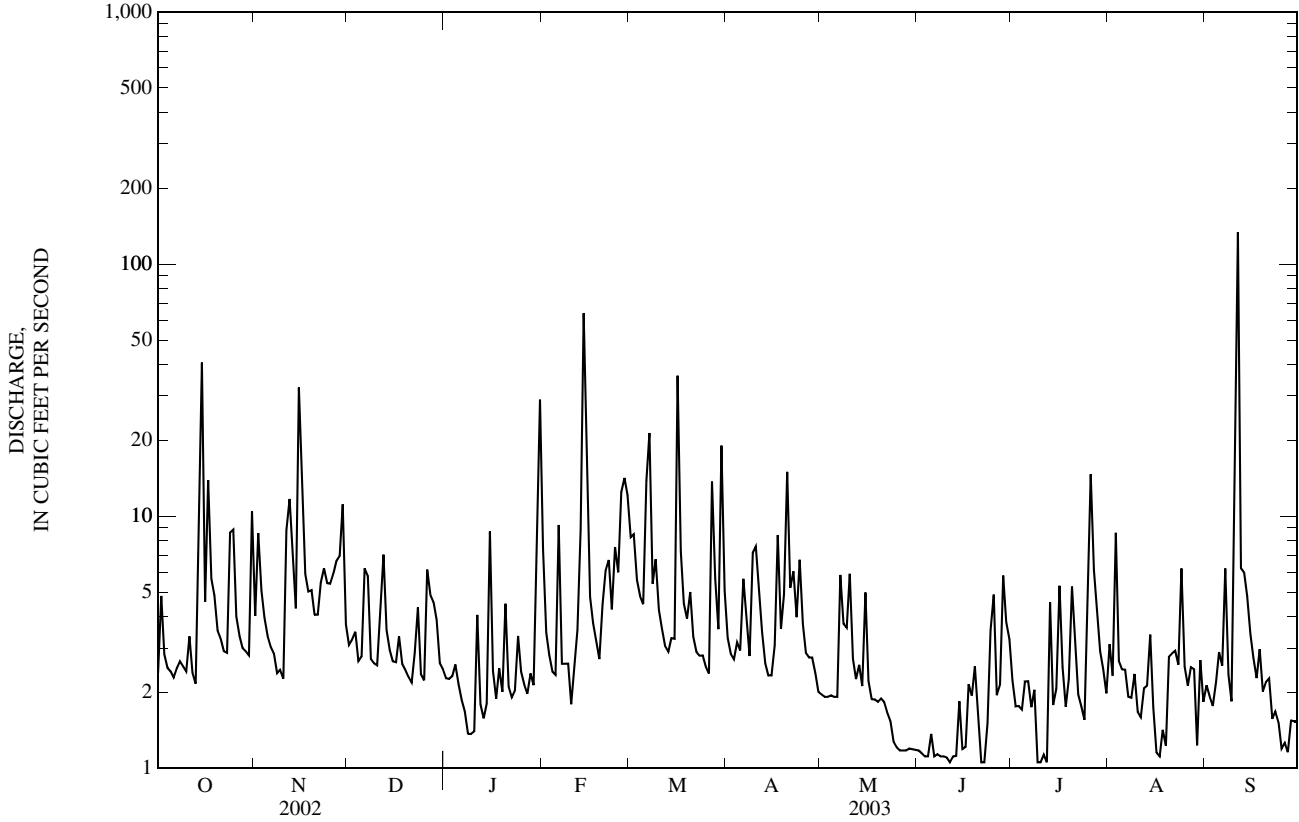
e Estimated



16242500 MANOA STREAM AT KANEWAI FIELD—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1999 - 2003	
ANNUAL TOTAL	3,307.6		1,672.7			
ANNUAL MEAN	9.06		4.58		8.41	
HIGHEST ANNUAL MEAN					10.8	2000
LOWEST ANNUAL MEAN					4.58	2003
HIGHEST DAILY MEAN	239	Jan 29	134	Sep 11	239	Jan 29, 2002
LOWEST DAILY MEAN	2.2	Oct 13	1.1	Jun 2	1.1	Jun 2, 2003
ANNUAL SEVEN-DAY MINIMUM	2.5	Oct 4	1.1	Jun 6	1.1	Jun 6, 2003
ANNUAL RUNOFF (AC-FT)	6,560		3,320		6,090	
10 PERCENT EXCEEDS	13		7.4		14	
50 PERCENT EXCEEDS	4.9		2.7		4.8	
90 PERCENT EXCEEDS	2.8		1.4		2.3	

e Estimated



HAWAII, ISLAND OF OAHU

16247100 MANOA-PALOLO DRAINAGE CANAL AT MOILILI

LOCATION.--Lat 21°17'24", long 157°49'17", Old Hawaiian Datum, Hydrologic Unit 20060000, on left bank at Kaimuki High School, and 0.3 mi downstream from confluence of Manoa and Palolo Streams, and 0.6 mi upstream from point of discharge into Ala Wai Canal.

DRAINAGE AREA.--10.6 mi².

PERIOD OF RECORD.--Annual maximum, water years 1968-99. October 1, 1999 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 5 ft above mean sea level (from topographic map). October 1, 1967 to November 29, 1972 crest-stage gage at site 1,800 feet upstream at same datum. November 29, 1972 to current year crest-stage gage at site 160 feet upstream at same datum.

REMARKS.--Records computed by H.A. Jeppesen and R.I. Taogoshi. Records poor due to tidal backwater.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,100 ft³/s, December 18, 1967, gage height, 12.60 feet, site then in use, from slope-area measurement of peak flow; minimum daily discharge, e1.6 ft³/s, August 16-17, 2003.

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

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Oct 15	0159	1,150	4.61	Sep 11	0245	*2320	*612

Minimum daily discharge, 1.6 ft³/s (estimated) Aug 16-17 2003.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e4.0	e4.4	e3.6	e2.6	e15	e11	e5.2	e2.9	e1.7	e4.4	e3.4	e2.5
2	e6.6	e10	e3.4	e2.4	e6.2	e10	e4.4	e2.9	e1.7	e3.9	e3.0	e2.2
3	e4.4	e5.6	e3.8	e2.4	e4.7	e6.7	e3.9	e2.8	e1.7	e4.0	e11	e2.1
4	e4.1	e4.6	e3.0	e2.6	e4.1	e5.2	e5.3	e2.8	e1.7	e2.4	e3.4	e2.4
5	e4.0	e3.7	e3.6	e2.7	e3.8	e5.0	e4.2	e2.6	e1.8	e2.8	e3.3	e2.8
6	e3.8	e3.6	e6.2	e2.2	e20	e21	e9.9	e2.6	e1.7	e3.1	e3.0	e2.5
7	e3.9	e3.4	e7.3	e2.2	e4.4	e39	e6.3	e7.6	e1.7	e2.6	e2.6	e6.6
8	e3.9	e3.3	e3.2	e2.2	e3.1	e7.9	e3.8	e5.0	e1.7	e3.5	e2.3	e2.5
9	e3.7	e3.2	e2.9	e2.1	e2.8	e10	e9.5	e4.9	e1.8	e3.4	e2.7	e2.0
10	e3.7	e3.1	e2.8	e2.1	e2.6	e6.6	e9.7	e7.0	e1.8	e3.3	e2.1	e43
11	e5.7	e11	e4.1	e6.6	e3.2	e5.4	e6.9	e3.5	e1.8	e4.6	e2.0	e264
12	e3.9	e17	e8.4	e3.1	e4.2	e4.3	e4.7	e3.1	e1.8	e3.7	e2.4	e8.5
13	e3.4	e11	e3.9	e2.5	e16	e4.1	e3.9	e3.2	e1.9	e7.3	e2.5	e8.7
14	e7.3	e5.3	e3.1	e6.6	e134	e3.7	e3.4	e3.0	e3.1	e4.0	e3.9	e6.6
15	e67	e42	e2.9	e20	e23	e3.7	e3.3	e5.7	e2.2	e5.0	e2.2	e4.7
16	e6.0	e14	e2.8	e3.6	e8.7	e68	e4.5	e3.1	e2.4	e11	e1.6	e3.9
17	e25	e8.0	e3.5	e2.6	e5.9	e12	e10	e2.8	e3.3	e5.7	e1.6	e3.3
18	e6.1	e6.3	e2.9	e2.5	e4.3	e6.3	e8.6	e2.7	e3.6	e2.8	e1.9	e4.0
19	e5.7	e5.8	e2.6	e2.5	e3.6	e4.8	e10	e2.7	e5.1	e3.6	e1.6	e2.9
20	e4.0	e4.5	e2.5	e17	e5.1	e5.6	e22	e2.7	e3.1	e7.9	e2.9	e3.0
21	e3.8	e4.0	e2.5	e2.5	e8.7	e4.2	e8.0	e2.5	e3.0	e6.1	e2.9	e3.2
22	e3.5	e3.7	e2.6	e2.4	e9.6	e3.8	e6.8	e2.5	e3.5	e3.5	e3.4	e2.4
23	e3.4	e3.5	e6.0	e2.5	e6.2	e3.5	e4.9	e2.4	e5.3	e3.1	e3.3	e2.3
24	e16	e3.4	e2.7	e4.4	e11	e3.4	e7.9	e2.3	e11	e2.8	e7.6	e2.1
25	e12	e3.3	e2.4	e2.8	e8.0	e3.3	e4.3	e2.2	e8.7	e7.8	e3.1	e1.8
26	e4.3	e3.2	e5.6	e2.3	e19	e3.4	e3.8	e2.1	e4.5	e27	e2.5	e1.9
27	e3.8	e3.9	e5.2	e2.4	e22	e28	e3.6	e1.9	e5.5	e10	e2.7	e1.7
28	e3.5	e3.9	e4.2	e6.6	e16	e10	e3.3	e1.8	e12	e7.2	e2.8	e2.0
29	e3.3	e23	e3.7	e2.3	---	e5.8	e3.2	e1.8	e8.8	e5.3	e1.7	e2.0
30	e3.2	e4.6	e2.8	e17	---	e38	e3.0	e1.7	e6.8	e4.0	e3.1	e1.9
31	e13	---	e2.6	e52	---	e9.5	---	e1.7	---	e3.5	e2.2	---
TOTAL	246.0	226.3	116.8	187.7	375.2	353.2	188.3	96.5	114.7	169.3	94.7	399.5
MEAN	7.94	7.54	3.77	6.05	13.4	11.4	6.28	3.11	3.82	5.46	3.05	13.3
MAX	67	42	8.4	52	134	68	22	7.6	12	27	11	264
MIN	3.2	3.1	2.4	2.1	2.6	3.3	3.0	1.7	1.7	2.4	1.6	1.7
AC-FT	488	449	232	372	744	701	373	191	228	336	188	792

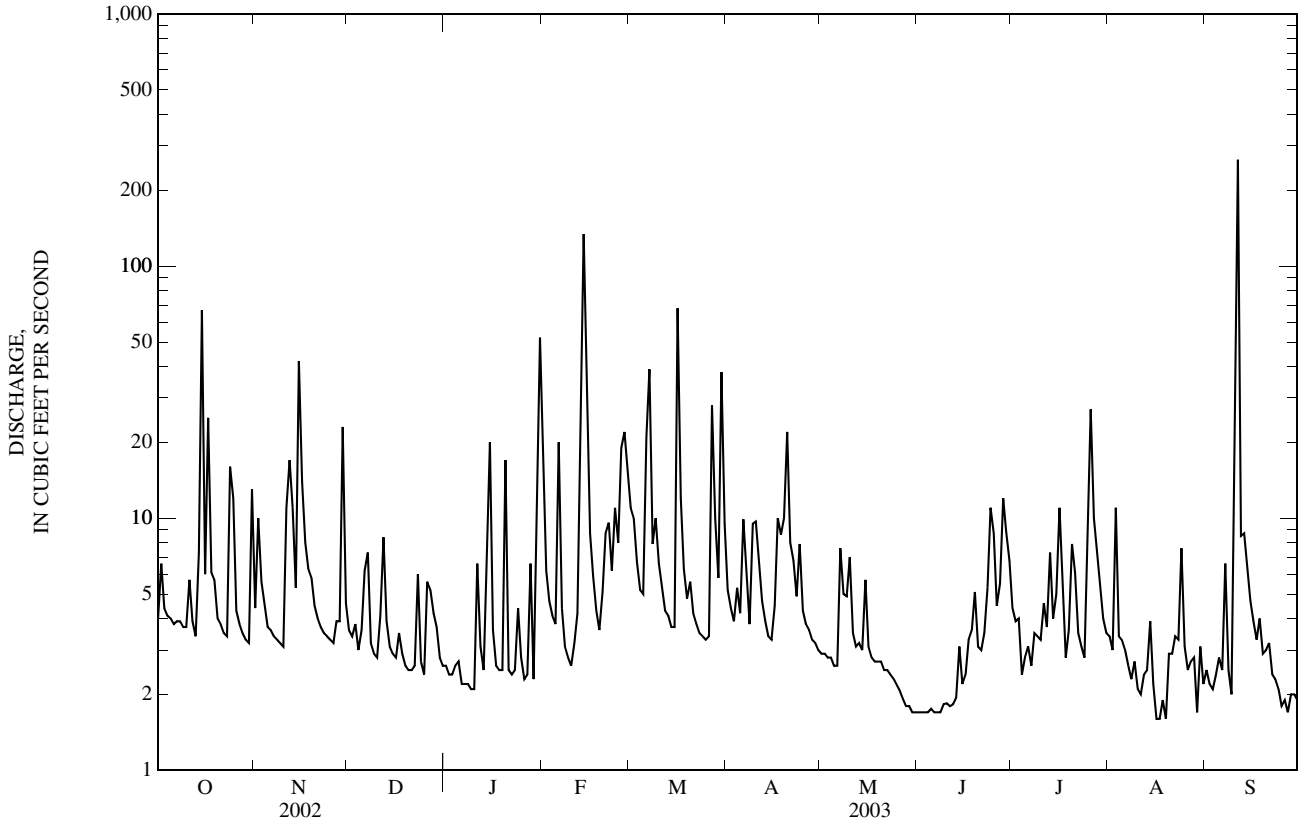
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1999 - 2003, BY WATER YEAR (WY)

MEAN	9.42	13.9	11.9	22.0	14.2	10.4	11.8	10.4	7.21	10.7	9.35	10.8
MAX	11.4	19.9	26.8	40.5	23.8	18.2	21.0	23.9	12.6	17.5	13.1	16.9
(WY)	(2001)	(2002)	(2000)	(2002)	(2002)	(2002)	(2000)	(2002)	(2001)	(1999)	(2000)	(2000)
MIN	7.46	7.54	3.77	6.05	6.08	5.16	6.28	3.11	3.82	5.24	3.05	6.04
(WY)	(2000)	(2003)	(2003)	(2003)	(2000)	(2000)	(2003)	(2003)	(2003)	(2001)	(2003)	(2001)

16247100 MANOA-PALOLO DRAINAGE CANAL AT MOILILI—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1999 - 2003	
ANNUAL TOTAL	5,043.5		2,568.2		11.7	
ANNUAL MEAN	13.8		7.04		7.04	
HIGHEST ANNUAL MEAN					15.7	2002
LOWEST ANNUAL MEAN					7.04	2003
HIGHEST DAILY MEAN	416	Jan 29	264	Sep 11	416	Jan 29, 2002
LOWEST DAILY MEAN	2.4	Dec 25	1.6	Aug 16	1.6	Aug 16, 2003
ANNUAL SEVEN-DAY MINIMUM	2.8	Dec 16	1.7	May 29	1.7	May 29, 2003
ANNUAL RUNOFF (AC-FT)	10,000		5,090		8,470	
10 PERCENT EXCEEDS	23		11		20	
50 PERCENT EXCEEDS	6.9		3.7		6.2	
90 PERCENT EXCEEDS	3.5		2.1		3.1	

e Estimated



16244000 PUKELE STREAM NEAR HONOLULU

LOCATION.--Lat 21°18'35", long 157°47'30", Old Hawaiian Datum, Hydrologic Unit 20060000, on right bank 200 ft upstream from bridge on Palolo Avenue, 0.6 mi upstream from confluence with Waiomao Stream, and 4.8 mi east of Honolulu Post Office.

DRAINAGE AREA.--1.18 mi².

PERIOD OF RECORD.--June 1926 to September 1982, October 2002 to current year.

REVISED RECORDS.--WSP 835: 1930(M). WSP 1569: Drainage area. WSP 1639: 1927-29(M), 1931(M), 1932(M), 1933-34(M). WSP 1719: 1935(M), 1937-40(M), 1942(M), 1948-59(P).

GAGE.--Water-stage recorder and V-notch. Datum of gage is 344.78 ft above mean sea level (Honolulu Board of Water Supply benchmark).

REMARKS.--Records computed by H.A. Jeppesen. Records fair. No diversion above station.

AVERAGE DISCHARGE.--57 years (water years 1926-82, 2003), 1.92 ft³/s (1,390 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,600 ft³/s, April 11, 1930, gage height, 7.75 ft, from floodmarks, from rating curve extended above 71 ft³/s by test of model of station site; minimum, 0.08 ft³/s, Oct. 31, 1929.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 140 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Sep 11	0145	*439	*4.45	No other peak greater than base discharge.			

Minimum discharge, 0.12 ft³/s, on Jan 7, Sept 2-10, gage height, 0.82 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.26	0.26	0.32	0.20	0.84	0.53	0.35	0.25	0.16	0.15	0.15	0.14
2	0.26	0.26	0.31	0.19	0.34	0.59	0.34	0.24	0.16	0.15	0.15	0.14
3	0.25	0.26	0.31	0.17	0.32	0.53	0.37	0.23	0.17	0.15	0.17	0.13
4	0.24	0.27	0.29	0.18	0.31	0.53	0.40	0.22	0.16	0.15	0.16	0.13
5	0.24	0.28	0.26	0.18	0.30	0.50	0.38	0.22	0.15	0.15	0.15	0.13
6	0.24	0.29	0.27	0.18	0.35	0.64	0.37	0.22	0.15	0.15	0.15	0.13
7	0.24	0.29	0.28	0.18	0.34	2.4	0.36	0.22	0.15	0.15	0.15	0.14
8	0.24	0.29	0.26	0.19	0.32	0.51	0.33	0.22	0.15	0.14	0.15	0.13
9	0.24	0.26	0.26	0.19	0.31	0.49	0.31	0.22	0.15	0.14	0.15	0.13
10	0.24	0.26	0.25	0.19	0.31	0.39	0.33	0.22	0.14	0.14	0.14	1.9
11	0.24	0.26	0.26	0.19	0.31	0.42	0.32	0.21	0.14	0.14	0.14	33
12	0.24	0.61	0.26	0.19	0.30	0.45	0.32	0.21	0.14	0.14	0.14	e3.0
13	0.24	0.35	0.25	0.19	0.30	0.47	0.34	0.20	0.15	0.14	0.14	e1.2
14	0.24	0.33	0.22	0.20	23	0.43	0.34	0.20	0.15	0.14	0.14	e0.61
15	1.4	1.3	0.22	0.22	1.6	0.43	0.34	0.20	0.15	0.14	0.14	e0.32
16	0.30	0.49	0.22	0.21	0.42	8.9	0.34	0.20	0.15	0.14	0.14	e0.29
17	0.32	0.35	0.22	0.20	0.38	0.83	0.34	0.20	0.15	0.14	0.14	e0.27
18	0.29	0.34	0.22	0.20	0.36	0.43	0.34	0.20	0.15	0.14	0.14	e0.28
19	0.29	0.31	0.22	0.20	0.36	0.40	0.31	0.18	0.15	0.14	0.14	e0.25
20	0.28	0.32	0.22	0.20	0.39	0.38	0.33	0.18	0.15	0.14	0.14	e0.23
21	0.26	0.31	0.22	0.20	0.46	0.42	0.31	0.18	0.15	0.14	0.14	e0.26
22	0.26	0.31	0.22	0.20	0.67	0.39	0.29	0.17	0.15	0.14	0.14	e0.22
23	0.26	0.30	0.22	0.20	0.43	0.40	0.29	0.17	0.15	0.14	0.14	e0.18
24	0.27	0.29	0.20	0.20	0.42	0.34	0.28	0.17	0.15	0.14	0.14	e0.18
25	0.29	0.29	0.20	0.20	0.39	0.33	0.27	0.17	0.16	0.14	0.14	e0.17
26	0.28	0.29	0.21	0.20	0.44	0.34	0.26	0.17	0.15	0.22	0.14	e0.18
27	0.26	0.31	0.22	0.20	1.3	1.5	0.26	0.17	0.15	0.21	0.14	e0.16
28	0.26	0.57	0.22	0.20	0.72	1.0	0.26	0.17	0.16	0.17	0.14	e0.15
29	0.26	3.0	0.22	0.20	---	0.35	0.26	0.17	0.16	0.15	0.14	e0.15
30	0.26	0.35	0.20	2.7	---	2.4	0.26	0.17	0.15	0.15	0.14	e0.15
31	0.26	---	0.20	8.0	---	0.57	---	0.17	---	0.15	0.14	---
TOTAL	9.21	13.40	7.45	16.35	35.99	28.29	9.60	6.12	4.55	4.62	4.46	44.35
MEAN	0.30	0.45	0.24	0.53	1.29	0.91	0.32	0.20	0.15	0.15	0.14	1.48
MAX	1.4	3.0	0.32	8.0	23	8.9	0.40	0.25	0.17	0.22	0.17	33
MIN	0.24	0.26	0.20	0.17	0.30	0.33	0.26	0.17	0.14	0.14	0.14	0.13
AC-FT	18	27	15	32	71	56	19	12	9.0	9.2	8.8	88

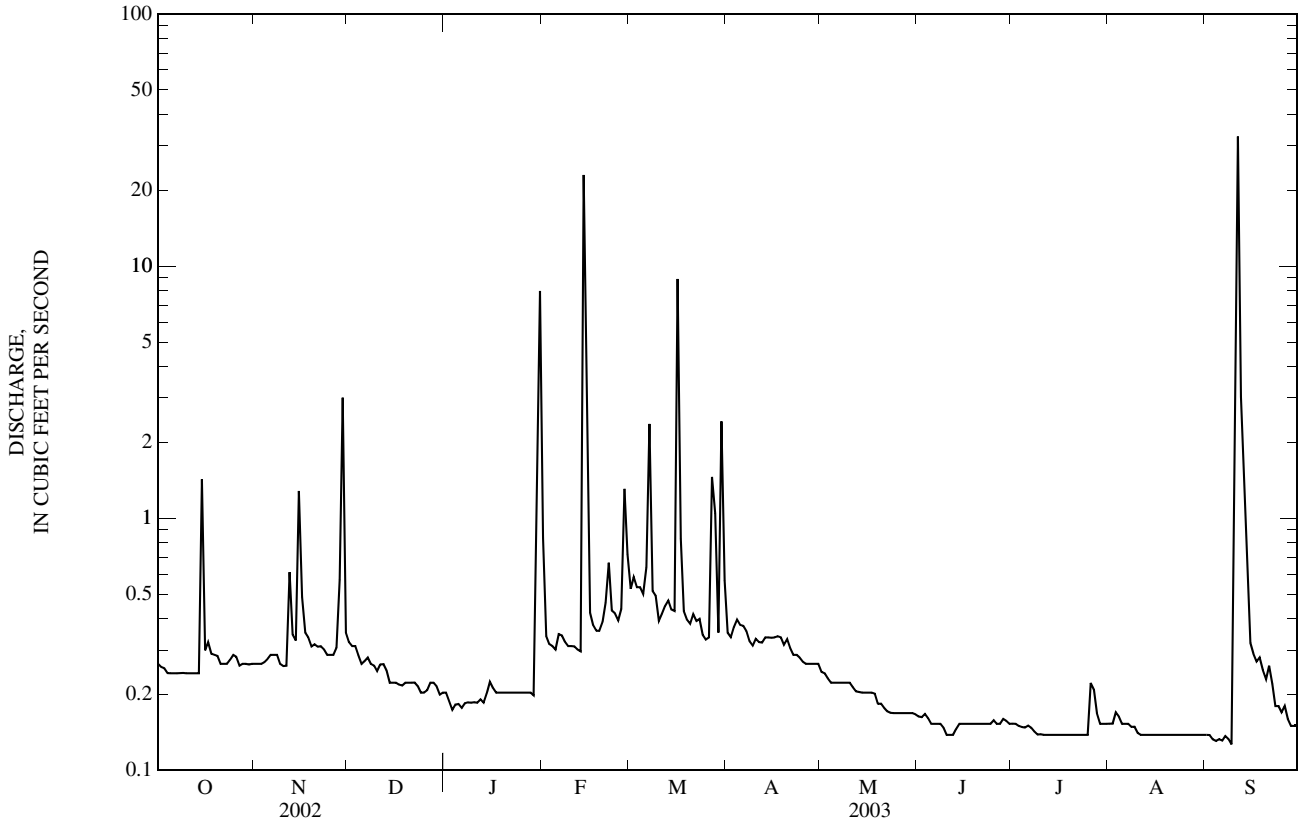
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1926 - 2003, BY WATER YEAR (WY)

MEAN	1.35	2.32	2.41	2.45	2.22	2.82	2.47	2.18	1.05	1.26	1.44	0.98
MAX	6.01	25.8	10.5	11.6	12.1	14.0	7.66	9.46	3.61	4.58	7.85	5.45
(WY)	(1937)	(1966)	(1930)	(1943)	(1932)	(1951)	(1927)	(1938)	(1954)	(1958)	(1931)	(1931)
MIN	0.16	0.12	0.24	0.23	0.23	0.24	0.32	0.20	0.15	0.13	0.14	0.22
(WY)	(1946)	(1946)	(2003)	(1973)	(1978)	(1978)	(2003)	(2003)	(2003)	(1945)	(2003)	(1975)

16244000 PUKELE STREAM NEAR HONOLULU—Continued

SUMMARY STATISTICS	FOR 2	003 WATER YEAR	WATER YEARS 1926 - 2003	
ANNUAL TOTAL		84.39		
ANNUAL MEAN		0.51	1.92	
HIGHEST ANNUAL MEAN			3.78	1966
LOWEST ANNUAL MEAN			0.51	2003
HIGHEST DAILY MEAN	33	Sep 11	155	Mar 5, 1958
LOWEST DAILY MEAN		0.13	0.08	Oct 31, 1929
ANNUAL SEVEN-DAY MINIMUM		0.13	0.09	Oct 26, 1929
ANNUAL RUNOFF (AC-FT)		66	1,390	
10 PERCENT EXCEEDS		0.45	3.3	
50 PERCENT EXCEEDS		0.22	0.77	
90 PERCENT EXCEEDS		0.14	0.31	

e Estimated



HAWAII, ISLAND OF OAHU

16254000 MAKAWAO STREAM NEAR KAILUA

LOCATION.--Lat 21°21'49", long 157°46'02", Old Hawaiian Datum, Hydrologic Unit 20060000, on left bank 650 ft upstream of confluence with Maunawili Stream, 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 M.T.J. Ball. Records fair. Maunawili ditch diverts ground and surface water 1.5 mi upstream of station at elevation 920 ft for irrigation in vicinity of Waimanalo.

AVERAGE DISCHARGE.--47 years (water years 1914-15, 1959-2003), 4.82 ft³/s (3,490 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)
Feb 14	0515	*464	*5.22	No other peak greater than base discharge.			

Minimum daily discharge, 1.2 ft³/s on many days.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.3	1.2	e1.9	e1.9	4.4	3.2	4.2	2.6	2.1	1.5	1.3	1.7
2	1.3	1.2	e1.8	e2.0	2.9	3.3	3.7	2.5	2.0	1.5	1.3	1.5
3	1.2	1.4	e1.8	e1.9	2.5	3.0	3.5	2.3	1.7	1.5	1.7	1.4
4	1.2	1.4	e1.7	e1.8	2.6	2.7	4.0	2.4	1.7	1.6	1.5	1.4
5	1.4	1.2	e1.9	e2.0	2.5	2.7	3.4	2.2	1.7	1.9	1.6	1.3
6	1.5	1.3	e2.0	e1.9	2.8	2.6	3.8	2.3	1.8	1.9	1.6	1.5
7	1.5	1.2	e2.0	e1.9	2.3	4.9	15	2.3	1.8	1.7	1.6	2.0
8	1.3	1.2	e1.9	e1.9	2.0	3.0	5.2	2.3	2.0	1.5	1.6	1.7
9	1.2	1.2	e1.9	e1.8	2.2	3.6	4.5	2.2	2.0	1.4	1.6	1.5
10	1.2	1.4	e1.9	e2.1	2.3	3.1	4.0	2.5	1.8	1.4	1.8	3.1
11	1.2	1.6	e2.5	e4.0	2.2	2.6	3.2	2.7	1.9	1.4	1.7	25
12	1.3	2.3	e2.2	e2.2	2.1	2.4	3.2	2.5	1.8	1.5	1.3	3.1
13	1.5	1.5	e1.9	e1.9	2.7	2.3	3.3	2.5	1.8	1.7	1.5	3.1
14	1.8	1.4	e1.9	e2.8	68	2.3	3.1	2.3	1.8	1.4	1.5	2.9
15	5.1	1.9	e1.9	e3.1	8.2	2.4	2.9	2.5	2.1	1.4	1.6	2.3
16	1.6	1.7	e1.9	e2.4	5.1	13	3.0	2.3	2.1	1.6	1.7	2.0
17	1.9	1.5	e1.9	e2.1	4.1	4.4	3.1	2.2	1.7	1.4	1.7	2.0
18	1.6	1.4	e1.8	e2.0	3.3	3.0	3.1	2.5	1.7	1.3	1.6	1.7
19	1.5	1.3	e1.8	e2.0	3.1	2.7	3.1	2.3	1.7	1.4	1.4	1.7
20	1.5	1.2	e1.8	e3.8	3.7	2.9	3.1	2.1	1.6	1.9	1.5	1.6
21	1.5	1.3	e1.8	e2.2	3.4	2.8	2.8	2.0	1.6	1.7	1.5	2.0
22	1.5	1.2	e1.8	e1.9	3.7	2.5	2.8	2.0	1.8	1.4	1.3	1.7
23	1.5	1.4	e1.9	e2.0	3.5	2.7	2.8	1.9	1.6	1.4	1.3	1.7
24	1.7	1.5	e2.0	e1.9	3.2	2.7	2.6	1.9	1.6	1.4	1.6	1.6
25	1.8	1.5	e2.0	1.7	3.0	2.6	2.4	2.2	1.6	1.6	1.5	1.4
26	1.5	1.3	e2.1	1.7	2.9	2.3	2.3	2.2	1.6	3.2	1.2	1.5
27	1.6	e2.0	e2.0	2.1	3.4	9.5	2.4	2.1	1.6	2.2	1.2	1.6
28	1.6	e2.4	e2.3	1.6	3.2	6.0	2.3	1.8	1.8	1.9	1.5	1.6
29	1.3	e4.5	e2.2	1.6	---	5.3	2.4	2.0	1.8	1.5	1.4	1.5
30	1.2	e1.3	e2.0	10	---	9.6	2.5	1.9	1.7	1.4	1.3	1.4
31	1.4	---	e1.9	7.9	---	5.3	---	1.8	---	1.4	1.5	---
TOTAL	48.7	46.9	60.4	80.1	155.3	121.4	107.7	69.3	53.5	50.0	46.4	78.5
MEAN	1.57	1.56	1.95	2.58	5.55	3.92	3.59	2.24	1.78	1.61	1.50	2.62
MAX	5.1	4.5	2.5	10	68	13	15	2.7	2.1	3.2	1.8	25
MIN	1.2	1.2	1.7	1.6	2.0	2.3	2.3	1.8	1.6	1.3	1.2	1.3
AC-FT	97	93	120	159	308	241	214	137	106	99	92	156

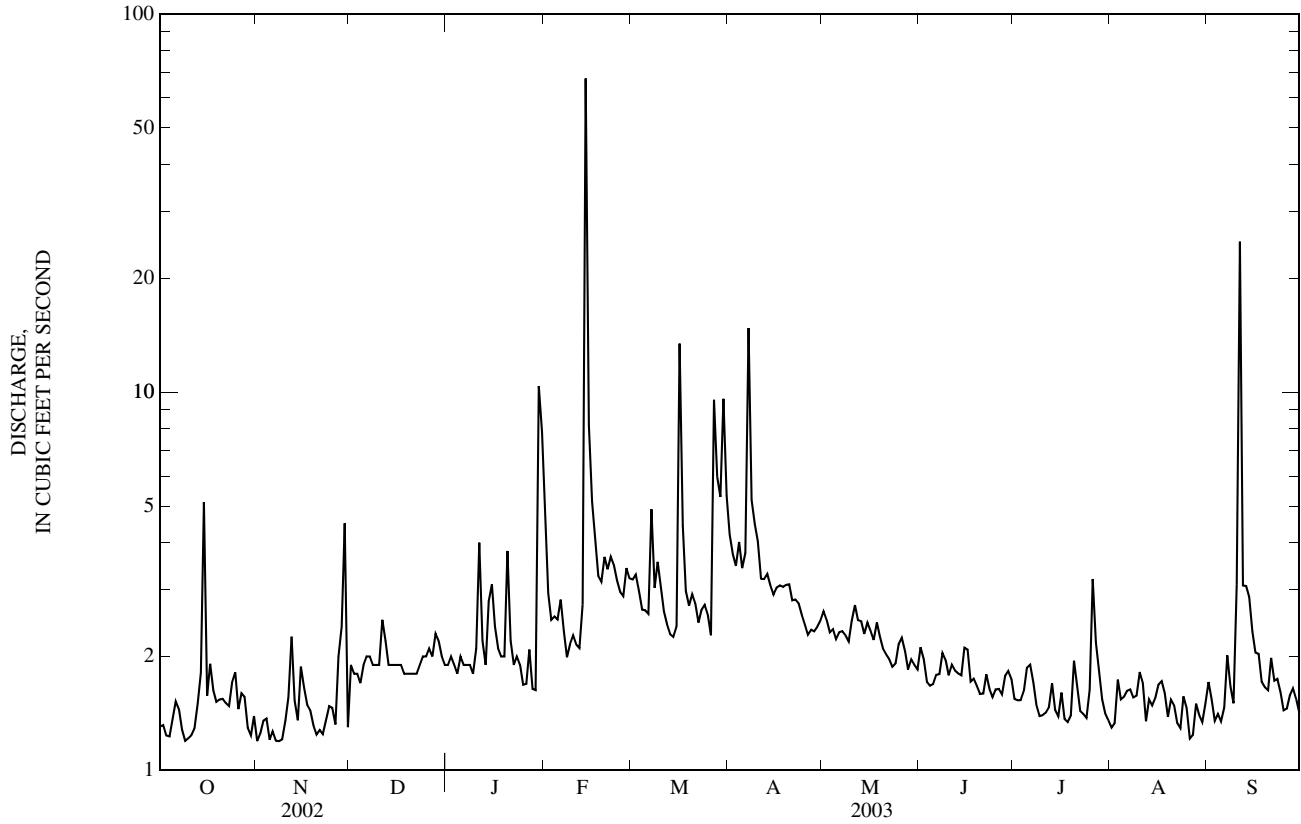
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1913 - 2003, BY WATER YEAR (WY)

MEAN	2.87	5.32	6.53	7.99	6.70	7.19	6.27	5.08	3.20	2.63	2.48	2.42
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	0.99	1.22	1.24	1.11	1.25	1.17	1.40	1.15	1.16	1.10	1.00
(WY)	(1976)	(1963)	(1978)	(1973)	(1978)	(1978)	(2001)	(1973)	(1973)	(2001)	(2001)	(1975)

16254000 MAKAWAO STREAM NEAR KAILUA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1913 - 2003	
ANNUAL TOTAL	1,129.9		918.2		4.82	
ANNUAL MEAN	3.10		2.52		11.1	
HIGHEST ANNUAL MEAN					1.31	
LOWEST ANNUAL MEAN					1973	
HIGHEST DAILY MEAN	63	Jan 29	68	Feb 14	518	Dec 31, 1987
LOWEST DAILY MEAN	1.2	Oct 3	1.2	Oct 3	0.50	Sep 8, 1964
ANNUAL SEVEN-DAY MINIMUM	1.3	Nov 1	1.3	Nov 1	0.67	Sep 8, 1964
ANNUAL RUNOFF (AC-FT)	2,240		1,820		3,490	
10 PERCENT EXCEEDS	4.7		3.3		8.2	
50 PERCENT EXCEEDS	2.0		1.9		2.7	
90 PERCENT EXCEEDS	1.4		1.4		1.4	

e Estimated



HAWAII, ISLAND OF OAHU

16272200 KAMOOALII STREAM BELOW LULUKU STREAM NEAR KANEOHE

LOCATION.--Lat 21°23'47", long 157°48'23", Old Hawaiian Datum, 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 B.H. Shimizu. Records good. Flow regulated by a flood-control dam upstream.

AVERAGE DISCHARGE.--26 years (water years 1977-2003), 9.95 ft³/s (7,210 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,760 ft³/s, January 25, 1996, gage height, 5.72 ft, from rating curve extended above 200 ft³/s; minimum, 0.22 ft³/s, September 25-26, 2000.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 360 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Feb 14	0600	*481	*3.74	No other peak greater than base discharge.			

Minimum discharge, 0.90 ft³/s, Jan. 14, gage height, 1.18 ft, result of maintenance work on upstream dam release outlet.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

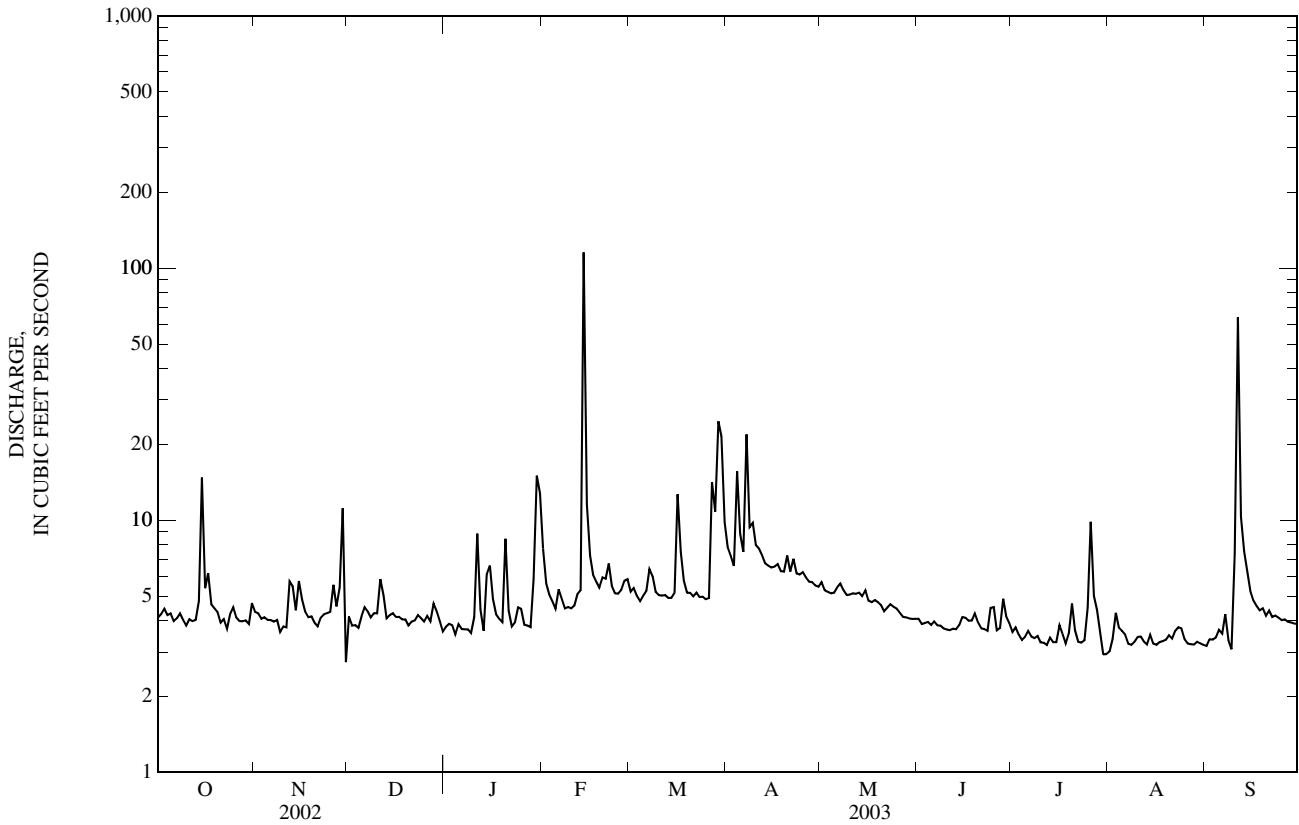
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.1	4.3	4.2	3.8	7.7	5.2	7.8	5.7	4.1	3.6	3.0	3.2
2	4.2	4.3	3.8	3.9	5.6	5.4	7.2	5.3	3.9	3.8	3.4	3.4
3	4.5	4.1	3.8	3.8	5.1	5.0	6.6	5.2	3.9	3.5	4.3	3.4
4	4.2	4.1	3.7	3.5	4.8	4.8	16	5.1	4.0	3.4	3.8	3.4
5	4.3	4.0	4.2	3.9	4.5	5.0	8.8	5.2	3.8	3.4	3.6	3.7
6	4.0	4.0	4.5	3.7	5.3	5.3	7.5	5.4	4.0	3.6	3.5	3.6
7	4.1	4.0	4.3	3.7	4.9	6.4	22	5.6	3.8	3.5	3.2	4.2
8	4.3	4.0	4.1	3.7	4.5	6.0	9.4	5.3	3.8	3.4	3.2	3.3
9	4.0	3.6	4.3	3.6	4.5	5.2	9.8	5.1	3.7	3.5	3.3	3.1
10	3.8	3.8	4.3	4.1	4.5	5.0	8.0	5.1	3.7	3.3	3.4	7.4
11	4.0	3.8	5.8	8.8	4.6	5.0	7.7	5.1	3.7	3.3	3.5	64
12	4.0	5.7	5.0	4.4	5.1	5.0	7.3	5.1	3.7	3.2	3.3	10
13	4.0	5.5	4.1	3.6	5.3	4.9	6.7	5.2	3.7	3.4	3.2	7.5
14	4.8	4.4	4.2	6.1	115	4.9	6.6	5.0	3.8	3.3	3.5	6.3
15	15	5.7	4.3	6.6	12	5.2	6.5	5.3	4.1	3.3	3.2	5.2
16	5.4	4.8	4.1	4.9	7.2	13	6.5	4.8	4.1	3.8	3.2	4.8
17	6.2	4.3	4.1	4.2	6.1	7.5	6.7	4.7	4.0	3.5	3.3	4.6
18	4.6	4.1	4.0	4.1	5.7	5.8	6.3	4.8	4.0	3.2	3.3	4.4
19	4.5	4.2	4.0	3.9	5.4	5.2	6.3	4.7	4.3	3.5	3.4	4.5
20	4.3	3.9	3.8	8.4	5.9	5.2	7.2	4.6	3.9	4.7	3.5	4.2
21	3.9	3.8	4.0	4.4	5.9	5.0	6.3	4.4	3.7	3.7	3.4	4.4
22	4.1	4.1	4.0	3.8	6.7	5.2	7.0	4.5	3.7	3.3	3.6	4.1
23	3.7	4.2	4.2	3.9	5.5	5.0	6.1	4.6	3.6	3.3	3.8	4.2
24	4.2	4.3	4.1	4.5	5.1	5.0	6.1	4.5	4.5	3.3	3.7	4.1
25	4.5	4.3	4.0	4.5	5.1	4.9	6.2	4.5	4.5	4.5	3.4	4.0
26	4.1	5.5	4.2	3.9	5.3	4.9	5.9	4.3	3.7	9.9	3.2	4.0
27	4.0	4.6	4.0	3.8	5.7	14	5.7	4.1	3.7	5.0	3.2	4.0
28	4.0	5.4	4.7	3.8	5.8	11	5.7	4.1	4.9	4.4	3.2	3.9
29	4.0	11	4.4	5.8	---	25	5.5	4.1	4.2	3.6	3.3	3.9
30	3.9	2.7	4.0	15	---	22	5.4	4.1	3.9	2.9	3.2	3.9
31	4.7	---	3.6	13	---	9.8	---	4.1	---	2.9	3.2	---
TOTAL	143.4	136.5	129.8	159.1	268.8	226.8	230.8	149.6	118.4	117.0	105.3	194.7
MEAN	4.63	4.55	4.19	5.13	9.60	7.32	7.69	4.83	3.95	3.77	3.40	6.49
MAX	15	11	5.8	15	115	25	22	5.7	4.9	9.9	4.3	64
MIN	3.7	2.7	3.6	3.5	4.5	4.8	5.4	4.1	3.6	2.9	3.0	3.1
AC-FT	284	271	257	316	533	450	458	297	235	232	209	386

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1977 - 2003, BY WATER YEAR (WY)

MEAN	7.44	10.4	11.2	14.1	11.6	12.6	11.5	10.1	8.19	7.32	6.82	6.82
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	3.29	4.02	4.05	3.83	4.03	3.82	3.44	2.65	2.75	2.89	2.27
(WY)	(1985)	(2000)	(2002)	(1977)	(1978)	(1978)	(2001)	(2000)	(2000)	(2001)	(2001)	(2001)

16272200 KAMOOALII STREAM BELOW LULUKU STREAM NEAR KANEOHE—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1977 - 2003	
ANNUAL TOTAL	2,793.0		1,980.2			
ANNUAL MEAN	7.65		5.43		9.95	
HIGHEST ANNUAL MEAN					22.0	1982
LOWEST ANNUAL MEAN					4.32	2001
HIGHEST DAILY MEAN	150	May 6	115	Feb 14	723	Jan 1, 1988
LOWEST DAILY MEAN	2.7	Nov 30	2.7	Nov 30	0.29	Oct 10, 1984
ANNUAL SEVEN-DAY MINIMUM	3.2	Jan 11	3.2	Aug 26	0.30	Oct 10, 1984
ANNUAL RUNOFF (AC-FT)	5,540		3,930		7,210	
10 PERCENT EXCEEDS	10		6.7		16	
50 PERCENT EXCEEDS	5.4		4.3		6.9	
90 PERCENT EXCEEDS	3.9		3.4		3.7	



HAWAII, ISLAND OF OAHU

16275000 HAIKU STREAM NEAR HEEIA

LOCATION.--Lat 21°24'45", long 157°49'35", Old Hawaiian Datum, 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 B.H. Shimizu. Records fair except for estimated days which are poor. Honolulu Board of Water Supply has diverted ground water from tunnel in drainage area since 1943.

AVERAGE DISCHARGE (since diversion from tunnel began).--55 years (water years 1944-77, 1983-2003), 2.18 ft³/s, (1,580 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 280 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Sep 11	0145	*495	*3.53	No other peak greater than base discharge			

Minimum daily discharge, 1.2 ft³/s, on several days

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.4	1.4	1.5	1.4	2.9	1.6	2.0	1.5	e1.4	e1.3	e1.2	e1.2
2	1.4	1.4	1.5	1.4	2.0	1.7	1.9	1.5	e1.3	e1.3	e1.3	e1.2
3	1.4	1.4	1.4	1.4	1.7	1.6	1.8	1.5	e1.3	e1.3	e1.5	e1.2
4	1.4	1.4	1.4	1.3	1.6	1.5	3.2	1.6	e1.4	e1.2	e1.3	e1.2
5	1.4	1.4	1.4	1.3	1.6	1.5	2.5	1.6	e1.4	e1.2	e1.3	e1.3
6	1.4	1.4	1.4	1.3	1.6	1.5	2.1	1.6	e1.4	e1.3	e1.3	e1.2
7	1.4	1.4	1.4	1.3	1.5	1.5	3.5	1.6	e1.3	e1.2	e1.2	e1.4
8	1.4	1.4	1.4	1.3	1.5	1.5	4.5	1.4	e1.3	e1.2	e1.2	e1.2
9	1.4	1.4	1.4	1.3	1.5	1.5	3.9	1.5	e1.3	e1.2	e1.2	e1.2
10	1.4	1.4	1.4	1.4	1.5	1.4	1.6	1.5	e1.3	e1.2	e1.2	e5.0
11	1.4	1.4	1.4	2.2	1.5	1.4	1.5	1.5	e1.3	e1.2	e1.2	65
12	1.4	1.5	1.4	1.9	1.5	1.4	1.6	1.5	e1.3	e1.2	e1.2	e2.9
13	1.4	1.5	1.4	1.5	1.5	1.4	1.6	1.5	e1.3	e1.2	e1.2	e2.4
14	1.4	1.5	1.4	1.5	2.9	1.4	1.6	1.5	e1.3	e1.2	e1.3	e1.9
15	3.1	1.6	1.4	1.7	4.7	1.4	1.6	1.5	e1.4	e1.2	e1.2	e1.6
16	1.8	1.7	1.4	1.7	2.6	5.3	1.6	e1.5	e1.4	e1.3	e1.2	e1.5
17	1.6	1.6	1.4	1.6	2.1	2.6	1.6	e1.5	e1.4	e1.3	e1.2	e1.5
18	1.5	1.5	1.4	1.5	2.0	1.8	1.6	e1.5	e1.4	e1.2	e1.2	e1.4
19	1.4	1.4	1.4	1.5	1.8	1.6	1.6	e1.5	e1.4	e1.3	e1.2	e1.4
20	1.4	1.4	1.4	1.7	1.8	1.6	1.6	e1.5	e1.3	e1.5	e1.2	e1.4
21	1.4	1.4	1.4	1.6	1.8	1.5	1.6	e1.4	e1.3	e1.3	e1.2	e1.4
22	1.4	1.4	1.4	1.5	1.7	1.5	1.6	e1.5	e1.3	e1.2	e1.3	e1.4
23	1.4	1.4	1.4	1.5	1.7	1.5	1.6	e1.5	e1.3	e1.2	e1.3	e1.4
24	1.4	1.4	1.4	1.5	1.7	1.5	1.6	e1.5	e1.5	e1.2	e1.3	e1.3
25	1.4	1.4	1.4	1.4	1.6	1.5	1.6	e1.5	e1.5	e1.5	e1.2	e1.3
26	1.4	1.4	1.4	1.4	1.6	1.5	1.5	e1.4	e1.3	e3.4	e1.2	e1.3
27	1.4	1.4	1.4	1.4	1.7	3.6	1.5	e1.4	e1.3	e1.7	e1.2	e1.3
28	1.4	1.5	1.4	1.4	1.7	3.3	1.5	e1.4	e1.5	e1.6	e1.2	e1.3
29	1.4	3.4	1.4	1.4	---	2.9	1.5	e1.4	e1.4	e1.4	e1.2	e1.3
30	1.4	1.9	1.4	4.8	---	3.4	1.5	e1.4	e1.3	e1.2	e1.2	e1.3
31	1.4	---	1.4	6.5	---	2.4	---	e1.4	---	e1.2	e1.2	---
TOTAL	45.8	45.7	43.6	54.6	79.4	59.8	58.4	46.1	40.6	41.9	38.3	110.4
MEAN	1.48	1.52	1.41	1.76	2.84	1.93	1.95	1.49	1.35	1.35	1.24	3.68
MAX	3.1	3.4	1.5	6.5	29	5.3	4.5	1.6	1.5	3.4	1.5	65
MIN	1.4	1.4	1.4	1.3	1.5	1.4	1.5	1.4	1.3	1.2	1.2	1.2
AC-FT	91	91	86	108	157	119	116	91	81	83	76	219

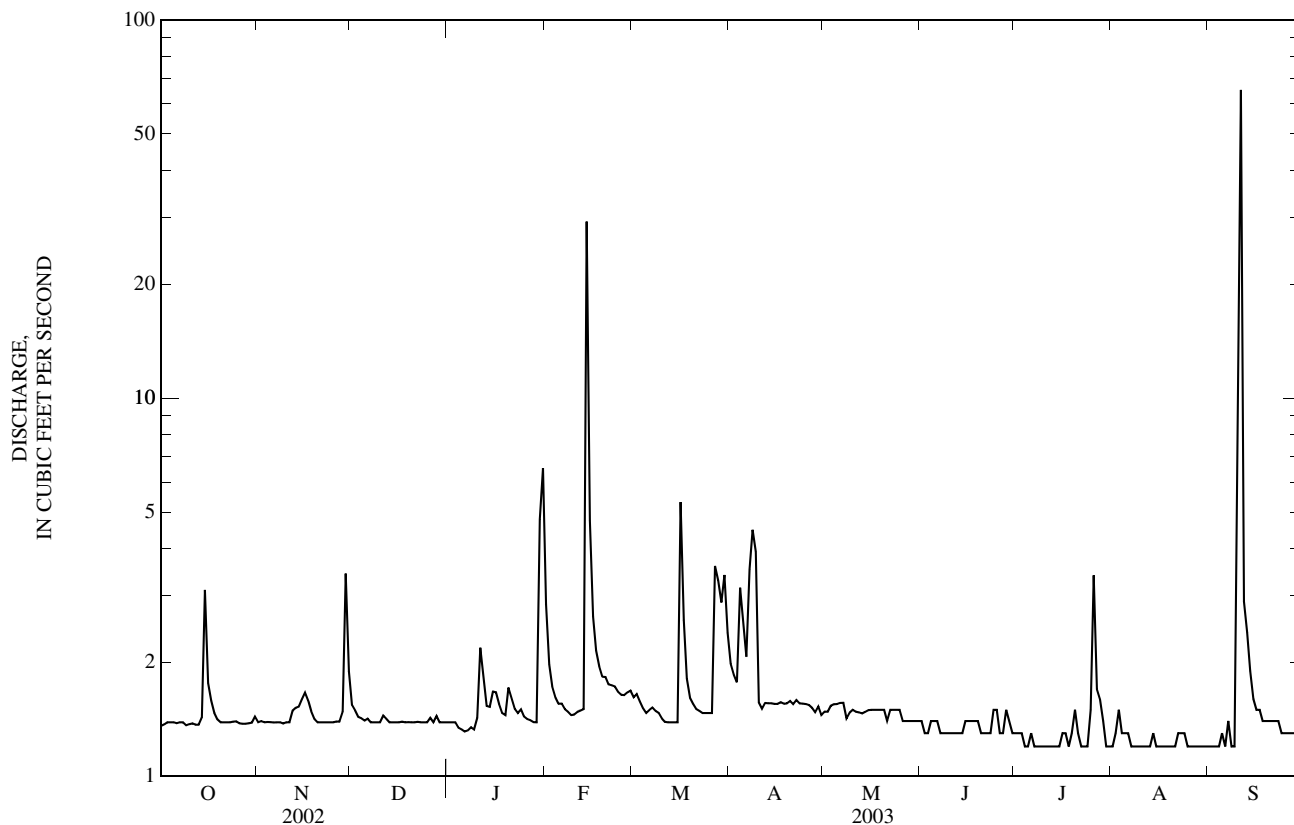
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1944 - 2003, BY WATER YEAR (WY)

MEAN	1.89	2.69	2.60	2.63	2.47	3.15	2.47	2.31	1.41	1.55	1.57	1.49
MAX	11.6	15.7	9.72	9.68	10.7	16.5	13.0	27.3	2.34	3.25	4.24	3.68
(WY)	(1959)	(1966)	(1988)	(1949)	(1955)	(1958)	(1989)	(1965)	(1989)	(1989)	(1967)	(2003)
MIN	0.32	0.33	0.64	0.94	0.86	0.60	0.50	0.51	0.38	0.41	0.56	0.36
(WY)	(1946)	(1946)	(1960)	(1977)	(1963)	(1946)	(1946)	(1961)	(1946)	(1945)	(1961)	(1945)

16275000 HAIKU STREAM NEAR HEEIA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1944 - 2003	
ANNUAL TOTAL	783.0		664.6		2.18	
ANNUAL MEAN	2.15		1.82		4.82 1965	
HIGHEST ANNUAL MEAN					0.67 1946	
LOWEST ANNUAL MEAN					620 May 2, 1965	
HIGHEST DAILY MEAN	52	May 6	65	Sep 11		
LOWEST DAILY MEAN	1.2	Jan 9	1.2	Jul 4	0.29 Jul 13, 1945	
ANNUAL SEVEN-DAY MINIMUM	1.2	Jan 9	1.2	Jul 7	0.29 Oct 19, 1945	
ANNUAL RUNOFF (AC-FT)	1,550		1,320		1,580	
10 PERCENT EXCEEDS	2.2		1.8		2.6	
50 PERCENT EXCEEDS	1.6		1.4		1.5	
90 PERCENT EXCEEDS	1.4		1.2		0.94	

e Estimated



HAWAII, ISLAND OF OAHU

16283200 KAHALUU STREAM NEAR AHUIMANU

LOCATION.--Lat 21°26'32", long 157°50'47", Old Hawaiian Datum, 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 Heeiea Elementary School.

DRAINAGE AREA.--0.84 mi².

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

REVISED RECORDS.--WDR HI-01-1: Drainage Area.

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

REMARKS.--Records computed by B. Shimizu. Records good. 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.--20 years (water years 1984-2003), 2.99 ft³/s (2,170 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 741 ft³/s march 16, 2002, gage height, 4.70 ft; maximum gage height, 6.05 ft, September 18, 1994; minimum discharge, 0.47 ft³/s on October 20-27, 2001.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 399 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Feb 14	0530	435	3.58	Sep 11	0300	*464	*3.68

Minimum discharge, 0.81 ft³/s, on several days, gage height, 1.12 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

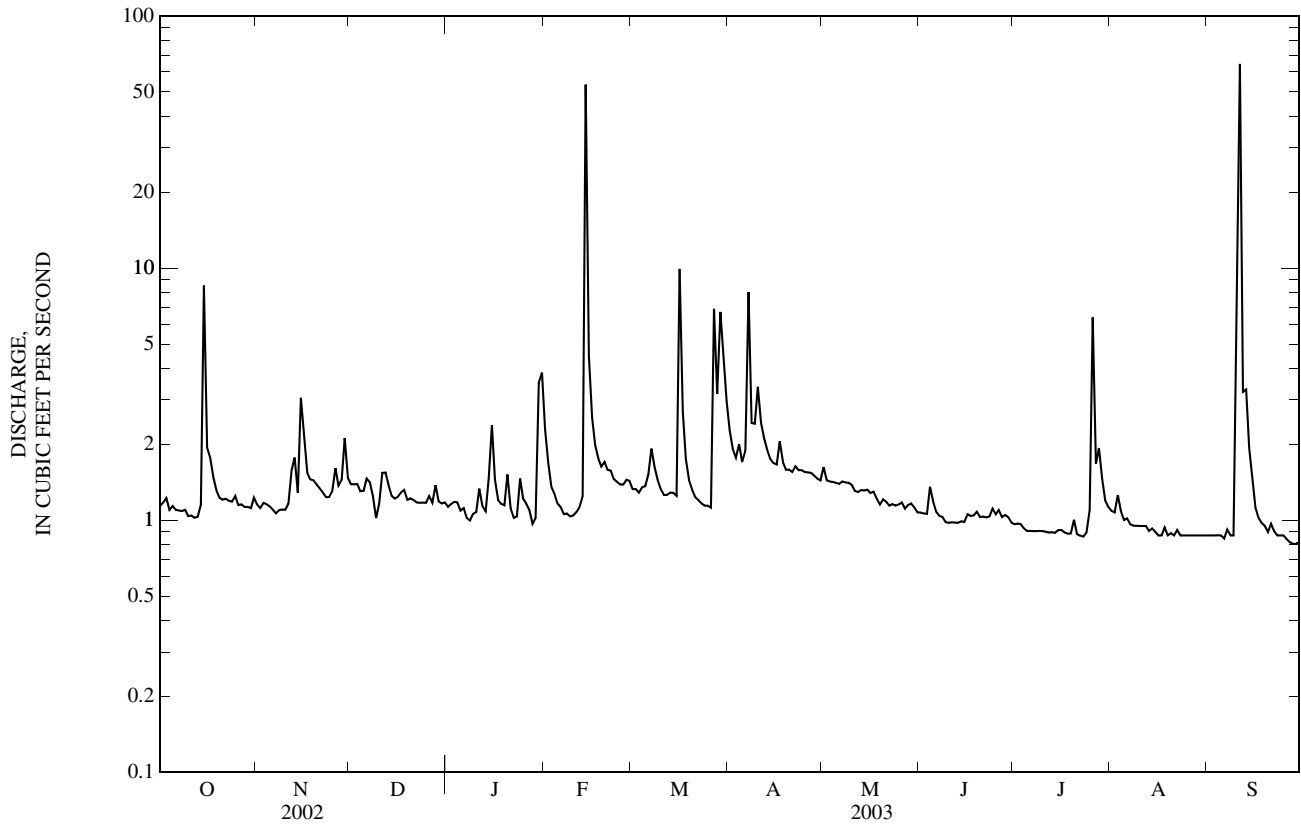
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.1	1.2	1.4	1.1	2.3	1.3	2.3	1.6	1.1	0.96	1.1	0.87
2	1.2	1.1	1.4	1.2	1.7	1.3	1.9	1.4	1.1	0.97	1.1	0.87
3	1.2	1.2	1.4	1.2	1.4	1.3	1.8	1.4	1.1	0.97	1.3	0.87
4	1.1	1.2	1.3	1.2	1.3	1.4	2.0	1.4	1.4	0.93	1.1	0.87
5	1.1	1.1	1.3	1.1	1.2	1.4	1.7	1.4	1.2	0.91	1.0	0.87
6	1.1	1.1	1.5	1.1	1.1	1.5	1.9	1.4	1.1	0.91	1.0	0.85
7	1.1	1.1	1.4	1.0	1.1	1.9	8.0	1.4	1.0	0.91	0.96	0.92
8	1.1	1.1	1.2	1.00	1.1	1.6	2.4	1.4	1.0	0.91	0.95	0.87
9	1.1	1.1	1.0	1.1	1.0	1.4	2.4	1.4	0.98	0.91	0.95	0.87
10	1.0	1.1	1.2	1.1	1.0	1.3	3.4	1.4	0.98	0.91	0.95	18
11	1.0	1.2	1.5	1.3	1.1	1.3	2.4	1.3	0.98	0.90	0.95	64
12	1.0	1.6	1.5	1.1	1.1	1.3	2.1	1.3	0.98	0.89	0.95	3.2
13	1.0	1.8	1.4	1.1	1.2	1.3	1.9	1.3	0.98	0.90	0.91	3.3
14	1.2	1.3	1.2	1.5	53	1.3	1.8	1.3	0.99	0.89	0.93	1.9
15	8.5	3.1	1.2	2.4	4.5	1.2	1.7	1.3	0.98	0.91	0.90	1.4
16	1.9	2.1	1.2	1.4	2.6	9.9	1.7	1.3	1.1	0.91	0.87	1.1
17	1.8	1.5	1.3	1.2	2.0	2.7	2.1	1.3	1.0	0.89	0.87	1.0
18	1.5	1.5	1.3	1.2	1.8	1.8	1.7	1.2	1.0	0.88	0.94	0.98
19	1.3	1.4	1.2	1.1	1.6	1.4	1.6	1.2	1.1	0.89	0.87	0.95
20	1.2	1.4	1.2	1.5	1.7	1.3	1.6	1.2	1.0	1.0	0.89	0.90
21	1.2	1.3	1.2	1.1	1.6	1.2	1.6	1.2	1.0	0.88	0.87	0.97
22	1.2	1.3	1.2	1.0	1.6	1.2	1.6	1.1	1.0	0.87	0.91	0.90
23	1.2	1.2	1.2	1.0	1.5	1.2	1.6	1.2	1.0	0.86	0.87	0.87
24	1.2	1.2	1.2	1.5	1.4	1.1	1.6	1.1	1.1	0.89	0.87	0.87
25	1.2	1.3	1.2	1.2	1.4	1.1	1.6	1.2	1.1	1.1	0.87	0.87
26	1.1	1.6	1.2	1.2	1.4	1.1	1.5	1.2	1.1	6.4	0.87	0.84
27	1.2	1.4	1.2	1.1	1.4	6.9	1.5	1.1	1.0	1.7	0.87	0.82
28	1.1	1.4	1.4	0.97	1.4	3.2	1.5	1.1	1.0	1.9	0.87	0.81
29	1.1	2.1	1.2	1.0	---	6.7	1.5	1.2	1.0	1.5	0.87	0.81
30	1.1	1.5	1.2	3.5	---	4.7	1.4	1.1	0.98	1.2	0.87	0.81
31	1.2	---	1.2	3.8	---	3.0	---	1.1	---	1.1	0.87	---
TOTAL	44.3	42.5	39.5	42.27	95.5	69.3	61.8	39.5	31.35	36.75	29.10	113.16
MEAN	1.43	1.42	1.27	1.36	3.41	2.24	2.06	1.27	1.04	1.19	0.94	3.77
MAX	8.5	3.1	1.5	3.8	53	9.9	8.0	1.6	1.4	6.4	1.3	64
MIN	1.0	1.1	1.0	0.97	1.0	1.1	1.4	1.1	0.98	0.86	0.87	0.81
AC-FT	88	84	78	84	189	137	123	78	62	73	58	224

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1984 - 2003, BY WATER YEAR (WY)

MEAN	2.72	3.35	3.23	3.41	3.33	3.72	3.13	3.02	2.39	2.59	2.35	2.70
MAX	6.69	10.6	9.56	8.65	7.55	11.8	10.6	7.27	4.78	5.89	5.78	5.81
(WY)	(1992)	(1991)	(1988)	(1988)	(1989)	(1991)	(1989)	(2002)	(1991)	(1989)	(1991)	(1992)
MIN	0.61	1.15	0.86	0.80	1.03	0.77	0.84	0.85	0.73	0.67	0.67	0.55
(WY)	(2002)	(2001)	(2001)	(2001)	(1986)	(2001)	(2001)	(1984)	(1984)	(2001)	(1984)	(2001)

16283200 KAHALUU STREAM NEAR AHUIMANU—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1984 - 2003	
ANNUAL TOTAL	866.75		645.03		2.99	
ANNUAL MEAN	2.37		1.77		5.97	
HIGHEST ANNUAL MEAN					0.90	1991
LOWEST ANNUAL MEAN					0.90	2001
HIGHEST DAILY MEAN	142	May 6	64	Sep 11	142	May 6, 2002
LOWEST DAILY MEAN	0.64	Jan 11	0.81	Sep 28	0.47	Oct 21, 2001
ANNUAL SEVEN-DAY MINIMUM	0.64	Jan 11	0.83	Sep 24	0.47	Oct 20, 2001
ANNUAL RUNOFF (AC-FT)	1,720		1,280		2,170	
10 PERCENT EXCEEDS	2.3		1.9		4.7	
50 PERCENT EXCEEDS	1.4		1.2		2.3	
90 PERCENT EXCEEDS	1.0		0.89		0.85	



16284200 WAIHEE STREAM NEAR KAHALUU

LOCATION.--Lat 21°27'04", long 157°51'36", Old Hawaiian Datum, 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 B. Shimizu. Records fair. Honolulu Board of Water Supply diverts water from tunnel and wells in drainage area.

AVERAGE DISCHARGE.--29 years (water years 1975-2003), 6.05 ft³/s (4,380 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)
Sep 11	0330	*286	*5.02	No other peak greater than base discharge.			

Minimum discharge, 4.2 ft³/s, on several days, gage height, 2.68 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

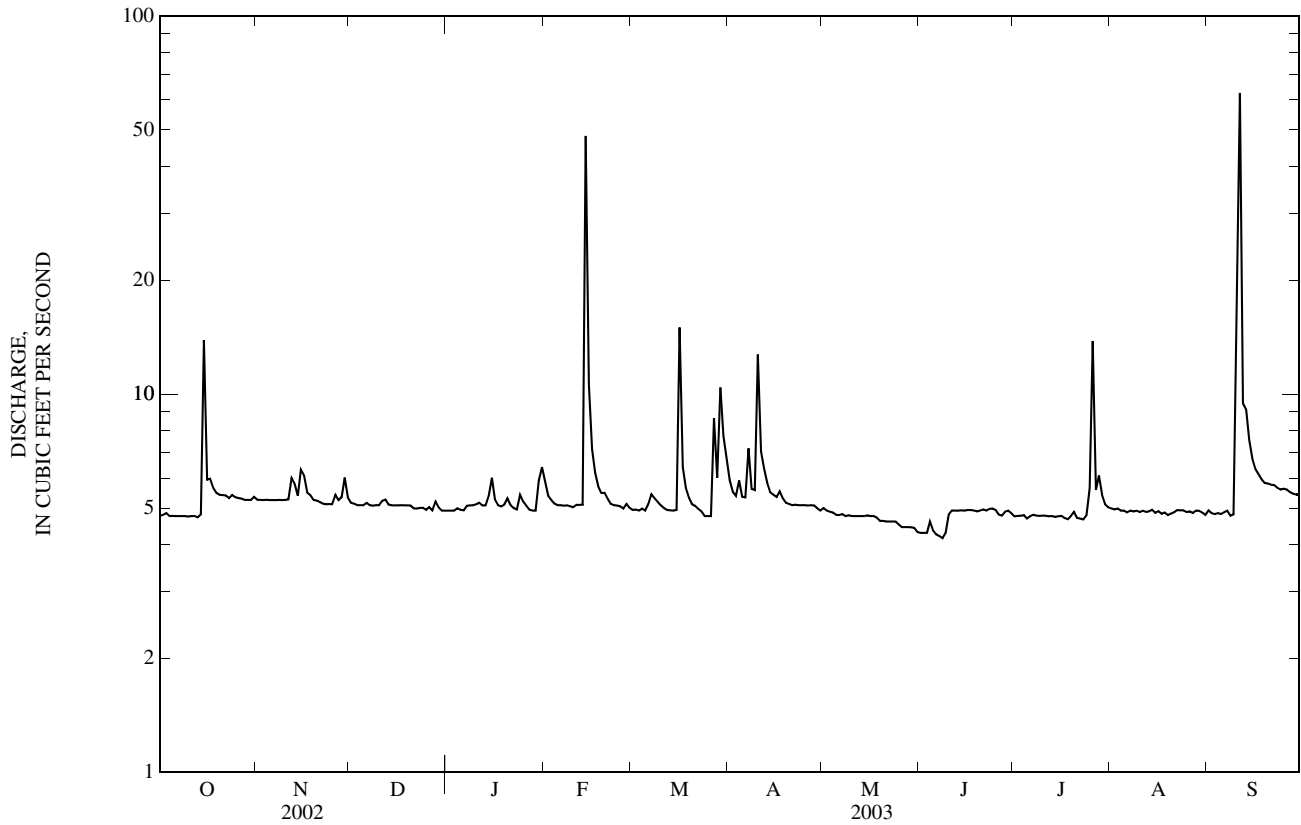
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.8	5.3	5.2	4.9	5.9	4.9	5.9	5.0	4.3	4.8	5.0	4.9
2	4.8	5.3	5.1	4.9	5.4	5.0	5.5	4.9	4.3	4.8	5.0	4.8
3	4.9	5.2	5.1	4.9	5.3	4.9	5.4	4.9	4.3	4.8	5.0	4.8
4	4.8	5.3	5.1	5.0	5.1	5.0	5.9	4.9	4.6	4.8	4.9	4.8
5	4.8	5.3	5.1	4.9	5.1	4.9	5.4	4.8	4.4	4.7	4.9	4.8
6	4.8	5.3	5.2	4.9	5.1	5.1	5.3	4.8	4.3	4.8	4.9	4.9
7	4.8	5.2	5.1	5.1	5.1	5.4	7.2	4.8	4.2	4.8	4.9	4.9
8	4.8	5.3	5.1	5.1	5.1	5.3	5.6	4.8	4.2	4.8	4.9	4.8
9	4.8	5.3	5.1	5.1	5.1	5.2	5.6	4.8	4.3	4.8	4.9	4.8
10	4.7	5.3	5.1	5.1	5.0	5.1	13	4.8	4.8	4.8	4.9	12
11	4.8	5.3	5.2	5.2	5.1	5.0	7.1	4.8	4.9	4.8	4.9	63
12	4.8	6.0	5.3	5.1	5.1	4.9	6.4	4.8	4.9	4.8	4.9	9.5
13	4.7	5.8	5.1	5.1	5.1	4.9	5.8	4.8	4.9	4.8	4.9	9.1
14	4.8	5.4	5.1	5.4	48	4.9	5.5	4.8	4.9	4.7	4.9	7.6
15	14	6.3	5.1	6.0	11	4.9	5.4	4.8	4.9	4.8	4.9	6.7
16	5.9	6.1	5.1	5.3	7.1	15	5.3	4.8	4.9	4.8	4.9	6.3
17	6.0	5.5	5.1	5.1	6.2	6.4	5.5	4.8	4.9	4.7	4.8	6.1
18	5.6	5.4	5.1	5.0	5.7	5.7	5.3	4.7	4.9	4.7	4.9	6.0
19	5.5	5.3	5.1	5.1	5.5	5.3	5.2	4.6	4.9	4.8	4.8	5.8
20	5.4	5.2	5.1	5.3	5.5	5.1	5.1	4.6	4.9	4.9	4.8	5.8
21	5.4	5.2	5.0	5.1	5.3	5.1	5.1	4.6	5.0	4.7	4.9	5.8
22	5.4	5.1	5.0	5.0	5.1	5.0	5.1	4.6	4.9	4.7	4.9	5.7
23	5.3	5.1	5.0	5.0	5.1	4.9	5.1	4.6	5.0	4.7	4.9	5.7
24	5.4	5.1	5.0	5.4	5.1	4.8	5.1	4.6	5.0	4.8	4.9	5.6
25	5.3	5.1	4.9	5.2	5.1	4.8	5.1	4.5	4.9	5.6	4.9	5.6
26	5.3	5.4	5.0	5.1	5.0	4.8	5.1	4.5	4.8	14	4.9	5.6
27	5.3	5.2	4.9	4.9	5.1	8.6	5.1	4.5	4.8	5.6	4.9	5.5
28	5.3	5.3	5.2	4.9	5.0	6.0	5.1	4.5	4.9	6.1	4.9	5.5
29	5.3	6.0	5.0	4.9	---	10	5.0	4.4	4.9	5.4	4.9	5.4
30	5.3	5.3	4.9	5.9	---	7.8	4.9	4.4	4.8	5.1	4.9	5.4
31	5.4	---	4.9	6.4	---	6.8	---	4.3	---	5.0	4.8	---
TOTAL	168.2	161.9	157.3	160.3	197.3	181.5	172.1	145.5	141.7	161.4	151.8	237.2
MEAN	5.43	5.40	5.07	5.17	7.05	5.85	5.74	4.69	4.72	5.21	4.90	7.91
MAX	14	6.3	5.3	6.4	48	15	13	5.0	5.0	14	5.0	63
MIN	4.7	5.1	4.9	4.9	5.0	4.8	4.9	4.3	4.2	4.7	4.8	4.8
AC-FT	334	321	312	318	391	360	341	289	281	320	301	470

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1975 - 2003, BY WATER YEAR (WY)

MEAN	5.59	6.36	6.27	6.68	6.38	7.08	6.11	5.99	5.51	5.60	5.47	5.54
MAX	9.81	14.3	15.5	12.1	13.2	17.7	15.1	14.7	8.88	9.95	10.6	9.43
(WY)	(1983)	(1991)	(1988)	(1988)	(1979)	(1991)	(1989)	(2002)	(1982)	(1989)	(1982)	(1982)
MIN	2.70	3.97	3.60	3.71	3.05	2.85	2.72	3.18	3.36	2.40	2.61	2.74
(WY)	(1976)	(2000)	(1976)	(1977)	(1977)	(1977)	(1977)	(1977)	(1976)	(1977)	(1976)	(1976)

16284200 WAIHEE STREAM NEAR KAHALUU—Continued

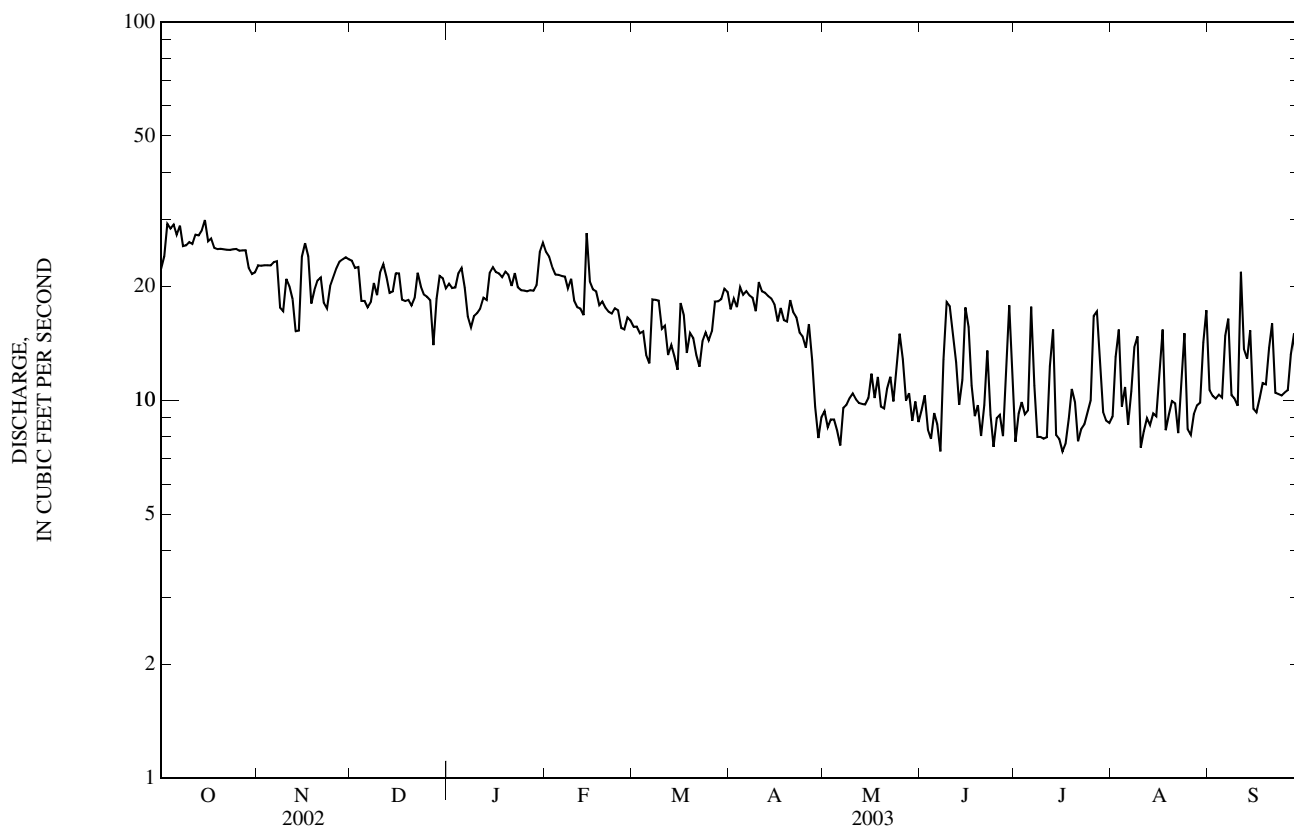
SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1975 - 2003	
ANNUAL TOTAL	2,574.6		2,036.2		6.05	
ANNUAL MEAN	7.05		5.58		3.32	
HIGHEST ANNUAL MEAN					9.36	1982
LOWEST ANNUAL MEAN					3.32	1977
HIGHEST DAILY MEAN	195	May 6	63	Sep 11	195	May 6, 2002
LOWEST DAILY MEAN	4.5	Jan 3	4.2	Jun 7	1.3	Apr 15, 1977
ANNUAL SEVEN-DAY MINIMUM	4.6	Jan 1	4.3	Jun 2	1.4	Apr 12, 1977
ANNUAL RUNOFF (AC-FT)	5,110		4,040		4,380	
10 PERCENT EXCEEDS	7.2		5.9		7.4	
50 PERCENT EXCEEDS	5.7		5.1		5.3	
90 PERCENT EXCEEDS	4.8		4.8		3.9	



16286000 WAIHAOLE TUNNEL WASTEWAY AT INTAKE 31, NEAR WAIHAOLE—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1951 - 2003	
ANNUAL TOTAL	10,028		5,840.8		4.38	
ANNUAL MEAN	27.5		16.0		0.000	
HIGHEST ANNUAL MEAN					27.8	2002
LOWEST ANNUAL MEAN					0.000	1961
HIGHEST DAILY MEAN	78	May 6	30	Oct 15	99	Nov 12, 1965
LOWEST DAILY MEAN	13	Aug 17	7.3	Jun 7	0.00	Feb 1, 1951
ANNUAL SEVEN-DAY MINIMUM	18	Nov 8	8.6	Apr 30	0.00	Feb 1, 1951
ANNUAL RUNOFF (AC-FT)	19,890		11,590		3,170	
10 PERCENT EXCEEDS	34		24		22	
50 PERCENT EXCEEDS	28		16		0.00	
90 PERCENT EXCEEDS	21		8.9		0.00	

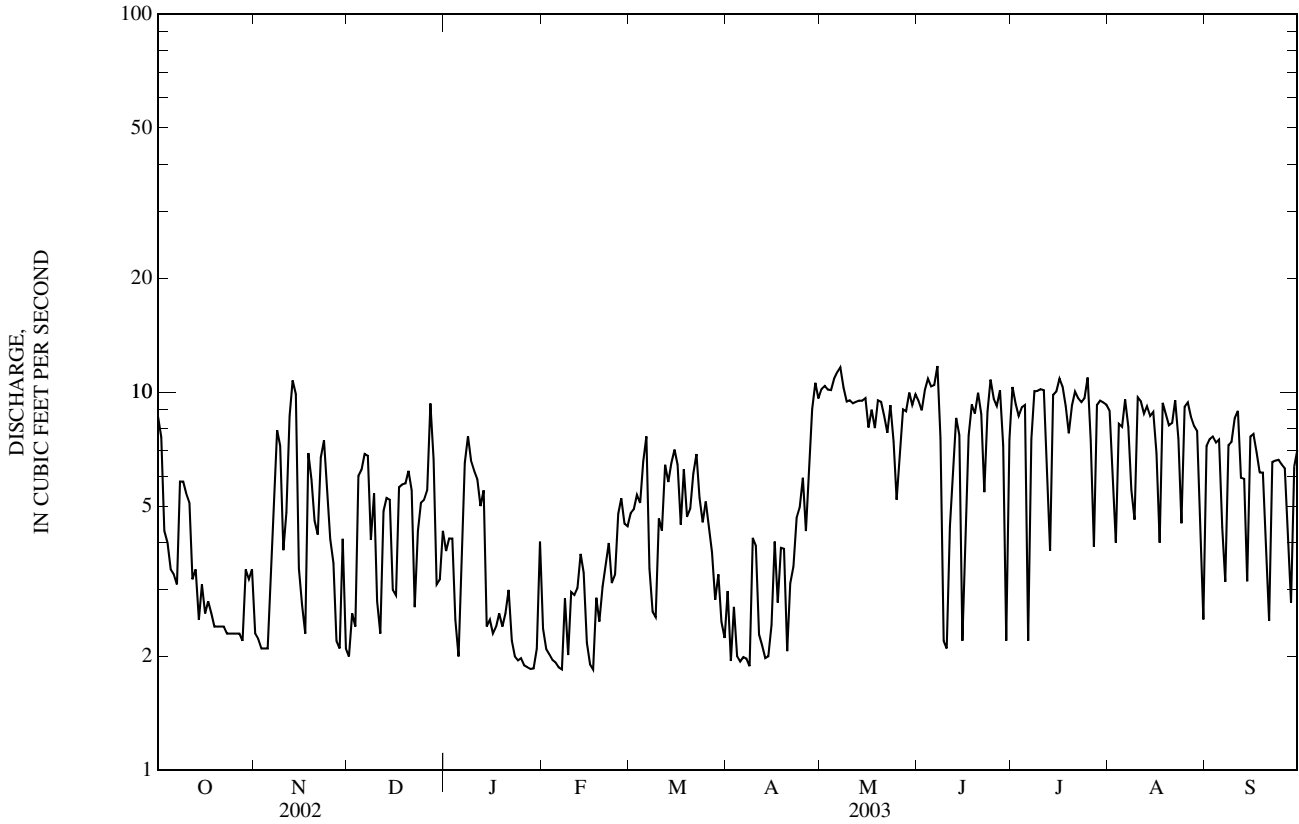
e Estimated



16287000 WAIHAOLE TUNNEL AT NORTH PORTAL, NEAR WAIHAOLE—Continued

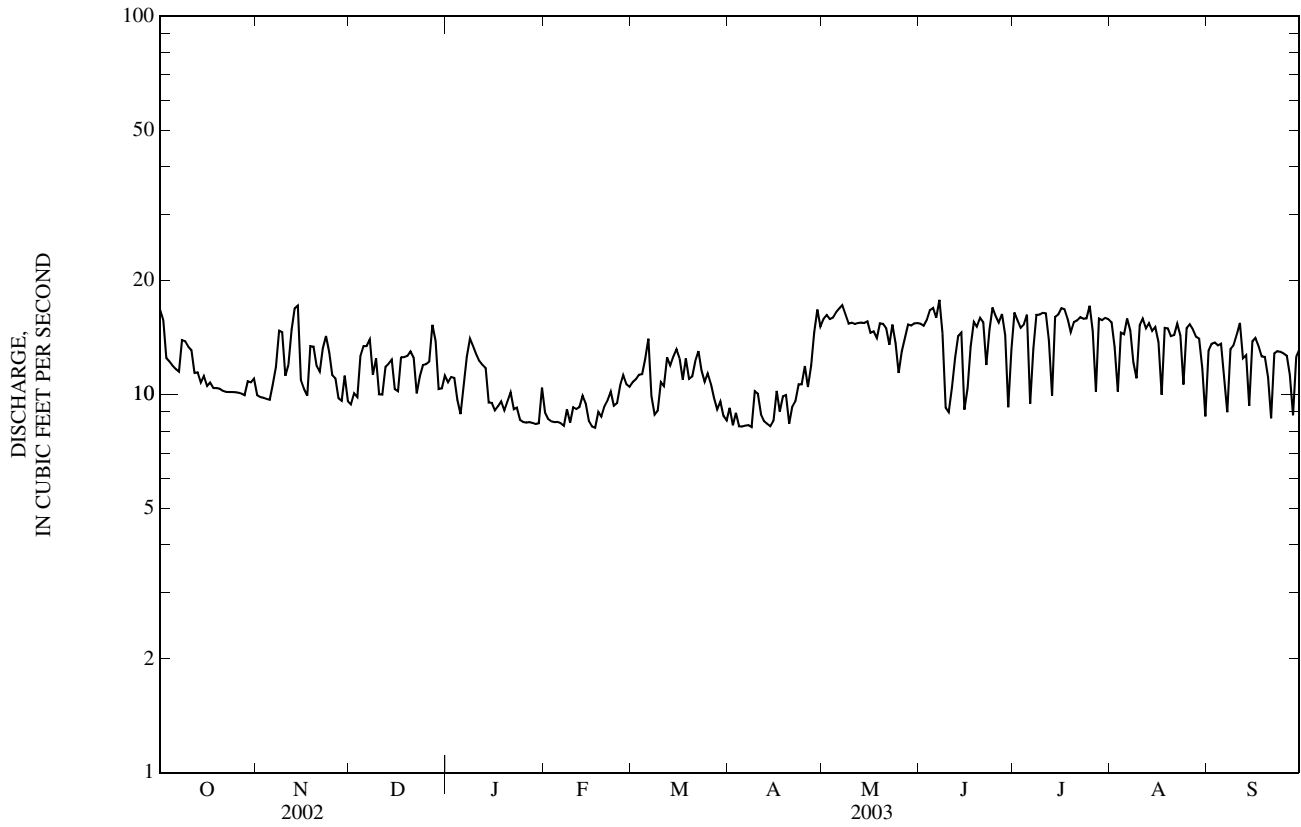
SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 2001 - 2003	
ANNUAL TOTAL	1,439.3		2,062.7		5.47	
ANNUAL MEAN	3.94		5.65		3.74	
HIGHEST ANNUAL MEAN					7.02	2001
LOWEST ANNUAL MEAN					3.74	2002
HIGHEST DAILY MEAN	20	Aug 17	12	May 7	20	Aug 17, 2002
LOWEST DAILY MEAN	1.8	Feb 12	1.8	Feb 7	1.8	May 13, 2001
ANNUAL SEVEN-DAY MINIMUM	1.8	Feb 20	1.9	Jan 23	1.8	Feb 20, 2002
ANNUAL RUNOFF (AC-FT)	2,850		4,090		3,960	
10 PERCENT EXCEEDS	7.2		9.6		9.5	
50 PERCENT EXCEEDS	3.1		5.2		5.1	
90 PERCENT EXCEEDS	2.1		2.2		2.2	

e Estimated



16287200 WAIHOLE TUNNEL AT ADIT 8, NEAR WAIPAHAU—Continued

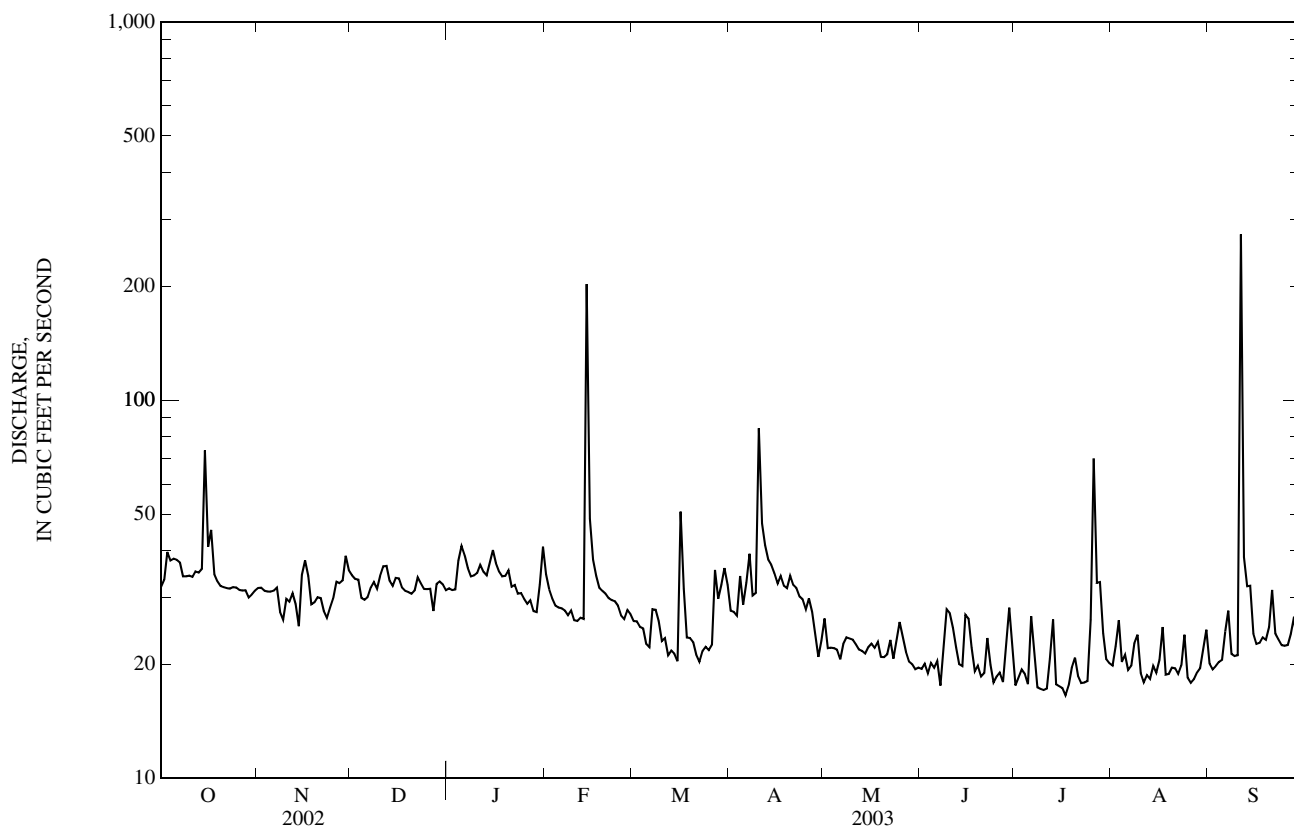
e Estimated



16294100 WAI AHOLE STREAM ABOVE KAMEHAMEHA HIGHWAY—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 2001 - 2003	
ANNUAL TOTAL	17,210		10,542		38.2	
ANNUAL MEAN	47.2		28.9		47.6	
HIGHEST ANNUAL MEAN					28.9	
LOWEST ANNUAL MEAN					28.9	
HIGHEST DAILY MEAN	1,150	May 6	275	Sep 11	1,150	May 6, 2002
LOWEST DAILY MEAN	25	Aug 17	17	Jul 8	17	Jul 8, 2003
ANNUAL SEVEN-DAY MINIMUM	28	Nov 8	18	Jul 14	18	Jul 14, 2003
ANNUAL RUNOFF (AC-FT)	34,140		20,910		27,710	
10 PERCENT EXCEEDS	53		36		48	
50 PERCENT EXCEEDS	40		28		34	
90 PERCENT EXCEEDS	31		19		21	

e Estimated



16294900 WAIKANE STREAM AT ALTITUDE 75 FT, AT WAIKANE

LOCATION.--Lat 21°30'00", long 157°51'54", Old Hawaiian Datum, Hydrologic Unit 20060000, on right bank, 0.3 mi downstream from Waikēke Stream, 0.7 mi west of Waikane, and 1.2 mi northwest of Waihole 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 B. Shimizu. Records poor. Waihole tunnel diverts ground water from tunnels upstream of station. Beginning early October, 2002, Waihole Ditch began releasing water into Waikane Stream. Elevation of the Waihole tunnel is 800 ft (from topographic map).

AVERAGE DISCHARGE.--(Prior to release from Waihole Ditch in October 2002) 42 years (water years 1961-2002), 8.50 ft³/s (6,160 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)
Feb 14	0330	825	5.55	Sep 11	0400	746	5.30
Jul 26	0645	837	5.59	Sep 11	0630	*871	*5.70

Minimum discharge, 0.01 ft³/s, Oct. 2, 3, 11, 14, gage height, 1.00 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e2.0	7.0	5.6	3.8	19	8.7	9.3	13	6.4	6.6	7.9	e5.8
2	e2.5	6.9	5.3	3.8	13	8.9	8.6	8.3	6.6	6.6	7.5	e5.5
3	e10	7.5	5.2	3.9	12	8.4	8.3	7.7	6.6	6.5	7.4	e5.4
4	e3.0	7.5	5.0	4.4	12	8.0	19	7.5	7.0	6.4	8.0	e5.4
5	e2.7	7.3	4.9	4.6	12	8.0	10	8.8	6.1	6.5	16	5.3
6	e2.3	5.0	6.1	4.4	11	9.4	14	8.0	5.9	6.4	e7.5	5.7
7	e2.0	1.5	6.6	4.8	11	11	20	8.8	5.9	6.4	e7.3	7.1
8	e1.9	4.1	5.6	4.5	11	9.5	11	8.0	5.9	6.5	e7.0	5.9
9	e1.8	7.3	5.7	4.6	10	8.6	14	7.5	6.3	6.3	e6.8	5.9
10	e1.9	7.3	5.6	5.0	11	8.2	32	8.3	6.6	6.2	e6.7	6.6
11	e4.0	7.6	6.8	8.3	11	7.8	19	7.4	6.6	6.3	e6.6	152
12	e9.5	19	9.2	5.6	11	7.6	15	7.1	6.6	6.2	e6.6	20
13	e11	13	6.4	5.2	12	7.5	13	7.0	6.6	6.4	e6.5	12
14	e5.4	7.1	5.7	5.6	179	7.3	11	6.9	6.6	6.1	e6.7	10
15	e20	15	5.3	8.6	26	7.6	11	8.2	6.6	6.1	e6.4	9.1
16	12	21	4.6	6.3	17	26	10	7.1	7.5	6.8	e6.3	7.7
17	22	9.9	4.8	5.5	15	13	10	6.8	7.6	6.2	e6.8	7.4
18	11	7.9	5.0	5.2	13	8.7	9.8	6.7	7.0	6.0	e7.2	8.8
19	7.0	7.3	5.0	5.1	12	7.9	9.5	6.6	7.0	6.0	e6.5	8.3
20	6.7	6.7	4.9	8.4	12	7.4	9.4	6.6	6.9	8.8	e6.3	8.0
21	6.9	6.6	4.9	5.9	12	7.3	9.2	6.6	6.6	6.9	e6.2	15
22	7.2	6.4	4.8	6.5	13	7.2	9.0	6.6	6.6	6.1	e6.5	10
23	7.4	6.3	5.0	8.8	11	7.1	8.9	6.6	6.6	6.0	e6.3	9.0
24	7.1	6.3	4.9	13	9.9	7.0	8.9	6.4	7.7	7.7	e6.5	8.1
25	7.2	6.1	4.8	13	9.6	6.9	8.8	6.1	7.5	23	e6.3	7.7
26	6.7	7.9	5.1	13	9.5	6.8	8.5	6.1	6.7	60	e6.0	7.5
27	6.4	6.8	4.0	14	11	12	8.5	6.0	6.9	21	e5.8	7.4
28	6.3	8.3	6.4	11	9.3	10	8.3	5.9	8.4	41	e5.8	7.1
29	6.3	16	4.5	10	---	13	8.0	5.9	7.6	15	e5.8	7.0
30	6.1	8.5	3.8	30	---	15	8.1	6.1	6.9	10	e6.2	7.0
31	8.5	---	3.7	46	---	12	---	6.3	---	8.8	e5.8	---
TOTAL	214.8	255.1	165.2	278.8	515.3	293.8	350.1	224.9	203.8	334.8	215.2	387.7
MEAN	6.93	8.50	5.33	8.99	18.4	9.48	11.7	7.25	6.79	10.8	6.94	12.9
MAX	22	21	9.2	46	179	26	32	13	8.4	60	16	152
MIN	1.8	1.5	3.7	3.8	9.3	6.8	8.0	5.9	5.9	6.0	5.8	5.3
AC-FT	426	506	328	553	1,020	583	694	446	404	664	427	769

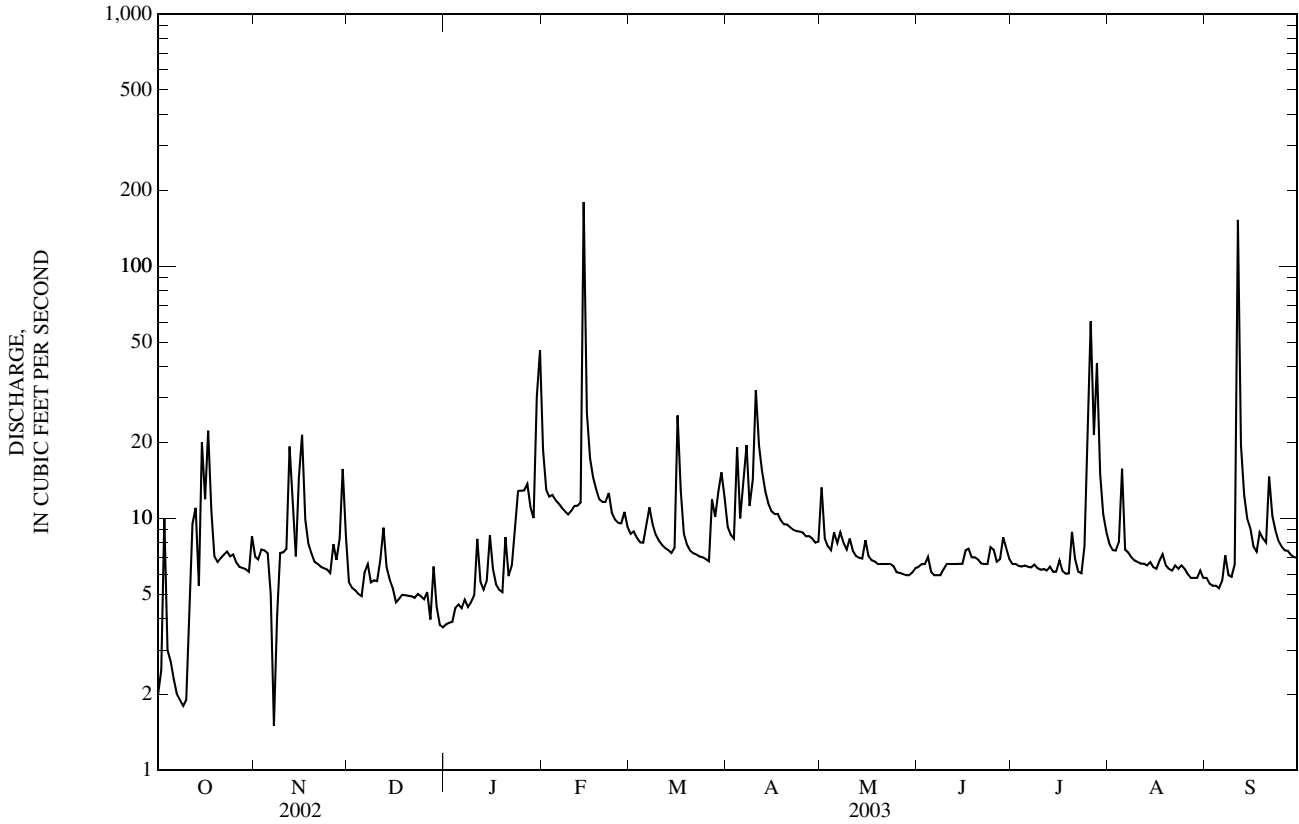
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1960 - 2003, BY WATER YEAR (WY)

MEAN	6.47	11.0	9.08	11.3	11.7	12.2	10.0	8.98	5.32	6.18	5.22	5.24
MAX	31.0	55.7	44.1	45.6	65.5	53.1	49.3	43.9	16.2	30.2	25.0	22.1
(WY)	(1992)	(1966)	(1988)	(1988)	(1994)	(1982)	(1963)	(2002)	(1977)	(1987)	(1967)	(1986)
MIN	1.55	2.13	2.23	1.67	1.78	2.03	2.65	1.98	1.83	1.76	1.58	1.38
(WY)	(1985)	(1963)	(1978)	(1977)	(1978)	(1978)	(1998)	(2000)	(1984)	(1984)	(1984)	(1984)

16294900 WAIKANE STREAM AT ALTITUDE 75 FT, AT WAIKANE—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1960 - 2003	
ANNUAL TOTAL	3,833.3		3,439.5		8.53	
ANNUAL MEAN	10.5		9.42		16.7	
HIGHEST ANNUAL MEAN					3.33	
LOWEST ANNUAL MEAN					1984	
HIGHEST DAILY MEAN	700	May 6	179	Feb 14	868	Feb 4, 1965
LOWEST DAILY MEAN	1.5	Nov 7	1.5	Nov 7	1.1	Oct 17, 1975
ANNUAL SEVEN-DAY MINIMUM	2.0	Sep 25	2.2	Oct 4	1.3	Sep 19, 1984
ANNUAL RUNOFF (AC-FT)	7,600		6,820		6,180	
10 PERCENT EXCEEDS	15		13		13	
50 PERCENT EXCEEDS	4.5		7.1		4.2	
90 PERCENT EXCEEDS	2.2		5.0		2.1	

e Estimated



16295300 HAKIPUU STREAM NEAR WAIKANE—Continued

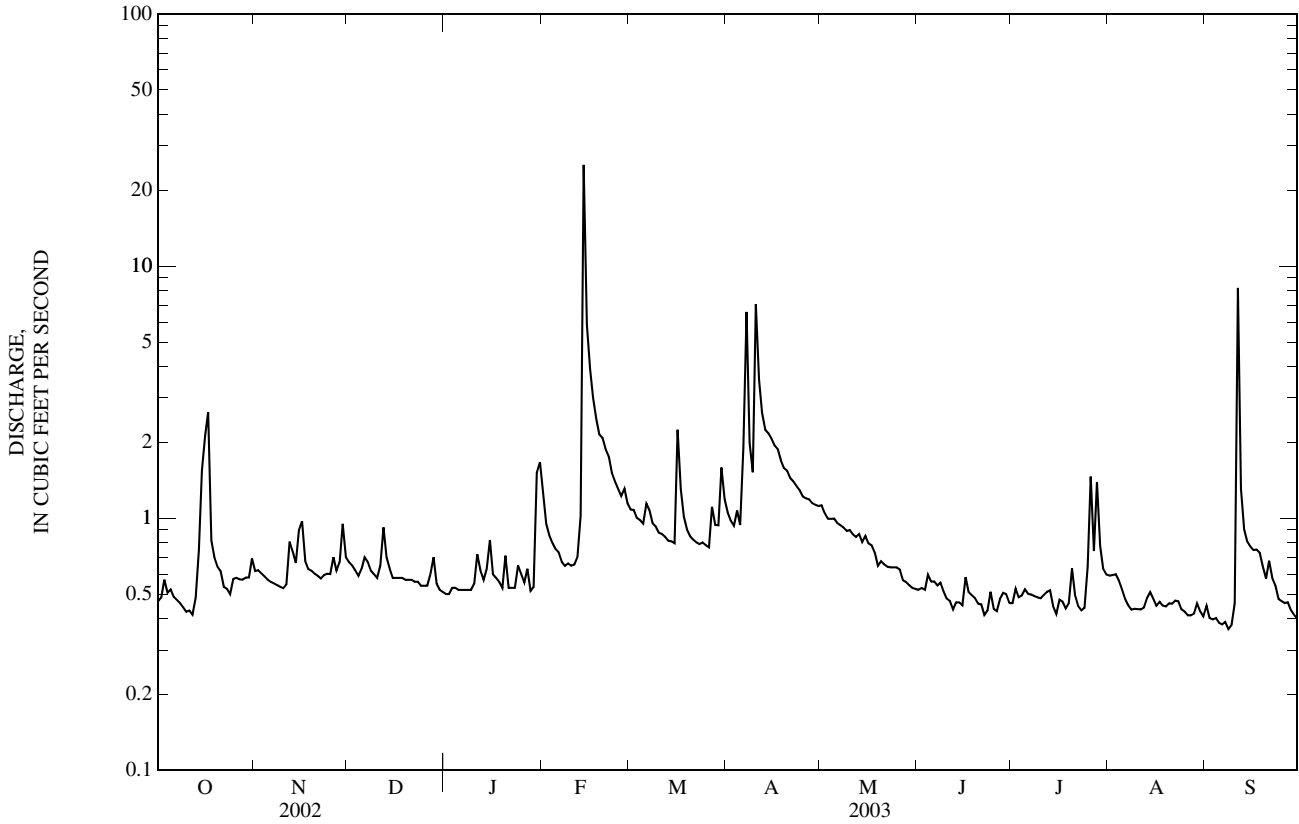
SUMMARY STATISTICS

FOR 2003 WATER YEAR

WATER YEARS 2002 - 2003

ANNUAL TOTAL	30.54		
ANNUAL MEAN	0.91		0.91
HIGHEST ANNUAL MEAN			0.91 2003
LOWEST ANNUAL MEAN			0.91 2003
HIGHEST DAILY MEAN	25 Feb 14		25 Feb 14, 2003
LOWEST DAILY MEAN		0.36 Sep 8	0.36 Sep 8, 2003
ANNUAL SEVEN-DAY MINIMUM		0.38 Sep 3	0.38 Sep 3, 2003
ANNUAL RUNOFF (AC-FT)	56		656
10 PERCENT EXCEEDS	1.4		1.4
50 PERCENT EXCEEDS	0.60		0.60
90 PERCENT EXCEEDS	0.45		0.45

e Estimated



HAWAII, ISLAND OF OAHU

16296500 KAHANA STREAM AT ALTITUDE 30 FT, NEAR KAHANA

LOCATION.--Lat 21°32'37", long 157°53'07", Old Hawaiian Datum, 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 B.H. 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). Recording rain gage located 50 ft from the streamgage at an elevation of 80 ft.

AVERAGE DISCHARGE.--44 years (water years 1960-2003), 36.1 ft³/s (26,170 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,580 ft³/s, May 6, 2002, gage height, 9.39 ft, from rating curve extended above 530 ft³/s on basis of computation of peak flow over weir at gage height 8.10 ft and slope area computation at gage height 9.39 ft; minimum, 9.9 ft³/s, June 5, 2000.

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)
Jul 26	0700	*2,080	*5.32	Sep 11	0545	1,950	5.18

Minimum discharge, 13 ft³/s, on several days, gage height, 1.08 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

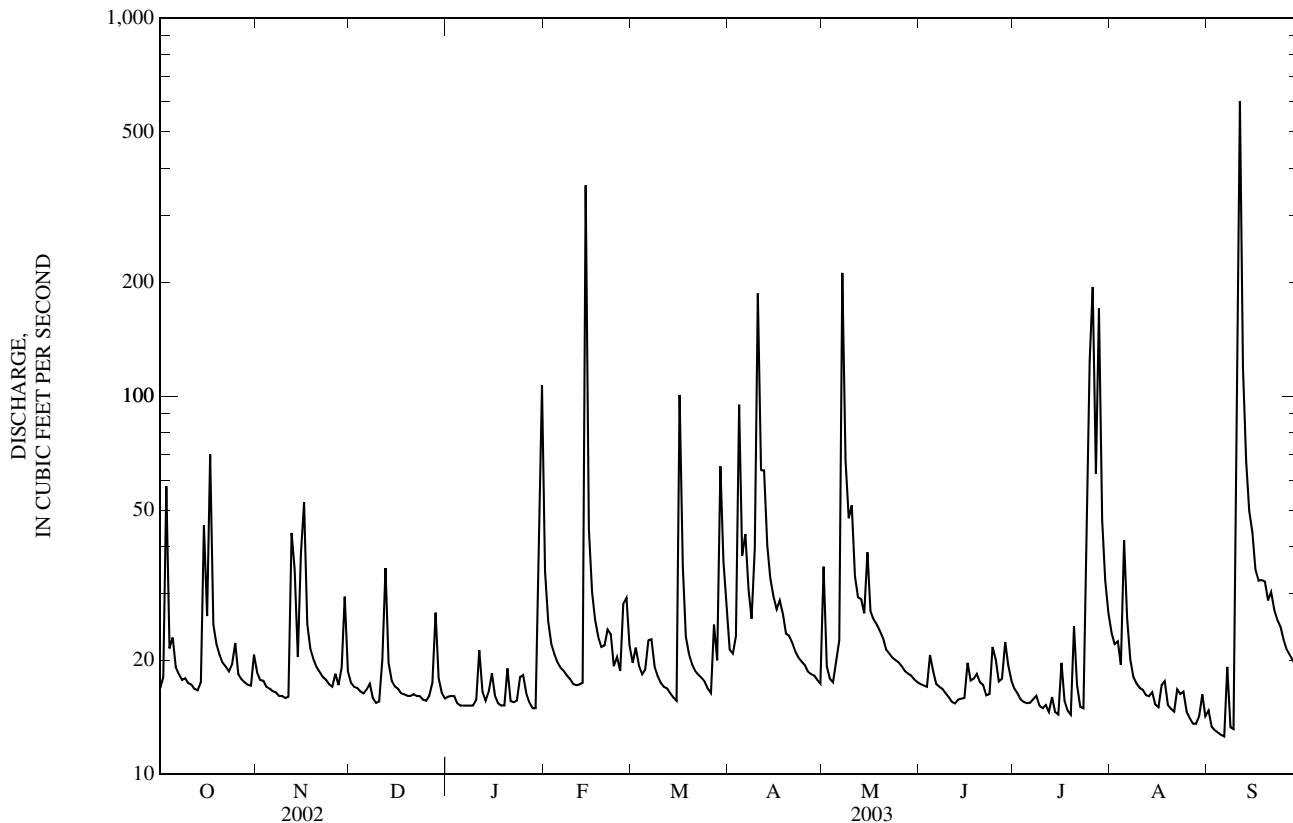
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17	19	17	16	34	20	21	35	17	17	24	15
2	18	18	17	16	25	22	21	19	17	16	22	13
3	58	18	17	16	22	19	23	18	17	16	22	13
4	22	17	17	15	21	18	95	18	21	16	19	13
5	23	17	16	15	20	19	38	20	19	15	42	13
6	19	17	17	15	19	23	43	23	17	15	26	13
7	18	16	17	15	19	23	31	212	17	16	20	19
8	18	16	16	15	18	19	26	68	17	16	18	13
9	18	16	15	15	18	18	40	48	16	15	17	13
10	17	16	16	16	17	17	187	51	16	15	17	41
11	17	16	20	21	17	17	64	33	16	15	17	602
12	17	43	35	17	17	17	64	29	15	15	16	119
13	17	35	20	16	17	16	40	29	16	16	16	67
14	18	20	18	17	361	16	33	27	16	15	16	50
15	45	38	17	18	44	16	30	39	16	14	15	44
16	26	52	17	16	30	101	27	27	20	20	15	35
17	70	25	16	15	26	36	29	26	18	16	17	33
18	25	22	16	15	23	23	27	25	18	15	18	33
19	22	20	16	15	22	21	24	24	18	14	15	32
20	21	19	16	19	22	20	23	23	18	25	15	29
21	20	19	16	16	24	19	22	21	17	17	15	30
22	19	18	16	16	23	18	21	21	16	15	17	27
23	19	18	16	16	19	18	20	20	16	15	16	26
24	20	17	16	18	20	18	20	20	22	52	17	25
25	22	17	16	18	19	17	19	20	20	124	15	23
26	18	18	16	16	28	16	19	19	18	194	14	21
27	18	17	17	15	29	25	18	19	18	62	14	21
28	18	19	27	15	22	20	18	18	22	170	14	20
29	17	30	18	15	---	65	18	18	19	47	14	19
30	17	19	16	49	---	37	17	18	18	33	16	19
31	21	---	16	107	---	28	---	18	---	27	14	---
TOTAL	715	652	546	624	976	762	1,078	1,006	531	1,078	553	1,441
MEAN	23.1	21.7	17.6	20.1	34.9	24.6	35.9	32.5	17.7	34.8	17.8	48.0
MAX	70	52	35	107	361	101	187	212	22	194	42	602
MIN	17	16	15	15	17	16	17	18	15	14	14	13
AC-FT	1,420	1,290	1,080	1,240	1,940	1,510	2,140	2,000	1,050	2,140	1,100	2,860

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1959 - 2003, BY WATER YEAR (WY)

MEAN	31.9	43.5	36.9	37.4	36.2	42.9	44.2	40.2	26.8	31.9	29.9	29.6
MAX	55.1	170	101	94.9	141	176	137	162	56.5	90.5	73.7	84.7
(WY)	(1992)	(1991)	(1988)	(1988)	(1969)	(1982)	(1963)	(2002)	(1978)	(1987)	(1978)	(1994)
MIN	12.6	14.5	14.5	12.9	13.2	14.5	19.3	13.3	13.8	15.0	13.6	13.3
(WY)	(1985)	(1963)	(1978)	(1977)	(1978)	(2000)	(1992)	(2000)	(2000)	(1984)	(1984)	(1975)

16296500 KAHANA STREAM AT ALTITUDE 30 FT, NEAR KAHANA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1959 - 2003	
ANNUAL TOTAL	16,200		9,962		36.1	
ANNUAL MEAN	44.4		27.3		67.2	
HIGHEST ANNUAL MEAN					1982	
LOWEST ANNUAL MEAN					20.1	
HIGHEST DAILY MEAN	2,160	May 6	602	Sep 11	2,160	May 6, 2002
LOWEST DAILY MEAN	15	Jan 17	13	Sep 2	10	Jun 5, 2000
ANNUAL SEVEN-DAY MINIMUM	16	Jan 13	13	Aug 31	11	May 31, 2000
ANNUAL RUNOFF (AC-FT)	32,130		19,760		26,170	
10 PERCENT EXCEEDS	56		38		57	
50 PERCENT EXCEEDS	23		18		23	
90 PERCENT EXCEEDS	17		15		15	



HAWAII, ISLAND OF OAHU

16302000 PUNALUU DITCH NEAR PUNALUU

LOCATION.--Lat 21°33'41", long 157°54'10", Old Hawaiian Datum, 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 H.A. Jeppesen. Records good. Ditch diverts water from Punaluu Stream for irrigation in Punaluu Valley.

AVERAGE DISCHARGE.--50 years (water years 1954-2003), 8.41 ft³/s (6,090 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 on several days; minimum daily 0.90 ft³/s, February 14.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

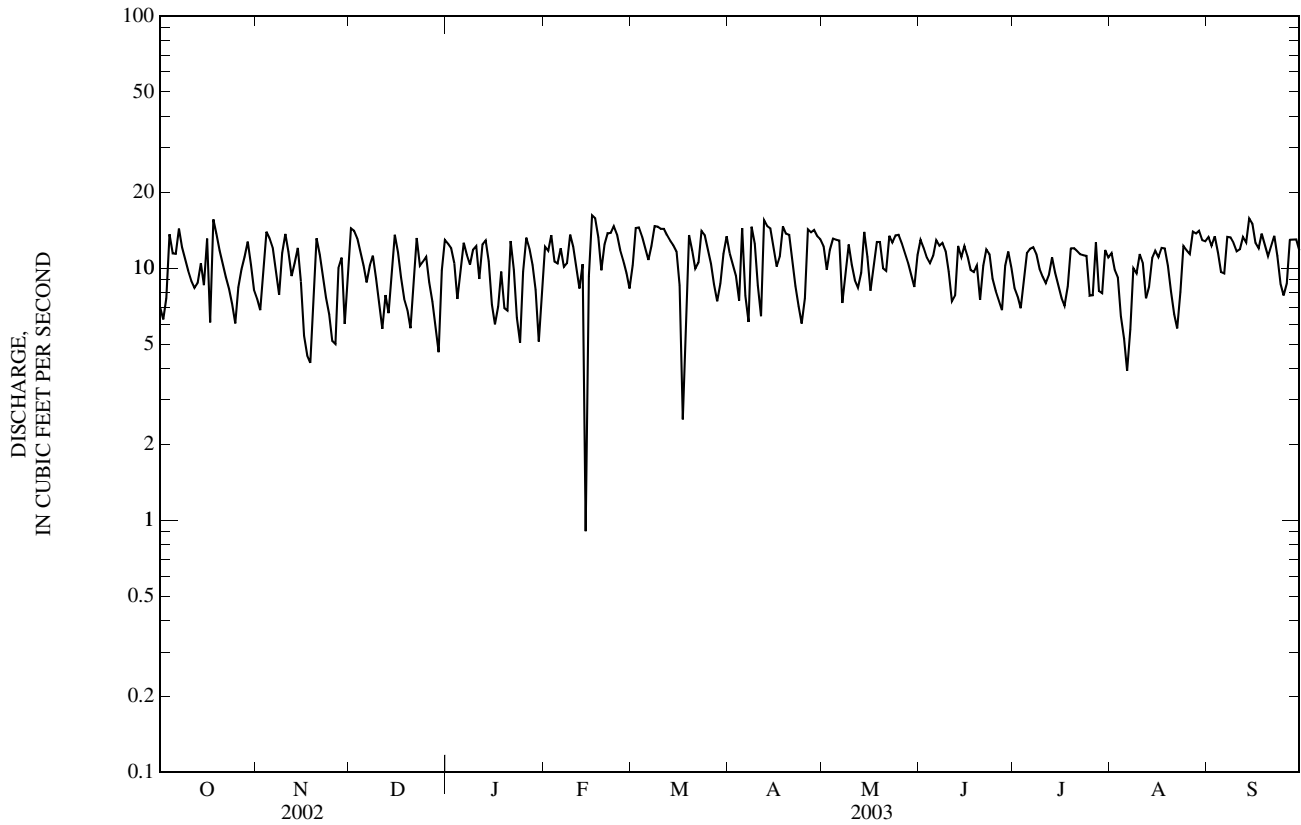
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.0	7.6	14	13	12	10	11	12	13	8.4	11	13
2	6.3	6.8	14	12	12	14	10	9.8	12	7.7	9.9	12
3	7.6	9.8	13	10	14	15	9.3	12	11	6.9	9.2	13
4	14	14	12	7.5	11	13	7.4	13	10	9.1	6.4	12
5	11	13	10	9.9	10	12	14	13	11	11	5.2	9.7
6	11	12	8.8	13	12	11	7.8	13	13	12	3.9	9.5
7	14	9.7	10	11	10	12	6.1	7.3	12	12	5.7	13
8	12	7.8	11	10	10	15	15	9.4	13	11	10	13
9	11	11	9.1	12	14	15	12	12	12	9.9	9.5	13
10	9.8	14	7.2	12	12	14	8.5	10	9.7	9.3	11	12
11	8.9	12	5.7	9.1	10	14	6.4	8.9	7.4	8.7	11	12
12	8.4	9.3	7.8	12	8.3	13	15	8.4	7.8	9.4	7.6	13
13	8.7	10	6.6	13	10	13	15	9.6	12	11	8.4	13
14	10	12	9.4	11	0.90	12	14	14	11	9.6	11	16
15	8.6	8.9	14	7.2	9.3	12	12	11	12	8.5	12	15
16	13	5.4	12	6.0	16	8.6	10	8.1	11	7.6	11	13
17	6.1	4.5	9.2	7.0	16	2.5	11	10	9.8	7.1	12	12
18	16	4.2	7.5	9.7	13	4.9	15	13	9.7	8.5	12	14
19	14	8.1	6.8	6.9	9.8	14	14	13	10	12	10	12
20	12	13	5.8	6.8	12	12	14	10	7.5	12	8.1	11
21	10	11	8.7	13	14	9.9	11	9.7	10	12	6.6	12
22	9.2	9.4	13	9.9	14	11	8.5	13	12	11	5.8	13
23	8.3	7.6	10	6.3	15	14	7.0	13	11	11	8.0	11
24	7.2	6.5	11	5.1	14	14	6.0	13	9.1	11	12	8.7
25	6.0	5.1	11	9.7	12	12	7.6	14	8.1	7.8	12	7.8
26	8.4	5.0	8.8	13	11	10	14	13	7.5	7.8	11	8.7
27	9.9	10	7.4	12	9.6	8.6	14	11	6.8	13	14	13
28	11	11	5.9	10	8.3	7.4	14	10	10	8.1	14	13
29	13	6.0	4.6	8.2	---	8.7	13	9.3	12	8.0	14	13
30	10	9.7	9.8	5.1	---	11	13	8.4	10	12	13	12
31	8.2	---	13	7.6	---	13	---	11	---	11	13	---
TOTAL	310.6	274.4	297.1	299.0	320.20	356.6	335.6	342.9	311.4	304.4	308.3	363.4
MEAN	10.0	9.15	9.58	9.65	11.4	11.5	11.2	11.1	10.4	9.82	9.95	12.1
MAX	16	14	14	13	16	15	15	14	13	13	14	16
MIN	6.0	4.2	4.6	5.1	0.90	2.5	6.0	7.3	6.8	6.9	3.9	7.8
AC-FT	616	544	589	593	635	707	666	680	618	604	612	721

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1953 - 2003, BY WATER YEAR (WY)

MEAN	9.23	7.80	6.46	6.32	6.40	7.24	8.65	8.92	9.68	10.1	10.2	10.1
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)	(1961)	(1964)	(1963)	(1963)	(1958)	(1958)
MIN	0.002	0.000	0.001	0.003	0.011	0.046	0.015	0.027	0.020	0.003	0.002	0.001
(WY)	(1981)	(1981)	(1981)	(1981)	(1981)	(1979)	(1979)	(1981)	(1979)	(1980)	(1974)	(1980)

16302000 PUNALUU DITCH NEAR PUNALUU—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1953 - 2003	
ANNUAL TOTAL	4,079.84		3,823.90			
ANNUAL MEAN	11.2		10.5		8.41	
HIGHEST ANNUAL MEAN					15.2	1964
LOWEST ANNUAL MEAN					0.23	1981
HIGHEST DAILY MEAN	17	Feb 11	16	Oct 18	54	Oct 31, 1964
LOWEST DAILY MEAN	0.17	Jan 29	0.90	Feb 14	0.00	Dec 7, 1963
ANNUAL SEVEN-DAY MINIMUM	4.4	Feb 4	7.1	Aug 3	0.00	Jan 5, 1969
ANNUAL RUNOFF (AC-FT)	8,090		7,580		6,090	
10 PERCENT EXCEEDS	15		14		17	
50 PERCENT EXCEEDS	12		11		7.9	
90 PERCENT EXCEEDS	6.8		6.9		0.32	



HAWAII, ISLAND OF OAHU

16303000 PUNALUU STREAM NEAR PUNALUU

LOCATION.--Lat 21°33'33", long 157°54'06", Old Hawaiian Datum, 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 H.A. Jeppesen. Records good, except for discharges above 50 ft³/s, which are poor. Records do not include flow of Punaluu ditch (see station 16302000).

AVERAGE DISCHARGE.--50 years (water years 1954-2003), 16.2 ft³/s (11,750 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)
Jul 26	0645	*1,710	*6.56	No other peak greater than base discharge.			

Minimum daily discharge, 0.75 ft³/s, July 19.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

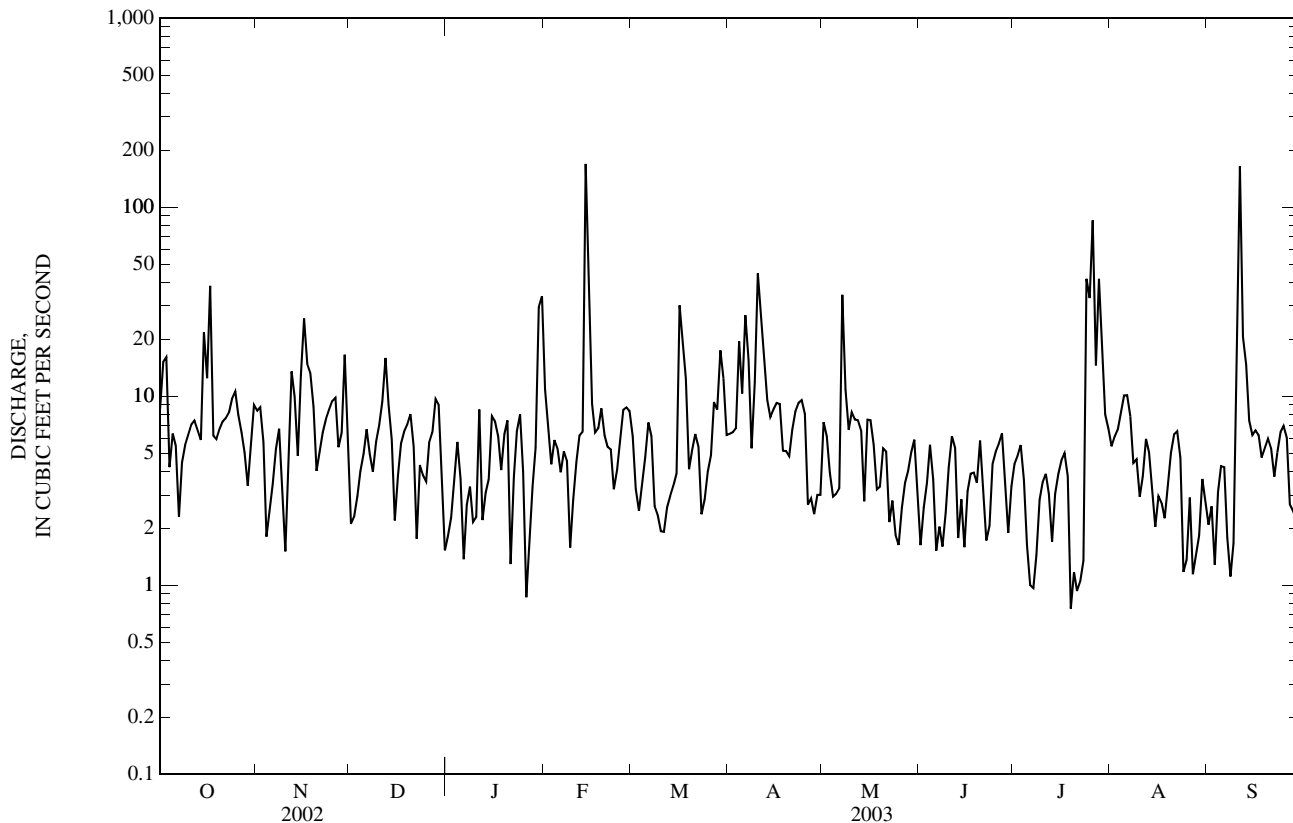
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.6	8.4	2.1	1.8	11	6.1	6.3	7.3	1.6	4.4	5.4	2.1
2	15	8.7	2.3	2.3	7.0	3.2	6.4	6.1	2.6	4.8	6.1	2.6
3	16	5.7	2.9	3.6	4.4	2.5	6.8	3.9	3.5	5.5	6.7	1.3
4	4.2	1.8	4.0	5.7	5.9	3.4	20	2.9	5.5	3.6	8.1	3.1
5	6.3	2.6	5.0	3.7	5.3	4.7	10	3.0	3.6	1.6	10	4.3
6	5.5	3.4	6.7	1.4	4.0	7.3	27	3.3	1.5	1.0	10	4.2
7	2.3	5.2	4.9	2.7	5.1	6.2	16	34	2.0	0.97	7.8	1.8
8	4.4	6.7	4.0	3.3	4.6	2.6	5.3	11	1.6	1.4	4.4	1.1
9	5.5	3.4	5.7	2.2	1.6	2.4	12	6.6	2.4	2.8	4.6	1.7
10	6.2	1.5	7.0	2.3	2.8	1.9	45	8.2	4.2	3.5	2.9	7.3
11	7.1	3.6	9.4	8.5	4.5	1.9	27	7.5	6.1	3.9	3.8	164
12	7.4	13	16	2.2	6.2	2.6	16	7.5	5.3	3.0	6.0	21
13	6.6	9.9	9.0	3.1	6.5	3.0	9.5	6.6	1.8	1.7	5.0	15
14	5.9	4.8	5.9	3.6	169	3.4	7.7	2.8	2.8	3.0	3.1	7.4
15	22	13	2.2	7.8	29	3.9	8.5	7.5	1.6	3.9	2.0	6.2
16	12	26	3.8	7.4	9.1	30	9.2	7.5	3.1	4.6	3.0	6.6
17	38	15	5.6	6.1	6.4	19	9.1	5.5	3.9	5.0	2.7	6.2
18	6.2	13	6.5	4.1	6.8	12	5.1	3.2	3.9	3.8	2.3	4.7
19	5.9	8.8	7.1	6.3	8.6	4.1	5.1	3.3	3.5	0.75	3.5	5.3
20	6.7	4.0	8.0	7.4	6.2	5.2	4.8	5.3	5.8	1.2	5.0	6.0
21	7.3	5.1	5.4	1.3	5.4	6.3	6.6	5.1	3.2	0.93	6.3	5.3
22	7.7	6.5	1.8	3.7	5.2	5.4	8.3	2.2	1.7	1.0	6.5	3.8
23	8.2	7.6	4.3	6.5	3.2	2.4	9.2	2.8	2.1	1.3	4.7	5.0
24	9.7	8.5	3.8	8.0	4.1	2.9	9.5	1.8	4.4	42	1.2	6.5
25	11	9.4	3.5	4.0	5.9	4.0	8.1	1.6	5.1	33	1.4	7.0
26	7.9	9.8	5.7	0.86	8.5	4.9	2.7	2.6	5.6	85	2.9	6.0
27	6.4	5.4	6.4	1.7	8.7	9.3	2.9	3.5	6.4	15	1.1	2.7
28	5.0	6.4	9.7	3.3	8.4	8.5	2.4	4.0	3.3	42	1.4	2.5
29	3.4	17	9.0	5.3	---	17	3.0	5.1	1.9	17	1.8	2.2
30	5.6	6.5	4.3	30	---	12	3.0	5.9	3.3	8.0	3.6	3.4
31	9.0	---	1.5	34	---	6.2	---	3.3	---	6.7	2.7	---
TOTAL	273.0	240.7	173.5	184.16	353.4	204.3	312.5	180.9	103.3	312.35	136.0	316.3
MEAN	8.81	8.02	5.60	5.94	12.6	6.59	10.4	5.84	3.44	10.1	4.39	10.5
MAX	38	26	16	34	169	30	45	34	6.4	85	10	164
MIN	2.3	1.5	1.5	0.86	1.6	1.9	2.4	1.6	1.5	0.75	1.1	1.1
AC-FT	541	477	344	365	701	405	620	359	205	620	270	627

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1953 - 2003, BY WATER YEAR (WY)

MEAN	13.2	19.3	19.5	20.2	20.4	20.7	20.5	17.0	10.8	11.6	10.9	9.97
MAX	38.7	74.7	64.5	40.9	76.3	73.1	84.6	64.9	35.4	39.0	36.9	29.9
(WY)	(1959)	(1991)	(1965)	(1988)	(1969)	(1982)	(1963)	(1965)	(1982)	(1974)	(1982)	(1994)
MIN	0.28	4.58	0.23	2.11	0.58	3.19	2.37	1.00	0.000	0.000	0.31	0.49
(WY)	(1958)	(1960)	(1960)	(2001)	(1964)	(1993)	(1954)	(1961)	(1953)	(1953)	(1961)	(1961)

16303000 PUNALUU STREAM NEAR PUNALUU—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1953 - 2003	
ANNUAL TOTAL	5,601.64		2,790.41		16.2	
ANNUAL MEAN	15.3		7.64		35.4	
HIGHEST ANNUAL MEAN					7.17	1982
LOWEST ANNUAL MEAN					1,010	2000
HIGHEST DAILY MEAN	734	May 6	169	Feb 14	0.00	Apr 15, 1963
LOWEST DAILY MEAN	0.50	Jan 11	0.75	Jul 19	0.00	Jun 1, 1953
ANNUAL SEVEN-DAY MINIMUM	1.7	Jan 10	1.9	Aug 24	0.00	Jun 1, 1953
ANNUAL RUNOFF (AC-FT)	11,110		5,530		11,750	
10 PERCENT EXCEEDS	24		12		29	
50 PERCENT EXCEEDS	7.4		5.2		11	
90 PERCENT EXCEEDS	3.5		1.8		2.3	



HAWAII, ISLAND OF OAHU

16304200 KALUANUI STREAM NEAR PUNALUU

LOCATION.--Lat 21°35'22", long 157°54'38", Old Hawaiian Datum, 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 H.A. Jeppesen. Records good except for discharges greater than 80 ft³/s, which are poor. No diversion upstream of station.

AVERAGE DISCHARGE.--36 years (water years 1968-2003), 4.24 ft³/s (3,070 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 measurement at gage height 10.84 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)
Jul 24	2215	584	7.87	Jul 26	0645	*980	*8.66

Minimum discharge, no flow, June 11-15.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

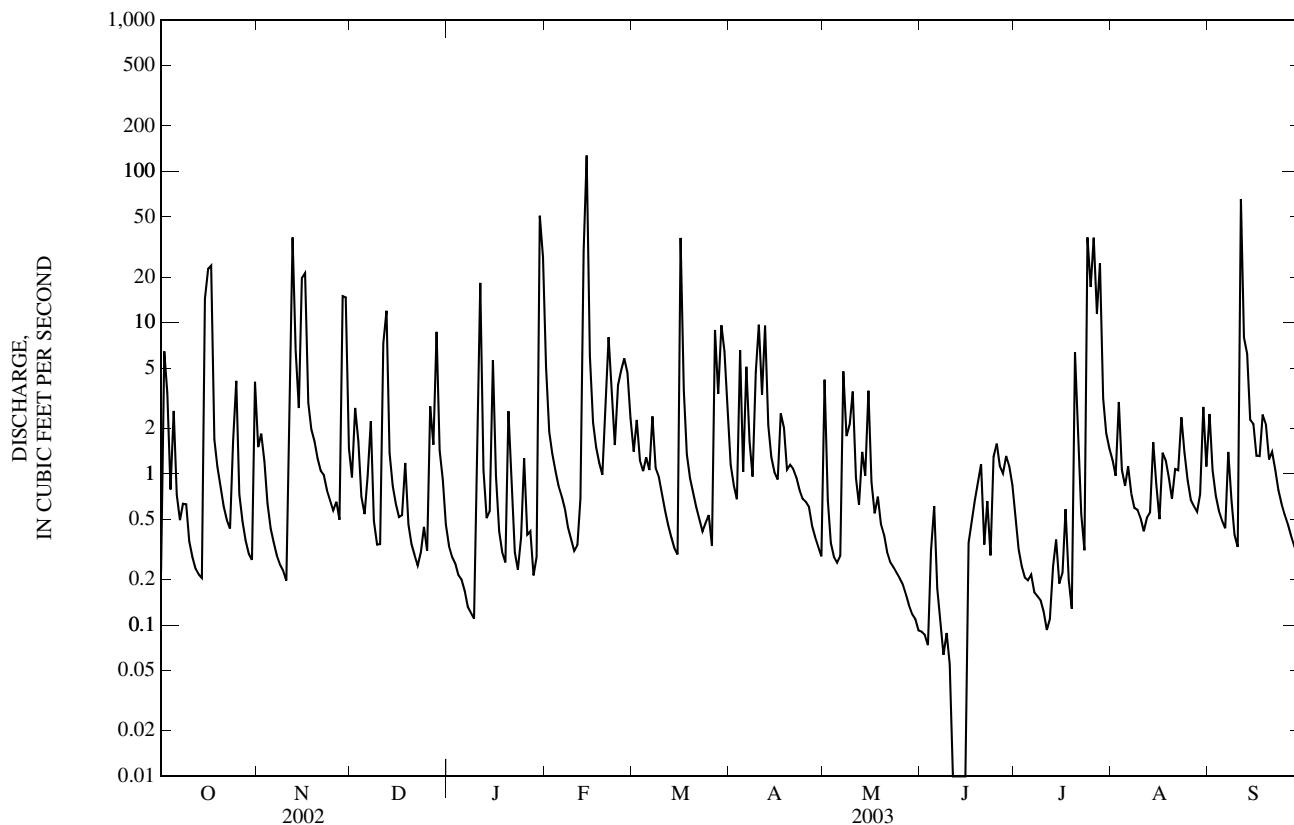
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.23	1.5	0.95	0.33	5.1	1.4	1.1	4.2	0.09	0.54	1.2	2.5
2	6.4	1.8	2.7	0.28	1.9	2.3	0.84	0.67	0.09	0.32	0.97	1.1
3	3.4	1.2	1.6	0.26	1.4	1.2	0.68	0.35	0.07	0.25	3.0	0.72
4	0.79	0.64	0.70	0.21	1.0	1.0	6.6	0.28	0.31	0.21	1.1	0.57
5	2.6	0.43	0.54	0.20	0.84	1.3	1.0	0.26	0.61	0.20	0.83	0.49
6	0.73	0.35	0.97	0.17	0.71	1.1	5.1	0.29	0.18	0.22	1.1	0.44
7	0.49	0.29	2.2	0.13	0.59	2.4	1.6	4.8	0.10	0.16	0.74	1.4
8	0.63	0.25	0.49	0.12	0.44	1.1	0.96	1.8	0.06	0.16	0.60	0.67
9	0.63	0.23	0.34	0.11	0.37	0.96	4.7	2.1	0.09	0.15	0.58	0.40
10	0.36	0.20	0.34	1.8	0.31	0.74	9.7	3.5	0.06	0.12	0.51	0.33
11	0.28	1.5	7.3	18	0.34	0.58	3.3	0.94	0.00	0.09	0.42	65
12	0.24	36	12	1.1	0.69	0.46	9.5	0.63	0.00	0.11	0.51	8.0
13	0.22	6.6	1.4	0.51	30	0.38	2.1	1.4	0.00	0.25	0.56	6.2
14	0.21	2.7	0.83	0.57	127	0.32	1.3	0.97	0.00	0.37	1.6	2.3
15	14	20	0.64	5.6	6.0	0.29	1.0	3.5	0.00	0.19	0.85	2.1
16	23	21	0.52	0.97	2.2	36	0.92	0.88	0.35	0.22	0.50	1.3
17	24	3.0	0.53	0.42	1.5	3.6	2.5	0.55	0.48	0.58	1.4	1.3
18	1.7	2.0	1.2	0.30	1.2	1.3	2.0	0.71	0.67	0.20	1.2	2.5
19	1.1	1.6	0.46	0.26	0.99	0.93	1.1	0.47	0.86	0.13	0.94	2.1
20	0.83	1.3	0.34	2.6	3.2	0.74	1.1	0.39	1.2	6.3	0.68	1.2
21	0.61	1.0	0.29	0.74	8.0	0.60	1.1	0.30	0.34	1.6	1.1	1.4
22	0.50	0.98	0.25	0.30	3.7	0.50	0.95	0.26	0.66	0.54	1.1	1.1
23	0.43	0.78	0.30	0.23	1.5	0.42	0.78	0.24	0.29	0.31	2.4	0.78
24	1.6	0.66	0.45	0.38	3.9	0.47	0.68	0.22	1.3	37	1.4	0.63
25	4.1	0.57	0.31	1.3	4.9	0.53	0.65	0.20	1.6	17	0.91	0.54
26	0.73	0.65	2.8	0.40	5.8	0.33	0.60	0.19	1.1	36	0.67	0.47
27	0.48	0.50	1.6	0.42	4.7	8.9	0.45	0.16	1.0	11	0.61	0.39
28	0.36	15	8.7	0.21	2.3	3.4	0.38	0.13	1.3	25	0.56	0.34
29	0.30	15	1.4	0.28	---	9.6	0.33	0.12	1.1	3.2	0.73	0.29
30	0.27	1.5	0.91	51	---	6.5	0.28	0.11	0.84	1.9	2.8	0.27
31	4.1	---	0.46	27	---	2.8	---	0.09	---	1.5	1.1	---
TOTAL	95.32	139.23	53.52	116.20	220.58	92.15	63.30	30.71	14.75	145.82	32.67	106.83
MEAN	3.07	4.64	1.73	3.75	7.88	2.97	2.11	0.99	0.49	4.70	1.05	3.56
MAX	24	36	12	51	127	36	9.7	4.8	1.6	37	3.0	65
MIN	0.21	0.20	0.25	0.11	0.31	0.29	0.28	0.09	0.00	0.09	0.42	0.27
AC-FT	189	276	106	230	438	183	126	61	29	289	65	212

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1968 - 2003, BY WATER YEAR (WY)

MEAN	3.36	5.73	4.80	5.23	4.50	5.26	5.53	3.81	2.67	3.97	3.03	2.99
MAX	7.68	19.0	17.7	17.9	19.7	32.2	19.3	14.6	7.72	11.7	8.37	9.34
(WY)	(1992)	(1991)	(1988)	(1988)	(1979)	(1982)	(1989)	(2002)	(1987)	(1982)	(1991)	(1994)
MIN	0.27	1.66	0.48	0.26	0.37	0.14	0.87	0.52	0.49	0.21	0.53	0.22
(WY)	(1985)	(1981)	(1977)	(1986)	(2000)	(1983)	(1979)	(2000)	(2003)	(1971)	(1984)	(1975)

16304200 KALUANUI STREAM NEAR PUNALUU—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1968 - 2003	
ANNUAL TOTAL	1,662.09		1,111.08		4.24	
ANNUAL MEAN	4.55		3.04		9.94	
HIGHEST ANNUAL MEAN					2.04	
LOWEST ANNUAL MEAN					1982	
HIGHEST DAILY MEAN	173	May 6	127	Feb 14	230	Feb 1, 1969
LOWEST DAILY MEAN	0.11	Apr 13	0.00	Jun 11	0.00	Jul 24, 1971
ANNUAL SEVEN-DAY MINIMUM	0.13	Apr 10	0.02	Jun 9	0.00	Sep 14, 1975
ANNUAL RUNOFF (AC-FT)	3,300		2,200		3,070	
10 PERCENT EXCEEDS	8.5		5.9		9.3	
50 PERCENT EXCEEDS	1.1		0.74		1.4	
90 PERCENT EXCEEDS	0.29		0.21		0.25	



HAWAII, ISLAND OF OAHU

16330000 KAMANANUI STREAM AT MAUNAWAI

LOCATION.--Lat 21°38'20", long 158°03'27", Old Hawaiian Datum, Hydrologic Unit 20060000, on right bank, 0.5 mi upstream from Kamehameha Highway, 5.9 mi northeast of Waialua School, and 7.4 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 H.A. Jeppesen. Records fair, except for estimated daily discharges, which are poor. Small diversion upstream of station.

AVERAGE DISCHARGE.--(Since diversion of Elehaha Stream into Kamananui Stream) 29 years (water years 1975-2003), 18.1 ft³/s (13,130 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)
Feb 14	0330	*1,540	*6.79	No other peak greater than base discharge.			

Minimum discharge, no flow, on several days.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.04	3.8	e3.1	e1.9	25	7.7	2.5	0.48	0.01	0.43	0.32	0.00
2	0.03	2.5	e2.0	e1.4	11	5.4	1.3	0.37	0.01	0.15	0.12	0.00
3	1.4	2.2	e3.3	e0.77	6.8	5.6	0.80	0.37	0.01	0.08	0.09	0.00
4	2.5	1.8	e3.1	e0.68	5.0	4.3	4.6	0.20	0.03	0.06	0.07	0.00
5	1.1	0.95	e1.7	e0.68	4.0	3.7	3.3	0.13	0.02	0.06	0.06	0.00
6	0.89	0.50	e1.1	e0.49	3.4	4.3	1.5	0.09	0.17	0.04	0.04	0.00
7	1.2	0.21	e16	0.14	3.4	8.8	1.5	0.07	0.05	0.03	0.03	0.00
8	0.49	0.11	e4.1	0.08	3.1	5.8	0.86	0.06	0.58	0.02	0.03	0.00
9	0.88	0.08	e1.8	0.06	2.7	3.7	0.58	0.20	0.35	0.02	0.04	0.00
10	1.2	0.07	e2.0	0.06	2.4	3.1	2.9	3.0	0.11	0.02	0.04	0.00
11	0.65	0.06	e4.3	30	2.2	2.7	4.6	5.7	0.06	0.02	0.04	62
12	0.28	11	e38	8.8	2.2	2.4	5.7	2.2	0.04	0.02	0.04	9.1
13	0.11	62	e8.9	3.3	2.6	2.2	9.3	1.0	0.04	0.02	0.04	4.0
14	0.08	8.7	e3.1	2.0	404	1.9	3.5	0.63	0.04	0.02	0.04	2.2
15	18	91	e1.8	11	41	1.8	2.3	0.47	0.02	0.03	0.04	1.4
16	6.3	196	e1.3	11	15	21	1.8	1.1	0.01	0.03	0.03	0.62
17	97	24	e1.1	3.9	9.8	38	2.1	1.4	0.01	0.02	0.02	0.30
18	8.5	11	e1.5	2.3	7.8	16	5.0	0.91	0.01	0.01	0.01	0.21
19	3.7	7.6	e1.5	1.8	6.5	5.7	4.0	0.49	0.01	0.01	0.00	0.16
20	2.5	5.6	e2.1	1.4	6.1	3.5	4.3	0.23	0.01	0.04	0.01	0.11
21	1.8	4.1	e1.5	2.7	9.7	2.8	5.5	0.09	1.4	2.1	0.02	0.16
22	1.1	3.3	e1.5	2.9	9.3	2.3	4.4	0.06	0.78	2.0	0.04	0.31
23	0.41	2.6	e1.7	1.5	7.4	1.8	3.4	0.06	0.34	0.59	0.03	0.18
24	0.42	2.3	e1.8	0.86	13	1.6	2.9	0.05	0.51	0.21	0.04	0.14
25	10	2.0	e1.7	3.5	8.9	1.3	2.1	0.04	1.7	2.1	0.04	0.12
26	5.2	e2.0	e1.6	4.1	29	1.1	1.7	0.03	2.4	100	0.04	0.10
27	2.4	e2.4	e5.9	2.1	13	1.3	1.4	0.02	1.5	16	0.01	0.06
28	1.3	e2.2	e18	1.2	9.4	7.6	1.2	0.01	0.90	9.5	0.04	0.03
29	0.59	e34	e11	0.95	---	3.4	0.86	0.01	0.53	5.4	0.05	0.03
30	0.27	e7.4	e4.7	75	---	6.1	0.67	0.01	0.36	2.1	0.01	0.02
31	0.18	---	e3.1	196	---	5.0	---	0.02	---	0.86	0.00	---
TOTAL	170.52	491.48	154.3	372.57	663.7	181.9	86.57	19.50	12.01	141.99	1.43	81.25
MEAN	5.50	16.4	4.98	12.0	23.7	5.87	2.89	0.63	0.40	4.58	0.046	2.71
MAX	97	196	38	196	404	38	9.3	5.7	2.4	100	0.32	62
MIN	0.03	0.06	1.1	0.06	2.2	1.1	0.58	0.01	0.01	0.01	0.00	0.00
AC-FT	338	975	306	739	1,320	361	172	39	24	282	2.8	161

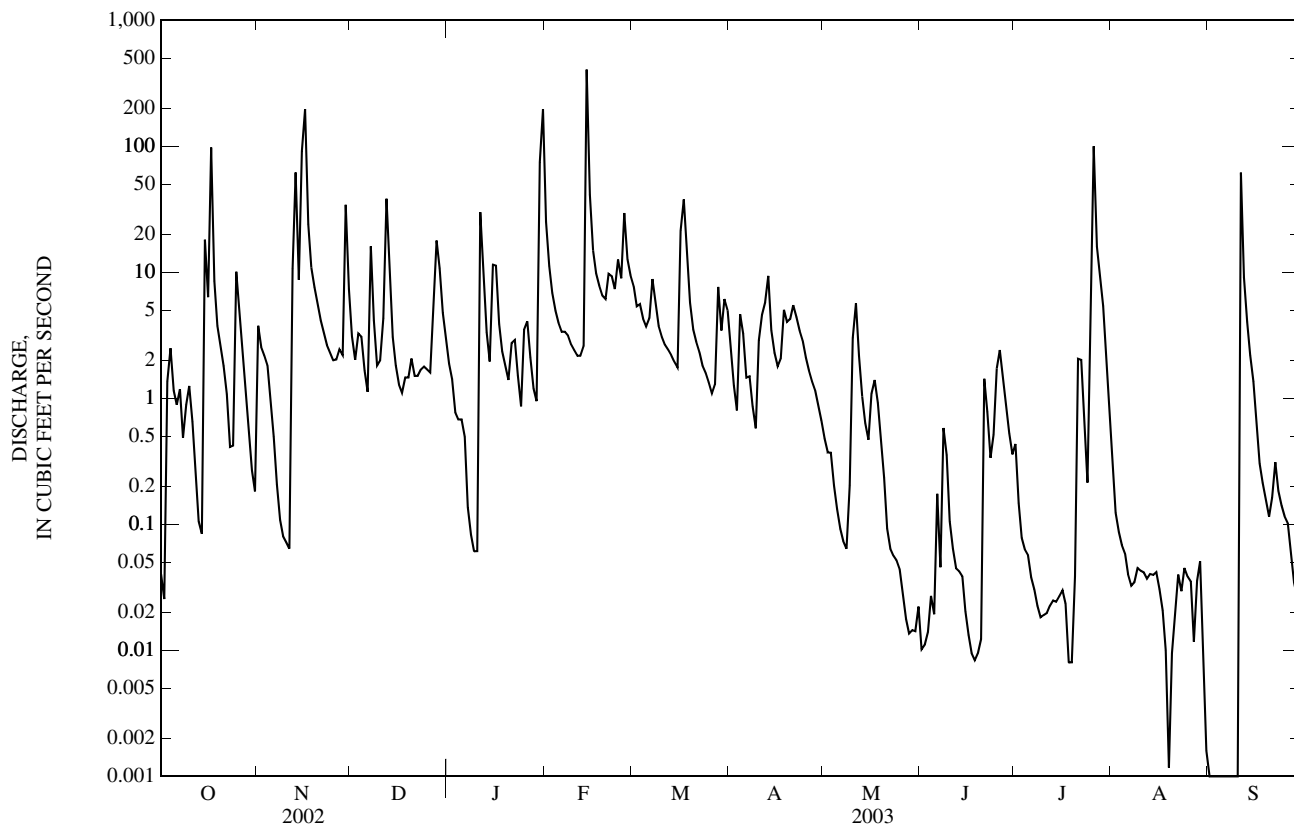
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1975 - 2003, BY WATER YEAR (WY)

MEAN	11.5	30.3	20.5	29.9	20.5	30.0	24.1	14.7	8.57	12.2	9.09	6.14
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	0.006	2.60	0.67	0.094	0.022	0.85	0.64	0.63	0.40	0.98	0.046	0.006
(WY)	(1985)	(1990)	(1977)	(1986)	(1978)	(1998)	(1992)	(2003)	(2003)	(1984)	(2003)	(1984)

16330000 KAMANANUI STREAM AT MAUNAWAI—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1975 - 2003	
ANNUAL TOTAL	5,042.34		2,377.22		18.1	
ANNUAL MEAN	13.8		6.51		50.3	
HIGHEST ANNUAL MEAN					4.81	
LOWEST ANNUAL MEAN					1,940	
HIGHEST DAILY MEAN	799	May 6	404	Feb 14	1,940	Jan 1, 1988
LOWEST DAILY MEAN	0.03	Oct 2	0.00	Aug 19	0.00	Sep 15, 1975
ANNUAL SEVEN-DAY MINIMUM	0.06	Sep 26	0.00	Aug 31	0.00	Sep 15, 1975
ANNUAL RUNOFF (AC-FT)	10,000		4,720		13,130	
10 PERCENT EXCEEDS	17		9.4		29	
50 PERCENT EXCEEDS	2.5		1.4		3.8	
90 PERCENT EXCEEDS	0.28		0.02		0.22	

e Estimated



HAWAII, ISLAND OF OAHU

16345000 OPAEULA STREAM NEAR WAHIAWA

LOCATION.--Lat 21°33'55", long 158°00'10", Old Hawaiian Datum, Hydrologic Unit 20060000, on left bank, 4.3 mi northeast of Leilehua High School in Wahiawa, and 8.1 mi east of Waialua 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 H.A. Jeppesen. Records good. No diversion upstream of station.

AVERAGE DISCHARGE.--44 years (water years 1960-2003), 13.3 ft³/s (9,670 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, 6.98 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)
Feb 14	0630	1,230	6.67	Jul 26	0830	1,660	7.53
Jul 24	2345	*2,120	*8.49				

Minimum discharge, 0.13 ft³/s, June 4 and June 17, gage height, 1.14 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

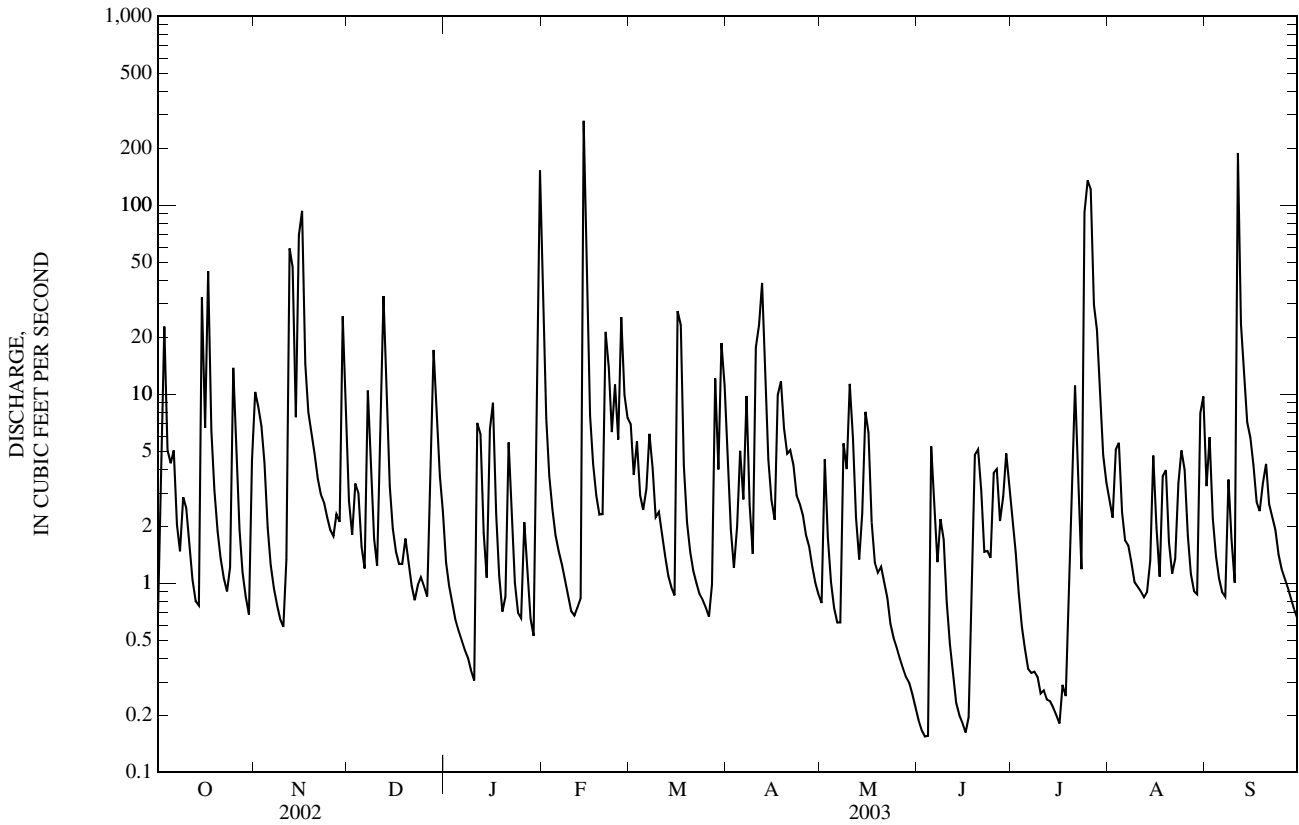
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.71	10	2.7	1.3	25	7.0	4.4	0.79	0.19	2.2	2.8	3.3
2	3.9	8.6	1.8	0.97	7.5	3.7	1.9	4.5	0.17	1.5	2.2	5.9
3	23	6.8	3.4	0.78	3.7	5.6	1.2	1.8	0.15	0.89	5.1	2.2
4	5.1	4.3	3.0	0.64	2.4	2.9	2.0	1.0	0.16	0.59	5.5	1.4
5	4.3	2.0	1.6	0.56	1.8	2.4	5.0	0.74	5.3	0.45	2.4	1.1
6	5.0	1.2	1.2	0.50	1.5	3.1	2.8	0.62	2.9	0.35	1.7	0.90
7	2.0	0.94	10	0.45	1.3	6.2	9.8	0.62	1.3	0.33	1.6	0.85
8	1.5	0.77	4.1	0.40	1.0	4.1	2.6	5.5	2.2	0.34	1.3	3.5
9	2.9	0.65	1.7	0.35	0.86	2.2	1.4	4.0	1.7	0.32	1.0	1.7
10	2.5	0.59	1.2	0.31	0.71	2.4	18	11	0.80	0.26	0.96	1.0
11	1.5	1.3	4.2	7.0	0.67	1.9	23	5.9	0.48	0.27	0.91	189
12	1.0	59	33	6.2	0.74	1.4	39	2.2	0.32	0.24	0.84	24
13	0.80	47	9.6	1.9	0.83	1.1	13	1.3	0.23	0.24	0.90	12
14	0.76	7.6	3.3	1.1	279	0.95	4.5	2.3	0.20	0.22	1.3	7.1
15	32	69	1.9	6.5	26	0.86	2.7	8.1	0.18	0.20	4.7	5.9
16	6.6	93	1.5	9.0	7.7	28	2.2	6.3	0.16	0.18	2.0	4.2
17	45	15	1.3	2.3	4.3	23	9.9	2.1	0.20	0.29	1.1	2.7
18	6.4	8.0	1.3	1.1	2.9	4.2	12	1.3	1.3	0.25	3.7	2.4
19	3.1	6.2	1.7	0.71	2.3	2.1	6.6	1.1	4.8	0.66	4.0	3.4
20	1.9	4.8	1.3	0.85	2.3	1.5	4.8	1.2	5.1	4.0	1.6	4.3
21	1.4	3.6	0.97	5.6	21	1.2	5.1	1.0	3.1	11	1.1	2.6
22	1.1	3.0	0.81	2.1	14	1.0	4.2	0.84	1.5	2.9	1.3	2.2
23	0.90	2.7	0.98	1.0	6.3	0.88	2.9	0.61	1.5	1.2	3.4	1.9
24	1.2	2.2	1.1	0.70	11	0.82	2.6	0.51	1.4	92	5.0	1.4
25	14	1.9	0.96	0.65	5.8	0.75	2.3	0.46	3.8	135	4.0	1.2
26	4.9	1.8	0.85	2.1	26	0.67	1.8	0.40	4.0	122	1.8	1.1
27	1.9	2.3	5.3	1.1	9.9	0.99	1.6	0.35	2.1	30	1.1	0.95
28	1.1	2.1	17	0.65	7.5	12	1.2	0.32	2.9	22	0.91	0.83
29	0.85	26	8.8	0.53	---	4.0	1.0	0.30	4.9	10	0.87	0.73
30	0.68	7.3	3.7	21	---	19	0.88	0.26	3.1	4.8	7.9	0.65
31	4.5	---	2.4	152	---	11	---	0.22	---	3.4	9.7	---
TOTAL	182.50	399.65	132.67	230.35	474.01	156.92	190.38	67.64	56.14	448.08	82.69	290.41
MEAN	5.89	13.3	4.28	7.43	16.9	5.06	6.35	2.18	1.87	14.5	2.67	9.68
MAX	45	93	33	152	279	28	39	11	5.3	135	9.7	189
MIN	0.68	0.59	0.81	0.31	0.67	0.67	0.88	0.22	0.15	0.18	0.84	0.65
AC-FT	362	793	263	457	940	311	378	134	111	889	164	576

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1959 - 2003, BY WATER YEAR (WY)

MEAN	10.8	18.1	15.2	16.1	13.4	19.4	19.9	12.2	7.38	11.6	8.41	7.50
MAX	30.7	71.9	52.6	54.1	66.9	90.0	75.7	45.7	24.9	29.3	31.0	24.9
(WY)	(1982)	(1991)	(1988)	(1988)	(1969)	(1982)	(1989)	(2002)	(1978)	(1989)	(1982)	(1994)
MIN	0.057	2.90	1.29	0.37	0.32	0.35	1.57	1.37	1.59	0.95	1.51	0.52
(WY)	(1985)	(1963)	(1977)	(1977)	(1978)	(1983)	(1966)	(2000)	(2000)	(1971)	(1984)	(1975)

16345000 OPAEULA STREAM NEAR WAHIAWA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1959 - 2003	
ANNUAL TOTAL	5,077.84		2,711.44		13.3	
ANNUAL MEAN	13.9		7.43		7.12	
HIGHEST ANNUAL MEAN					29.7	1982
LOWEST ANNUAL MEAN					7.12	1998
HIGHEST DAILY MEAN	845	May 6	279	Feb 14	845	May 6, 2002
LOWEST DAILY MEAN	0.59	Nov 10	0.15	Jun 3	0.00	Jan 24, 1977
ANNUAL SEVEN-DAY MINIMUM	0.84	Sep 25	0.21	May 29	0.00	Oct 24, 1984
ANNUAL RUNOFF (AC-FT)	10,070		5,380		9,670	
10 PERCENT EXCEEDS	22		12		27	
50 PERCENT EXCEEDS	3.2		2.0		4.5	
90 PERCENT EXCEEDS	0.98		0.49		0.92	



Surface-Water Station Records
for Molokai

HAWAII, ISLAND OF MOLOKAI

16400000 HALAWA STREAM NEAR HALAWA

LOCATION.--Lat 21°09'31", long 156°45'53", Old Hawaiian Datum, 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 Matt Wong. Records fair. No diversion upstream.

AVERAGE DISCHARGE.--79 years (water years 1918-31, 1939-2003), 29.4 ft³/s (21,330 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)
Oct 15	0445	*2,540	*9.33	Jan 29	2245	2,140	8.78

Minimum discharge, 1.7 ft³/s, June 10, 11, 12, 13, gage height, 1.39 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

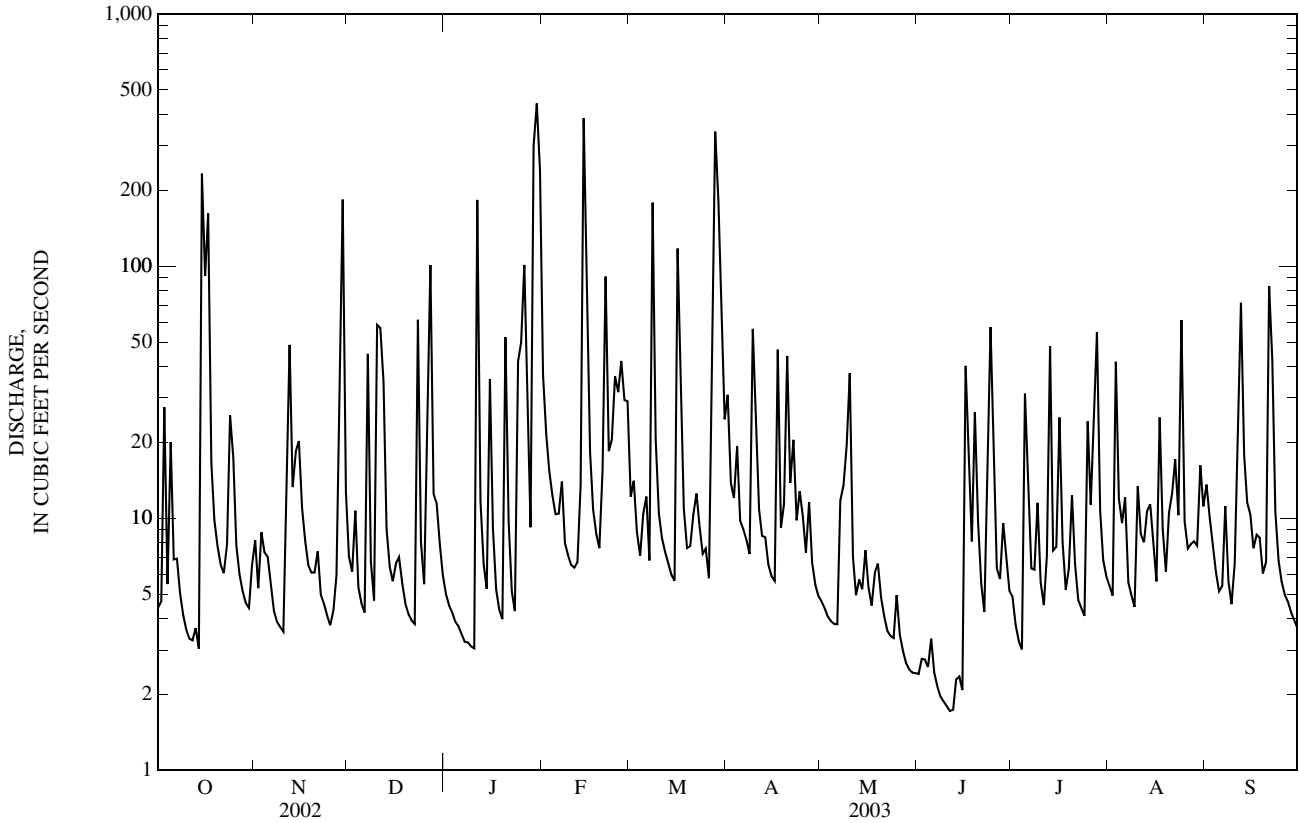
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.4	8.2	7.0	5.0	37	12	31	4.7	2.4	4.9	5.4	14
2	4.7	5.3	6.1	4.5	21	14	14	4.4	2.8	3.8	4.9	10
3	28	8.8	11	4.2	15	8.8	12	4.1	2.8	3.3	42	7.9
4	5.5	7.3	5.3	3.9	12	7.1	19	3.9	2.6	3.0	12	6.1
5	20	7.0	4.6	3.7	10	10	9.8	3.8	3.3	31	9.6	5.1
6	6.9	5.6	4.2	3.5	10	12	9.0	3.8	2.4	12	12	5.4
7	6.9	4.3	45	3.2	14	6.8	8.2	12	2.1	6.3	5.6	11
8	5.1	3.9	6.7	3.2	8.0	179	7.2	14	2.0	6.2	5.0	5.6
9	4.1	3.7	4.7	3.1	7.1	21	56	20	1.9	12	4.4	4.6
10	3.6	3.5	59	3.0	6.5	10	25	38	1.8	5.6	13	6.6
11	3.3	14	57	183	6.4	8.4	11	7.0	1.7	4.5	8.7	15
12	3.3	49	35	12	6.7	7.4	8.5	5.0	1.7	7.1	8.0	71
13	3.7	13	9.1	6.6	14	6.6	8.4	5.7	2.3	48	11	18
14	3.0	18	6.4	5.3	386	6.0	6.6	5.2	2.4	7.4	11	12
15	233	20	5.6	36	60	5.7	5.9	7.5	2.1	7.7	7.9	10
16	91	11	6.6	9.1	18	117	5.6	5.3	40	25	5.6	7.6
17	162	8.1	7.0	5.2	11	34	47	4.5	15	8.1	25	8.6
18	17	6.5	5.5	4.3	8.7	11	9.2	6.1	8.1	5.2	9.1	8.4
19	9.8	6.1	4.6	4.0	7.6	7.6	11	6.6	26	6.3	6.1	6.0
20	7.7	6.1	4.2	52	15	7.7	44	4.8	9.6	12	10	6.7
21	6.6	7.4	3.9	9.7	91	10	14	4.1	5.5	6.6	13	83
22	6.1	5.0	3.8	5.1	18	13	20	3.6	4.2	4.7	17	42
23	7.9	4.6	61	4.3	21	9.3	9.8	3.4	13	4.4	10	11
24	26	4.1	8.0	42	36	7.2	13	3.3	57	4.1	61	6.8
25	17	3.8	5.5	50	32	7.6	10	5.0	20	24	9.7	5.6
26	7.8	4.3	19	101	42	5.8	7.3	3.4	6.4	11	7.6	5.0
27	6.0	5.9	101	24	29	31	12	3.0	5.7	22	7.9	4.7
28	5.2	23	12	9.2	29	341	6.6	2.7	9.6	55	8.1	4.3
29	4.6	184	11	299	---	182	5.4	2.5	7.1	11	7.8	3.9
30	4.4	13	7.9	442	---	57	4.9	2.4	5.1	6.8	16	3.7
31	6.5	---	5.9	239	---	25	---	2.4	---	5.9	11	---
TOTAL	721.1	464.5	533.6	1,580.1	972.0	1,181.0	451.4	202.2	266.6	374.9	385.4	409.6
MEAN	23.3	15.5	17.2	51.0	34.7	38.1	15.0	6.52	8.89	12.1	12.4	13.7
MAX	233	184	101	442	386	341	56	38	57	55	61	83
MIN	3.0	3.5	3.8	3.0	6.4	5.7	4.9	2.4	1.7	3.0	4.4	3.7
AC-FT	1,430	921	1,060	3,130	1,930	2,340	895	401	529	744	764	812

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1917 - 2003, BY WATER YEAR (WY)

	MEAN	MAX	MIN	(WY)	MEAN	MAX	MIN	(WY)	MEAN	MAX	MIN	(WY)	MEAN	MAX	MIN	(WY)	MEAN	MAX	MIN	(WY)
	26.4	100	2.04	(1918)	36.2	97.8	5.80	(1920)	35.7	84.7	8.56	(1977)	34.1	118	5.31	(1977)	29.2	114	2.98	(1978)
	36.9	134	5.48	(1970)	39.3	157	11.7	(1990)	26.8	85.2	4.26	(1920)	18.7	59.2	4.93	(1966)	25.5	58.2	6.00	(1917)
	26.8	85.2	4.26	(1920)	18.7	59.2	4.93	(1966)	25.5	58.2	6.00	(1917)	20.4	58.2	1.19	(1971)	20.4	58.2	1.19	(1975)

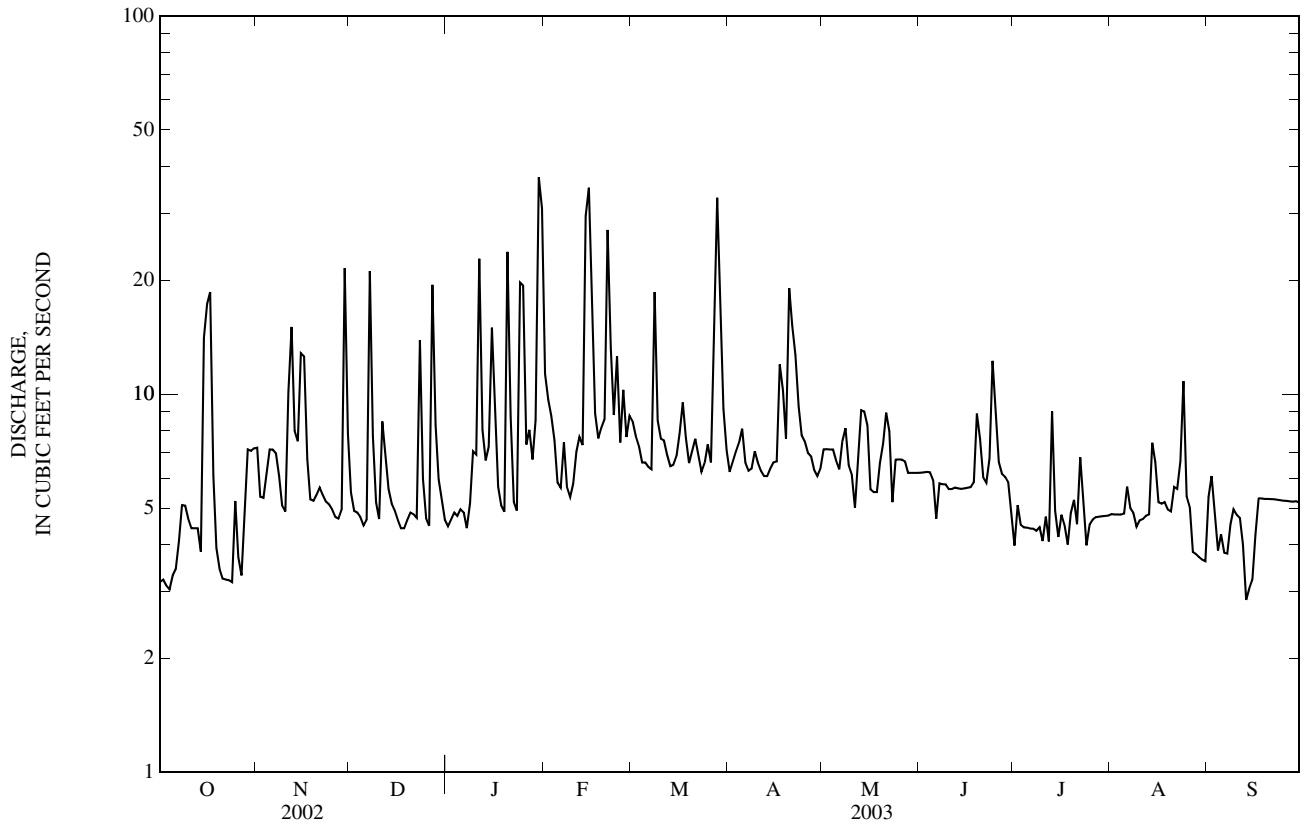
16400000 HALAWA STREAM NEAR HALAWA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1917 - 2003	
ANNUAL TOTAL	10,325.6		7,542.4		29.4	
ANNUAL MEAN	28.3		20.7		47.4	
HIGHEST ANNUAL MEAN					1965	
LOWEST ANNUAL MEAN					1975	
HIGHEST DAILY MEAN	751	Jan 29	442	Jan 30	1,240	Feb 4, 1965
LOWEST DAILY MEAN	3.0	Oct 14	1.7	Jun 11	0.86	Sep 1, 1971
ANNUAL SEVEN-DAY MINIMUM	3.5	Sep 23	1.9	Jun 7	0.90	Aug 26, 1971
ANNUAL RUNOFF (AC-FT)	20,480		14,960		21,330	
10 PERCENT EXCEEDS	61		42		65	
50 PERCENT EXCEEDS	9.4		7.6		13	
90 PERCENT EXCEEDS	4.3		3.7		4.8	



16405300 MOLOKAI TUNNEL AT WEST PORTAL—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1965 - 2003	
ANNUAL TOTAL	2,730.9		2,584.7			
ANNUAL MEAN	7.48		7.08		7.36	
HIGHEST ANNUAL MEAN					11.4	1987
LOWEST ANNUAL MEAN					3.46	1974
HIGHEST DAILY MEAN	30	Feb 13	37	Jan 30	39	Apr 8, 1986
LOWEST DAILY MEAN	3.0	Oct 4	2.9	Sep 13	1.8	Oct 15, 1967
ANNUAL SEVEN-DAY MINIMUM	3.2	Sep 29	3.3	Oct 1	1.9	May 3, 1976
ANNUAL RUNOFF (AC-FT)	5,420		5,130		5,330	
10 PERCENT EXCEEDS	13		10		12	
50 PERCENT EXCEEDS	6.0		5.8		6.2	
90 PERCENT EXCEEDS	4.2		4.4		3.2	



HAWAII, ISLAND OF MOLOKAI

16405500 WAIKOLU STREAM AT ALTITUDE 900 FT, NEAR KALAUPAPA

LOCATION.--Lat 21°08'43", long 156°55'18", Old Hawaiian Datum, 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. Station discontinued October 2003.

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 Matt Wong. Records fair. Since November 16, 1960, low flow water diverted 400 ft upstream into Molokai tunnel (16405100, 16405300). Hawaii Department of Agriculture diverts flow into transmountain tunnel for irrigation in west central Molokai.

AVERAGE DISCHARGE (since Molokai tunnel diversion began).--42 years (water years 1961, 1963-2003), 5.68 ft³/s (4,120 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 measurements at gage heights 5.24 ft and 6.64 ft; no flow at times since 1984.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of October 31, 1961, reached a gage height 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 29	2230	753	4.01	Feb 14	0800	*1,120	*4.55

Minimum discharge, 0.00 ft³/s, on many days, gage height, 0.73 ft.

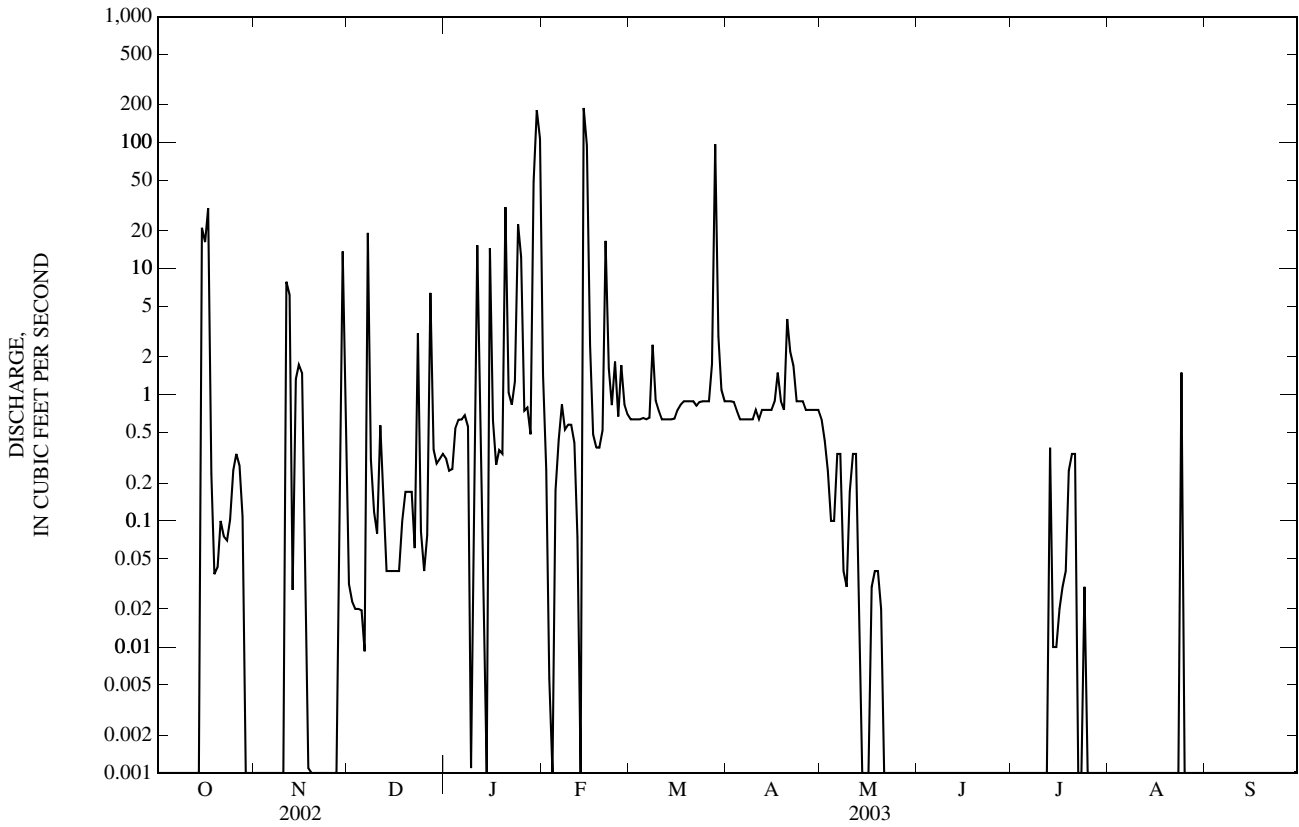
DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	0.00	0.03	0.31	1.4	0.64	0.89	0.64	0.00	0.00	0.00	0.00
2	0.00	0.00	0.02	0.25	0.25	0.64	0.89	0.43	0.00	0.00	0.00	0.00
3	0.00	0.00	0.02	0.26	0.01	0.64	0.88	0.25	0.00	0.00	0.00	0.00
4	0.00	0.00	0.02	0.54	0.00	0.64	0.74	0.10	0.00	0.00	0.00	0.00
5	0.00	0.00	0.02	0.64	0.17	0.65	0.64	0.10	0.00	0.00	0.00	0.00
6	0.00	0.00	0.01	0.64	0.44	0.64	0.64	0.34	0.00	0.00	0.00	0.00
7	0.00	0.00	19	0.69	0.84	0.66	0.64	0.34	0.00	0.00	0.00	0.00
8	0.00	0.00	0.31	0.56	0.53	2.5	0.64	0.04	0.00	0.00	0.00	0.00
9	0.00	0.00	0.12	0.00	0.58	0.90	0.64	0.03	0.00	0.00	0.00	0.00
10	0.00	0.00	0.08	0.47	0.58	0.75	0.76	0.17	0.00	0.00	0.00	0.00
11	0.00	7.9	0.57	15	0.42	0.64	0.64	0.34	0.00	0.00	0.00	0.00
12	0.00	6.2	0.12	0.20	0.07	0.64	0.76	0.34	0.00	0.00	0.00	0.00
13	0.00	0.03	0.04	0.03	0.00	0.64	0.76	0.03	0.00	0.38	0.00	0.00
14	0.00	1.3	0.04	0.00	189	0.64	0.76	0.00	0.00	0.01	0.00	0.00
15	21	1.7	0.04	15	96	0.65	0.76	0.00	0.00	0.01	0.00	0.00
16	16	1.5	0.04	0.63	2.5	0.76	0.89	0.00	0.00	0.02	0.00	0.00
17	30	0.10	0.04	0.28	0.49	0.84	1.5	0.03	0.00	0.03	0.00	0.00
18	0.24	0.00	0.10	0.36	0.38	0.89	0.89	0.04	0.00	0.04	0.00	0.00
19	0.04	0.00	0.17	0.34	0.38	0.89	0.76	0.04	0.00	0.25	0.00	0.00
20	0.04	0.00	0.17	31	0.52	0.89	4.0	0.02	0.00	0.34	0.00	0.00
21	0.10	0.00	0.17	1.0	17	0.89	2.2	0.00	0.00	0.34	0.00	0.00
22	0.08	0.00	0.06	0.83	1.6	0.82	1.7	0.00	0.00	0.00	0.00	0.00
23	0.07	0.00	3.1	1.3	0.83	0.88	0.89	0.00	0.00	0.00	0.00	0.00
24	0.10	0.00	0.08	23	1.8	0.89	0.89	0.00	0.00	0.03	1.5	0.00
25	0.25	0.00	0.04	12	0.67	0.89	0.89	0.00	0.00	0.00	0.00	0.00
26	0.34	0.00	0.08	0.75	1.7	0.89	0.76	0.00	0.00	0.00	0.00	0.00
27	0.27	0.00	6.4	0.79	0.84	1.8	0.76	0.00	0.00	0.00	0.00	0.00
28	0.11	0.01	0.37	0.49	0.70	97	0.76	0.00	0.00	0.00	0.00	0.00
29	0.00	14	0.29	49	---	2.9	0.76	0.00	0.00	0.00	0.00	0.00
30	0.00	0.21	0.31	182	---	1.1	0.76	0.00	0.00	0.00	0.00	0.00
31	0.00	---	0.34	108	---	0.89	---	0.00	---	0.00	0.00	---
TOTAL	68.64	32.95	32.20	446.36	319.70	125.09	29.45	3.28	0.00	1.45	1.50	0.00
MEAN	2.21	1.10	1.04	14.4	11.4	4.04	0.98	0.11	0.000	0.047	0.048	0.000
MAX	30	14	19	182	189	97	4.0	0.64	0.00	0.38	1.5	0.00
MIN	0.00	0.00	0.01	0.00	0.00	0.64	0.64	0.00	0.00	0.00	0.00	0.00
AC-FT	136	65	64	885	634	248	58	6.5	0.00	2.9	3.0	0.00

16405500 WAIKOLU STREAM AT ALTITUDE 900 FT, NEAR KALAUPAPA—Continued

DISCHARGE, CUBIC FEET PER SECOND—CONTINUED
 WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
 DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1961 - 2003, BY WATER YEAR (WY)												
MEAN	3.00	8.13	8.61	10.6	8.43	8.43	8.89	4.27	2.21	2.62	1.92	1.31
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	0.000	0.000	0.22	0.15	0.000	0.18	0.36	0.000	0.000	0.000	0.010	0.000
(WY)	(1985)	(2000)	(2001)	(2001)	(2000)	(2001)	(2002)	(2001)	(1985)	(2001)	(1996)	(1996)
SUMMARY STATISTICS												
	FOR 2002 CALENDAR YEAR				FOR 2003 WATER YEAR				WATER YEARS 1961 - 2003			
ANNUAL TOTAL	1,009.37				1,060.62							
ANNUAL MEAN	2.77				2.91				5.68			
HIGHEST ANNUAL MEAN									11.8			
LOWEST ANNUAL MEAN									0.52			
HIGHEST DAILY MEAN	219				Mar 17				189			
LOWEST DAILY MEAN	0.00				Jan 2				0.00			
ANNUAL SEVEN-DAY MINIMUM	0.00				Apr 9				0.00			
ANNUAL RUNOFF (AC-FT)	2,000								2,100			
10 PERCENT EXCEEDS	2.7								1.3			
50 PERCENT EXCEEDS	0.38								0.03			
90 PERCENT EXCEEDS	0.00								0.00			



HAWAII, ISLAND OF MOLOKAI

16414200 KAUNAKAKAI GULCH AT 75 FEET

LOCATION.--Lat 21°05'50", Long 157°00'51", Old Hawaiian Datum, Hydrologic Unit 2000500000, on left bank 0.7 mile upstream of Highway 46, and 0.4 mile northeast of Kaunakakai Post Office.

DRAINAGE AREA.--7.05 mi².

PERIOD OF RECORD.--Water Year 2002 (annual maximum), February to September 2003.

GAGE.--Crest stage gage in water year 2002. Water stage recorder. Elevation of gage is 75 feet above mean sea level (from topographic map).

REMARKS.--Records computed by Phillip Teeters. Records poor. No diversions upstream. Flow has been augmented by occasional spillage from Molokai Tunnel since May 1965.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 602 ft³/s, November 27, 2001, gage height, 7.05 ft; no flow on many days.

EXTREMES FOR CURRENT YEAR.--Peak discharge during period February to September 2003 greater than base of 280 ft³/s and maximum (*).

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Feb 14	0945	*301	*6.42				

No other peak greater than base discharge.

Minimum discharge, 0.00 ft³/s, on many days, gage height, 3.80 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	0.00	0.00	---	---	---	0.00	0.00
2	---	---	---	---	---	0.00	0.00	---	---	---	0.00	0.00
3	---	---	---	---	---	0.00	0.00	---	---	---	0.00	0.00
4	---	---	---	---	---	0.00	0.00	---	---	---	0.00	0.00
5	---	---	---	---	---	0.00	0.00	---	---	---	0.00	0.00
6	---	---	---	---	0.00	0.00	0.00	---	---	---	0.00	0.00
7	---	---	---	---	0.00	0.00	---	---	---	---	0.00	0.00
8	---	---	---	---	0.00	0.00	---	---	---	---	0.00	0.00
9	---	---	---	---	0.00	0.00	---	---	---	---	0.00	0.00
10	---	---	---	---	0.00	0.00	---	---	---	---	0.00	0.00
11	---	---	---	---	0.00	0.00	---	---	---	---	0.00	0.00
12	---	---	---	---	0.00	0.00	---	---	---	---	0.00	0.00
13	---	---	---	---	0.00	0.00	---	---	---	---	0.00	0.00
14	---	---	---	---	13	0.00	---	---	---	0.00	0.00	0.00
15	---	---	---	---	14	0.06	---	---	---	0.00	0.00	0.00
16	---	---	---	---	8.4	0.00	---	---	---	0.00	0.00	0.00
17	---	---	---	---	e5.7	0.00	---	---	---	0.00	0.00	0.00
18	---	---	---	---	e3.4	0.00	---	---	---	0.00	0.00	0.00
19	---	---	---	---	e1.2	0.00	---	---	---	0.00	0.00	0.00
20	---	---	---	---	0.00	0.00	---	---	---	0.00	0.00	0.00
21	---	---	---	---	1.1	0.00	---	---	---	0.00	0.00	0.00
22	---	---	---	---	e5.0	0.00	---	---	---	0.00	0.00	0.00
23	---	---	---	---	e0.90	0.00	---	---	---	0.00	0.00	0.00
24	---	---	---	---	0.00	0.00	---	---	---	0.00	0.00	0.00
25	---	---	---	---	0.00	0.00	---	---	---	0.00	0.00	0.00
26	---	---	---	---	0.00	0.00	---	---	---	0.00	0.00	0.00
27	---	---	---	---	0.00	0.00	---	---	---	0.00	0.00	0.00
28	---	---	---	---	0.00	7.1	---	---	---	0.00	0.00	0.00
29	---	---	---	---	---	e4.7	---	---	---	0.00	0.00	0.00
30	---	---	---	---	---	e0.30	---	---	---	0.00	0.00	0.00
31	---	---	---	---	---	0.00	---	---	---	0.00	0.00	---
TOTAL	---	---	---	---	---	12.16	---	---	---	---	0.00	0.00
MEAN	---	---	---	---	---	0.39	---	---	---	---	0.000	0.000
MAX	---	---	---	---	---	7.1	---	---	---	---	0.00	0.00
MIN	---	---	---	---	---	0.00	---	---	---	---	0.00	0.00
AC-FT	---	---	---	---	---	24	---	---	---	---	0.00	0.00

e Estimated

HAWAII, ISLAND OF MOLOKAI
 16419500 PAPIO GULCH AT HALAWA

LOCATION.--Lat 21°08'55", long 156°44'16", Old Hawaiian Datum, Hydrologic Unit 20050000, on left bank 200 ft downstream from concrete 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 Matt Wong. Records fair. Diversion upstream of station for domestic use at Puu O Hoku Ranch.

AVERAGE DISCHARGE.--40 years (water years 1964-2003), 0.77 ft³/s (558 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 50 ft³/s, revised, and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jan 30	0115	*86	*2.99	No other peak greater than base discharge.			

Minimum discharge, 0.00 ft³/s, on many days, gage height, 0.26 ft.

DISCHARGE, CUBIC FEET PER SECOND
 WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
 DAILY MEAN VALUES

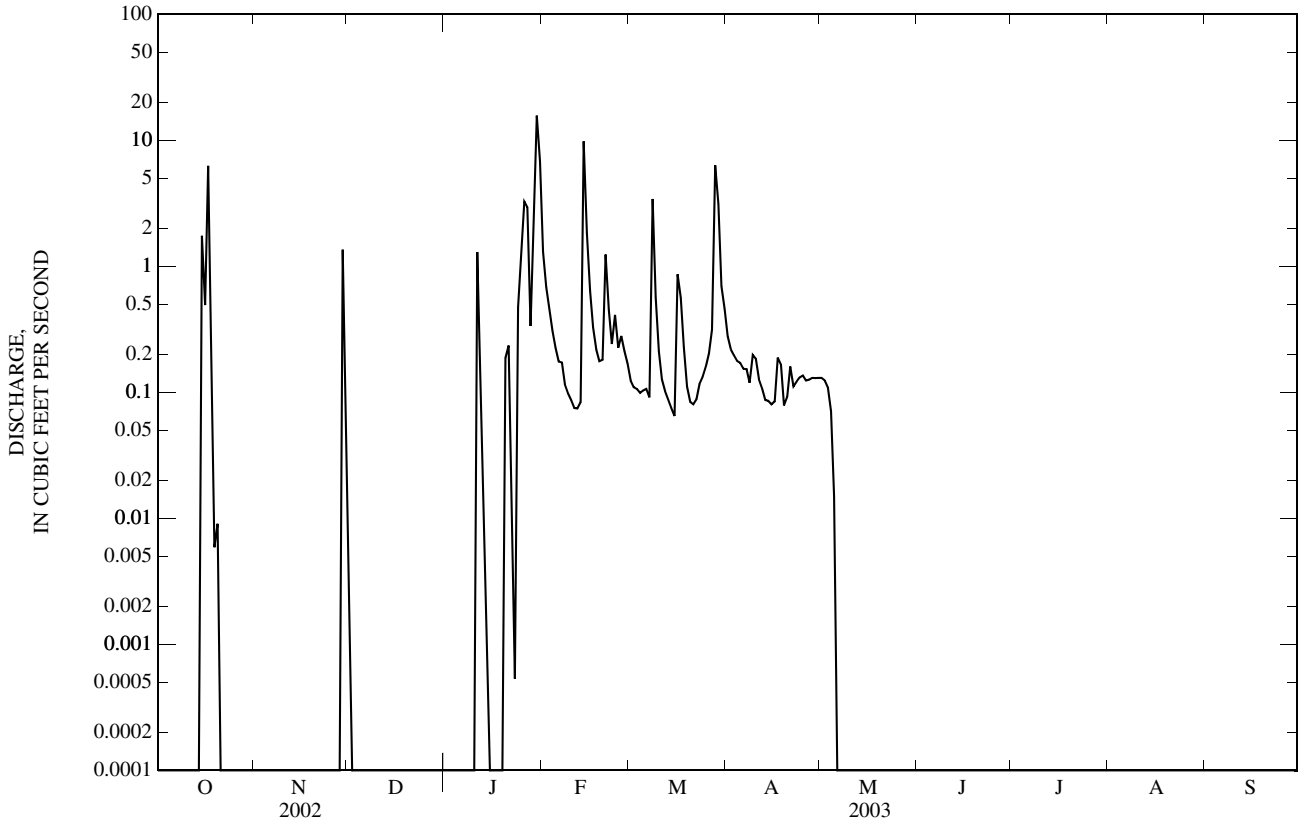
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	0.00	0.00	0.00	1.3	0.12	0.28	0.13	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.68	0.11	0.22	0.12	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.46	0.11	0.20	0.11	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.31	0.10	0.18	0.07	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.23	0.10	0.17	0.01	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.18	0.11	0.15	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.17	0.09	0.15	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.11	3.4	0.12	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.10	0.57	0.20	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.09	0.21	0.18	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	1.3	0.07	0.13	0.13	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.11	0.07	0.10	0.11	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.01	0.08	0.09	0.09	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	9.8	0.08	0.09	0.00	0.00	0.00	0.00	0.00
15	1.7	0.00	0.00	0.00	1.8	0.06	0.08	0.00	0.00	0.00	0.00	0.00
16	0.49	0.00	0.00	0.00	0.64	0.86	0.08	0.00	0.00	0.00	0.00	0.00
17	6.2	0.00	0.00	0.00	0.32	0.56	0.19	0.00	0.00	0.00	0.00	0.00
18	0.28	0.00	0.00	0.00	0.22	0.23	0.17	0.00	0.00	0.00	0.00	0.00
19	0.01	0.00	0.00	0.00	0.18	0.11	0.08	0.00	0.00	0.00	0.00	0.00
20	0.01	0.00	0.00	0.19	0.18	0.08	0.09	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.23	1.2	0.08	0.16	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.02	0.45	0.09	0.11	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.24	0.12	0.12	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.47	0.41	0.13	0.13	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	1.3	0.23	0.16	0.14	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	3.3	0.28	0.20	0.12	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	2.9	0.21	0.31	0.13	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.33	0.17	6.3	0.13	0.00	0.00	0.00	0.00	0.00
29	0.00	1.3	0.00	1.5	---	3.1	0.13	0.00	0.00	0.00	0.00	0.00
30	0.00	0.14	0.00	16	---	0.69	0.13	0.00	0.00	0.00	0.00	0.00
31	0.00	---	0.00	6.8	---	0.46	---	0.00	---	0.00	0.00	---
TOTAL	8.69	1.44	0.00	34.46	20.18	18.86	4.26	0.44	0.00	0.00	0.00	0.00
MEAN	0.28	0.048	0.000	1.11	0.72	0.61	0.14	0.014	0.000	0.000	0.000	0.000
MAX	6.2	1.3	0.00	16	9.8	6.3	0.28	0.13	0.00	0.00	0.00	0.00
MIN	0.00	0.00	0.00	0.00	0.07	0.06	0.08	0.00	0.00	0.00	0.00	0.00
AC-FT	17	2.9	0.00	68	40	37	8.4	0.9	0.00	0.00	0.00	0.00

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1963 - 2003, BY WATER YEAR (WY)

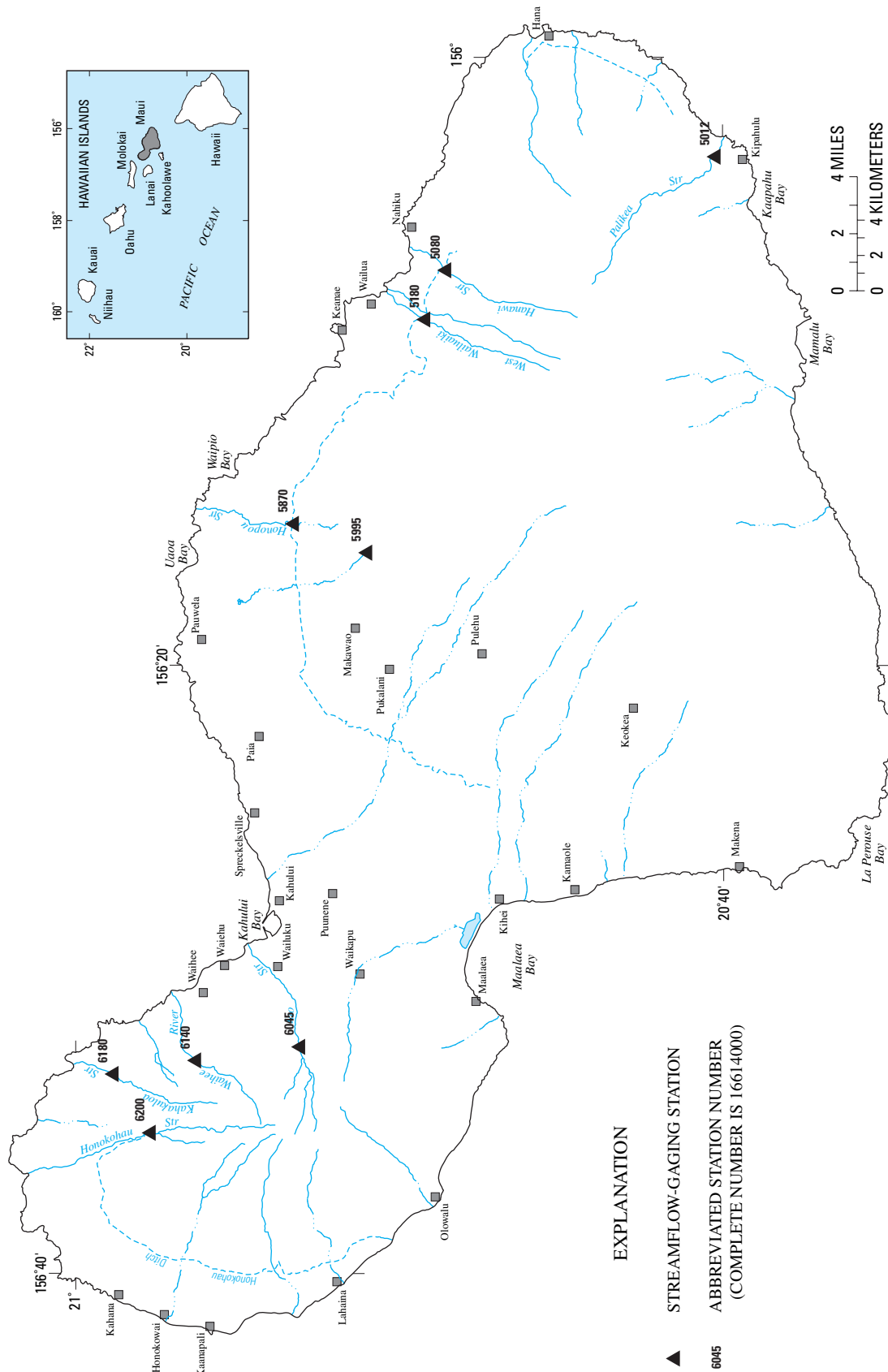
	0.46	1.09	0.98	1.27	1.09	1.27	1.25	0.62	0.29	0.40	0.28	0.27
MEAN	0.46	1.09	0.98	1.27	1.09	1.27	1.25	0.62	0.29	0.40	0.28	0.27
MAX	2.63	7.56	6.12	4.84	5.88	6.42	10.3	3.99	1.43	1.56	1.21	2.24
(WY)	(1986)	(1971)	(1965)	(1988)	(1965)	(1968)	(1989)	(1987)	(1982)	(1993)	(1980)	(1992)
MIN	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
(WY)	(1972)	(1972)	(1972)	(1977)	(1973)	(2001)	(2001)	(1975)	(1964)	(1972)	(1964)	(1964)

16419500 PAPIO GULCH AT HALAWA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1963 - 2003	
ANNUAL TOTAL	142.56		88.33		0.77	
ANNUAL MEAN	0.39		0.24		0.062	
HIGHEST ANNUAL MEAN					2.32	1989
LOWEST ANNUAL MEAN					0.062	2001
HIGHEST DAILY MEAN	56	Jan 29	16	Jan 30	164	Apr 13, 1965
LOWEST DAILY MEAN	0.00	Jan 1	0.00	Oct 1	0.00	Jul 5, 1963
ANNUAL SEVEN-DAY MINIMUM	0.00	Jan 1	0.00	Oct 1	0.00	Aug 3, 1963
ANNUAL RUNOFF (AC-FT)	283		175		558	
10 PERCENT EXCEEDS	0.13		0.26		1.4	
50 PERCENT EXCEEDS	0.00		0.00		0.18	
90 PERCENT EXCEEDS	0.00		0.00		0.00	



Surface-Water Station Records
for Maui



EXPLANATION

- ▲ STREAMFLOW-GAGING STATION
- 6045 ABBREVIATED STATION NUMBER
(COMPLETE NUMBER IS 16614000)

Figure 8. Locations of streamflow-gaging stations on Maui.

HAWAII, ISLAND OF MAUI

16501200 OHEO GULCH AT DAM NEAR KIPAHULU

LOCATION.--Lat 20°40'17", long 156°03'17", Old Hawaiian Datum, Hydrologic Unit 20020000, on right bank 31 ft. upstream from dam, 1,000 ft. downstream from the confluence of Palikea and Pipiwai Streams, 0.8 mi. upstream from mouth, and 1.0 mi. north from Kipahulu Church.

DRAINAGE AREA.--8.06 mi².

PERIOD OF RECORD.--July 1988 to September 1997. Oct. 2001 to Sept 2002 (peak discharge and discharge measurements only), Oct. 2002 to current year.

REVISED RECORDS.--WDR HI-94-1: 1989-93 (P).

GAGE.--Water-stage recorder. Elevation of the gage is 420 ft. above mean sea level (from topographic map).

REMARKS.--Records computed by Matt Wong. Records fair. No diversions upstream of gage.

AVERAGE DISCHARGE.--10 years (water years 1989-97,2003), 53.2 ft³/s (38,530 acre ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,700 ft³/s, September 18, 1994 from rating curve extended on the basis of flow over dam computation; no flow, on many days.

EXTREMES FOR CURRENT YEAR.--Peak discharge greater than base discharge 2,680 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Oct 15	0745	*5,550	*7.58	Apr 10	1745	5,290	7.45

Minimum discharge, no flow on many days, gage height, 0.23 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e2.8	1.5	0.04	0.88	1.6	5.9	97	3.4	0.73	2.0	7.9	179
2	e2.7	1.3	0.16	0.54	1.8	6.0	31	3.2	15	1.8	3.6	19
3	e2.2	1.2	0.25	0.49	1.3	3.1	158	2.1	5.7	1.4	5.4	5.4
4	e2.2	1.2	0.17	0.34	0.99	1.8	85	1.9	1.8	1.7	2.0	3.3
5	e5.5	1.1	0.27	0.18	0.74	44	14	2.0	1.4	3.2	5.0	7.5
6	e3.3	1.2	0.37	0.13	0.51	48	135	3.4	1.4	3.8	5.5	19
7	e2.7	0.93	0.32	0.13	0.43	12	40	33	1.2	74	3.7	130
8	e3.0	0.84	0.41	0.25	0.18	4.0	7.8	90	1.1	40	5.0	10
9	e3.6	0.77	0.28	0.15	0.67	3.5	40	81	1.0	215	20	6.9
10	e2.6	0.81	14	0.01	0.57	2.0	444	108	1.1	12	40	6.8
11	2.8	0.60	43	0.00	0.39	1.6	72	13	1.1	6.7	7.1	9.1
12	2.5	0.56	41	0.00	0.23	1.4	76	7.4	1.4	5.5	48	4.9
13	26	0.69	3.8	0.43	1.3	1.2	29	6.6	1.7	20	22	2.8
14	16	0.46	e1.9	0.25	124	0.99	6.1	5.3	1.4	5.5	134	2.6
15	435	0.53	e1.8	12	163	0.82	3.5	58	1.5	3.6	31	2.6
16	216	1.4	e1.9	1.2	13	0.74	7.7	9.2	22	3.9	122	2.5
17	13	0.78	2.1	0.45	4.3	6.7	195	13	6.6	1.9	76	2.3
18	5.7	0.48	0.96	0.31	2.1	1.2	118	9.6	12	1.6	130	2.4
19	3.8	0.52	0.52	0.18	1.5	1.2	114	4.9	27	3.4	72	13
20	2.8	1.0	0.46	1.4	2.9	0.90	359	4.3	8.7	5.8	36	9.1
21	8.8	0.88	0.43	0.15	2.1	1.3	146	3.3	3.7	3.6	24	25
22	3.1	0.45	0.35	0.00	1.1	5.4	211	2.8	2.2	2.7	7.8	6.3
23	4.2	0.51	100	0.00	12	2.0	30	2.3	3.3	1.9	8.4	3.6
24	46	0.64	4.3	118	81	0.83	107	2.0	13	3.6	32	7.0
25	29	0.86	1.6	154	50	0.55	60	1.6	27	5.3	6.8	2.4
26	8.5	0.58	7.9	16	61	2.0	10	1.5	6.1	3.2	4.1	2.3
27	3.5	0.36	57	6.0	19	0.66	12	1.2	4.6	8.7	3.4	3.1
28	2.0	0.12	7.4	2.8	20	9.1	6.2	0.98	3.6	12	2.3	1.8
29	1.7	0.56	67	1.9	---	44	4.2	0.92	2.0	3.1	2.2	1.5
30	1.6	0.27	5.8	1.4	---	21	3.0	0.83	2.3	3.2	2.7	1.4
31	1.5	---	1.9	5.2	---	42	---	0.73	---	3.0	5.6	---
TOTAL	864.1	23.10	367.39	324.77	567.71	275.89	2,621.5	477.46	181.63	463.1	875.5	492.6
MEAN	27.9	0.77	11.9	10.5	20.3	8.90	87.4	15.4	6.05	14.9	28.2	16.4
MAX	435	1.5	100	154	163	48	444	108	27	215	134	179
MIN	1.5	0.12	0.04	0.00	0.18	0.55	3.0	0.73	0.73	1.4	2.0	1.4
AC-FT	1,710	46	729	644	1,130	547	5,200	947	360	919	1,740	977

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1988 - 2003, BY WATER YEAR (WY)

MEAN	50.7	88.0	82.8	50.2	48.8	83.0	44.9	23.7	33.0	47.0	31.6	41.1
MAX	145	334	203	218	163	320	116	99.1	88.8	114	82.4	131
(WY)	(1990)	(1991)	(1993)	(1989)	(1994)	(1991)	(1989)	(1989)	(1997)	(1993)	(1991)	(1994)
MIN	6.03	0.77	5.28	1.94	2.90	8.90	6.56	3.03	6.05	14.9	5.33	5.62
(WY)	(1993)	(2003)	(1990)	(1998)	(1992)	(2003)	(1992)	(1992)	(2003)	(2003)	(1997)	(1997)

16501200 OHEO GULCH AT DAM NEAR KIPAHULU—Continued

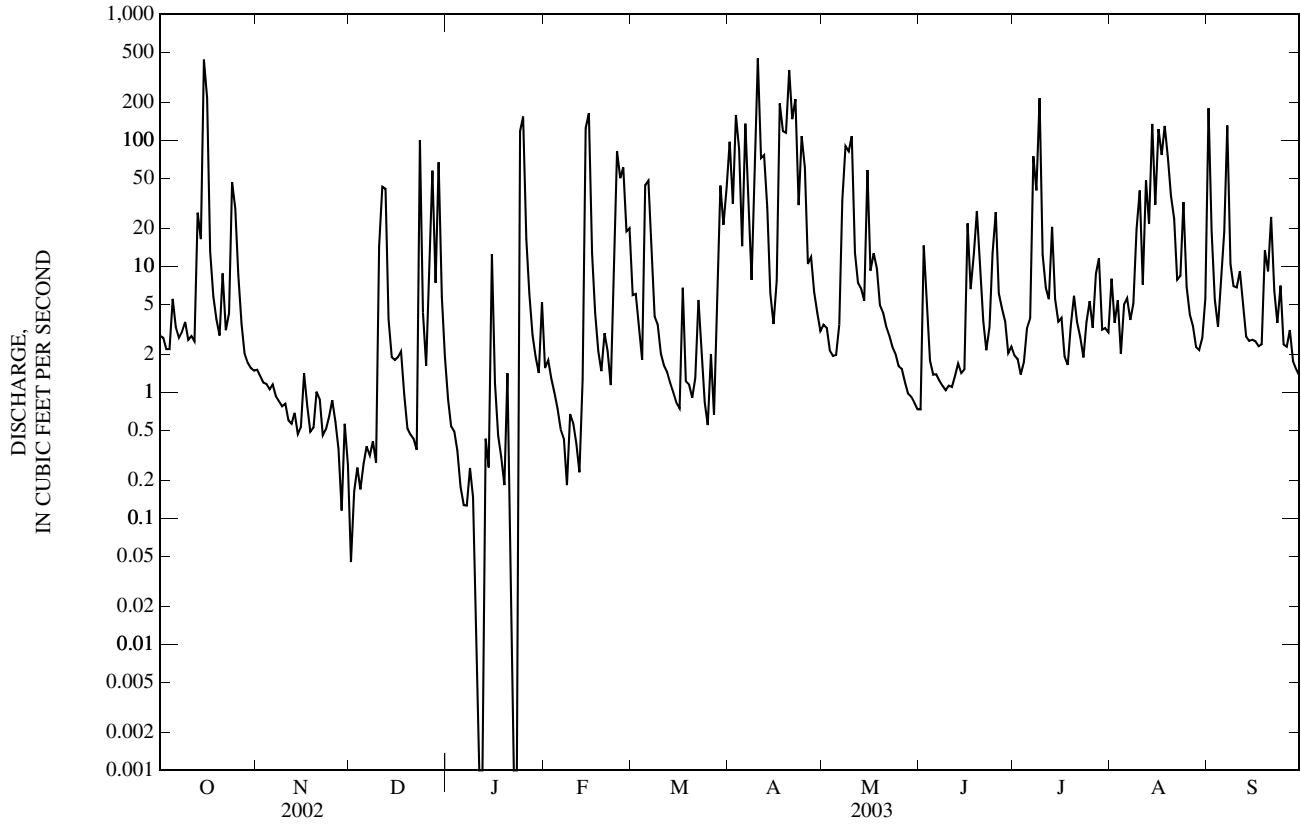
SUMMARY STATISTICS

FOR 2003 WATER YEAR

WATER YEARS 1988 - 2003

ANNUAL TOTAL	34.75		
ANNUAL MEAN	20.6		53.2
HIGHEST ANNUAL MEAN			102
LOWEST ANNUAL MEAN			20.6
HIGHEST DAILY MEAN	44	Apr 10	2,220
LOWEST DAILY MEAN		0.00	0.00
ANNUAL SEVEN-DAY MINIMUM		0.10	0.00
ANNUAL RUNOFF (AC-FT)	50	Jan 11	38,530
10 PERCENT EXCEEDS	60	Jan 6	139
50 PERCENT EXCEEDS	3.2		6.3
90 PERCENT EXCEEDS	0.46		0.97

e Estimated



HAWAII, ISLAND OF MAUI

16508000 HANAWI STREAM NEAR NAHIKU

LOCATION.--Lat 20°48'37", long 156°07'00", Old Hawaiian Datum, 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 at datum 0.12 ft lower.

REMARKS.--Records computed by Matt Wong. Records good except discharges above 1,300 ft³/s which are fair. No diversion upstream of station.

AVERAGE DISCHARGE.--81 years (water years 1923-2003), 23.7 ft³/s (17,190 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 (*):

		Discharge	Gage height
Date	Time	(ft ³ /s)	(ft)
Feb 14	0900	*2,070	*7.15

No other peaks greater than base discharge.

Minimum discharge, 1.6 ft³/s, Feb. 12, 13, 14, gage height, 0.11 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

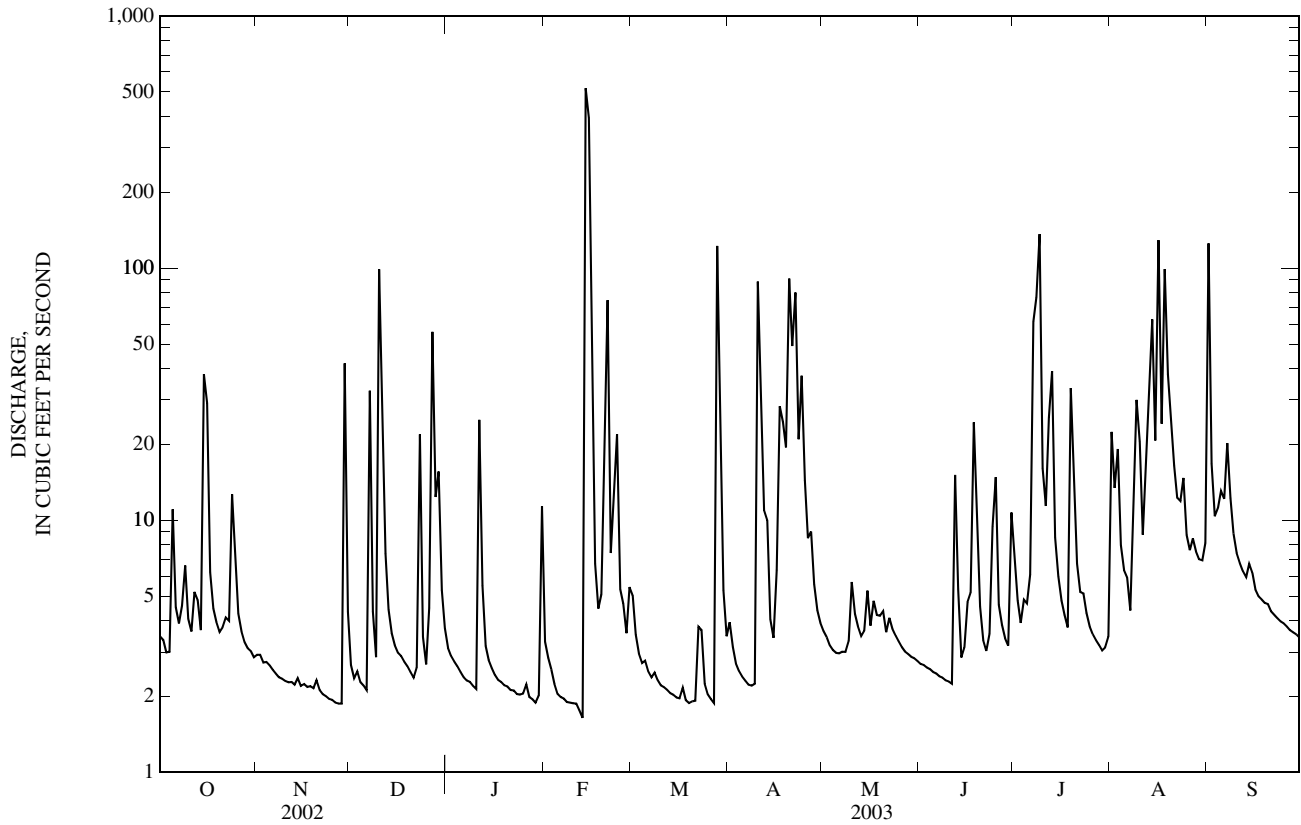
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.5	2.9	2.7	3.1	3.3	5.0	3.9	3.6	2.7	7.2	22	125
2	3.4	2.9	2.4	2.9	2.8	3.5	3.1	3.4	2.7	4.8	13	17
3	3.0	2.7	2.5	2.7	2.6	3.0	2.7	3.2	2.6	3.9	19	10
4	3.0	2.7	2.3	2.6	2.2	2.7	2.5	3.1	2.6	4.8	8.0	11
5	11	2.7	2.2	2.5	2.0	2.8	2.4	3.0	2.5	4.7	6.3	13
6	4.5	2.6	2.1	2.4	2.0	2.5	2.3	3.0	2.5	6.1	5.9	12
7	3.9	2.5	33	2.3	2.0	2.4	2.2	3.0	2.4	61	4.4	20
8	4.6	2.4	4.3	2.3	1.9	2.5	2.2	3.0	2.4	77	11	12
9	6.6	2.4	2.9	2.2	1.9	2.3	2.2	3.3	2.3	136	30	8.8
10	4.1	2.3	99	2.1	1.9	2.2	88	5.7	2.3	16	20	7.4
11	3.6	2.3	32	25	1.9	2.2	24	4.3	2.2	11	8.8	6.7
12	5.2	2.3	7.4	5.5	1.8	2.1	11	3.8	15	25	15	6.3
13	4.8	2.2	4.4	3.2	1.6	2.1	10	3.5	5.3	39	30	5.9
14	3.7	2.4	3.6	2.8	517	2.0	4.0	3.6	2.9	8.5	63	6.7
15	38	2.2	3.2	2.6	394	2.0	3.4	5.3	3.1	6.0	21	6.2
16	29	2.2	3.0	2.4	24	2.0	6.3	3.8	4.7	4.8	129	5.3
17	6.2	2.2	2.9	2.3	6.7	2.2	28	4.8	5.2	4.2	24	5.0
18	4.5	2.2	2.7	2.3	4.5	1.9	25	4.2	24	3.8	99	4.9
19	3.9	2.2	2.6	2.2	5.1	1.9	19	4.2	13	33	38	4.7
20	3.6	2.3	2.5	2.2	13	1.9	91	4.4	4.6	13	24	4.6
21	3.8	2.1	2.4	2.1	75	1.9	49	3.6	3.3	6.7	16	4.4
22	4.1	2.0	2.6	2.1	7.4	3.8	80	4.1	3.0	5.2	12	4.2
23	4.0	2.0	22	2.0	12	3.7	21	3.7	3.5	5.1	12	4.1
24	13	2.0	3.4	2.0	22	2.2	37	3.5	9.4	4.3	15	4.0
25	7.6	1.9	2.7	2.1	5.3	2.0	14	3.3	15	3.8	8.7	3.9
26	4.3	1.9	4.5	2.2	4.7	2.0	8.5	3.1	4.6	3.5	7.6	3.8
27	3.6	1.9	56	2.0	3.6	1.9	9.0	3.0	3.8	3.3	8.5	3.7
28	3.3	1.9	12	1.9	5.4	123	5.6	2.9	3.4	3.2	7.5	3.6
29	3.1	42	16	1.9	---	36	4.4	2.9	3.2	3.0	7.0	3.5
30	3.0	4.3	5.3	2.0	---	5.3	3.9	2.8	11	3.1	6.9	3.4
31	2.9	---	3.7	11	---	3.5	---	2.8	---	3.5	8.1	---
TOTAL	202.8	110.6	348.3	106.9	1,127.6	234.5	565.6	111.9	165.2	514.5	700.7	331.1
MEAN	6.54	3.69	11.2	3.45	40.3	7.56	18.9	3.61	5.51	16.6	22.6	11.0
MAX	38	42	99	25	517	123	91	5.7	24	136	129	125
MIN	2.9	1.9	2.1	1.9	1.6	1.9	2.2	2.8	2.2	3.0	4.4	3.4
AC-FT	402	219	691	212	2,240	465	1,120	222	328	1,020	1,390	657

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1914 - 2003, BY WATER YEAR (WY)

MEAN	15.1	29.6	32.1	30.3	30.8	40.3	35.7	19.7	11.0	16.0	16.9	11.5
MAX	101	110	129	123	182	235	161	68.2	61.2	62.0	66.2	52.3
(WY)	(1942)	(1991)	(1947)	(1979)	(1969)	(1980)	(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)

16508000 HANAWI STREAM NEAR NAHIKU—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1914 - 2003	
ANNUAL TOTAL	6,595.6		4,519.7			
ANNUAL MEAN	18.1		12.4		23.7	
HIGHEST ANNUAL MEAN					52.6	1969
LOWEST ANNUAL MEAN					7.59	1926
HIGHEST DAILY MEAN	559	Jan 29	517	Feb 14	1,610	Jan 25, 1948
LOWEST DAILY MEAN	1.9	Nov 25	1.6	Feb 13	0.90	Oct 31, 1984
ANNUAL SEVEN-DAY MINIMUM	1.9	Nov 22	1.9	Feb 7	0.96	Oct 25, 1984
ANNUAL RUNOFF (AC-FT)	13,080		8,960		17,190	
10 PERCENT EXCEEDS	24		24		50	
50 PERCENT EXCEEDS	5.4		3.7		7.0	
90 PERCENT EXCEEDS	2.6		2.1		2.8	



HAWAII, ISLAND OF MAUI

16518000 WEST WAILUAIKI STREAM NEAR KEANAE

LOCATION.--Lat 20°49'16", long 156°08'37", Old Hawaiian Datum, 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.--83 years (water years 1915, 1917, 1923-2003), 34.5 ft³/s (24,980 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 by logarithmic plotting; 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)
Feb 14	0900	*4,080	*9.90

No other peaks greater than base discharge.

Minimum discharge, 1.5 ft³/s, on several days, gage height, 0.49 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.3	4.6	4.7	5.5	5.6	11	7.9	7.7	2.2	9.6	31	142
2	3.7	4.1	3.6	4.9	5.8	7.8	5.7	7.0	2.2	9.4	15	24
3	3.2	3.9	4.6	4.4	3.8	6.5	4.7	6.4	2.0	7.2	22	14
4	3.6	3.9	4.3	4.0	3.0	5.8	4.2	6.0	1.9	7.1	11	14
5	16	3.5	3.2	3.7	2.7	5.8	3.8	5.6	2.3	7.0	8.6	16
6	5.4	3.1	2.8	3.4	2.5	5.1	3.6	5.2	1.8	7.8	7.2	14
7	4.9	3.0	80	3.2	2.4	4.7	3.6	5.0	1.6	75	6.3	27
8	5.5	2.8	11	3.0	2.2	4.8	3.3	4.8	1.5	101	19	16
9	8.1	2.7	7.4	2.8	2.1	4.7	3.6	5.3	e1.4	199	54	12
10	4.0	2.6	125	2.7	2.0	4.3	27	8.5	e1.3	27	33	10
11	3.5	2.5	41	38	2.0	3.8	17	5.8	e1.2	18	14	9.3
12	5.2	2.6	13	11	2.0	3.6	9.9	5.2	22	29	21	8.6
13	4.2	2.6	8.2	6.5	1.9	3.4	11	4.5	8.4	54	35	8.1
14	3.2	2.9	6.5	4.8	665	3.2	6.6	4.8	3.8	15	75	9.2
15	35	2.6	5.5	4.0	511	3.1	5.9	5.9	3.9	11	31	7.7
16	44	3.1	4.9	3.5	39	3.1	11	4.3	7.2	9.5	114	6.6
17	11	3.3	4.9	3.2	15	3.4	20	5.5	7.0	8.2	23	6.2
18	7.1	2.6	e4.0	3.0	10	2.9	24	4.5	27	7.3	102	5.9
19	5.7	2.7	e4.0	2.9	11	2.7	21	4.7	15	53	46	5.6
20	4.7	3.1	e3.9	2.8	15	3.2	76	4.9	6.7	19	30	6.0
21	6.5	2.4	3.0	2.7	98	3.6	49	3.7	5.2	11	26	6.0
22	5.4	2.2	3.8	2.5	16	8.1	84	e3.6	4.4	9.6	19	4.9
23	6.0	2.1	30	2.4	15	5.2	30	e3.5	5.4	8.8	17	4.6
24	16	2.0	6.3	2.4	23	3.1	39	3.5	11	7.5	18	4.3
25	10	1.9	4.3	2.5	11	2.7	18	3.2	14	6.7	13	4.1
26	6.2	1.8	11	3.8	9.3	2.5	13	2.9	6.5	6.0	12	3.9
27	5.1	1.7	71	e3.7	7.9	2.4	14	2.8	5.7	5.5	12	3.8
28	4.6	1.7	19	e3.7	11	137	11	2.6	5.0	5.1	10	3.6
29	4.6	63	14	2.1	---	81	9.3	2.5	4.9	4.7	9.4	3.5
30	4.4	8.8	8.7	3.2	---	14	8.4	2.4	15	5.2	8.8	3.4
31	4.5	---	6.6	32	---	8.2	---	2.4	---	5.7	10	---
TOTAL	255.6	149.8	520.2	178.3	1,495.2	360.7	545.5	144.7	197.5	749.9	853.3	404.3
MEAN	8.25	4.99	16.8	5.75	53.4	11.6	18.2	4.67	6.58	24.2	27.5	13.5
MAX	44	63	125	38	665	137	84	8.5	27	199	114	142
MIN	3.2	1.7	2.8	2.1	1.9	2.4	3.3	2.4	1.2	4.7	6.3	3.4
AC-FT	507	297	1,030	354	2,970	715	1,080	287	392	1,490	1,690	802

16518000 WEST WAILUAIKI STREAM NEAR KEANAE—Continued

DISCHARGE, CUBIC FEET PER SECOND—CONTINUED
 WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
 DAILY MEAN VALUES

DAY OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1914 - 2003, BY WATER YEAR (WY)

MEAN	23.8	45.4	47.8	41.6	45.8	55.1	53.2	28.6	16.5	24.8	25.7	18.0
MAX	133	198	200	192	222	303	221	88.4	67.7	99.4	111	101
(WY)	(1942)	(1922)	(1937)	(1979)	(1932)	(1942)	(1989)	(1914)	(1997)	(1914)	(1914)	(1914)
MIN	0.88	4.06	2.82	2.01	2.65	2.04	4.17	3.86	2.37	1.72	2.85	1.68
(WY)	(1985)	(1992)	(1981)	(1977)	(1995)	(1926)	(1992)	(1945)	(1981)	(1922)	(1973)	(1974)

SUMMARY STATISTICS

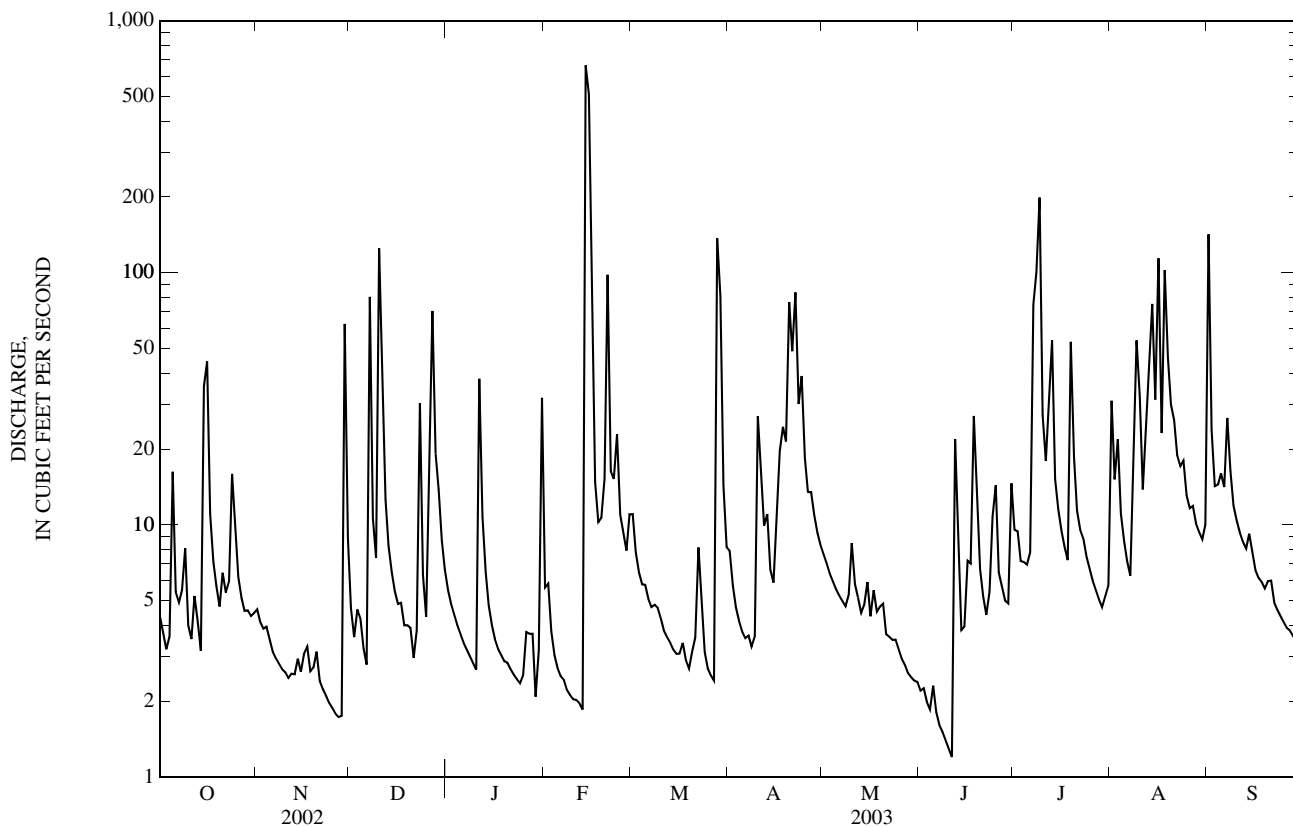
FOR 2002 CALENDAR YEAR

FOR 2003 WATER YEAR

WATER YEARS 1914 - 2003

ANNUAL TOTAL	9,149.1		5,855.0			
ANNUAL MEAN	25.1		16.0		34.5	
HIGHEST ANNUAL MEAN					67.3	
LOWEST ANNUAL MEAN					14.5	
HIGHEST DAILY MEAN	1,010	Mar 17	665	Feb 14	2,260	Jan 26, 1948
LOWEST DAILY MEAN	1.7	Nov 27	1.2	Jun 11	0.62	Jul 23, 1922
ANNUAL SEVEN-DAY MINIMUM	1.9	Nov 22	1.6	Jun 5	0.71	Oct 25, 1984
ANNUAL RUNOFF (AC-FT)	18,150		11,610		24,980	
10 PERCENT EXCEEDS	35		30		73	
50 PERCENT EXCEEDS	7.7		5.6		10	
90 PERCENT EXCEEDS	3.1		2.5		3.3	

e Estimated



HAWAII, ISLAND OF MAUI

16587000 HONOPOU STREAM NEAR HUELO

LOCATION.--Lat 20°53'20", long 156°15'20". Old Hawaiian Datum, 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 steel weir plate. 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 Matt Wong. Records fair. No diversion upstream of station.

AVERAGE DISCHARGE.--92 years (water years 1912-2003), 4.77 ft³/s (3,460 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)
Dec 10	1715	*534	*3.48	Feb 14	1045	414	3.32

Minimum discharge, 0.35 ft³/s, June 11, gage height, 0.45 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

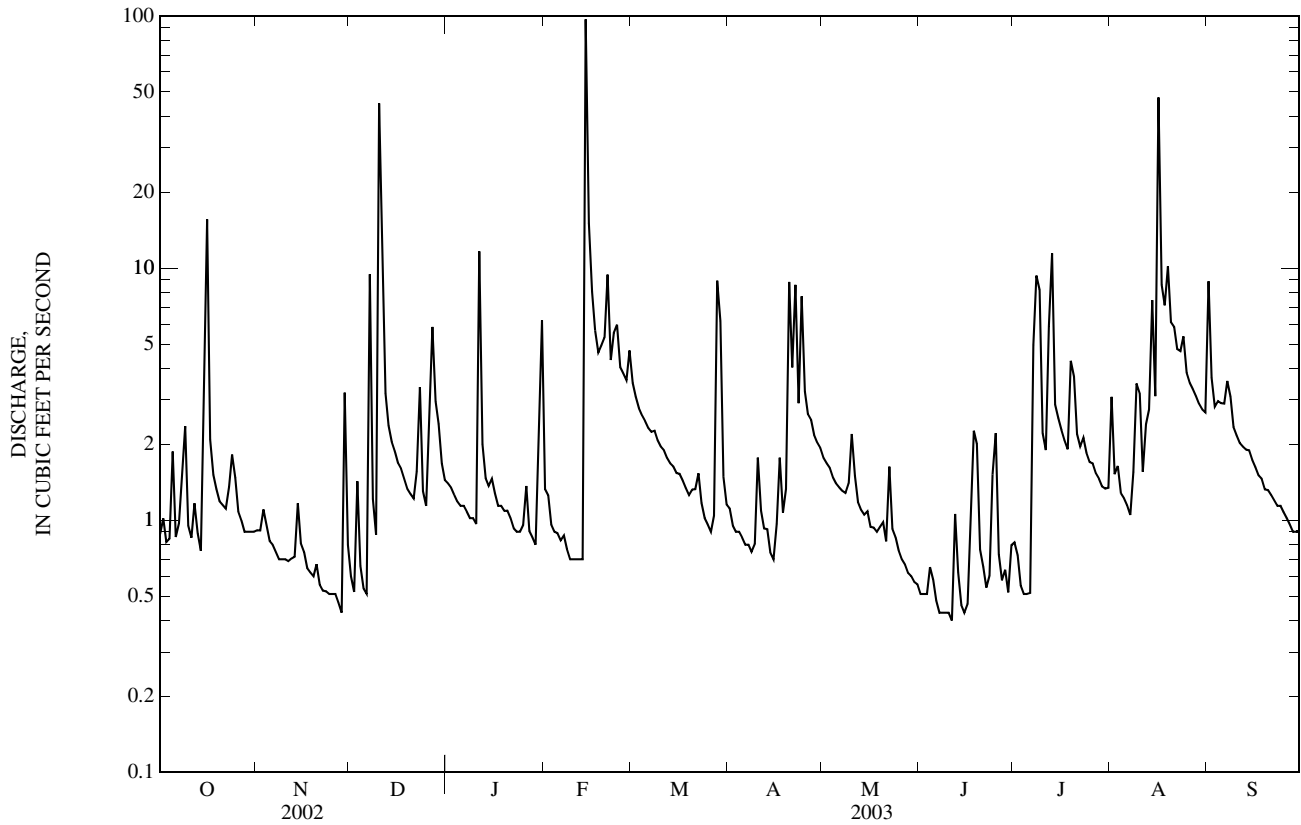
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.88	0.91	0.60	1.4	1.3	3.5	1.1	1.8	0.51	0.82	3.1	8.9
2	1.0	0.91	0.52	1.3	1.3	3.1	0.95	1.7	0.51	0.73	1.5	3.7
3	0.82	1.1	1.4	1.3	0.96	2.8	0.90	1.6	0.51	0.55	1.6	2.8
4	0.85	0.96	0.66	1.2	0.90	2.6	0.90	1.5	0.65	0.51	1.3	3.0
5	1.9	0.83	0.53	1.1	0.89	2.5	0.85	1.4	0.58	0.51	1.2	2.9
6	0.86	0.80	0.51	1.1	0.83	2.3	0.80	1.3	0.48	0.51	1.1	2.9
7	0.97	0.75	9.4	1.1	0.87	2.2	0.80	1.3	0.43	5.0	1.0	3.6
8	1.6	0.70	1.2	1.0	0.77	2.3	0.75	1.3	0.43	9.3	1.6	3.1
9	2.4	0.70	0.88	1.0	0.70	2.1	0.80	1.4	0.43	8.2	3.5	2.3
10	0.95	0.70	45	0.97	0.70	2.0	1.8	2.2	0.43	2.2	3.2	2.2
11	0.85	0.69	9.3	12	0.70	1.9	1.1	1.5	0.40	1.9	1.6	2.0
12	1.2	0.71	3.2	2.0	0.70	1.8	0.93	1.2	1.1	5.9	2.4	2.0
13	0.89	0.72	2.4	1.5	0.70	1.7	0.92	1.1	0.62	11	2.7	1.9
14	0.76	1.2	2.0	1.4	97	1.6	0.75	1.1	0.46	2.9	7.5	1.9
15	3.8	0.81	1.9	1.5	15	1.5	0.70	1.1	0.43	2.5	3.1	1.7
16	16	0.75	1.7	1.3	8.1	1.5	0.97	0.94	0.47	2.3	47	1.6
17	2.1	0.65	1.6	1.1	5.7	1.4	1.8	0.94	0.92	2.1	8.6	1.5
18	1.5	0.62	1.5	1.1	4.6	1.3	1.1	0.90	2.3	1.9	7.1	1.5
19	1.3	0.60	1.3	1.1	4.9	1.3	1.3	0.94	2.0	4.3	10	1.3
20	1.2	0.67	1.3	1.1	5.3	1.3	8.8	0.98	0.76	3.7	6.1	1.3
21	1.2	0.55	1.2	1.0	9.4	1.3	4.0	0.82	0.65	2.2	5.8	1.3
22	1.1	0.53	1.6	0.93	4.3	1.5	8.6	1.6	0.54	2.0	4.8	1.2
23	1.4	0.52	3.4	0.90	5.5	1.2	2.9	0.93	0.60	2.1	4.7	1.1
24	1.8	0.51	1.3	0.90	6.0	1.0	7.7	0.86	1.5	1.9	5.4	1.1
25	1.5	0.51	1.1	0.95	4.1	0.96	3.2	0.76	2.2	1.7	3.9	1.1
26	1.1	0.51	2.1	1.4	3.8	0.90	2.6	0.70	0.73	1.7	3.5	1.0
27	1.00	0.47	5.8	0.91	3.6	1.0	2.5	0.67	0.58	1.5	3.3	0.96
28	0.90	0.43	3.0	0.85	4.7	8.9	2.2	0.62	0.64	1.5	3.1	0.90
29	0.90	3.2	2.4	0.80	---	6.2	2.0	0.60	0.52	1.4	2.9	0.90
30	0.90	0.80	1.7	2.3	---	1.5	1.9	0.57	0.80	1.3	2.7	0.90
31	0.90	---	1.4	6.2	---	1.2	---	0.56	---	1.3	2.7	---
TOTAL	54.53	23.81	111.90	52.71	193.32	66.36	65.62	34.89	23.18	85.43	158.0	62.56
MEAN	1.76	0.79	3.61	1.70	6.90	2.14	2.19	1.13	0.77	2.76	5.10	2.09
MAX	16	3.2	45	12	97	8.9	8.8	2.2	2.3	11	47	8.9
MIN	0.76	0.43	0.51	0.80	0.70	0.90	0.70	0.56	0.40	0.51	1.0	0.90
AC-FT	108	47	222	105	383	132	130	69	46	169	313	124

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1912 - 2003, BY WATER YEAR (WY)

MEAN	2.75	5.44	6.10	5.45	5.21	7.12	7.42	4.95	2.72	3.55	3.96	2.58
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	0.15	0.25	1.04	0.57	0.62	0.79	0.58	0.84	0.37	0.41	0.40	0.25
(WY)	(1985)	(1963)	(1981)	(2001)	(1983)	(1992)	(1992)	(1933)	(2000)	(1981)	(1973)	(1984)

16587000 HONOPOU STREAM NEAR HUELO—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1912 - 2003	
ANNUAL TOTAL	1,239.44		932.31		4.77	
ANNUAL MEAN	3.40		2.55		9.88	
HIGHEST ANNUAL MEAN					1.73	
LOWEST ANNUAL MEAN					305	
HIGHEST DAILY MEAN	79	Mar 17	97	Feb 14	0.11	Apr 7, 1989
LOWEST DAILY MEAN	0.43	Nov 28	0.40	Jun 11	0.11	Oct 27, 1984
ANNUAL SEVEN-DAY MINIMUM	0.50	Nov 22	0.45	Jun 5	0.11	Oct 26, 1984
ANNUAL RUNOFF (AC-FT)	2,460		1,850		3,460	
10 PERCENT EXCEEDS	5.4		4.7		9.9	
50 PERCENT EXCEEDS	1.8		1.3		2.4	
90 PERCENT EXCEEDS	0.76		0.60		0.74	



HAWAII, ISLAND OF MAUI

16599500 OPANA TUNNEL AT KAILILI

LOCATION.--Lat 20°51'04", long 156°16'17", Old Hawaiian Datum, Hydrologic Unit 20020000, on left bank at tunnel outlet, 0.3 mi north of Kailili, 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.--38 years (water years 1966-2003), 3.13 ft³/s (2,270 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, 11 ft³/s, Feb. 15; minimum daily, 0.17 ft³/s, Nov. 24-28.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.38	0.60	0.39	0.75	1.7	2.5	1.0	0.88	0.24	e0.53	1.7	8.4
2	0.39	0.44	0.27	0.64	1.0	2.1	0.89	0.84	0.24	e0.50	1.4	5.6
3	0.38	0.40	0.56	0.56	0.80	1.9	0.74	0.79	0.24	e0.55	1.4	3.0
4	0.38	0.37	0.58	0.47	0.61	1.8	0.68	0.77	0.43	e0.37	1.2	2.5
5	0.78	0.33	0.36	0.42	0.50	1.6	0.62	0.72	0.62	e0.31	0.96	2.4
6	0.62	0.30	0.27	0.39	0.42	1.4	0.63	0.68	0.36	e0.28	0.88	2.2
7	0.40	0.28	6.0	0.35	0.44	1.3	0.82	0.63	0.27	e3.9	0.81	3.9
8	0.37	0.27	2.3	0.34	0.37	1.4	0.66	0.61	0.24	e6.5	1.3	2.7
9	0.38	0.27	1.0	0.31	0.31	1.3	0.59	0.68	0.23	e4.9	4.7	2.1
10	0.30	0.24	4.1	0.29	0.28	1.2	1.3	1.1	0.21	e2.2	4.1	2.0
11	0.29	0.24	6.2	4.1	0.25	1.1	2.9	0.83	0.20	e1.9	2.3	1.8
12	0.40	0.24	2.5	2.2	0.24	1.1	1.1	0.67	2.0	e4.9	3.0	1.7
13	0.31	0.24	1.5	1.1	0.24	1.0	0.78	0.59	1.3	e7.8	2.9	1.6
14	0.27	0.26	1.0	0.75	9.5	0.94	0.62	0.54	0.50	e2.3	7.3	1.5
15	2.7	0.25	0.82	1.7	11	0.90	0.54	0.51	0.34	e1.5	6.0	1.4
16	8.5	0.24	0.67	2.6	7.9	0.88	0.70	0.48	0.33	e1.3	6.8	1.3
17	3.8	0.23	0.56	1.0	4.6	0.87	0.87	0.48	0.40	e1.1	4.3	1.2
18	1.6	0.23	0.47	0.73	3.1	0.82	0.84	0.46	e0.69	e1.1	5.6	1.2
19	1.0	0.21	0.42	0.57	2.5	0.76	0.90	0.43	e1.7	7.7	7.6	1.1
20	0.79	0.22	0.38	1.1	2.5	0.78	5.4	0.41	e0.59	4.5	4.9	1.1
21	0.69	0.20	0.34	1.7	7.1	0.74	6.6	0.39	e0.65	2.6	4.5	1.1
22	0.60	0.20	0.39	0.85	4.9	0.79	7.3	0.42	e0.43	2.1	3.3	1.0
23	0.62	0.20	4.9	0.62	3.1	0.71	5.7	0.39	e0.50	1.8	3.0	1.00
24	0.82	0.17	1.6	0.48	4.2	0.65	4.4	0.40	e1.0	1.5	2.9	0.93
25	0.97	0.17	0.85	0.79	2.6	0.60	2.6	0.38	e1.6	1.3	2.5	0.88
26	0.70	0.17	0.72	0.90	2.3	0.60	1.9	0.35	e0.53	1.3	2.3	0.85
27	0.55	0.17	6.2	0.61	2.2	0.61	1.5	0.31	e0.37	1.1	2.2	0.82
28	0.46	0.17	3.3	0.46	3.2	1.6	1.2	0.30	e0.37	1.1	2.1	0.79
29	0.48	1.6	1.9	0.41	---	5.0	1.1	0.28	e0.31	0.97	2.0	0.77
30	0.43	0.76	1.2	0.40	---	2.1	0.95	0.27	e0.53	0.92	2.1	0.73
31	0.44	---	0.93	4.1	---	1.2	---	0.26	---	0.89	2.0	---
TOTAL	30.80	9.67	52.68	31.69	77.86	40.25	55.83	16.85	17.42	69.72	98.05	57.57
MEAN	0.99	0.32	1.70	1.02	2.78	1.30	1.86	0.54	0.58	2.25	3.16	1.92
MAX	8.5	1.6	6.2	4.1	11	5.0	7.3	1.1	2.0	7.8	7.6	8.4
MIN	0.27	0.17	0.27	0.29	0.24	0.60	0.54	0.26	0.20	0.28	0.81	0.73
AC-FT	61	19	104	63	154	80	111	33	35	138	194	114

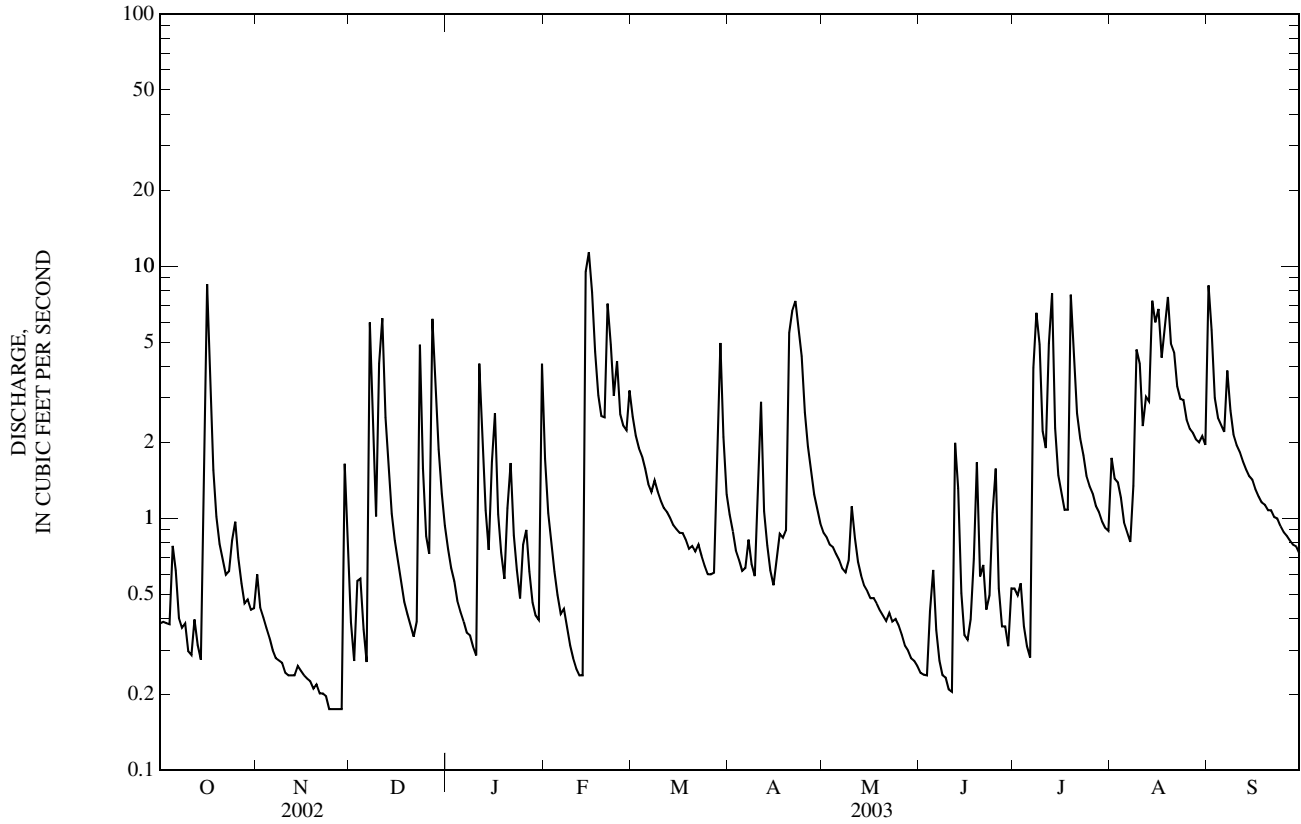
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1965 - 2003, BY WATER YEAR (WY)

MEAN	1.86	3.27	3.95	3.62	3.68	4.55	4.95	3.36	2.09	2.55	2.16	1.54
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	0.14	0.25	0.65	0.22	0.36	0.51	0.27	0.54	0.50	0.40	0.19	0.15
(WY)	(1985)	(1992)	(1977)	(1977)	(1978)	(1983)	(1992)	(2003)	(1999)	(1981)	(1974)	(1984)

16599500 OPANA TUNNEL AT KAILIILI—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1965 - 2003	
ANNUAL TOTAL	795.06		558.39		3.13	
ANNUAL MEAN	2.18		1.53		5.34	
HIGHEST ANNUAL MEAN					1.45	1981
LOWEST ANNUAL MEAN					18	Mar 31, 1982
HIGHEST DAILY MEAN	13	Jan 19	11	Feb 15	0.11	Nov 5, 1973
LOWEST DAILY MEAN	0.17	Nov 24	0.17	Nov 24	0.11	Nov 4, 1973
ANNUAL SEVEN-DAY MINIMUM	0.18	Nov 22	0.18	Nov 22	0.11	Nov 4, 1973
ANNUAL RUNOFF (AC-FT)	1,580		1,110		2,270	
10 PERCENT EXCEEDS	5.2		4.1		7.7	
50 PERCENT EXCEEDS	1.2		0.82		2.1	
90 PERCENT EXCEEDS	0.38		0.27		0.38	

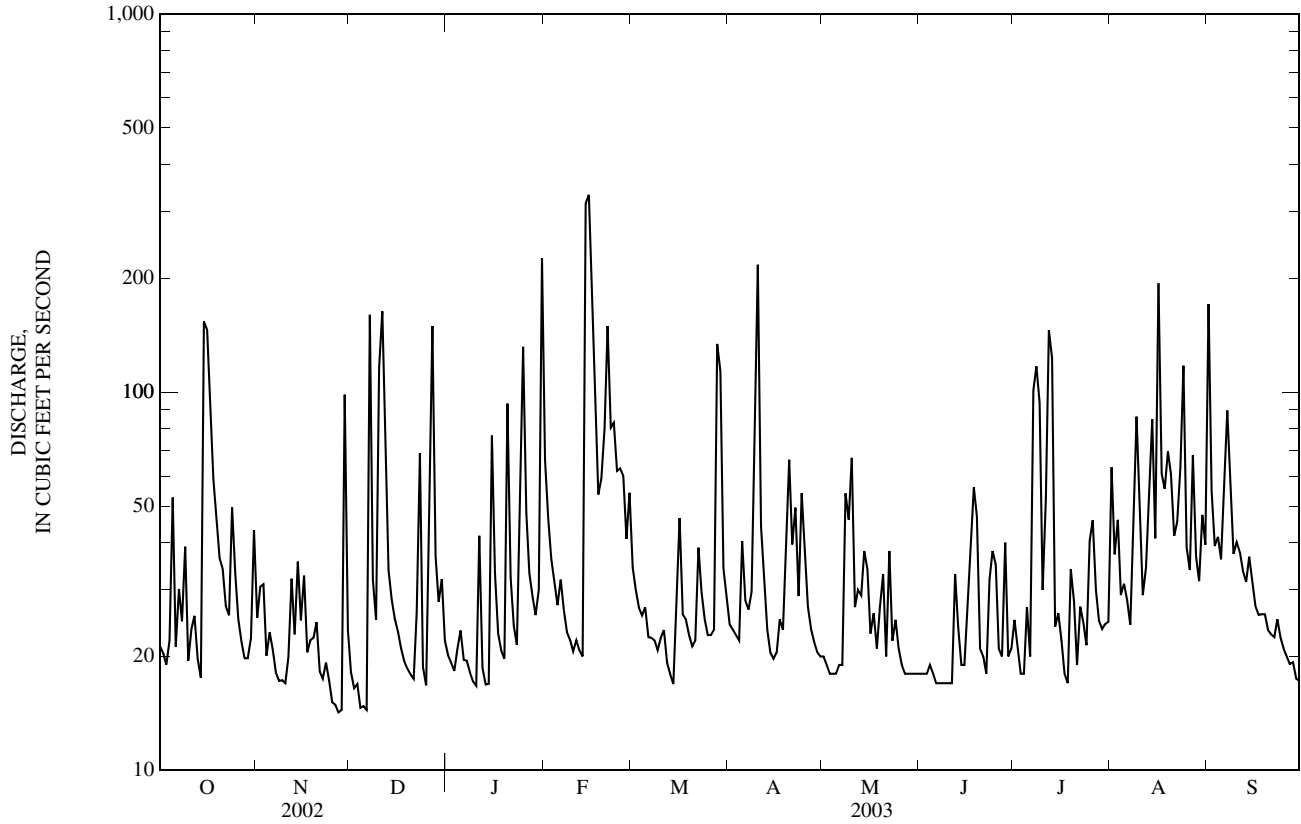
e Estimated



16604500 IAO STREAM AT KEPANIWAI PARK, NEAR WAILUKU—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1983 - 2003	
ANNUAL TOTAL	20,186		14,351		63.0	
ANNUAL MEAN	55.3		39.3		93.4	
HIGHEST ANNUAL MEAN					1994	
LOWEST ANNUAL MEAN					2003	
HIGHEST DAILY MEAN	520	Jan 26	333	Feb 15	913	Apr 10, 1986
LOWEST DAILY MEAN	14	Nov 27	14	Nov 27	11	Oct 7, 1984
ANNUAL SEVEN-DAY MINIMUM	16	Nov 22	16	Nov 22	11	Oct 16, 1984
ANNUAL RUNOFF (AC-FT)	40,040		28,470		45,620	
10 PERCENT EXCEEDS	117		68		130	
50 PERCENT EXCEEDS	37		26		40	
90 PERCENT EXCEEDS	20		18		20	

e Estimated



HAWAII, ISLAND OF MAUI

16614000 WAIHEE RIVER AT DAM NEAR WAIHEE

LOCATION.--Lat 20°56'21", long 156°32'59", Old Hawaiian Datum, 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 Phillip Teeters. Records fair. No diversion upstream of station.

AVERAGE DISCHARGE.--19 years (water years 1985-2003), 76.6 ft³/s (55,510 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)
Oct 15	0600	*6,040	*7.44	Apr 10	1530	2,200	5.02

Minimum discharge, 28 ft³/s, on several days, gage height, 1.25 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	38	46	e39	37	42	42	37	36	29	37	78	86
2	42	49	e38	36	39	41	38	35	29	33	52	48
3	37	57	e38	36	37	39	36	34	29	30	59	42
4	48	46	e37	36	36	38	36	34	30	29	49	e47
5	61	48	e37	35	35	40	45	34	29	38	63	e50
6	39	44	36	35	36	38	37	35	29	31	48	e67
7	45	e41	120	35	36	37	38	34	29	111	40	e99
8	45	e40	45	34	35	43	38	71	28	126	60	e68
9	58	e39	48	34	34	38	66	63	28	101	70	e51
10	38	e38	195	34	34	36	297	77	28	42	61	e54
11	42	44	143	84	36	36	52	39	28	62	42	e51
12	45	65	50	39	35	36	46	42	44	154	47	e48
13	38	51	41	36	35	35	41	41	35	149	71	e46
14	37	59	41	35	417	35	39	50	30	47	64	e50
15	238	46	41	71	197	35	38	46	30	48	46	e46
16	122	51	42	39	52	57	41	35	37	43	126	e42
17	78	43	40	36	43	38	44	38	46	39	46	e41
18	49	46	38	35	40	35	41	32	67	37	47	e41
19	e44	45	37	35	49	35	46	39	58	57	55	e40
20	e40	48	37	59	71	36	74	44	33	51	51	e38
21	e38	43	36	36	120	36	47	31	32	40	48	e38
22	e43	42	54	35	59	49	64	49	29	38	48	e37
23	48	47	72	34	54	38	42	33	44	39	55	e40
24	63	45	39	45	52	36	69	36	49	43	92	e37
25	52	40	37	64	75	35	50	33	47	90	43	e37
26	47	e38	74	55	68	34	40	30	32	80	41	e36
27	e42	40	123	38	47	36	38	30	31	46	56	e35
28	e40	48	42	36	57	137	37	30	52	44	47	e35
29	e39	140	42	35	---	137	36	30	31	38	43	e34
30	46	e42	46	58	---	45	36	30	32	38	60	e33
31	56	---	38	168	---	39	---	29	---	39	48	---
TOTAL	1,698	1,471	1,746	1,425	1,871	1,392	1,589	1,220	1,075	1,800	1,756	1,417
MEAN	54.8	49.0	56.3	46.0	66.8	44.9	53.0	39.4	35.8	58.1	56.6	47.2
MAX	238	140	195	168	417	137	297	77	67	154	126	99
MIN	37	38	36	34	34	34	36	29	28	29	40	33
AC-FT	3,370	2,920	3,460	2,830	3,710	2,760	3,150	2,420	2,130	3,570	3,480	2,810

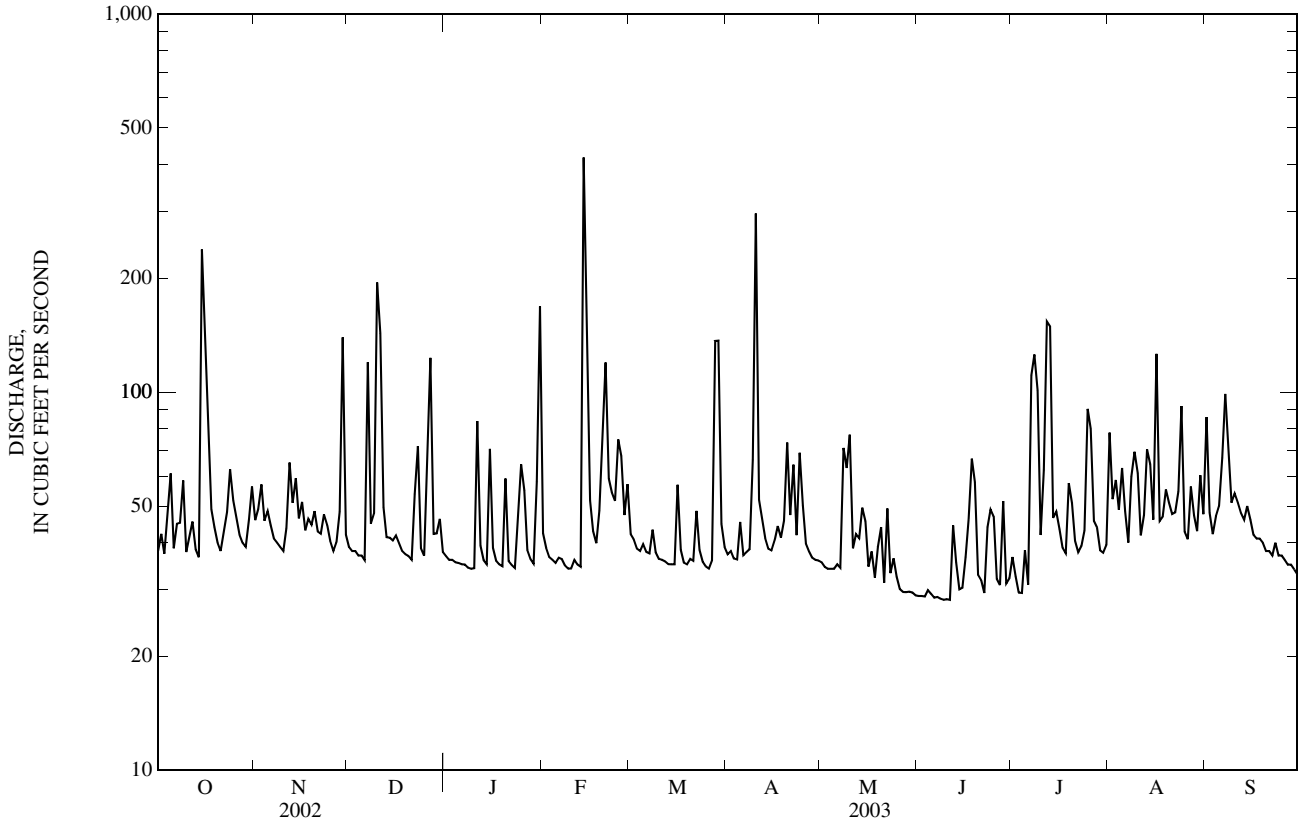
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1984 - 2003, BY WATER YEAR (WY)

	68.0	80.9	71.0	75.1	67.6	85.3	87.5	75.5	69.5	84.0	75.1	69.0
MEAN	68.0	80.9	71.0	75.1	67.6	85.3	87.5	75.5	69.5	84.0	75.1	69.0
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	39.4	35.8	52.3	46.1	32.9
(WY)	(1985)	(1985)	(1985)	(1985)	(1993)	(1992)	(1992)	(2003)	(2003)	(2001)	(1984)	(1984)

16614000 WAIHEE RIVER AT DAM NEAR WAIHEE—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1984 - 2003	
ANNUAL TOTAL	26,802		18,460		76.6	
ANNUAL MEAN	73.4		50.6		106	
HIGHEST ANNUAL MEAN					1994	
LOWEST ANNUAL MEAN					2003	
HIGHEST DAILY MEAN	748	Jan 26	417	Feb 14	1,160	Jan 28, 1988
LOWEST DAILY MEAN	36	Dec 6	28	Jun 8	22	Jan 18, 1985
ANNUAL SEVEN-DAY MINIMUM	38	Nov 30	28	Jun 5	23	Jan 18, 1985
ANNUAL RUNOFF (AC-FT)	53,160		36,620		55,510	
10 PERCENT EXCEEDS	122		71		130	
50 PERCENT EXCEEDS	56		41		54	
90 PERCENT EXCEEDS	41		34		38	

e Estimated



HAWAII, ISLAND OF MAUI

16618000 KAHAKULOA STREAM NEAR HONOKOHAU
(Hydrologic Benchmark Network Station)

LOCATION.--Lat 20°58'54", long 156°33'26", Old Hawaiian Datum, 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 Phillip Teeters. Records poor. No diversion upstream of station.

AVERAGE DISCHARGE.--54 years (water years 1940-42, 1948-70, 1976-2003), 17.6 ft³/s (12,760 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)
Oct 15	0615	788	5.26	Apr 10	1630	*965	*5.96
Feb 14	0815	865	5.59				

Minimum discharge, 3.3 ft³/s, Sept. 30, gage height, 1.83 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.4	5.4	5.8	4.5	9.4	6.4	6.4	4.6	3.8	4.5	8.7	14
2	7.3	4.6	5.0	4.2	6.2	5.7	5.9	4.4	3.8	4.4	6.2	8.8
3	6.6	6.3	5.5	4.2	5.3	5.2	6.1	4.2	3.8	4.0	7.7	5.8
4	5.2	5.6	4.8	4.0	4.9	4.9	5.5	4.2	5.7	3.8	12	6.4
5	11	8.0	4.5	3.9	4.6	4.8	5.0	4.1	4.5	5.7	23	6.9
6	5.2	5.9	4.2	3.9	4.6	4.7	5.6	4.1	3.8	4.9	13	29
7	5.4	4.7	48	3.9	5.1	4.7	4.9	4.1	3.7	60	5.6	27
8	5.1	4.5	7.1	3.8	4.3	14	5.8	4.7	3.6	80	8.3	11
9	10	4.4	5.2	3.8	4.2	6.4	24	5.1	3.6	86	9.0	6.2
10	5.1	4.2	133	3.7	4.1	5.0	135	15	3.6	7.3	12	33
11	4.9	4.3	71	100	4.2	4.7	14	6.1	3.6	16	5.9	11
12	5.1	8.8	11	9.1	4.2	4.6	6.8	5.1	3.7	93	6.5	5.5
13	4.9	6.6	6.3	5.2	4.1	4.4	5.8	5.8	4.3	110	18	5.0
14	4.4	9.6	5.4	4.6	398	4.2	5.2	6.6	3.7	9.3	9.5	8.5
15	104	8.9	5.0	44	143	4.2	4.9	5.6	3.6	8.6	7.0	9.2
16	55	6.9	5.7	9.0	14	29	4.9	4.6	5.9	7.3	29	4.6
17	32	5.3	5.3	5.0	8.9	10	5.5	4.3	7.3	5.9	7.0	4.2
18	9.0	5.7	4.7	4.5	7.1	5.0	5.7	4.1	11	4.9	5.5	4.1
19	6.2	5.3	4.4	4.2	6.4	4.5	7.9	4.1	11	9.8	6.0	4.1
20	5.5	6.0	4.2	17	14	4.3	25	4.9	5.7	9.8	7.5	4.4
21	5.2	5.1	4.2	5.7	90	4.3	7.8	4.2	4.2	6.2	6.4	4.4
22	5.2	4.5	4.7	4.4	16	8.5	12	18	3.9	4.9	5.5	8.1
23	5.4	5.5	22	4.2	12	5.3	7.2	6.7	6.2	5.7	5.5	6.0
24	5.2	13	5.4	4.2	11	4.5	31	7.0	7.3	4.9	44	4.0
25	6.0	4.9	4.5	17	6.8	4.2	7.4	7.4	11	15	6.4	3.8
26	5.0	4.5	15	40	9.8	4.1	5.9	4.6	5.3	16	4.9	3.7
27	4.8	4.6	53	8.4	9.3	4.1	5.2	4.2	4.2	8.4	9.1	3.6
28	4.6	5.4	7.7	5.5	12	154	4.9	3.9	9.5	8.5	8.0	3.5
29	4.5	142	5.3	4.8	---	143	4.7	3.9	5.1	6.2	10	3.5
30	5.5	9.7	6.6	40	---	12	4.6	3.9	4.1	4.8	5.1	3.5
31	5.2	---	4.9	102	---	8.4	---	3.9	---	4.5	6.8	---
TOTAL	352.9	320.2	479.4	478.7	823.5	489.1	380.6	173.4	160.5	620.3	319.1	252.8
MEAN	11.4	10.7	15.5	15.4	29.4	15.8	12.7	5.59	5.35	20.0	10.3	8.43
MAX	104	142	133	102	398	154	135	18	11	110	44	33
MIN	4.4	4.2	4.2	3.7	4.1	4.1	4.6	3.9	3.6	3.8	4.9	3.5
AC-FT	700	635	951	950	1,630	970	755	344	318	1,230	633	501

16618000 KAHAKULOA STREAM NEAR HONOKOHAU—Continued

DISCHARGE, CUBIC FEET PER SECOND—CONTINUED
 WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
 DAILY MEAN VALUES

DAY OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1939 - 2003, BY WATER YEAR (WY)

MEAN	15.2	20.4	18.4	18.3	17.7	24.3	23.2	16.9	12.0	16.1	16.4	11.9
MAX	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)	(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)

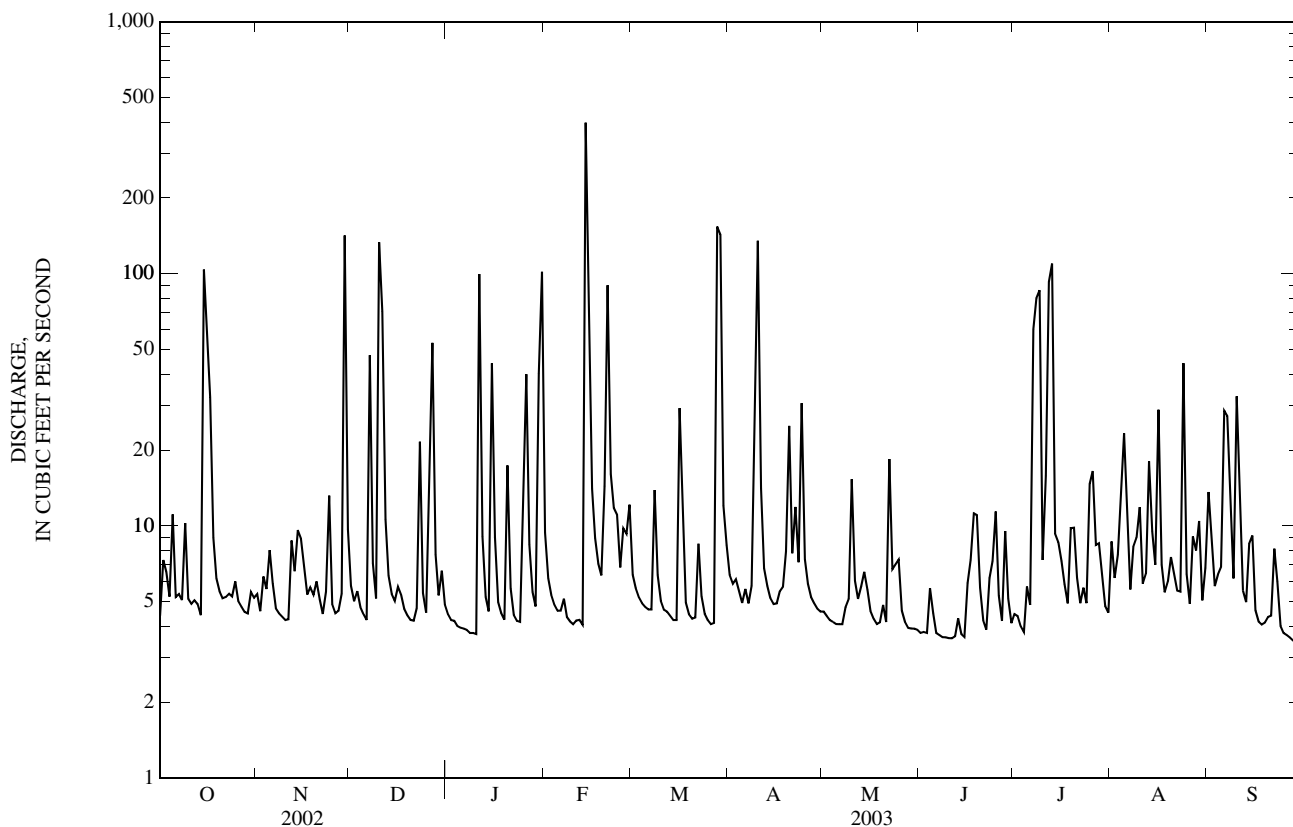
SUMMARY STATISTICS

FOR 2002 CALENDAR YEAR

FOR 2003 WATER YEAR

WATER YEARS 1939 - 2003

ANNUAL TOTAL	6,508.0		4,850.5		17.6	
ANNUAL MEAN	17.8		13.3		30.8	
HIGHEST ANNUAL MEAN					11.0	
LOWEST ANNUAL MEAN					1942	
HIGHEST DAILY MEAN	317	Jan 26	398	Feb 14	696	Mar 10, 1942
LOWEST DAILY MEAN	4.2	Nov 10	3.5	Sep 28	2.7	Jan 28, 1985
ANNUAL SEVEN-DAY MINIMUM	4.7	Dec 16	3.7	Jun 6	2.8	Feb 6, 1985
ANNUAL RUNOFF (AC-FT)	12,910		9,620		12,760	
10 PERCENT EXCEEDS	39		18		35	
50 PERCENT EXCEEDS	7.4		5.5		8.8	
90 PERCENT EXCEEDS	5.1		4.1		5.1	



HAWAII, ISLAND OF MAUI

16620000 HONOKOHAU STREAM NEAR HONOKOHAU

LOCATION.--Lat 20°57'45", long 156°35'22", Old Hawaiian Datum, 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). WDR HI-00-1: 1991-99 (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 Phillip Teeters. Records good. 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.--54 years (water years 1914-19, 1923-88, 1991-2003), 39.0 ft³/s (28,240 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)
Oct 15	0615	*2,040	*4.40	Apr 10	1430	1,960	4.36
Feb 14	0630	1,680	4.22				

Minimum discharge, 12 ft³/s, on many days, gage height, 1.39 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

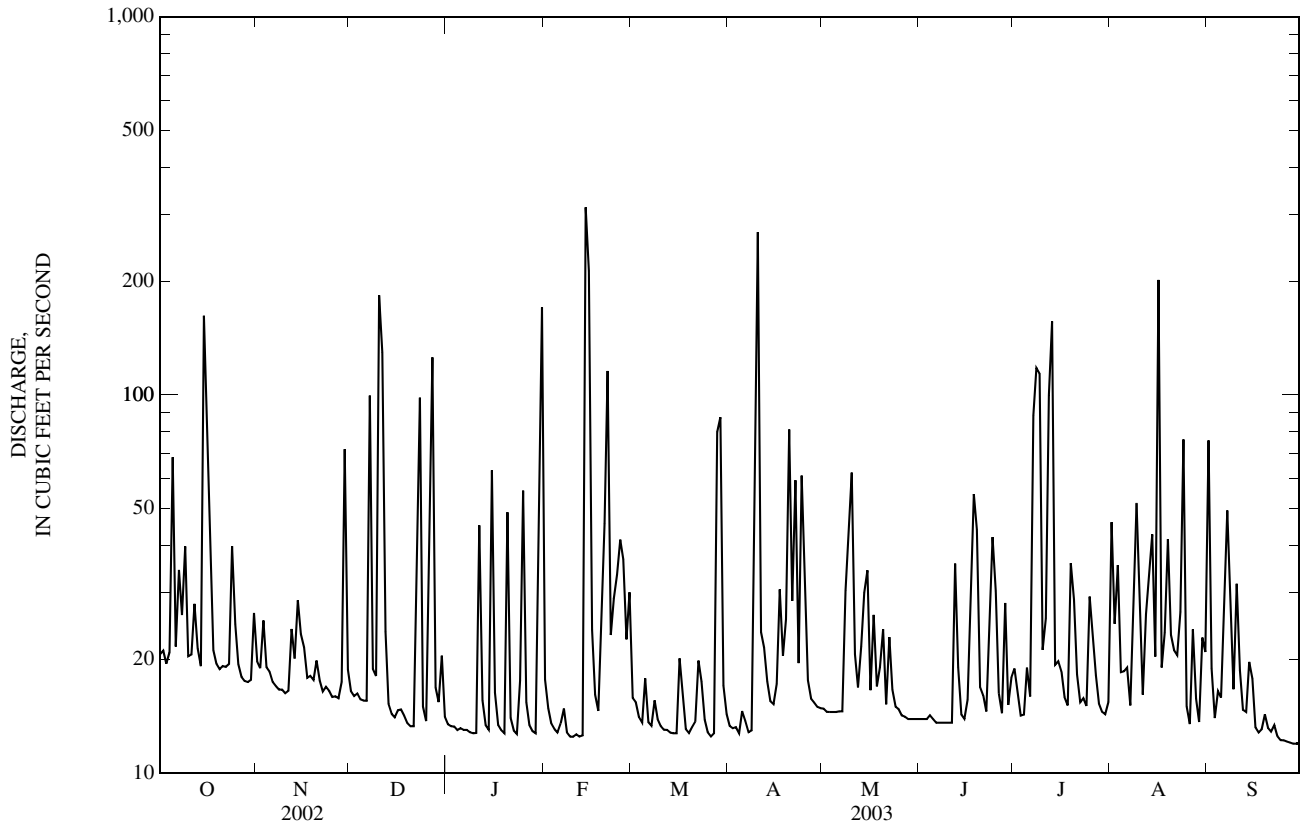
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	20	16	13	18	16	13	15	14	19	46	76
2	21	19	16	13	15	15	13	15	14	16	25	19
3	19	25	16	13	14	14	13	14	14	14	35	14
4	21	19	16	13	13	14	13	14	14	14	18	16
5	68	19	16	13	13	18	15	14	14	19	19	16
6	22	17	16	13	14	14	14	15	14	16	19	30
7	34	17	99	13	15	13	13	15	14	88	15	49
8	26	17	19	13	13	16	13	30	14	118	31	26
9	40	17	18	13	12	14	30	45	14	114	52	17
10	20	16	183	13	12	13	269	62	14	21	31	32
11	21	16	129	45	13	13	24	21	14	26	16	19
12	28	24	24	16	12	13	21	17	36	100	26	15
13	21	20	15	13	13	13	17	22	19	156	34	15
14	19	29	14	13	313	13	15	30	14	19	43	20
15	162	23	14	63	213	13	15	34	14	20	20	18
16	76	21	15	16	24	20	17	17	16	19	201	13
17	45	18	15	13	16	16	31	26	26	16	19	13
18	21	18	14	13	15	13	20	17	55	15	24	13
19	19	18	14	13	27	13	26	19	44	36	42	14
20	19	20	13	49	46	13	81	24	17	29	23	13
21	19	18	13	14	116	14	29	15	16	18	21	13
22	19	16	31	13	23	20	59	23	15	15	20	13
23	19	17	98	13	29	17	20	17	27	16	27	13
24	40	16	15	18	33	14	61	15	42	15	76	12
25	25	16	14	56	41	13	28	15	30	29	15	12
26	19	16	49	15	37	12	18	14	16	23	13	12
27	18	16	126	13	23	13	16	14	14	18	24	12
28	18	17	17	13	30	80	15	14	28	15	16	12
29	17	72	15	13	---	87	15	14	15	15	14	12
30	18	19	20	31	---	17	15	14	18	14	23	12
31	26	---	14	170	---	14	---	14	---	15	21	---
TOTAL	961	616	1,094	753	1,163	588	949	635	616	1,068	1,009	571
MEAN	31.0	20.5	35.3	24.3	41.5	19.0	31.6	20.5	20.5	34.5	32.5	19.0
MAX	162	72	183	170	313	87	269	62	55	156	201	76
MIN	17	16	13	13	12	12	13	14	14	14	13	12
AC-FT	1,910	1,220	2,170	1,490	2,310	1,170	1,880	1,260	1,220	2,120	2,000	1,130

16620000 HONOKOHAU STREAM NEAR HONOKOHAU—Continued

DISCHARGE, CUBIC FEET PER SECOND—CONTINUED
 WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
 DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1913 - 2003, BY WATER YEAR (WY)												
MEAN	31.7	41.0	40.7	35.9	36.9	43.7	48.0	40.6	34.3	40.0	40.9	30.5
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)

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1913 - 2003	
ANNUAL TOTAL	15,368		10,023			
ANNUAL MEAN	42.1		27.5		39.0	
HIGHEST ANNUAL MEAN					68.3	
LOWEST ANNUAL MEAN					24.1	
HIGHEST DAILY MEAN	399	Mar 6	313	Feb 14	781	Apr 7, 1938
LOWEST DAILY MEAN	13	Dec 20	12	Feb 9	8.0	Aug 10, 1920
ANNUAL SEVEN-DAY MINIMUM	14	Dec 15	12	Sep 24	8.5	Feb 6, 1985
ANNUAL RUNOFF (AC-FT)	30,480		19,880		28,240	
10 PERCENT EXCEEDS	88		46		79	
50 PERCENT EXCEEDS	25		17		24	
90 PERCENT EXCEEDS	17		13		13	



Surface-Water Station Records
for Hawaii

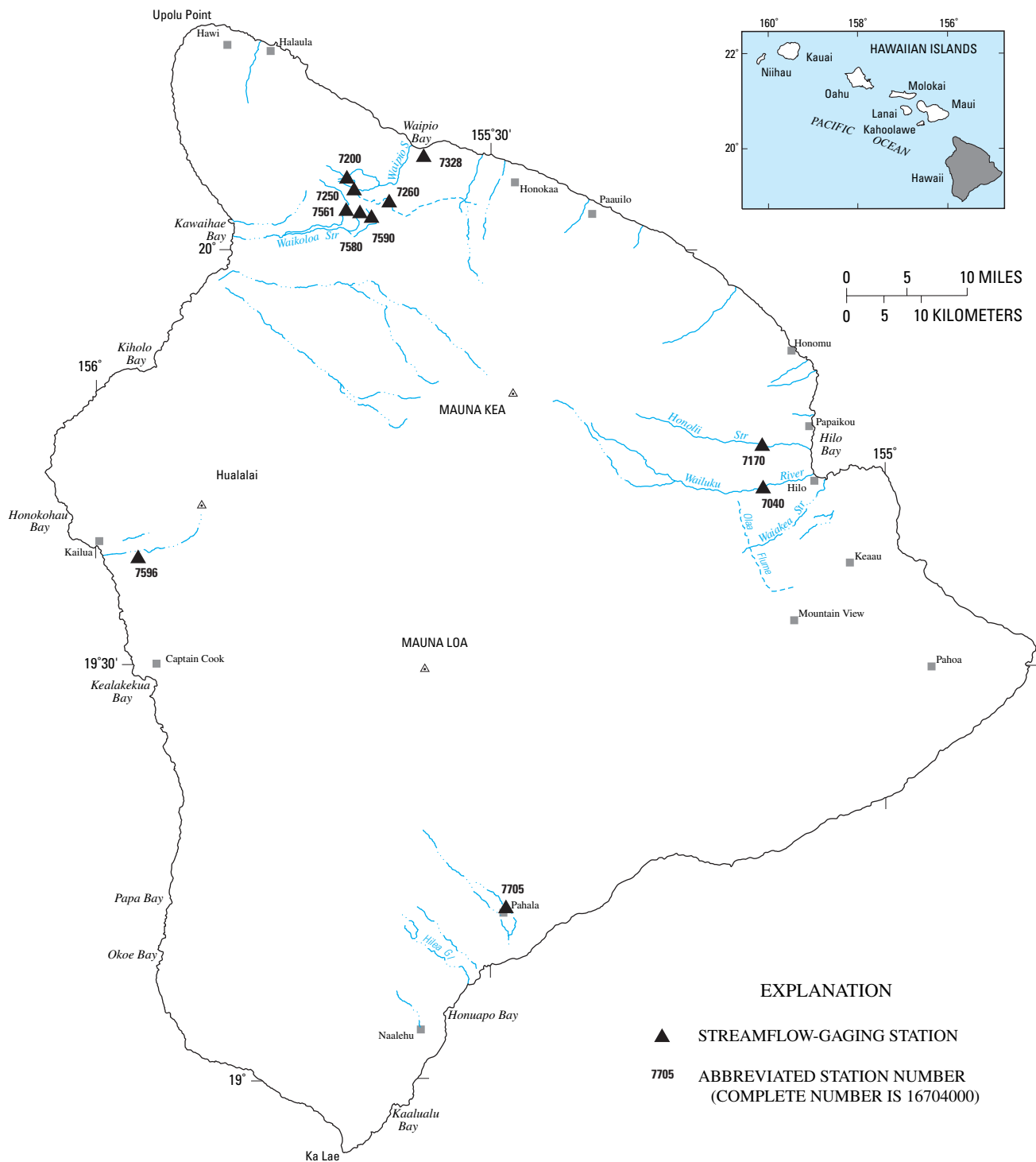


Figure 9. Locations of streamflow-gaging stations on Hawaii.

HAWAII, ISLAND OF HAWAII

16704000 WAILUKU RIVER AT PIIHONUA

LOCATION.--Lat 19°42'56", long 155°09'12", Old Hawaiian Datum, 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.

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 good. 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 variable amounts of water up to 160 ft³/s about 1 mi upstream of gage and discharges it about 500 ft below gage (from 1993).

AVERAGE DISCHARGE.--72 years (water years 1929-39, 1942-47, 1949-2003), 276 ft³/s (200,100 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 80,200 ft³/s, 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, 13,200 ft³/s, Sept. 1, gage height, 16.08 ft; minimum, 3.2 ft³/s, Mar. 31, gage height, 1.11 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

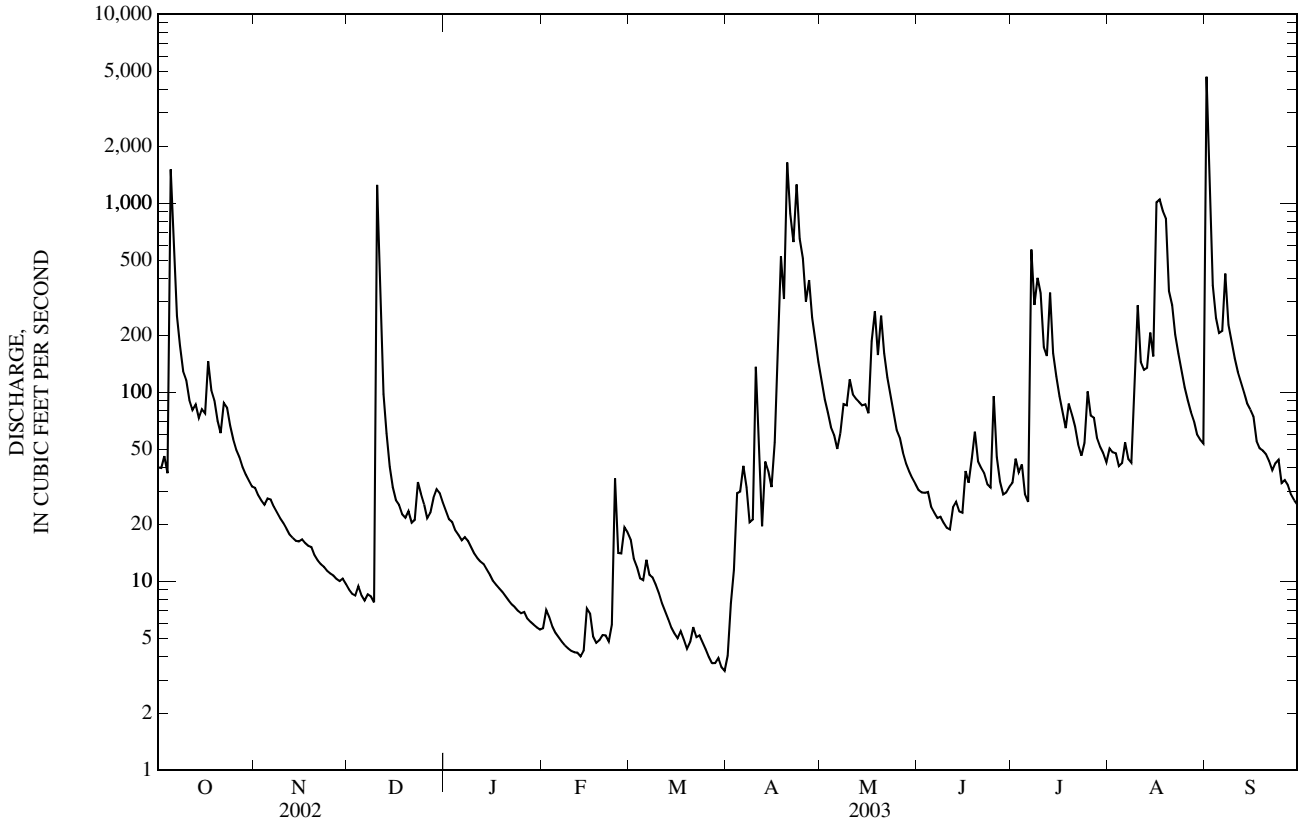
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	40	31	9.1	23	5.6	17	4.0	115	30	33	50	4,650
2	40	29	8.6	21	7.1	13	7.6	92	29	44	48	1,070
3	46	27	8.4	21	6.5	12	11	78	29	38	47	367
4	37	25	9.4	19	5.7	10	29	65	30	41	41	247
5	1,510	27	8.4	18	5.3	10	30	59	25	29	42	206
6	689	27	7.9	16	5.0	13	41	50	23	26	54	211
7	253	25	8.5	17	4.8	11	31	61	22	568	44	424
8	176	23	8.3	16	4.6	10	20	86	22	289	42	227
9	129	22	7.7	15	4.4	9.6	21	85	20	403	117	186
10	116	20	1,250	14	4.3	8.7	136	117	19	334	288	152
11	91	19	378	13	4.2	7.7	42	97	19	173	145	128
12	81	18	98	13	4.2	7.0	20	92	25	155	131	113
13	86	17	61	12	4.0	6.3	43	89	26	336	135	99
14	73	16	40	12	4.3	5.7	38	85	23	161	206	87
15	81	16	31	11	7.2	5.3	32	86	23	121	155	81
16	77	17	27	10	6.7	5.0	54	77	38	95	1,010	75
17	146	16	25	9.6	5.1	5.4	134	186	33	78	1,050	55
18	102	15	23	9.2	4.7	4.9	522	268	45	65	913	50
19	91	15	22	8.8	4.9	4.4	311	157	62	87	831	49
20	71	14	23	8.4	5.2	4.8	1,640	254	43	76	343	47
21	61	13	20	7.9	5.2	5.7	880	161	40	66	289	43
22	88	12	21	7.5	4.8	5.1	622	119	37	53	201	39
23	83	12	33	7.3	5.9	5.2	1,260	96	33	46	160	42
24	67	11	29	7.0	35	4.7	648	77	31	54	132	44
25	56	11	25	6.8	14	4.4	510	63	95	101	106	33
26	50	11	22	6.9	14	4.0	302	57	45	75	90	34
27	45	10	23	6.3	19	3.7	391	48	34	73	79	32
28	40	10	28	6.1	18	3.7	247	42	29	57	70	29
29	37	10	31	5.9	---	3.9	188	38	29	51	60	27
30	34	9.7	29	5.7	---	3.5	144	35	32	48	56	25
31	32	---	26	5.5	---	3.4	---	33	---	43	53	---
TOTAL	4,528	528.7	2,341.3	359.9	219.7	218.1	8,358.6	2,968	991	3,819	6,988	8,872
MEAN	146	17.6	75.5	11.6	7.85	7.04	279	95.7	33.0	123	225	296
MAX	1,510	31	1,250	23	35	17	1,640	268	95	568	1,050	4,650
MIN	32	9.7	7.7	5.5	4.0	3.4	4.0	33	19	26	41	25
AC-FT	8,980	1,050	4,640	714	436	433	16,580	5,890	1,970	7,570	13,860	17,600

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1928 - 2003, BY WATER YEAR (WY)

MEAN	171	378	362	285	301	395	378	219	127	213	283	167
MAX	765	2,238	1,368	2,061	2,050	2,026	2,262	1,246	715	1,140	1,989	992
(WY)	(1942)	(1991)	(1971)	(1975)	(1969)	(1991)	(1986)	(1964)	(1941)	(1989)	(1930)	(1930)
MIN	2.96	17.6	7.15	1.10	0.51	0.26	7.83	6.23	5.48	2.79	12.8	10.2
(WY)	(1985)	(2003)	(1934)	(1981)	(1983)	(1983)	(1992)	(1992)	(1981)	(1981)	(1971)	(1974)

16704000 WAILUKU RIVER AT PIIHONUA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1928 - 2003	
ANNUAL TOTAL	57,934.0		40,192.3			
ANNUAL MEAN	159		110		276	
HIGHEST ANNUAL MEAN					588	1991
LOWEST ANNUAL MEAN					103	1981
HIGHEST DAILY MEAN	4,210	Jan 29	4,650	Sep 1	22,200	Jan 8, 1975
LOWEST DAILY MEAN	7.7	Dec 9	3.4	Mar 31	0.22	Mar 20, 1983
ANNUAL SEVEN-DAY MINIMUM	8.4	Dec 3	3.7	Mar 26	0.23	Mar 17, 1983
ANNUAL RUNOFF (AC-FT)	114,900		79,720		200,100	
10 PERCENT EXCEEDS	291		217		595	
50 PERCENT EXCEEDS	66		33		79	
90 PERCENT EXCEEDS	17		5.7		13	



HAWAII, ISLAND OF HAWAII

16717000 HONOLII STREAM NEAR PAPAIIKOU

LOCATION.--Lat 19°46'00", long 155°09'16", Old Hawaiian Datum, 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.--Records computed by Dale Nishimoto. 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.--37 years (water years 1912, 1968-2003), 129 ft³/s (93,750 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 22,600 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 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 10	1800	4,830	11.92	Sep 1	0915	*6,530	*13.42
Apr 10	1615	4,840	11.93				

Minimum discharge, 5.3 ft³/s, Feb. 12, 13, 14, Mar. 27, 28, gage height, 2.10 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

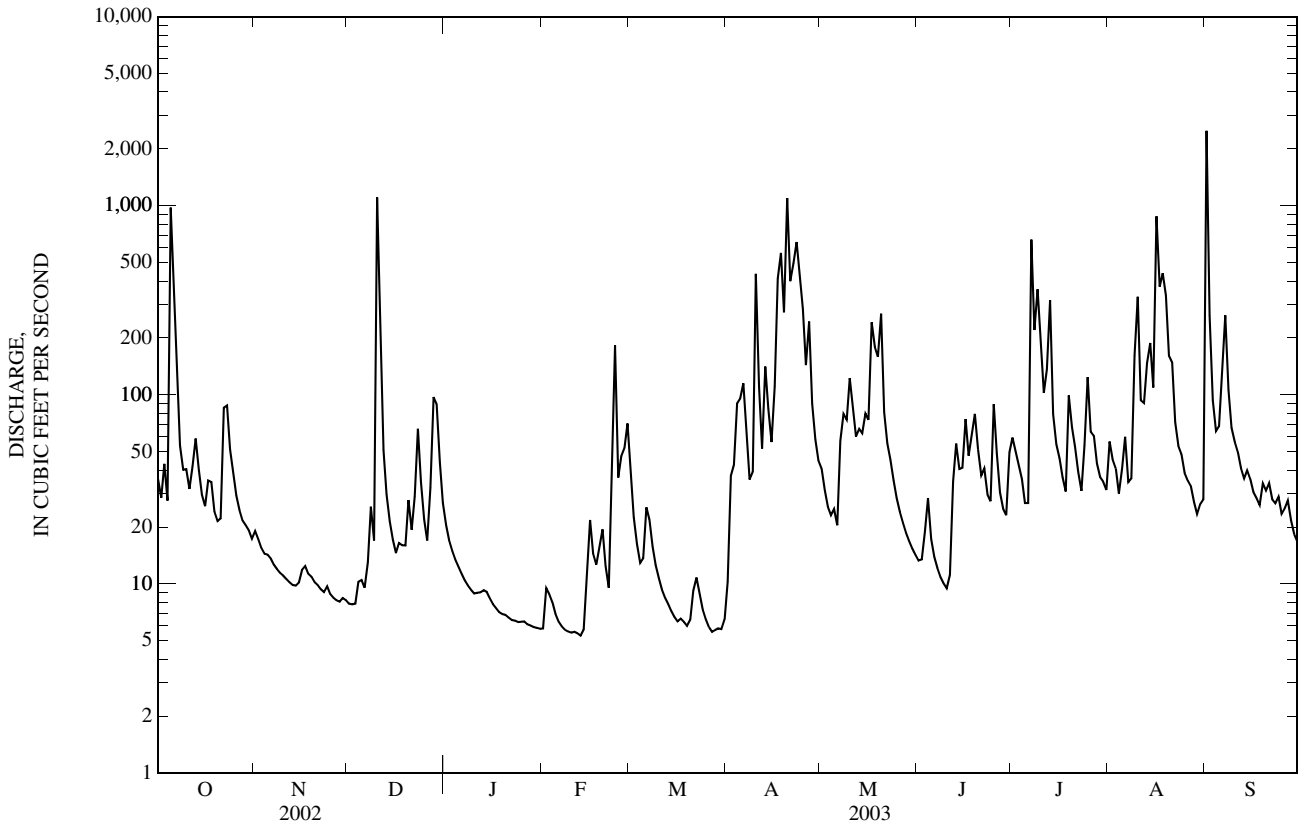
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	36	19	7.9	21	5.8	37	10	41	13	59	57	2,490
2	29	17	7.8	17	9.5	23	37	31	13	50	45	263
3	43	15	7.9	15	8.8	16	43	26	19	42	41	94
4	28	14	10	13	8.0	13	90	23	28	36	30	64
5	977	14	10	12	6.9	14	96	25	17	27	41	68
6	309	14	9.5	11	6.3	25	115	20	14	27	60	132
7	111	13	13	10	6.0	22	67	57	12	662	35	263
8	54	12	26	9.8	5.7	16	36	79	11	220	36	106
9	40	11	17	9.3	5.6	13	39	74	10	362	162	67
10	40	11	1,110	8.9	5.5	11	436	123	9.5	195	330	57
11	32	11	228	9.0	5.6	9.4	111	83	11	102	94	50
12	42	10	51	9.0	5.5	8.5	52	60	35	136	91	41
13	59	9.9	30	9.3	5.3	7.8	141	66	55	317	147	36
14	40	9.8	21	9.1	5.7	7.2	85	63	41	79	188	40
15	30	10	17	8.4	12	6.7	56	80	41	55	109	36
16	26	12	15	7.8	22	6.3	111	74	75	46	880	31
17	35	12	16	7.4	15	6.5	412	242	48	37	374	28
18	35	11	16	7.1	13	6.3	563	179	61	31	440	26
19	24	11	16	6.9	16	6.0	273	159	79	99	336	34
20	22	10	28	6.9	19	6.5	1,100	268	51	67	161	31
21	22	9.9	19	6.6	12	9.2	399	81	37	53	148	34
22	86	9.4	29	6.4	9.5	11	495	55	41	39	72	28
23	88	9.0	66	6.4	28	8.9	642	45	30	31	54	27
24	51	9.7	35	6.3	183	7.3	419	35	27	54	49	29
25	39	8.9	22	6.3	37	6.5	285	29	89	124	39	23
26	29	8.5	17	6.3	47	5.9	144	24	49	64	35	25
27	25	8.2	32	6.1	52	5.6	244	21	30	61	33	28
28	22	8.0	97	6.0	71	5.7	90	19	25	43	27	22
29	20	8.4	90	5.9	---	5.8	58	17	23	37	23	18
30	19	8.2	44	5.9	---	5.8	45	15	50	35	26	17
31	17	---	27	5.8	---	6.5	---	14	---	31	28	---
TOTAL	2,430	334.9	2,135.1	275.9	626.7	339.4	6,694	2,128	1,044.5	3,221	4,191	4,208
MEAN	78.4	11.2	68.9	8.90	22.4	10.9	223	68.6	34.8	104	135	140
MAX	977	19	1,110	21	183	37	1,100	268	89	662	880	2,490
MIN	17	8.0	7.8	5.8	5.3	5.6	10	14	9.5	27	23	17
AC-FT	4,820	664	4,230	547	1,240	673	13,280	4,220	2,070	6,390	8,310	8,350

16717000 HONOLII STREAM NEAR PAPAIIKOU—Continued

DISCHARGE, CUBIC FEET PER SECOND—CONTINUED
 WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
 DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1968 - 2003, BY WATER YEAR (WY)												
MEAN	81.7	189	165	127	119	198	188	94.2	72.0	118	117	82.0
MAX	222	783	625	648	752	1,349	772	319	349	384	420	276
(WY)	(1991)	(1995)	(1971)	(1975)	(1969)	(1980)	(1986)	(1989)	(1997)	(1989)	(1982)	(1994)
MIN	9.70	11.2	10.5	5.64	4.80	6.71	12.5	11.4	8.61	9.66	13.9	8.81
(WY)	(1985)	(2003)	(1984)	(1981)	(1980)	(1983)	(1992)	(1992)	(1981)	(1981)	(1973)	(1979)

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1968 - 2003	
ANNUAL TOTAL	37,026.0		27,628.5			
ANNUAL MEAN	101		75.7		129	
HIGHEST ANNUAL MEAN					220	
LOWEST ANNUAL MEAN					53.1	
HIGHEST DAILY MEAN	2,170	Jan 29	2,490	Sep 1	6,410	Dec 10, 1999
LOWEST DAILY MEAN	7.8	Dec 2	5.3	Feb 13	1.0	Feb 23, 1980
ANNUAL SEVEN-DAY MINIMUM	8.1	Nov 27	5.6	Feb 8	1.0	Feb 22, 1980
ANNUAL RUNOFF (AC-FT)	73,440		54,800		93,750	
10 PERCENT EXCEEDS	228		152		266	
50 PERCENT EXCEEDS	38		28		41	
90 PERCENT EXCEEDS	13		6.9		11	



HAWAII, ISLAND OF HAWAII

16720000 KAWAINUI STREAM NEAR KAMUELA

LOCATION.--Lat 20°05'18", long 155°40'58", Old Hawaiian Datum, Hydrologic Unit 20010000, on left bank 125 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 Gary Sanchez. Records fair. No diversion upstream.

AVERAGE DISCHARGE.--39 years (water years 1965-2003), 15.0 ft³/s (10,880 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.

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)
Feb 21	1200	*646	*5.70	Sep 1	0630	475	5.13

Minimum discharge, 0.11 ft³/s, June 9, 10, 11, Sept. 25, gage height, 1.06 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.6	e1.1	e0.57	1.5	0.83	17	2.9	0.80	0.28	22	18	227
2	1.3	e0.89	e0.55	1.2	2.6	7.5	3.8	0.62	0.24	20	9.5	29
3	1.1	e0.74	e2.7	1.1	2.2	4.5	2.2	0.57	0.26	9.8	14	6.6
4	0.93	e0.69	e16	0.95	1.6	3.1	1.5	0.57	0.24	9.1	3.1	7.3
5	39	e0.72	e2.2	0.89	1.2	2.3	1.2	0.47	0.20	3.1	36	20
6	19	e0.67	e2.0	0.84	1.0	1.8	0.96	0.41	0.16	4.0	11	11
7	7.2	e0.59	e62	0.77	0.86	1.5	0.83	0.37	0.15	50	3.9	20
8	e2.3	e0.51	e10	0.75	0.74	1.3	0.56	0.44	0.13	47	5.7	5.8
9	e1.7	e0.48	e4.8	0.66	0.68	4.9	0.57	5.9	0.12	113	34	2.7
10	e2.1	e0.45	e65	0.62	0.64	2.7	0.69	35	0.12	23	49	1.7
11	e1.9	e0.44	e15	2.7	0.96	1.7	0.68	16	0.15	15	9.3	1.2
12	e4.5	e0.42	e4.5	5.8	1.6	1.3	0.73	6.9	21	81	19	0.88
13	e2.6	e0.41	2.7	3.5	1.3	1.2	7.3	8.9	21	56	56	1.3
14	e1.5	e0.47	1.8	2.0	103	1.0	4.5	14	3.7	6.3	42	2.0
15	e1.3	e1.4	1.4	19	91	0.90	5.2	24	2.3	15	31	2.7
16	e1.4	e2.6	1.2	16	23	0.77	14	4.2	11	11	38	1.7
17	e1.1	e1.1	1.2	3.5	10	0.70	26	23	17	3.9	9.4	1.1
18	e0.98	e0.57	1.0	2.0	13	0.64	20	14	50	2.4	8.7	0.83
19	e0.82	e0.51	0.93	1.5	39	0.62	13	6.2	31	62	14	0.70
20	e0.74	e0.59	0.82	48	35	0.67	69	28	18	24	19	0.58
21	e0.70	e0.56	0.73	9.0	110	0.96	24	4.6	20	13	15	0.49
22	e0.84	e0.39	0.84	3.2	14	6.8	57	9.7	15	3.7	10	0.42
23	e2.3	e0.40	11	1.9	40	8.9	45	17	5.9	2.2	8.9	0.35
24	e2.6	e0.38	12	1.5	52	3.7	28	8.1	20	1.8	15	0.27
25	e1.4	e0.41	6.5	1.4	9.1	2.2	29	6.1	48	4.0	3.5	0.23
26	e1.1	e0.40	6.6	1.6	13	1.5	21	1.9	5.6	1.9	2.9	0.25
27	e0.81	e0.37	25	1.3	12	1.2	25	1.0	2.2	1.3	12	0.23
28	e0.69	e0.39	10	1.1	53	1.7	4.0	0.70	1.8	0.95	8.3	0.21
29	e0.67	e1.0	8.1	0.96	---	4.8	1.8	0.51	1.6	0.87	6.8	0.19
30	e0.81	e1.3	3.6	0.91	---	5.0	1.1	0.40	26	4.6	19	0.18
31	e0.79	---	2.1	0.89	---	2.4	---	0.33	---	3.6	45	---
TOTAL	105.78	20.95	282.84	137.04	633.31	95.26	411.52	240.69	323.15	615.52	577.0	346.91
MEAN	3.41	0.70	9.12	4.42	22.6	3.07	13.7	7.76	10.8	19.9	18.6	11.6
MAX	39	2.6	65	48	110	17	69	35	50	113	56	227
MIN	0.67	0.37	0.55	0.62	0.64	0.62	0.56	0.33	0.12	0.87	2.9	0.18
AC-FT	210	42	561	272	1,260	189	816	477	641	1,220	1,140	688

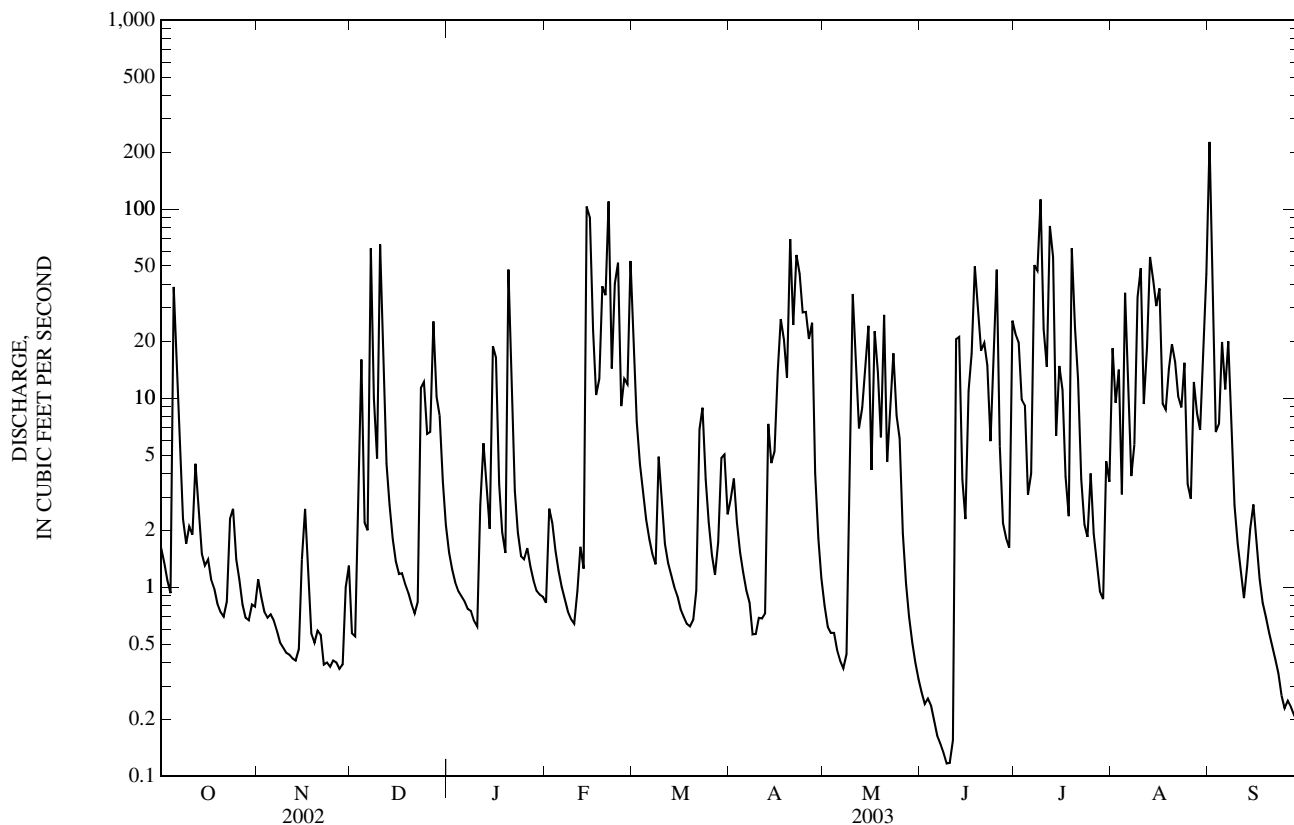
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1964 - 2003, BY WATER YEAR (WY)

MEAN	9.73	16.5	15.5	14.6	13.0	20.1	22.2	12.1	13.9	18.9	15.4	8.73
MAX	27.7	55.8	41.4	62.5	40.6	98.0	67.5	36.0	37.7	37.0	31.8	27.5
(WY)	(2002)	(1980)	(1971)	(1979)	(1969)	(1980)	(1986)	(1998)	(1998)	(1982)	(1982)	(1992)
MIN	0.17	0.70	0.51	0.34	0.51	3.07	1.71	1.07	3.18	4.56	2.70	0.27
(WY)	(1985)	(2003)	(1981)	(1981)	(1995)	(2003)	(1992)	(1999)	(1985)	(1981)	(1971)	(1965)

16720000 KAWAINUI STREAM NEAR KAMUELA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1964 - 2003	
ANNUAL TOTAL	5,033.25		3,789.97		15.0	
ANNUAL MEAN	13.8		10.4		26.3	
HIGHEST ANNUAL MEAN					7.33	
LOWEST ANNUAL MEAN					1980	
HIGHEST DAILY MEAN	282	Feb 26	227	Sep 1	612	Nov 18, 1979
LOWEST DAILY MEAN	0.37	Nov 27	0.12	Jun 9	0.01	Jan 23, 1977
ANNUAL SEVEN-DAY MINIMUM	0.39	Nov 22	0.15	Jun 5	0.01	Jan 22, 1977
ANNUAL RUNOFF (AC-FT)	9,980		7,520		10,880	
10 PERCENT EXCEEDS	36		28		41	
50 PERCENT EXCEEDS	4.3		2.2		4.5	
90 PERCENT EXCEEDS	0.68		0.46		0.51	

e Estimated



HAWAII, ISLAND OF HAWAII

16725000 ALAKAHI STREAM NEAR KAMUELA

LOCATION.--Lat 20°04'27", long 155°40'25", Old Hawaiian Datum, 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 except estimated periods which are poor. Parker Ranch pipeline no longer diverts from tributary 0.4 mi upstream for ranch use in Kamuela area.

AVERAGE DISCHARGE.--39 years (water years 1965-2003), 7.90 ft³/s (5,720 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,430 ft³/s, 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)
Feb 21	1215	*375	*6.58	Sep 1	0630	195	5.05

Minimum discharge, 0.39 ft³/s, February 1, 8-10 on June 9-11.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.87	1.4	e0.80	0.77	0.41	3.8	1.1	0.92	0.52	10	7.2	e104
2	0.87	1.2	e0.75	0.65	0.53	2.4	1.4	0.81	0.49	9.2	3.5	e18
3	0.83	1.0	e1.5	0.58	0.60	1.5	0.99	0.77	0.49	4.4	4.4	e5.6
4	0.79	0.95	e9.4	0.53	0.49	1.1	0.83	0.75	0.48	4.1	e2.6	e5.6
5	15	1.0	e1.9	0.49	0.46	0.96	0.68	0.67	0.46	1.7	e18	e15
6	9.3	0.96	e1.5	0.47	0.45	0.85	0.57	0.63	0.44	2.1	e7.0	e7.5
7	2.8	0.86	e26	0.46	0.43	0.74	0.50	0.59	0.44	21	e3.2	e12
8	1.7	0.73	e7.4	0.45	0.41	0.65	0.51	0.65	0.42	20	e3.6	e4.5
9	1.3	0.67	e3.4	0.43	0.39	1.7	0.67	1.5	0.41	59	e15	e3.2
10	1.7	0.64	e33	0.43	0.40	1.3	0.74	13	0.40	12	e24	e2.5
11	1.5	0.61	7.5	0.57	0.47	e0.92	0.77	7.1	0.42	5.5	e6.7	e1.9
12	3.2	0.59	2.2	1.0	0.58	e0.81	0.76	4.3	10	18	e9.3	1.8
13	2.2	0.58	1.3	1.0	0.55	e0.68	3.5	4.9	9.5	10	e27	2.4
14	1.3	0.63	1.0	0.81	37	0.58	2.3	6.7	2.0	e5.4	e22	e2.6
15	1.1	1.6	0.92	5.2	49	0.54	2.0	11	1.6	e9.6	e16	e2.8
16	1.1	3.1	0.84	5.7	9.8	0.51	6.2	2.3	4.1	e7.8	e19	e1.7
17	0.99	1.4	0.78	1.1	2.7	0.49	7.6	9.1	6.5	e3.4	e6.7	e1.3
18	0.97	0.97	0.72	0.76	3.6	0.47	6.7	5.7	24	e2.3	e5.5	e1.1
19	0.89	e1.0	0.68	0.64	15	0.46	5.0	3.5	14	e26	e7.6	e0.95
20	0.85	e1.2	0.64	26	13	0.47	27	17	8.1	e13	e9.4	e0.90
21	0.83	e0.90	0.59	3.5	56	0.48	11	2.7	8.0	e8.6	e8.6	e0.85
22	0.94	e0.80	0.62	1.1	6.7	0.97	27	5.1	4.9	e3.3	e6.2	e0.80
23	2.7	e0.70	3.1	0.78	12	2.1	19	9.1	2.6	e2.2	e5.8	e0.73
24	3.3	e0.62	3.8	0.66	20	1.2	12	4.2	11	e1.9	e9.0	e0.66
25	1.7	e0.67	2.3	0.59	3.0	0.86	13	3.6	24	e3.0	e3.0	e0.61
26	1.3	e0.64	1.8	0.56	4.4	0.70	12	1.4	2.9	e1.8	e2.5	e0.63
27	1.1	e0.60	8.9	0.50	4.3	0.54	12	0.99	1.4	e1.4	e7.1	e0.60
28	0.94	e0.62	3.2	0.45	23	0.72	3.2	0.85	1.1	e1.2	e5.5	e0.57
29	0.90	e0.80	1.7	0.43	---	2.3	1.4	0.73	1.0	0.85	e4.3	e0.54
30	1.0	e1.0	1.1	0.42	---	2.5	1.1	0.63	10	2.1	e10	e0.52
31	1.0	---	0.88	0.42	---	1.2	---	0.57	---	2.1	e23	---
TOTAL	64.97	28.44	130.22	57.45	265.67	34.50	181.52	121.76	151.67	272.95	302.7	201.86
MEAN	2.10	0.95	4.20	1.85	9.49	1.11	6.05	3.93	5.06	8.80	9.76	6.73
MAX	15	3.1	33	26	56	3.8	27	17	24	59	27	104
MIN	0.79	0.58	0.59	0.42	0.39	0.46	0.50	0.57	0.40	0.85	2.5	0.52
AC-FT	129	56	258	114	527	68	360	242	301	541	600	400

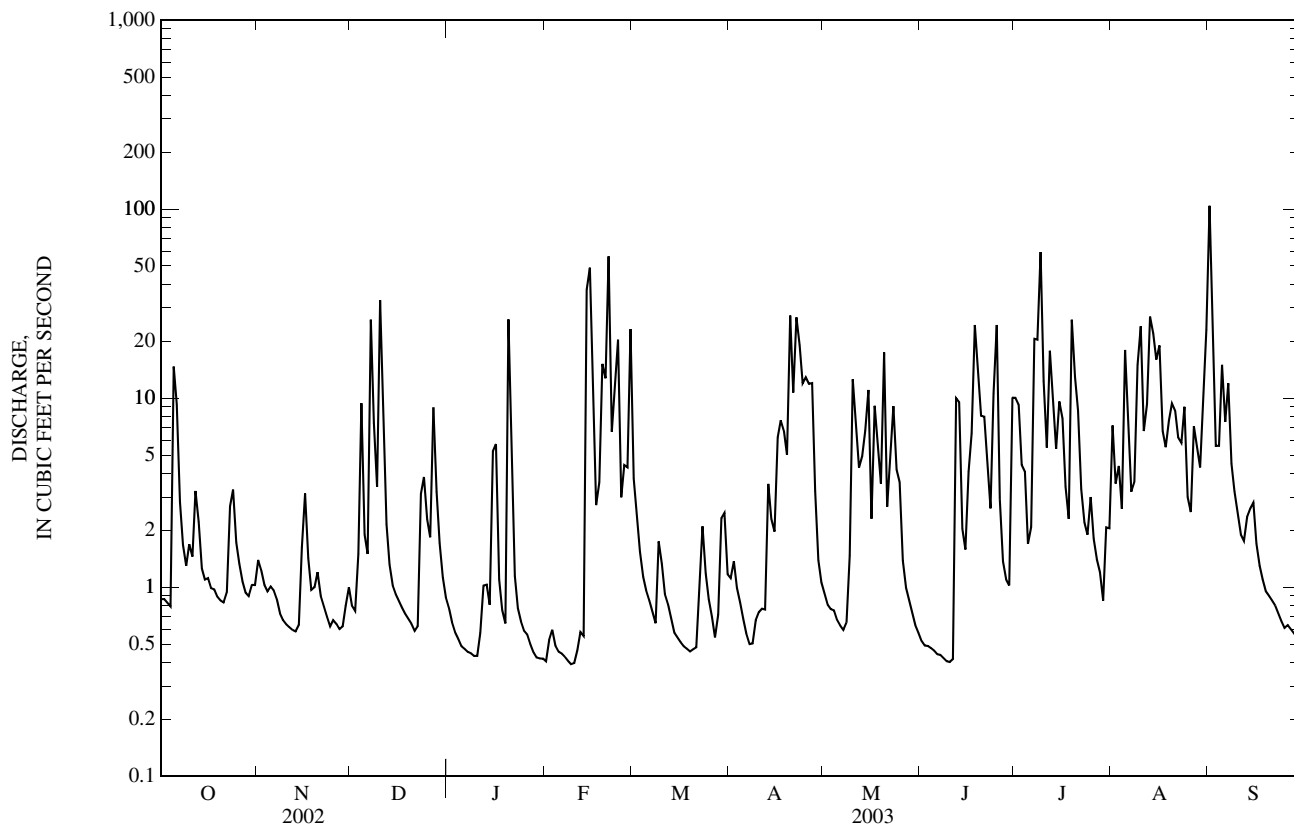
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1964 - 2003, BY WATER YEAR (WY)

MEAN	5.29	8.25	7.38	7.40	6.40	9.85	11.3	6.79	7.89	10.5	8.66	5.16
MAX	14.7	26.5	16.7	26.4	18.6	37.9	31.6	20.5	22.6	22.5	19.2	17.8
(WY)	(1999)	(1980)	(1971)	(1979)	(1969)	(1980)	(1986)	(1998)	(1998)	(2002)	(2001)	(1992)
MIN	0.31	0.95	0.54	0.46	0.40	1.11	0.82	0.78	2.04	2.38	1.72	0.087
(WY)	(1985)	(2003)	(1981)	(1981)	(1993)	(2003)	(1992)	(1999)	(1985)	(1981)	(1971)	(1965)

16725000 ALAKAHI STREAM NEAR KAMUELA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1964 - 2003	
ANNUAL TOTAL	2,950.03		1,813.71		7.90	
ANNUAL MEAN	8.08		4.97		13.4	
HIGHEST ANNUAL MEAN					1994	
LOWEST ANNUAL MEAN					1981	
HIGHEST DAILY MEAN	166	Feb 26	104	Sep 1	338	Nov 18, 1979
LOWEST DAILY MEAN	0.58	Nov 13	0.39	Feb 9	0.03	May 22, 1965
ANNUAL SEVEN-DAY MINIMUM	0.62	Apr 9	0.43	Jun 5	0.04	Sep 22, 1965
ANNUAL RUNOFF (AC-FT)	5,850		3,600		5,720	
10 PERCENT EXCEEDS	22		13		20	
50 PERCENT EXCEEDS	2.7		1.4		3.1	
90 PERCENT EXCEEDS	0.78		0.51		0.59	

e Estimated



HAWAII, ISLAND OF HAWAII

16726000 UPPER HAMAKUA DITCH ABOVE WAIMEA RESERVOIR DIVERSION, NEAR KAMUELA

LOCATION.--Lat 20°03'31", long 155°37'40", Old Hawaiian Datum, Hydrologic Unit 20010000, on left bank 500 ft upstream from diversion intake leading to Waimea Reservoir and 3.7 mi northeast of Kamuela Post Office.

PERIOD OF RECORD.--October 1974 to September 1983, September 1992 to September 1994 (discharge measurements only). October 1994 to current year.

REVISED RECORDS.--WDR HI-94-1: 1981, 1984-90.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 3,020 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Dale Nishimoto. Records good. Ditch diverts from Kawainui, Kawaiki, and Alakahi Streams for use in vicinity of Kamuela.

AVERAGE DISCHARGE.--18 years (water years 1975-83, 1995-2003), 9.64 ft³/s (6,980 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 48 ft³/s, April 6, 1977; no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 33 ft³/s, Sep 1; minimum daily, 0.40 ft³/s, Feb 25.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

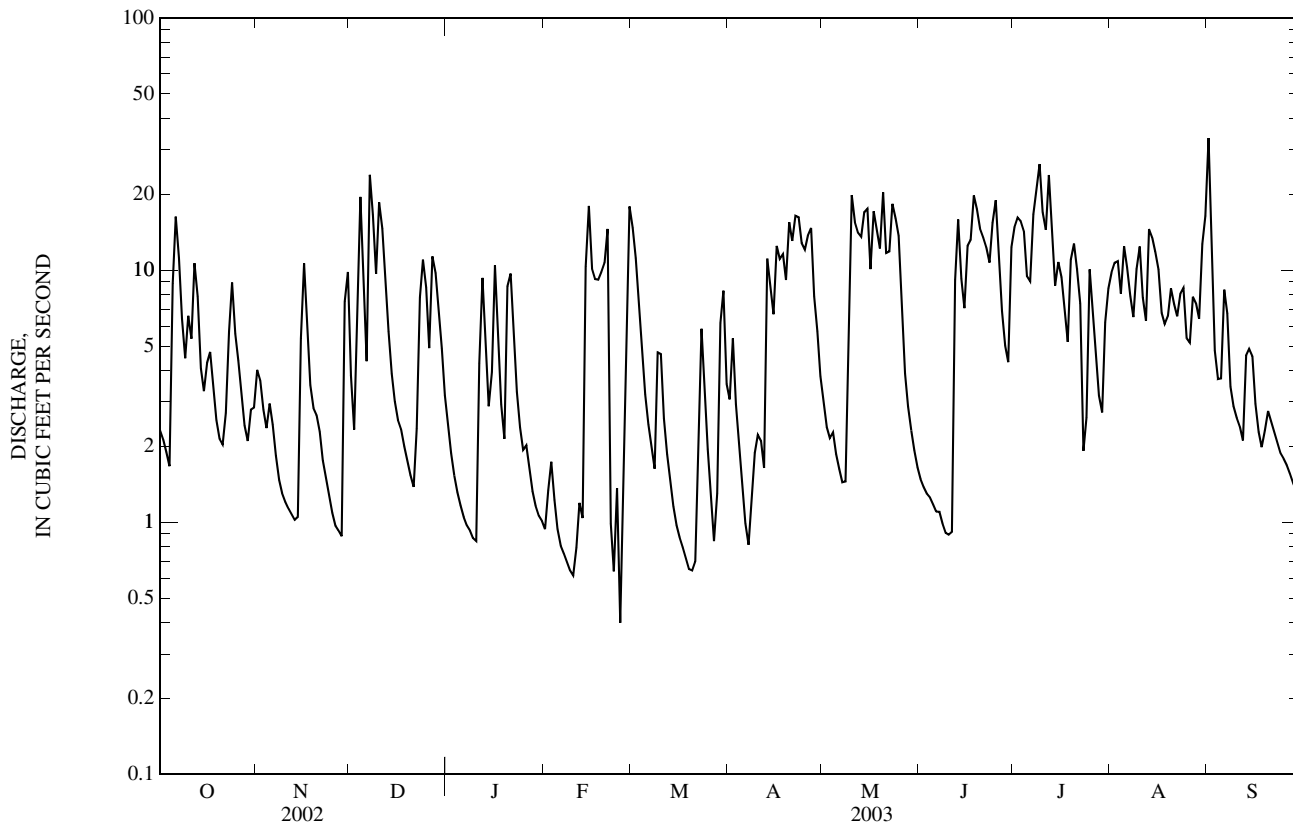
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.3	4.0	3.8	2.4	0.94	15	3.1	3.0	1.5	15	9.8	33
2	2.1	3.7	2.3	1.9	1.3	11	5.4	2.4	1.4	16	11	12
3	1.9	2.8	6.8	1.5	1.7	7.3	2.9	2.2	1.3	16	11	4.8
4	1.7	2.4	20	1.3	1.2	4.9	1.9	2.3	1.3	14	8.1	3.7
5	8.8	3.0	9.1	1.2	0.94	3.2	1.4	1.9	1.2	9.5	12	3.7
6	16	2.4	4.3	1.0	0.81	2.4	0.99	1.6	1.1	9.0	10	8.4
7	11	1.8	24	0.97	0.75	2.0	0.81	1.4	1.1	17	7.9	6.7
8	6.4	1.5	17	0.93	0.70	1.6	1.2	1.5	0.99	21	6.5	3.4
9	4.5	1.3	9.7	0.87	0.64	4.7	1.9	5.8	0.91	26	10	2.9
10	6.6	1.2	19	0.84	0.61	4.6	2.2	20	0.89	17	12	2.6
11	5.3	1.1	15	4.3	0.79	2.6	2.1	15	0.91	14	7.8	2.4
12	11	1.1	9.4	9.3	1.2	1.9	1.6	14	9.1	24	6.3	2.1
13	7.9	1.0	5.7	5.6	1.0	1.5	11	14	16	14	15	4.6
14	4.1	1.0	3.9	2.9	10	1.2	8.7	17	9.2	8.7	13	4.9
15	3.3	5.3	3.0	3.9	18	0.97	6.7	18	7.1	11	12	4.6
16	4.3	11	2.5	10	10	0.87	12	10	12	9.4	10	2.9
17	4.7	6.0	2.3	5.2	9.2	0.79	11	17	13	7.2	6.8	2.3
18	3.5	3.5	2.0	2.9	9.2	0.72	12	14	20	5.2	6.1	2.0
19	2.5	2.8	1.8	2.1	9.8	0.65	9.1	12	17	11	6.6	2.3
20	2.1	2.7	1.5	8.6	11	0.64	15	20	15	13	8.5	2.8
21	2.0	2.3	1.4	9.7	15	0.70	13	12	13	10	7.3	2.5
22	2.7	1.8	2.4	5.5	0.99	1.7	16	12	12	7.4	6.6	2.3
23	5.7	1.5	7.8	3.3	0.64	5.8	16	18	11	1.9	8.1	2.1
24	8.9	1.3	11	2.4	1.4	3.6	13	16	15	2.6	8.5	1.9
25	5.6	1.1	8.6	1.9	0.40	1.9	12	14	19	10	5.4	1.8
26	4.4	0.97	4.9	2.0	1.4	1.3	14	6.6	11	6.7	5.2	1.7
27	3.2	0.93	11	1.6	7.8	0.84	15	3.9	6.9	4.5	7.8	1.6
28	2.4	0.88	9.7	1.3	18	1.3	7.9	2.9	5.0	3.2	7.4	1.4
29	2.1	7.5	6.9	1.2	---	6.2	5.7	2.3	4.3	2.7	6.4	1.3
30	2.8	9.8	4.9	1.1	---	8.3	3.8	1.9	12	6.2	13	1.3
31	2.9	---	3.2	1.0	---	3.5	---	1.7	---	8.5	16	---
TOTAL	152.7	87.68	234.9	98.71	135.41	103.68	227.40	284.4	240.20	341.7	282.1	130.0
MEAN	4.93	2.92	7.58	3.18	4.84	3.34	7.58	9.17	8.01	11.0	9.10	4.33
MAX	16	11	24	10	18	15	16	20	20	26	16	33
MIN	1.7	0.88	1.4	0.84	0.40	0.64	0.81	1.4	0.89	1.9	5.2	1.3
AC-FT	303	174	466	196	269	206	451	564	476	678	560	258

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1975 - 2003, BY WATER YEAR (WY)

MEAN	7.95	10.1	8.09	5.73	6.11	10.6	12.7	10.4	10.1	13.7	11.6	8.41
MAX	17.3	17.4	12.6	13.4	15.1	19.7	26.0	23.9	26.3	26.0	19.6	16.9
(WY)	(1999)	(1977)	(1979)	(2000)	(1999)	(1982)	(1998)	(1998)	(1998)	(1978)	(1978)	(1982)
MIN	1.18	2.82	0.79	0.31	0.63	3.34	2.76	2.05	3.03	2.84	2.23	2.95
(WY)	(1975)	(1996)	(1981)	(1981)	(1995)	(2003)	(1981)	(1999)	(1981)	(1981)	(1979)	(1981)

16726000 UPPER HAMAKUA DITCH ABOVE WAIMEA RESERVOIR DIVERSION, NEAR KAMUELA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1975 - 2003	
ANNUAL TOTAL	3,349.80		2,318.88			
ANNUAL MEAN	9.18		6.35		9.64	
HIGHEST ANNUAL MEAN					15.0	1998
LOWEST ANNUAL MEAN					3.80	1981
HIGHEST DAILY MEAN	29	Jul 1	33	Sep 1	48	Apr 6, 1977
LOWEST DAILY MEAN	0.00	Feb 28	0.40	Feb 25	0.00	Oct 1, 1974
ANNUAL SEVEN-DAY MINIMUM	0.90	Apr 10	0.75	Feb 5	0.00	Oct 1, 1974
ANNUAL RUNOFF (AC-FT)	6,640		4,600		6,980	
10 PERCENT EXCEEDS	19		15		22	
50 PERCENT EXCEEDS	7.7		4.4		6.9	
90 PERCENT EXCEEDS	1.4		1.0		0.79	



HAWAII, ISLAND OF HAWAII

16732800 LOWER HAMAKUA DITCH ABOVE MAIN WEIR

LOCATION.--Lat 20°06'52", long 155°35'06", Old Hawaiian Datum, Hydrologic Unit 20010000, on left bank 500 ft upstream from Lower Hamakua ditch Main Weir and 1 mile west of Kukuihaele County Park.

PERIOD OF RECORD.--October 2002 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 900 ft above mean sea level (from topographic map).

COOPERATION.--State of Hawaii, Department of Agriculture.

REMARKS.--Records computed by Gary Sanchez. Records good, except for periods of estimation, which are poor.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 29 ft³/s, June 25; minimum daily, 0.55 ft³/2, (estimated) Oct 1 to Mar 3.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e0.55	e0.55	e0.55	e0.55	e0.55	e0.55	20	15	16	24	19	14
2	e0.55	e0.55	e0.55	e0.55	e0.55	e0.55	21	15	15	24	19	10
3	e0.55	e0.55	e0.55	e0.55	e0.55	e0.55	20	15	15	22	20	9.8
4	e0.55	e0.55	e0.55	e0.55	e0.55	e5.4	19	15	15	23	18	9.8
5	e0.55	e0.55	e0.55	e0.55	e0.55	21	19	15	15	20	19	9.9
6	e0.55	e0.55	e0.55	e0.55	e0.55	21	19	15	15	19	10	9.9
7	e0.55	e0.55	e0.55	e0.55	e0.55	21	19	15	15	25	9.9	10
8	e0.55	e0.55	e0.55	e0.55	e0.55	21	19	15	15	25	9.7	9.8
9	e0.55	e0.55	e0.55	e0.55	e0.55	24	20	16	15	23	10	9.8
10	e0.55	e0.55	e0.55	e0.55	e0.55	23	20	20	15	19	10	9.8
11	e0.55	e0.55	e0.55	e0.55	e0.55	22	20	19	15	18	10	9.8
12	e0.55	e0.55	e0.55	e0.55	e0.55	21	20	19	20	20	9.7	9.8
13	e0.55	e0.55	e0.55	e0.55	e0.55	21	22	18	28	18	10	9.9
14	e0.55	e0.55	e0.55	e0.55	e0.55	21	22	19	20	16	11	9.9
15	e0.55	e0.55	e0.55	e0.55	e0.55	20	21	20	18	17	11	9.9
16	e0.55	e0.55	e0.55	e0.55	e0.55	20	20	18	23	17	11	9.8
17	e0.55	e0.55	e0.55	e0.55	e0.55	20	19	20	23	16	10	9.8
18	e0.55	e0.55	e0.55	e0.55	e0.55	20	17	20	25	16	13	9.8
19	e0.55	e0.55	e0.55	e0.55	e0.55	20	17	18	18	17	21	9.8
20	e0.55	e0.55	e0.55	e0.55	e0.55	20	17	21	15	16	20	9.8
21	e0.55	e0.55	e0.55	e0.55	e0.55	21	16	19	15	16	21	9.8
22	e0.55	e0.55	e0.55	e0.55	e0.55	22	16	18	15	15	20	9.8
23	e0.55	e0.55	e0.55	e0.55	e0.55	25	15	21	17	15	18	9.8
24	e0.55	e0.55	e0.55	e0.55	e0.55	23	14	20	24	15	20	9.8
25	e0.55	e0.55	e0.55	e0.55	e0.55	21	14	20	29	16	17	9.8
26	e0.55	e0.55	e0.55	e0.55	e0.55	21	14	18	23	16	16	9.8
27	e0.55	e0.55	e0.55	e0.55	e0.55	20	15	18	19	16	18	11
28	e0.55	e0.55	e0.55	e0.55	e0.55	21	14	17	18	16	19	14
29	e0.55	e0.55	e0.55	e0.55	---	21	14	16	18	17	17	14
30	e0.55	e0.55	e0.55	e0.55	---	20	15	16	22	17	21	13
31	e0.55	---	e0.55	e0.55	---	19	---	16	---	18	21	---
TOTAL	17.05	16.50	17.05	17.05	15.40	577.05	538	547	556	572	479.3	311.9
MEAN	0.55	0.55	0.55	0.55	0.55	18.6	17.9	17.6	18.5	18.5	15.5	10.4
MAX	0.55	0.55	0.55	0.55	0.55	25	22	21	29	25	21	14
MIN	0.55	0.55	0.55	0.55	0.55	0.55	14	15	15	15	9.7	9.8
AC-FT	34	33	34	34	31	1,140	1,070	1,080	1,100	1,130	951	619

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 2003 - 2003, BY WATER YEAR (WY)

MEAN	0.55	0.55	0.55	0.55	0.55	18.6	17.9	17.6	18.5	18.5	15.5	10.4
MAX	0.55	0.55	0.55	0.55	0.55	18.6	17.9	17.6	18.5	18.5	15.5	10.4
(WY)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)
MIN	0.55	0.55	0.55	0.55	0.55	18.6	17.9	17.6	18.5	18.5	15.5	10.4
(WY)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)

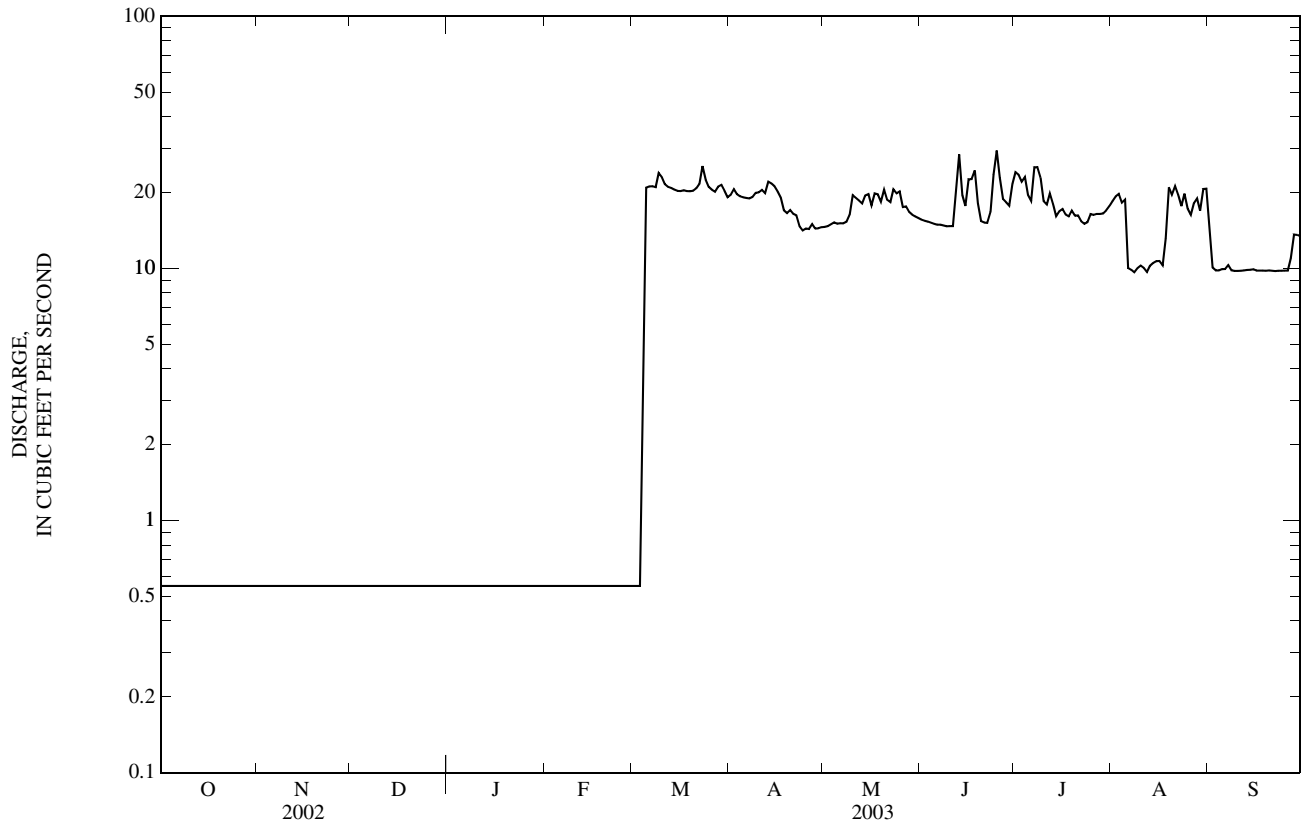
SUMMARY STATISTICS

FOR 2003 WATER YEAR

ANNUAL TOTAL	3664.30
ANNUAL MEAN	10.0
HIGHEST DAILY MEAN	29 Jun 25
LOWEST DAILY MEAN	0.55 Oct 1
ANNUAL SEVEN-DAY MINIMUM	0.55 Oct 1
ANNUAL RUNOFF (AC-FT)	7270
10 PERCENT EXCEEDS	21
50 PERCENT EXCEEDS	10
90 PERCENT EXCEEDS	0.55

e Estimated

16732800 LOWER HAMAKUA DITCH ABOVE MAIN WEIR—Continued



HAWAII, ISLAND OF HAWAII

16756100 KOHAKOHAU STREAM ABOVE DWS INTAKE, NEAR KAMUELA

LOCATION.--Lat 20°02'58", long 155°41'05", Old Hawaiian Datum, Hydrologic Unit 20010000, on right bank 200 ft upstream of Dept. 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.--Records computed by Gary Sanchez. Records fair. Parker Ranch diverts water from Kohakohau Stream at an altitude of 4,250 ft through a 4-inch pipeline. Hawaii Dept. of Water Supply diverts water at dam 200 ft downstream for domestic use in the Kamuela and Kawaihae areas since August 20, 1973.

AVERAGE DISCHARGE.--6 years (water years 1998-2003), 11.5 ft³/s (8,330 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,460 ft³/s, February 26, 2002, gage height, 6.81 ft from rating curve developed using flow-over-dam computations and high water marks at gage; minimum, 0.14 ft³/s, February 10, 2003.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 400 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Feb 21	1230	*1,330	*6.93	Sep 1	0715	752	5.99

Minimum discharge, 0.14 ft³/s, Feb. 10, gage height, 1.28 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

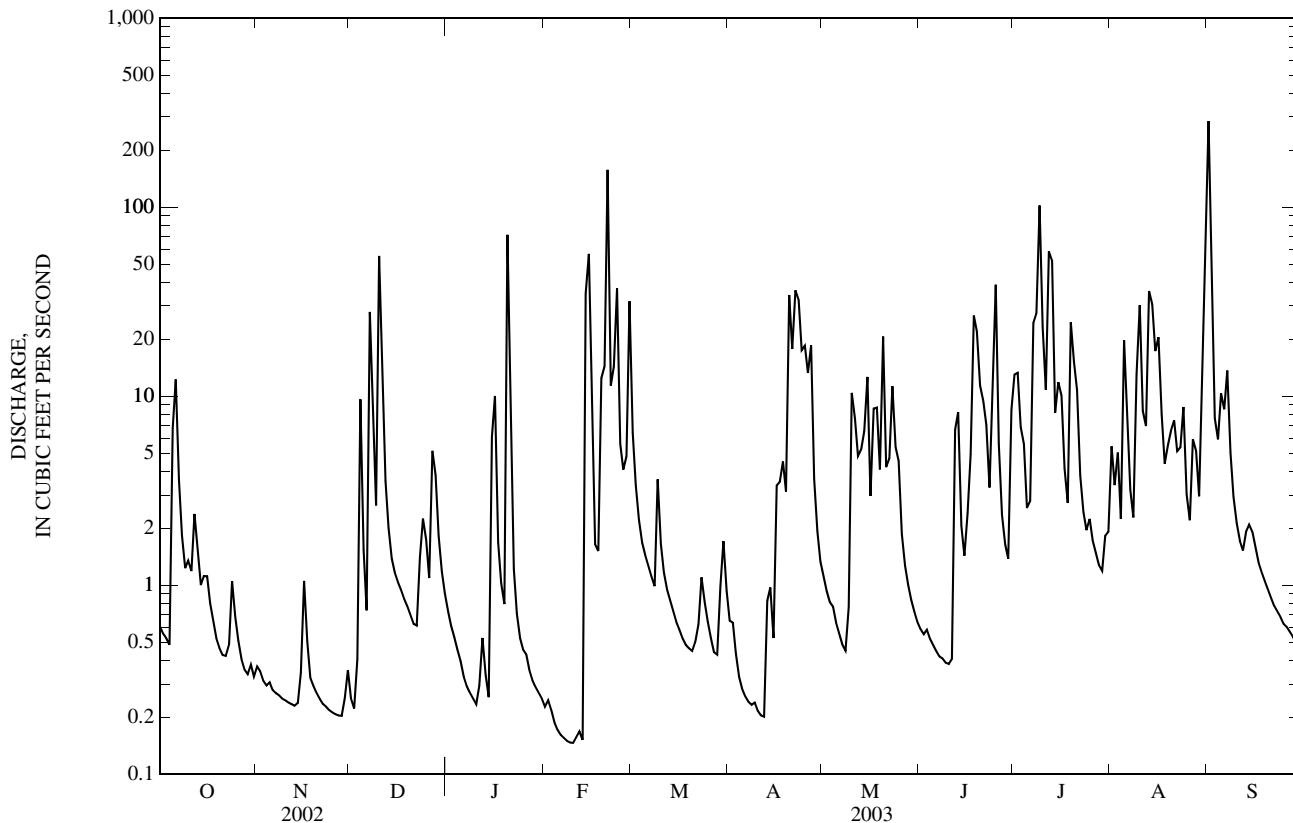
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.60	0.37	0.25	0.73	0.23	6.4	0.65	1.1	0.59	13	5.4	285
2	0.55	0.35	0.22	0.61	0.25	3.4	0.63	0.93	0.55	13	3.4	28
3	0.52	0.31	0.41	0.53	0.22	2.2	0.43	0.81	0.58	6.9	5.0	7.6
4	0.48	0.30	9.6	0.46	0.19	1.7	0.33	0.77	0.52	5.6	2.2	5.9
5	6.8	0.31	1.5	0.40	0.17	1.4	0.28	0.64	0.48	2.6	20	10
6	12	0.28	0.74	0.33	0.16	1.3	0.26	0.55	0.45	2.8	7.3	8.5
7	3.6	0.27	28	0.29	0.16	1.1	0.24	0.49	0.42	24	3.2	14
8	1.8	0.26	10	0.27	0.15	0.99	0.23	0.45	0.41	27	2.3	5.0
9	1.2	0.25	2.6	0.25	0.15	3.6	0.24	0.77	0.39	102	13	2.9
10	1.3	0.25	55	0.23	0.15	1.7	0.22	10	0.38	23	30	2.1
11	1.2	0.24	15	0.29	0.16	1.2	0.20	7.6	0.41	11	8.4	1.7
12	2.4	0.24	3.6	0.53	0.17	0.95	0.20	4.8	6.6	58	6.9	1.5
13	1.6	0.23	2.0	0.33	0.15	0.82	0.83	5.2	8.2	52	36	1.9
14	1.0	0.24	1.4	0.26	35	0.72	0.97	6.5	2.1	8.2	31	2.1
15	1.1	0.35	1.2	6.1	57	0.64	0.53	13	1.4	12	17	1.9
16	1.1	1.1	1.0	10	12	0.58	3.4	3.0	2.4	10	21	1.6
17	0.80	0.50	0.95	1.7	1.7	0.52	3.5	8.6	4.9	4.1	8.0	1.3
18	0.65	0.33	0.85	1.0	1.5	0.48	4.5	8.7	27	2.7	4.4	1.2
19	0.52	0.29	0.77	0.79	12	0.46	3.1	4.1	22	25	5.5	1.1
20	0.46	0.27	0.70	71	14	0.45	34	21	11	15	6.6	0.95
21	0.43	0.25	0.63	5.4	157	0.50	18	4.2	9.4	11	7.4	0.86
22	0.42	0.24	0.61	1.2	11	0.62	36	4.7	7.1	3.8	5.1	0.78
23	0.48	0.23	1.4	0.71	14	1.1	32	11	3.3	2.4	5.4	0.73
24	1.1	0.22	2.2	0.53	37	0.81	18	5.4	11	2.0	8.8	0.68
25	0.68	0.21	1.7	0.46	5.6	0.64	18	4.6	39	2.2	3.0	0.63
26	0.51	0.21	1.1	0.43	4.1	0.52	13	1.9	5.6	1.7	2.2	0.60
27	0.41	0.20	5.1	0.36	4.8	0.44	19	1.3	2.4	1.5	5.9	0.57
28	0.36	0.20	3.8	0.31	32	0.43	3.7	1.0	1.6	1.3	5.1	0.53
29	0.34	0.25	1.8	0.29	---	0.99	1.9	0.83	1.4	1.2	3.0	0.49
30	0.38	0.36	1.2	0.27	---	1.7	1.3	0.73	8.5	1.8	9.0	0.45
31	0.33	---	0.90	0.25	---	0.93	---	0.64	---	1.9	30	---
TOTAL	45.12	9.11	156.23	106.31	401.01	39.29	215.64	135.31	180.08	448.7	321.5	390.57
MEAN	1.46	0.30	5.04	3.43	14.3	1.27	7.19	4.36	6.00	14.5	10.4	13.0
MAX	12	1.1	55	71	157	6.4	36	21	39	102	36	285
MIN	0.33	0.20	0.22	0.23	0.15	0.43	0.20	0.45	0.38	1.2	2.2	0.45
AC-FT	89	18	310	211	795	78	428	268	357	890	638	775

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1998 - 2003, BY WATER YEAR (WY)

MEAN	12.1	13.9	13.1	10.8	20.2	15.1	7.55	3.48	5.20	15.3	15.6	10.5
MAX	24.6	21.5	31.3	25.4	39.8	54.8	11.9	4.36	11.7	30.5	23.8	21.7
(WY)	(1999)	(2000)	(2002)	(2000)	(2002)	(1999)	(2000)	(2003)	(2002)	(2002)	(2001)	(1998)
MIN	1.46	0.30	1.32	0.38	0.52	1.27	1.46	0.50	2.01	6.85	10.4	6.23
(WY)	(2003)	(2003)	(2001)	(2001)	(2000)	(2003)	(2002)	(1999)	(1999)	(1999)	(2003)	(1999)

16756100 KOHAKOHAU STREAM ABOVE DWS INTAKE, NEAR KAMUELA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1998 - 2003	
ANNUAL TOTAL	4,165.69		2,448.87			
ANNUAL MEAN	11.4		6.71		11.5	
HIGHEST ANNUAL MEAN					16.4	2002
LOWEST ANNUAL MEAN					6.71	2003
HIGHEST DAILY MEAN	524	Feb 26	285	Sep 1	524	Feb 26, 2002
LOWEST DAILY MEAN	0.20	Nov 27	0.15	Feb 8	0.15	Feb 8, 2003
ANNUAL SEVEN-DAY MINIMUM	0.22	Nov 22	0.16	Feb 7	0.16	Feb 7, 2003
ANNUAL RUNOFF (AC-FT)	8,260		4,860		8,330	
10 PERCENT EXCEEDS	25		15		29	
50 PERCENT EXCEEDS	2.3		1.2		2.6	
90 PERCENT EXCEEDS	0.41		0.25		0.40	



HAWAII, ISLAND OF HAWAII

16758000 WAIKOLOA STREAM AT MARINE DAM, NEAR KAMUELA

LOCATION.--Lat 20°02'48", long 155°39'58", Old Hawaiian Datum, 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 computed by Dale Nishimoto. Records good except for estimated period which is fair. Parker Ranch diverts less than 1 ft³/s through a 6-in. pipe upstream of gage.

AVERAGE DISCHARGE.--56 years (water years 1948-2003), 9.32 ft³/s (6,750 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)
Feb 21	1245	*408	*4.04	Sep 1	0345	226	3.50

Minimum discharge, 0.81 ft³/s, Feb. 9, 10, gage height, 1.37 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.2	2.4	2.1	1.7	1.2	6.4	2.2	2.2	1.7	e13	6.4	118
2	2.2	2.2	1.6	1.6	1.3	4.5	2.6	1.9	1.6	e13	5.7	21
3	1.9	1.9	4.5	1.5	1.2	3.5	2.0	1.9	1.6	e8.5	6.7	7.9
4	1.9	1.8	20	1.5	1.1	2.9	1.7	1.9	1.5	e7.6	3.9	6.3
5	7.7	2.0	4.4	1.5	1.0	2.4	1.4	1.8	1.5	e4.7	25	6.5
6	9.7	1.7	2.5	1.4	1.0	2.2	1.2	1.7	1.5	e5.0	10	10
7	5.0	1.6	38	1.4	1.0	2.1	1.2	1.6	1.5	e20	6.2	10
8	3.4	1.5	11	1.4	0.97	1.9	1.2	1.7	1.4	21	4.6	5.5
9	2.8	1.6	4.0	1.1	0.96	3.6	1.4	3.6	1.3	58	11	4.2
10	4.2	1.6	31	1.2	0.95	2.8	1.5	18	1.3	19	18	3.7
11	3.6	1.5	11	1.7	1.1	2.2	1.5	9.3	1.4	12	7.9	3.3
12	6.0	1.4	4.2	3.6	1.3	1.9	1.5	7.9	11	52	5.9	2.9
13	4.0	1.5	2.8	2.7	1.1	1.8	5.1	9.6	11	39	26	4.7
14	2.8	1.4	2.3	1.8	25	1.7	3.6	10	3.8	11	21	5.9
15	2.9	2.0	2.0	6.3	53	1.6	2.5	13	3.2	18	15	5.5
16	2.9	3.6	1.9	8.0	13	1.5	6.5	4.8	5.1	13	13	3.8
17	2.6	2.3	1.8	2.6	4.4	1.5	5.9	13	7.6	6.6	7.6	3.0
18	2.4	1.8	1.7	1.7	4.1	1.5	6.1	8.5	26	4.8	6.3	2.6
19	2.1	1.5	1.7	1.6	10	1.5	3.8	8.5	20	15	6.8	2.3
20	2.0	1.4	1.6	28	13	1.5	16	24	12	17	7.0	2.2
21	1.9	1.5	1.4	6.9	69	1.4	9.9	5.6	9.5	12	7.1	2.1
22	1.9	1.3	1.8	2.9	9.6	1.7	24	7.8	7.0	5.9	6.4	2.0
23	2.1	1.3	4.3	2.1	9.2	2.1	17	16	4.6	4.4	7.6	1.9
24	2.3	1.2	5.0	1.9	19	1.8	12	9.9	e11	4.0	9.8	1.8
25	2.4	1.3	3.5	1.9	5.7	1.6	11	7.6	e24	5.0	4.9	1.7
26	2.2	1.3	2.5	1.9	5.3	1.5	15	3.5	e7.4	3.8	4.3	1.7
27	1.9	1.2	5.0	1.6	5.3	1.4	15	2.7	e4.4	3.2	9.7	1.7
28	1.8	1.2	4.3	1.3	23	1.6	4.6	2.2	e3.6	2.8	8.7	1.6
29	1.9	2.8	2.8	1.3	---	3.5	3.1	1.9	e3.2	2.8	5.7	1.5
30	2.1	4.1	2.3	1.3	---	3.9	2.6	1.8	e10	3.7	14	1.5
31	2.2	---	1.9	1.3	---	2.4	---	1.8	---	3.9	27	---
TOTAL	95.0	53.9	184.9	96.7	282.78	71.9	183.1	205.7	200.7	409.7	319.2	246.8
MEAN	3.06	1.80	5.96	3.12	10.1	2.32	6.10	6.64	6.69	13.2	10.3	8.23
MAX	9.7	4.1	38	28	69	6.4	24	24	26	58	27	118
MIN	1.8	1.2	1.4	1.1	0.95	1.4	1.2	1.6	1.3	2.8	3.9	1.5
AC-FT	188	107	367	192	561	143	363	408	398	813	633	490

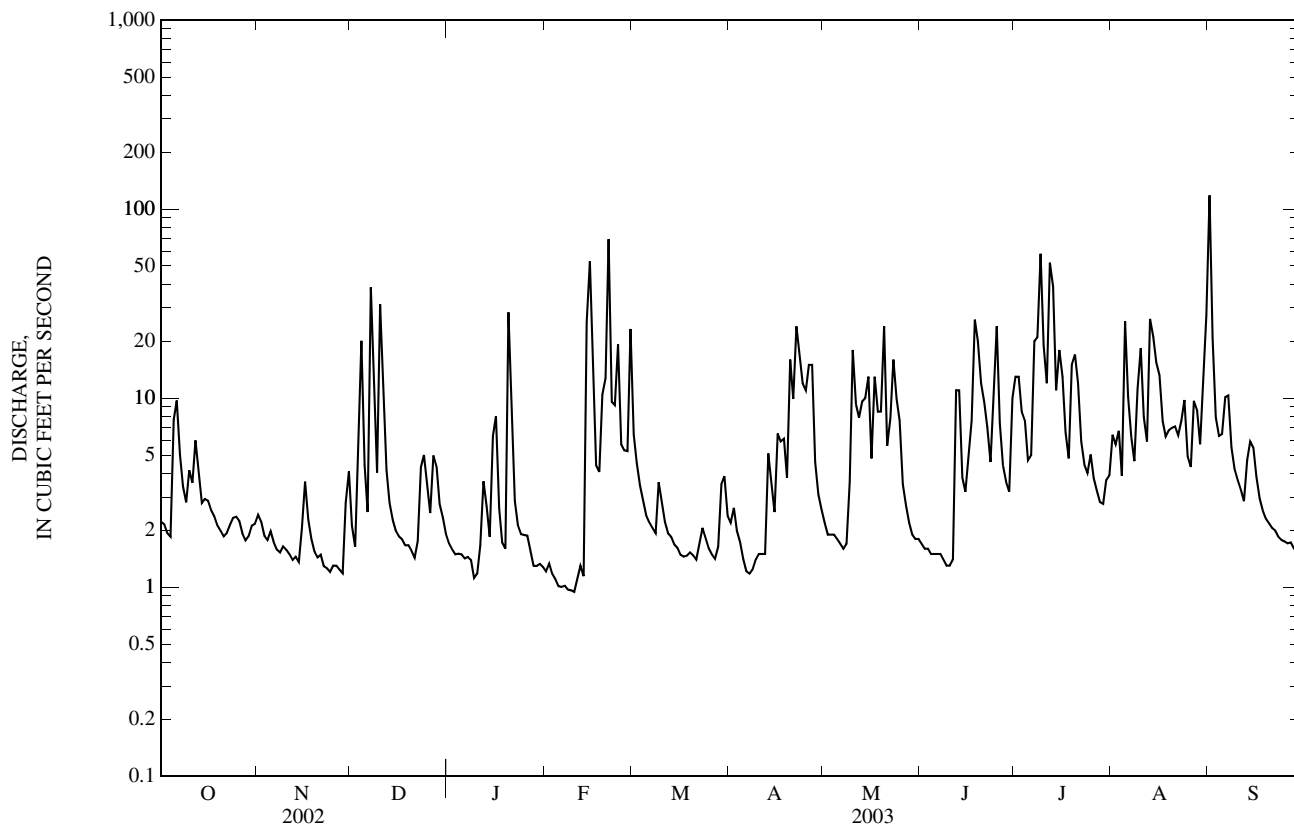
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1947 - 2003, BY WATER YEAR (WY)

MEAN	6.13	8.83	9.64	8.44	7.88	10.5	12.6	8.98	8.93	12.1	11.3	6.09
MAX	18.2	43.7	31.4	38.7	23.0	52.1	43.4	22.1	28.4	26.9	33.6	24.9
(WY)	(1984)	(1980)	(1958)	(1979)	(1960)	(1980)	(1986)	(1998)	(1998)	(2002)	(1958)	(1992)
MIN	0.98	1.42	1.47	1.46	1.31	2.11	1.53	1.95	2.68	3.08	2.27	0.91
(WY)	(1997)	(1963)	(1996)	(1953)	(1954)	(1983)	(1992)	(1999)	(1962)	(1961)	(1973)	(1965)

16758000 WAIKOLOA STREAM AT MARINE DAM, NEAR KAMUELA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1947 - 2003	
ANNUAL TOTAL	3,720.4		2,350.38			
ANNUAL MEAN	10.2		6.44		9.32	
HIGHEST ANNUAL MEAN					17.8	1980
LOWEST ANNUAL MEAN					4.49	1981
HIGHEST DAILY MEAN	225	Feb 26	118	Sep 1	641	Nov 18, 1979
LOWEST DAILY MEAN	1.2	Nov 24	0.95	Feb 10	0.37	Jun 3, 1992
ANNUAL SEVEN-DAY MINIMUM	1.3	Nov 22	1.00	Feb 4	0.42	May 21, 1992
ANNUAL RUNOFF (AC-FT)	7,380		4,660		6,750	
10 PERCENT EXCEEDS	22		15		21	
50 PERCENT EXCEEDS	4.6		2.9		4.3	
90 PERCENT EXCEEDS	1.9		1.4		1.8	

e Estimated



HAWAII, ISLAND OF HAWAII

16759000 HAUANI GULCH NEAR KAMUELA

LOCATION.--Lat 20°02'28", long 155°39'05", Old Hawaiian Datum, 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.--Records computed by Dale Nishimoto. Records good. Diversion upstream for livestock and domestic use.

AVERAGE DISCHARGE.--47 years (water years 1957-2003), 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 basis of slope-conveyance study; maximum gage height, 4.65 ft, October 23, 1957; no flow at times.

EXTREMES FOR CURRENT YEAR.--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 21	1100	*150	*2.97	Sep 1	0400	107	2.74

Minimum discharge, 0.09 ft³/s, Apr. 7, 8, gage height, 0.83 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

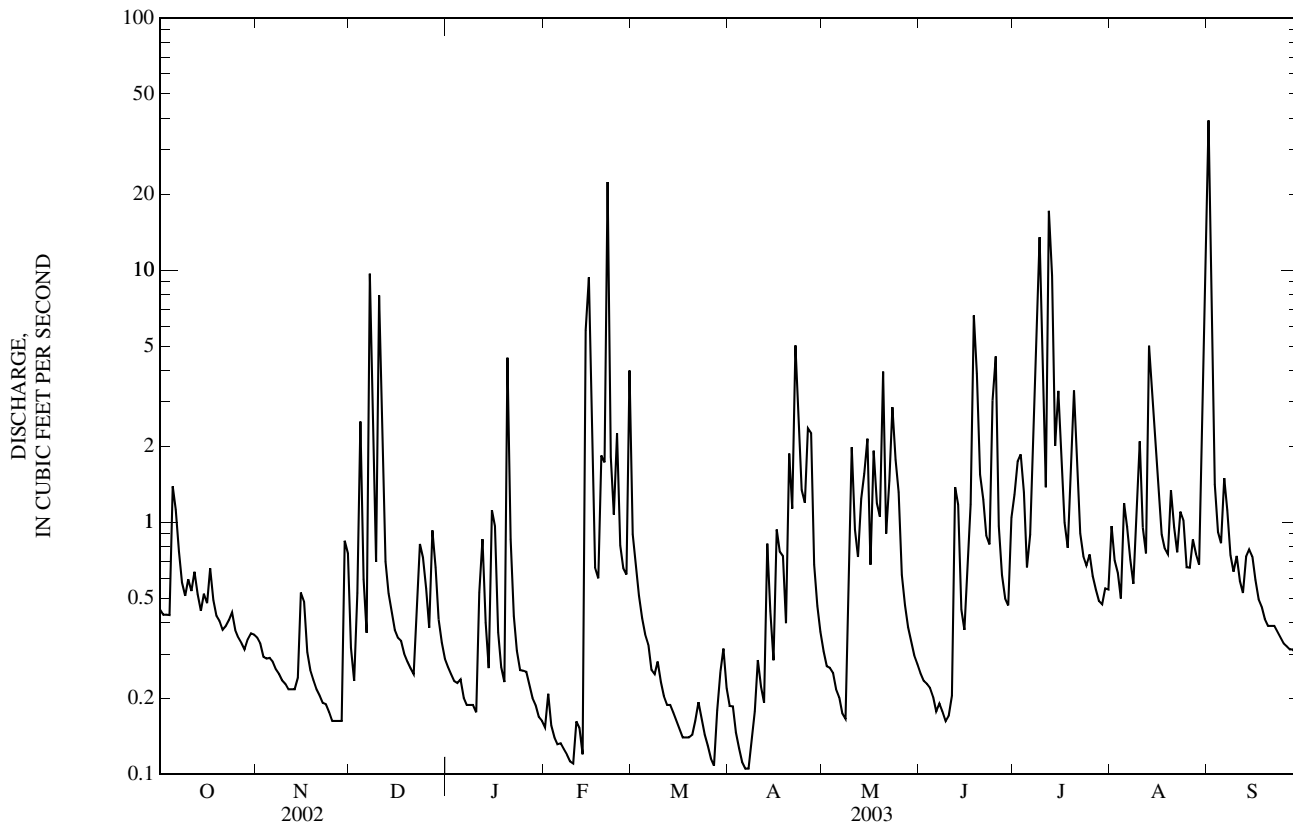
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.45	0.35	0.32	0.27	0.15	0.90	0.19	0.31	0.25	1.3	0.97	39
2	0.43	0.33	0.23	0.25	0.21	0.68	0.19	0.27	0.24	1.7	0.71	4.5
3	0.43	0.29	0.52	0.23	0.16	0.51	0.15	0.26	0.23	1.9	0.63	1.4
4	0.43	0.29	2.5	0.23	0.14	0.42	0.13	0.25	0.22	1.3	0.50	0.92
5	1.4	0.29	0.59	0.24	0.13	0.36	0.11	0.22	0.20	0.66	1.2	0.83
6	1.1	0.28	0.36	0.20	0.13	0.33	0.11	0.20	0.18	0.89	0.96	1.5
7	0.77	0.26	9.7	0.19	0.13	0.26	0.11	0.17	0.19	2.0	0.71	1.1
8	0.58	0.25	1.9	0.19	0.12	0.25	0.13	0.17	0.18	5.6	0.57	0.74
9	0.51	0.24	0.69	0.19	0.11	0.28	0.18	0.50	0.16	14	1.1	0.64
10	0.59	0.23	7.9	0.18	0.11	0.23	0.28	2.0	0.17	3.1	2.1	0.74
11	0.53	0.22	1.8	0.53	0.16	0.20	0.22	0.94	0.20	1.4	0.95	0.58
12	0.64	0.22	0.70	0.86	0.15	0.19	0.19	0.73	1.4	17	0.75	0.52
13	0.52	0.22	0.52	0.40	0.12	0.19	0.82	1.2	1.2	9.5	5.0	0.73
14	0.45	0.24	0.44	0.26	5.8	0.18	0.44	1.6	0.45	2.0	3.5	0.78
15	0.52	0.53	0.37	1.1	9.4	0.16	0.28	2.1	0.37	3.3	2.3	0.73
16	0.48	0.48	0.35	0.96	1.9	0.15	0.94	0.68	0.69	2.0	1.5	0.59
17	0.66	0.31	0.34	0.37	0.66	0.14	0.76	1.9	1.2	1.00	0.90	0.50
18	0.49	0.26	0.30	0.27	0.60	0.14	0.73	1.2	6.6	0.79	0.79	0.46
19	0.43	0.24	0.28	0.23	1.8	0.14	0.40	1.1	3.9	1.7	0.75	0.41
20	0.41	0.22	0.26	4.5	1.7	0.14	1.9	4.0	1.5	3.3	1.3	0.39
21	0.37	0.21	0.25	0.86	22	0.16	1.1	0.90	1.2	2.0	0.95	0.39
22	0.39	0.19	0.43	0.42	1.8	0.19	5.0	1.5	0.88	0.90	0.76	0.39
23	0.41	0.19	0.82	0.31	1.1	0.17	2.9	2.9	0.82	0.73	1.1	0.37
24	0.44	0.18	0.73	0.26	2.3	0.14	1.3	1.8	3.0	0.67	1.0	0.35
25	0.37	0.16	0.55	0.26	0.81	0.13	1.2	1.3	4.5	0.74	0.66	0.33
26	0.35	0.16	0.38	0.26	0.66	0.12	2.4	0.62	0.97	0.61	0.66	0.32
27	0.33	0.16	0.93	0.23	0.62	0.11	2.3	0.47	0.62	0.54	0.85	0.31
28	0.31	0.16	0.66	0.20	4.0	0.18	0.68	0.38	0.50	0.49	0.75	0.31
29	0.34	0.84	0.41	0.19	---	0.25	0.46	0.34	0.47	0.47	0.68	0.30
30	0.36	0.75	0.33	0.17	---	0.32	0.37	0.30	1.0	0.55	2.3	0.28
31	0.36	---	0.29	0.16	---	0.22	---	0.27	---	0.54	7.1	---
TOTAL	15.85	8.75	35.85	14.97	56.97	7.84	25.97	30.58	33.49	82.68	44.00	60.41
MEAN	0.51	0.29	1.16	0.48	2.03	0.25	0.87	0.99	1.12	2.67	1.42	2.01
MAX	1.4	0.84	9.7	4.5	22	0.90	5.0	4.0	6.6	17	7.1	39
MIN	0.31	0.16	0.23	0.16	0.11	0.11	0.11	0.17	0.16	0.47	0.50	0.28
AC-FT	31	17	71	30	113	16	52	61	66	164	87	120

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1956 - 2003, BY WATER YEAR (WY)

MEAN	1.01	1.60	1.80	1.72	1.49	2.14	2.62	1.44	1.53	2.32	2.15	0.99
MAX	3.86	8.31	7.01	11.9	6.69	15.7	10.5	4.89	7.07	6.78	8.13	5.93
(WY)	(1984)	(1980)	(1960)	(1979)	(1960)	(1980)	(1986)	(1998)	(1998)	(2002)	(1958)	(1992)
MIN	0.008	0.000	0.071	0.046	0.089	0.10	0.20	0.20	0.16	0.15	0.12	0.000
(WY)	(1985)	(1963)	(1996)	(1962)	(1983)	(1983)	(1981)	(1966)	(1981)	(1961)	(1965)	(1965)

16759000 HAUANI GULCH NEAR KAMUELA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1956 - 2003	
ANNUAL TOTAL	787.50		417.36			
ANNUAL MEAN	2.16		1.14		1.74	
HIGHEST ANNUAL MEAN					3.66	1998
LOWEST ANNUAL MEAN					0.48	1981
HIGHEST DAILY MEAN	47	Feb 26	39	Sep 1	108	Mar 24, 1980
LOWEST DAILY MEAN	0.16	Nov 25	0.11	Feb 9	0.00	Jul 29, 1961
ANNUAL SEVEN-DAY MINIMUM	0.17	Nov 22	0.12	Feb 4	0.00	Sep 8, 1961
ANNUAL RUNOFF (AC-FT)	1,560		828		1,260	
10 PERCENT EXCEEDS	5.1		2.0		3.9	
50 PERCENT EXCEEDS	0.78		0.47		0.54	
90 PERCENT EXCEEDS	0.33		0.17		0.09	



HAWAII, ISLAND OF HAWAII

16759600 WAIAHA STREAM AT HOLUALOA, HAWAII

LOCATION.--Lat 19°38'03", long 155°57'00", Old Hawaiian Datum, Hydrologic Unit 20010000, on right bank 3 mi southeast of intersection of Hwys 19 and 190 and 1.7 mi north of intersection of Hwy 180 and Holualoa Road to driveway at 75-5282A Mamalahoa Hwy.

DRAINAGE AREA.--9.61 mi².

PERIOD OF RECORD.--November 2002 to September 2003.

GAGE.--Water-stage recorder attached to telemetry transmission device. Datum of gage is 1,440 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Gary Sanchez. Records poor.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 374 ft³/s, April 9, 2003, gage height, 2.98 ft from rating curve developed using super-critical flow computations; minimum 0.00 ft³/s on many days.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 374 ft³/s, Apr. 9; minimum, 0.00 ft³/s, on many days.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

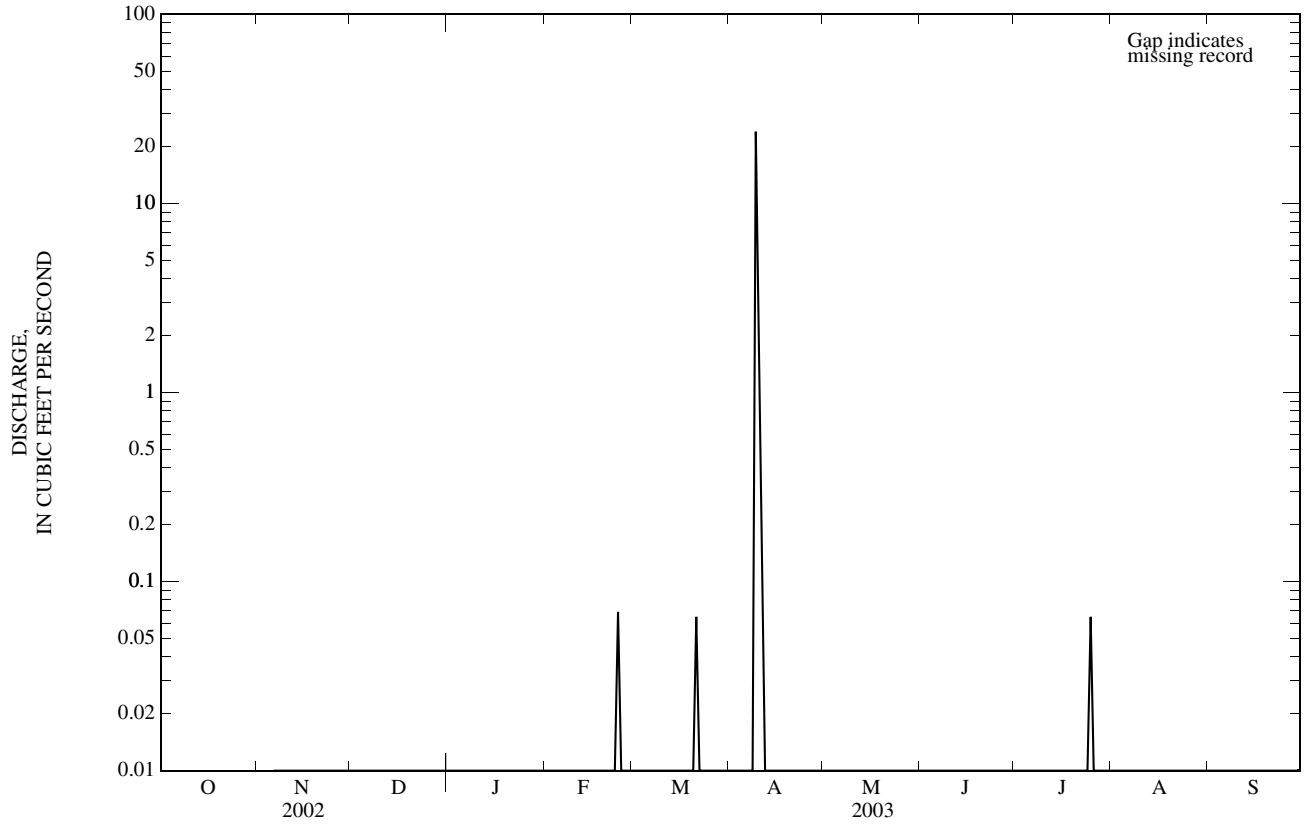
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	---	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	---	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	---	0.00	0.00	0.00	0.00	0.00	24	0.00	0.00	0.00	0.00	0.00
10	---	0.00	0.00	0.00	0.00	0.00	5.1	0.00	0.00	0.00	0.00	0.00
11	---	0.00	0.00	0.00	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
12	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	---	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	---	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	---	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	---	0.00	0.00	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00
17	---	0.00	0.00	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00
18	---	0.00	0.00	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00
19	---	0.00	0.00	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00
20	---	0.00	0.00	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00
21	---	0.00	0.00	0.00	0.00	0.07	e0.00	0.00	0.00	0.00	0.00	0.00
22	---	0.00	0.00	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00
23	---	0.00	0.00	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00
24	---	0.00	0.00	0.00	0.07	0.00	e0.00	0.00	0.00	0.00	0.00	0.00
25	---	0.00	0.00	0.00	0.00	0.00	e0.00	0.00	0.00	0.07	0.00	0.00
26	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	---	0.00	0.00	0.00	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	---	0.00	0.00	0.00	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	---	---	0.00	0.00	---	0.00	---	0.00	---	0.00	0.00	---
TOTAL	---	---	0.00	0.00	0.07	0.07	30.07	0.00	0.00	0.07	0.00	0.00
MEAN	---	---	0.000	0.000	0.003	0.002	1.00	0.000	0.000	0.002	0.000	0.000
MAX	---	---	0.00	0.00	0.07	0.07	24	0.00	0.00	0.07	0.00	0.00
MIN	---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AC-FT	---	---	0.00	0.00	0.1	0.1	60	0.00	0.00	0.1	0.00	0.00

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 2003 - 2003, BY WATER YEAR (WY)

MEAN	---	---	0.000	0.000	0.003	0.002	1.00	0.000	0.000	0.002	0.000	0.000
MAX	---	---	0.000	0.000	0.003	0.002	1.00	0.000	0.000	0.002	0.000	0.000
(WY)	---	---	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)
MIN	---	---	0.000	0.000	0.003	0.002	1.00	0.000	0.000	0.002	0.000	0.000
(WY)	---	---	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)	(2003)

e Estimated

16759600 WAIAHA STREAM AT HOLUALOEA, HAWAII—Continued



HAWAII, ISLAND OF HAWAII

16770500 PAAUAU GULCH AT PAHALA

LOCATION.--Lat 19°12'39", long 155°28'48", Old Hawaiian Datum, Hydrologic Unit 20010000, on right bank 50 ft downstream from Wood Valley Road bridge and 0.7 mi north of Pahala.

DRAINAGE AREA.--1.74 mi².

PERIOD OF RECORD.--May 1962 to January 1979, annual maximum, water years 1994-98, October 1999 to June 2000 (gage heights only) annual maximum, water year 2001, October 2001 to current year.

REVISED RECORDS.--WDR HI-01-1: 1963 (P), 1965-77 (P), 1979-90 (P), 1997-98 (P).

GAGE.--Water-stage recorder. Elevation of gage is 972 ft above mean sea level (from stadia survey). Nonrecording gage water years 1994 to 1998 and 2001.

REMARKS.--Records computed by Gary Sanchez. Records fair, except for periods of estimation, which are poor. No diversion upstream.

AVERAGE DISCHARGE.--18 years (water years 1963-78, 2003), 0.72 ft³/s (525 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,480 ft³/s, November 2, 2000, gage height, 12.02 ft, from floodmarks and culvert computation with road-over-flow section; no flow at times.

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)
No flow during year..			

Minimum discharge, 0.00 ft³/s, on many days, gage height, 0.82 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	e0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	e0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	e0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	e0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	e0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	e0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	e0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	e0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	e0.00	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	e0.00	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00	---	0.00	e0.00	---	0.00	---	0.00	---	0.00	0.00	---
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MEAN	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MAX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AC-FT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1962 - 2003, BY WATER YEAR (WY)

MEAN	0.42	1.47	0.52	3.67	0.78	0.20	0.58	0.49	0.041	0.047	0.19	0.12
MAX	5.65	9.19	7.01	29.5	8.12	1.54	6.89	2.58	0.27	0.25	1.81	1.06
(WY)	(1969)	(1967)	(1974)	(1975)	(1976)	(1963)	(1963)	(2002)	(1978)	(1978)	(1977)	(1973)
MIN	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
(WY)	(1964)	(1963)	(1963)	(1963)	(1970)	(1970)	(1970)	(1974)	(1962)	(1962)	(1962)	(1964)

16770500 PAAUUAU GULCH AT PAHALA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1962 - 2003	
ANNUAL TOTAL	316.34		0.00			
ANNUAL MEAN	0.87		0.000		0.72	
HIGHEST ANNUAL MEAN					2.76 1975	
LOWEST ANNUAL MEAN					0.000 2003	
HIGHEST DAILY MEAN	218	Jan 29	0.00	Oct 1	720	Jan 8, 1975
LOWEST DAILY MEAN	0.00	Jan 1	0.00	Oct 1	0.00	May 1, 1962
ANNUAL SEVEN-DAY MINIMUM	0.00	Jan 1	0.00	Oct 1	0.00	May 20, 1962
ANNUAL RUNOFF (AC-FT)	627		0.00		525	
10 PERCENT EXCEEDS	0.00		0.00		0.20	
50 PERCENT EXCEEDS	0.00		0.00		0.00	
90 PERCENT EXCEEDS	0.00		0.00		0.00	

e Estimated

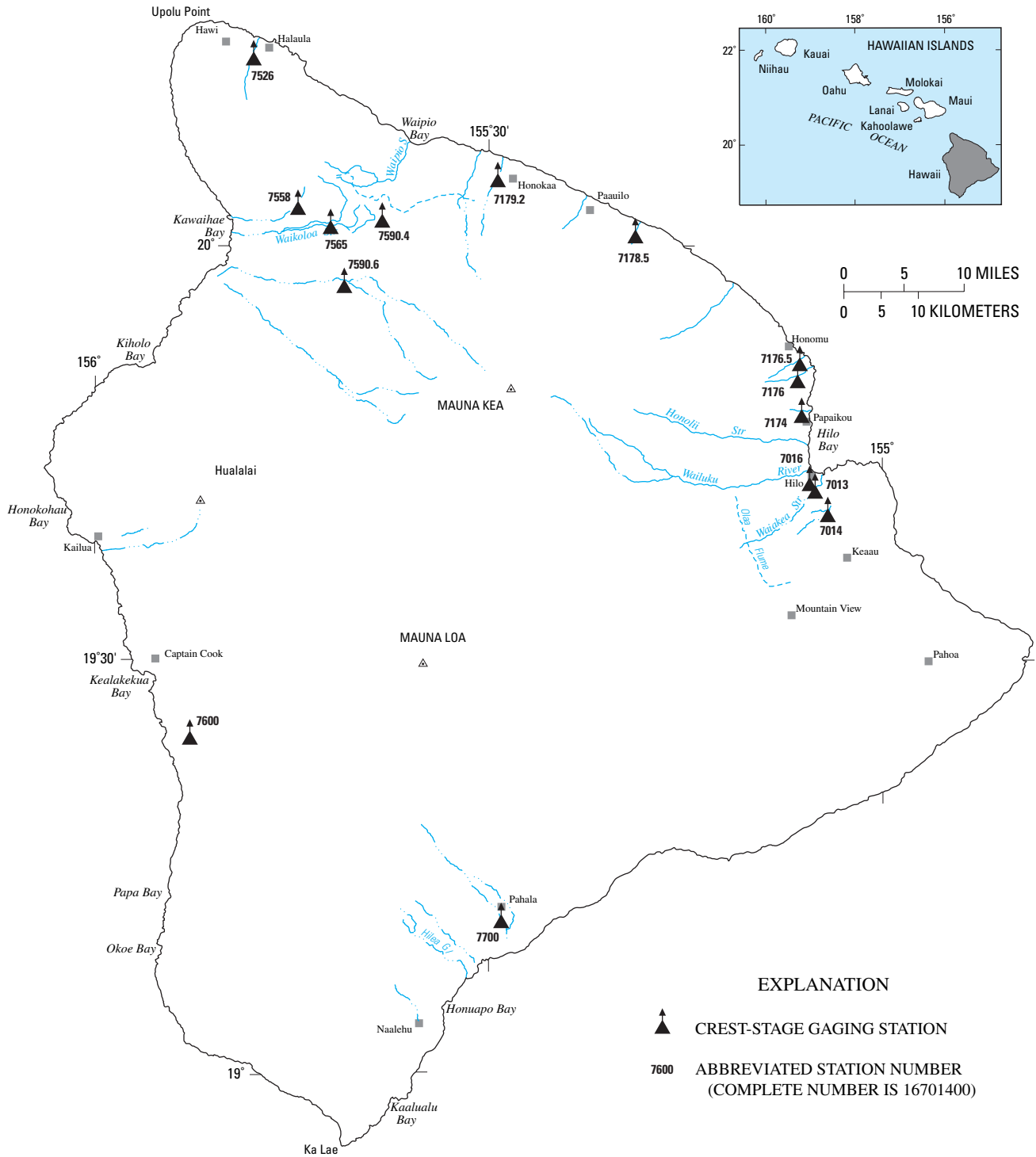


Figure 14. Locations of crest-stage gaging stations on Hawaii.

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 annual maximum discharge at crest-stage partial-record stations during water year 1994

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 1994 maximum			Period of record max		
				Date	Gage height (ft)	Discharge (ft ³ /s)	Date	Gage height (ft)	Discharge (ft ³ /s)
Island of Oahu									
16249000 Waimanalo Stream	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 ≠ 1971-2003	11-03-93	3.50	e1,500	02-14-85 03-06-63 11-26-70	10.82 --- 10.00	a4,560 a4,560
a At old gage datum									
e Estimated									

Revised annual maximum discharge at crest-stage partial-record stations during water year 2002

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 2002 maximum			Period of record max		
				Date	Gage height (ft)	Discharge (ft ³ /s)	Date	Gage height (ft)	Discharge (ft ³ /s)
Island of Oahu									
16274499 Keaahala Stream	Lat 21°25'12", long 157°48'15", 35 ft upstream from bridge on Kamehameha Highway at Kaneohe.	0.62	1959-2003	05-06-02	3.82	483	05-02-65	a11.50	2,750
16232000 Nuuanu Stream	Lat 21°20'57", long 157°49'40", on right bank beside Old Pali Road in upper Nuuanu Valley, 0.2 mi downstream from reservoir 2 wasteway, and 3.5 mi northeast of Honolulu Post Office.	3.35	1913-96¼ ≠ 2001-03	01-26-02	7.08	1,340	01-16-21	8.74	6,990

≠ Operated as a continuous-record gaging station

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 2003 maximum			Period of record maximum			
				Date	Gage height (ft)	Discharge (ft ³ /s)	Date	Gage height (ft)	Discharge (ft ³ /s)	
Island of Kauai- Continued										
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, 1970-2003r	10-17-02	10.74	350	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	1964-2003r	04-02-03	4.38	198	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	1962-2003	04-02-03	11.18	5,210	12-14-91	23.11	30,300	
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, 1971-2003	02-13-03	3.63	75	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	1963-2003b,r	07-26-03	11.82	-	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≠, 1972-2003	06-06-03	4.06	79	04-15-72	7.15	2,120	

≠ Operated as a continuous-record gaging station

b Gage height only

r Revised

16052000 peak gage height and discharge published for water years 1963-92 were revised in water-resources data report for Hawaii, water year 1993

16073500 peak gage height and discharge published for water year 1993 were revised in water-resources data report for Hawaii, water year 1999

16081200 peak gage heights and discharges published for water years 1993-98 were revised in water-resources data report for Hawaii, water year 1999

16104200 peak gage height published for water years 1983-92 were revised in water-resources data report for Hawaii, water year 1993

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 2003 maximum			Period of record maximum			
				Date	Gage height (ft)	Discharge (ft ³ /s)	Date	Gage height (ft)	Discharge (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, 1968-2003	2003	<19.30	unknown	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	1967-2003	09-11-03	10.77	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.	4.15	1958-63, 1964-65≠, 1966-2003	03-16-03	8.50	unknown	11-13-65 11-14-96	a7.41 a9.41	3,640 -	

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 2003 maximum			Period of record maximum			
				Date	Gage height (ft)	Discharge (ft ³ /s)	Date	Gage height (ft)	Discharge (ft ³ /s)	
Island of Oahu- Continued										
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	1966-2003	10-17-02	7.89	unknown	11-14-96	a17.60	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≠, 1973-2003	11-29-02	3.50	unknown	01-06-82	7.82	3,640	
16212200 Mailiili 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	1958-2003	2003	<0.95	unknown	01-06-82	7.20	2,460	
16212300 Nanakuli Str at Nanakuli	Lat 21°23'08", long 158°08'11", on left bank 0.7 mi southwest of Nanaikapono Elementary School, 1.8 mi north of Kahe Point Electric Plant, and 0.6 mi upstream of Farrington Highway.	3.98	1968-2003	10-15-02	19.60	50	2-7-76 10-20-85	a26.20 a26.28	3,320 -	
16212450 Kalo Gulch tributary 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	1968-2003	10-15-02	3.18	unknown	11-25-75 01-08-80	7.89 7.45	- 724	
16212470 Kalo Gulch at railroad bridge at Ewa	Lat 21°20'19", long 158°02'22", at railroad bridge, 100 ft upstream of Coral Creek golf course pond, 0.6 mi south of Ewa Elementary School, and 2.3 mi south of Saint Francis Medical Center.	9.37	2001-2003	2003	<4.40	unknown		unknown		
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	1956-2003	2003	<0.41	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, 1960-2003	06-08-03	5.26	223	01-06-82	22.50	1,850	
16212700 Waikakalaua Str nr Wahiawa	Lat 21°27'50", long 158°01'37", 0.2 mi downstream from Kamehameha Highway and 2.4 mi south of Wahiawa Post Office.	6.93	1958-2003	06-08-03	6.15	unknown	04-15-63	16.50	4,820	
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.	4.29	1974-2003	06-08-03	11.72	unknown	02-10-79 10-16-91	8.36 13.49	e600 -	
16215400 Waimano Str nr Pearl City	Lat 21°25'11", long 157°57'47", at Komo Mai Drive bridge, 0.5 mi northwest of Pearl City High School and 1.7 mi northeast of Pearl City Post Office.	5.15	2002-2003	09-11-03	4.83	unknown	05-06-02	r6.38	unknown	
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 northwest of Aiea High School.	5.97	1952-70≠, 1973-2003	09-11-03	2.53	738	01-05-68 05-14-60	a6.82 a9.49	8,020 -	

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 2003 maximum			Period of record maximum			
				Date	Gage height (ft)	Discharge (ft ³ /s)	Date	Gage height (ft)	Discharge (ft ³ /s)	
Island of Oahu- Continued										
16224500 Kalauao Str at Moanalua Road, at Aiea	Lat 21°23'07", long 157°56'22", on right bank at upstream side of Moanalua Road bridge, 0.4 mi northwest of Aiea Post Office, and 2.3 mi southeast of Pearl City Post Office.	2.59	1957-82≠, 1984-91, 2000-2003	09-11-03	12.30	unknown	05-14-63	a6.63	2,580	
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	1969-2003	09-11-03	4.20	721	03-18-80	9.97	4,860	
16232000 Nuuanu Stream blw Reservoir 2 wasteway nr Honolulu	Lat 21°20'57", long 157°49'40", on right bank beside Old Pali Road in upper Nuuanu Valley, 0.2 mi downstream from reservoir 2 wasteway, and 3.5 mi northeast of Honolulu Post Office.	3.35	1913-96≠, 2001-2003r	09-11-03	5.52	458	01-16-21	a8.74	6,990	
16235400 Waolani Str at Honolulu	Lat 21°20'00", long 157°51'04", at Wylie Street Bridge and 1.8 mi NE of Honolulu Post Office.	1.29	1958-2003r	10-15-02	0.45	unknown	05-14-63	6.14	2,510	
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	1958-2003	2003	<0.21	unknown	05-14-63	4.65	2,200	
16241500 Manoa Str at Lowrey Avenue Bridge	Lat 21°18'53", long 157°48'41", on right bank 20 ft upstream from Lowrey Ave, 0.4 mi south of Manoa Elem. School, and 1.4 mi NW of Palolo Elem. School.	4.02	2003	09-11-03	5.18	1,140	09-11-03	5.18	1,140	
16247000 Palolo Str nr Honolulu	Lat 21°17'35", long 157°48'25", on left bank 250 ft downstream from bridge on Palolo Avenue, and 3.9 mi east of Honolulu Post Office.	3.63	1952-1979≠ 2003	09-11-03	17.28	508	12-18-67	a5.98	4,270	
16247130 Ala Wai Canal at Ala Wai Elementary School, Oahu	Lat 21°17'16", long 157°49'51", at Ala Wai Canal, 300 ft south of Ala Wai Elem. School, 30 ft south of the Ala Wai Community Garden	11.7	2003b	06-14-03	2.82	-	06-14-03	2.82	-	
16247140 Ala Wai Canal at McCully Street Bridge, Oahu	Lat 21°17'30", long 157°50'08", on right bank, at downstream end of McCully Street Bridge, 0.5 mi NW of Ala Wai Elem. School, 0.6 mi SE of Washington Intermed. School.	12.9	2003b	06-14-03	2.67	-	06-14-03	2.67	-	
16247160 Ala Wai Canal at Ala Moana Blvd. Bridge, Oahu	Lat 21°17'29", long 157°50'35", on right bank, at downstream end of Ala Moana Blvd. Bridge, 0.9 mi NW of Ala Wai Elem. School.	16.0	2003b	06-14-03	3.09	-	06-14-03	3.09	-	
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 Highway in Aina Haina.	2.35	1958-2003	09-11-03	9.88	257	12-18-67 03-05-58	a5.72 a7.20	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, 1970-2003	02-14-03	28.58	610	12-31-87	36.55	4,700	

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 2003 maximum			Period of record maximum			
				Date	Gage height (ft)	Discharge (ft ³ /s)	Date	Gage height (ft)	Discharge (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	1998-2003	02-14-03	7.68	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≠, 1971-2003r	02-14-03	4.18	e237	02-14-85 03-06-63 11-26-70	10.82 - 10.00	- a4,560 a4,560	
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	1963-2003	2003	<1.76	<34	12-31-87	7.53	467	
16249195 Kaelepulu Stream at Keolu Drive bridge	Lat 21°22'55", long 157°43'45", at bridge on Keolu Drive, 0.2 mi south of St. John Vianney School and 1.2 mi east of Kailua High School.	2.73	2002-2003b	02-14-03	9.09	-	11-27-02	9.66	-	
16264600 Kawainui Marsh nr Levee Station 15+00	Lat 21°23'53", long 157°45'07", at Kawainui Marsh, 0.6 mi west of Kailua Elementary School and 1.1 mi southeast of Kalaheo High School. Datum of gage is at mean sea level.	11.0	02/2001-2003b	02-15-03	4.74	-	05-07-02	r5.10	-	
16264790 Kawainui Marsh nr Levee Station 64+00	Lat 21°24'31", long 157°45'33", at Kawainui Marsh, 0.2 mi south of Kalaheo High School, and 1.2 mi northwest of Kailua Elementary School. Datum of gage is at mean sea level.	11.0	02/2001-2003b	09-06-03	2.88	-	09-06-03	2.88	-	
16264850 Kawainui Canal at Oneawa Street bridge	Lat 21°24'44", long 157°45'25", on Oneawa Street bridge and 0.15 mi southeast of Kalaheo High School. Datum of gage is at mean sea level.	11.0	02/2001-2003b	09-06-03	2.63	-	09-06-03	2.63	-	
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, 1977-2003	04-07-03	7.12	893	02-01-69	17.90	5,290	
16274499 Keahala 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	1959-2003r	02-14-03	3.65	438	05-02-65	a11.50	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	1963-2003	02-14-03	5.19	432	02-01-69 11-25-70	a11.80 a14.30	7,300 7,300	
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	1997-2003b	10-17-02	4.36	-	01-29-02	5.55	-	

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 2003 maximum			Period of record maximum		
				Date	Gage height (ft)	Discharge (ft ³ /s)	Date	Gage height (ft)	Discharge (ft ³ /s)
Island of Oahu- Continued									
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	1958-2003	02-14-03	11.19	408	04-15-63 05-06-02	a12.10 c13.04	4,640 -
16311000 Oio Stream nr Kahuku	Lat 21°42'02", long 157°59'43", on left bank of stream 30 ft upstream of Highway 83 and 3.0 mi northwest of Kahuku Hospital.	2.27	1958-2003	02-14-03	7.10	115	05-02-65 11-14-96	a8.13 a8.63	1,390 -
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	1973-2003	02-14-03	6.36	unknown	11-27-01 02-14-03	5.91 6.36	663 -
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	1968-2003	02-14-03	2.65	38	04-19-74 04-04-89	4.97 6.44	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	1968-2003	2003	<1.44	<21	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	1958-2003	02-14-03	5.66	1,700	04-19-74	15.80	15,900
16350000 Opaepala 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	1956-2003	07-25-03	12.71	1,260	04-19-74	20.7	7,600

< Actual value is known to be less than the value shown

≠ Operated as a continuous-record gaging station

a At old gage datum

b Gage height only

c At new gage datum

e Estimated

r Revised

16232000 peak discharge for water year 2002 was revised in water resources data report for Hawaii, water year 2003.

16235400 peak discharge for period of record published for water year 1992-2002 revised in water resources data report for Hawaii, water year 2003.

16249000 peak discharge for water year 1994 was revised in water resources data report for Hawaii, water year 2003.

16264600 peak gage height for water year 2002 was revised in water resources data report for Hawaii, water year 2003.

16274499 peak gage height for water year 2002 was revised in water resources data report for Hawaii, water year 2003.

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 2003 maximum			Period of record maximum		
				Date	Gage height (ft)	Discharge (ft ³ /s)	Date	Gage height (ft)	Discharge (ft ³ /s)
Island of Molokai									
16411300 Kakaako Gulch at Highway 46 nr Mauna Loa	Lat 21°08'49", long 157°11'36", at Highway 46, 1.6 mi northeast of Mauna Loa, and 1.8 mi upstream from Kamakahi Gulch.	0.55	1964-85, 2003	10-15-02	<3.23	unknown	04-13-65	3.06	80
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	1965-2003	10-15-02	5.30	1,390	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	1964-2003	No flow.			12-08-73	3.30	86
16413500 Manawainui Gulch nr Kualapuu	Lat 21°07'42", long 157°03'25", at bridge on Highway 46, 0.5 mi south of Holomua School, and 2.3 mi southwest of Kualapuu.	10.4	1965-87, 2000-2003 ^r	02-14-03	8.05	unknown	04-04-89	-	3,620
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	1964-2003	10-15-02	1.46	501	04-13-65	2.61	1,250
16415600 Kawela Gulch nr Moku	Lat 21°04'22", long 156°57'03", on left bank 1,000 ft upstream of Highway 45, and 5 mi southeast of Kaunakakai.	5.30	2002-2003	10-15-02	3.23	808	11-27-01	6.76	3,190
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	1964-2003	10-15-02	unknown	unknown	11-04-66	8.93	989

< Actual value is known to be less than the value shown

r Revised

16413500 peak discharge published for water year 1988 and 1990-97 were revised in water-resources data report for Hawaii, water year 2001

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 2003 maximum			Period of record maximum		
				Date	Gage height (ft)	Discharge (ft ³ /s)	Date	Gage height (ft)	Discharge (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 ^r , 1973-2003	10-16-02	4.48	115	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	1967-2003	10-16-02	6.83	1,340	01-08-80	15.10	13,600
16500800 Kukuiula 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 ^r , 1969-2003	10-15-02	<4.47	unknown	03-31-82	13.76	5,950

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 2003 maximum			Period of record maximum			
				Date	Gage height (ft)	Discharge (ft ³ /s)	Date	Gage height (ft)	Discharge (ft ³ /s)	
Island of Maui- Continued										
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	1963-2003	10-15-02	2.61	95	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	1963-2003	02-14-03	10.91	unknown	10-29-00	15.64	2,950	
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	1965-2003	02-14-03	10.33	unknown	10-29-00	14.53	e22,200	
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	1967-2003	10-15-02	≥4.55	unknown	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	1963-2003	10-15-02	3.07	86	07-23-64	9.90	306	
16603850 Kalialinui Gulch nr Kahului	Lat 20°52'49", long 156°26'05", 600 ft upstream from Hansen Road, 0.5 mi northeast of Puunene Hospital and 2.5 mi southeast of Kahului Post Office.	17.9	1967-2003	02-14-03	≥6.04	unknown	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≠, 1952-2003	10-15-02	5.20	3,640	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	1964-2003	04-10-03	<2.80	<10	01-12-75	7.29	e97	
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	1965-2003	02-14-03	6.69	158	03-16-68	15.22	1,760	
16630200 Honokowai Str at Honokowai	Lat 20°56'58", long 156°41'02", 0.5 mi southeast of Honokowai and 1.1 mi northwest of Puukolii.	5.59	1962-63, 1965-2003r	04-10-03	4.59	306	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≠ 1990-2003r	10-15-02	7.98	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, 1964-2003	10-15-02	4.63	602	05-13-60	7.9	2,660	

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 2003 maximum			Period of record maximum		
				Date	Gage height (ft)	Discharge (ft ³ /s)	Date	Gage height (ft)	Discharge (ft ³ /s)
Island of Maui- Continued									
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 ^e , 1973-2003	10-15-02	4.08	unknown	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	1964-2003	10-15-02	6.48	115	01-10-80	12.95	350
16650200 Waikapu Stream at Waikapu	Lat 20°51'20", long 156°30'08", 500 ft downstream from Highway 30 bridge in Waikapu.	3.45	2002-03	10-15-02	7.11	unknown	01-26-02	6.86	unknown
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	1964-2003	10-15-02	4.17	137	01-28-71	8.23	409
16659000 Waiakoa Gulch at Kihei	Lat 20°47'15", long 156°27'42", 0.3 mi northeast of Kihei and 0.4 mi upstream from mouth.	10.1	1963-2003	10-15-02	7.51	304	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 ^e , 1971-2003	10-15-02	3.02	1,210	01-28-71	9.40	4,460

< Actual value is known to be less than the value shown

≠ Operated as a continuous-record gaging station

e Estimated

r Revised

16619700 peak gage height and discharge published for water year 1999 were revised in water-resources data report for Hawaii, water year 2000

16630200 peak gage height and discharge published for water years 1997 were revised in water-resources data report for Hawaii, water year 2000

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 2003 maximum			Period of record maximum		
				Date	Gage height (ft)	Discharge (ft ³ /s)	Date	Gage height (ft)	Discharge (ft ³ /s)
Island of Hawaii									
16701300 Waiakea Str at Hilo	Lat 19°42'38", long 155°05'02", 0.3 mi upstream from Kinooles Street bridge and 1.3 mi southeast of Hilo Post Office.	35.8	1969-75, 1979, 1994-2003r	12-10-02	4.30	445	11-02-00	15.05	5,760
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, 2002-03r	12-10-02	3.07	80	11-02-00	unknown	1,580
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	1997-2003	unknown	<6.77	unknown	11-02-00	13.12	6,300

Station name and number	Location	Drainage area (mi ²)	Period of record	Water year 2003 maximum			Period of record maximum			
				Date	Gage height (ft)	Discharge (ft ³ /s)	Date	Gage height (ft)	Discharge (ft ³ /s)	
Island of Hawaii- Continued										
16717400 Kalaoa Mauka Stream near Hilo	Lat 19°48'07", long 155°06'03", on upstream side of Hwy 19, 1.0 mi north of Papaikou, 5.1 mi north of Hilo Post Office.	0.24	1963-67, 1973-76, 1978-79, 1985, 2002-03r	12-10-02	3.19	<40	02-20-79	20.60	400	
16717600 Alia Str nr Hilo	Lat 19°50'38", long 155°06'21", on upstream right bank wingwall of culvert on Highway 19 at Pepekeo 2.0 mi south of Honomu, and 8.0 mi north of Hilo.	0.58	1962-72≠, 1979, 1986, 1994-2003r	12-10-02	6.91	150	02-20-79	17.1	2,850	
16717650 Kapehu Str nr Pepekeo	Lat 19°51'52", long 155°06'11", at culvert on Highway 19, 1.0 mi southeast of Honomu, 2.2 mi north of Pepekeo, and 9.4 mi north of Hilo.	1.09	1963-68, 1975, 1979, 1985-86, 1994-2003r	12-10-02	4.36	263	02-20-79	29.93	3,320	
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, 1993-2003						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, 1995-2003						Records being reviewed.	
16752600 Hapahapai Gulch at Kapaau	Lat 20°14'00", long 155°48'00", at Highway 27, 300 ft east of Kapaau Post Office.	1.52	1963-90, 1995-2003						Records being reviewed.	
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, 1994-2003						Records being reviewed.	
16756500 Keanuiomano 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≠, 1973-2003r	02-21-03	7.25	1,070	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, 1994-2003r	02-21-03 09-01-03	6.29 2.50	f 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	1963-68, 1972-74, 1979, 1982-83, 1994-2003	02-24-03	6.54	1,190	01-16-63	4.35	1,290	

≠ Operated as a continuous-record gaging station

f 16759040 probable backwater from debris in culvert entrance

r Revised

16701300 peak gage height and discharge published for water years 1976-78, 1980-90 were revised in water-resources data report for Hawaii, water year 1999; peak gage height and discharge published for water years 1991 and 1993 were revised in water-resources data report for Hawaii, water year 2001

16701400 peak gage height and discharge published for water years 1972-78, 1981-90 were revised in water-resources data report for Hawaii, water year 1999

16717400 peak gage height and discharge published for water years 1968-72, 1977, 1979-84, 1986-90 were revised in water-resources data report for Hawaii, water year 1999

16717600 peak gage height and discharge published for water years 1973-78, 1980-90, 1995-97 were revised in water-resources data report for Hawaii, water year 1998

16717650 peak gage height and discharge published for water years 1966, 1969-74, 1976-78, 1980-84, 1987-90, 1996, 1999-2000 were revised in water-resources data report for Hawaii, water year 2001

16756500 peak gage height and discharge published for water years 1964, 1975, 1978, 1991-96 were revised in water-resources data report for Hawaii, water year 1998

16759040 peak gage height and discharge published for water years 1966, 1971-90, 1994-98 were revised in water-resources data report for Hawaii, water year 1999

Low-Flow Partial-Record Stations

Measurements of streamflow 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 long-term 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 2003

Station name and number	Location	Drainage area (mi ²)	Period of record	Date	Measurement	
					Gage height (ft)	Discharge (ft ³ /s)
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.	1.14	1913-21≠, 1925-83¼≠, 1999-2003	10-08-02	--	0.25
				01-08-03	--	0.07
				03-12-03	--	0.48
				04-23-03	--	0.82
				08-04-03	--	0.40
16292600 Waianu Stream at Gate 30	Lat 21°28'59", long 157°53'11", 2.1 mi northwest of Waiahole Elementary School and 2.3 mi west of Waikane.	--	1995, 2002-03	10-29-02	--	3.2
				04-15-03	--	5.0
				05-13-03	--	4.9
				06-09-03	--	4.7
				07-10-03	--	4.3
				08-15-03 09-10-03	-- --	4.5 4.4
16292800 Waianu Stream at alt 380 ft	Lat 21°29'08", long 157°52'51", 1.6 mi northwest of Waiahole Elementary School and 1.9 mi west of Waikane.	0.55	1959-61, 1995, 2002-03	10-29-02	--	2.5
				10-29-02	--	3.6
				04-15-03	--	4.9
				05-13-03	--	4.4
				06-09-03	--	4.1
				07-10-03	--	3.5
				08-15-03 09-10-03	-- --	4.3 3.8
16292890 Waianu Stream above confluence with Uwau Stream	Lat 21°29'13", long 157°52'27", 1.2 mi northwest of Waiahole Elementary School and 1.5 mi west of Waikane.	0.67	1960, 1995, 2002-03	10-29-02	--	4.0
				04-15-03	--	5.6
				05-13-03	--	5.0
				06-09-03	--	4.0
				07-10-03	--	3.6
				08-15-03 09-10-03	-- --	4.3 3.8
16292900 Uwau Stream at mouth	Lat 21°29'16", long 157°52'27", at road crossing Uwau Stream, 1.2 mi northwest of Waiahole Elementary School and 1.5 mi west of Waikane.	0.56	1911, 1959-61, 1995, 2002-03	10-29-02	--	0.14
				04-15-03	--	1.4
				05-13-03	--	0.40
				06-09-03	--	0.21
				07-10-03	--	0.12
				08-15-03	--	0.15
				09-10-03	--	0.08
16293100 Waianu Stream at Waiahole	Lat 21°29'01", long 157°51'47", at bridge crossing Waianu Stream, 0.5 mi west of Waiahole Elementary School, and 2.3 mi northwest of Kahaluu Elementary School.	1.65	1959-63, 1965-66, 1988-90, 1995, 2002-03	10-29-02	--	4.3
				04-15-03	--	9.8
				05-13-03	--	5.7
				06-09-03	--	5.0
				07-10-03	--	4.4
				08-15-03 09-10-03	-- --	5.3 4.5
16294400 North Fork Waikane Stream at alt 220 ft	Lat 21°30'20", long 157°52'41", 2.0 mi northwest of Waiahole Elementary School and 1.7 mi west of Waikane.	0.58	1988-90, 2002-03	05-12-03	--	0.76
				06-09-03	--	0.40
				07-09-03	--	0.34
				08-14-03	--	0.83
				09-10-03	--	0.47

Station name and number	Location	Drainage area (mi ²)	Period of record	Date	Measurement	
					Gage height (ft)	Discharge (ft ³ /s)
Island of Oahu--Continued						
16294500	Lat 21°30'17", long 157°52'40", 1.8 mi north-west of Waiahole Elementary School and 1.7 mi west of Waikane.	0.67	1988-90, 2002-03	05-12-03	--	5.2
South Fork Waikane Stream at alt 220 ft				06-09-03	--	4.3
				07-09-03	--	4.6
				08-14-03	--	4.8
				09-10-03	--	4.5
16294700	Lat 21°30'01", long 157°52'12", 1.4 mi north-west of Waiahole Elementary School and 1.1 mi west of Waikane.	0.43	1959-61, 1988-90, 2002-03	10-29-02	--	0.09
Waikeekie Stream at mouth				04-15-03	--	1.3
				05-12-03	--	0.34
				06-09-03	--	0.12
				07-09-03	--	0.03
				08-14-03	--	0.06
09-10-03	--	0.02				
16294800	Lat 21°30'04", long 157°52'10", 1.4 mi north-west of Waiahole Elementary School and 1.1 mi west of Waikane.	1.57	1959-61, 1988-90, 2002-03	10-29-02	--	5.4
Waikane Stream at alt 90 ft				04-15-03	--	9.1
				05-12-03	--	6.6
				06-09-03	--	5.7
				07-09-03	--	5.4
				08-14-03	--	6.3
09-10-03	--	5.0				
16295195	Lat 21°29'56", long 157°51'15", 0.8 mi north-east of Waiahole Elementary School and 0.1 mi south of Waikane.	2.50	1988-90, 2002-03	10-29-02	--	5.9
Waikane Stream at Kamehameha Hwy				04-15-03	--	11.7
				05-12-03	--	7.0
				06-09-03	--	6.4
				07-09-03	--	5.6
				08-14-03	--	7.2
09-10-03	--	5.2				
16295200	Lat 21°29'38", long 157°51'10", 200 ft downstream from Kamehameha Hwy bridge and 0.1 mi south of Waikane.	2.60	1957-60a, 2003	04-15-03	--	11.9
16295995	Lat 21°32'17", long 157°53'29", 1.8 mi upstream from main bridge on Kamehameha Highway and 2.8 mi southwest of Kaaawa School.	3.18	1960-62, 1966, 1971-72, 1974-81, 1988-90, 2002-03	10-29-02	--	15
Kahana Stream at Mauka trail crossing				04-15-03	--	26
				05-12-03	--	26
				06-09-03	--	15
				07-09-03	--	14
				08-14-03	--	15
09-10-03	--	13				
16297000	Lat 21°32'33", long 157°53'00", 0.1 mi upstream from mouth and 2.3 mi southwest of Kaaua School.	2.09	1914-17≠, 1958, 1961-62, 1966, 1971-72, 1974-81, 1983-85, 1988-90, 2002-03	10-29-02	--	2.3
Kawa Stream near Kahana				04-15-03	--	8.7
				05-12-03	--	2.4
				06-09-03	--	1.1
				07-09-03	--	0.73
				08-14-03	--	1.9
				09-10-03	--	0.78
				Island of Maui		
16588000	Lat 20°53'20", long 156°15'19", on right bank 100 ft downstream from intake at Honopou Stream, 0.5 mi west of Lupi, and 2.2 mi southwest of Huelo.	unknown	1924-87≠, 1988-2003	11-15-02	2.08	57.4
Wailoa ditch at Honopou, near Huelo				02-26-03	4.09	162
				04-30-03	3.42	126
				07-15-03	5.02	231

Station name and number	Location	Drainage area (mi ²)	Period of record	Date	Measurement	
					Gage height (ft)	Discharge (ft ³ /s)
Island of Maui--Continued						
16589000	Lat 20°53'28", long 156°15'22", on right bank	unknown	1919-85 ^a ,	11-15-02	0.82	0.65
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.		1986-2003	01-29-03	0.80	0.57
				04-30-03	0.95	1.62
				07-15-03	1.08	3.06
16592000	Lat 20°54'57", long 156°15'08", on left bank	unknown	1911-26 ^a ,	10-21-02	2.50	9.23
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 ^a , 1986-2003	01-29-03	2.36	6.31
				04-30-03	2.68	16.1
				07-15-03	2.80	20.7
16594000	Lat 20°55'07", long 156°14'58", on right bank	unknown	1911 ^a / ₄ ,	10-21-02	0.35	1.33
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 ^a / ₄ , 1916-28 ^a / ₄ , 1931-85 ^a / ₄ , 1986-2003	01-29-03	0.25	0.73
				04-30-03	0.42	1.97
				07-15-03	0.36	1.54
^a Operated as a continuous-record gaging station						
a Operated as a crest-stage gage						

WAI AHOLE BASIN
Waiahole Ditch Tunnel Seepage Investigation 2002

Discharge measurements were made on Feb. 27, 2002 in the Waiahole Ditch Tunnel in Windward Oahu to study tunnel gains and losses. The reach is 4.8 miles in length and extends from the North Portal gage to intake 1 in Kahana Valley. The measurements were made during a period of constant base flow in the tunnel. No measurable precipitation in Waikane Valley fell during the investigation or for twelve days prior to the investigation. There was measurable precipitation in Kahana Valley two days prior to the investigation, however, small amounts of precipitation due to tradewind showers have a very minimal effect on tunnel flows. Minor surface-water inflows were observed at intakes 1, 16 and 17. Development tunnel flow was not considered to be a gain. Released flow was not considered to be a loss. Indicated gains or losses may be in error as affected by small inaccuracies in open channel measurements. A previous seepage investigation of the ditch tunnel was conducted in 1959.

Distance upstream of North Portal gage (ft)	Station Number	Location	Meas. disch. (ft ³ /s)	Gain or loss (ft ³ /s)	Meas. disch. (Mgal/d)	Gain or loss (Mgal/d)
			Feb. 27, 2002			
25,600	213128157544001	Downstream of intake 1	0.05	--	0.03	--
22,800	213108157542101	Upstream of Kahana development tunnel	0.23	+0.18	0.15	+0.12
22,600	213106157542001	Downstream of Kahana development tunnel	1.77	--	1.14	--
18,500	213047157535101	Downstream of intake 17	2.46	+0.69	1.59	+0.45
16,200	213030157533101	Waikane/Kahana basin divide	2.78	+0.32	1.80	+0.21
14,700	213025157532301	at intake 21 gage	3.66	+0.88	2.37	+0.57
14,300	213022157532401	Downstream of Waikane development tunnel 1 at intake 22	7.81	--	5.05	--
10,600	212951157531801	Upstream of Waikane development tunnel 2	9.96	+2.15	6.44	+1.39
9,900	212934157531401	Downstream of Waikane development tunnel 2 at Waikane/Waiahole basin divide	11.4	--	7.37	--
8,400	212929157531601	Upstream of Uwau development tunnel	11.1	-0.30	7.17	-0.20
8,200	212926157531601	Downstream of Uwau development tunnel	29.7	--	19.2	--
5,900	212903157531401	at intake 29 gage	31.7	+2.0	20.5	+1.3
5,400	16292600	Gate 30 release	4.40	--	2.84	--
3,000	16286000	Gate 31 release	24.7*	--	16.0	--
0	16287000	North Portal gage	1.85*	-0.75	1.20	-0.46
		Overall net gain or loss		+5.17		+3.38

* discharge from stage-discharge relationship

WAI AHOLE BASIN
Waiahole Ditch Tunnel Seepage Investigation 2003

Discharge measurements were made on Aug. 20, 2003 in the Waiahole Ditch Tunnel in Windward Oahu to study tunnel gains and losses. The reach is 4.3 miles in length and extends from the North Portal gage to upstream of the Kahana development tunnel. The measurements were made during a period of constant base flow in the tunnel. No measurable precipitation in Waikane Valley fell during the investigation or for two days prior to the investigation. There was measurable precipitation in Kahana Valley during the investigation and on two days prior to the investigation, however, small amounts of precipitation due to tradewind showers have a very minimal effect on tunnel flows. Minor surface-water inflows were observed at intakes 14 and 16. Development tunnel flow was not considered to be a gain. Released flow was not considered to be a loss. Indicated gains or losses may be in error as affected by small inaccuracies in open channel measurements. A previous seepage investigation of the ditch tunnel was conducted in 1959 and 2002.

Distance upstream of North Portal gage (ft)	Station Number	Location	Meas. disch.	Gain or loss	Meas. disch.	Gain or loss
			(ft ³ /s)	(ft ³ /s)	(Mgal/d)	(Mgal/d)
			Aug. 20, 2003			
22,800	213108157542101	Upstream of Kahana development tunnel	0.24	--	0.16	--
22,600	213106157542001	Downstream of Kahana development tunnel	1.53	--	0.99	--
18,500	213047157535101	Downstream of intake 17	1.75	+0.22	1.13	+0.14
16,200	213030157533101	Waikane/Kahana basin divide	1.77	+0.02	1.14	+0.01
14,700	213025157532301	at intake 21 gage	2.76	+0.99	1.78	+0.64
14,300	213022157532401	Downstream of Waikane development tunnel 1 at intake 22	6.50	--	4.20	--
13,500	213012157532601	Intake 23 release	4.62*	--	2.97	--
10,600	212951157531801	Upstream of Waikane development tunnel 2	2.30	+0.42	1.49	+0.26
9,900	212934157531401	Downstream of Waikane development tunnel 2 at Waikane/Waiahole basin divide	3.50	--	2.26	--
8,400	212929157531601	Upstream of Uwau development tunnel	2.93	-0.57	1.89	-0.37
8,200	212926157531601	Downstream of Uwau development tunnel	18.7	--	12.1	--
5,900	212903157531401	at intake 29 gage	21.5	+2.80	13.9	+1.80
5,400	16292600	Gate 30 release	4.69*	--	3.03	--
3,000	16286000	Gate 31 release	10.8*	--	6.98	--
0	16287000	North Portal gage	7.65*	+1.64	4.94	+1.05
Overall net gain or loss				+5.52		+3.53

* discharge from stage-discharge relationship

WAIKANE BASIN
Waikane Stream Seepage Investigation 2002

Discharge measurements were made on Sep. 18, 2002 on Waikane Stream and tributaries to study channel gains and losses. The reach is 3.0 miles in length and extends from an altitude of 10 ft at Kamehamaha Highway to an altitude of 500 ft. The measurements were made during a period of constant base flow in the stream. No measureable precipitation fell during the investigation or on the three days prior to the investigation. Small amounts (0.1 in) fell four and six days prior due to tradewind showers. Tributary flow was not considered to be a gain. There were no diversions between measurement sites. Indicated gains or losses may be in error as affected by small inaccuracies in open channel measurements. A previous seepage investigation of this stream was conducted in 1959.

Distance up- stream of mouth (mi)	Stream	Station Number	Location	Meas.	Gain or	Water	Spec.
				disch. (ft ³ /s)	loss (ft ³ /s)	temp. (°C)	Cond. (µS/cm)
				Sep. 18, 2002			
3.0	N.F. Waikane	213033157530801	At alt 500 ft	0.30	--	21.5	126
2.8	.....do.....	213030157525801	At alt 410 ft	0.31	+0.01	22.0	132
2.4	.....do.....	16294400	At alt 220 ft, at mouth	0.56	+0.25	22.5	137
2.4	S.F. Waikane	213015157524601	At alt 240 ft	0.21	--	23.0	197
2.3	.....do.....	16294500	At alt 220 ft, at mouth	0.25	--	23.0	199
1.6	Waikane	16294800	At alt 90 ft	1.44	+0.63	22.5	171
1.6	Waikakee	16294700	At alt 90 ft, at mouth	0.05	--	24.0	204
1.3	Waikane	16294900	At alt 75 ft	2.12	+0.63	23.0	184
0.90	.....do.....	212950157514101	At alt 35 ft	2.04	-0.08	23.5	187
0.25	.....do.....	16295195	At alt 10 ft, at Kam Hwy	1.63	-0.41	24.0	191
Overall net gain or loss					+1.03		

WAIKANE BASIN
Waikane Stream Seepage Investigation 2003

Discharge measurements were made on May 12, 2003 on Waikane Stream and tributaries to study channel gains and losses. The reach is 3.5 miles in length and extends from an altitude of 10 ft at Kamehamaha Highway to an altitude of 760 ft. The measurements were made during a period of constant base flow in the stream. No measureable precipitation fell during the investigation or on the day prior to the investigation. Small amounts (0.1 in) fell two days prior due to tradewind showers. Tributary flow was not considered to be a gain. There were no diversions between measurement sites. Indicated gains or losses may be in error as affected by small inaccuracies in open channel measurements. A previous seepage investigation of this stream was conducted in 1959 and 2002.

* discharge from stage-discharge relationship

Distance upstream of mouth (mi)	Stream	Station Number	Location	Meas. disch. (ft ³ /s)	Gain or loss (ft ³ /s)	Water temp. (°C)	Spec. Cond. (µS/cm)
				May 12, 2003			
3.0	N.F. Waikane	213033157530801	At alt 500 ft	0.29	--	21.0	126
2.8	.....do.....	213030157525801	At alt 410 ft	0.34	+0.05	21.0	134
2.4	.....do.....	16294400	At alt 220 ft, at mouth	0.76	+0.42	21.5	141
3.5	S.F. Waikane	213012157532601	Intake 23 release, alt 760 ft	4.65	--	19.5	124
2.3	.....do.....	16294500	At alt 220 ft, at mouth	5.20	--	20.5	132
1.6	Waikane	16294800	At alt 90 ft	6.56	+0.60	21.0	140
1.6	Waikakee	16294700	At alt 90 ft, at mouth	0.34	--	22.5	194
1.3	Waikane	16294900	At alt 75 ft	6.9*	0.00	--	--
0.90	.....do.....	212950157514101	At alt 35 ft	7.68	+0.78	22.0	152
0.25	.....do.....	16295195	At alt 10 ft, at Kam Hwy	6.95	-0.73	22.5	154
Overall net gain or loss					+1.12		

Discharge measurements made at miscellaneous sites during water year 2000-2001

Station name and number	Location	Measured previously (water years)	Date	Discharge (ft ³ /s)
Island of Hawaii				
16724000 Kawainui Stream at alt 775 ft near Waipio	Lat 20° 04'45", long 155°38'32", 250 ft upstream from confluence with Alakahi Stream, at alt 775 ft	1901-02 ≠	09-21-00	12
16731000 Koiawe Stream at alt 610 ft near Waipio	Lat 20°04'38", long 155°38'08", 100 ft upstream from mouth, at alt 610 ft	1901-02 ≠	09-21-00	6.4
16732150 Waima Stream at alt 385 ft near Waipio	Lat 20°04'42", long 155°37'22", 100 ft upstream from mouth, at alt 385 ft	1901-02 ≠	09-21-00	35
16732200 Wailoa Stream near Waipio	Lat 20°05'28", long 155°37'01", at alt 150 ft, 0.35 mi upstream from end of Waipio Valley road	1901-02 ≠ 1911-12 ≠ 1964-69 ≠	09-21-00 01-10-01 03-09-01 05-30-01 09-26-01	78 69 76 73 103
16732600 Lower Hamakua Ditch at Waima Flume near Waipio	Lat 20°04'05", long 155°37'36", 20 ft upstream from Waima intake, at alt 980 ft	1910-13 ≠	09-20-00 09-26-01	23 22
16732200 Wailoa Stream near Waipio	Lat 20°05'28", long 155°37'01", at alt 150 ft, 0.35 mi upstream from end of Waipio Valley road	1901-02 = 1911-12 = 1964-69 = 2000-01	06-27-03 09-25-03	83 85
200505155383801 Kawainui Stream above Lower Hamakua Ditch near Waipio	Lat 20°05'05", long 155°38'38", 50 ft upstream from diversion dam at start of Lower Hamakua Ditch in Waipio Valley, at alt 1070 ft	2000-01	06-26-03 09-25-03	35 23
200413155390301 Alakahi Stream above Lower Hamakua Ditch near Waipio	Lat 20°04'13", long 155°39'03", 200 ft upstream from Lower Hamakua Ditch diversion dam on Alakahi Stream, at alt 1,030 ft	2001	06-26-03 09-25-03	17 14
200351155380901 Koiawe Stream above Lower Hamakua Ditch near Waipio	Lat 20°03'51", long 155°38'09", 300 ft upstream from Lower Hamakau Ditch diversion dam on Koiawe Stream, at alt 1,020 ft	2000-01	06-27-03 09-26-03	8.3 7.5
200351155372801 Waima Stream above Lower Hamakua Ditch near Waipio	Lat 20°03'51", long 155°37'28", 100 ft upstream from Lower Hamakua Ditch diversion dam on Waima Stream, at alt 1,040 ft	2000-01	06-27-03 09-26-03	0.67 0.67

Station name and number	Location	Measured previously (water years)	Date	Discharge (ft ³ /s)
Island of Hawaii--Continued				
200354155380801	Lat 20°03'54", long 155°38'08", 30 ft upstream from Koiawe Stream diversion dam, in tunnel	--	09-20-00 09-26-01	18 12
200351155380901	Lat 20°03'51", long 155°38'09", 300 ft upstream from Lower Hamakau Ditch diversion dam on Koiawe Stream, at alt 1,020 ft	--	08-08-00 09-21-00 01-11-01 03-09-01 05-31-01 09-26-01	7.0 7.5 7.3 8.3 7.2 11
200353155380801	Lat 20°03'53", long 155°38'08", 10 ft downstream from tunnel adit, adit is first one downstream from Koiawe Stream diversion dam	--	09-20-00 09-26-01	23 21
200351155372801	Lat 20°03'51", long 155°37'28", 100 ft upstream from Lower Hamakua Ditch diversion dam on Waima Stream, at alt 1,040 ft	--	08-08-00 09-20-00 01-11-01 03-09-01 05-31-01 09-26-01	0.62 0.61 0.69 0.60 0.53 0.86
200424155370301	Lat 20°04'24", long 155°37'03", 0.8 mi downstream from Koiawe Stream diversion dam, in tunnel	--	09-20-00 09-26-01	25 20
200434155372001	Lat 20°04'34", long 155°37'20", 600 ft upstream from confluence with Waima Stream, at alt 400 ft	--	09-21-00	43
200542155354501	Lat 20°05'42", long 155°35'45", 30 feet downstream from Hiilawe Falls, upstream from leaking flume, in tunnel	--	09-20-00 08-09-01 09-26-01	27 25 22
200542155354101	Lat 20°05'42", long 155°35'41", 20 ft downstream from Hakalaoa Falls and leaking flume, in tunnel	--	09-20-00 09-20-00 08-09-01 09-26-01	22 21 25 20

≠ Operated as a continuous-record gaging station

Discharge measurements made at miscellaneous sites during water year 2003

Station name and number	Location	Measured previously (water years)	Date	Discharge (ft ³ /s)
Island of Maui				
16516000 Kopiliula Stream near Keanae	Lat 20°49'05", long 156°08'12"	2002	11-18-02	2.35
			02-20-03	10.2
			04-17-03	38.2
			08-04-03	10.9
16520000 East Wailuanui Stream near Keanae	Lat 20°49'24", long 156°08'37"	2002	11-06-02	1.16
			01-23-03	0.66
			03-03-03	1.81
16527000 Honomanu Stream near Keanae	Lat 20°50'07", long 156°11'18"	--	10-10-02	1.76
			11-08-02	1.12
			02-19-03	3.38
			03-04-03	2.16
			06-17-03 (09:40)	8.07
			06-17-03 (16:05)	6.73
16555000 Waikamoi Stream above Wailoa Ditch near Huelo	Lat 20°51'42", long 156°11'59"	--	10-10-02	1.37
			11-08-02	0.71
			02-19-03	3.83
			03-04-03	1.42
			04-17-03	7.34
			06-16-03	7.08
			09-09-03	5.41
204023156032501 Oheo Gulch Habitat Site	Lat 20°40'23", long 156°03'25"	--	07-24-03 (09:36)	0.34
			07-24-03 (10:00)	0.24
204902156063101 Hanawi 23, Nahiku (middle habitat site)	Lat 20°49'02", long 156°06'31"	1994, 1995	12-16-02	9.61
			03-05-03	7.48
			07-23-03	5.66
			08-05-03	7.98
			09-24-03	7.20
204934156061901 Hanawi Stream, lower habitat site	Lat 20°49'34.6", long 156°06'19.2"	--	10-09-02	22.2
			11-07-02	21.0
			12-16-02	23.9
			03-05-03	21.1
			04-15-03	19.9
			04-22-03	38.8
			06-03-03	17.8
			08-05-03	20.1
			09-23-03	18.6
204952156073501 Kopiliula Stream, middle habitat site	Lat 20°49'52.9", long 156°07'35.7"	2002	10-24-02	0.91
			02-18-03	1.98
			02-20-03	8.83
			03-06-03	0.95
			08-07-03	1.42
			09-11-03	0.97
204959156072201 Kopiliula Stream, lower habitat site	Lat 20°49'59", long 156°07'22"	2002	10-21-02	2.23
			02-18-03	5.53
			02-20-03	11.0
			03-06-03	2.33
			06-05-03	1.86
			07-21-03	4.06
			07-22-03	3.04
			09-11-03	3.73

Station name and number	Location	Measured previously (water years)	Date	Discharge (ft ³ /s)
Island of Maui--Continued				
205008156082901 Wailuanui Stream, middle habitat site	Lat 20°50'08", long 156°08'29"	2002	10-09-02	0.51
			11-19-02	0.25
			03-06-03	0.76
205036156080501 Wailuanui Stream, lower habitat site	Lat 20°50'36", long 156°08'05"	2002	11-05-02	0.56
			03-06-03	0.52
			04-18-03	2.56
			04-23-03	18.0
			06-06-03	0.20
			08-06-03	1.73
09-10-03	2.29			
205127156102101 Honomanu Stream, lower habitat site	Lat 20°51'27", long 156°10'21"	--	04-21-03	11.7
			04-22-03	1.44
205211156105001 Puohokamoa Stream, habitat site, near Hana Highway	Lat 20°52'11", long 156°10'50"	--	04-21-03	0.66
205224156113101 Waikamoi 14 (middle-upper habitat site)	Lat 20°52'24", long 156°11'31"	1994	10-10-02	0.50
			11-20-02	0.46
			02-19-03	1.18
			03-04-03	0.59
			04-14-03	0.84
			05-20-03	0.52
			05-22-03	1.28
			07-25-03	1.08
			08-06-03	1.00
09-12-03	0.76			
205231156112301 Waikamoi Stream, middle-lower habitat site (above spring)	Lat 20°52'31.2", long 156°11'23"	--	10-11-02	0.13
			11-20-02	0.17
			03-07-03	0.09
			04-17-03	0.15
			06-06-03	0.09
			06-18-03	0.10
205233156111901 Waikamoi Stream, middle-lower habitat site below spring	Lat 20°52'33", long 156°11'19"	--	10-11-02	0.18
			11-20-02	0.24
			03-07-03	0.14
			04-17-03	0.43
			06-06-03	0.12
			06-18-03	0.18
			07-25-03	0.17
			08-06-03	0.14
			09-08-03	0.25
205256156110201 Waikamoi Stream, lower habitat site	Lat 20°52'56.5", long 156°11'02.7"	--	06-20-03	0.02
			09-10-02	0.01

Station name and number	Location	Measured previously (water years)	Date	Discharge (ft ³ /s)
Island of Hawaii				
16732200 Wailoa Stream near Waipio	Lat 20°05'28", long 155°37'01", at alt 150 ft, 0.35 mi upstream from end of Waipio Valley road	1901-02 = 1911-12 = 1964-69 = 2000-01	06-27-03 09-25-03	82.9 84.6
200505155383801 Kawainui Stream above Lower Hamakua Ditch near Waipio	Lat 20°05'05", long 155°38'38", 50 ft upstream from diversion dam at start of Lower Hamakua Ditch in Waipio Valley, at alt 1070 ft	2000-01	06-26-03 09-25-03	35.0 22.6
200413155390301 Alakahi Stream above Lower Hamakua Ditch near Waipio	Lat 20°04'13", long 155°39'03", 200 ft upstream from Lower Hamakua Ditch diversion dam on Alakahi Stream, at alt 1,030 ft	2001	06-26-03 09-25-03	17.2 14.3
200351155380901 Koiawe Stream above Lower Hamakua Ditch near Waipio	Lat 20°03'51", long 155°38'09", 300 ft upstream from Lower Hamakau Ditch diversion dam on Koiawe Stream, at alt 1,020 ft	2000-01	06-27-03 09-26-03	8.30 7.52
200351155372801 Waima Stream above Lower Hamakua Ditch near Waipio	Lat 20°03'51", long 155°×37'28", 100 ft upstream from Lower Hamakua Ditch diversion dam on Waima Stream, at alt 1,040 ft	2000-01	06-27-03 09-26-03	0.67 0.67
= operated as a continuous-record gaging station				

Discharge measurements made at miscellaneous sites during water years 2002 and 2003

Discharge measurements in the following table were made at miscellaneous sites on the north-northwestern side of the Kohala Mountains of the Island of Hawaii. It is the initial part of a proposed larger seepage study of the area.

Site number and name	Location	Measured previously (water years)	Measurement	
			Date.	Discharge (ft ³ /sec)
201348155445501 Niulii Stream at Keokea Beach Park (site 1)	Lat 20° 13' 48" long 155° 44' 55"	none	09-18-02	4.82
			08-28-03	2.14
201322155450101 Niulii Stream at Hwy 270 (site 2)	Lat 20° 13' 22" long 155° 45' 02"	none	09-18-02	2.63
			08-28-03	1.34
201229155450201 Niulii Stream at ranch road bridge (site 3)	Lat 20° 12' 29" long 155° 45' 02"	none	09-18-02	2.39
			08-28-03	1.21
201150155451101 Niulii Stream above Kohala Ditch diversion (site 4A)	Lat 20° 11' 50" long 155° 45' 11"	none	09-18-02	2.23
			08-28-03	1.33
201150155451102 Niulii Stream diversion to Kohala Ditch (site 4B)	Lat 20° 11' 50" long 155° 45' 11"	none	09-18-02	0.22
			08-28-03	0.58
201104155453201 Niulii Stream above for- est boundary (site 5)	Lat 20° 11' 04" long 155° 45' 32"	none	09-18-02	1.69
			08-28-03	0.63
201321155450601 Waikani Stream at Hwy 270 (site 1)	Lat 20° 13' 21" long 155° 45' 06"	none	09-18-02	2.76
			08-28-03	0.69
201232155451501 Waikani Stream at ranch road ford (site 2)	Lat 20° 12' 32" long 155° 45' 15"	none	09-18-02	2.01
			08-28-03	1.08
201156155452801 EB Waikani Stream above Kohala Ditch intake (site 3A)	Lat 20° 11' 56" long 155° 45' 28"	none	09-18-02	1.06
			08-28-03	0.68
201156155452802 EB Waikani Stream diversion into Kohala Ditch (site 3B)	Lat 20° 11' 56" long 155° 45' 28"	none	09-18-02	0.74
			08-28-03	0.61
201109155453801 EB Waikani Stream near forest boundary (site 4)	Lat 20° 11' 09" long 155° 45' 38"	none	09-18-02	0.33
			08-28-03	0.19

Discharge, specific conductance, and water temperature measurements at low flow stations, Molokai Springs

Station Number	Station Name	Location	Time	Date	Discharge (ft ³ /s)	Spec. Cond. (μ S/cm)	Water temp. ($^{\circ}$ C)
Island of Molokai							
210545157022201	Coconut Grove Springs nr Kaunakakai, Molokai	Lat 21° 05'45", long 157° 02'22" at Kapuaiwa Coconut Grove, 1.3 mi west of Kaunaka- kai on Hwy 460	13:22	11-07-02	2.34	3,860	23.9
			12:15	12-05-02	2.27	4,630	24.0
			13:20	02-05-03	2.30	3,450	23.9
			12:05	04-09-03		3,480	23.7
			09:45	07-30-03	3.15	4,110	24.0
210432156484801	Pukoo Spring at Puk- oo, Molokai	Lat 21° 04'32", long 156° 48'48" at Pukoo, 15 mi east of Kaunakakai on Hwy 450, 300 ft towards ocean from Hwy	09:00	11-07-02	0.50	566	24.2
			09:40	12-05-02	0.59	800	23.9
			14:00	02-04-03	0.52	515	26.0
			09:45	04-09-03	0.53	508	24.3
			11:12	07-30-03	0.46	584	25.6

PEARL HARBOR SPRINGS MEASURING SITES

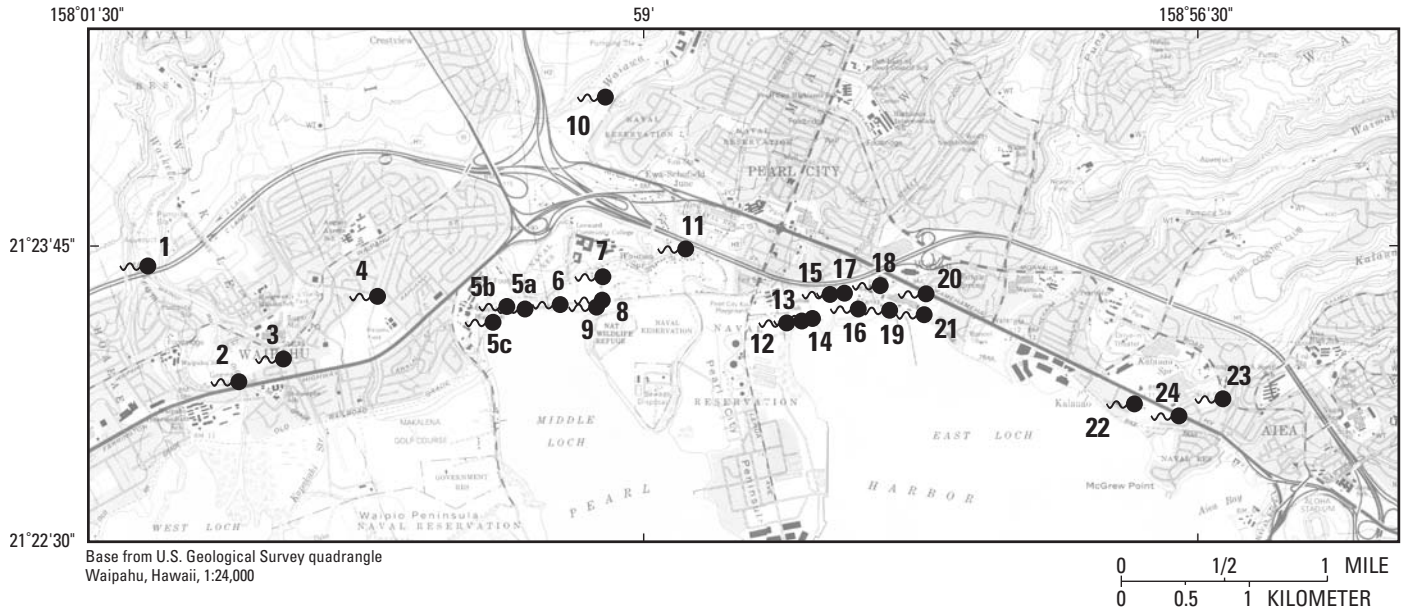


Figure 15. Map showing locations of Pearl Harbor Springs measuring sites, Oahu.

Discharge at low-flow stations, Pearl Harbor Springs, Oahu

Map number (see figure 15)	Station number	Station name	Location	Measurement					
				Time	Date	Discharge (ft ³ /s)	Specific Conductance (μS/cm)	Water temperature (oC)	Chloride (mg/L)
1	16212950	Waikele Stream below 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.	1402	04/30/03	0.50	176	29.5	17
				1210	07/29/03	20	58	26.0	8
2	16213000	Waikele 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.	1050	04/30/03	15	--	22.5	107
				0950	07/29/03	41	198	24.0	37
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.	1439	04/30/03	1.5	538	24.5	101
				1405	07/29/03	1.4	533	23.5	103
4	212332158001201	Waipahu Drainage Canal above Paiwa Street	Lat 21°23'32", long 158°00'12", 1,500 ft upstream from Farrington Highway and 0.5 mi east of Waipahu Sugar Mill, upstream from Paiwa Street bridge.	0916	04/30/03	2.1	--	23.0	116
				1100	07/29/03	1.3	580	27.0	119
5	212328157593601	Spring Outlet 2 West of Waiawa Spring	Lat 21°23'28", long 157°59'36", a 5×8 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.	0940	05/01/03	0.14	3520	24.0	1050
				1010	07/30/03	0.17	4720	26.0	1460
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.	1100	05/01/03	0.45	4750	24.0	1470
				0930	07/30/03	0.41	4390	22.0	1360
7	16214000	Pearl Harbor Springs at Waiawa near Pearl City	Lat 21°23'36", long 157°59'11", near Leeward Community College, 0.7 mi west of Pearl City, and 9.8 mi northwest of Honolulu, about 350 ft upstream from the mouth.	0905	05/01/03	11	3460	--	1060
				1000	07/30/03	10	3270	23.0	1010
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.	1120	05/01/03	0.14	303	26.0	25
				0955	07/30/03	2.0	122	--	14
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.	1358	05/01/03	3.3	742	24.5	162
				1130	07/30/03	5.0	470	--	97
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.	1005	05/01/03	0.96	1170	20.5	323
				1110	07/30/03	0.76	1110	22.0	302

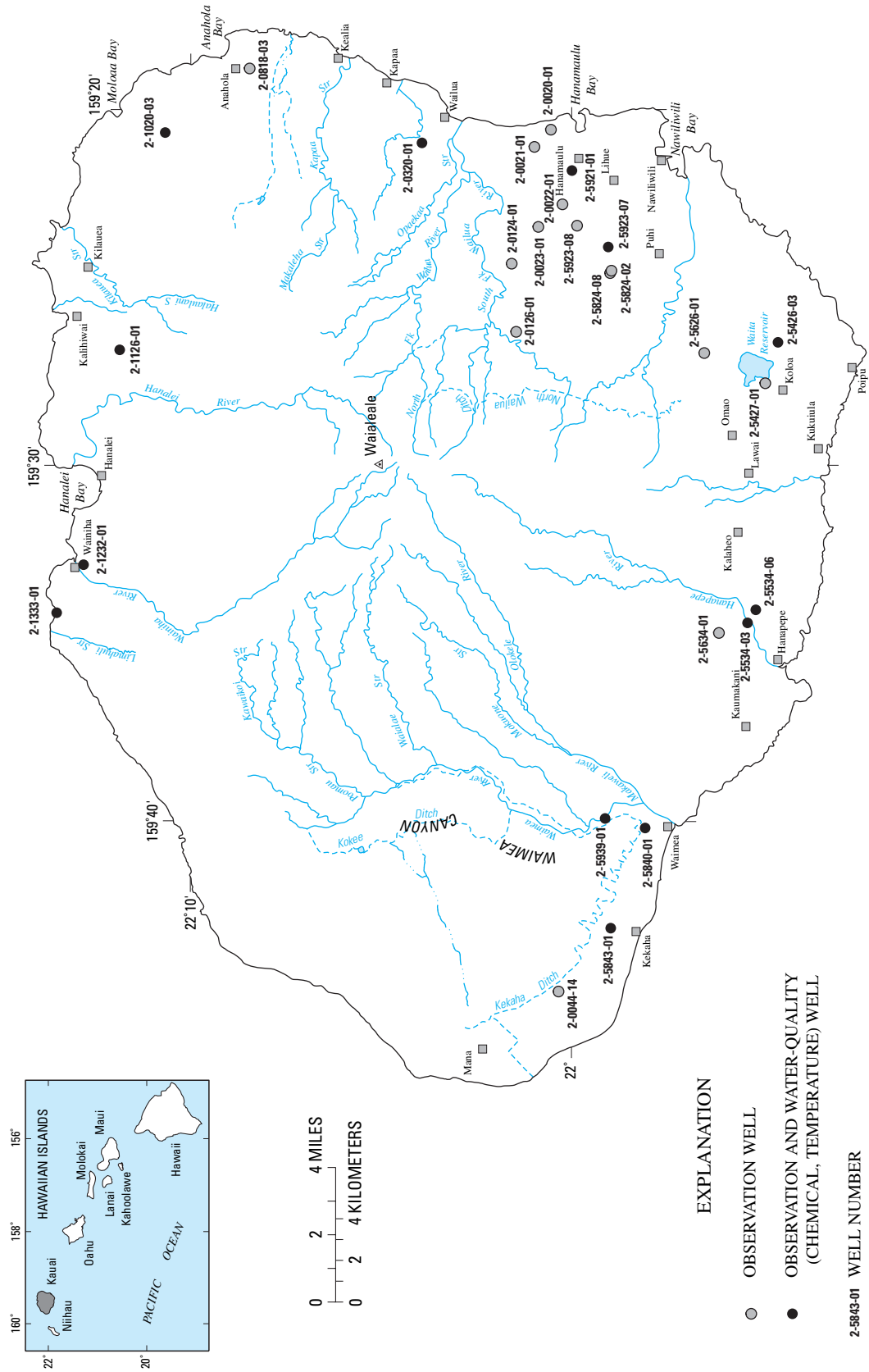
Map number (see figure 15)	Station number	Station name	Location	Measurement						
				Time	Date	Discharge (ft ³ /s)	Specific Conductance (μS/cm)	Water temperature (oC)	Chloride (mg/L)	
13	212325157581301	Puukapu Site 2	Lat 21°23'25", long 157°58'13", at two 4-ft concrete culverts on concrete roadway 100 ft north of old concrete gage house and 300 ft west of Waimano flood channel at mouth.	0956	05/01/03	1.4	1700	23.0	453	
				1100	07/30/03	1.4	1370	--	364	
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.	1029	05/01/03	0.43	2870	20.5	855	
				1135	07/30/03	0.47	--	--	765	
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.	1055	05/01/03	0.54	667	23.5	150	
				1007	07/30/03	0.83	--	--	222	
17	212333157580101	Kaluaoopu 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.	0832	04/30/03	6.7	855	22.0	269	
				0912	07/29/03	6.0	926	22.0	215	
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.	1412	04/30/03	2.6	861	20.0	225	
				1225	07/29/03	2.3	805	20.5	222	
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.	0931	04/30/03	0.51	1170	20.5	327	
				1030	07/29/03	0.46	1240	21.0	352	
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.	1320	04/30/03	1.5	322	21.5	55	
				1115	07/29/03	1.3	332	22.5	53	
22	16224000	Pearl Harbor Spring at Kalauao 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.	1015	04/30/03	12	1540	22.5	417	
				1103	07/29/03	9.9	15	27.0	426	
23	16224500	Kalauao 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.	1100	04/30/03	0.24	690	22.5	140	
				1205	07/29/03	3.5	268	24.0	45	
24	16224550	Kalauao 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.	0911	04/30/03	0.47	825	23.0	175	
				0957	07/29/03	3.6	308	24.5	56	

PEARL HARBOR GROUND-WATER-LEVEL SURVEYS, OCTOBER 31, 2002 AND MAY 15, 2003

[BWS, Honolulu Board of Water Supply; CWRM, Commission on Water Resource Management]; msl, Mean sea level

State well number and Site-ID	Well name	Date	Time	Water Level, msl (ft)	Measured by
3-2101-03	Honouliuli	10/31/02	1118	17.23	USGS
212154158015201		05/15/03	1130	16.81	USGS
3-2103-01	Makakilo	10/31/02	1058	14.37	USGS
212132158035701		05/15/03	1115	14.30	USGS
3-2201-10	Waipahu (T41)	10/31/02	1056	17.14	BWS
212250158015801		05/15/03	1040	16.72	BWS
3-2253-03	State Halawa Deep	05/15/03	0900	15.99	CWRM
212241157535501					
3-2255-33	Halawa Obs. (T45)	10/31/02	0900	15.09	BWS
212233157552301		05/15/03	0900	14.48	BWS
3-2256-10	Aiea US Navy (187-B)	10/31/02	1003	15.03	USGS
212238157561101		05/15/03	0950	14.37	USGS
3-2256-12	Aiea US Navy (187-C)	10/31/02	0950	15.04	USGS
212238157561102		05/15/03	1015	14.39	USGS
3-2300-18	Waipahu Deep Monitor Well	10/31/02	1033	17.34	BWS
212340158001901		05/15/03	1022	16.94	BWS
3-2303-07	Honouliuli Deep Monitor Well	10/31/02	0941	14.55	USGS
212313158032401		05/15/03	1034	14.56	USGS/CWRM
3-2355-15	Kaamilo Deep	10/31/02	0903	14.66	BWS
212340157552301		05/15/03	0903	14.05	BWS
3-2356-53	Aiea (T75)	10/31/02	0921	14.24	BWS
212333157565701		05/15/03	0918	13.56	BWS
3-2358-19	Pearl City Peninsula	10/31/02	0915	14.31	USGS
21231815783401		05/15/03	0915	13.86	USGS
3-2358-20	Pearl City Obs. (T27)	10/31/02	1020	13.56	BWS
212353157583101		05/15/03	1010	13.12	BWS
3-2403-02	Ewa-Kunia Middle	10/31/02	1015	15.36	USGS
212425158035901		05/15/03	1004	15.42	CWRM
3-2455-01	Upper Waimalu (T52)	10/31/02	0950	15.44	BWS
212416157554301		05/15/03	0942	14.87	BWS
3-2456-04	Newtown Deep	10/31/02	0946	15.64	BWS
212435157561401		05/15/03	0935	15.14	BWS
3-2458-06	BWS Manana Deep	05/15/03	1056	13.13	BWS
212411157582801					
3-2459-26	Waiawa Deep	10/31/02	0924	16.47	USGS
212415157593401		05/15/03	0900	16.10	USGS/CWRM
3-2500-03	Waiola Deep Monitor Well	10/31/02	0951	18.21	USGS
212516158004601		05/15/03	1029	16.61	BWS
3-2557-04	Waimano Deep	10/31/02	1114	17.87	USGS
212515157574501		05/15/03	0935	17.31	USGS/CWRM
3-2602-02	Poliwai Gulch Deep Monitor Well	10/31/02	1049	20.05	USGS
212621158021901		05/15/03	1103	19.63	USGS
3-2659-01	Waipio-Mauka Deep Monitor Well	10/31/02	1018	19.22	USGS
212614157594301		05/15/03	0902	18.75	USGS
3-2659-04	Waiawa 575 ft-2	10/31/02	0921	19.35	USGS
212621157590201		05/15/03	0926	18.86	USGS
3-2703-02	Kunia Basal Monitor Well	10/31/02	1051	20.14	USGS
212738158034301		05/15/03	1022	19.71	USGS

Ground-Water Station Records



GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI

220008159204701. Local number, 2-0020-03. EWM No 1, Hanamaulu, Kauai.

LOCATION.--Lat 22°00', long 159°21', Old Hawaiian Datum, Hydrologic Unit 20070000, 1.5 mi. south of Wailua County Golf Course, and 0.6 mi south of Wailua County Golf Course, and 0.6 mi northwest of Hanamaulu Beach Park.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 290 ft, 12-in. casing diameter, cased to 110 ft., open hole 110-290 ft.

DATUM.--Elevation of land-surface datum is 69 ft. Measuring point is the top of flange after 5/8 inch plug is removed 70.09 ft above mean sea level.

PERIOD OF RECORD.-- Water level: occasional measurements, March 2002 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 8.82 ft above mean sea level, January 22, 2003; lowest water level measured, 7.35 ft above mean sea level, March 4, 2002.

REMARKS.--Well is to provide water for future needs as lands are developed.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2001 TO SEPTEMBER 2002

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 04	7.35	APR 15	7.79	SEP 04	8.40

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 10	8.58	JAN 22	8.82	JUN 20	8.18
DEC 09	8.71	APR 03	8.63	JUL 31	8.38

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

220057159210301. Local number 2-0021-01. Kalepa Ridge, Kauai.

LOCATION.--Lat 22°01', long 159°21', Old Hawaiian Datum, Hydrologic Unit 20070000, 1.0 mi southwest of Wailua County Golf Course, and 1.3 mi north of Hanamaulu Park.

AQUIFER.--Waimea Canyon Basalt, Miocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled 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 November 1999. Occasional measurements, November 1999 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, , 8.65 ft above mean sea level, March 4, 2002.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 01	9.38	DEC 09	9.67	JAN 22	9.84	APR 08	10.07	JUN 20	9.57	JUL 24	9.48

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

220013159224001. Local number 2-0022-01, Hanamaulu W-1, Kauai.

LOCATION.--Lat 22°00', long 159°23', Old Hawaiian Datum, Hydrologic Unit 20070000, 3.2 mi north of Lihue, and 1.4 mi west of the nearest shoreline.

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, 234.61 ft above mean sea level, January 22, 2002.

REMARKS.--Well part of a network of observation wells in cooperation with the County of Kauai, Department of Water.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 01	242.13	JAN 22	240.43	APR 18	242.35	JUN 20	243.39	AUG 15	241.96
DEC 09	240.87	MAR 04	240.93	MAY 12	242.80	AUG 08	242.12	SEP 09	241.46

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

220051159231801. Local number 2-0023-01. Pukaki Reservoir monitor well, Kauai.

LOCATION.--Lat 22°01', long 159°23', Old Hawaiian Datum, Hydrologic Unit 20070000, 2.5 mi northwest of Lihue, and 2.8 mi west of the nearest shoreline.

AQUIFER.--Koloa Volcanics and Waimea Canyon Basalt, Miocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled well, depth 1,590 ft; 10-in. solid steel outer casing: 0-156 ft, annular space grouted: 0-156 ft, open hole: 156 ft to bottom. Well deepened in 2002 from 1,147 to 1,590 ft.

DATUM.--Elevation of land-surface datum is 319 ft. Measuring point is the top of 10-in. well casing, 320.12 ft above mean sea level.

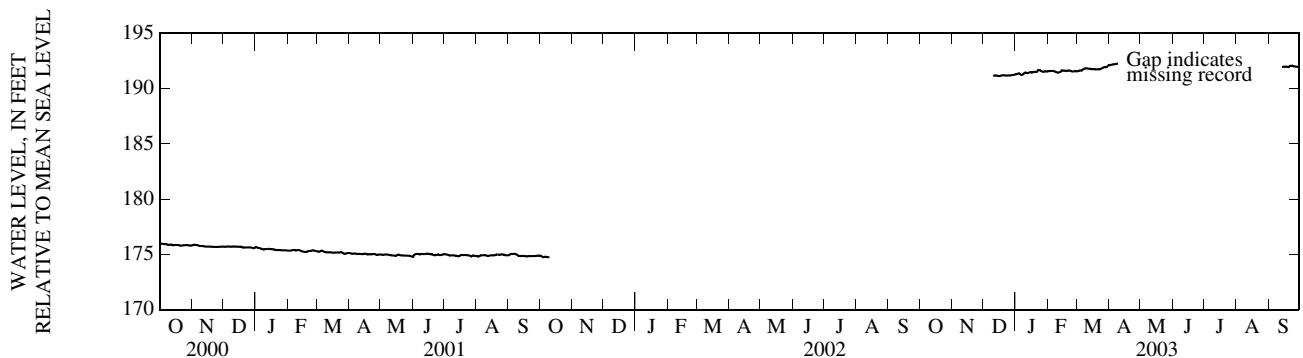
PERIOD OF RECORD.--Water-level: occasional measurements, November 1996 to December 8, 1999. Continuous water-level recorder, December 1999 to October 2001. Occasional measurements October 2001 to December 9, 2002. Continuous water-level recorder, January 22, 2003 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 192.63 ft above mean sea level, May 12, 2003; 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 RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	191.31	191.59	191.56	192.12	192.60	192.47	192.09	192.16	192.02
2	---	---	---	191.33	191.59	191.59	192.14	192.59	192.47	192.12	192.16	192.01
3	---	---	---	191.35	191.60	191.65	192.17	192.55	192.49	192.13	192.15	192.02
4	---	---	---	191.38	191.60	191.65	192.19	192.53	192.48	192.10	192.14	192.00
5	---	---	---	191.29	191.60	191.64	192.20	192.54	192.45	192.07	192.13	191.98
6	---	---	---	191.24	191.60	191.72	192.21	192.55	192.45	192.04	192.13	191.97
7	---	---	---	191.25	191.56	191.80	192.23	192.59	192.48	192.02	192.12	191.94
8	---	---	---	191.30	191.52	191.81	192.25	192.60	192.48	192.00	192.11	191.94
9	---	---	---	191.42	191.47	191.85	192.28	192.58	192.45	191.99	192.12	191.94
10	---	---	191.16	191.45	191.44	191.83	192.29	192.60	192.42	192.00	192.12	191.94
11	---	---	191.17	191.42	191.46	191.80	192.29	192.60	192.40	191.98	192.11	191.95
12	---	---	191.19	191.41	191.49	191.80	192.30	192.61	192.38	191.95	192.10	191.96
13	---	---	191.19	191.43	191.54	191.80	192.28	192.59	192.36	191.94	192.09	191.98
14	---	---	191.17	191.47	191.65	191.77	192.28	192.59	192.34	191.95	192.08	191.97
15	---	---	191.16	191.50	191.64	191.76	192.31	192.58	192.33	191.95	192.09	191.98
16	---	---	191.15	191.45	191.65	191.78	192.38	192.56	192.32	191.99	192.10	191.99
17	---	---	191.16	191.50	191.63	191.76	192.42	192.54	192.30	192.00	192.09	191.99
18	---	---	191.20	191.50	191.60	191.74	192.41	192.53	192.28	191.99	192.09	191.97
19	---	---	191.21	191.53	191.60	191.75	192.40	192.52	192.26	191.98	192.07	191.98
20	---	---	191.22	191.53	191.64	191.75	192.41	192.51	192.24	192.02	192.05	191.97
21	---	---	191.20	191.52	191.65	191.76	192.43	192.50	192.25	192.05	192.05	192.07
22	---	---	191.20	191.68	191.62	191.74	192.47	192.48	192.24	192.10	192.06	192.07
23	---	---	191.18	191.67	191.58	191.76	192.51	192.46	192.25	192.10	192.07	192.08
24	---	---	191.18	191.67	191.56	191.82	192.53	192.48	192.25	192.08	192.06	192.04
25	---	---	191.20	191.58	191.56	191.87	192.52	192.50	192.23	192.11	192.04	192.02
26	---	---	191.20	191.54	191.57	191.92	192.52	192.50	192.22	192.15	192.03	192.01
27	---	---	191.20	191.52	191.59	191.95	192.53	192.46	192.22	192.22	192.02	192.00
28	---	---	191.22	191.53	191.58	191.92	192.55	192.43	192.19	192.20	192.08	191.97
29	---	---	191.24	191.57	---	191.95	192.55	192.47	192.14	192.17	192.08	191.96
30	---	---	191.26	191.56	---	192.05	192.57	192.46	192.10	192.15	192.06	191.97
31	---	---	191.28	191.55	---	192.14	---	192.48	---	192.16	192.02	---
MEAN	---	---	---	191.47	191.58	191.80	192.36	192.53	192.33	192.06	192.09	191.99
MAX	---	---	---	191.68	191.65	192.14	192.57	192.61	192.49	192.22	192.16	192.08
MIN	---	---	---	191.24	191.44	191.56	192.12	192.43	192.10	191.94	192.02	191.94



GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

220019159444801. Local number 2-0044-14. Kaunalewa, Kauai.

LOCATION.--Lat 22°00', long 159°45', Old Hawaiian Datum, Hydrologic Unit 20070000, 1.8 mi northeast of Kokole Point, and 2.8 mi northwest of Kekaha School.

AQUIFER.--Waimea Canyon Basalt, Miocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled artesian well, depth 245 ft, casing diameter 13-in., cased to 164 ft.

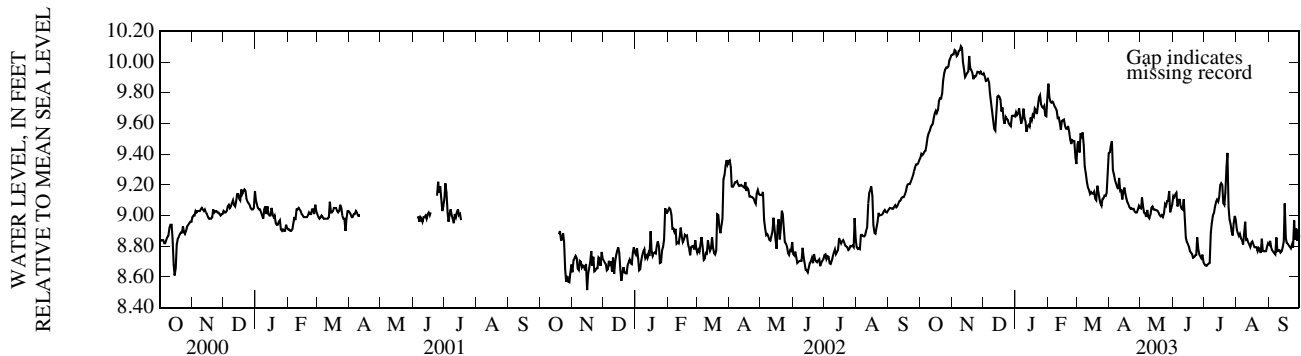
DATUM.--Elevation of land-surface datum is 8 ft. Measuring point is the top of standpipe, 11.49 ft until February 9, 1997; changed measuring point to top of recorder shelf on February 10, 1997, 11.57 ft above mean sea level. Prior to June 1979, nonrecording gage at datum 0.25 ft lower.

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 RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.37	10.05	9.93	9.67	9.86	9.46	9.41	9.05	9.13	8.68	8.91	8.81
2	9.40	10.05	9.90	9.65	9.77	9.48	9.45	9.12	9.12	8.67	8.89	8.83
3	9.39	10.08	9.88	9.67	9.74	9.41	9.48	9.06	9.14	8.67	8.87	8.79
4	9.40	10.07	9.88	9.70	9.74	9.54	9.30	9.02	9.15	8.68	8.88	8.77
5	9.42	10.04	9.89	9.64	9.74	9.52	9.27	9.02	9.06	8.69	8.85	8.76
6	9.42	10.05	9.87	9.60	9.73	9.54	9.23	8.99	9.08	8.69	8.84	8.75
7	9.46	10.07	9.79	9.62	9.71	9.46	9.21	9.04	9.11	8.89	8.81	8.75
8	9.51	10.08	9.73	9.70	9.70	9.32	9.19	8.99	9.06	8.95	8.87	8.86
9	9.53	10.10	9.68	9.64	9.69	9.27	9.17	8.98	9.04	9.00	8.96	8.77
10	9.55	10.09	9.62	9.62	9.63	9.22	9.25	9.00	9.04	9.02	8.84	8.77
11	9.57	10.00	9.57	9.55	9.64	9.18	9.16	9.05	9.11	9.06	8.85	8.77
12	9.59	9.95	9.55	9.58	9.61	9.17	9.16	9.06	8.98	9.09	8.82	8.76
13	9.60	9.90	9.66	9.59	9.56	9.14	9.11	9.04	8.86	9.10	8.81	8.77
14	9.64	9.92	9.78	9.58	9.62	9.15	9.16	9.04	8.83	9.09	8.80	8.79
15	9.67	9.93	9.78	9.64	9.62	9.14	9.18	9.04	8.82	9.12	8.82	8.83
16	9.68	9.94	9.78	9.62	9.63	9.14	9.14	9.04	8.80	9.20	8.83	9.08
17	9.67	10.04	9.76	9.66	9.58	9.15	9.11	9.03	8.77	9.21	8.81	8.85
18	9.69	9.96	9.68	9.64	9.57	9.11	9.09	9.02	8.76	9.20	8.79	8.82
19	9.75	9.95	9.71	9.70	9.56	9.10	9.07	9.00	8.75	9.08	8.79	8.82
20	9.76	9.93	9.63	9.69	9.58	9.19	9.05	8.99	8.73	9.07	8.79	8.80
21	9.76	9.89	9.60	9.66	9.54	9.16	9.04	9.00	8.73	9.15	8.77	8.80
22	9.80	9.91	9.64	9.72	9.50	9.11	9.05	8.99	8.74	9.31	8.79	8.79
23	9.88	9.91	9.63	9.77	9.47	9.08	9.04	9.01	8.74	9.41	8.78	8.81
24	9.93	9.92	9.62	9.78	9.49	9.07	9.04	9.07	8.86	9.06	8.76	8.79
25	9.95	9.94	9.60	9.73	9.49	9.11	9.03	9.06	8.78	8.98	8.85	8.97
26	9.96	9.94	9.59	9.71	9.48	9.11	9.02	9.09	8.75	8.94	8.77	8.84
27	9.96	9.93	9.58	9.70	9.38	9.13	9.02	9.09	8.73	8.90	8.77	8.92
28	9.97	9.94	9.65	9.71	9.34	9.13	9.04	9.16	8.72	8.87	8.77	8.84
29	10.01	9.92	9.65	9.65	---	9.15	9.06	9.02	8.74	8.95	8.77	8.91
30	10.03	9.92	9.65	9.65	---	9.28	9.05	9.05	8.70	9.00	8.79	8.86
31	10.05	---	9.65	9.76	---	9.41	---	9.07	---	8.97	8.82	---
MEAN	9.69	9.98	9.71	9.66	9.61	9.24	9.15	9.04	8.89	8.99	8.82	8.82
MAX	10.05	10.10	9.93	9.78	9.86	9.54	9.48	9.16	9.15	9.41	8.96	9.08
MIN	9.37	9.89	9.55	9.55	9.34	9.07	9.02	8.98	8.70	8.67	8.76	8.75



GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

220133159242001. Local number, 2-0124-01. Northeast Kilohana monitor well.

LOCATION.--Lat 22°01', long 159°24', Old Hawaiian Datum, Hydrologic unit 20070000, 3.7 mi northwest of Lihue, and 3.8 mi west of the nearest shoreline.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled well, depth 1,033 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.

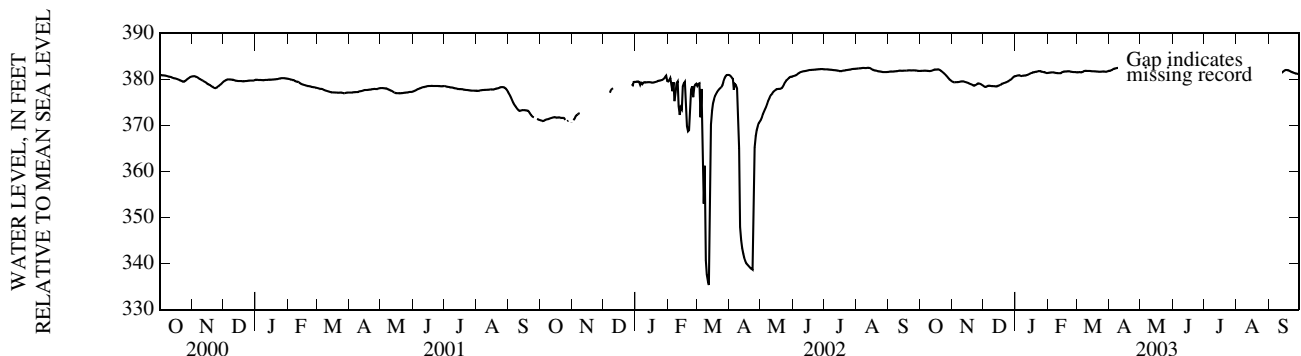
PERIOD OF RECORD.--Water level: occasional measurements, started in November 1996. Continuous water level recorder, December 1996 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 388.31 ft above mean sea level, May 19, 1998; lowest static water level measured, 368.10 ft above mean sea level, October 27, 1998. Lowest water level measured, 332.98 ft above sea level when nearby pump was running on Mar. 4, 2002.

REMARKS.--Well part of a network of observation wells in cooperation with the County of Kauai Department of Water. Water level affected by drilling of nearby well after August 2001.

WATER LEVEL, IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	381.86	379.51	378.56	380.75	381.45	381.54	381.86	381.97	382.59	382.74	381.93	381.49
2	381.87	379.42	378.39	380.80	381.47	381.56	381.94	382.14	382.80	382.84	381.87	381.43
3	381.88	379.39	378.36	380.86	381.51	381.60	382.03	382.20	382.94	382.91	381.80	381.37
4	381.89	379.41	378.46	380.91	381.52	381.58	382.18	382.22	382.96	382.93	381.74	381.28
5	381.90	379.41	378.61	380.80	381.55	381.54	382.33	382.26	382.94	382.94	381.69	381.19
6	381.90	379.43	378.65	380.72	381.55	381.59	382.38	382.29	382.93	382.96	381.66	381.10
7	381.89	379.44	378.60	380.76	381.48	381.76	382.41	382.36	382.92	382.99	381.62	380.99
8	381.88	379.47	378.57	380.83	381.44	381.85	382.46	382.45	382.94	383.02	381.59	380.92
9	381.86	379.55	378.56	380.84	381.40	381.87	382.51	382.53	382.90	383.06	381.59	380.94
10	381.83	379.58	378.55	380.88	381.35	381.85	382.59	382.61	382.85	383.12	381.64	381.03
11	381.84	379.57	378.53	380.90	381.36	381.84	382.67	382.70	382.79	383.08	381.66	381.16
12	381.88	379.52	378.51	380.98	381.37	381.84	382.78	382.77	382.74	383.00	381.73	381.30
13	381.95	379.45	378.48	381.08	381.37	381.85	382.85	382.79	382.67	382.92	381.82	381.45
14	382.08	379.37	378.53	381.21	381.54	381.81	382.92	382.81	382.59	382.85	381.94	381.61
15	382.15	379.29	378.62	381.34	381.62	381.78	382.95	382.84	382.51	382.76	382.10	381.78
16	382.12	379.23	378.72	381.41	381.70	381.79	382.96	382.82	382.43	382.69	382.19	381.96
17	382.16	379.10	378.80	381.55	381.75	381.77	382.89	382.78	382.33	382.62	382.20	382.04
18	382.20	378.99	378.95	381.57	381.73	381.74	382.74	382.76	382.30	382.50	382.17	382.05
19	382.13	378.92	379.07	381.62	381.72	381.74	382.60	382.73	382.30	382.36	382.11	382.01
20	382.04	378.82	379.16	381.67	381.78	381.71	382.46	382.67	382.30	382.26	382.04	381.93
21	381.87	378.69	379.23	381.67	381.76	381.70	382.33	382.60	382.33	382.17	381.97	381.82
22	381.69	378.66	379.33	381.76	381.72	381.68	382.23	382.52	382.38	382.07	381.94	381.69
23	381.48	378.76	379.43	381.80	381.66	381.68	382.16	382.40	382.45	382.05	381.97	381.61
24	381.28	378.91	379.56	381.82	381.64	381.70	382.07	382.29	382.51	382.08	381.96	381.49
25	381.08	379.09	379.70	381.72	381.62	381.72	381.96	382.23	382.56	382.16	381.92	381.40
26	380.85	379.13	379.82	381.66	381.62	381.74	381.84	382.12	382.61	382.25	381.87	381.34
27	380.60	379.07	379.95	381.62	381.61	381.73	381.73	381.97	382.66	382.25	381.82	381.28
28	380.31	378.99	380.16	381.60	381.57	381.67	381.63	381.96	382.69	382.17	381.79	381.21
29	380.06	378.87	380.38	381.52	---	381.67	381.66	382.08	382.68	382.09	381.72	381.16
30	379.86	378.74	380.58	381.40	---	381.75	381.79	382.25	382.69	382.02	381.63	381.14
31	379.67	---	380.69	381.38	---	381.89	---	382.43	---	381.97	381.54	---
MEAN	381.55	379.19	379.08	381.27	381.57	381.73	382.33	382.44	382.64	382.58	381.85	381.44
MAX	382.20	379.58	380.69	381.82	381.78	381.89	382.96	382.84	382.96	383.12	382.20	382.05
MIN	379.67	378.66	378.36	380.72	381.35	381.54	381.63	381.96	382.30	381.97	381.54	380.92



GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

220126159261501. Local number, 2-0126-01. Northwest Kilohana monitor well, Kauai.

LOCATION.--Lat 22°01', long 159°26', Old Hawaiian Datum, Hydrologic unit 20070000, 5.3 northwest of Lihue, and 6.2 mi west of the nearest shoreline.

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.

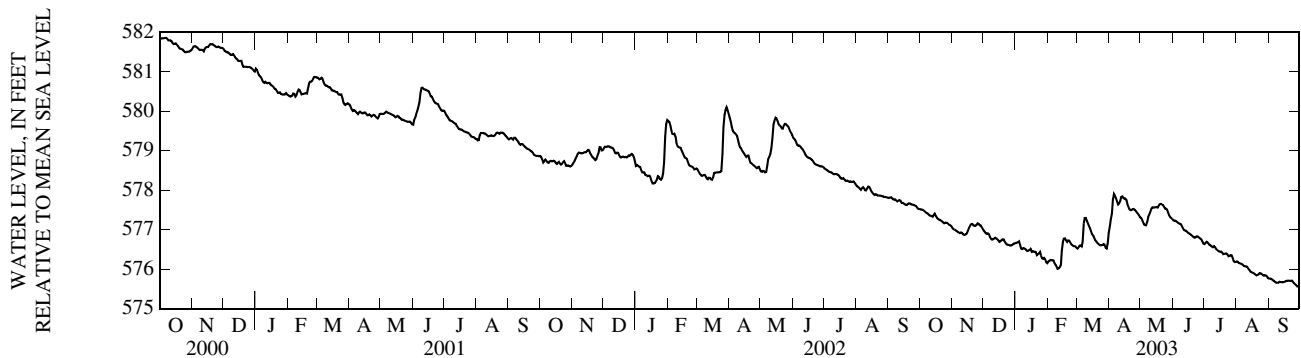
PERIOD OF RECORD.-- Water level: occasional measurements started in November 1996. Continuous water-level recorder, December 1996 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 589.96 ft above mean sea level, December 23, 1996; lowest water level measured, 575.54 ft above mean sea level, September 28-30, 2003.

REMARKS.--Well part of network of observation wells in cooperation with the County of Kauai Department of Water.

WATER LEVEL, IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	577.52	577.04	576.98	576.66	576.20	576.52	577.09	577.30	577.24	576.64	576.20	575.76
2	577.51	577.01	576.95	576.67	576.21	576.55	577.26	577.26	577.23	576.66	576.19	575.76
3	577.51	577.00	576.91	576.68	576.23	576.60	577.41	577.19	577.23	576.69	576.16	575.76
4	577.49	576.99	576.89	576.71	576.23	576.60	577.75	577.14	577.22	576.68	576.15	575.74
5	577.47	576.97	576.90	576.61	576.23	576.58	577.91	577.12	577.19	576.64	576.14	575.72
6	577.45	576.95	576.88	576.52	576.23	576.69	577.86	577.11	577.17	576.61	576.13	575.70
7	577.43	576.93	576.81	576.51	576.15	577.15	577.80	577.20	577.15	576.60	576.10	575.67
8	577.41	576.91	576.77	576.53	576.11	577.29	577.72	577.32	577.15	576.58	576.08	575.66
9	577.39	576.93	576.75	576.53	576.06	577.30	577.64	577.39	577.11	576.56	576.07	575.66
10	577.36	576.92	576.75	576.51	576.01	577.23	577.66	577.46	577.05	576.58	576.07	575.66
11	577.35	576.89	576.77	576.48	576.02	577.16	577.72	577.53	577.00	576.56	576.06	575.68
12	577.35	576.87	576.80	576.46	576.05	577.10	577.83	577.57	576.98	576.52	576.01	575.67
13	577.33	576.87	576.78	576.47	576.10	577.04	577.85	577.56	576.98	576.49	575.98	575.67
14	577.38	576.89	576.76	576.49	576.47	576.96	577.81	577.56	576.95	576.47	575.95	575.67
15	577.41	576.92	576.73	576.52	576.69	576.89	577.78	577.57	576.93	576.45	575.92	575.68
16	577.35	576.99	576.69	576.44	576.77	576.85	577.79	577.58	576.91	576.44	575.91	575.68
17	577.31	577.05	576.70	576.46	576.78	576.80	577.75	577.56	576.89	576.44	575.90	575.69
18	577.28	577.11	576.74	576.45	576.73	576.74	577.65	577.61	576.87	576.42	575.89	575.71
19	577.25	577.14	576.76	576.44	576.69	576.71	577.57	577.64	576.85	576.38	575.86	575.71
20	577.25	577.14	576.75	576.43	576.73	576.67	577.52	577.65	576.83	576.39	575.84	575.71
21	577.23	577.12	576.71	576.35	576.72	576.64	577.50	577.64	576.80	576.39	575.86	575.71
22	577.21	577.10	576.66	576.38	576.68	576.62	577.50	577.63	576.80	576.40	575.86	575.70
23	577.19	577.10	576.63	576.40	576.63	576.60	577.52	577.59	576.83	576.38	575.90	575.71
24	577.16	577.12	576.62	576.43	576.61	576.61	577.52	577.54	576.83	576.32	575.90	575.68
25	577.18	577.16	576.62	576.35	576.59	576.62	577.51	577.53	576.82	576.33	575.88	575.64
26	577.18	577.15	576.60	576.28	576.59	576.63	577.48	577.51	576.79	576.35	575.85	575.62
27	577.17	577.11	576.60	576.26	576.58	576.62	577.44	577.44	576.78	576.35	575.84	575.60
28	577.15	577.11	576.61	576.29	576.55	576.54	577.41	577.36	576.76	576.29	575.85	575.56
29	577.12	577.07	576.63	576.25	---	576.53	577.37	577.32	576.70	576.21	575.84	575.55
30	577.11	577.02	576.65	576.17	---	576.66	577.32	577.30	576.65	576.18	575.82	575.59
31	577.09	---	576.66	576.15	---	576.92	---	577.27	---	576.19	575.77	---
MEAN	577.31	577.02	576.74	576.45	576.42	576.79	577.60	577.43	576.96	576.46	575.97	575.68
MAX	577.52	577.16	576.98	576.71	576.78	577.30	577.91	577.65	577.24	576.69	576.20	575.76
MIN	577.09	576.87	576.60	576.15	576.01	576.52	577.09	577.11	576.65	576.18	575.77	575.55



GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

220354159205602. Local number, 2-0320-03. Nonou W-B, Kauai.

LOCATION.--Lat 22°04', long 159°21', Old Hawaiian Datum, Hydrologic unit 20070000, 0.6 mi east of Sleeping Giant Mountain, and 1.3 mi northwest of Wailua River bridge.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled 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, 156.65 ft above mean sea level.

PERIOD OF RECORD.-- Water level: occasional measurements, August 1976 to current year. Water quality: occasional measurements, 1972, 1976 to 2002.

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, 11.95 ft below mean sea level, October 23, 2002.

REMARKS.--Water is used for public supply. Water level affected by pumping and by nearby well.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 23	-11.95	DEC 12	-10.31	FEB 05	-10.30	APR 03	-8.03	JUN 04	-11.25	AUG 27	-9.43

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

220825159185301. Local number 2-0818-03. Anahola C, Kauai.

LOCATION.--Lat 22°08', long 159°19', Old Hawaiian Datum, Hydrologic Unit 20070000, 1.3 mi southwest of Kahala Point, and 0.2 mi south of Anahola School.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 466 ft, 12-in. casing diameter, cased to 290 ft.

DATUM.--Elevation of land-surface datum is 267 ft. Measuring point is the top of west side of 4 1/2 -in. pipe at 268.98 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, lowest water level measured with nearby pump on, 6.79 ft above mean sea level, February 15, 2000.

REMARKS.--Water for future public supply. Water level affected by pumping of nearby wells.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 17	10.67	DEC 12	10.79	FEB 05	11.18	APR 03	11.07	JUN 04	10.88	AUG 27	11.14

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

221038159203801. Local number, 2-1020-03. Moloaa, Kauai.

LOCATION.--Lat 22°11', long 159°21', Old Hawaiian Datum, Hydrologic Unit 20070000, 2.6 mi south of Kulikoa Point, and 2.6 mi northwest of Kuaehu Point.

AQUIFER.--Waimea Canyon Basalt, Miocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 700 ft.

DATUM.--Elevation of land-surface datum is 358 ft. Measuring point is the top of the 12 inch casing, elevation 357.92 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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 08	96.32	DEC 10	98.65	FEB 05	100.44	APR 03	102.35	JUN 03	103.55	AUG 01	104.02

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

221150159264501. Local number, 2-1126-01. Princeville W-1, Kauai.

LOCATION.--Lat 22°12', long 159°27', Old Hawaiian Datum, Hydrologic Unit 20070000, 1.2 mi south of Princeville Airport terminal, and 4.0 mi east southeast of Puupoa Point.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled 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 2002.

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 and by nearby well.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 09	5.94	DEC 11	6.71	FEB 06	7.39	APR 10	7.19	JUN 03	7.38	AUG 07	5.25

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

221247159324801. Local number, 2-1232-01. Wainiha, Kauai.

LOCATION.--Lat 22°13', long 159°33', Old Hawaiian Datum, Hydrologic Unit 20070000, 0.9 mi southwest of Kolokoko Point, and 1.5 mi southeast of Haena Point.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled 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 2002.

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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 17	7.73	DEC 12	7.68	FEB 05	8.78	APR 03	5.28	JUN 04	8.71	AUG 27	7.29

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

221318159335901. Local number, 2-1333-01. Haena, Kauai.

LOCATION.--Lat 22°13', long 159°34', Old Hawaiian Datum, Hydrologic Unit 20070000, 0.6 mi south southwest of Haena Point, and 1.2 mi east southeast of Kailiu Point.

AQUIFER.--Waimea Canyon Basalt, Miocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled 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 2002.

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, 5.49 ft below mean sea level, June 7, 2001.

REMARKS.--Water used for public supply. Water level affected by pumping.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 17	-2.35	DEC 12	-3.98	FEB 05	-4.37	APR 03	4.67	JUN 04	-2.96	AUG 27	-4.11

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

215434159263301. Local number, 2-5426-03. Koloa, Kauai.

LOCATION.--Lat 21°55', long 159°27', Old Hawaiian Datum, Hydrologic Unit 20070000, 0.6 mi northeast of Koloa Mill, and 2.6 mi north of Makahuena Point.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled 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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 09	25.36	DEC 10	25.42	FEB 04	25.47	MAR 28	25.30	JUN 04	25.19	AUG 22	25.23

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

215454159274201. Local number, 2-5427-01. Koloa W-A, Kauai.

LOCATION.--Lat 21°55', long 159°28', Old Hawaiian Datum, Hydrologic Unit 20070000, 0.1 mi west of the southwest corner of Waita Reservoir, and 2.7 mi northeast of Kaulala Point.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled 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 246.68 ft above mean sea level.

PERIOD OF RECORD.-- Water level: occasional measurements, 1972 to current year. Water quality: occasional measurements, 1972 to 2002.

REVISED RECORDS.--WDR HI-94-1: 1988-94 (the minimum water level for the period of record). WDR HI-01-1: 1988-2001 (the maximum water level for the period of record).

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 39.74 ft above mean sea level, January 9, 1975; 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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 09	33.86	DEC 10	33.88	FEB 04	34.03	APR 01	33.93	JUN 05	33.77	AUG 26	33.66

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

215522159342601. Local number, 2-5534-03. Hanapepe Town, Kauai.

LOCATION.--Lat 21°55', long 159°34', Old Hawaiian Datum, Hydrologic Unit 20070000, 1.9 mi north from Weli Point, and 2.9 mi northeast from Puolo Point.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 109 ft; 9-in. casing diameter.

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 2002.

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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 09	15.64	DEC 10	15.47	FEB 04	16.03	MAR 28	16.86	JUN 05	16.44	AUG 26	14.44

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

215509159340401. Local number, 2-5534-06. Upper Eleele Reservoir, Kauai.

LOCATION.--Lat 21°55', long 159°34', Old Hawaiian Datum, Hydrologic Unit 20070000, 1.6 mi north of Weli Point and 2.4 mi northeast of Puolo Point.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 740 ft; 12 in solid steel outer casing: 0-100 ft.

DATUM.--Elevation of land surface is 385.48 ft. Measuring point is top of 4 inch pvc casing from September 9, 2002, 386.78 ft above mean sea level.

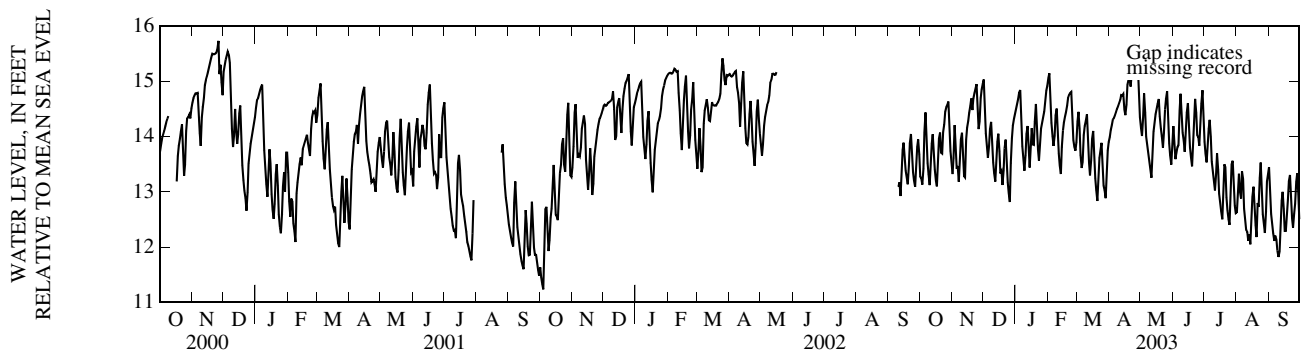
PERIOD OF RECORD.--Water-level recorder January 11, 2000 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 17.62 ft above mean sea level, January 19, 2000; lowest water level measured, 11.02 ft above mean sea level, June 29, 2000.

REMARKS.--Water level affected by pumping of nearby well.

WATER LEVEL, IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13.28	13.32	15.03	14.50	15.06	14.28	14.00	14.15	14.19	13.90	12.63	13.45
2	13.24	13.61	14.59	14.58	15.15	14.45	14.12	14.01	13.90	13.69	12.96	13.06
3	13.13	14.21	14.06	14.68	14.74	14.14	14.21	14.35	13.59	13.53	13.33	12.60
4	13.42	13.78	13.81	14.79	14.25	13.66	14.31	14.78	13.70	13.78	13.01	12.42
5	14.08	13.42	13.61	14.84	14.00	13.43	14.34	14.43	13.81	14.15	12.88	12.25
6	14.44	13.47	13.83	14.37	13.83	13.54	14.38	14.00	13.84	14.30	13.37	12.11
7	13.93	13.18	14.13	13.83	14.01	14.03	14.44	13.82	14.47	14.00	13.23	12.21
8	13.52	13.55	14.27	13.59	14.38	14.19	14.50	13.68	14.78	13.55	12.70	12.14
9	13.32	13.95	13.95	13.38	14.50	14.29	14.55	13.53	14.45	13.38	12.50	11.94
10	13.12	14.07	13.53	13.66	14.16	14.40	14.60	13.39	14.07	13.19	12.31	11.82
11	13.45	13.71	13.33	14.05	13.69	14.01	14.66	13.26	13.92	13.03	12.27	11.92
12	13.88	13.28	13.18	14.19	13.47	13.53	14.75	13.63	13.73	13.32	12.11	12.44
13	14.04	13.26	13.51	13.86	13.32	13.30	14.75	14.09	14.07	13.69	12.23	12.84
14	13.75	13.95	13.90	13.44	13.81	13.57	14.77	14.26	14.44	13.40	12.05	13.00
15	13.40	14.16	14.05	13.78	14.11	13.96	14.49	14.40	14.60	12.97	12.45	12.69
16	13.20	14.28	13.73	14.15	14.25	14.10	14.39	14.51	14.26	12.79	12.91	12.29
17	13.10	14.43	13.33	13.86	14.36	13.72	14.57	14.60	13.80	12.64	13.09	12.29
18	13.52	14.56	13.37	13.85	14.44	13.24	14.94	14.68	13.63	12.50	12.76	12.59
19	13.96	14.69	13.12	14.27	14.56	13.03	15.03	14.36	13.46	12.88	12.40	12.86
20	14.07	14.48	13.38	14.59	14.70	12.83	15.09	14.15	13.95	13.50	12.18	13.19
21	13.71	14.69	13.79	14.24	14.76	13.19	14.91	14.00	14.34	13.45	12.80	13.30
22	13.69	14.79	13.94	13.77	14.79	13.61	15.11	13.80	14.68	12.90	12.73	12.93
23	14.08	14.86	13.62	13.57	14.81	13.74	15.16	14.06	14.43	12.67	13.25	12.52
24	14.22	14.95	13.17	13.90	14.39	13.89	15.20	14.49	14.03	12.50	13.53	12.35
25	14.45	14.55	12.98	14.14	13.93	13.53	15.24	14.68	13.99	12.40	13.06	12.61
26	14.53	14.14	12.81	14.25	13.82	13.11	15.25	14.82	13.84	13.04	12.60	12.78
27	14.57	14.27	13.52	14.35	13.74	13.03	15.26	14.38	14.19	13.50	12.40	13.18
28	14.63	14.70	13.97	14.45	13.90	12.89	15.29	13.88	14.60	13.56	12.26	13.33
29	14.24	14.85	14.20	14.64	---	13.27	14.77	13.65	14.84	13.19	12.64	12.96
30	13.74	14.95	14.32	14.83	---	13.75	14.35	13.49	14.42	12.75	13.19	12.51
31	13.53	---	14.40	14.92	---	13.90	---	13.80	---	12.61	13.32	---
MEAN	13.78	14.14	13.76	14.17	14.25	13.66	14.71	14.10	14.13	13.25	12.75	12.62
MAX	14.63	14.95	15.03	14.92	15.15	14.45	15.29	14.82	14.84	14.30	13.53	13.45
MIN	13.10	13.18	12.81	13.38	13.32	12.83	14.00	13.26	13.46	12.40	12.05	11.82



GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

215630159265101. Local number, 2-5626-01. Puakukui Springs, Kauai.

LOCATION.--Lat 21°57', long 159°27', Old Hawaiian Datum, Hydrologic Unit 20070000, 5.7 mi south of Lihue, and 3.8 mi northwest of the nearest shoreline.

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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 01	176.60	JAN 22	176.88	APR 08	176.13	JUN 20	175.92	AUG 15	175.82
DEC 09	177.25	MAR 04	176.33	MAY 12	176.12	JUL 24	175.89	SEP 09	175.75

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

215607159344301. Local number 2-5634-01. Hanapepe Ridge, Kauai.

LOCATION.--Lat 21°56', long 159°35', Old Hawaiian Datum, Hydrologic Unit 20070000, 2.7 mi north of Weli Point, and 3.3 mi northeast of Puolo Point.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 508 ft, 8-in. casing diameter, cased to 507 ft.

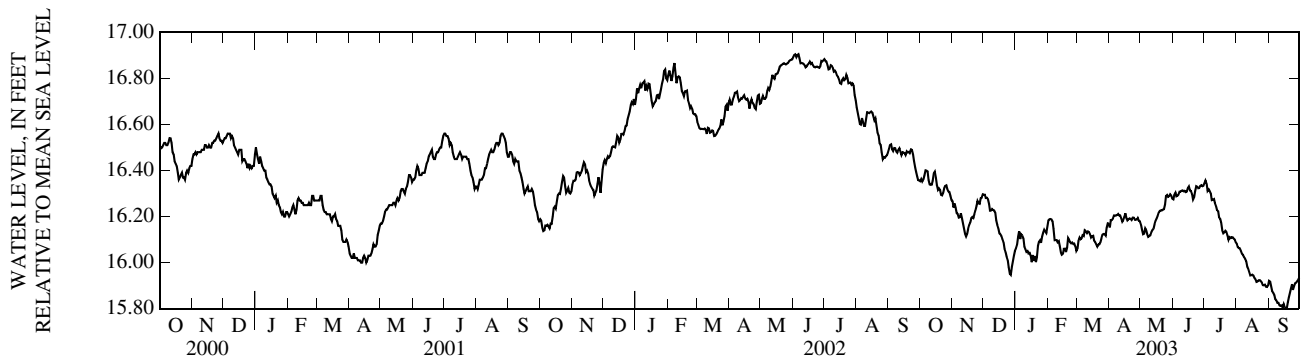
DATUM.--Elevation of land-surface datum is 439 ft. Measuring point is the top of recorder shelf 440.68 ft above mean sea level.

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, 15.76 ft above mean sea level, September 17, 18, 2003.

WATER LEVEL, IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16.35	16.27	16.29	16.06	16.18	16.06	16.15	16.16	16.28	16.35	16.08	15.92
2	16.36	16.24	16.30	16.08	16.19	16.09	16.18	16.14	16.29	16.36	16.07	15.92
3	16.35	16.26	16.28	16.11	16.19	16.11	16.18	16.12	16.30	16.34	16.06	15.90
4	16.36	16.24	16.28	16.14	16.19	16.10	16.19	16.13	16.29	16.31	16.06	15.88
5	16.38	16.21	16.28	16.10	16.18	16.10	16.20	16.15	16.29	16.32	16.05	15.87
6	16.40	16.21	16.26	16.12	16.15	16.12	16.20	16.14	16.29	16.31	16.04	15.86
7	16.40	16.20	16.23	16.12	16.10	16.12	16.20	16.12	16.31	16.30	16.03	15.84
8	16.40	16.20	16.23	16.11	16.10	16.14	16.21	16.11	16.31	16.27	16.02	15.84
9	16.36	16.21	16.23	16.07	16.10	16.14	16.21	16.12	16.31	16.27	16.02	15.83
10	16.34	16.19	16.23	16.06	16.09	16.13	16.21	16.12	16.31	16.28	16.01	15.83
11	16.34	16.17	16.23	16.05	16.09	16.14	16.21	16.13	16.31	16.26	15.98	15.81
12	16.34	16.15	16.22	16.05	16.07	16.13	16.19	16.14	16.31	16.25	15.97	15.81
13	16.36	16.13	16.18	16.04	16.04	16.12	16.18	16.15	16.31	16.23	15.96	15.81
14	16.39	16.11	16.16	16.04	16.03	16.11	16.18	16.17	16.31	16.22	15.94	15.81
15	16.40	16.12	16.15	16.03	16.04	16.11	16.20	16.18	16.32	16.20	15.95	15.82
16	16.37	16.15	16.13	16.00	16.06	16.12	16.21	16.19	16.33	16.19	15.95	15.81
17	16.34	16.16	16.12	16.03	16.06	16.10	16.19	16.20	16.31	16.17	15.94	15.80
18	16.32	16.17	16.11	16.01	16.05	16.09	16.18	16.22	16.31	16.14	15.93	15.80
19	16.32	16.19	16.10	16.03	16.07	16.08	16.19	16.22	16.30	16.13	15.93	15.83
20	16.32	16.20	16.09	16.00	16.11	16.07	16.19	16.23	16.27	16.13	15.92	15.85
21	16.30	16.19	16.06	16.02	16.10	16.08	16.19	16.23	16.28	16.14	15.92	15.87
22	16.29	16.21	16.04	16.07	16.09	16.08	16.19	16.23	16.31	16.13	15.92	15.89
23	16.30	16.23	16.03	16.09	16.08	16.09	16.20	16.23	16.33	16.12	15.92	15.91
24	16.32	16.25	16.01	16.10	16.09	16.11	16.20	16.25	16.33	16.10	15.92	15.88
25	16.33	16.27	15.98	16.09	16.08	16.12	16.19	16.29	16.32	16.11	15.91	15.90
26	16.34	16.26	15.95	16.11	16.08	16.12	16.19	16.29	16.32	16.11	15.90	15.91
27	16.32	16.26	15.95	16.13	16.07	16.12	16.19	16.29	16.33	16.11	15.90	15.91
28	16.31	16.28	15.98	16.14	16.05	16.12	16.19	16.29	16.34	16.11	15.90	15.92
29	16.31	16.28	16.01	16.13	---	16.15	16.18	16.30	16.33	16.10	15.89	15.93
30	16.29	16.30	16.03	16.13	---	16.17	16.18	16.29	16.33	16.10	15.89	15.93
31	16.27	---	16.05	16.15	---	16.17	---	16.28	---	16.09	15.90	---
MEAN	16.34	16.21	16.14	16.08	16.10	16.11	16.19	16.20	16.31	16.20	15.96	15.86
MAX	16.40	16.30	16.30	16.15	16.19	16.17	16.21	16.30	16.34	16.36	16.08	15.93
MIN	16.27	16.11	15.95	16.00	16.03	16.06	16.15	16.11	16.27	16.09	15.89	15.80



GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

215856159243201. Local number, 2-5824-02. Kilohana D, Kauai.

LOCATION.--Lat 21°59', long 159°24', Old Hawaiian Datum, Hydrologic Unit 20070000, 2.0 mi nwest of Lihue, and 3.5 mi northwest of the nearest shoreline.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 250 ft, 12-in. solid casing: 0-60 ft; 12-in. perforated casing; 60-185 ft; 8-in. open hole: 185-200 ft; 6-in. open hole; 200-250 ft.

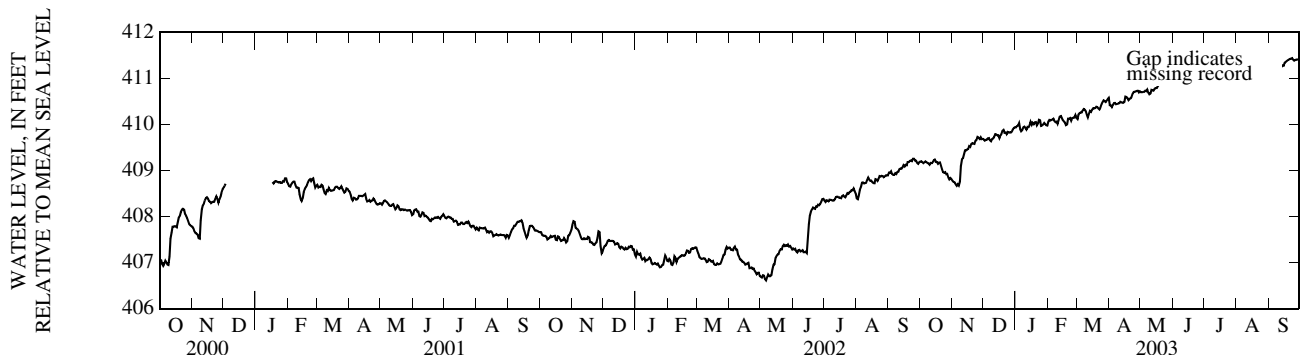
DATUM.--Elevation of land surface is 482 ft. Measuring point is top of the 12-in. well casing, 483.68 ft above mean sea level.

PERIOD OF RECORD.--Water-level recorder, December 1999 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 411.50 ft above mean sea level, September 23, 2003; lowest water level measured, 406.57 ft above mean sea level, May 6, 2002.

WATER LEVEL, IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	409.19	408.78	409.68	409.94	410.07	410.12	410.42	410.70	411.01	---	411.18	411.19
2	409.20	408.75	409.65	409.97	410.10	410.22	410.42	410.70	411.01	---	411.21	411.20
3	409.18	408.74	409.67	409.98	410.09	410.25	410.38	410.70	411.06	---	411.18	411.21
4	409.16	408.71	409.67	410.03	410.10	410.26	410.42	410.71	411.04	---	411.20	411.23
5	409.18	408.67	409.70	409.90	410.11	410.26	410.47	410.73	411.01	---	411.18	411.23
6	409.20	408.71	409.71	409.85	410.12	410.30	410.47	410.72	411.02	---	411.20	411.24
7	409.18	408.67	409.66	409.88	410.07	410.34	410.44	410.76	411.04	---	411.16	411.20
8	409.17	408.76	409.64	409.94	410.05	410.32	410.44	410.69	411.03	---	411.15	411.21
9	409.16	409.09	409.68	409.95	410.06	410.29	410.45	410.66	411.01	---	411.16	411.21
10	409.13	409.24	409.70	409.92	410.02	410.21	410.46	410.68	410.99	---	411.18	411.24
11	409.17	409.27	409.73	409.89	410.10	410.15	410.50	410.75	410.96	---	411.18	411.27
12	409.16	409.36	409.79	409.95	410.17	410.23	410.48	410.74	411.00	---	411.16	411.25
13	409.18	409.44	409.78	409.94	410.19	410.30	410.47	410.73	410.98	---	411.19	411.26
14	409.22	409.44	409.76	409.99	410.15	410.27	410.47	410.78	411.00	---	411.16	411.28
15	409.24	409.46	409.77	410.06	410.09	410.32	410.49	410.79	411.00	---	411.17	411.27
16	409.19	409.46	409.71	409.99	410.07	410.35	410.61	410.79	411.03	---	411.16	411.34
17	409.19	409.53	409.76	410.04	410.04	410.35	410.60	410.83	411.01	---	411.11	411.36
18	409.15	409.51	409.79	410.01	409.99	410.35	410.58	410.86	411.01	---	411.10	411.38
19	409.17	409.57	409.86	410.05	410.00	410.39	410.53	410.88	411.04	---	411.06	411.40
20	409.18	409.59	409.88	410.05	410.12	410.38	410.56	410.87	411.01	---	411.11	411.41
21	409.11	409.58	409.82	409.98	410.12	410.35	410.57	410.93	411.04	---	411.14	411.42
22	409.02	409.58	409.83	410.02	410.14	410.33	410.60	410.95	411.06	---	411.18	411.43
23	408.96	409.64	409.79	410.10	410.08	410.36	410.67	410.95	411.11	---	411.26	411.44
24	408.95	409.66	409.84	410.09	410.14	410.43	410.70	410.93	411.15	---	411.26	411.41
25	408.96	409.73	409.83	409.97	410.15	410.48	410.71	410.94	411.17	---	411.25	411.39
26	408.92	409.71	409.83	409.98	410.15	410.52	410.72	410.97	411.16	---	411.23	411.40
27	408.93	409.69	409.82	410.00	410.20	410.51	410.73	410.92	411.16	---	411.23	411.41
28	408.85	409.73	409.84	410.03	410.14	410.49	410.73	410.95	411.18	---	411.26	411.41
29	408.81	409.68	409.89	410.01	---	410.51	410.70	410.94	411.13	---	411.24	411.41
30	408.83	409.69	409.93	409.98	---	410.55	410.72	411.01	411.07	411.10	411.23	411.43
31	408.81	---	409.94	409.98	---	410.58	---	411.03	---	411.16	411.18	---
MEAN	409.09	409.31	409.77	409.98	410.10	410.35	410.55	410.83	411.05	---	411.18	411.32
MAX	409.24	409.73	409.94	410.10	410.20	410.58	410.73	411.03	411.18	---	411.26	411.44
MIN	408.81	408.67	409.64	409.85	409.99	410.12	410.38	410.66	410.96	---	411.06	411.19



GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

215858159243601. Local number, 2-5824-08. Puhi 5A, Kauai.

LOCATION.--Lat 21°59', long 159°59'

Running H/F 259°25', Old Hawaiian Datum, Hydrologic Unit 20070000, 2.0 mi west of Lihue, and 3.5 mi northwest of the nearest shoreline.

AQUIFER.--Koloa Volcanics, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 970 ft, 12-in. solid casing: 0-565 ft; 20-in. open hole: 565-900 ft; 12-in open hole; 900-970 ft.

DATUM.--Elevation of land surface is 482 ft. Measuring point is top of threaded 1 1/2" coupling on northeast side of pump, 487.76 ft above mean sea level.

PERIOD OF RECORD.--Water level: Occasional measurements, December 2002 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 56.33 ft above mean sea level, January 22, 2003; lowest water level measured, 54.18 ft above mean sea level, July 24, 2003.

REMARKS.--Water used for public supply. Water level affected by pumping.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 09	55.44	JAN 22	56.33	MAR 13	55.97	JUN 17	54.46	JUL 24	54.18

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

215803159401201. Local number, 2-5840-01. Waimea, Kauai.

LOCATION.--Lat 21°58', long 159°40', Old Hawaiian Datum, Hydrologic Unit 20070000, 0.7 mi north of Waimea Recreational Pier State Park, and 2.4 mi east northeast of Oomano Point.

AQUIFER.--Waimea Canyon Basalt, Miocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 190 ft, 8-in. casing diameter, cased to 167 ft.

DATUM.--Elevation of land-surface datum is 168 ft. Measuring point is the top of 1-in. hole on pump base, 168.17 ft above mean sea level.

PERIOD OF RECORD.-- Water level: occasional measurements, 1973 to current year. Water quality: occasional measurements, 1973 to 2002.

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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 07	8.81	DEC 10	8.80	FEB 04	8.87	MAR 28	8.66	JUN 10	8.70	AUG 26	8.69

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

215857159430101. Local number, 2-5843-01. Kekaha Shaft, Kauai.

LOCATION.--Lat 21°59', long 159°43', Old Hawaiian Datum, Hydrologic Unit 20070000, 2.7 mi east northeast from Kokole Point, and 1.4 mi north-northwest of Oomano Point.

AQUIFER.--Waimea Canyon Basalt, Miocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled 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-in. pipe, 57.97 ft above mean sea level.

PERIOD OF RECORD.-- Water level: occasional measurements, 1972, 1985 to current year. Water quality: occasional measurements, 1972, 1997 to 2002.

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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 09	9.03	DEC 10	9.02	FEB 04	9.14	MAR 28	8.89	JUN 05	8.83	AUG 26	8.75

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

215958159214301. Local number 2-5921-01. Kalepa Ridge, W-10, Kauai.

LOCATION.--Lat 22°00', long 159°22', Old Hawaiian Datum, Hydrologic Unit 20070000, 1.0 mi west of Hanamaulu Beach Park, and 3.3 mi south-southwest of Lydgate State Park.

AQUIFER.--Waimea Canyon Basalt, Miocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled 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 ft 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 2002.

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, 8.21 ft above mean sea level, April 1, 2002.

REMARKS.--Water level affected by pumping.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 17	9.33	DEC 12	9.67	FEB 05	9.77	APR 03	9.61	JUN 04	9.51	AUG 27	9.32

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

215901159235201. Local number 2-5923-07. Kilohana W-I, Kauai.

LOCATION.--Lat 21°59', long 159°24', Old Hawaiian Datum, Hydrologic Unit 20070000, 4.2 mi northwest of Ninini Point and 3.4 mi west from Lihue Airport terminal.

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, 365.29 ft above mean sea level.

PERIOD OF RECORD.-- Water level: occasional measurements, 1985 to current year. Water quality: occasional measurements, 1985 to 2002.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 226.86 ft above mean sea level, December 8, 1989; lowest water level measured, 207.40 ft above mean sea level, August 2, 2001.

REMARKS.--Water used for public supply. Water level affected by pumping and by nearby well.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 17	211.10	DEC 12	212.31	FEB 05	213.49	APR 03	213.19	JUN 04	212.69	AUG 27	211.71

GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

215950159231601. Local number 2-5923-08. Hanamaulu monitor well, Kauai.

LOCATION.--Lat 22°00', long 159°23'16", Old Hawaiian Datum, Hydrologic Unit 20070000, 1.5 mi northwest of Lihue, and 2.8 mi west of the nearest shoreline.

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.

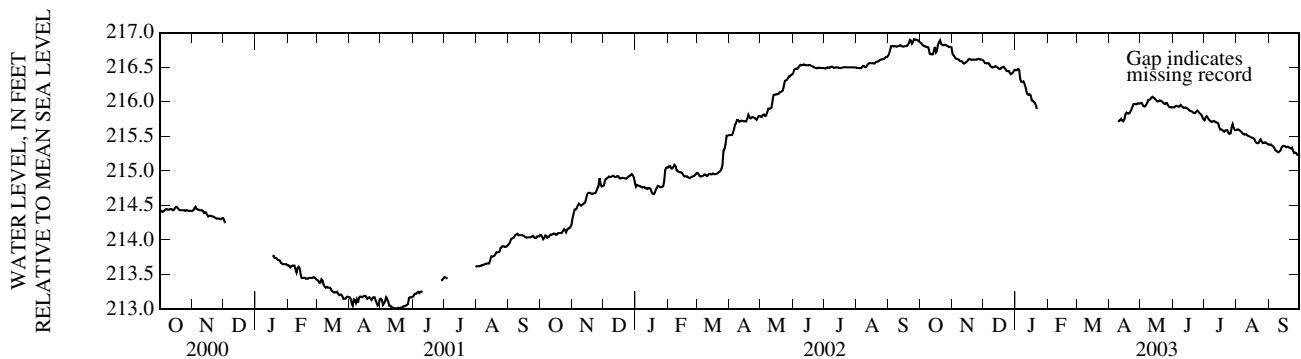
PERIOD OF RECORD.--Water-level recorder, February 1996 to current year.

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 RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	216.86	216.69	216.59	216.45	---	---	---	215.98	215.92	215.73	215.59	215.38
2	216.85	216.67	216.56	216.46	---	---	---	215.98	215.92	215.77	215.60	215.38
3	216.82	216.66	216.56	216.47	---	---	---	215.95	215.94	215.79	215.59	215.38
4	216.81	216.63	216.56	216.47	---	---	---	215.93	215.94	215.77	215.58	215.36
5	216.81	216.62	216.56	216.33	---	---	---	215.93	215.93	215.75	215.57	215.35
6	216.80	216.62	216.56	216.29	---	---	---	215.95	215.93	215.73	215.55	215.34
7	216.79	216.61	216.53	216.29	---	---	---	215.99	215.93	215.72	215.54	215.30
8	216.80	216.59	216.51	216.30	---	---	---	216.02	215.96	215.71	215.53	215.29
9	216.78	216.59	216.50	216.27	---	---	215.71	216.03	215.94	215.71	215.53	215.28
10	216.70	216.59	216.50	216.21	---	---	215.72	216.04	215.92	215.72	215.53	215.27
11	216.69	216.57	216.50	216.15	---	---	215.73	216.06	215.91	215.71	215.52	215.28
12	216.69	216.56	216.52	216.11	---	---	215.75	216.07	215.92	215.70	215.50	215.29
13	216.69	216.56	216.51	216.10	---	---	215.73	216.06	215.92	215.70	215.50	215.34
14	216.73	216.57	216.50	216.11	---	---	215.72	216.05	215.91	215.69	215.49	215.36
15	216.79	216.58	216.49	216.09	---	---	215.75	216.03	215.90	215.64	215.48	215.36
16	216.71	216.61	216.47	216.02	---	---	215.82	216.01	215.89	215.60	215.48	215.36
17	216.74	216.62	216.48	216.02	---	---	215.84	216.00	215.87	215.60	215.47	215.34
18	216.83	216.62	216.49	215.99	---	---	215.83	216.01	215.86	215.59	215.46	215.34
19	216.86	216.61	216.50	215.99	---	---	215.83	216.02	215.86	215.58	215.42	215.35
20	216.89	216.61	216.51	215.95	---	---	215.83	216.01	215.85	215.57	215.40	215.34
21	216.84	216.61	216.49	215.90	---	---	215.86	216.01	215.84	215.59	215.40	215.33
22	216.83	216.61	216.47	---	---	---	215.89	215.99	215.84	215.59	215.40	215.32
23	216.82	216.61	216.45	---	---	---	215.94	215.98	215.86	215.59	215.44	215.34
24	216.82	216.61	216.44	---	---	---	215.97	215.97	215.87	215.54	215.46	215.30
25	216.83	216.62	216.45	---	---	---	215.97	215.98	215.86	215.53	215.42	215.26
26	216.82	216.62	216.42	---	---	---	215.96	215.98	215.84	215.55	215.40	215.26
27	216.81	216.61	216.40	---	---	---	215.97	215.95	215.82	215.63	215.40	215.26
28	216.80	216.62	216.41	---	---	---	215.98	215.93	215.81	215.67	215.41	215.23
29	216.79	216.61	216.42	---	---	---	215.97	215.92	215.78	215.62	215.41	215.23
30	216.79	216.60	216.45	---	---	---	215.98	215.92	215.75	215.59	215.40	215.24
31	216.79	---	216.46	---	---	---	---	215.92	---	215.59	215.38	---
MEAN	216.79	216.61	216.49	---	---	---	---	215.99	215.88	215.65	215.48	215.32
MAX	216.89	216.69	216.59	---	---	---	---	216.07	215.96	215.79	215.60	215.38
MIN	216.69	216.56	216.40	---	---	---	---	215.92	215.75	215.53	215.38	215.23



GROUND-WATER LEVELS

HAWAII, ISLAND OF KAUAI—Continued

215906159395601. Local number, 2-5939-01. Waimea Shaft, Kauai.

LOCATION.--Lat 21°59', long 159°40', Old Hawaiian Datum, Hydrologic Unit 20070000, 2.3 mi north northeast of Waimea Recreational Pier State Park, and 3.2 mi northeast from Oomano Point.

AQUIFER.--Waimea Canyon Basalt, Miocene to Pliocene age.

WELL CHARACTERISTICS.--Drilled 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 2002.

REVISED RECORDS.--WDR HI-94-1: 1988-93 (the minimum water level for the period of record). WDR HI-01-1: 1988-01 (the maximum water level for the period of record)

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 10.57 ft above mean sea level, December 11, 1986; 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.--Well is presently unused.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 13	9.22	FEB 04	9.40	MAR 28	9.18	JUN 05	9.18	AUG 22	9.16

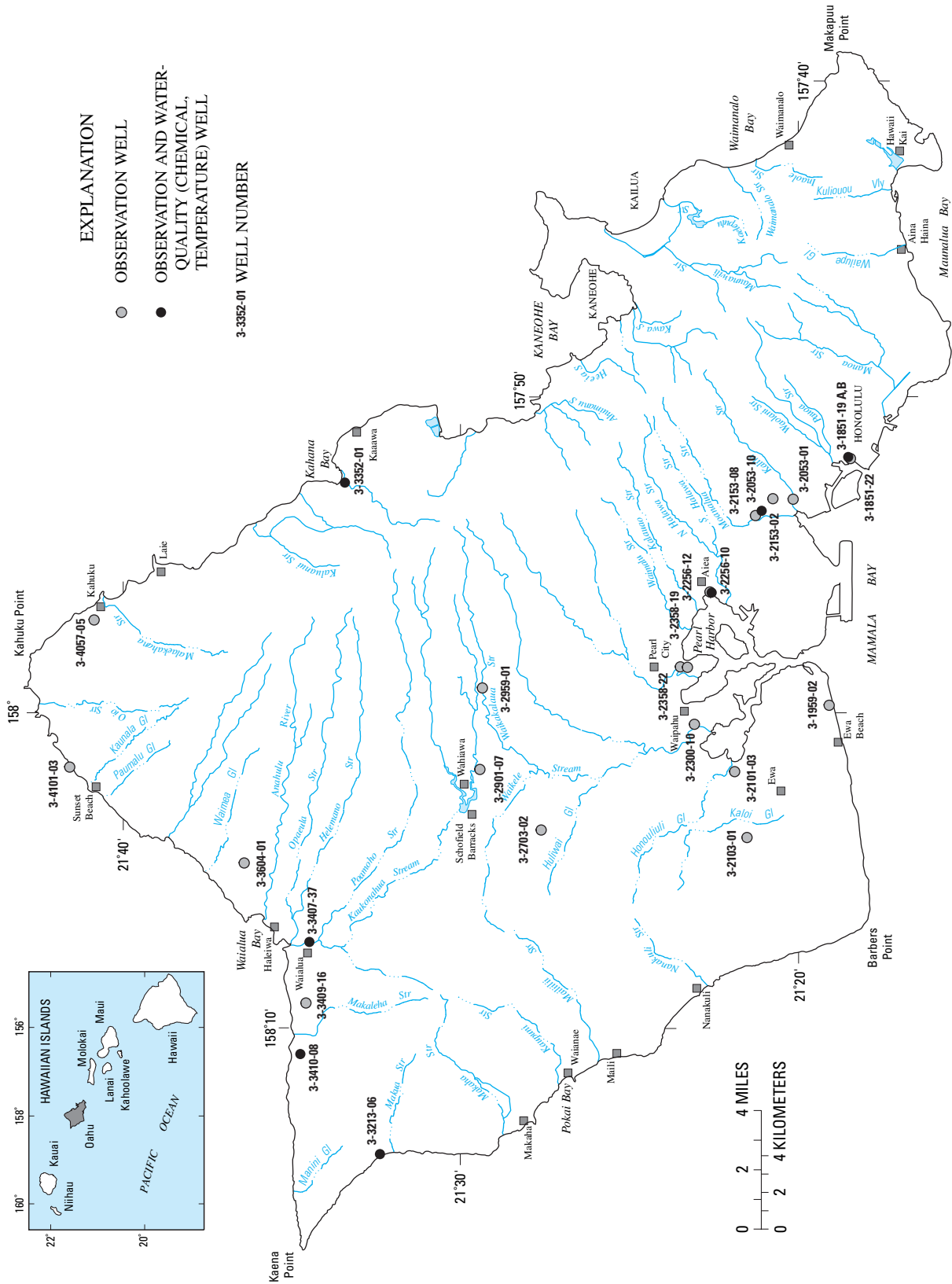


Figure 17. Locations of observation wells and ground-water quality sampling sites on Oahu.

GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU

211832157515501. Local number and name, 3-1851-19 Halekauwila Street, Pipe A, Oahu.

LOCATION.--Lat 21°19', long 157°52', Old Hawaiian Datum, Hydrologic Unit 20060000, corner of Richards and Halekauwila Streets, adjacent to Ala Moana Boulevard.

AQUIFER.--Koolau Basalt, Pliocene to Pleistocene 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 are 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, 3.89 ft above mean sea level, September 29, 2003.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 10	4.20	DEC 09	5.02	JAN 23	4.90	SEP 29	3.89

GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

211832157515502. Local number and name, 3-1851-19 Halekauwila Street, Pipe B, Oahu.

LOCATION.--Lat 21°19', long 157°52', Old Hawaiian Datum, Hydrologic Unit 20060000, corner of Richards and Halekauwila Streets, adjacent to Ala Moana Boulevard.

AQUIFER.--Koolau Basalt, Pliocene to Pleistocene 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, 10.06 ft above mean sea level, September 29, 2003.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 10	10.75	JAN 23	11.87	MAR 10	12.20	APR 25	12.24	JUL 10	10.59	SEP 29	10.06

GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

211828157515801. Local number and name, 3-1851-22, Ala Moana Blvd., Oahu.

LOCATION.--Lat 21°18', long 157°52', Old Hawaiian Datum, Hydrologic Unit 20060000, northeast corner of the mini-park at the intersection of Richards Street and Ala Moana Boulevard.

AQUIFER.--Koolau Basalt, Pliocene to Pleistocene 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, 14.17 ft, above mean sea level, September 29, 2003.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 10	14.68	JAN 23	15.85	MAR 10	16.09	APR 18	16.23	JUN 16	15.16	SEP 29	14.17

GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

211907157594701. Local number and name, 3-1959-05 Fort Weaver Road, Oahu.

LOCATION.--Lat 21°19', long 158°00', Old Hawaiian Datum, Hydrologic Unit 20060000, 600 ft northwest of Ewa Beach Park, and 1.2 mi southeast of Campbell High School.

AQUIFER.--Koolau Basalt, Pliocene to Pleistocene 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.

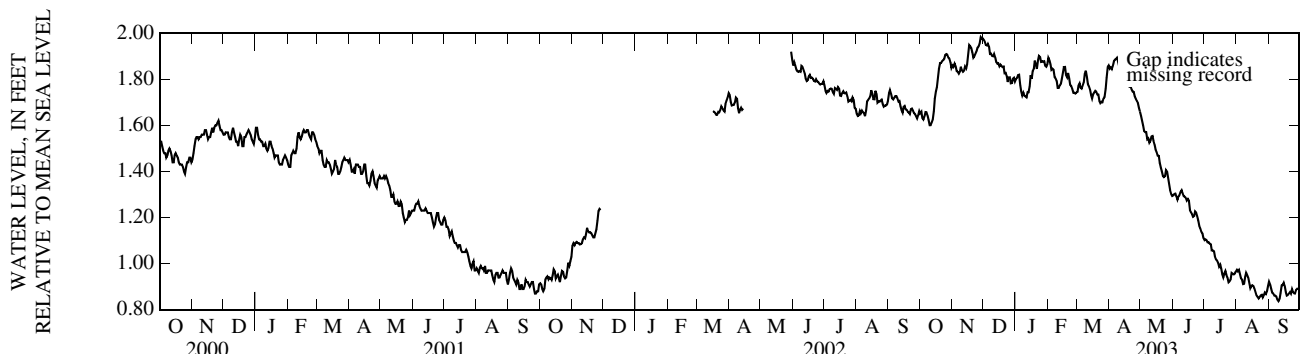
REMARKS.--Geophysical log and water-quality records are available in files of USGS Hawaii district office.

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 RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.65	1.86	1.97	1.80	1.89	1.75	1.85	1.64	1.30	1.10	0.97	0.92
2	1.66	1.85	1.96	1.81	1.88	1.77	1.85	1.62	1.30	1.10	0.97	0.91
3	1.63	1.87	1.95	1.82	1.87	1.78	1.84	1.60	1.30	1.10	0.97	0.89
4	1.63	1.86	1.95	1.82	1.84	1.76	1.86	1.58	1.29	1.09	0.95	0.87
5	1.64	1.84	1.96	1.78	1.85	1.76	1.88	1.57	1.28	1.09	0.94	0.87
6	1.66	1.83	1.94	1.75	1.84	1.77	1.89	1.57	1.29	1.09	0.93	0.86
7	1.66	1.82	1.91	1.73	1.81	1.79	1.89	1.54	1.30	1.08	0.91	0.86
8	1.64	1.83	1.91	1.74	1.81	1.82	1.89	1.54	1.31	1.06	0.91	0.86
9	1.62	1.86	1.90	1.73	1.79	1.84	1.88	1.53	1.32	1.06	0.94	0.84
10	1.60	1.84	1.90	1.73	1.76	1.81	1.86	1.53	1.31	1.05	0.96	0.84
11	1.60	1.83	1.91	1.72	1.76	1.78	1.86	1.55	1.29	1.03	0.95	0.85
12	1.61	1.84	1.90	1.74	1.77	1.77	1.83	1.55	1.29	1.02	0.94	0.87
13	1.62	1.86	1.88	1.74	1.78	1.76	1.81	1.53	1.29	1.01	0.91	0.90
14	1.66	1.85	1.87	1.77	1.80	1.73	1.81	1.52	1.27	1.00	0.89	0.91
15	1.72	1.87	1.87	1.82	1.83	1.72	1.80	1.50	1.28	0.99	0.90	0.92
16	1.75	1.91	1.86	1.80	1.85	1.74	1.83	1.48	1.27	1.00	0.91	0.90
17	1.77	1.95	1.86	1.84	1.85	1.74	1.81	1.47	1.23	0.98	0.90	0.88
18	1.81	1.94	1.86	1.85	1.82	1.75	1.81	1.47	1.22	0.95	0.89	0.86
19	1.85	1.94	1.85	1.88	1.81	1.75	1.78	1.44	1.21	0.94	0.88	0.86
20	1.87	1.92	1.86	1.87	1.83	1.74	1.77	1.42	1.20	0.96	0.86	0.87
21	1.87	1.89	1.83	1.85	1.80	1.73	1.77	1.40	1.21	0.97	0.86	0.88
22	1.88	1.90	1.83	1.88	1.78	1.71	1.76	1.38	1.23	0.95	0.85	0.87
23	1.88	1.91	1.82	1.90	1.77	1.70	1.75	1.38	1.22	0.94	0.86	0.89
24	1.89	1.92	1.79	1.90	1.76	1.70	1.75	1.38	1.21	0.92	0.86	0.88
25	1.91	1.94	1.81	1.88	1.74	1.70	1.73	1.41	1.19	0.92	0.86	0.87
26	1.91	1.94	1.81	1.88	1.74	1.72	1.72	1.40	1.16	0.93	0.85	0.87
27	1.91	1.95	1.78	1.88	1.74	1.72	1.71	1.37	1.15	0.96	0.86	0.89
28	1.89	1.98	1.78	1.88	1.74	1.76	1.70	1.34	1.14	0.95	0.87	0.89
29	1.89	1.98	1.80	1.86	---	1.81	1.68	1.32	1.13	0.95	0.87	0.89
30	1.87	1.98	1.81	1.85	---	1.85	1.66	1.30	1.11	0.96	0.88	0.89
31	1.85	---	1.79	1.86	---	1.86	---	1.29	---	0.96	0.90	---
MEAN	1.75	1.89	1.87	1.82	1.80	1.76	1.80	1.47	1.24	1.00	0.90	0.88
MAX	1.91	1.98	1.97	1.90	1.89	1.86	1.89	1.64	1.32	1.10	0.97	0.92
MIN	1.60	1.82	1.78	1.72	1.74	1.70	1.66	1.29	1.11	0.92	0.85	0.84



GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

212010157531501. Local number and name, 3-2053-08 Kalihi, Oahu.

LOCATION.--Lat 21°20', long 157°53', Old Hawaiian Datum, Hydrologic Unit 20060000, 0.5 mi west of Farrington High School, and 0.5 mi north of Puuhale School.

AQUIFER.--Koolau Basalt, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled flowing artesian well, depth 607 ft, 10-in. casing diameter. .

DATUM.--Elevation of land-surface datum is 10.5 ft. Measuring point is top of concrete manhole frame, elevation 10.48 ft above mean sea level.

REMARKS.--Prior to October 2001, unpublished records in files of the USGS Hawaii district office.

PERIOD OF RECORD.--Water level: occasional measurements, April 1910 to September 1931, January 1935 to December 1956, September 2000 to current year. Water quality: occasional measurements, January 1912 to October 1915, March 1924 to March 1928.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 31.42 ft above mean sea level, March 1911; lowest measured, 16.68 ft above mean sea level, June 16, 2003.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 10	17.04	JAN 23	17.52	APR 18	17.32	SEP 29	17.32
DEC 09	17.42	MAR 10	17.18	JUN 16	16.68		

GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

212046157531401. Local number and name, 3-2053-10, Fort Shafter Well, Oahu.

LOCATION.--Lat 21°21', long 157°53', Old Hawaiian Datum, Hydrologic Unit 20060000, in Fort Shafter, about 1,000 ft east of Buckner Gate, and 100 ft north of Fort Shafter Elementary School.

AQUIFER.--Koolau Basalt, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Drilled well, depth 279 ft, 12-in. casing diameter, cased to 169 ft.

DATUM.--Elevation of land-surface datum is 20 ft. Measuring point is a chiseled "1 1" on top of 8-inch casing (flange removed), at south end of pump house (Bldg. 509), 24.90 ft above mean sea level.

REMARKS.--Prior to January 2000, unpublished records are available in files of USGS Hawaii District office.

PERIOD OF RECORD.--Occasional water quality measurements, December 1915 to November 1972. Occasional water level measurements, December 1915 to September 1931, January 2000 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 31.82 ft above mean sea level, April 1917; lowest measured, 16.67 ft above mean sea level, September 03, 2003.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 01	17.45	DEC 02	17.87	FEB 03	17.85	APR 01	17.79	JUN 04	17.13	AUG 01	16.73
NOV 01	17.63	JAN 03	17.80	MAR 03	17.55	MAY 01	17.61	JUL 01	16.99	SEP 03	16.67

GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

212154158015201. Local number and name, 3-2101-03 Honouliuli, Oahu.

LOCATION.--Lat 21°22', long 158°02', Old Hawaiian Datum, Hydrologic Unit 20060000, 0.4 mi southeast of Honouliuli, and 0.5 mi north of St. Francis Hospital.

AQUIFER.--Koolau Basalt, Pliocene to Pleistocene 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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	17.23	JAN 23	17.36	MAY 15	16.81	AUG 11	16.05
DEC 16	17.34	MAR 21	17.12	JUN 24	16.47		

GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

212132158035701. Local number and name, 3-2103-01 Puu Makakilo, Oahu.

LOCATION.--Lat 21°22', long 158°04', Old Hawaiian Datum, Hydrologic Unit 20060000, 1 mi east of Makakilo, and 2 mi north of Barbers Point Naval Air Station.

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 September 2003 (discontinued). 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, 14.11 ft above mean sea level, August 15, 2002.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	14.37	JAN 23	14.40	MAY 15	14.30	AUG 21	14.17
DEC 16	14.32	MAR 24	14.40	JUN 24	14.33		

GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

212106157533701. Local number and name, 3-2153-02 Moanalua, Oahu.

LOCATION.--Lat 21°21', long 157°54', Old Hawaiian Datum, Hydrologic Unit 20060000, in Pineapple Place near Moanalua School.

AQUIFER.--Koolau Basalt, Pliocene to Pleistocene 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 September 2002.

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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	17.60	JAN 27	17.80	MAY 15	17.24	AUG 21	16.54
DEC 18	17.68	APR 01	17.72	JUN 25	16.86		

GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

212117157534601. Local number and name, 3-2153-08 Tripler Army Medical Center, Oahu.

LOCATION.--Lat 21°21', long 157°54', Old Hawaiian Datum, 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.

AQUIFER.--Koolau Basalt, Pliocene to Pleistocene 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, 16.34 ft above mean sea level, August 1, 2003.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 01	17.14	DEC 02	17.52	FEB 03	17.42	APR 01	17.47	JUN 04	16.78	AUG 01	16.34
NOV 01	17.39	JAN 03	17.46	MAR 03	17.18	MAY 01	17.19	JUL 01	16.53	SEP 03	16.37

GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

212238157561101. Local number and name, 3-2256-10 Aiea, U.S. Navy (187-B), Oahu.

LOCATION.--Lat 21°23', long 157°56', Old Hawaiian Datum, Hydrologic Unit 20060000, 0.4 mi southwest of Aiea School, and 0.5 mi east of McGrew Point.

AQUIFER.--Koolau Basalt, Pliocene to Pleistocene 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.

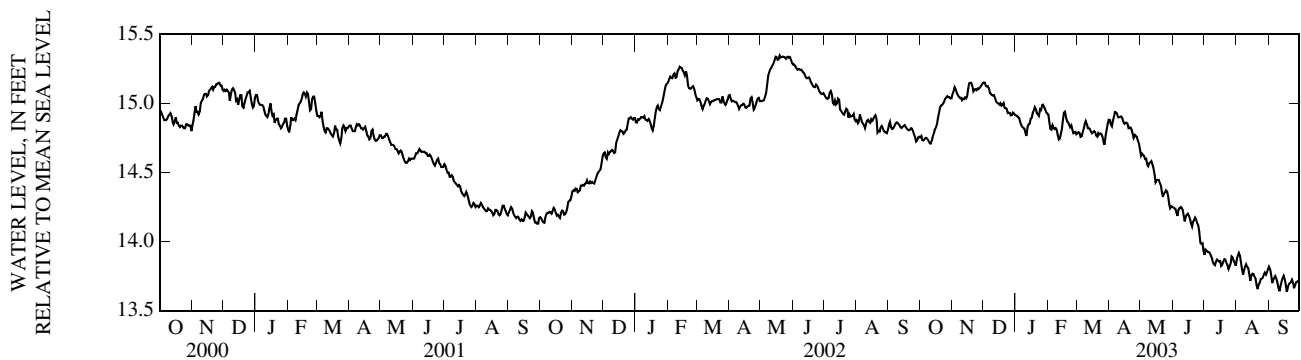
REMARKS.--Water-quality records for 1923, 1928-30, 1934-68, 1972, 1974-75 are available in files of USGS Hawaii District office.

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 RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14.75	15.07	15.15	14.91	14.92	14.78	14.88	14.62	14.25	13.90	13.87	13.82
2	14.76	15.09	15.15	14.91	14.86	14.79	14.85	14.64	14.24	13.94	13.90	13.80
3	14.73	15.12	15.13	14.90	14.81	14.79	14.83	14.63	14.24	13.93	13.92	13.76
4	14.73	15.11	15.12	14.90	14.81	14.76	14.87	14.62	14.21	13.93	13.90	13.70
5	14.74	15.08	15.13	14.87	14.84	14.76	14.91	14.60	14.19	13.93	13.85	13.72
6	14.75	15.06	15.11	14.85	14.82	14.79	14.94	14.60	14.23	13.92	13.80	13.74
7	14.75	15.05	15.08	14.83	14.82	14.82	14.94	14.56	14.24	13.90	13.76	13.75
8	14.74	15.04	15.07	14.82	14.82	14.85	14.93	14.54	14.25	13.88	13.79	13.73
9	14.73	15.04	15.06	14.82	14.81	14.87	14.90	14.57	14.25	13.85	13.82	13.70
10	14.71	15.02	15.06	14.79	14.77	14.85	14.90	14.57	14.23	13.84	13.84	13.66
11	14.71	15.04	15.06	14.77	14.74	14.82	14.90	14.58	14.19	13.83	13.82	13.64
12	14.73	15.03	15.03	14.83	14.75	14.82	14.91	14.56	14.15	13.86	13.81	13.68
13	14.76	15.04	15.01	14.85	14.78	14.81	14.89	14.53	14.18	13.87	13.76	13.71
14	14.78	15.04	15.00	14.85	14.81	14.79	14.87	14.48	14.19	13.86	13.72	13.73
15	14.81	15.05	15.00	14.89	14.88	14.78	14.85	14.43	14.20	13.86	13.76	13.75
16	14.83	15.11	14.99	14.90	14.93	14.79	14.86	14.44	14.19	13.86	13.77	13.73
17	14.85	15.15	15.00	14.93	14.94	14.80	14.86	14.45	14.17	13.82	13.77	13.68
18	14.90	15.15	14.98	14.95	14.90	14.79	14.86	14.45	14.13	13.83	13.75	13.64
19	14.93	15.15	14.99	14.97	14.87	14.77	14.82	14.43	14.11	13.85	13.73	13.67
20	14.97	15.13	15.00	14.96	14.86	14.76	14.83	14.41	14.14	13.87	13.69	13.69
21	14.98	15.09	14.97	14.93	14.85	14.79	14.83	14.36	14.15	13.87	13.66	13.70
22	14.99	15.10	14.97	14.92	14.83	14.78	14.81	14.32	14.17	13.84	13.69	13.71
23	15.00	15.10	14.96	14.91	14.84	14.78	14.78	14.35	14.16	13.83	13.70	13.73
24	15.01	15.10	14.93	14.96	14.82	14.78	14.75	14.36	14.13	13.80	13.73	13.70
25	15.03	15.11	14.93	14.95	14.79	14.76	14.77	14.37	14.12	13.82	13.73	13.66
26	15.04	15.10	14.93	14.99	14.79	14.72	14.77	14.36	14.07	13.84	13.74	13.68
27	15.05	15.11	14.91	14.99	14.79	14.70	14.76	14.33	13.99	13.89	13.76	13.70
28	15.05	15.12	14.92	14.97	14.78	14.77	14.73	14.27	13.98	13.88	13.77	13.71
29	15.05	15.13	14.93	14.96	---	14.81	14.71	14.24	13.99	13.86	13.76	13.72
30	15.04	15.15	14.93	14.94	---	14.85	14.67	14.26	13.94	13.85	13.78	13.71
31	15.04	---	14.92	14.93	---	14.88	---	14.25	---	13.82	13.80	---
MEAN	14.87	15.09	15.01	14.90	14.83	14.79	14.84	14.46	14.16	13.87	13.78	13.71
MAX	15.05	15.15	15.15	14.99	14.94	14.88	14.94	14.64	14.25	13.94	13.92	13.82
MIN	14.71	15.02	14.91	14.77	14.74	14.70	14.67	14.24	13.94	13.80	13.66	13.64



GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

212238157561102. Local number and name, 3-2256-12 Aiea, U.S. Navy (187-C), Oahu.

LOCATION.--Lat 21°23', long 157°56', Old Hawaiian Datum, Hydrologic Unit 20060000, 0.4 mi southwest of Aiea School, and 0.5 mi east of McGrew Point.

AQUIFER.--Koolau Basalt, Pliocene to Pleistocene 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 September 2003 (discontinued). Water quality: occasional measurements, January 1928 to November 1929, 1930-31, 1934, 1947, December 1966, September 1972 to September 2003.

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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	15.04	JAN 27	15.02	MAY 15	14.39	SEP 03	13.83
DEC 19	15.00	MAR 24	14.79	JUN 23	14.18		

GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

212318157583401. Local number and name, 3-2358-19 Pearl City Peninsula, Oahu.

LOCATION.--Lat 21°23', long 157°59', Old Hawaiian Datum, Hydrologic Unit 20060000, 0.3 mi southwest of Lehua Elementary School, and 0.7 mi south of Pearl City Elementary School.

AQUIFER.--Koolau Basalt, Pliocene to Pleistocene 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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	14.31	JAN 27	14.38	MAY 15	13.86	AUG 29	<13.30
DEC 18	14.33	APR 01	14.20	JUN 23	13.61		

GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

212738158034301. Local number and name, 3-2703-02 Kunia basal monitor well, Oahu.

LOCATION.--Lat 21°28', long 158°04', Old Hawaiian Datum, Hydrologic Unit 20060000, 2.9 mi southwest of Kaala School, 0.4 mi southeast of Kunia school and 2.2 mi east of Mililani Golf Course.

AQUIFER.--Waianae Volcanics, Pliocene age.

WELL CHARACTERISTICS.--Drilled basal water-table well, depth 993.5 ft, 8-in. casing diameter, solid casing to 820.5 ft. and perforated casing from 820.5 ft to 971.1 ft.

DATUM.--Elevation of land-surface datum is 849.5 ft. Measuring point is top of 3-in. PVC pipe, elevation is 852.38 ft above mean sea level.

REMARKS.--Data is given to cooperator after each measurement.

PERIOD OF RECORD.--Water level: occasional measurements, January 2001 to current year.

EXTREMES FOR PERIOD OF RECORD.-- Highest water level measured, 20.17 ft above mean sea level, January 23, 2003; lowest measured, 18.25 ft above mean sea level, October 26, 2001.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	20.14	JAN 23	20.17	MAY 15	19.70	AUG 25	18.54
DEC 17	20.13	MAR 20	19.89	JUN 27	19.20		

HAWAII, ISLAND OF OAHU—Continued

212813158080201. Local number and name, 3-2808-01 Nanakuli, Oahu.

LOCATION.--Lat 21°28'13", long 158°08'04", Old Hawaiian Datum, 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.

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 September 2003 (discontinued). 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 RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JAN 24	429.64	MAR 21	430.34	MAY 13	430.34	JUN 25	428.96	AUG 27	425.73

GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

212927158014801. Local number and name, 3-2901-07 Schofield Shaft, Oahu.

LOCATION.--Lat 21°29', long 158°02', Old Hawaiian Datum, Hydrologic Unit 20060000, across the main gate of Wheeler Air Force Base, and 1,200 ft south of Wahiawa bridge on Kaukonahua Stream.

AQUIFER.--Koolau Basalt, Pliocene to Pleistocene 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. Measuring point is top of 2-inch pipe for float tape cable (cap removed) 287.16 ft. above mean sea level.

REMARKS.--Maximum and minimum daily water levels are published due to the fluctuations in the water level caused by pumping.

PERIOD OF RECORD.-- Water level: water-level recorder, November 1938 to current year. Water quality: occasional measurements, 1966-72, 1975 to current year.

REVISED RECORDS.--WDR HI-99-1: Elevation of land-surface datum and measuring point. WDR HI-99-1: (m) based on non-pumping values.

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 above mean sea level, May 1, 1985.

WATER LEVEL, IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DAY	MAX		MIN		MAX		MIN		MAX		MIN		MAX		MIN	
	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH										
1	273.02	272.01	273.26	272.88	273.27	273.00	273.36	272.42	273.46	273.11	273.14	272.49				
2	272.82	272.04	273.15	272.85	273.38	272.52	272.82	272.46	273.38	273.14	273.21	272.49				
3	272.81	272.01	273.14	272.85	272.57	272.47	272.83	272.50	273.48	272.64	273.30	272.46				
4	272.82	272.43	273.09	272.43	272.78	272.51	272.85	272.56	272.88	272.61	273.14	272.43				
5	272.67	272.43	272.49	272.41	272.79	272.55	272.79	272.47	272.87	272.61	273.11	272.37				
6	272.67	272.45	273.12	272.31	272.82	272.51	273.13	272.66	272.90	272.55	273.12	272.43				
7	272.85	272.04	272.47	272.40	272.75	272.47	273.28	272.42	272.79	272.55	273.09	272.43				
8	272.30	272.04	273.27	272.39	272.76	272.49	273.24	273.01	272.82	272.52	273.15	272.46				
9	272.24	272.04	273.30	272.33	273.03	272.51	273.24	273.01	272.81	272.52	273.12	272.40				
10	272.19	272.03	272.45	272.27	273.23	272.98	273.24	272.97	273.18	272.52	273.06	272.40				
11	273.03	272.06	273.03	272.27	273.25	273.00	273.22	272.47	273.24	272.52	273.11	272.41				
12	272.22	272.04	273.06	272.27	273.27	273.03	273.24	273.02	273.36	273.08	273.08	272.43				
13	272.28	272.06	273.11	272.88	273.27	273.01	273.24	272.56	273.33	273.05	273.11	272.41				
14	272.76	272.19	273.11	272.88	273.27	273.00	272.83	272.56	273.27	273.06	273.03	272.40				
15	272.99	272.73	273.12	272.97	273.23	273.00	272.87	272.57	273.24	273.18	273.03	272.40				
16	273.15	272.75	273.18	273.11	273.23	272.40	272.81	272.56	273.22	273.03	273.00	272.15				
17	272.94	272.71	273.18	272.97	272.80	272.58	272.90	272.49	273.21	272.49	273.00	272.27				
18	272.94	272.76	273.15	272.49	272.85	272.50	272.89	272.59	273.14	272.46	272.95	272.27				
19	272.99	272.79	272.75	272.49	272.85	272.64	272.92	272.59	273.30	272.51	272.99	272.28				
20	273.03	272.25	272.75	272.49	272.85	272.64	273.28	272.89	273.21	272.55	272.55	272.28				
21	273.14	272.40	272.78	272.47	272.80	272.47	273.29	272.99	273.33	272.52	272.57	272.30				
22	272.97	272.40	272.75	272.47	273.09	272.38	273.48	273.14	273.21	272.45	272.52	272.28				
23	273.00	272.25	272.76	272.49	273.15	272.42	273.46	273.18	273.14	272.45	272.58	272.28				
24	273.03	272.25	272.78	272.51	273.17	272.96	273.36	273.16	273.15	272.37	272.57	272.28				
25	273.21	272.43	273.27	272.57	273.21	273.00	273.38	273.05	273.16	272.33	272.99	272.39				
26	273.11	272.43	273.24	272.99	273.28	272.94	273.33	273.05	273.21	272.54	273.06	272.22				
27	273.08	272.45	273.27	272.99	273.13	272.94	273.39	273.12	273.15	272.54	273.05	272.81				
28	273.08	272.43	273.29	273.00	273.23	273.00	273.44	273.09	273.15	272.47	273.06	272.76				
29	273.11	272.49	273.26	272.99	273.25	273.00	273.44	273.12	---	---	273.08	272.97				
30	273.11	272.87	273.29	273.00	273.23	273.00	273.39	273.06	---	---	273.11	272.79				
31	273.09	272.88	---	---	273.25	272.53	273.30	273.12	---	---	273.03	272.79				
MONTH	273.21	272.01	273.30	272.27	273.38	272.38	273.48	272.42	273.48	272.33	273.30	272.15				

GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

212934157592301. Local number and name, 3-2959-01 Schofield, Army MW2-5, Oahu.

LOCATION.--Lat 21°30', long 157°59', Old Hawaiian Datum, Hydrologic Unit 20060000, inside "East Range" remote area, 0.1 mile east of USGS gaging station 16208000, and 2.4 miles east of Wahiawa Post Office.

AQUIFER.--Koolau Basalt, Pliocene to Pleistocene age.

WELL CHARACTERISTICS.--Depth 775 ft., 6 1/2-inch casing diameter, cased to 625 ft. (solid) and 775 ft. (perforated)..

DATUM.--Elevation of land-surface datum is 910 ft. Measuring point is top of sounding tube with an elevation of 912.20 ft. above mean sea level.

PERIOD OF RECORD.-- Water level: occasional measurements, December 2001 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 272.48 ft. above mean sea level, March 4, 2003; lowest measured, 271.05 ft. above mean sea level, December 4, 2001.

WATER SURFACE ELEVATION IN FEET (NGVD1929), WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 03	272.15	JAN 07	272.47	MAY 05	272.05	AUG 19	271.20
NOV 18	272.39	MAR 04	272.48	JUN 17	271.69		

GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

213224158135901. Local number and name, 3-3213-06 Makua, U.S. Air Force, Oahu.

LOCATION.--Lat 21°32', long 158°14', Old Hawaiian Datum, Hydrologic Unit 20060000, along Farrington Highway, 1.2 miles north of Makua Cave, and 1.0 mile southeast of Yokohama Bay.

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 March 2002.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 7.92 ft above mean sea level, January 2, 1975; lowest measured, 6.39 ft above mean sea level, March 12, 2002.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 01	6.54	JAN 24	6.54	APR 01	6.47	MAY 13	6.52	JUN 24	6.61	AUG 22	6.63

GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

213430158071601. Local number and name, 3-3407-37 Kiiikii Exploratory Well, Oahu.

LOCATION.--Lat 21°34', long 158°07', Old Hawaiian Datum, Hydrologic Unit 20060000, 2.75 miles down Haleiwa Beach Road from Weed Circle heading southwest and 0.5 miles northeast of Waiialua Elementary School.

AQUIFER.--Koolau Basalt, Pliocene to Pleistocene age

WELL CHARACTERISTICS.--Drilled flowing well, depth 135 ft., surface casing steel, diameter 8 5/8-inch, inner casing 4 1/2-inch PVC, cased to 115 ft.

DATUM.--Elevation of land-surface datum is 5 ft. Measuring point is top of casing, 14.68 ft. above mean sea level.

LEVELS -- Date of last levels -- unknown

REMARKS.--Prior to October 2000, unpublished records in files of the U.S. Geological survey

PERIOD OF RECORD.-- Water level: occasional measurements, August 1994 to current year. Water quality: occasional measurements, October 2000 to September 2002.

EXTREMES FOR PERIOD OF RECORD.-- Highest water level measured, 11.60 ft. above mean sea level, February 13, 1995; lowest 10.96 ft. above mean sea level, May 13, 2003.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 16	11.34	NOV 21	11.28	MAR 18	11.04	MAY 13	10.96	JUN 26	11.20	SEP 03	11.34

GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

213438158091101. Local number and name, 3-3409-16 Mokuleia, Oahu.

LOCATION.--Lat 21°35', long 158°09', Old Hawaiian Datum, Hydrologic Unit 20060000, 1.6 mi west of Waialua High School, 2.6 mi east of Mokuleia Beach Park along Farrington Highway.

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, 15.86 ft above mean sea level, September 9, 2003.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 16	16.51	JAN 08	16.19	MAY 13	16.06	SEP 09	15.86
NOV 21	16.27	MAR 13	16.06	JUN 26	16.06		

GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

213446158104901. Local number and name, 3-3410-08 Kawaihapai, Mokuleia, Oahu.

LOCATION.--Lat 21°35', long 158°11', Old Hawaiian Datum, Hydrologic Unit 20060000, 0.5 mi east of Dillingham Airfield, and 1.1 mi southeast of Mokuleia Beach Park.

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. On June 14, 2000, measuring point was changed to top of 1 1/2 inch drain pipe at bottom of 12-inch stilling well, 14.50 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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 16	17.26	NOV 21	17.12	JAN 08	17.12	MAR 13	16.98	MAY 13	17.02	SEP 02	17.02

GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

213626158044601. Local number and name, 3-3604-01 Kawaihoa Deep Monitoring Well, Oahu.

LOCATION.--Lat 21°36', long 158°05', Old Hawaiian Datum, Hydrologic Unit 20060000, 12.6 miles northwest of Weed Circle and 1.0 miles north of Anahulu Gulch.

AQUIFER.--Koolau, Basalt, Pliocene to Pleistocene age

WELL CHARACTERISTICS.--Drilled well, depth 701 ft., surface casing diameter 8 5/8-in., cased to 69 ft., inner casing 4 1/2 -in., cased to 701 ft., bottom 400 ft. screened.

DATUM.--Elevation of land-surface datum is 308 ft. Measuring point is located on the top of the casing, 309.01 ft. above mean sea level.

LEVELS.--Dates of last levels -- unknown.

REMARKS.--Prior to September 2000, unpublished records in files of the U.S. Geological Survey.

PERIOD OF RECORD.-- Water level: occasional measurements, January 1994 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.12 ft. above mean sea level, April 18, 2001; lowest 3.81 ft. above mean sea level, April 10, 1995.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 08	4.44	JAN 08	4.33	MAY 09	3.99	AUG 25	4.35
NOV 20	4.36	MAR 12	4.15	JUN 23	4.10		

GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

214053157570401. Local number and name, 3-4057-05 Kahuku, Oahu.

LOCATION.--Lat 21°41', long 157°57', Old Hawaiian Datum, Hydrologic Unit 20060000, 0.4 mi northeast of Kahuku Hospital, and 500 ft north of Kahuku High School.

AQUIFER.--Koolau Basalt, Pliocene to Pleistocene 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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 09	12.04	JAN 30	11.97	APR 22	11.79	AUG 08	11.67
NOV 26	12.07	MAR 11	11.86	JUN 12	11.60		

GROUND-WATER LEVELS

HAWAII, ISLAND OF OAHU—Continued

214125158013401. Local number and name, 3-4101-03 Waialea, Oahu.

LOCATION.--Lat 21°41', long 158°02', Old Hawaiian Datum, Hydrologic Unit 20060000, 1,500 ft northeast of University of Hawaii agriculture experiment station in Waialea, and 1.9 mi northeast of Sunset Beach.

AQUIFER.--Koolau Basalt, Pliocene to Pleistocene 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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 09	12.63	JAN 30	12.90	APR 22	12.52	AUG 08	12.51
NOV 26	12.84	MAR 11	12.59	JUN 12	12.56		

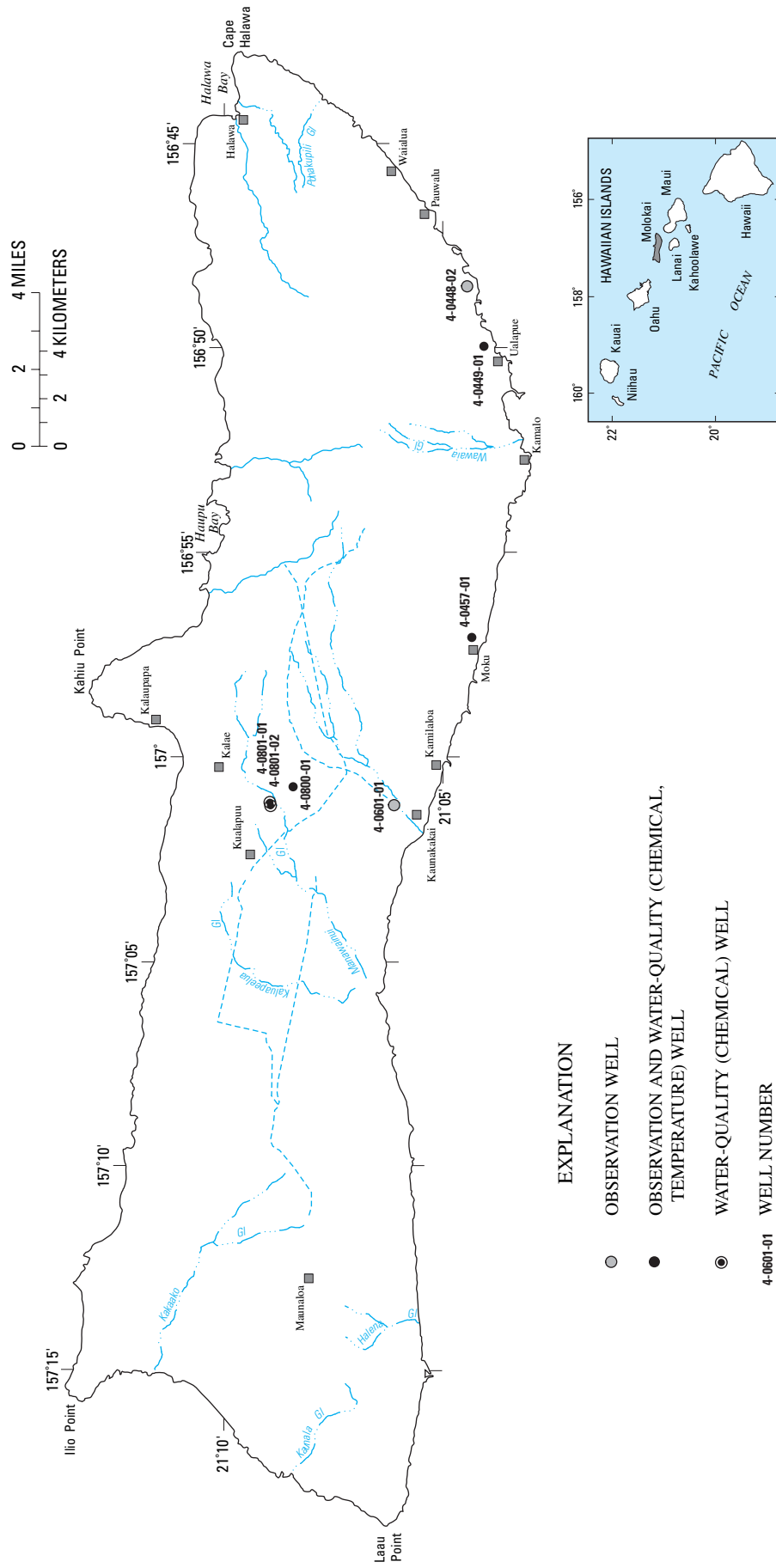


Figure 18. Locations of observation wells and ground-water quality sampling sites on Molokai.

GROUND-WATER LEVELS

HAWAII, ISLAND OF MOLOKAI

210425156483001. Local number, 4-0448-02. Mapulehu Shaft 2, Molokai.

LOCATION.--Lat 21°04', long 156°49', Old Hawaiian Datum, Hydrologic Unit 20050000, 100 ft north of Highway 45, and 0.8 mi west of Pukoo.

AQUIFER.--East Molokai Volcanics, Pliocene age.

WELL CHARACTERISTICS.--Dug 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, 1993-2000, 2003.

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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	4.14	DEC 03	4.07	FEB 03	4.19	APR 07	4.12	JUL 28	3.98

GROUND-WATER LEVELS

HAWAII, ISLAND OF MOLOKAI—Continued

210402156495801. Local number, 4-0449-01. Ualapue Shaft, Molokai.

LOCATION.--Lat 21°04', long 156°50', Old Hawaiian Datum, Hydrologic Unit 20050000, 1,800 ft north of Ualapue Fishpond, and 0.5 mi northeast of Kilohana School.

AQUIFER.--East Molokai Volcanics, Pliocene age.

WELL CHARACTERISTICS.--Dug 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 2002.

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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	3.13	DEC 03	3.04	FEB 03	3.09	APR 07	3.09	JUL 28	3.05

GROUND-WATER LEVELS

HAWAII, ISLAND OF MOLOKAI—Continued

210419156570501. Local number, 4-0457-01. Kawela Shaft, Molokai.

LOCATION.--Lat 21°04', long 156°57', Old Hawaiian Datum, Hydrologic Unit 20050000, 0.5 mi northwest of Kakahaia Fishpond, and 0.5 mi northeast of Moku.

AQUIFER.--East Molokai Volcanics, Pliocene age.

WELL CHARACTERISTICS.--Dug 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, 37.56 ft, above mean sea level. New measuring point August. 14, 2001, 37.56 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 2002.

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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	2.30	DEC 03	1.76	FEB 03	1.80	APR 07	1.76	JUL 28	1.83

GROUND-WATER LEVELS

HAWAII, ISLAND OF MOLOKAI—Continued

210605157012001. Local number, 4-0601-01. Kaunakakai, Molokai.

LOCATION.--Lat 21°06', long 157°01', Old Hawaiian Datum, Hydrologic Unit 20050000, 0.6 mi north of Kaunakakai School, and 0.9 mi east of Kalaniana'ole Colony.

AQUIFER.--East Molokai Volcanics, Pliocene age.

WELL CHARACTERISTICS.--Drilled 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, 1954-2000, 2003.

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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	2.69	DEC 03	2.63	FEB 05	2.66	APR 07	2.53	JUL 30	2.64

GROUND-WATER LEVELS

HAWAII, ISLAND OF MAUI

203912156255901. Local number, 6-3925-01. Makena, Maui.

LOCATION.--Lat 20°39', long 156°26', Old Hawaiian Datum, Hydrologic Unit 20020000, 0.8 mi east of Keawalai Church, and 0.9 mi southeast of intersection of Kihei and Makena Roads.

AQUIFER.--Hana Volcanics, Pleistocene age.

WELL CHARACTERISTICS.--Drilled 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, 0.60 ft below mean sea level, May 24, 2001.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 11	.13	JAN 14	-.1	FEB 04	.05	APR 11	-.21	JUL 14	-.19	AUG 12	-.05

GROUND-WATER LEVELS

HAWAII, ISLAND OF MAUI—Continued

204407156215501. Local number, 6-4422-01. Waiohuli Exploratory Well, Kula, Maui

LOCATION.-Lat 20°44', Long 156°21', Old Hawaiian Datum, Hydrologic Unit 20020000, 2.2 miles north-northwest of Keokea and 1.7 miles west of Kula Highway.

AQUIFER.-Honomanu basalt, Pliocene age.

WELL CHARACTERISTICS.-Drilled water-table well, depth 1,924 ft, 4-in. casing diameter, cased to 1,830 ft, screened from 1,830 to 1,920 ft.

DATUM.-Elevation of land-surface datum is 1,864 ft. Measuring point is top of 4-in. well casing, 1,867.56 ft. above mean sea level.

REMARKS.-Water quality sample taken on April 3, 2002. Electric tape calibrated on Apr. 2003. Correction coefficient applied to the depth to water readings after the calibration date.

PERIOD OF RECORD.-Water level: occasional measurements, Sept. 2001 to Aug. 2003 (discontinued).

EXTREMES FOR PERIOD OF RECORD (prior to calibration).-Highest water level measured, 6.11 ft. above mean sea level, Dec. 18, 2001; Lowest measured, 5.58 ft. above mean sea level, Sept. 27, 2001. (subsequent to calibration).- Highest water level measured, 5.92 ft. above mean sea level, Oct. 04, 2002; Lowest measured, 5.05 ft. above mean sea level, Apr. 29, 2003.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 04	5.92	DEC 19	5.78	FEB 10	5.81	APR 29	5.05	JUL 16	5.10	AUG 26	5.18

GROUND-WATER LEVELS

HAWAII, ISLAND OF MAUI—Continued

204827156242201. Local number, 6-4824-01. Kihei exploratory well, Maui

LOCATION.--Lat 20°48', long 156°24', Old Hawaiian Datum, Hydrologic Unit 20020000, on Waiakoa Road 1,000 ft south of intersection with Kalaloe Gulch, and 4 mi east of Kihei.

AQUIFER.--Kula Volcanics, Pleistocene age.

WELL CHARACTERISTICS.--Drilled 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, 3.58 ft above mean sea level, June 14, 2000.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 11	4.09	DEC 19	3.96	FEB 10	3.99	APR 29	3.96	JUL 16	4.05	AUG 26	4.14

GROUND-WATER LEVELS

HAWAII, ISLAND OF MAUI—Continued

204818156310301. Local number, 6-4831-01. Maalaea, Maui.

LOCATION.--Lat 20°48', long 156°31', Old Hawaiian Datum, 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.

AQUIFER.--Wailuku Basalt, Pliocene age.

WELL CHARACTERISTICS.--Drilled 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 Aug. 2003 (discontinued).

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.76 ft above mean sea level, November 30, 1983; lowest measured, 4.66 ft above mean sea level, June 12, 2000.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 08	4.98	DEC 10	4.89	FEB 19	4.82	APR 17	4.93	JUN 23	4.97	AUG 18	5.10

GROUND-WATER LEVELS

HAWAII, ISLAND OF MAUI—Continued

204909156281401. Local number, 6-4928-02. Puunene Airport Shaft, Maui.

LOCATION.--Lat 20°49', long 156°28', Old Hawaiian Datum, Hydrologic Unit 20020000, at Puunene Airport on Mokulele Highway 2.3 mi north of intersection with Kihei Road, Kihei.

AQUIFER.--Honomanu Basalt, Pliocene age.

WELL CHARACTERISTICS.--Dug 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 Aug. 2003 (discontinued).

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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 29	3.86	DEC 02	3.64	FEB 04	3.69	APR 29	3.63	JUL 14	3.67	AUG 12	3.71

GROUND-WATER LEVELS

HAWAII, ISLAND OF MAUI—Continued

205140156304501. Local number, 6-5130-01. Waikapu 1, Maui.

LOCATION.--Lat 20°51', long 156°31', Old Hawaiian Datum, Hydrologic Unit 20020000, 0.5 mi northwest of Waikapu, and 1.0 mi southeast of Wailuku Heights.

AQUIFER.--Wailuku Basalt, Pliocene age.

WELL CHARACTERISTICS.--Drilled 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, 11.21 ft above mean sea level, April 4, 2000.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 01	12.59	JAN 07	11.95	MAR 31	11.94	JUL 10	12.22
NOV 19	12.36	FEB 11	11.48	MAY 14	11.77	AUG 19	11.54

GROUND-WATER LEVELS

HAWAII, ISLAND OF MAUI—Continued

205154156303801. Local number, 6-5130-02. Waikapu 2, Maui.

LOCATION.--Lat 20°52', long 156°31', Old Hawaiian Datum, Hydrologic Unit 20020000, 0.6 mi northwest of Waikapu, and 1.0 mi southeast of Wailuku Heights.

AQUIFER.--Wailuku Basalt, Pliocene age.

WELL CHARACTERISTICS.--Drilled 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, 10.23 ft above mean sea level, October 1, 2002.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 01	10.23	JAN 07	11.18	MAR 31	11.34	JUL 10	11.12
NOV 19	11.14	FEB 11	11.15	MAY 14	11.21	AUG 19	11.15

GROUND-WATER LEVELS

HAWAII, ISLAND OF MAUI—Continued

205305156304401. Local number, 6-5330-05. Shaft 33, well 1, Maui.

LOCATION.--Lat 20°53', long 156°31', Old Hawaiian Datum, 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, 7.83 ft above mean sea level, October 16, 2001.

REMARKS.--Water level affected by pumping of adjacent well in shaft, and by other nearby wells. Well inaccessible October 2002 to October 2003 because of ventilation problems.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL
OCT 01	7.86

GROUND-WATER LEVELS

HAWAII, ISLAND OF MAUI—Continued

205329156305502. Local number, 6-5330-09. Mokuhau Pump 2, Maui.

LOCATION.--Lat 20 53'. long 156 31', Old Hawaiian Datum, Hydrologic Unit 20020000, .5 mi northwest of Wailuku and 0.6 mi west on Mokuhau Road from Market Street.

AQUIFER.--Wailuku Basalt, Pliocene age.

WELL CHARACTERISTICS.--Drilled 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. pipe. 353.79 ft above mean sea level.

PERIOD FOR RECORD.--Chloride samples collected since 1972. Pump removed sometime in 1998 (Sept., Oct., Nov.). Water level: occasional measurements December 1998 to current year.

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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 01	6.68	JAN 07	9.91	MAR 31	8.32	JUL 10	7.60
NOV 19	7.10	FEB 11	9.21	MAY 14	7.30	AUG 19	5.60

GROUND-WATER LEVELS

HAWAII, ISLAND OF MAUI—Continued

205312156321402. Local number, 6-5332-04. Kepaniwai observation well, Maui.

LOCATION.--Lat 20°53', long 156°32", Old Hawaiian Datum, 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.

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, 83.20 ft below land-surface datum, July 6, 2000.

REMARKS.--Water level affected by pumping of nearby well.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 01	81.03	JAN 07	80.78	MAR 31	79.31	JUL 10	79.30
NOV 19	80.59	FEB 11	79.77	MAY 14	79.82	AUG 19	78.15

GROUND-WATER LEVELS

HAWAII, ISLAND OF MAUI—Continued

205419156304401. Local number, 6-5430-03. TH-E Waiehu, Maui.

LOCATION.--Lat 20°54', long 156°31', Old Hawaiian Datum, Hydrologic Unit 20020000, 2,000 ft north of Puuohala Village, and 0.5 mi northwest of Wailuku Sugar Mill reservoir.

AQUIFER.--Wailuku Basalt, Pliocene age.

WELL CHARACTERISTICS.--Drilled 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, 9.08 ft above mean sea level, October 1, 1999.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 01	9.53	JAN 07	11.08	MAR 31	11.66	JUL 10	10.71
NOV 18	10.72	FEB 11	11.79	MAY 14	10.81	AUG 19	10.31

GROUND-WATER LEVELS

HAWAII, ISLAND OF MAUI—Continued

205405156305401. Local number, 6-5430-05. Waiehu deep monitor well, Maui

LOCATION.--Lat 20°55', long 156°31', Old Hawaiian Datum, Hydrologic Unit 20020000, 1.0 mi southwest of intersection of Malaihi Road and Highway 33, and 1.2 mi south of Waihee.

AQUIFER.--Wailuku Basalt, Pliocene age.

WELL CHARACTERISTICS.--Drilled 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.

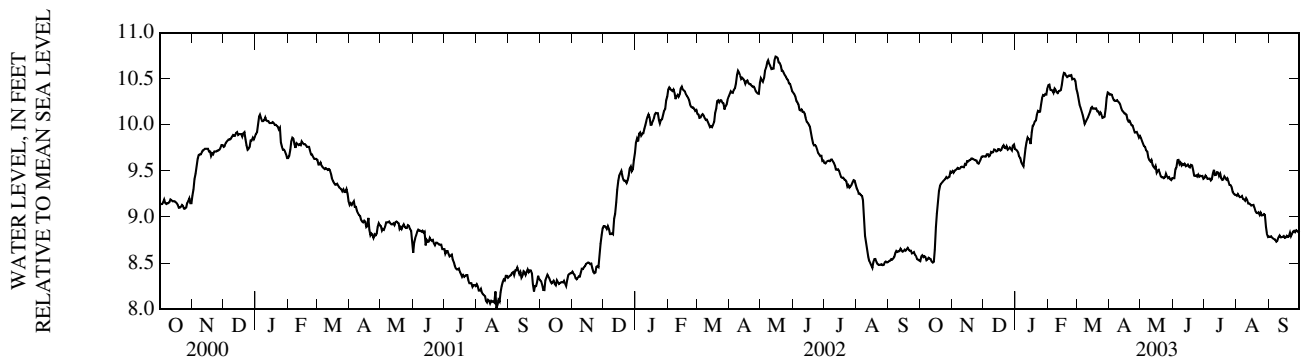
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 18.20 ft above mean sea level, December 14, 1989; lowest measured, 7.66 ft above mean sea level, October 18, 1999.

REMARKS.--Geophysical log and water-quality records are available in files at USGS Hawaii District Office.

WATER LEVEL, IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.52	9.50	9.66	9.73	10.43	10.34	10.33	9.86	e9.42	9.42	9.23	8.79
2	e8.57	9.48	9.66	9.72	10.43	10.29	e10.33	9.83	e9.42	9.45	9.25	8.78
3	8.58	9.50	9.65	9.70	10.38	10.22	10.32	9.80	e9.52	9.43	9.23	8.79
4	8.56	9.51	9.68	9.66	10.38	10.19	10.29	9.77	9.54	9.41	9.21	8.77
5	8.57	9.52	9.68	9.64	10.37	10.15	10.27	9.76	9.61	9.42	9.22	8.77
6	8.56	9.53	9.66	9.60	10.35	10.11	10.26	9.72	9.62	9.42	9.23	8.76
7	8.53	9.52	9.67	9.57	10.40	10.06	10.26	9.71	9.57	9.39	9.19	8.75
8	8.54	9.52	9.71	e9.55	10.38	10.01	10.27	9.65	9.59	9.41	9.19	8.73
9	8.56	9.54	9.70	9.64	10.35	10.03	10.25	9.62	9.56	e9.47	9.17	8.74
10	8.55	9.55	9.70	9.74	10.35	10.06	10.24	9.60	9.58	9.51	9.20	8.78
11	8.54	9.54	9.73	9.81	10.36	10.08	10.22	9.62	9.56	9.46	9.18	8.80
12	8.51	9.54	9.73	9.86	10.37	e10.11	10.18	9.57	9.58	9.46	9.15	8.78
13	8.51	9.58	9.71	9.84	10.38	10.14	10.15	9.55	9.55	9.48	9.15	8.78
14	8.51	9.57	9.71	9.84	10.43	10.18	10.14	e9.53	9.56	9.48	9.14	8.78
15	8.64	9.60	9.74	9.79	10.52	10.19	10.12	e9.55	9.57	9.44	9.12	8.79
16	8.89	9.60	9.73	9.92	10.56	10.17	10.12	e9.48	9.55	9.47	9.13	8.77
17	9.04	9.61	9.72	9.99	10.56	10.18	10.11	e9.50	9.54	9.42	9.13	8.78
18	9.17	9.62	9.73	10.00	10.54	10.17	10.06	e9.51	9.56	9.40	9.10	8.80
19	9.28	9.63	e9.76	10.03	10.52	10.18	10.03	e9.48	9.56	9.40	9.06	8.78
20	9.34	9.63	9.78	10.05	10.52	10.15	10.04	e9.44	9.51	9.44	9.04	8.79
21	9.36	9.62	9.75	10.11	10.54	10.15	10.02	e9.43	9.45	9.42	9.04	8.83
22	9.37	9.62	9.75	10.15	10.53	10.12	10.0	e9.43	9.44	9.40	9.05	8.79
23	9.39	9.61	9.77	10.14	10.54	10.14	9.99	e9.42	9.45	9.42	9.02	8.81
24	9.40	9.61	9.73	10.14	10.49	10.11	9.96	e9.43	9.44	9.38	9.05	8.84
25	9.41	9.59	9.74	10.22	10.50	10.07	9.92	e9.47	9.46	9.35	9.02	8.85
26	9.43	9.58	9.75	10.29	10.50	10.08	9.92	e9.44	9.44	9.34	9.02	8.84
27	9.42	9.60	9.74	10.32	10.47	10.09	9.92	e9.42	9.45	9.32	9.03	8.86
28	9.43	9.62	9.72	10.32	10.39	10.17	9.90	e9.43	9.44	9.27	9.02	8.85
29	9.44	9.65	9.77	10.33	---	10.29	9.86	e9.41	9.45	9.25	8.89	8.83
30	9.49	9.66	9.79	10.33	---	10.35	9.88	e9.40	9.41	9.24	8.82	8.85
31	9.48	---	9.74	10.39	---	10.34	---	e9.42	---	9.24	8.78	---
MEAN	8.95	9.57	9.72	9.95	10.45	10.16	10.11	9.56	9.51	9.40	9.10	8.80
MAX	9.49	9.66	9.79	10.39	10.56	10.35	10.33	9.86	9.62	9.51	9.25	8.86
MIN	8.51	9.48	9.65	9.55	10.35	10.01	9.86	9.40	9.41	9.24	8.78	8.73

e Estimated



GROUND-WATER LEVELS

HAWAII, ISLAND OF MAUI—Continued

205437156310501. Local number, 6-5431-01. TH-B Waichu, Maui

LOCATION.--Lat 20°55', long 156°31', Old Hawaiian Datum, Hydrologic Unit 20020000, 0.5 mi southwest of Waichu Village, and 1.4 mi southwest of intersection of Malaiki Road and Kahekili Highway.

AQUIFER.--Wailuku Basalt, Pliocene age.

WELL CHARACTERISTICS.--Drilled 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.

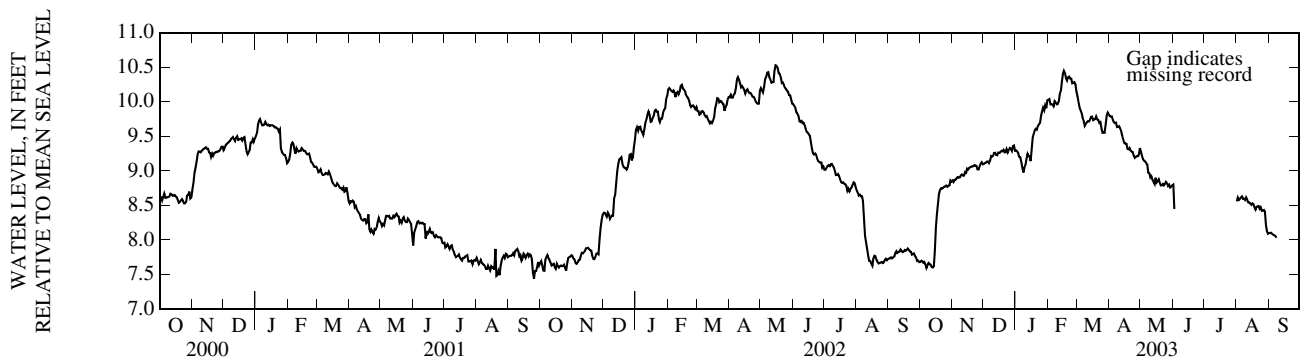
PERIOD OF RECORD.--Water-level recorder, August 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 19.52 ft above mean sea level, January 2, 1983; lowest measured, 6.86 ft above mean sea level, November 26, 1999.

WATER LEVEL, IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.68	8.86	9.10	9.30	10.03	10.08	9.79	9.27	e8.80	---	e8.56	8.10
2	7.70	8.84	9.11	9.29	10.04	10.0	9.78	9.22	e8.45	---	8.62	8.10
3	7.69	8.87	9.12	9.26	9.96	9.91	9.79	9.17	---	---	8.58	8.10
4	7.67	8.87	9.14	9.20	9.96	9.88	9.74	9.15	---	---	8.60	8.09
5	7.68	8.90	9.14	9.20	9.96	9.84	9.70	9.14	---	---	8.62	8.07
6	7.64	8.91	9.11	9.14	9.94	9.77	9.69	9.11	---	---	8.63	8.07
7	7.59	8.90	9.14	e9.05	10.01	9.72	9.70	9.09	---	---	8.59	8.06
8	7.64	8.91	9.21	8.98	9.99	9.65	9.63	8.98	---	---	8.60	8.03
9	7.67	8.93	9.20	9.04	9.96	9.68	9.64	8.96	---	---	8.58	---
10	7.65	8.95	9.22	9.09	9.97	9.71	9.65	8.90	---	---	8.62	---
11	7.64	8.93	9.26	9.17	10.01	9.72	9.61	8.92	---	---	8.58	---
12	7.61	8.93	9.26	9.25	10.11	9.71	9.57	8.87	---	---	8.54	---
13	7.60	8.98	9.23	9.22	10.16	9.74	9.50	8.85	---	---	8.54	---
14	7.62	8.97	9.23	9.21	10.28	9.78	9.45	e8.81	---	---	8.53	---
15	7.83	9.03	9.26	9.14	10.41	9.78	9.40	e8.90	---	---	8.51	---
16	8.19	9.02	9.26	9.33	10.45	9.74	9.40	e8.83	---	---	8.53	---
17	8.37	9.04	9.27	9.48	10.42	9.74	9.39	e8.85	---	---	8.52	---
18	8.54	9.05	9.29	9.54	10.34	9.75	9.32	e8.88	---	---	8.47	---
19	8.67	9.06	9.28	9.59	10.31	9.79	9.31	e8.83	---	---	8.44	---
20	8.72	9.07	9.30	9.61	10.35	9.74	9.33	e8.79	---	---	8.48	---
21	8.75	9.07	9.27	9.60	10.37	9.74	9.29	e8.79	---	---	8.49	---
22	8.74	9.08	9.27	9.65	10.34	9.69	9.28	e8.81	---	---	8.49	---
23	8.76	9.08	9.31	9.67	10.33	9.70	9.27	e8.79	---	---	8.45	---
24	8.77	9.07	9.27	9.70	10.27	9.61	9.23	e8.81	---	---	8.48	---
25	8.77	9.02	9.30	9.80	10.28	9.55	9.19	e8.84	---	---	8.42	---
26	8.79	9.02	9.33	9.87	10.28	9.56	9.20	e8.82	---	---	8.42	---
27	8.77	9.06	9.32	9.92	10.26	9.55	9.21	e8.78	---	---	8.43	---
28	8.78	9.10	9.29	9.88	10.15	9.67	9.21	e8.80	---	---	8.41	---
29	8.79	9.12	9.36	9.95	---	9.79	9.24	e8.76	---	---	8.21	---
30	8.86	9.09	9.37	9.91	---	9.84	9.33	e8.77	---	---	8.13	---
31	8.84	---	9.29	10.02	---	9.82	---	e8.79	---	---	8.09	---
MEAN	8.19	8.99	9.24	9.45	10.18	9.75	9.46	8.91	---	---	8.49	---
MAX	8.86	9.12	9.37	10.02	10.45	10.08	9.79	9.27	---	---	8.63	---
MIN	7.59	8.84	9.10	8.98	9.94	9.55	9.19	8.76	---	---	8.09	---

e Estimated



GROUND-WATER LEVELS

HAWAII, ISLAND OF MAUI—Continued

205617156311101. Local number, 6-5631-01. TH-A1 Waihee, Maui.

LOCATION.--Lat 20°56', long 156°31', Old Hawaiian Datum, Hydrologic Unit 20020000, 2,000 ft southwest of Waihee Farm, and 1.3 mi northwest of Waiehu Golf Course.

AQUIFER.--Wailuku Basalt, Pliocene age.

WELL CHARACTERISTICS.--Drilled 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, 10.80 ft above mean sea level, August 21, 2001.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 04	11.37	FEB 11	11.89	MAY 14	11.79	AUG 19	11.44
JAN 07	11.60	MAR 31	12.12	JUL 10	11.44		

GROUND-WATER LEVELS

HAWAII, ISLAND OF MAUI—Continued

205705156312401. Local number, 6-5731-05. Kanoa Test Hole, Maui

LOCATION.-Lat 20°57', Long 156°31', Old Hawaiian Datum, Hydrologic Unit 20020000, 300 ft. west of highway 330 and 1.0 mile north of Waihee school.

AQUIFER.-Wailuku basalt, Pliocene age.

WELL CHARACTERISTICS.-Drilled water-table well, 2-in. PVC casing, depth is approximately 358.00 ft.

DATUM.-Elevation of land-surface datum is 309 ft. Measuring point is top of 2-in. well casing, 303.56 ft. above mean sea level. Measuring point surveyed December 2003.

REMARKS.-Water level affected by pumping of nearby wells.

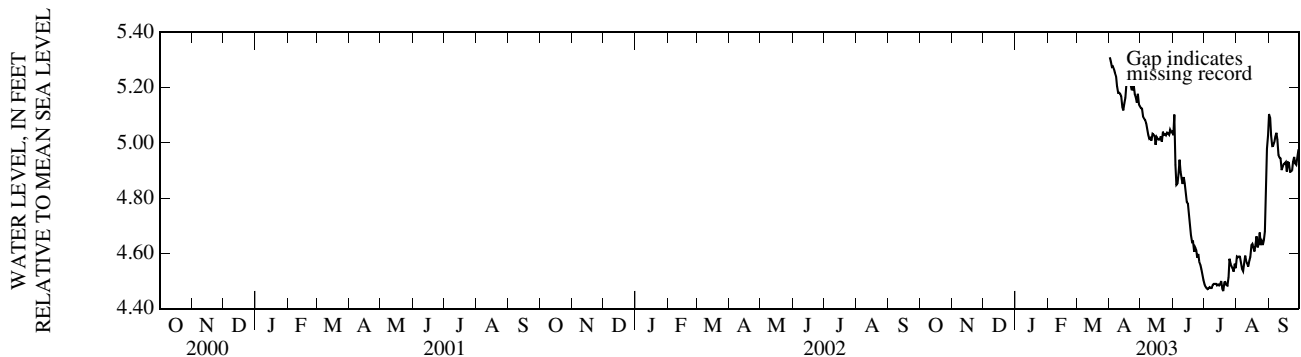
PERIOD OF RECORD.-Water level: occasional measurements, Aug. 2001 to Mar 2003. Water level recorder, Apr. 2003 to current year.

EXTREMES FOR PERIOD OF RECORD.-Highest water level measured, 5.31 ft. above mean sea level, Apr. 1, 2003; Lowest measured, 4.46 ft. above mean sea level, Aug. 21, 2001.

WATER LEVEL, IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	e5.31	5.13	5.03	4.49	4.59	5.10
2	---	---	---	---	---	---	5.30	5.12	5.10	4.48	4.59	5.09
3	---	---	---	---	---	---	5.28	5.09	4.92	4.47	4.59	5.03
4	---	---	---	---	---	---	5.28	5.09	4.85	4.47	4.59	4.99
5	---	---	---	---	---	---	5.27	5.08	4.85	4.47	4.57	4.99
6	---	---	---	---	---	---	5.25	5.07	4.89	4.48	4.54	5.00
7	---	---	---	---	---	---	5.24	5.05	4.94	4.47	4.54	5.02
8	---	---	---	---	---	---	5.21	5.03	4.90	4.47	4.56	5.04
9	---	---	---	---	---	---	5.18	5.01	4.87	4.49	4.59	5.01
10	---	---	---	---	---	---	5.18	5.02	4.85	4.49	4.57	4.96
11	---	---	---	---	---	---	5.18	5.01	4.88	4.49	4.56	4.95
12	---	---	---	---	---	---	5.17	5.03	4.85	4.49	4.55	4.94
13	---	---	---	---	---	---	5.13	5.03	4.82	4.48	4.57	4.90
14	---	---	---	---	---	---	5.12	5.03	4.79	4.49	4.59	4.91
15	---	---	---	---	---	---	5.14	4.99	4.78	4.48	4.63	4.92
16	---	---	---	---	---	---	5.16	5.02	4.74	4.49	4.63	4.93
17	---	---	---	---	---	---	5.22	5.01	4.70	4.50	4.62	4.93
18	---	---	---	---	---	---	5.24	5.01	4.67	4.47	4.61	4.90
19	---	---	---	---	---	---	5.24	5.01	4.64	4.46	4.63	4.93
20	---	---	---	---	---	---	5.23	5.02	4.64	4.50	4.66	4.93
21	---	---	---	---	---	---	5.21	5.00	4.61	4.50	4.62	4.90
22	---	---	---	---	---	---	5.19	5.04	4.62	4.49	4.63	4.90
23	---	---	---	---	---	---	5.19	5.03	4.61	4.48	4.68	4.90
24	---	---	---	---	---	---	5.21	5.03	4.58	4.51	4.63	4.93
25	---	---	---	---	---	---	5.18	5.03	4.60	4.58	4.64	4.95
26	---	---	---	---	---	---	5.17	5.04	4.57	4.56	4.63	4.93
27	---	---	---	---	---	---	5.15	5.03	4.56	4.55	4.65	4.92
28	---	---	---	---	---	---	5.18	5.03	4.54	4.54	4.68	4.94
29	---	---	---	---	---	---	5.14	5.05	4.52	4.53	4.88	4.97
30	---	---	---	---	---	---	5.13	5.04	4.50	4.56	4.98	4.97
31	---	---	---	---	---	---	---	5.04	---	4.55	5.03	---
MEAN	---	---	---	---	---	---	5.20	5.04	4.75	4.50	4.64	4.96
MAX	---	---	---	---	---	---	5.31	5.13	5.10	4.58	5.03	5.10
MIN	---	---	---	---	---	---	5.12	4.99	4.50	4.46	4.54	4.90

e Estimated



GROUND-WATER LEVELS

HAWAII, ISLAND OF MAUI—Continued

205856156400101. Local number, 6-5840-01 Alaeloa, Maui.

LOCATION.--Lat 20°59', long 156°40', Old Hawaiian Datum, Hydrologic Unit 20020000, on pineapple plantation road 0.9 mi east of Kahana, and 1.5 mi southwest of Honokahua.

AQUIFER.--Honolua Volcanics, Pliocene age.

WELL CHARACTERISTICS.--Drilled 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, 257.33 ft. above mean sea level.

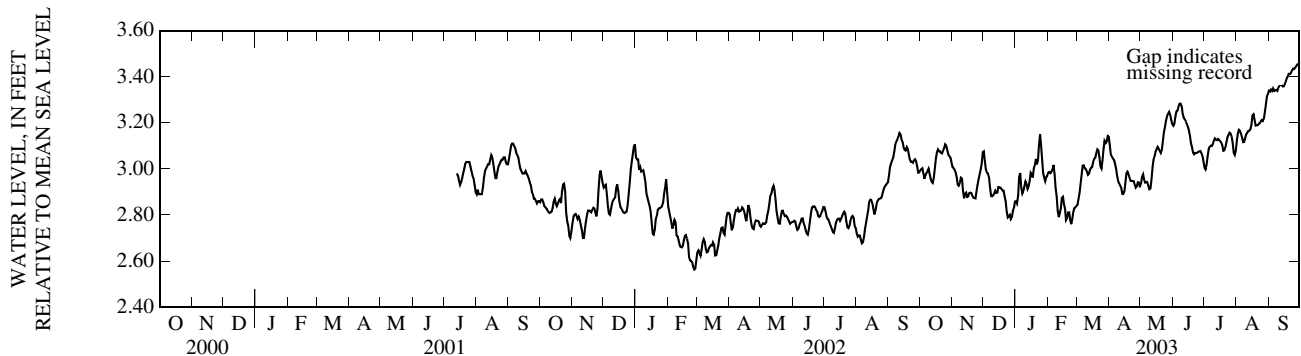
REMARKS.--Water-quality records for 1964 and 1980 are available in files of USGS Hawaii District Office.

PERIOD OF RECORD.--Occasional measurements, March 1972 to July 1975. Water-level recorder, August 1975 to June 1993. Occasional measurements, July 1993 to July 2001. Water level recorder July 12, 2001 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, Feb. 26, 27 2002.

WATER LEVEL, IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.99	3.01	3.08	2.86	2.98	2.84	3.10	2.94	3.19	3.00	3.12	3.34
2	3.00	3.00	3.04	2.85	2.99	2.87	3.06	2.96	3.19	3.00	3.15	3.34
3	3.00	3.00	3.00	2.88	2.98	2.90	3.05	2.98	3.23	3.02	3.17	3.34
4	2.98	2.99	2.98	2.96	2.99	2.93	3.04	2.95	3.25	3.05	3.17	3.34
5	2.96	2.96	2.98	2.98	3.00	2.97	3.04	2.94	3.25	3.09	3.15	3.35
6	2.97	2.93	2.96	2.92	3.02	3.01	3.02	2.94	3.27	3.10	3.14	3.34
7	2.98	2.93	2.92	2.89	2.98	3.02	3.00	2.94	3.28	3.10	3.12	3.34
8	2.99	2.94	2.88	2.91	2.92	3.00	2.97	2.93	3.28	3.10	3.12	3.34
9	3.00	2.96	2.88	2.92	2.88	3.00	2.95	2.91	3.27	3.11	3.13	3.34
10	2.98	2.96	2.89	2.95	2.82	2.99	2.94	2.92	3.24	3.12	3.15	3.35
11	2.96	2.91	2.89	2.94	2.79	2.97	2.93	2.95	3.22	3.13	3.16	3.36
12	2.94	2.87	2.90	2.91	2.81	2.98	2.92	3.01	3.22	3.13	3.17	3.37
13	2.94	2.89	2.90	2.92	2.83	3.00	2.89	3.04	3.21	3.12	3.17	3.36
14	2.96	2.90	2.90	2.95	2.87	3.00	2.89	3.06	3.20	3.13	3.17	3.36
15	3.00	2.88	2.92	2.98	2.88	3.01	2.90	3.08	3.18	3.13	3.19	3.36
16	3.05	2.88	2.92	2.98	2.85	3.03	2.94	3.09	3.17	3.12	3.23	3.37
17	3.07	2.89	2.92	2.96	2.83	3.04	2.98	3.10	3.14	3.12	3.24	3.38
18	3.08	2.90	2.91	3.00	2.78	3.05	2.99	3.09	3.11	3.10	3.22	3.39
19	3.08	2.90	2.91	3.01	2.79	3.07	2.98	3.08	3.09	3.08	3.19	3.40
20	3.08	2.88	2.90	3.04	2.81	3.08	2.96	3.07	3.07	3.08	3.19	3.41
21	3.07	2.88	2.88	3.02	2.81	3.08	2.95	3.08	3.06	3.09	3.19	3.41
22	3.07	2.87	2.86	3.04	2.78	3.05	2.95	3.12	3.07	3.12	3.19	3.42
23	3.08	2.87	2.82	3.10	2.76	3.01	2.95	3.16	3.07	3.14	3.20	3.43
24	3.09	2.90	2.79	3.15	2.78	3.00	2.95	3.18	3.07	3.15	3.21	3.43
25	3.11	2.93	2.79	3.11	2.81	3.04	2.93	3.21	3.07	3.16	3.21	3.43
26	3.10	2.96	2.80	3.04	2.83	3.09	2.92	3.23	3.08	3.15	3.21	3.44
27	3.08	2.98	2.78	2.98	2.83	3.12	2.93	3.24	3.08	3.14	3.22	3.45
28	3.06	3.00	2.79	2.96	2.84	3.11	2.94	3.25	3.07	3.11	3.25	3.45
29	3.06	3.02	2.82	2.95	---	3.12	2.94	3.24	3.06	3.07	3.28	3.45
30	3.05	3.07	2.83	2.97	---	3.14	2.92	3.21	3.03	3.06	3.31	3.46
31	3.03	---	2.86	2.97	---	3.14	---	3.20	---	3.08	3.33	---
MEAN	3.03	2.94	2.89	2.97	2.87	3.02	2.96	3.07	3.16	3.10	3.19	3.38
MAX	3.11	3.07	3.08	3.15	3.02	3.14	3.10	3.25	3.28	3.16	3.33	3.46
MIN	2.94	2.87	2.78	2.85	2.76	2.84	2.89	2.91	3.03	3.00	3.12	3.34



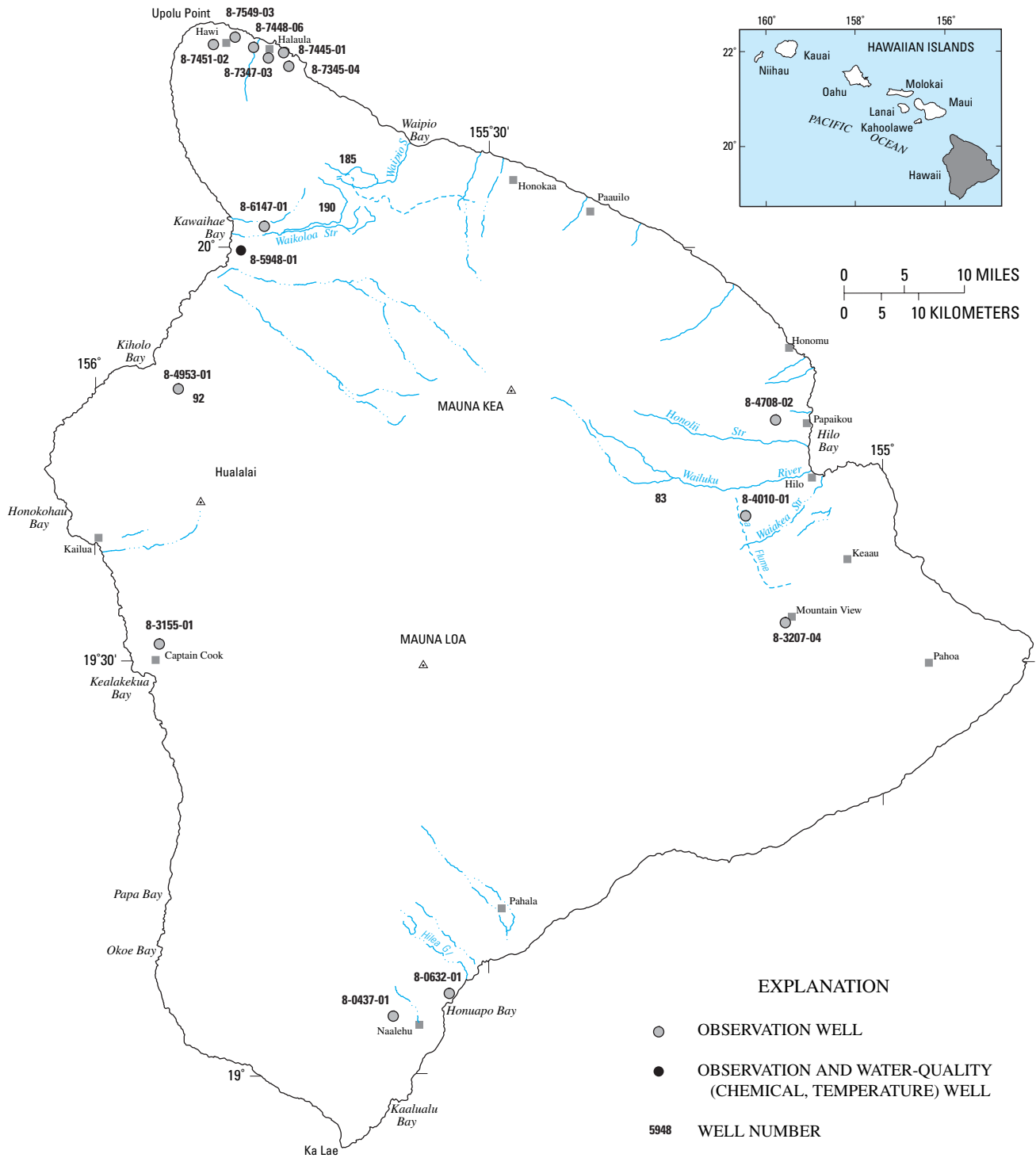


Figure 19. Locations of observation wells and ground-water quality sampling sites on Hawaii.

GROUND-WATER LEVELS

HAWAII, ISLAND OF HAWAII

190423155371501. Local number and name 8-0437-01 Waiohinu, Hawaii.

LOCATION.--Lat 19°04', long 155°37', Old Hawaiian Datum, Hydrologic Unit 20010000, 2,500 ft northwest of Waiohinu.

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, 1,016.03 ft above mean sea level, February 12, 2002; lowest measured, 1,012.17 ft above mean sea level, October 25, 1999.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 18	1014.85	DEC 18	1014.46	FEB 19	1014.14	APR 18	1013.84	JUL 17	1013.43

GROUND-WATER LEVELS

HAWAII, ISLAND OF HAWAII—Continued

190602155325901. Local number and name 8-0632-01 Honuapo W-2, Hawaii.

LOCATION.--Lat 19°06', long 155°33', Old Hawaiian Datum, Hydrologic Unit 20010000, 0.9 mi north of Whittington Park, and 3.3 mi northeast of Naalehu.

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 "X" mark on pump base, 104.01 ft above mean sea level.

PERIOD OF RECORD.-- Water level: occasional measurements, April 1972 to current year. Water quality: occasional measurements, 1972-73.

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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 18	1.26	DEC 18	1.51	FEB 19	.87	APR 18	.49	JUL 17	1.08

GROUND-WATER LEVELS

HAWAII, ISLAND OF HAWAII—Continued

19311715550801. Local number and name 8-3155-01 Kealahou, Hawaii.

LOCATION.--Lat 19°31', long 155°55', Old Hawaiian Datum, Hydrologic Unit 20010000, 0.3 mi east of Kealahou Post Office and 0.6 mi north of Kealahou High School.

AQUIFER.--Kau Basalt, Holocene and Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 1,505 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 1,746.80 ft. Measuring point is top of aluminum cap on 4-in. casing, 1,745.84 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, 451.39 ft above mean sea level, July 24, 2003.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 16	454.73	DEC 16	453.64	FEB 21	452.73	APR 16	452.29	JUL 24	451.39

GROUND-WATER LEVELS

HAWAII, ISLAND OF HAWAII—Continued

193251155072101. Local number and name 8-3207-04 Mt. View, Hawaii.

LOCATION.--Lat 19°32', long 155°07', Old Hawaiian Datum, Hydrologic Unit 20010000, 1.4 mi southwest of Mountain View.

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, 981.02 ft above mean sea level, July 17, 2003.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 18	996.22	DEC 19	993.75	FEB 19	988.54	APR 18	988.05	JUL 17	981.02		

GROUND-WATER LEVELS

HAWAII, ISLAND OF HAWAII—Continued

194035155102201. Local number and name 8-4010-01 Kaumana, Hawaii.

LOCATION.--Lat 19°41', long 155°10', Old Hawaiian Datum, Hydrologic Unit 20010000, 2 mi west of Kaumana at western end of Kaumana Estates subdivision.

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, 982.10 ft above mean sea level, November 8, 1999; lowest measured, 962.17 ft above mean sea level, January 21, 1999.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 16	977.63	DEC 20	977.18	FEB 19	974.07	APR 18	970.51	JUL 18	965.07

GROUND-WATER LEVELS

HAWAII, ISLAND OF HAWAII—Continued

194731155080401. Local number and name 8-4708-02 Kaieie Mauka, Hawaii.

LOCATION.--Lat 19°48', long 155°08', Old Hawaiian Datum, Hydrologic Unit 20010000, 3.0 mi up Kaiéie Road near DWS water tank and 2.6 mi west-northwest of Papaikou Post Office.

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 1,134.5 ft. Measuring point is top of 4-in. casing, 1,135.08 ft above mean 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, 145.96 ft above mean sea level, February 23, 2001; lowest measured, 143.87 ft above mean sea level, July 23, 2003.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 17	144.08	DEC 17	144.03	FEB 20	144.02	APR 17	143.91	JUL 23	143.87

GROUND-WATER LEVELS

HAWAII, ISLAND OF HAWAII—Continued

194945155534401. Local number and name 8-4953-01 Kiholo, Hawaii.

LOCATION.--Lat 19°50', long 155°54', Old Hawaiian Datum, Hydrologic Unit 20010000, 2.7 mi inland from Kiholo Bay.

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.

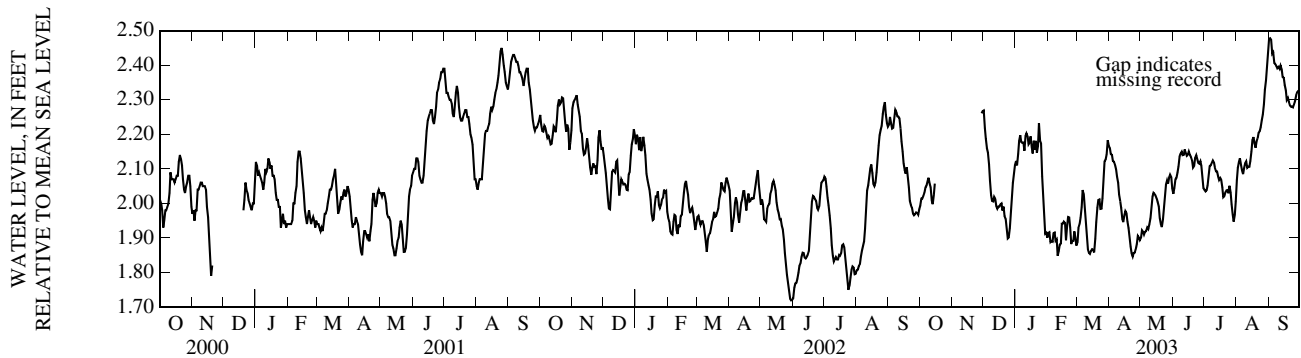
DATUM.--Elevation of land-surface datum is 931.65 ft. Measuring point is top of 7 1/4 in. (O.D.) casing, 932.48 ft above mean sea level.

PERIOD OF RECORD.-- Water level: occasional measurements, June 1972 to September 1999; continuous water-level measurements September 30, 1999 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, 1.47 ft above mean sea level, November 21, 2000.

WATER LEVEL, IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.99	---	2.27	2.12	1.91	1.89	2.16	1.90	2.03	2.04	2.07	2.48
2	2.01	---	2.22	2.11	1.92	1.93	2.14	1.92	2.04	2.03	2.10	2.48
3	2.01	---	2.19	2.14	1.89	1.94	2.14	1.92	2.07	2.04	2.12	2.47
4	2.02	---	2.16	2.18	1.89	1.96	2.12	1.91	2.07	2.05	2.13	2.43
5	2.03	---	2.15	2.20	1.89	1.99	2.12	1.92	2.09	2.08	2.11	2.44
6	2.05	---	2.11	2.18	1.91	2.04	2.11	1.92	2.11	2.11	2.10	2.41
7	2.05	---	2.07	2.17	1.92	2.03	2.10	1.93	2.14	2.11	2.08	2.40
8	2.06	---	2.02	2.18	1.89	2.00	2.08	1.93	2.14	2.12	2.10	2.40
9	2.07	---	2.01	2.15	1.90	1.95	2.06	1.94	2.15	2.12	2.12	2.39
10	2.06	---	2.01	2.20	1.85	1.91	2.03	1.96	2.14	2.12	2.12	2.40
11	2.05	---	2.02	2.20	1.86	1.87	2.01	1.99	2.14	2.10	2.10	2.39
12	2.01	---	2.01	2.19	1.88	1.86	1.99	2.02	2.16	2.09	2.11	2.40
13	2.00	---	1.99	2.17	1.88	1.85	1.95	2.03	2.15	2.09	2.11	2.39
14	2.02	---	1.98	2.18	1.94	1.86	1.95	2.03	2.14	2.08	2.12	2.37
15	2.06	---	1.99	2.19	1.94	1.87	1.97	2.02	2.14	2.07	2.15	2.36
16	---	---	1.99	2.16	1.95	1.87	1.98	2.01	2.15	2.07	2.18	2.34
17	---	---	2.00	2.14	1.94	1.86	1.97	2.00	2.14	2.07	2.19	2.33
18	---	---	2.00	2.18	1.89	1.90	1.95	1.99	2.13	2.05	2.17	2.30
19	---	---	1.98	2.16	1.93	1.95	1.93	1.96	2.12	2.02	2.16	2.31
20	---	---	1.99	2.18	1.96	1.99	1.90	1.94	2.10	2.02	2.18	2.29
21	---	---	1.96	2.15	1.96	2.01	1.87	1.93	2.11	2.03	2.19	2.28
22	---	---	1.96	2.17	1.93	2.01	1.86	1.95	2.13	2.04	2.20	2.28
23	---	---	1.93	2.23	1.88	1.98	1.85	1.98	2.14	2.04	2.21	2.28
24	---	---	1.90	2.18	1.89	1.98	1.86	2.02	2.13	2.03	2.22	2.28
25	---	---	1.90	2.17	1.89	2.01	1.86	2.05	2.12	2.05	2.24	2.29
26	---	---	1.93	2.08	1.92	2.07	1.87	2.07	2.11	2.03	2.26	2.30
27	---	---	1.97	2.02	1.90	2.12	1.88	2.06	2.12	2.00	2.29	2.31
28	---	---	2.02	1.97	1.88	2.13	1.91	2.08	2.11	1.97	2.33	2.32
29	---	2.26	2.06	1.91	---	2.14	1.90	2.08	2.07	1.95	2.36	2.33
30	---	2.27	2.09	1.91	---	2.18	1.89	2.08	2.04	1.97	2.39	2.33
31	---	---	2.11	1.90	---	2.17	---	2.04	---	2.01	2.44	---
MEAN	---	---	2.03	2.13	1.91	1.98	1.98	1.99	2.11	2.05	2.18	2.36
MAX	---	---	2.27	2.23	1.96	2.18	2.16	2.08	2.16	2.12	2.44	2.48
MIN	---	---	1.90	1.90	1.85	1.85	1.85	1.90	2.03	1.95	2.07	2.28



GROUND-WATER LEVELS

HAWAII, ISLAND OF HAWAII—Continued

195840155462601. Local number and name 8-5846-01 Waikoloa Mauna Lani Resort 1, Hawaii.

LOCATION.--Lat 19°59', long 155°46', Old Hawaiian Datum, Hydrologic Unit 20010000, 4.0 mi east of Puako Bay.

AQUIFER.--Hamakua Volcanics, Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 1240 ft, 20-in. casing diameter, cased to 1240 ft, perforated section 1140 to 1240 ft.

DATUM.--Elevation of land-surface datum is 1146 ft. Measuring point is top of 1 1/4-in pvc pipe, 1149.23 ft above mean sea level.

PERIOD OF RECORD.--Water level: occasional measurements, October 2002 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.19 ft above mean sea level, October 25, 2002; lowest measured, 4.98 ft above mean sea level, Feb 21, 2003.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 25	5.19	DEC 16	5.13	FEB 21	4.98	APR 16	5.06	JUL 23	5.04

GROUND-WATER LEVELS

HAWAII, ISLAND OF HAWAII—Continued

195947155485801. Local number and name 8-5948-01 Hapuna Beach Park, Hawaii.

LOCATION.--Lat 20°00', long 155°49', Old Hawaiian Datum, Hydrologic Unit 20010000, 0.7 mi east of Hapuna Beach Park, and 3.1 mi southeast of Kawaihae.

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 2002.

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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 17	3.27	DEC 16	3.32	FEB 21	3.22	APR 17	3.00	JUL 23	3.41

GROUND-WATER LEVELS

HAWAII, ISLAND OF HAWAII—Continued

200143155414201. Local number and name 8-6141-01 Waiaka Tank, Hawaii.

LOCATION.--Lat 20°02', long 155°42', Old Hawaiian Datum, Hydrologic Unit 20010000, 2.6 mi west of Kamuela Post Office.

AQUIFER.--Hawi Volcanics, Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 1,507 ft, 4-in. diameter steel casing, cased to 1,260 ft, 4-inch slotted casing from 1,260 to 1,507 ft.

DATUM.--Elevation of land-surface datum is 2,506.38 ft. Measuring point is paint mark at top of 4-inch casing at 2,507.00 ft above mean sea level.

REMARKS.--Drilling completed August 6, 1999.

PERIOD OF RECORD.--Water level: September 1999 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1,245.37 ft, November 2, 1999; lowest measured, 1,242.64 ft, July 23, 2003.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 17	1243.25	DEC 16	1243.22	FEB 20	1243.05	APR 17	1242.89	JUL 23	1242.64

GROUND-WATER LEVELS

HAWAII, ISLAND OF HAWAII—Continued

200132155471101. Local number and name 8-6147-01 Kawaihae W-3, Hawaii.

LOCATION.--Lat 20°02', long 155°47', Old Hawaiian Datum, Hydrologic Unit 20010000, on Highway 26, 3.1 mi east of Kawaihae, and 2.8 mi northeast of Hapuna Beach Park.

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.

PERIOD OF RECORD.-- Water level: occasional measurements, June to July 1963, June 1973 to current year. Water quality: occasional measurements, 1963-64.

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 SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 17	5.13	DEC 17	5.11	FEB 21	5.05	APR 17	5.10	JUL 23	5.18

GROUND-WATER LEVELS

HAWAII, ISLAND OF HAWAII—Continued

201347155470501. Local number and name 8-7347-03 Halaula Makai E, Hawaii.

LOCATION.--Lat 20°14', long 155°47', Old Hawaiian Datum, Hydrologic Unit 20010000, near intersection of Highway 270 and Kauhola Point Lighthouse Road and 40 ft north of Kohala Sugar Company Halaula well.

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.

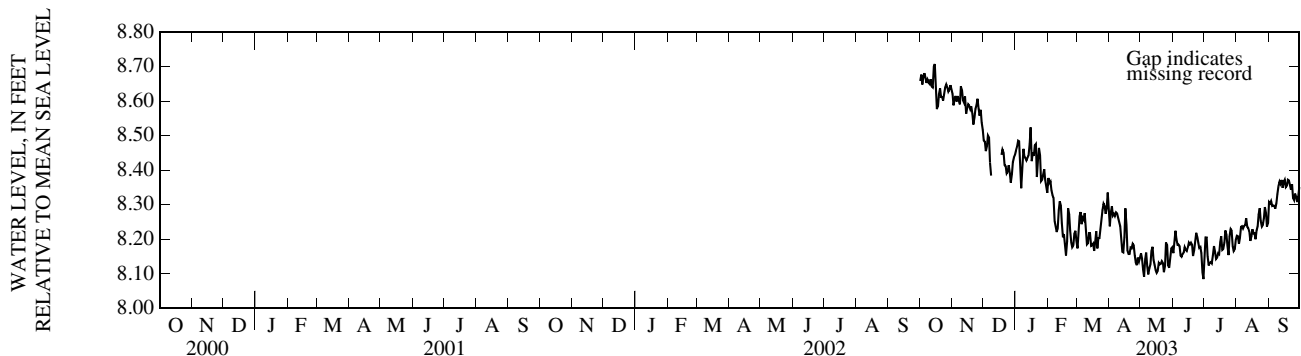
DATUM.--Elevation of land-surface datum is 340.5 ft. Measuring point is top of 2" x 4" wood on angle iron, 341.97.

PERIOD OF RECORD.--Water level: occasional measurements, July 1989, July 1990 to December 1990, September 1999 to September 2002. Continuous record October 2002 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 14.03 ft above mean sea level, September 10, 1990; lowest measured, 7.91 ft above mean sea level, April 26, 2001.

WATER LEVEL, IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.66	8.62	8.49	8.46	8.38	8.17	8.24	8.16	8.16	8.14	8.21	8.31
2	8.68	8.59	8.48	8.47	8.36	8.22	8.28	8.14	8.19	8.20	8.21	8.30
3	8.65	8.61	8.46	8.49	8.37	8.27	8.30	8.11	8.22	8.21	8.19	8.31
4	8.67	8.61	8.47	8.48	8.34	8.28	8.27	8.09	8.20	8.15	8.20	8.30
5	8.68	8.60	8.50	8.40	8.33	8.24	8.27	8.14	8.18	8.12	8.24	8.30
6	8.67	8.61	8.49	8.35	8.32	8.26	8.27	8.16	8.18	8.13	8.24	8.30
7	8.65	8.60	8.42	8.41	8.25	8.26	8.28	8.12	8.18	8.13	8.23	8.29
8	8.66	8.59	8.38	8.46	8.24	8.28	8.28	8.10	8.15	8.13	8.24	8.30
9	8.65	8.64	---	8.44	8.22	8.23	8.26	8.12	8.15	8.15	8.24	8.33
10	8.65	8.63	---	8.43	8.23	8.18	8.25	8.13	8.16	8.18	8.26	8.35
11	8.66	8.60	---	8.43	8.28	8.19	8.24	8.17	8.16	8.16	8.24	8.37
12	8.64	8.60	---	8.44	8.31	8.22	8.21	8.18	8.18	8.14	8.23	8.36
13	8.64	8.61	---	8.44	8.30	8.22	8.16	8.14	8.17	8.15	8.22	8.37
14	8.70	8.56	---	8.48	8.25	8.18	8.16	8.13	8.17	8.16	8.20	8.35
15	8.71	8.58	---	8.52	8.21	8.18	8.21	8.11	8.18	8.16	8.21	8.37
16	8.64	8.59	---	8.43	8.21	8.19	8.29	8.10	8.19	8.19	8.23	8.37
17	8.58	8.59	---	8.45	8.18	8.17	8.24	8.11	8.18	8.21	8.22	8.35
18	8.59	8.58	8.44	8.44	8.15	8.19	8.17	8.13	8.19	8.17	8.22	8.35
19	8.62	8.58	8.46	8.47	8.19	8.22	8.16	8.13	8.18	8.17	8.20	8.37
20	8.64	8.56	8.45	8.48	8.29	8.17	8.16	8.13	8.15	8.19	8.23	8.37
21	8.61	8.53	8.42	8.38	8.27	8.20	8.18	8.14	8.17	8.23	8.24	8.36
22	8.61	8.55	8.41	8.43	8.22	8.20	8.17	8.13	8.19	8.21	8.27	8.34
23	8.60	8.58	8.39	8.46	8.19	8.23	8.19	8.10	8.22	8.18	8.29	8.36
24	8.62	8.59	8.40	8.44	8.18	8.26	8.18	8.12	8.21	8.15	8.25	8.32
25	8.64	8.61	8.41	8.37	8.18	8.28	8.15	8.19	8.19	8.21	8.24	8.31
26	8.65	8.58	8.39	8.37	8.22	8.30	8.13	8.18	8.17	8.23	8.24	8.33
27	8.64	8.56	8.36	8.39	8.22	8.30	8.13	8.13	8.18	8.23	8.26	8.32
28	8.63	8.57	8.39	8.40	8.20	8.27	8.15	8.12	8.16	8.18	8.29	8.31
29	8.63	8.54	8.42	8.37	---	8.29	8.14	8.14	8.10	8.17	8.28	8.32
30	8.65	8.52	8.44	8.35	---	8.34	8.15	8.17	8.08	8.17	8.24	8.35
31	8.63	---	8.44	8.33	---	8.28	---	8.18	---	8.20	8.25	---
MEAN	8.64	8.59	---	8.43	8.25	8.23	8.21	8.14	8.17	8.17	8.24	8.33
MAX	8.71	8.64	---	8.52	8.38	8.34	8.30	8.19	8.22	8.23	8.29	8.37
MIN	8.58	8.52	---	8.33	8.15	8.17	8.13	8.09	8.08	8.12	8.19	8.29



GROUND-WATER LEVELS

HAWAII, ISLAND OF HAWAII—Continued

201406155454401. Local number and name 8-7445-01 Hapuu Bay D, Hawaii.

LOCATION.--Lat 20°14', long 155°46', Old Hawaiian Datum, Hydrologic Unit 20010000, 7.5 mi east of Hawi.

AQUIFER.--Pololu Basalt, Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 460 ft, open hole.

DATUM.--Elevation of land-surface datum is 108.50 ft. Measuring point is top of casing, 0.11 ft above bolt head. Measuring point elevation is 108.76 ft above mean sea level.

PERIOD OF RECORD.-- Water level: April 1989, April, July, August 1990, 1991, July 1992, May 1993, June 1994, 1995, 1999 to current year. Water quality: April 1989, 1990, June 1994, 1995, September 2000, January 2001.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 8.55 ft above mean sea level, January 27, 1995; lowest measured, 6.41 ft above mean sea level, April 26, 2001.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 17	7.05	DEC 17	6.89	FEB 20	6.85	APR 17	6.71	JUL 23	6.70

GROUND-WATER LEVELS

HAWAII, ISLAND OF HAWAII—Continued

201429155480201. Local number and name 8-7448-06 Kohala F, Hawaii.

LOCATION.--Lat 20°14', long 155°48', Old Hawaiian Datum, Hydrologic Unit 20010000, 3.4 mi east of Hawi.

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, 411.77 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, 8.68 ft above mean sea level, May 25, 1999; lowest measured, 6.55 ft above mean sea level, April 26, 2001.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 17	7.70	DEC 17	7.55	FEB 20	8.29	APR 17	7.23	JUL 23	7.59

GROUND-WATER LEVELS

HAWAII, ISLAND OF HAWAII—Continued

201441155510701. Local number and name 8-7451-02 Upolu J-B, Hawaii.

LOCATION.--Lat 20°15', long 155°51', Old Hawaiian Datum, Hydrologic Unit 20010000, 3.1 mi south of Upolu Point.

AQUIFER.--Pololu Volcanics, Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, depth 632 ft, 8-in. casing diameter, open hole 560 to 632 ft.

DATUM.--Elevation of land-surface datum is 566.83 ft. Measuring point is top of casing, 567.20 ft above mean sea level.

PERIOD OF RECORD.--Water level: occasional measurements, June 1990 to July 1992, July 1993, August 2001 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.88 ft above mean sea level, September 10, 1990; lowest measured, 4.27 ft above mean sea level, April 17, 2003.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 17	4.88	DEC 17	4.70	FEB 20	4.70	APR 17	4.27	JUL 23	4.84

GROUND-WATER LEVELS

HAWAII, ISLAND OF HAWAII—Continued

201517155493701. Local number and name 8-7549-03 Hawi Makai I, Hawaii.

LOCATION.--Lat 20°15', long 155°50', Old Hawaiian Datum, 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.

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, September 2000, January 2001.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.91 ft above mean sea level, December 10, 1991; lowest measured, 1.64 ft above mean sea level, April 17, 2003.

WATER SURFACE ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 17	2.49	DEC 17	2.36	FEB 20	2.12	APR 17	1.64	JUL 23	2.44

QUALITY OF GROUND WATER--WELLS

414

HAWAII, ISLAND OF OAHU

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
 211832157515501 -- 3-1851-19 Halekauwila Street, Pipe A, Oahu, HI

Date	Time	Flow rate, instan- taneous gal/min (00059)	Specif. conduc- tance, wat unf uS/cm 25 degC (00095)	Temper- ature, water, deg C (00010)	Chlor- ide, water, unfltrd mg/L (99220)
JAN					
23...	1240	.16	36200	24.6	13000
SEP					
29...	1115	.94	35000	25.3	13000

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
 211832157515502 -- 3-1851-19 Halekauwila Street, Pipe B, Oahu, HI

Date	Time	Specif. conduc- tance, wat unf uS/cm 25 degC (00095)	Temper- ature, water, deg C (00010)	Chlor- ide, water, unfltrd mg/L (99220)
OCT				
10...	1615	21300	25.0	7800
DEC				
09...	0950	21900	24.0	7900
JAN				
23...	1240	22900	24.5	8000
MAR				
10...	1005	--	--	8000
APR				
25...	0945	22300	25.5	8000
JUL				
10...	1255	22400	25.5	8000
SEP				
29...	1039	22500	24.6	8300

QUALITY OF GROUND WATER--WELLS--Continued
HAWAII, ISLAND OF OAHU

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
212342157584301 -- 3-2358-22 Taba Farm, Waiawa (204-4), Oahu, Hi

Date	Time	Specif. conduc- tance, wat unf uS/cm 25 degC (00095)	Temper- ature, water, deg C (00010)	Chlor- ide, water, unfltrd mg/L (99220)
OCT				
31...	1317	1410	20.5	380
DEC				
18...	0915	1440	20.5	390
JAN				
27...	1010	1440	20.5	380
MAR				
24...	1100	1440	20.5	390
MAY				
15...	1305	1430	20.5	380
JUN				
23...	1145	1370	20.5	370
AUG				
21...	1150	1310	20.5	340

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
213446158104901 -- 3-3410-08 Kawaihapai, Mokuleia, Oahu, HI

Date	Time	Specif. conduc- tance, wat unf uS/cm 25 degC (00095)	Temper- ature, water, deg C (00010)	Chlor- ide, water, unfltrd mg/L (99220)
OCT				
16...	1406	634	22.5	150
NOV				
21...	1403	717	22.0	150
JAN				
08...	1422	613	22.0	140
MAR				
13...	1115	613	22.0	140
MAY				
13...	1330	613	22.0	150
SEP				
02...	1400	720	22.0	160

QUALITY OF GROUND WATER--WELLS

HAWAII, ISLAND OF MOLOKAI

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

416

210425156483001 -- 4-0448-02 Mapulehu Shaft 2, Molokai, HI

Date	Time	Specif. conduc- tance, wat unf uS/cm 25 degC (00095)	Temper- ature, water, deg C (00010)	Chlor- ide, water, unfltrd mg/L (99220)
NOV				
05...	1305	373	24.9	18
DEC				
03...	1245	367	24.5	17
FEB				
03...	1315	355	24.4	17
APR				
07...	1358	352	24.4	18
JUL				
28...	1340	358	24.7	16
28...	1345	358	24.7	16

210605157012001 -- 4-0601-01 Kaunakakai, Molokai, HI

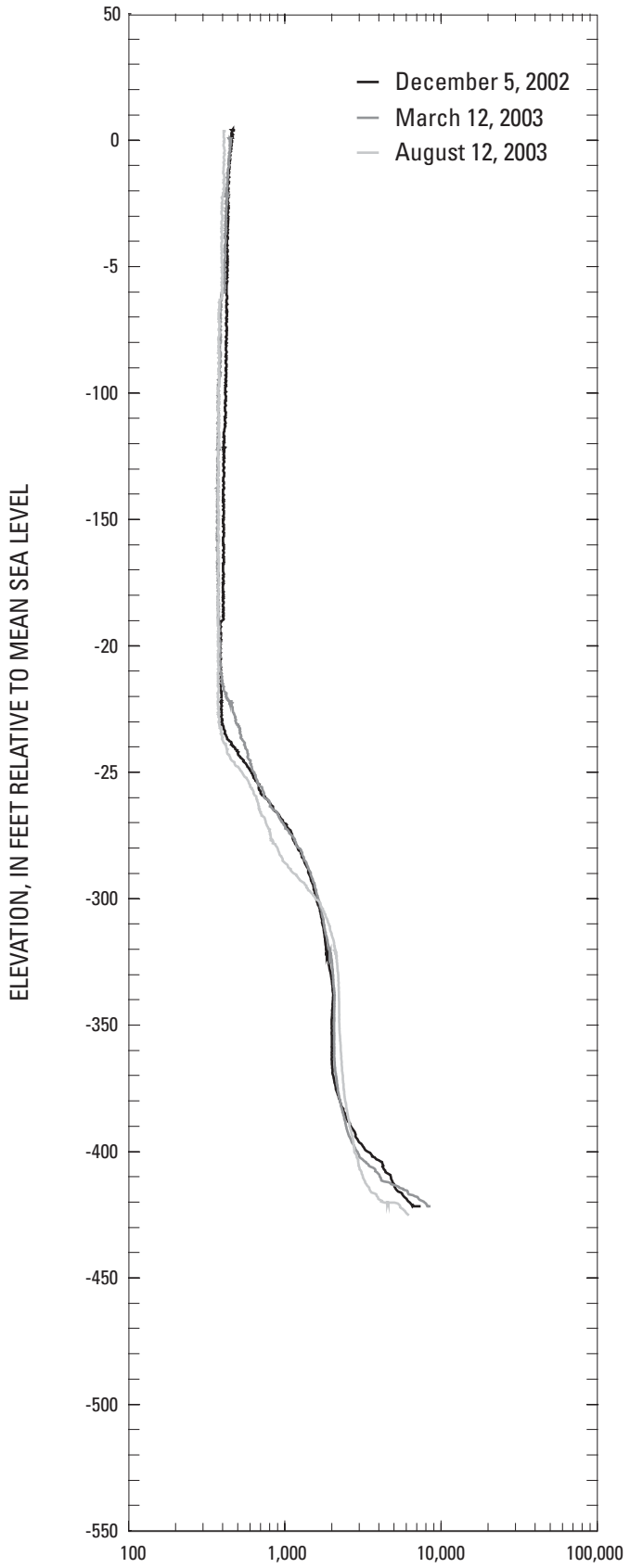
Date	Time	Specif. conduc- tance, wat unf uS/cm 25 degC (00095)	Temper- ature, water, deg C (00010)	Chlor- ide, water, unfltrd mg/L (99220)
NOV				
05...	1605	493	24.8	79
DEC				
03...	0950	487	24.9	83
FEB				
05...	1050	417	25.4	64
APR				
07...	1630	381	26.0	48
JUL				
30...	0845	473	25.8	73

210856157011201 -- 4-0801-01 DHHL 1, Molokai, HI

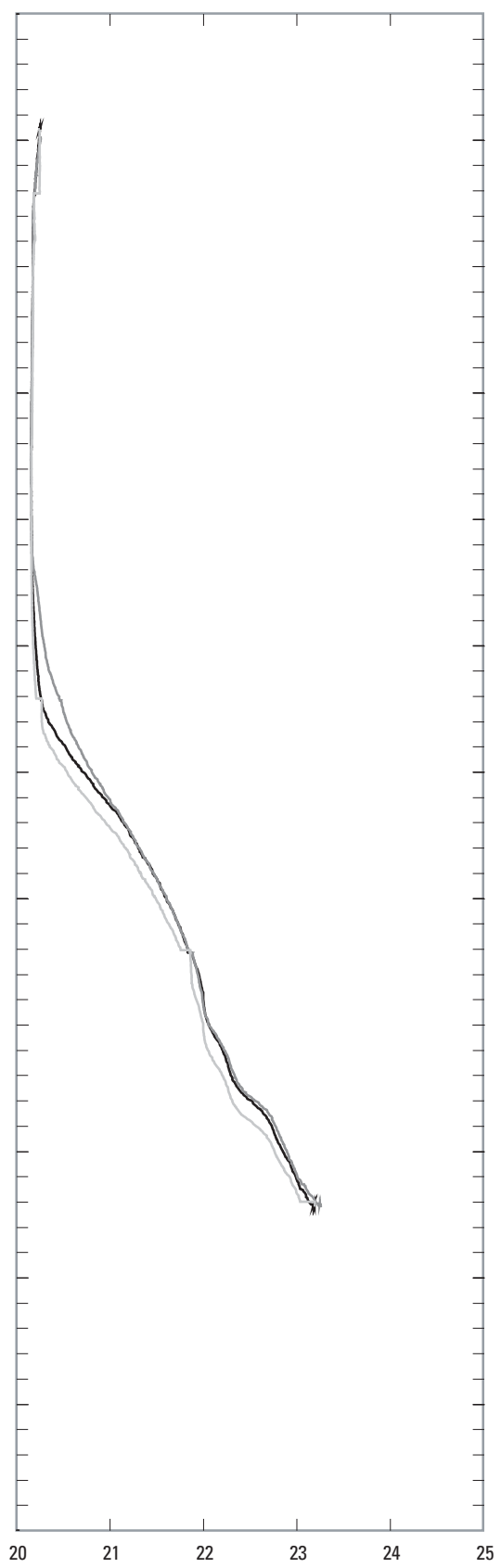
Date	Time	Specif. conduc- tance, wat unf uS/cm 25 degC (00095)	Temper- ature, water, deg C (00010)	Chlor- ide, water, unfltrd mg/L (99220)
FEB				
06...	0945	--	--	140

210857156010701 -- 4-0801-02 DHHL 2, Molokai, HI

Date	Time	Specif. conduc- tance, wat unf uS/cm 25 degC (00095)	Temper- ature, water, deg C (00010)	Chlor- ide, water, unfltrd mg/L (99220)
FEB				
06...	0930	--	--	78



WATER CONDUCTIVITY, IN MICROSIEMENS PER CENTIMETER



WATER TEMPERATURE, IN DEGREES CELSIUS

Water-conductivity and -temperature profiles measured in the Kualapuu deep monitor well (4-0800-01) on December 5, 2002, March 12, 2003, August 12, 2003, Molokai, Hawaii. Data available from USGS Hawaii District log archive.

QUALITY OF GROUND WATER--WELLS

HAWAII, ISLAND OF OAHU--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

213446158104901 -- 3-3410-08 Kawaihapai, Mokuleia, Oahu, HI

Date	Time	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	TEMPER- ATURE WATER (DEG C) (00010)	CHLOR- IDE WATER UNFLTRD (MG/L) (99220)
OCT				
16...	1406	634	22.5	150
NOV				
21...	1403	717	22.0	150
JAN				
08...	1422	613	22.0	140
MAR				
13...	1115	613	22.0	140
MAY				
13...	1330	613	22.0	150
SEP				
02...	1400	720	22.0	160

QUALITY OF GROUND WATER--WELLS

HAWAII, ISLAND OF MAUI

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

205405156305401 -- 6-5430-05 Waiehu Deep Monitor Well, Maui, HI

Date	Time	Sampl- ing depth, feet below MSL (78890)	Specif. conduc- tance, wat unf uS/cm 25 degC (00095)	Temper- ature, water, deg C (00010)	Chlor- ide, water, unfltrd mg/L (99220)
OCT					
02...	1011	200	225	23.3	16
02...	1028	400	224	23.2	12
02...	1048	600	673	22.1	170
02...	1110	650	3970	22.2	1200
02...	1133	675	11500	22.9	3900
02...	1157	700	32300	22.6	12000
02...	1222	725	43300	22.6	16000
02...	1245	750	46800	23.0	18000
02...	1311	800	48400	22.9	18000
02...	1342	1000	49700	22.7	19000
JAN					
08...	1015	200	222	21.1	11
08...	1035	400	219	21.7	9.6
08...	1055	600	705	21.9	180
08...	1120	650	4080	21.6	1300
08...	1140	675	13100	22.2	4500
08...	1205	700	33100	21.9	13000
08...	1230	725	43500	21.9	16000
08...	1250	750	46900	22.2	17000
08...	1320	800	49000	22.2	18000
08...	1345	1000	49900	22.5	19000
APR					
02...	0952	200	224	22.9	11
02...	1008	400	219	22.4	11
02...	1027	600	704	22.0	180
02...	1050	650	4030	23.0	1300
02...	1110	675	13600	22.6	4700
02...	1137	700	33700	22.3	13000
02...	1200	725	44300	22.4	17000
02...	1225	750	47400	22.2	17000
02...	1250	800	49100	22.1	18000
02...	1320	1000	50300	22.6	19000
JUL					
09...	1043	200	223	22.6	10
09...	1100	400	222	22.4	10
09...	1120	600	808	22.2	210
09...	1143	650	4890	22.4	1500
09...	1207	675	16400	22.2	5700
09...	1235	700	35300	22.1	13000
09...	1300	725	44600	22.0	17000
09...	1323	750	47500	22.3	18000
09...	1347	800	49300	22.2	18000
09...	1415	1000	50400	22.4	19000

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", Old Hawaiian Datum, 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" National Weather Service accumulation can and a electronic data logger with a tipping bucket catchment (0.01 inch per tip). Elevation of gage is 4,000 ft (from topographic map).

REMARKS.--Records good. Rainfall recorded in hundredths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.01	0.00	0.00	0.04	0.00	0.01	0.78	0.40	0.18	0.04	0.04	0.00
2	0.07	0.00	0.02	0.00	0.01	0.00	0.13	0.19	0.00	0.01	0.02	0.00
3	0.00	0.02	0.00	0.03	0.00	0.13	1.92	0.01	0.00	0.10	0.07	0.05
4	0.85	0.00	0.00	0.33	0.00	0.01	0.22	0.05	0.26	0.00	0.00	0.04
5	0.28	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.40	0.00	0.00	0.02
6	0.00	0.00	0.12	0.00	0.51	0.90	0.53	0.63	1.95	0.02	0.31	0.02
7	0.01	0.00	0.00	0.00	0.00	0.00	0.51	0.19	0.12	0.00	0.00	0.04
8	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.30	0.31	0.01	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.05	0.18	0.01	0.00	0.03
10	0.01	0.15	0.00	0.23	0.00	0.00	0.07	0.07	0.05	0.01	0.00	0.02
11	0.35	0.01	0.00	0.01	0.00	0.00	1.16	0.01	0.00	0.00	0.03	0.12
12	0.01	0.01	0.01	0.00	0.04	0.00	3.92	0.00	0.04	0.00	0.10	0.00
13	0.05	0.61	0.01	0.00	1.72	0.00	0.00	0.04	0.02	0.01	0.13	0.00
14	0.56	0.32	0.00	0.32	0.66	0.00	0.01	0.00	0.07	0.00	0.00	0.30
15	0.02	1.09	0.00	0.95	0.06	0.02	0.00	0.00	0.08	0.00	0.01	0.00
16	0.01	0.17	0.00	0.00	0.00	0.01	0.13	0.00	0.01	0.00	0.00	0.00
17	0.05	0.10	0.04	0.03	0.00	0.12	0.11	0.18	0.12	0.00	0.00	0.04
18	0.26	0.16	0.03	0.35	0.03	0.00	0.02	0.20	0.00	0.00	0.08	0.00
19	0.00	0.04	0.01	1.21	0.00	0.00	0.07	0.10	0.13	0.03	0.06	0.00
20	0.00	0.00	0.05	0.42	0.03	0.02	0.10	0.00	0.04	0.27	0.00	0.00
21	0.00	0.00	0.01	0.00	0.01	0.00	0.19	0.00	0.07	0.00	0.05	0.09
22	0.00	0.01	0.00	0.00	0.03	0.00	0.45	0.00	0.08	0.02	0.09	0.01
23	0.00	0.00	0.09	0.01	0.06	0.00	0.06	0.00	0.06	0.00	0.10	0.14
24	0.08	0.00	0.00	3.47	0.12	0.00	0.09	0.00	0.04	0.00	0.00	0.55
25	0.10	1.37	0.02	0.01	0.00	0.00	0.03	0.00	0.00	0.01	0.00	0.21
26	0.00	0.10	0.04	0.00	0.13	0.63	0.05	0.00	0.14	0.12	0.00	0.03
27	0.00	0.29	0.08	0.00	0.00	0.49	0.05	0.00	0.06	0.00	0.01	0.01
28	0.12	0.10	0.14	0.07	0.11	0.00	0.00	0.00	0.13	0.00	0.01	0.00
29	0.02	0.01	0.01	0.17	---	0.07	0.00	0.00	0.04	0.00	0.00	0.00
30	0.02	0.00	0.00	0.07	---	1.72	0.00	0.00	0.00	0.02	0.01	0.00
31	0.01	---	0.00	0.01	---	2.43	---	0.00	---	0.07	0.00	---
TOTAL	2.91	4.56	0.68	7.73	3.52	6.56	10.69	2.42	4.58	0.75	1.12	1.72
CAL YR	2002	TOTAL 56.17										
WTR YR	2003	TOTAL 47.24										

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", Old Hawaiian Datum, 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.--Standard 8" National Weather Service accumulation can and a 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. Rainfall recorded in hundredths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.42	0.00	0.00	0.04	0.10	0.13	0.84	0.50	0.19	0.46	0.37	0.00
2	1.27	0.03	0.14	0.01	0.03	0.07	0.05	0.18	0.06	0.11	0.09	0.06
3	0.01	0.14	0.00	0.03	0.00	0.09	1.33	0.01	0.00	0.43	0.20	0.26
4	0.00	0.00	0.00	0.55	0.00	0.01	0.17	0.16	0.02	0.02	0.06	0.09
5	1.47	0.00	0.00	0.01	0.00	0.00	0.15	0.00	0.89	0.02	0.00	0.11
6	0.08	0.00	0.52	0.00	0.53	0.99	0.67	0.16	2.08	0.25	0.00	0.08
7	0.12	0.00	0.01	0.00	0.00	0.00	0.70	0.43	0.45	0.17	0.01	0.30
8	0.13	0.00	0.02	0.00	0.00	0.01	0.05	0.74	0.60	0.35	0.03	0.07
9	0.01	0.00	0.05	0.00	0.00	0.00	0.54	0.45	0.29	0.20	0.05	0.12
10	0.04	0.34	0.00	0.36	0.00	0.00	0.55	0.46	0.33	0.21	0.07	0.06
11	0.65	0.12	0.03	0.10	0.02	0.00	3.36	0.09	0.06	0.13	0.27	0.53
12	0.17	0.09	0.03	0.00	0.16	0.00	6.50	0.02	0.39	0.01	0.59	0.05
13	0.11	1.66	0.03	0.00	2.73	0.00	0.00	0.98	0.21	0.05	0.34	0.01
14	0.64	1.04	0.01	0.41	1.57	0.00	0.16	0.09	0.34	0.01	0.13	0.29
15	0.01	3.02	0.00	1.50	0.23	0.09	0.11	0.26	0.42	0.00	0.21	0.03
16	0.03	1.53	0.07	0.00	0.02	0.01	0.79	0.01	0.17	0.05	0.02	0.03
17	0.17	0.44	0.38	0.04	0.12	0.02	1.27	0.44	0.36	0.00	0.13	0.25
18	0.32	0.56	0.18	0.51	0.09	0.02	0.68	0.95	0.03	0.00	0.33	0.19
19	0.00	0.07	0.04	1.94	0.04	0.02	0.44	0.49	0.76	0.13	0.25	0.01
20	0.00	0.02	0.01	0.44	0.15	0.08	0.84	0.03	0.15	1.90	0.17	0.00
21	0.00	0.00	0.02	0.00	0.04	0.00	0.79	0.00	0.37	0.02	0.45	0.13
22	0.00	0.01	0.02	0.00	0.23	0.00	1.74	0.02	0.48	0.04	0.78	0.01
23	0.00	0.00	0.26	0.01	0.25	0.02	0.42	0.00	0.65	0.00	0.76	0.11
24	0.37	0.00	0.18	5.57	1.23	0.03	0.53	0.00	0.52	0.00	0.01	0.77
25	0.76	2.08	0.13	0.00	0.04	0.00	0.21	0.00	0.19	0.21	0.03	0.29
26	0.00	0.10	0.35	0.00	0.60	1.02	0.17	0.00	0.71	0.63	0.02	0.02
27	0.00	0.32	0.72	0.00	0.01	0.46	0.01	0.00	0.24	0.01	0.04	0.02
28	0.53	0.22	1.19	0.06	0.64	0.01	0.01	0.00	0.43	0.00	0.05	0.01
29	0.15	0.03	0.10	0.33	---	0.15	0.01	0.00	0.28	0.00	0.05	0.00
30	0.12	0.00	0.00	0.27	---	2.96	0.00	0.00	0.01	0.23	0.61	0.01
31	0.02	---	0.01	0.07	---	2.35	---	0.00	---	0.19	0.01	---
TOTAL	7.60	11.82	4.50	12.25	8.83	8.54	23.09	6.47	11.68	5.83	6.13	3.91
CAL YR	2002	TOTAL 124.39										
WTR YR	2003	TOTAL 110.65										

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", Old Hawaiian Datum, 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" National Weather Service accumulation can and a electronic data logger with a tipping bucket catchment (0.01 inch per tip). Elevation of gage is 1,110 ft (from topographic map).

REMARKS.--Records good. Rainfall recorded in hundredths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.21	0.03	0.00	0.01	0.26	0.20	0.17	0.36	0.01	0.11	0.34	0.00
2	0.45	0.05	0.08	0.00	0.20	0.07	0.35	0.13	0.11	0.16	0.28	0.08
3	0.08	0.21	0.00	0.00	0.00	0.01	2.02	0.04	0.07	0.32	0.09	0.27
4	0.02	0.00	0.00	0.38	0.00	0.00	0.30	0.27	0.74	0.05	0.15	0.17
5	1.22	0.00	0.00	0.00	0.00	0.00	0.01	0.05	3.66	0.01	0.00	0.18
6	0.02	0.02	0.84	0.00	0.40	1.44	0.15	0.34	1.23	0.45	0.01	0.06
7	0.18	0.00	0.00	0.00	0.00	0.05	0.01	1.40	1.76	0.38	0.09	0.65
8	0.15	0.00	0.00	0.00	0.00	0.00	0.00	2.10	1.04	0.35	0.11	0.17
9	0.07	0.00	0.05	0.00	0.00	0.00	1.21	0.53	0.15	0.25	0.13	0.26
10	0.04	0.80	0.00	0.15	0.00	0.00	0.31	0.48	0.35	0.26	0.10	0.28
11	0.57	0.15	0.04	0.09	0.00	0.00	2.68	0.15	0.00	0.16	0.47	0.77
12	0.16	0.09	1.60	0.00	0.09	0.00	1.68	0.07	0.08	0.02	0.29	0.27
13	0.57	1.00	0.10	0.00	3.84	0.00	0.01	1.43	0.39	0.05	0.34	0.70
14	0.17	0.56	0.00	0.11	2.75	0.00	0.16	0.19	0.35	0.01	0.26	0.10
15	0.01	1.07	0.00	1.00	0.15	0.67	0.14	2.29	0.19	0.02	0.10	0.80
16	0.26	0.50	0.22	0.00	0.03	0.55	0.63	0.14	0.09	0.09	0.09	0.16
17	0.62	0.40	0.42	0.00	0.08	0.01	1.08	0.78	0.32	0.00	0.17	0.84
18	0.34	0.54	0.14	0.25	0.03	0.00	0.28	0.84	0.03	0.00	0.33	0.75
19	0.00	0.03	0.10	1.53	0.01	0.03	0.39	0.48	0.44	0.01	0.18	0.19
20	0.01	0.01	0.00	0.07	0.13	0.03	0.60	0.05	0.21	0.62	0.24	0.04
21	0.04	0.04	0.15	0.00	0.00	0.01	0.87	0.00	0.28	0.13	0.63	0.07
22	0.00	0.01	0.01	0.00	0.24	0.00	1.25	0.00	0.37	0.05	0.53	0.01
23	0.00	0.04	0.22	0.00	0.23	0.07	0.53	0.02	0.72	0.06	0.81	0.03
24	0.20	0.00	0.34	5.22	0.73	0.05	0.28	0.00	0.29	0.01	0.02	0.47
25	0.40	1.20	0.19	0.00	0.09	0.17	0.33	0.00	0.16	0.93	0.38	0.03
26	0.01	0.00	0.64	0.02	0.48	0.48	0.41	0.00	0.44	1.57	0.02	0.23
27	0.00	0.16	0.70	0.00	0.25	0.33	0.64	0.00	0.18	0.85	0.07	0.01
28	0.35	0.50	0.71	0.00	0.84	0.00	0.02	0.00	0.47	0.09	0.02	0.01
29	0.15	0.04	0.31	0.18	---	0.20	0.00	0.02	0.16	0.04	0.87	0.00
30	0.23	0.00	0.01	0.24	---	3.42	0.00	0.01	0.01	0.17	1.38	0.00
31	0.02	---	0.00	0.49	---	1.89	---	0.12	---	0.25	0.15	---
TOTAL	6.55	7.45	6.87	9.74	10.83	9.68	16.51	12.29	14.30	7.47	8.65	7.60
CAL YR	2002	TOTAL 176.70										
WTR YR	2003	TOTAL 117.94										

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", Old Hawaiian Datum, 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.--Standard 8" National Weather Service accumulation can and a 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. Rainfall recorded in hundredths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	0.01	0.00	0.02	0.24	0.06	0.13	0.08	0.02	0.10	0.22	0.01
2	0.06	0.01	0.13	0.01	0.06	0.03	2.45	0.04	0.00	0.04	0.20	0.07
3	2.08	0.09	0.00	0.00	0.00	0.00	1.37	0.02	0.00	0.20	0.23	0.10
4	0.02	0.03	0.02	0.02	0.00	0.00	1.01	0.23	1.38	0.01	0.05	0.06
5	0.24	0.01	0.00	0.00	0.00	0.00	0.01	0.02	0.46	0.00	0.00	0.06
6	0.05	0.02	0.55	0.00	0.07	1.62	0.78	0.16	0.05	0.19	0.00	0.01
7	0.05	0.00	0.00	0.00	0.00	0.08	0.42	1.48	0.98	0.27	0.02	0.45
8	0.04	0.00	0.00	0.00	0.00	0.01	0.03	0.62	0.61	0.06	0.06	0.09
9	0.11	0.00	0.03	0.00	0.00	0.00	0.43	0.23	0.02	0.17	0.08	0.06
10	0.01	0.09	0.00	0.09	0.00	0.00	0.13	0.24	0.06	0.17	0.01	0.05
11	0.32	0.06	0.02	0.01	0.00	0.00	1.46	0.03	0.00	0.06	0.09	0.74
12	0.05	0.06	0.42	0.00	0.07	0.00	0.36	0.04	0.05	0.03	0.22	0.12
13	0.01	1.17	0.08	0.00	3.97	0.00	0.00	0.61	0.16	0.01	0.10	0.47
14	0.01	0.31	0.00	0.03	0.83	0.00	0.20	0.06	0.30	0.02	0.23	0.39
15	0.00	1.59	0.00	0.17	0.04	1.08	0.15	0.18	0.07	0.00	0.07	0.22
16	0.15	0.43	0.11	0.00	0.17	0.60	0.24	0.12	0.21	0.06	0.02	0.15
17	3.39	0.15	0.23	0.00	0.00	0.00	0.26	0.56	0.20	0.00	0.01	0.37
18	0.27	0.24	0.10	0.14	0.00	0.00	0.07	0.36	0.02	0.00	0.08	0.26
19	0.00	0.10	0.04	0.32	0.02	0.01	0.21	0.29	0.28	0.09	0.06	0.13
20	0.02	0.03	0.00	0.02	0.04	0.01	0.18	0.15	0.06	0.31	0.02	0.02
21	0.00	0.01	0.12	0.00	0.03	0.02	0.12	0.00	0.13	0.12	0.36	0.10
22	0.00	0.00	0.01	0.00	0.34	0.00	0.52	0.00	0.09	0.05	0.39	0.00
23	0.01	0.03	0.16	0.00	0.17	0.11	0.13	0.10	0.53	0.05	0.69	0.01
24	0.06	0.00	0.05	1.32	0.28	0.01	0.16	0.00	0.14	0.01	0.02	0.27
25	0.16	0.19	0.16	0.00	0.01	0.01	0.16	0.00	0.09	0.48	0.09	0.05
26	0.04	0.00	0.68	0.00	0.26	0.22	0.26	0.00	0.17	0.94	0.04	0.04
27	0.00	0.04	0.34	0.00	0.28	0.07	0.01	0.00	0.07	0.15	0.04	0.00
28	0.12	0.37	0.48	0.00	0.71	0.00	0.00	0.00	0.13	0.02	0.09	0.01
29	0.10	0.01	0.06	0.08	---	0.00	0.00	0.00	0.09	0.02	0.12	0.00
30	0.27	0.00	0.00	0.41	---	2.71	0.00	0.00	0.00	0.05	0.27	0.00
31	0.02	---	0.00	0.27	---	1.32	---	0.02	---	0.16	0.00	---
TOTAL	7.66	5.05	3.79	2.91	7.59	7.97	11.25	5.64	6.37	3.84	3.88	4.31
CAL YR	2002	TOTAL 78.84										
WTR YR	2003	TOTAL 70.26										

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", Old Hawaiian Datum, 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" National Weather Service accumulation can and a electronic data logger with a tipping bucket catchment (0.01 inch per tip). Elevation of gage is 3,700 ft (from topographic map).

REMARKS.--Records good. Rainfall recorded in hundredths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	0.00	0.01	0.20	0.01	0.00	1.04	0.54	0.06	0.22	0.05	0.00
2	0.00	0.01	0.09	0.01	0.00	0.00	0.03	0.07	0.01	0.02	0.09	0.00
3	0.00	0.01	0.00	0.07	0.00	0.09	1.91	0.00	0.00	0.19	0.09	0.24
4	0.00	0.00	0.00	0.31	0.00	0.00	0.36	0.06	1.55	0.01	0.02	0.03
5	0.10	0.00	0.00	0.00	0.00	0.00	0.41	0.00	0.57	0.00	0.00	0.06
6	0.00	0.00	0.63	0.00	0.91	1.69	0.29	0.52	1.75	0.02	0.40	0.06
7	0.02	0.00	0.00	0.00	0.00	0.00	0.44	0.20	0.01	0.00	0.00	0.01
8	0.02	0.00	0.00	0.00	0.00	0.00	0.86	0.05	0.05	0.05	0.02	0.01
9	0.00	0.00	0.01	0.00	0.00	0.00	0.24	0.10	0.08	0.10	0.02	0.01
10	0.01	0.38	0.00	0.51	0.00	0.00	0.10	0.19	0.16	0.07	0.00	0.00
11	0.39	0.05	0.01	0.04	0.00	0.00	0.69	0.02	0.01	0.03	0.01	0.05
12	0.03	0.00	0.01	0.00	0.24	0.00	2.19	0.00	0.20	0.00	0.15	0.00
13	0.01	1.35	0.17	0.00	2.83	0.00	0.00	0.08	0.02	0.02	0.25	0.02
14	0.44	1.18	0.00	0.42	0.96	0.00	0.01	0.01	0.14	0.00	0.01	0.35
15	0.06	2.81	0.00	1.72	0.26	0.01	0.02	0.00	0.20	0.00	0.05	0.00
16	0.01	0.86	0.01	0.00	0.00	0.01	0.24	0.00	0.21	0.00	0.00	0.00
17	0.13	0.31	0.06	0.05	0.00	0.14	0.09	0.52	0.11	0.00	0.00	0.01
18	0.17	0.27	0.03	0.27	0.00	0.00	0.00	0.15	0.00	0.00	0.27	0.00
19	0.20	0.12	0.00	1.35	0.00	0.00	0.24	0.04	0.26	0.00	0.00	0.00
20	0.55	0.02	0.00	1.00	0.03	0.00	0.18	0.00	0.07	0.25	0.02	0.00
21	0.00	0.00	0.02	0.00	0.03	0.00	0.20	0.00	0.13	0.00	0.12	0.28
22	0.00	0.04	0.00	0.00	0.13	0.00	0.83	0.00	0.07	0.04	0.06	0.00
23	0.00	0.00	0.03	0.00	0.00	0.00	0.06	0.00	0.12	0.01	0.18	0.21
24	0.07	0.00	0.00	4.09	0.14	0.00	0.08	0.00	0.01	0.00	0.00	0.61
25	0.07	1.39	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.14	0.00	0.25
26	0.00	0.04	0.16	0.00	0.04	0.87	0.00	0.00	0.06	0.07	0.00	0.01
27	0.00	0.13	0.12	0.00	0.00	0.46	0.00	0.00	0.02	0.01	0.02	0.00
28	0.36	0.24	0.07	0.10	0.13	0.00	0.00	0.00	0.08	0.00	0.00	0.01
29	0.03	0.01	0.00	0.34	---	0.00	0.00	0.00	0.08	0.00	0.12	0.00
30	0.08	0.00	0.00	0.09	---	1.29	0.00	0.05	0.00	0.13	0.02	0.01
31	0.01	---	0.00	0.02	---	2.59	---	0.00	---	0.17	0.00	---
TOTAL	2.76	9.22	1.43	10.60	5.71	7.15	10.52	2.60	6.03	1.55	1.97	2.23
CAL YR	2002	TOTAL 63.28										
WTR YR	2003	TOTAL 61.77										

RAINFALL RECORDS

HAWAII, ISLAND OF KAUAI—Continued

220739159373001. State Key Number 1082.0 Waiakoali rain gage near Waimea, Kauai.

LOCATION.--Lat 22°07'39", long 159°37'30", Old Hawaiian Datum, 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" National Weather Service accumulation can and a electronic data logger with tipping bucket catchment (0.01 inch per tip). Elevation of gage is 3,420 ft (from topographic map).

REMARKS.--Records good. Rainfall recorded in hundredths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	0.00	0.00	0.13	0.01	0.01	1.05	0.58	0.12	0.18	0.06	0.00
2	0.00	0.01	0.10	0.00	0.00	0.00	0.04	0.06	0.00	0.02	0.08	0.00
3	0.00	0.01	0.00	0.05	0.00	0.10	1.94	0.00	0.00	0.16	0.07	0.15
4	0.02	0.00	0.00	0.34	0.00	0.01	0.35	0.05	1.64	0.01	0.02	0.03
5	0.12	0.00	0.00	0.00	0.00	0.00	0.47	0.00	0.81	0.00	0.00	0.04
6	0.01	0.00	0.51	0.00	0.80	1.69	0.32	0.41	1.87	0.02	0.17	0.03
7	0.01	0.00	0.01	0.00	0.00	0.00	0.58	0.29	0.05	0.01	0.00	0.01
8	0.03	0.00	0.00	0.00	0.00	0.00	1.48	0.08	0.13	0.02	0.01	0.01
9	0.00	0.00	0.01	0.00	0.00	0.00	0.20	0.08	0.19	0.06	0.02	0.01
10	0.02	0.37	0.00	0.39	0.00	0.00	0.09	0.18	0.12	0.07	0.00	0.00
11	0.34	0.05	0.01	0.04	0.00	0.00	0.69	0.03	0.01	0.03	0.02	0.07
12	0.02	0.00	0.00	0.00	0.40	0.00	2.62	0.00	0.14	0.00	0.11	0.00
13	0.01	1.15	0.08	0.00	2.07	0.00	0.00	0.06	0.03	0.02	0.22	0.01
14	0.55	1.05	0.01	0.42	0.81	0.00	0.03	0.01	0.10	0.00	0.00	0.33
15	0.04	2.02	0.00	1.56	0.21	0.00	0.02	0.00	0.14	0.00	0.05	0.01
16	0.03	0.82	0.00	0.00	0.00	0.01	0.26	0.00	0.17	0.00	0.00	0.00
17	0.07	0.28	0.08	0.02	0.00	0.08	0.10	0.31	0.08	0.00	0.00	0.01
18	0.18	0.24	0.04	0.25	0.01	0.00	0.01	0.16	0.01	0.00	0.24	0.00
19	0.47	0.11	0.00	1.38	0.01	0.00	0.19	0.04	0.21	0.00	0.00	0.00
20	0.14	0.02	0.00	0.82	0.03	0.01	0.24	0.00	0.06	0.23	0.02	0.00
21	0.00	0.00	0.00	0.00	0.03	0.00	0.18	0.00	0.11	0.01	0.10	0.31
22	0.00	0.03	0.00	0.00	0.13	0.00	0.61	0.00	0.08	0.04	0.05	0.00
23	0.00	0.01	0.04	0.01	0.00	0.00	0.05	0.00	0.10	0.00	0.19	0.25
24	0.09	0.00	0.00	3.89	0.13	0.00	0.05	0.00	0.00	0.00	0.00	0.63
25	0.10	1.80	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.17	0.00	0.29
26	0.00	0.08	0.16	0.00	0.04	1.01	0.02	0.00	0.08	0.09	0.00	0.06
27	0.00	0.16	0.11	0.00	0.00	0.50	0.00	0.00	0.02	0.00	0.03	0.00
28	0.31	0.27	0.10	0.09	0.11	0.00	0.00	0.00	0.09	0.00	0.00	0.00
29	0.03	0.01	0.00	0.29	---	0.00	0.00	0.00	0.08	0.00	0.05	0.00
30	0.11	0.00	0.00	0.08	---	1.31	0.00	0.02	0.00	0.10	0.03	0.00
31	0.00	---	0.00	0.01	---	2.52	---	0.00	---	0.14	0.00	---
TOTAL	2.70	8.49	1.27	9.77	4.79	7.25	11.60	2.36	6.44	1.38	1.54	2.25
CAL YR	2002	TOTAL 63.86										
WTR YR	2003	TOTAL 59.84										

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", Old Hawaiian Datum, 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.--Standard 8" national Weather Service accumulation can and a 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. Rainfall recorded in hundredths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	0.00	0.00	0.10	0.00	0.01	0.84	0.42	0.14	0.19	0.14	0.00
2	0.02	0.00	0.06	0.01	0.00	0.00	0.02	0.11	0.00	0.05	0.07	0.01
3	0.00	0.04	0.00	0.07	0.00	0.11	2.11	0.01	0.00	0.19	0.12	0.15
4	0.68	0.01	0.00	0.49	0.00	0.01	0.32	0.04	0.69	0.01	0.02	0.04
5	0.14	0.00	0.00	0.01	0.00	0.00	0.16	0.00	0.35	0.00	0.00	0.11
6	0.00	0.00	0.29	0.00	0.58	1.46	0.59	0.28	1.66	0.05	0.03	0.04
7	0.04	0.00	0.00	0.00	0.00	0.00	0.50	0.38	0.29	0.02	0.00	0.04
8	0.05	0.00	0.00	0.00	0.00	0.00	0.03	0.06	0.36	0.03	0.03	0.01
9	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.12	0.07	0.07	0.01	0.04
10	0.02	0.37	0.00	0.34	0.00	0.00	0.10	0.22	0.10	0.09	0.00	0.00
11	0.46	0.03	0.02	0.03	0.00	0.00	0.90	0.03	0.01	0.05	0.03	0.08
12	0.02	0.02	0.01	0.00	0.22	0.00	3.53	0.00	0.17	0.00	0.17	0.00
13	0.16	1.02	0.03	0.00	2.53	0.00	0.00	0.12	0.04	0.00	0.28	0.03
14	0.49	1.18	0.01	0.23	0.92	0.00	0.03	0.02	0.11	0.00	0.01	0.32
15	0.02	2.19	0.00	1.38	0.19	0.00	0.03	0.01	0.12	0.00	0.06	0.00
16	0.02	0.87	0.01	0.00	0.00	0.00	0.26	0.00	0.07	0.00	0.00	0.00
17	0.08	0.38	0.11	0.02	0.00	0.21	0.17	0.31	0.18	0.00	0.00	0.05
18	0.22	0.27	0.07	0.29	0.02	0.01	0.05	0.25	0.01	0.00	0.22	0.01
19	0.19	0.09	0.00	1.33	0.01	0.00	0.23	0.12	0.23	0.01	0.01	0.00
20	0.06	0.02	0.00	0.78	0.06	0.01	0.26	0.01	0.07	0.35	0.02	0.00
21	0.00	0.00	0.01	0.00	0.02	0.00	0.21	0.00	0.12	0.00	0.15	0.13
22	0.00	0.03	0.00	0.00	0.14	0.00	0.75	0.00	0.18	0.02	0.08	0.00
23	0.00	0.01	0.09	0.01	0.00	0.00	0.08	0.00	0.17	0.01	0.21	0.17
24	0.15	0.00	0.00	3.99	0.20	0.00	0.09	0.00	0.00	0.00	0.00	0.52
25	0.22	2.26	0.01	0.01	0.00	0.00	0.02	0.00	0.00	1.00	0.00	0.15
26	0.00	0.10	0.24	0.00	0.08	0.91	0.04	0.00	0.14	0.07	0.01	0.00
27	0.00	0.28	0.15	0.00	0.00	0.51	0.00	0.00	0.10	0.00	0.00	0.00
28	0.24	0.19	0.25	0.06	0.23	0.00	0.00	0.00	0.17	0.01	0.00	0.00
29	0.06	0.01	0.00	0.23	---	0.00	0.00	0.00	0.12	0.00	0.02	0.00
30	0.10	0.00	0.00	0.08	---	1.46	0.00	0.00	0.00	0.13	0.03	0.00
31	0.01	---	0.00	0.02	---	2.51	---	0.00	---	0.17	0.00	---
TOTAL	3.45	9.37	1.36	9.48	5.20	7.21	11.58	2.51	5.67	2.52	1.72	1.90
CAL YR	2002	TOTAL		68.39								
WTR YR	2003	TOTAL		61.97								

RAINFALL RECORDS

HAWAII, ISLAND OF OAHU

211747157485601. State Key Number 711.6 Manoa rain gage at Kanewai Field at Honolulu, Oahu.

LOCATION.--Lat 21°17'47", long 157°48'56", Old Hawaiian Datum, Hydrologic Unit 20060000, in USGS stream-gaging station 16242500 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 of confluence with Palolo Stream.

PERIOD OF RECORD.--Continuous-record station, May 1999 to current year.

GAGE.--Standard 8-in. National Weather Service collector and 8-in. rain can with tipping-bucket attachment. An electronic data logger records rainfall at 15-minute intervals. Elevation of gage is 22 ft above mean sea level (from topographic map).

REMARKS.--Records poor. Rainfall recorded in hundredths of an inch.

RAINFALL RECORD

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.03
2	0.00	0.14	0.08	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00
4	0.00	0.00	0.00	0.04	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.07	0.00	1.33	0.85	0.39	0.00	0.00	0.00	0.00	0.03
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.03
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.03	0.00
9	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.04	0.00	0.00	0.00	0.00
10	0.00	0.09	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.03
11	0.18	0.83	0.02	0.00	0.10	0.00	0.06	0.00	0.03	0.00	0.00	0.00
12	0.00	0.46	0.00	0.00	0.00	0.00	0.06	0.00	0.03	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.04	0.16	0.00	0.00	0.03
14	0.00	0.05	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.14	0.83	0.00	0.07	0.00	0.02	0.00	0.00	0.08	0.03	0.00	0.00
16	0.09	0.23	0.00	0.00	0.00	0.29	0.08	0.00	0.00	0.00	0.00	0.03
17	0.00	0.00	0.02	0.00	0.00	0.00	0.09	0.03	0.08	0.00	0.00	0.00
18	0.00	0.09	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.00	0.00	0.00
19	0.14	0.23	0.00	0.14	0.00	0.00	0.04	0.00	0.05	0.03	0.00	0.00
20	0.00	0.00	0.00	0.03	0.17	0.02	0.07	0.00	0.00	0.00	0.08	0.12
21	0.00	0.00	0.00	0.00	0.20	0.00	0.23	0.00	0.00	0.00	0.03	0.00
22	0.05	0.00	0.02	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.01	0.10	0.14	0.00	0.02	0.00	0.00	0.00	0.06	0.09
24	0.51	0.00	0.01	0.34	0.10	0.00	0.05	0.00	0.03	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.01	0.00	0.07	0.00	0.00	0.00	0.03	0.00	0.06	0.00
27	0.00	0.07	0.07	0.00	0.34	0.81	0.00	0.00	0.11	0.11	0.00	0.00
28	0.00	0.06	0.01	0.17	0.10	0.00	0.00	0.00	0.00	0.00	0.03	0.00
29	0.00	0.00	0.00	0.00	---	0.01	0.00	0.00	0.00	0.00	0.00	0.00
30	0.14	0.00	0.00	0.00	---	0.74	0.00	0.00	0.14	0.00	0.00	0.00
31	0.23	---	0.00	0.03	---	0.00	---	0.00	---	0.03	0.00	---
TOTAL	1.48	3.08	0.32	0.95	3.30	2.94	1.21	0.13	0.77	0.28	0.32	0.39

CAL YR 2002 TOTAL 19.49

WTR YR 2003 TOTAL 15.17

RAINFALL RECORD

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", Old Hawaiian Datum, 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 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 recorded in tenths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
2	0.2	0.6	0.3	0.0	0.0	0.4	0.2	0.0	0.0	0.0	0.5	0.0
3	0.1	0.2	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.7	0.0
4	0.0	0.2	0.0	0.2	0.0	0.0	1.1	0.0	0.1	0.0	0.0	0.1
5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.9	1.2	0.3
6	0.0	0.0	1.1	0.0	0.0	0.6	0.1	0.1	0.0	0.1	0.0	0.2
7	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.0	0.3	0.1	0.7
8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.3	0.0	0.1	0.0	0.0
10	0.0	0.0	0.1	0.9	0.0	0.0	0.6	0.3	0.0	0.0	0.1	6.7
11	0.0	0.4	0.9	0.8	0.4	0.0	0.4	0.1	0.0	0.2	0.1	5.1
12	0.3	2.3	0.7	0.0	0.2	0.0	0.8	0.0	0.2	0.0	0.1	0.0
13	0.0	0.1	0.0	0.0	0.3	0.0	0.0	0.2	0.0	0.4	0.2	1.1
14	0.6	0.4	0.0	1.0	6.8	0.0	0.0	0.4	0.2	0.0	0.7	0.3
15	2.0	1.7	0.0	0.6	0.0	0.0	0.0	0.3	0.8	0.1	0.0	0.0
16	0.4	0.2	0.0	0.0	0.0	2.7	0.2	0.0	0.2	0.5	0.2	0.3
17	0.1	0.0	0.1	0.0	0.0	0.0	0.5	0.0	0.3	0.0	0.4	0.1
18	0.0	0.2	0.0	0.0	0.0	0.0	0.3	0.0	0.5	0.0	0.0	0.1
19	0.4	0.1	0.0	0.1	0.0	0.0	0.2	0.0	0.5	0.5	0.0	0.1
20	0.0	0.0	0.0	0.6	0.9	0.1	1.1	0.0	0.0	0.7	0.1	0.0
21	0.0	0.0	0.0	0.0	0.5	0.0	0.2	0.0	0.2	0.0	0.1	0.0
22	0.1	0.0	0.0	0.0	0.3	0.0	0.8	0.0	0.0	0.0	0.6	0.0
23	0.0	0.0	0.2	0.0	0.1	0.1	0.1	0.0	0.3	0.6	0.3	0.0
24	1.0	0.0	0.1	0.4	0.0	0.0	0.5	0.1	0.4	1.2	0.3	0.0
25	0.1	0.0	0.0	0.1	0.9	0.0	0.0	0.0	0.1	1.5	0.0	0.0
26	0.0	0.4	0.9	0.0	0.2	0.0	0.0	0.0	0.2	1.6	0.0	0.0
27	0.0	0.1	0.0	0.0	0.4	2.4	0.1	0.0	0.4	0.1	0.0	0.0
28	0.0	1.6	1.0	0.1	0.5	0.0	0.0	0.0	0.8	0.8	0.0	0.0
29	0.0	0.5	0.1	0.0	---	1.9	0.0	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	3.6	---	0.9	0.0	0.0	0.0	0.0	0.2	0.0
31	1.2	---	0.0	2.5	---	0.0	---	0.0	---	0.1	0.1	---
TOTAL	7.1	9.0	5.5	10.9	11.5	9.1	8.4	2.4	5.2	9.8	6.0	15.2

CAL YR 2002 TOTAL 129.0

WTR YR 2003 TOTAL 100.1

RAINFALL RECORDS

HAWAII, ISLAND OF OAHU—Continued

212304157542201. State Key Number 771.9 North Halawa rain gage near Honolulu, Oahu.

LOCATION.--Lat 21°23'04", long 157°54'22", Old Hawaiian Datum, Hydrologic Unit 20060000, in USGS stream-gaging station 16226200, on right bank, 0.6 mi north of Oahu Prison, 1.0 mi south of Keaiwa Heiau, and 1.7 mi east of Aiea High School.

PERIOD OF RECORD.--Continuous-record station, May 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 recorded in tenths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.1	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.1	0.1
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.2
11	0.1	0.3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.7
12	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	1.5	0.1	0.0	0.6	0.7	0.0	0.0	0.0	0.1	0.0	0.1	0.0
15	1.6	1.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
17	0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0
19	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0
20	0.0	0.0	0.0	0.5	0.1	0.0	0.7	0.0	0.0	0.2	0.0	0.0
21	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.1
22	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.1	0.0	0.0	0.0	0.0
23	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	0.1	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
25	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	0.0	0.4	0.1	0.0	0.2	0.0	0.0	0.0	0.1	0.5	0.0	0.0
27	0.0	0.2	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0
28	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
29	0.0	0.0	0.0	0.1	---	0.0	0.0	0.0	0.1	0.0	0.0	0.1
30	0.0	0.0	0.0	0.0	---	1.1	0.0	0.0	0.0	0.0	0.0	0.0
31	0.3	---	0.0	0.4	---	0.0	---	0.0	---	0.0	0.0	---
TOTAL	4.2	2.5	0.5	2.2	1.7	3.0	2.9	0.4	0.9	1.1	0.4	1.3
CAL YR	2002	TOTAL		32.1								
WTR YR	2003	TOTAL		21.1								

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", Old Hawaiian Datum, 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 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 period of missing record which is poor. Rainfall recorded in tenths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
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	0.0	0.0	0.0	0.0	0.1
2	0.3	---	---	---	0.0	0.3	0.2	0.0	0.0	0.2	0.6	0.0
3	0.1	---	---	---	0.0	0.0	0.7	0.0	0.0	0.0	0.7	0.0
4	0.1	---	---	---	0.0	0.0	0.9	0.0	0.0	0.0	0.1	0.2
5	0.2	---	---	---	0.0	0.0	0.3	0.0	0.0	0.2	0.2	0.1
6	0.0	---	---	---	0.1	0.4	0.3	0.0	0.0	0.1	0.0	0.1
7	0.2	---	---	---	0.0	0.1	0.5	0.6	0.0	0.1	0.0	0.6
8	0.2	---	---	---	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.0
9	0.0	---	---	---	0.0	0.0	0.9	0.2	0.0	0.2	0.0	0.0
10	0.0	---	---	---	0.0	0.0	0.5	0.1	0.0	0.0	0.0	6.3
11	---	---	---	---	0.2	0.0	0.4	0.1	0.0	0.2	0.1	5.2
12	---	---	---	---	0.3	0.0	0.9	0.0	0.2	0.0	0.1	0.0
13	---	---	---	---	0.2	0.0	0.0	0.3	0.1	0.5	0.1	0.9
14	---	---	---	---	6.4	0.0	0.1	0.3	0.2	0.0	0.6	0.0
15	---	---	---	---	0.0	0.0	0.1	0.3	0.3	0.1	0.0	0.0
16	---	---	---	0.0	0.0	3.3	0.1	0.0	0.4	0.6	0.0	0.4
17	---	---	---	0.0	0.0	0.0	0.7	0.1	0.4	0.0	0.1	0.2
18	---	---	---	0.0	0.0	0.0	0.1	0.1	0.3	0.0	0.0	0.0
19	---	---	---	0.0	0.0	0.1	0.1	0.0	0.5	0.4	0.0	0.2
20	---	---	---	0.4	0.5	0.0	0.7	0.0	0.1	0.8	0.1	0.0
21	---	---	---	0.0	0.4	0.0	0.2	0.0	0.0	0.0	0.0	0.0
22	---	---	---	0.0	0.1	0.1	0.9	0.0	0.1	0.0	0.4	0.0
23	---	---	---	0.0	0.2	0.0	0.1	0.0	0.2	0.1	0.1	0.1
24	---	---	---	0.2	0.0	0.0	0.3	0.0	0.7	1.8	0.0	0.0
25	---	---	---	0.1	1.1	0.0	0.2	0.0	0.1	1.6	0.0	0.0
26	---	---	---	0.0	0.2	0.0	0.1	0.0	0.2	1.4	0.0	0.0
27	---	---	---	0.0	0.3	1.7	0.1	0.0	0.1	0.1	0.0	0.0
28	---	---	---	0.0	0.6	0.1	0.0	0.0	1.0	0.9	0.1	0.0
29	---	---	---	0.1	---	2.0	0.0	0.0	0.0	0.0	0.0	0.0
30	---	---	---	3.2	---	1.0	0.0	0.0	0.0	0.0	0.0	0.0
31	---	---	---	2.0	---	0.1	---	0.0	---	0.1	0.2	---
TOTAL	---	---	---	---	10.7	9.2	9.4	2.2	4.9	9.6	3.5	14.4

Partial daily record on Oct. 10 (0015 hrs. to 1215 hrs.) is 0.0 inches.

No daily record Oct. 10 (1230 hrs.) to Jan. 16 (1145 hrs.).

Partial daily record on Jan. 16 (1200 hrs. to 2400 hrs.) is 0.0 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", Old Hawaiian Datum, 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 float-type system. 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 poor. Rainfall recorded in hundredths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.14	---	---	---	---	---	---	---	---	---	---	---
2	0.03	---	---	---	---	---	---	---	---	---	---	---
3	0.00	---	---	---	---	---	---	---	---	---	---	---
4	0.00	---	---	---	---	---	---	---	---	---	---	---
5	0.00	---	---	---	---	---	---	---	---	---	---	0.00
6	0.00	---	---	---	---	---	---	---	---	---	---	0.00
7	0.00	---	---	---	---	---	---	---	---	---	---	0.00
8	0.00	---	---	---	---	---	---	---	---	---	---	0.12
9	0.00	---	---	---	---	---	---	---	---	---	---	0.00
10	0.00	---	---	---	---	---	---	---	---	---	---	0.24
11	0.30	---	---	---	---	---	---	---	---	---	---	1.56
12	0.05	---	---	---	---	---	---	---	---	---	---	0.00
13	0.00	---	---	---	---	---	---	---	---	---	---	0.00
14	0.29	---	---	---	---	---	---	---	---	---	---	0.00
15	0.20	---	---	---	---	---	---	---	---	---	---	0.00
16	0.04	---	---	---	---	---	---	---	---	---	---	0.00
17	0.00	---	---	---	---	---	---	---	---	---	---	0.00
18	0.00	---	---	---	---	---	---	---	---	---	---	0.00
19	0.00	---	---	---	---	---	---	---	---	---	---	0.00
20	0.00	---	---	---	---	---	---	---	---	---	---	0.00
21	0.00	---	---	---	---	---	---	---	---	---	---	0.00
22	0.00	---	---	---	---	---	---	---	---	---	---	0.00
23	0.00	---	---	---	---	---	---	---	---	---	---	0.12
24	0.01	---	---	---	---	---	---	---	---	---	---	0.00
25	0.01	---	---	---	---	---	---	---	---	---	---	0.00
26	0.03	---	---	---	---	---	---	---	---	---	---	0.00
27	0.00	---	---	---	---	---	---	---	---	---	---	0.00
28	1.30	---	---	---	---	---	---	---	---	---	---	0.00
29	---	---	---	---	---	---	---	---	---	---	---	0.00
30	---	---	---	---	---	---	---	---	---	---	---	0.00
31	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL	---	---	---	---	---	---	---	---	---	---	---	---

CAL YR2002 TOTAL 15.28 (estimated)

Total accumulated rainfall from Oct. 29 to Dec. 2 is 1.60 inches.

Total accumulated rainfall from Dec. 2 to Jan. 9 is 0.40 inches.

Total accumulated rainfall from Jan. 9 to Mar. 3 is 2.40 inches.

Total accumulated rainfall from Mar. 3 to Apr. 14 is 3.40 inches.

Total accumulated rainfall from Apr. 14 to Jun. 12 is 0.70 inches.

No data from Jun. 12 to Sep. 4.

Total accumulated rainfall from Sep. 4 (1415 hrs.) to Sep. 5 (1230 hrs.) is 0.10 inches.

Partial daily rainfall for Sep. 5 (1230 hrs. to 2400 hrs.) is 0.00 inches.

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", Old Hawaiian Datum, Hydrologic Unit 20060000, in USGS stream-gaging station 16249000, 260 ft downstream from Kalaniana'ole Highway, 2.3 mi northwest of Waimanalo Post Office, and 0.9 mi southeast of Bellows AFB radar towers.

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 7 5/16-in. diameter rain can, 4 ft tall, with a float system attached to a data logger. Elevation of gage is 20 ft above mean sea level (from topographic map).

REMARKS.--Records good. Rainfall recorded in tenths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.00	0.10
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10
6	0.00	0.00	0.50	0.00	0.20	0.30	0.00	0.10	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	1.50	0.70	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.30	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.10
12	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.10	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.10	0.00	0.00	0.40	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	1.80	0.50	0.00	0.60	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00
16	0.70	0.00	0.00	0.00	0.00	0.30	0.00	0.00	0.40	0.00	0.00	0.00
17	1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10
19	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.50	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00
23	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00
27	0.00	0.50	0.00	0.00	0.00	3.00	0.00	0.00	0.00	0.60	0.00	0.00
28	0.00	0.80	0.00	0.10	0.00	0.40	0.00	0.00	0.10	0.00	0.00	0.00
29	0.00	1.10	0.00	0.70	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	3.00	---	1.10	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00	---	0.00	0.30	---	0.10	---	0.00	---	0.00	0.00	---
TOTAL	3.90	3.20	0.80	7.80	6.80	7.30	1.50	0.10	0.60	0.80	0.10	1.40
CAL YR	2002	TOTAL 34.40										
WTR YR	2003	TOTAL 34.30										

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", Old Hawaiian Datum, 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 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 fair. Rainfall recorded in tenths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.2	0.0	0.0	0.0	---	---	---	0.0	0.2	0.1	0.0	0.0
2	0.2	0.2	0.0	0.0	---	---	---	0.0	0.0	0.1	0.0	0.1
3	0.1	0.2	0.0	0.0	---	---	---	0.0	0.0	0.0	0.1	0.0
4	0.2	0.0	0.1	0.1	---	---	---	0.0	0.5	0.0	0.0	0.0
5	0.3	0.0	0.0	0.0	---	---	---	0.0	0.3	0.0	0.0	0.1
6	0.0	0.0	0.1	0.1	---	---	---	0.0	0.0	0.0	0.0	0.0
7	0.1	0.0	0.0	0.0	---	---	---	0.0	1.1	0.1	0.0	0.2
8	0.0	0.0	0.0	0.1	---	---	0.0	0.0	1.5	0.1	0.1	0.0
9	0.0	0.0	0.0	0.0	---	---	0.3	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.1	---	---	1.7	0.4	0.0	0.0	0.0	1.0
11	0.2	0.1	0.0	0.0	---	---	0.2	0.0	0.0	0.0	0.1	0.6
12	0.0	0.4	0.0	0.0	---	---	0.2	0.1	0.1	0.0	0.0	0.2
13	0.0	0.2	0.0	0.0	---	---	0.0	0.0	0.1	0.0	0.0	0.0
14	1.2	0.2	0.0	0.4	---	---	0.0	0.0	0.0	0.0	0.0	0.1
15	1.7	2.3	0.0	0.6	---	---	0.0	0.1	0.0	0.1	0.0	0.0
16	0.5	0.4	0.0	0.0	---	---	0.1	0.0	0.0	0.0	0.0	0.0
17	0.3	0.0	0.4	0.0	---	---	0.2	0.1	0.1	0.0	0.1	0.0
18	0.0	0.1	0.0	0.0	---	---	0.0	0.0	0.2	0.0	0.1	0.0
19	0.0	0.0	0.0	0.4	---	---	0.1	0.2	0.4	0.1	0.1	0.1
20	0.0	0.0	0.0	0.4	---	---	1.4	0.0	0.0	0.7	0.1	0.1
21	0.1	0.0	0.0	0.0	---	---	0.1	0.1	0.4	0.0	0.0	0.0
22	0.0	0.0	0.1	---	---	---	0.9	0.0	0.1	0.0	0.1	0.0
23	0.1	0.0	0.2	---	---	---	0.0	0.0	0.2	0.0	0.0	0.1
24	0.6	0.0	0.0	---	---	---	0.4	0.0	0.1	0.5	0.1	0.0
25	0.0	0.0	0.0	---	---	---	0.0	0.0	0.1	0.0	0.0	0.0
26	0.0	0.3	0.3	---	---	---	0.0	0.0	0.1	1.3	0.0	0.0
27	0.0	0.0	0.0	---	---	---	0.0	0.1	0.1	0.0	0.0	0.0
28	0.0	0.0	0.5	---	---	---	0.0	0.0	0.3	0.1	0.2	0.0
29	0.0	0.0	0.0	---	---	---	0.0	0.0	0.1	0.0	0.0	0.0
30	0.0	0.0	0.0	---	---	---	0.0	0.0	0.1	0.0	0.1	0.0
31	0.4	---	0.0	---	---	---	---	0.0	---	0.0	0.0	---
TOTAL	6.2	4.4	1.7	---	---	---	---	1.1	6.1	3.2	1.2	2.6
CAL YR	2002	TOTAL	60.2									
WTR YR	2003	TOTAL	44.5									

Partial daily record Jan. 22 (0000 hrs. to 1130 hrs.) is 0.1 inches.

Total accumulated rainfall from Jan. 22 (1130 hrs.) to Apr. 2 (0915 hrs.) is 8.7 inches.

Total accumulated rainfall from Apr. 2 (0915 hrs.) to Apr. 7 (1215 hrs.) is 1.4 inches.

Partial daily record Apr. 7 (1215 hrs. to 2400 hrs.) is 0.2 inches.

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", Old Hawaiian Datum, Hydrologic Unit 20060000, in USGS stream-gaging station 16211600, on right bank, 0.8 mi northeast of Kaneaki Heiau, and 2.9 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 938.64 ft above mean sea level (from Waianae Plantation Benchmark).

REMARKS.--Records good, except for period of estimated record, which are poor. Rainfall recorded in tenths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.1	0.0	0.0	0.7	0.0	0.4	0.0	0.0	0.0
5	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.4	0.0	0.0	0.0
6	0.0	0.0	0.4	0.0	0.3	0.4	0.3	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.6	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
11	0.0	0.2	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1
12	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	1.0	0.1	0.0	1.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1
15	0.7	1.8	0.0	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	2.0	0.4	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0
17	0.6	0.0	0.1	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0
18	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1
20	0.0	0.0	0.0	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	0.2	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	e0.0
27	0.0	0.5	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.3	0.0	e0.0
28	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	e0.0
29	0.0	0.0	0.0	0.4	---	0.0	0.0	0.0	0.0	0.1	0.0	e0.0
30	0.0	0.0	0.0	0.3	---	3.0	0.0	0.0	0.0	0.0	0.0	e0.0
31	0.2	---	0.0	0.6	---	0.0	---	0.0	---	0.0	0.0	---
TOTAL	4.8	5.1	0.9	5.6	2.4	5.6	2.4	0.0	1.2	0.9	0.0	0.3
CAL YR	2002	TOTAL		37.3								
WTR YR	2003	TOTAL		29.2								

e Estimated

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", Old Hawaiian Datum, Hydrologic Unit 20060000, on right side of Poamoho Trail, and 0.2 mi northeast from trail marker.

PERIOD OF RECORD.--Accumulated-rainfall station, July 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.--Records fair. Cumulative rainfall read in nearest tenths of an inch.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 2001 TO SEPTEMBER 2002
INTERMITTENT READINGS

Period	Rainfall
Oct. 01 to Oct. 15	5.4a
Oct. 15 to Dec. 17	13.1
Dec. 17 to Feb. 04	8.5
Feb. 04 to Mar. 19	11.6
Mar. 19 to Apr. 16	10.0
Apr. 16 to May. 28	9.6
May. 28 to Aug. 01	17.5
Aug. 01 to Sep. 25	14.9
Sep. 25 to Sep. 30	0.0b

CAL YR 2002 TOTAL 122.8 inches (estimated).

WTR YR 2003 TOTAL 90.6 inches (estimated).

a Estimate based on total accumulated rainfall from June 18, 2002 to Oct. 15 of 32.0 inches.

b Estimate based on total accumulated rainfall from Sep. 25 to Nov. 4, 2003 of 9.8 inches.

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", long 157°56'24", Old Hawaiian Datum, 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 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.--Records fair, except for period of missing record which is poor. Rainfall recorded in 0.188-inch increments.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.13	0.00	0.00	0.00	0.19	0.00	0.19	0.38	0.00	0.00	---	0.37
2	1.69	0.56	0.19	0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.37	0.00
3	0.18	0.19	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.38	0.19
4	0.19	0.00	0.00	0.00	0.00	0.56	0.37	0.00	2.44	0.00	0.00	0.00
5	0.57	0.00	0.00	0.00	0.00	0.19	0.75	0.00	0.19	0.19	0.00	0.19
6	0.00	0.00	0.94	0.00	0.00	0.94	0.94	0.93	0.00	0.19	0.00	0.37
7	0.37	0.00	0.19	0.00	0.00	0.00	0.19	1.50	0.37	0.18	0.00	0.57
8	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.75	0.00	0.19	0.00	0.19
9	0.18	0.00	0.00	0.00	0.00	0.00	0.94	0.75	0.00	0.19	0.19	0.19
10	0.00	0.00	0.18	0.19	0.00	0.00	3.57	0.75	0.00	0.00	0.00	4.50
11	0.19	1.31	0.75	0.00	0.37	0.00	1.12	0.00	0.00	0.18	0.37	3.75
12	0.00	1.87	1.13	0.00	0.37	0.00	1.31	0.00	0.00	0.19	0.19	0.57
13	0.38	0.19	0.00	0.00	0.94	0.00	0.00	0.38	0.19	0.19	0.19	0.18
14	0.56	0.38	0.00	0.37	3.75	0.00	0.00	0.37	0.18	0.00	0.37	0.38
15	e1.50	2.25	0.00	0.57	0.19	0.19	0.00	0.75	0.38	0.00	0.00	0.00
16	e1.12	0.94	0.00	0.00	0.00	1.50	0.19	0.00	0.37	0.38	0.37	0.18
17	0.19	0.00	0.18	0.00	0.00	0.18	2.25	0.19	0.38	0.00	0.94	0.00
18	0.00	0.18	0.00	0.00	0.00	0.00	0.56	0.00	0.56	0.00	0.19	0.38
19	0.19	0.00	0.00	0.18	0.19	0.18	0.00	0.19	0.57	0.37	0.00	0.00
20	0.00	0.00	0.00	0.38	0.75	0.00	0.94	0.18	0.00	0.94	0.37	0.19
21	0.00	0.19	0.00	0.19	0.37	0.00	0.38	0.00	0.74	0.00	0.19	0.19
22	0.00	0.00	0.38	0.00	0.38	0.00	0.37	0.00	0.19	0.00	0.19	0.00
23	0.00	0.00	0.38	0.19	0.75	0.00	0.19	0.00	0.19	0.19	0.19	0.00
24	1.12	0.00	0.00	0.37	0.37	0.00	0.37	0.00	0.75	5.43	0.19	0.00
25	0.00	0.37	0.19	0.00	1.13	0.19	0.00	0.00	0.37	1.12	0.19	0.00
26	0.00	0.00	0.75	0.00	0.56	0.00	0.00	0.00	0.57	4.53	0.00	0.00
27	0.00	0.38	0.00	0.00	0.56	0.94	0.19	0.00	0.37	---	0.19	0.00
28	0.00	0.38	1.13	0.00	0.37	0.00	0.00	0.00	0.75	---	0.19	0.00
29	0.00	0.18	1.12	0.19	---	1.12	0.00	0.00	0.19	---	0.37	0.00
30	0.38	0.00	0.00	1.50	---	0.75	0.00	0.00	0.00	---	1.87	0.00
31	0.75	---	0.00	1.87	---	0.00	---	0.00	---	---	0.19	---
TOTAL	10.88	9.37	7.51	6.00	11.24	7.30	14.82	7.31	9.75	---	---	12.39
CAL YR	2002	TOTAL	171.76									
WTR YR	2003	TOTAL	120.08									

Total accumulated rainfall from July 27 to Aug. 1 is 1.36 inches.
e Estimated

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", Old Hawaiian Datum, 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 poor. Rainfall recorded in 0.188-inch increments.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	0.19	0.00	0.00	0.38	0.00	0.19	0.93	0.00	0.00	0.00	---
2	---	0.38	0.18	0.19	0.00	0.56	0.00	0.00	0.00	0.00	0.00	---
3	---	0.19	0.19	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.00	---
4	---	0.00	0.00	0.00	0.00	0.57	0.56	0.19	2.62	0.19	---	---
5	---	0.00	0.00	0.00	0.00	0.18	1.69	0.19	0.00	0.00	---	---
6	---	0.00	0.75	0.00	0.00	1.13	1.50	0.94	0.00	0.00	---	---
7	---	0.00	0.19	0.00	0.00	0.00	0.00	2.62	0.19	0.00	---	---
8	---	0.00	0.00	0.00	0.00	0.19	0.00	0.75	0.00	0.00	---	---
9	---	0.00	0.00	0.00	0.00	0.00	1.31	0.57	0.00	0.18	---	---
10	---	0.00	0.00	0.38	0.00	0.00	3.19	0.56	0.00	0.00	---	---
11	---	0.74	0.94	0.38	0.19	0.00	1.12	0.00	0.00	0.00	---	---
12	---	1.88	1.87	0.00	0.37	0.00	0.94	0.18	0.00	0.00	---	---
13	---	0.00	0.00	0.00	1.69	0.00	0.00	0.38	0.38	0.19	---	---
14	---	0.38	0.00	0.56	5.25	0.00	0.00	0.38	0.18	0.00	---	---
15	---	0.93	0.00	0.75	0.19	0.37	0.00	0.74	0.19	0.00	---	---
16	---	0.75	0.00	0.00	0.00	2.81	0.19	0.00	0.56	0.00	---	---
17	---	0.00	0.19	0.00	0.00	0.00	1.50	0.00	0.38	0.00	---	---
18	---	0.19	0.00	0.00	0.00	0.00	0.19	0.19	0.37	0.00	---	---
19	---	0.19	0.00	0.38	0.18	0.00	0.19	0.00	0.38	0.00	---	---
20	---	0.00	0.00	0.75	0.57	0.00	0.56	0.38	0.00	0.00	---	---
21	---	0.00	0.00	0.00	0.37	0.00	0.19	0.00	0.37	0.00	---	---
22	---	0.00	0.18	0.00	0.38	0.00	0.19	0.00	0.19	0.19	---	---
23	0.00	0.00	0.19	0.00	0.37	0.00	0.18	0.00	0.19	0.00	---	---
24	0.93	0.00	0.00	0.56	0.19	0.19	0.38	0.00	0.19	0.00	---	---
25	0.00	0.37	0.19	0.00	0.94	0.00	0.00	0.00	0.18	0.00	---	---
26	0.00	0.19	0.56	0.00	0.56	0.00	0.00	0.00	0.00	0.00	---	---
27	0.00	0.38	0.00	0.00	0.56	1.50	0.00	0.00	0.00	0.00	---	---
28	0.00	0.93	0.75	0.00	0.19	0.19	0.00	0.00	0.19	0.00	---	---
29	0.00	0.57	0.75	0.38	---	1.50	0.19	0.00	0.00	0.00	---	---
30	0.38	0.00	0.00	2.24	---	0.93	0.00	0.00	0.00	0.00	---	---
31	0.93	---	0.00	1.50	---	0.00	---	0.00	---	0.19	---	---
TOTAL	---	8.26	6.93	8.07	12.38	10.12	14.45	9.00	6.56	0.94	---	---
CAL YR	2002	TOTAL 159.39 estimated										
WTR YR	2003	TOTAL 118.47 estimated										

Partial daily record on Oct. 23 from 1345 to 2400 hrs.

Estimated accumulated rainfall from Oct. 1 (0015 hrs.) to Oct. 15 (1315 hrs.) is 8.75 inches.

Total accumulated rainfall from Oct. 15 (1330 hrs.) to Oct. 23 (1330 hrs.) is 2.44 inches.

Partial daily record on Aug. 3 from 0015 to 1400 hrs.

Total accumulated rainfall from Aug. 3 (1415 hrs.) to Sep. 25 (1330 hrs.) is 28.33 inches.

Total accumulated rainfall from Sep. 25 (1345 hrs.) to Nov. 4, 2003 (1515 hrs) is 11.85 inches.

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", Old Hawaiian Datum, 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 1958 to May 1961, February 1990 to June 1994. Continuous-record station, May 1961 to February 1990, June 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 15-minute intervals. Elevation of gage is 95 ft above mean sea level (from topographic map).

REMARKS.--Records good. Rainfall recorded in tenths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
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	0.3	0.0	0.0	0.6	0.0	0.0	0.0	0.3
2	3.5	0.1	0.1	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.1	0.0
3	3.7	0.2	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.3	0.0
4	0.1	0.0	0.0	0.0	0.0	0.2	1.6	0.0	0.4	0.0	0.1	0.0
5	0.2	0.0	0.0	0.0	0.0	0.3	0.0	0.2	0.0	0.3	0.8	0.1
6	0.0	0.0	0.3	0.0	0.0	0.6	1.0	0.1	0.0	0.1	0.0	0.2
7	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.1	0.0	0.0	0.0	0.1
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.1	0.0	0.1	0.0	0.0
10	0.0	0.0	0.1	0.8	0.0	0.0	2.0	0.4	0.0	0.0	0.1	0.9
11	0.1	0.0	1.0	0.7	0.0	0.0	0.6	0.0	0.0	0.1	0.0	3.6
12	0.0	1.8	0.4	0.0	0.1	0.0	0.5	0.0	0.0	0.0	0.1	0.4
13	0.0	0.1	0.0	0.0	1.8	0.0	0.0	0.1	0.2	0.1	0.1	0.6
14	0.8	0.3	0.0	0.2	3.7	0.0	0.0	0.2	0.1	0.0	0.1	0.2
15	1.1	0.5	0.0	0.4	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0
16	2.4	0.5	0.0	0.0	0.0	2.5	0.0	0.0	0.5	0.2	0.4	0.0
17	0.7	0.1	0.1	0.0	0.0	0.0	0.3	0.1	0.0	0.0	0.3	0.1
18	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.3	0.0	0.1	0.1
19	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.1	0.3	0.0	0.0	0.2
20	0.0	0.0	0.0	0.4	0.7	0.0	0.1	0.0	0.0	0.3	0.1	0.0
21	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.2	0.7
22	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.3	0.0
23	0.0	0.0	0.1	0.1	0.1	0.0	0.2	0.0	0.1	0.0	0.2	0.1
24	0.5	0.0	0.0	0.6	0.1	0.0	0.1	0.0	0.2	0.9	0.0	0.0
25	0.0	0.2	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.8	0.0	0.0
26	0.0	0.0	0.3	0.0	0.1	0.0	0.0	0.0	0.2	2.2	0.0	0.0
27	0.0	0.1	0.0	0.0	0.4	1.4	0.1	0.0	0.1	1.8	0.0	0.0
28	0.0	0.3	0.4	0.0	0.1	0.0	0.0	0.0	0.2	2.3	0.0	0.0
29	0.0	0.7	0.0	0.4	---	1.3	0.0	0.0	0.0	0.0	0.1	0.0
30	0.3	0.0	0.0	1.6	---	1.1	0.4	0.0	0.1	0.0	0.1	0.0
31	0.6	---	0.0	0.2	---	0.0	---	0.0	---	0.1	0.2	---
TOTAL	14.0	5.0	2.9	5.6	7.9	8.1	8.6	2.5	2.9	9.5	3.7	7.6
CAL YR	2002	TOTAL		104.20								
WTR YR	2003	TOTAL		78.30								

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", Old Hawaiian Datum, Hydrologic Unit 20060000, in USGS stream-gaging station 16294900, 0.3 mi downstream from Waikakee Stream, 0.7 mi west of Waikane, and 1.2 mi northwest of Waiahole School.

PERIOD OF RECORD.--Continuous-record station, February 1960 to October 1985, May 1994 to current year. Accumulated-rainfall station, October 1985 to May 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. Daily record read in nearest tenths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.3	0.0	0.0	0.0	0.0
2	0.1	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.5	0.0	0.0	0.0
5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.8	0.0	0.0	0.7	1.6	0.0	0.0	0.1	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.1	0.9	0.0	0.0	0.0	0.0	0.1
8	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
9	0.1	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.7	0.0	0.0	0.7	0.1	0.0	0.0	0.0	1.0
11	0.0	0.0	0.5	0.8	0.1	0.0	0.1	0.0	0.0	0.0	0.0	6.0
12	0.0	0.9	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.2
13	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.6
14	1.1	0.0	0.0	0.3	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.2
15	2.1	0.5	0.0	0.5	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
16	2.5	0.2	0.0	0.0	0.0	1.3	0.0	0.0	0.4	0.0	0.0	0.0
17	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
19	0.0	0.1	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
20	0.0	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.3	0.0	0.1
21	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.7
22	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0
23	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
24	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.1	0.2	0.2	0.0	0.0
25	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0
26	0.0	0.5	0.2	0.4	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0
27	0.0	0.1	0.0	0.0	0.5	1.8	0.2	0.0	0.2	0.7	0.0	0.0
28	0.0	1.5	0.4	0.0	0.1	0.0	0.0	0.0	0.3	0.3	0.0	0.0
29	0.0	0.4	0.0	0.1	---	0.3	0.0	0.0	0.0	0.0	0.1	0.0
30	0.0	0.0	0.0	1.6	---	1.1	0.5	0.0	0.0	0.0	0.0	0.0
31	0.4	---	0.0	0.1	---	0.1	---	0.0	---	0.0	0.0	---
TOTAL	7.0	4.2	2.3	5.6	8.0	5.5	5.7	0.6	1.8	3.7	0.5	9.3
CAL YR	2002	TOTAL		62.5								
WTR YR	2003	TOTAL		54.2								

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", Old Hawaiian Datum, Hydrologic Unit 20060000, on left bank, at USGS stream-gaging station 16325000, 20 ft upstream from Pupukea Military Road, and 3.5 mi southeast of Maunawai.

PERIOD OF RECORD.--Continuous-record station, July 1963 to September 2003 (discontinued). 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 poor. Rainfall recorded in hundredths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.09	0.02	0.00	0.00	0.11	0.00	0.02	0.00	0.00	0.00	0.00	0.13
2	1.42	0.17	0.19	0.37	0.00	0.12	0.00	0.00	0.00	0.00	0.16	0.00
3	0.00	0.38	0.01	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.06	0.00
4	0.09	0.00	0.00	0.05	0.00	0.04	0.13	0.01	0.00	0.00	0.00	0.00
5	0.19	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.14	0.01	0.00	0.00
6	0.00	0.00	0.20	0.00	0.26	1.18	0.31	0.01	1.31	0.01	0.00	0.04
7	0.10	0.00	0.01	0.00	0.00	0.01	0.05	0.01	0.18	0.02	0.00	0.01
8	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.12	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.19	0.00	0.00	0.02	0.00
10	0.00	0.01	0.18	0.72	0.00	0.00	0.16	0.72	0.00	0.03	0.02	1.69
11	0.01	0.43	0.26	0.38	0.25	0.00	0.18	0.00	0.00	0.08	0.00	2.12
12	0.04	1.82	0.14	0.00	0.10	0.00	0.14	0.00	0.00	0.00	0.00	0.20
13	0.00	0.15	0.01	0.00	0.99	0.00	0.00	0.10	0.01	0.18	0.00	0.04
14	0.65	0.11	0.00	0.11	3.02	0.00	0.00	0.00	0.01	0.01	0.03	0.02
15	0.64	4.38	0.00	0.90	0.17	0.34	0.00	0.08	0.15	0.03	0.14	0.00
16	1.49	1.26	0.00	0.00	0.02	0.92	0.12	0.00	0.02	0.06	0.00	0.00
17	0.50	0.06	0.54	0.00	0.00	1.33	0.24	0.24	0.09	0.00	0.20	0.08
18	0.00	0.10	0.01	0.00	0.00	0.00	0.22	0.01	0.33	0.01	0.07	0.01
19	0.08	0.05	0.00	0.23	0.02	0.01	0.02	0.06	0.42	0.47	0.00	0.01
20	0.00	0.00	0.00	0.50	0.61	0.00	0.25	0.00	0.01	0.54	0.03	0.03
21	0.00	0.00	0.00	0.00	0.15	0.00	0.13	0.00	0.42	0.00	0.04	0.00
22	0.03	0.00	0.52	0.00	0.02	0.01	0.13	0.00	0.09	0.00	0.24	0.22
23	0.01	0.00	0.22	0.00	0.53	0.00	0.01	0.00	0.50	0.00	0.13	0.01
24	1.05	0.00	0.00	0.70	0.19	0.00	0.13	0.00	0.09	0.23	0.09	0.00
25	0.06	0.00	0.05	0.08	0.43	0.00	0.01	0.00	0.06	0.02	0.01	e0.00
26	0.00	0.00	0.51	0.00	0.43	0.00	0.00	0.00	0.30	1.71	0.00	e0.00
27	0.00	0.01	0.00	0.00	0.02	0.82	0.01	0.00	0.08	0.20	0.04	e0.00
28	0.00	0.71	0.33	0.00	0.12	0.02	0.00	0.00	0.22	0.25	0.00	e0.00
29	0.00	0.12	0.28	1.03	---	0.19	0.00	0.00	0.08	0.00	0.00	e0.00
30	0.08	0.00	0.00	2.12	---	0.37	0.00	0.00	0.01	0.00	0.04	e0.00
31	0.42	---	0.00	0.77	---	0.00	---	0.00	---	0.00	0.00	---
TOTAL	7.06	9.78	3.46	7.96	7.44	5.62	2.63	1.45	4.52	3.88	1.44	4.61
CAL YR	2002	TOTAL 70.77										
WTR YR	2003	TOTAL 59.85										

e Estimated

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", Old Hawaiian Datum, 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 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 float-type system attached to an electronic data logger. Elevation of gage is 1,160 ft above mean sea level (from topographic map).

REMARKS.--Records good, except for period of missing record which is poor. Rainfall recorded in 0.12-inch increments.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.24	e0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.24	e0.36	0.12	0.24	0.00	0.12	0.00	0.00	0.00	0.00	0.12	0.00
3	0.00	e0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	e0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.12
5	0.12	e0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.12
6	0.00	e0.00	0.12	0.00	0.12	0.48	0.12	0.00	0.12	0.00	0.00	0.00
7	0.12	e0.00	0.00	0.00	0.00	0.12	0.12	0.00	0.00	0.12	0.00	0.00
8	0.12	e0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.12	0.00	0.00
9	0.00	e0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00
10	0.00	e0.00	0.12	0.24	0.00	0.00	0.36	0.48	0.00	0.00	0.00	0.84
11	0.00	e0.60	0.12	0.12	0.12	0.00	0.24	0.00	0.00	0.00	0.12	1.08
12	0.12	e1.32	0.12	0.00	0.12	0.00	0.24	0.00	0.00	0.00	0.00	0.00
13	0.00	e0.12	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.24	0.00	0.00
14	0.48	e0.12	0.00	0.24	2.52	0.00	0.00	0.00	0.12	0.00	0.00	0.12
15	0.48	e3.00	0.00	1.08	0.12	0.12	0.00	0.00	0.24	0.00	0.00	0.00
16	1.20	e1.08	0.00	0.00	0.00	0.48	0.36	0.00	0.00	0.12	0.00	0.00
17	0.36	e0.00	0.36	---	0.00	1.56	0.36	0.12	0.12	0.00	0.12	0.00
18	0.00	e0.12	0.00	---	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00
19	0.00	e0.12	0.00	---	0.00	0.00	0.12	0.12	0.36	0.36	0.00	0.00
20	0.00	e0.00	0.00	---	0.60	0.00	0.72	0.00	0.00	0.36	0.00	0.00
21	0.00	0.00	0.00	---	0.24	0.00	0.24	0.00	0.24	0.00	0.00	0.00
22	0.00	0.00	0.36	0.00	0.12	0.00	0.48	0.00	0.24	0.00	0.12	0.00
23	0.12	0.00	0.24	0.00	0.36	0.00	0.00	0.00	0.36	0.00	0.12	0.00
24	1.44	0.00	0.00	0.72	0.12	0.00	0.12	0.00	0.12	0.36	0.24	0.00
25	0.12	0.00	0.12	0.00	0.24	0.00	0.12	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.48	0.00	0.24	0.00	0.00	0.00	0.24	1.32	0.00	0.00
27	0.00	0.00	0.00	0.00	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.24	0.48	0.00	0.12	0.00	0.00	0.00	0.24	0.12	0.12	0.00
29	e0.00	0.00	0.12	0.48	---	0.00	0.00	0.00	0.24	0.00	0.00	0.00
30	e0.12	0.00	0.00	1.08	---	0.24	0.00	0.00	0.00	0.00	0.00	0.00
31	e0.48	---	0.00	0.60	---	0.12	---	0.00	---	0.00	0.00	---
TOTAL	5.76	7.32	2.76	---	5.40	3.84	3.72	0.84	3.00	3.12	0.96	2.28
CAL YR	2002	TOTAL	57.84									
WTR YR	2003	TOTAL	44.28									

Partial daily record from Jan. 17 0000 hrs. to 1645 hrs. is 0.00 inches.

Total accumulated rainfall from Jan. 17 (1645 hrs.) to Jan. 21 (1145 hrs.) is 0.48 inches.

Partial daily record from Jan. 21 (1145 hrs.) to Jan. 21 (2400 hrs.) is 0.00 inches.

Estimated

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", Old Hawaiian Datum, Hydrologic Unit 20050000, on right 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 August 2003 (discontinued). 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 National Weather Service accumulation can as a backup. Elevation of gage is 900 ft (from topographic map).

REMARKS.--Records poor. Rainfall recorded in hundredths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	---	0.00	0.00	0.00	0.00	0.00	---	---	---	0.03	---
2	0.00	0.30	0.10	0.00	0.00	0.02	0.00	---	---	---	---	---
3	0.00	0.12	0.04	0.00	0.00	0.00	0.00	---	---	---	---	---
4	0.00	0.01	0.00	0.18	0.00	0.00	---	---	---	---	---	---
5	0.00	0.04	0.00	0.17	0.00	0.00	---	---	---	---	---	---
6	0.00	0.00	0.24	0.00	0.72	0.00	---	---	---	---	---	---
7	0.00	0.00	3.63	0.00	0.00	0.74	---	---	---	---	---	---
8	0.01	0.00	0.00	0.00	0.00	1.69	---	---	---	---	---	---
9	0.00	0.00	0.03	0.00	0.00	0.17	---	---	---	---	---	---
10	0.01	0.00	0.35	2.45	0.00	0.00	---	---	---	---	---	---
11	0.01	2.98	0.10	2.32	0.07	0.00	---	---	---	---	---	---
12	0.02	0.70	0.02	0.00	0.06	0.00	---	---	---	---	---	---
13	0.02	0.60	---	0.00	0.10	0.00	---	---	---	---	---	---
14	0.01	1.07	---	0.00	11.15	0.00	---	---	---	---	---	---
15	0.52	0.44	---	1.33	4.48	0.17	---	---	---	---	---	---
16	---	0.39	---	0.02	0.01	0.54	---	---	---	---	---	---
17	---	0.02	---	0.00	0.00	0.19	---	---	---	---	---	---
18	---	0.05	---	0.00	0.00	0.01	---	---	---	---	---	---
19	---	0.25	---	0.00	0.18	0.03	---	---	---	---	---	---
20	---	0.22	---	2.19	0.52	0.18	---	---	---	---	---	---
21	---	0.02	---	0.00	2.31	0.00	---	---	---	---	---	---
22	---	0.10	0.81	0.00	0.02	0.13	---	---	---	---	---	---
23	---	0.00	1.00	0.00	0.14	0.00	---	---	---	---	---	---
24	---	0.00	0.00	2.38	0.02	0.00	---	---	---	---	---	---
25	---	0.00	0.00	0.41	0.13	0.01	---	---	---	0.11	---	---
26	---	0.11	1.07	1.00	0.09	0.00	---	---	---	0.24	---	---
27	---	0.00	1.45	0.01	0.02	2.43	---	---	---	0.03	---	---
28	---	1.41	0.00	0.00	0.21	5.99	---	---	---	0.04	---	---
29	---	2.01	0.00	4.30	---	0.55	---	---	---	0.18	---	---
30	---	0.00	0.02	8.74	---	0.07	---	---	---	0.02	---	---
31	---	---	0.00	5.65	---	0.02	---	---	---	0.11	---	---
TOTAL	---	---	---	31.15	20.23	12.94	---	---	---	---	---	---

CAL YR 2002 TOTAL 95.01

Estimated total rainfall for Oct. 16 to Nov. 1 is 2.7 inches.

Total accumulated rainfall for Dec. 13 to Dec. 21 is 0.10 inches.

Estimated total rainfall for April 4 to July 24 is 10.70 inches.

Total accumulated rainfall for August 2 to August 3 (0600) is 0.24 inches.

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", Old Hawaiian Datum, Hydrologic Unit 20050000, at discontinued 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.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	0.01	0.00	0.00	0.04	0.00	0.03	0.00	0.00	0.02	0.00	0.00
2	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.02	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.01
6	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.08	0.00	0.00	0.54	0.03	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.04	0.00
9	0.00	0.00	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54
11	0.00	0.31	0.09	0.44	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.28
12	0.00	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10
13	0.00	0.24	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.05	0.01	0.00
14	0.00	0.08	0.00	0.00	1.72	0.00	0.00	0.00	0.00	0.01	0.00	0.00
15	3.54	0.29	0.00	1.12	0.04	0.17	0.00	0.00	0.00	0.00	0.00	0.00
16	1.95	0.14	0.01	0.00	0.00	0.24	0.00	0.00	0.01	0.02	0.00	0.00
17	3.40	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00
18	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.00	0.00	0.00
19	0.01	0.00	0.00	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.36	0.15	0.03	0.00	0.00	0.00	0.00	0.00	0.80
21	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.08	0.00	0.03	0.10
22	0.04	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02
23	0.00	0.00	0.12	0.05	0.01	0.00	0.00	0.00	0.08	0.00	0.05	0.01
24	0.16	0.00	0.00	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.01	0.16	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
27	0.00	0.01	0.10	0.00	0.00	1.23	0.00	0.00	0.00	0.02	0.02	0.00
28	0.01	0.36	0.00	0.00	0.04	0.12	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.04	0.00	0.40	---	0.21	0.00	0.00	0.07	0.00	0.00	0.00
30	0.01	0.00	0.00	2.03	---	0.00	0.00	0.00	0.00	0.02	0.00	0.00
31	0.08	---	0.00	0.12	---	0.02	---	0.00	---	0.00	0.00	---
TOTAL	9.22	2.42	0.44	5.68	2.60	3.01	0.14	0.04	0.34	0.14	0.19	1.86
CAL YR	2002	TOTAL 27.35										
WTR YR	2003	TOTAL 26.08										

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", Old Hawaiian Datum, Hydrologic Unit 20020000, near 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.--Data logger with a .01-in. tipping bucket attachment. 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 hundredths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.06	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.18	0.00	0.00	0.00
3	0.01	0.00	0.00	0.00	0.00	0.00	0.81	0.00	0.04	0.00	0.00	0.00
4	0.00	0.00	0.00	0.10	0.00	0.00	0.19	0.00	0.09	0.00	0.00	0.00
5	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00
6	0.00	0.00	0.00	0.00	0.22	0.00	0.54	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.37	0.00	0.00	0.00	0.02
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.75	0.15	0.00	0.00	0.01	0.00	0.00
10	0.00	0.00	0.01	0.00	0.00	0.00	1.47	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	2.86	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00
16	4.33	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.08	0.00	0.01	0.00
17	0.02	0.00	0.00	0.01	0.00	0.39	0.03	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.54	1.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
23	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	1.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	1.70	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.01	0.72	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	0.00	0.56	0.04	0.00	0.00	0.00	0.00	0.00
28	0.00	0.31	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.02	0.06	0.00	---	0.43	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	---	0.03	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00	---	0.00	0.00	---	0.23	---	0.00	---	0.00	0.00	---
TOTAL	8.01	1.05	0.90	4.70	0.58	2.69	3.39	0.50	0.47	0.01	0.05	0.04
CAL YR	2002	TOTAL 31.57										
WTR YR	2003	TOTAL 22.39										

RAINFALL RECORDS

HAWAII, ISLAND OF MAUI—Continued

204017156031701. State Key Number 280.1 Oheo Gulch rain gage at dam near Kipahulu, Maui.

LOCATION.--Lat 20°40'17", long 165°03'17", Old Hawaiian Datum, Hydrologic Unit 20020000, at USGS stream-gaging station 16501200 on right bank, 31 ft. upstream from dam, 0.8 mi. upstream from mouth, and 1.0 mi north of Kipahulu church.

PERIOD OF RECORD.--January 2002 to current year.

GAGE.--Data logger with a .01-in. tipping bucket attachment. Elevation of gage is 420 ft (from topographic map).

REMARKS.--Records good, estimated record poor. Rainfall recorded in hundredths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	0.16	0.00	0.00	0.07	0.05	0.49	0.01	0.15	0.15	0.09	0.69
2	---	0.19	0.00	0.00	0.01	0.12	0.24	0.12	0.83	0.05	0.14	0.01
3	---	0.06	0.00	0.00	0.00	0.00	0.02	0.00	0.32	0.20	0.24	0.09
4	---	0.02	0.00	0.00	0.00	0.00	0.62	0.01	0.01	0.20	0.05	0.03
5	---	0.07	0.11	0.00	0.00	0.02	0.05	0.00	0.01	0.50	0.41	0.17
6	---	0.00	0.00	0.00	0.28	0.10	0.94	0.20	0.01	0.23	0.02	0.51
7	---	0.00	0.09	0.00	0.01	0.13	0.11	0.23	0.01	1.00	0.08	0.76
8	---	0.02	0.00	0.00	0.00	0.61	0.25	0.27	0.00	0.79	0.22	0.02
9	---	0.00	0.05	0.00	0.00	0.37	0.45	0.55	0.00	0.48	0.17	0.38
10	---	0.00	0.15	0.00	0.00	0.00	1.00	0.09	0.00	0.03	0.23	0.24
11	0.13	0.00	1.23	0.17	0.01	0.00	0.10	0.00	0.00	0.01	0.14	0.04
12	0.10	0.02	0.36	0.01	0.00	0.00	0.04	0.12	0.06	0.33	0.38	0.66
13	0.04	0.06	0.00	1.09	0.71	0.00	0.01	0.12	0.11	0.27	0.27	0.10
14	0.00	0.04	0.00	0.06	2.82	0.00	0.07	0.14	0.01	0.03	0.42	0.13
15	3.74	0.04	---	0.52	0.86	0.00	0.00	0.22	0.41	0.09	0.00	0.16
16	1.71	0.10	---	0.00	0.08	0.05	0.23	0.04	0.53	0.04	0.42	0.04
17	0.00	0.02	0.24	0.00	0.00	0.35	0.42	0.10	0.38	0.02	0.16	0.20
18	0.04	0.04	0.00	0.00	0.00	0.00	0.15	0.05	0.52	0.05	0.32	0.06
19	0.03	0.03	0.00	0.00	0.13	0.00	0.19	0.04	0.36	0.12	0.03	0.27
20	0.00	0.16	0.00	0.85	0.05	0.05	0.72	0.00	0.01	0.36	0.39	0.35
21	0.59	0.00	0.00	0.00	0.29	0.01	0.59	0.00	0.09	0.01	0.08	0.48
22	0.01	0.07	0.61	0.00	0.06	0.35	0.63	0.12	0.01	0.02	0.16	0.65
23	0.11	0.00	0.23	0.00	0.36	0.05	0.14	0.04	0.38	0.27	0.55	0.00
24	0.27	0.01	0.10	2.88	0.01	0.08	0.03	0.00	0.81	0.36	0.32	0.16
25	0.09	0.00	0.00	1.45	0.55	0.01	0.33	0.00	0.18	0.10	0.02	0.02
26	0.00	0.00	0.32	0.47	0.40	0.07	0.08	0.00	0.05	0.01	0.11	0.29
27	0.00	0.00	0.43	0.02	0.01	0.00	0.87	0.00	0.28	0.10	0.13	0.08
28	0.00	0.00	0.03	0.00	0.10	1.46	0.00	0.00	0.19	0.24	0.07	0.00
29	0.01	0.16	0.02	0.00	---	0.78	0.00	0.00	0.02	0.20	0.09	0.00
30	0.02	0.00	0.00	0.19	---	0.06	0.00	0.00	0.08	0.23	0.19	0.00
31	0.14	---	0.00	0.65	---	0.00	---	0.00	---	0.12	0.26	---
TOTAL	---	1.27	---	8.36	6.81	4.72	8.77	2.47	5.82	6.61	6.16	6.59

WTR YR 2003 TOTAL 68.95 inches.

Estimated total rainfall Oct. 1-10 is 0.32 inches.
Estimated total rainfall Dec. 15-16 is 0.06 inches.

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", Old Hawaiian Datum, Hydrologic Unit 20020000, at 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.--Data logger with a tipping basket attachment. A Standard 8-in. National Weather Service accumulation can also was installed as a backup. Elevation of gage is 130 ft (from topographic map).

REMARKS.--Records poor. Rainfall recorded in hundredths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00
5	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.04	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	3.06	0.00	0.00	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.80	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.73	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58
24	0.00	0.00	0.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.13	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	0.00	0.93	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.02	0.00	0.00	---	0.02	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00	---	0.00	0.01	---	0.00	---	0.00	---	0.00	0.00	---
TOTAL	4.59	0.15	0.04	1.87	1.08	1.06	0.03	0.00	0.20	0.00	0.00	0.67
CAL YR	2002	TOTAL		16.57								
WTR YR	2003	TOTAL		9.69								

RAINFALL RECORDS

HAWAII, ISLAND OF MAUI—Continued

204606156270301. State Key Number 311.3 Kulanihakoi rain gage near Kihei, Maui.

LOCATION.--Lat 20°46'06", long 156°27'03", Old Hawaiian Datum, Hydrologic Unit 20020000, at 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.--Data logger with a .01-in. tipping bucket attachment. 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 hundredths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
5	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00
6	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	3.14	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	2.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	1.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	0.00	1.25	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.01	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00	---	0.00	0.02	---	0.00	---	0.00	---	0.00	0.00	---
TOTAL	5.86	0.23	0.07	1.85	1.54	1.68	0.00	0.00	0.02	0.04	0.00	0.00
CAL YR	2002	TOTAL 14.12										
WTR YR	2003	TOTAL 11.29										

RAINFALL RECORDS

HAWAII, ISLAND OF MAUI—Continued

204916156083701. State Key Number 348.5 West Wailuaiki rain gage near Keanae, Maui.

LOCATION.--Lat 20°49'16", long 156°08'37", Old Hawaiian Datum, Hydrologic Unit 20020000, at USGS stream-gaging station 16518000 on left bank 500 ft. upstream from Koolau ditch crossing and 2.8 mi south of Keanae.

PERIOD OF RECORD.--November 2002 to September 2003.

GAGE.--Electronic data logger with a 8 inch diameter tipping bucket. Elevation of gage is 1,343 ft (by vertical levels).

REMARKS.--Records good except estimated records which are poor. Rainfall recorded in hundredths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	0.00	0.00	0.10	0.17	0.26	0.00	0.00	0.26	1.54	2.22
2	---	---	0.17	0.00	0.14	0.16	0.01	0.00	0.00	0.14	0.78	0.05
3	---	---	0.41	0.00	0.00	0.00	0.02	0.00	0.00	0.29	0.73	0.16
4	---	---	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.31	0.01	0.86
5	---	---	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.59	0.33	0.54
6	---	---	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.37	0.00	0.96
7	---	---	2.79	0.00	0.01	0.00	0.07	0.10	0.00	1.88	0.17	1.20
8	---	---	0.05	0.00	0.00	0.15	0.07	0.24	0.00	2.59	1.21	0.43
9	---	---	0.14	0.00	0.00	0.11	0.33	1.14	0.00	1.72	0.73	0.00
10	---	---	4.92	0.00	0.01	0.00	4.42	0.74	0.00	0.16	0.71	0.01
11	---	---	0.99	4.43	0.06	0.00	0.04	0.09	0.07	0.93	0.37	0.00
12	---	---	0.11	0.03	0.02	0.00	0.94	0.12	0.44	2.83	0.66	0.04
13	---	---	0.00	0.01	0.00	0.02	0.09	0.19	0.03	1.16	2.02	0.09
14	---	---	0.01	0.00	16.03	0.00	0.09	0.61	0.03	0.14	2.02	1.08
15	---	---	0.01	0.00	5.05	0.00	0.09	0.33	0.66	0.40	0.32	0.04
16	---	---	0.14	0.00	0.26	0.05	0.92	0.37	0.41	0.14	3.43	0.04
17	---	---	0.09	0.00	0.05	0.41	1.09	0.41	1.01	0.17	0.23	0.25
18	---	---	0.00	0.00	0.02	0.00	0.76	0.15	1.62	0.32	0.60	0.26
19	---	0.08	---	0.00	0.75	0.03	1.17	0.66	0.75	2.15	0.78	0.27
20	---	0.42	---	0.07	0.73	0.49	1.97	0.10	0.09	1.17	1.12	0.11
21	---	0.01	0.00	0.00	1.49	0.18	0.79	0.02	0.20	0.13	0.36	0.00
22	---	0.12	1.19	0.00	0.39	1.23	2.34	---	0.07	0.33	0.26	0.00
23	---	0.00	0.47	0.00	1.40	0.03	0.32	---	0.64	0.27	1.01	0.00
24	---	0.00	0.02	0.00	0.21	0.01	1.22	0.23	1.12	0.50	0.40	0.00
25	---	0.00	0.00	0.41	0.56	0.04	0.26	0.00	0.68	0.03	0.05	0.00
26	---	0.00	1.23	1.14	0.09	0.01	0.13	0.00	0.11	0.03	0.17	0.00
27	---	0.00	1.49	---	0.44	0.02	0.59	0.00	0.25	0.00	0.41	0.00
28	---	0.41	0.80	---	0.51	5.90	0.00	0.00	0.33	0.02	0.00	0.00
29	---	3.30	0.31	0.00	---	0.73	0.00	0.00	0.23	0.05	0.04	0.00
30	---	0.00	0.15	1.36	---	0.01	0.00	0.00	0.49	0.40	0.43	0.00
31	---	---	0.00	1.12	---	0.01	---	0.00	---	0.51	0.74	---
TOTAL	---	---	---	---	28.32	10.24	17.99	---	9.23	19.99	21.63	8.61

Estimated total rainfall for Dec. 19-20 is 0.00 inches.

Estimated total rainfall for Jan. 27-28 is 0.05 inches.

Total accumulated rainfall for May 22-23 is 1.01 inches.

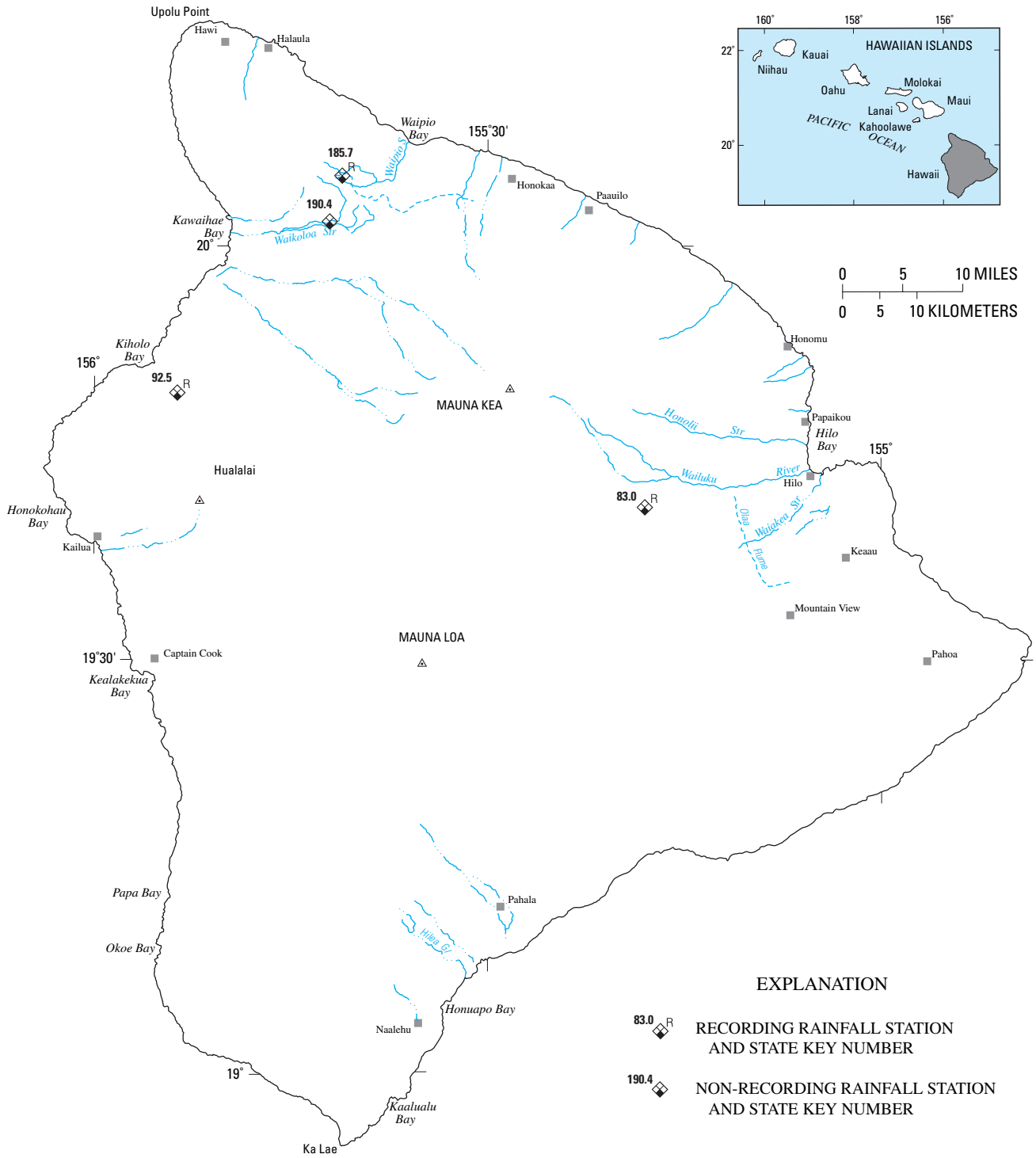


Figure 17. Locations of rainfall stations on Hawaii.

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", Old Hawaiian Datum, 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 rain gage connected to data logger and tipping bucket attachment. Elevation of gage is 4,140 ft (from topographic map).

REMARKS.--Records good except for missing period which is poor. Rainfall recorded in hundredths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.16	0.06	0.00	---	---	0.00	0.38	0.00	0.04	0.11	0.36	9.56
2	0.32	0.06	0.01	---	---	0.00	0.16	0.00	0.05	0.20	0.02	0.10
3	0.19	0.00	0.32	---	---	0.00	0.13	0.00	0.15	0.17	0.14	0.13
4	0.05	0.00	0.23	---	---	0.00	0.49	0.00	0.00	0.09	0.38	0.08
5	5.22	0.01	0.00	---	---	0.25	0.17	0.06	0.00	0.31	2.02	0.23
6	0.47	0.00	0.00	---	---	0.07	0.11	0.32	0.00	0.38	0.04	0.87
7	0.10	0.01	0.25	---	---	0.01	0.07	0.52	0.00	2.29	0.02	0.82
8	0.00	0.01	0.02	---	---	0.01	0.09	0.44	0.01	0.24	0.34	0.17
9	0.00	0.00	0.04	---	---	0.16	0.21	0.29	0.01	1.38	1.19	0.17
10	0.08	0.00	5.30	---	---	0.00	1.28	0.31	0.02	0.11	0.98	0.12
11	0.01	0.00	0.03	---	---	0.00	0.01	0.08	0.14	0.09	0.04	0.17
12	0.22	0.00	0.03	---	---	0.00	0.40	0.07	0.66	1.19	0.24	0.01
13	0.37	0.00	0.01	---	---	0.00	0.67	0.22	0.11	0.35	0.80	0.33
14	0.01	0.19	0.00	---	0.33	0.00	0.04	0.15	0.35	0.05	0.23	0.13
15	0.24	0.10	0.00	---	0.14	0.00	0.58	0.22	0.27	0.01	0.21	0.02
16	0.27	0.20	0.08	---	0.06	0.02	0.40	0.32	0.40	0.01	2.85	0.09
17	0.27	0.01	0.18	---	0.25	0.19	0.88	0.93	0.39	0.06	0.34	0.05
18	0.00	0.06	0.16	---	0.02	0.00	0.61	0.04	0.37	0.00	1.81	0.35
19	0.00	0.07	0.28	---	0.12	0.00	0.44	0.30	0.13	0.22	0.23	0.08
20	0.04	0.01	---	---	0.08	0.16	2.84	0.18	0.03	0.22	0.60	0.15
21	0.10	0.00	---	---	0.16	0.13	0.70	0.04	0.29	0.08	0.00	0.12
22	0.86	0.00	---	---	0.00	0.00	1.61	0.04	0.10	0.00	0.00	0.06
23	0.23	0.00	---	---	0.93	0.00	1.26	0.00	0.21	0.00	0.03	0.10
24	0.32	0.00	---	---	0.46	0.00	0.98	0.00	0.29	0.95	0.04	0.11
25	0.00	0.03	---	---	0.19	0.00	0.46	0.00	0.21	0.10	0.07	0.01
26	0.01	0.05	---	---	0.36	0.00	0.49	0.00	0.01	0.17	0.15	0.14
27	0.03	0.01	---	---	0.09	0.00	0.26	0.00	0.04	0.03	0.04	0.01
28	0.00	0.00	---	---	0.33	0.21	0.07	0.00	0.03	0.03	0.06	0.00
29	0.00	0.09	---	---	---	0.10	0.00	0.00	0.15	0.00	0.09	0.00
30	0.00	0.01	---	---	---	0.02	0.11	0.00	0.43	0.15	0.25	0.00
31	0.01	---	---	---	---	0.00	---	0.06	---	0.04	0.57	---
TOTAL	9.58	0.98	---	---	---	1.33	15.90	4.59	4.89	9.03	14.14	14.18

WTR YR 2003 TOTAL 87.63 inches.

Total rainfall from Dec 20 to Feb 13 was 2.55 inches.

RAINFALL RECORDS

HAWAII, ISLAND OF HAWAII—Continued

194945155534402. State Key Number 92.5 Kiholo rain gage, Hawaii.

LOCATION.--Lat 19°49'45", long 155°53'44", Old Hawaiian Datum, Hydrologic Unit 20010000, 2.7 mi inland from Kiholo Bay.

PERIOD OF RECORD.--October 2002 to September 2003.

GAGE.--Standard 8-in. National Weather Service rain gage connected to data logger and tipping bucket attachment. Elevation of gage is 931 ft (from survey).

REMARKS.--Records good except for missing period. Rainfall recorded in hundredths of an inch.

 PRECIPITATION, TOTAL, INCHES
 WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
 DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.00	0.18
2	---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00
3	---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.01	0.00
6	---	---	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.06	0.00
7	---	---	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.09	0.00	0.00
8	---	---	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.21	0.00	0.00
9	---	---	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00
10	---	---	0.02	0.00	0.00	0.00	0.77	0.00	0.00	0.00	0.00	0.00
11	---	---	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00
13	---	---	0.00	0.00	0.09	0.00	0.00	0.00	0.02	0.00	0.00	0.09
14	---	---	0.00	0.00	0.35	0.00	0.00	0.00	0.02	0.00	0.00	0.00
15	---	---	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
17	---	---	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.01	0.00
18	---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.00	0.00	0.00
20	---	---	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	---	---	0.00	0.00	0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	---	---	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.05
23	---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.13
24	---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
25	---	---	0.00	0.28	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00
26	---	---	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	---	---	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	---	---	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00
29	---	0.00	0.00	0.16	---	0.18	0.00	0.00	0.00	0.00	0.01	0.00
30	---	0.00	0.00	0.00	---	0.00	0.00	0.00	0.02	0.00	0.00	0.00
31	---	---	0.00	0.00	---	0.00	---	0.00	---	0.00	0.00	---
TOTAL	---	---	0.02	1.19	2.24	0.32	1.76	0.01	0.88	0.66	0.09	0.47

Total rainfall from Oct 28 (1410) to Nov 28 was 0.45 inches.

RAINFALL RECORDS

HAWAII, ISLAND OF HAWAII—Continued

200518155405801. State Key Number 185.7 Kawainui rain gage, Hawaii.

LOCATION.--Lat 20°05'18", long 155°40'58", Old Hawaiian Datum, Hydrologic Unit 20010000, on left bank 125 ft upstream from Upper Hamakua Ditch intake and 4.5 mi north of Kamuela.

PERIOD OF RECORD.--February 2002 to current year.

GAGE.--Standard 8-in. National Weather Service rain gage connected to data logger and tipping bucket attachment. Elevation of gage is 4,060 ft (from topographic map).

REMARKS.--Records good. Rainfall recorded in hundredths of an inch.

PRECIPITATION, TOTAL, INCHES
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.15	---	---	0.00	0.00	0.24	0.63	0.01	0.00	0.39	0.98	7.24
2	0.00	---	---	0.00	0.00	0.02	0.00	0.12	0.02	0.66	0.84	0.21
3	0.02	---	---	0.00	0.00	0.01	0.01	0.39	0.16	0.56	0.16	0.27
4	0.15	---	---	0.00	0.00	0.01	0.00	0.02	0.00	0.14	0.31	0.40
5	2.59	---	---	0.00	0.00	0.00	0.00	0.09	0.00	0.22	3.31	0.70
6	0.45	---	---	0.01	0.00	0.00	0.00	0.03	0.00	0.90	0.34	0.94
7	0.05	---	---	0.00	0.02	0.00	0.00	0.14	0.10	1.51	0.25	0.45
8	---	---	---	0.00	0.00	0.00	0.35	0.48	0.00	1.77	0.67	0.04
9	---	---	---	0.00	0.00	0.99	0.32	1.14	0.00	3.57	1.32	0.08
10	---	---	---	0.00	0.29	0.00	0.32	1.24	0.08	0.34	1.16	0.16
11	---	---	---	1.49	0.62	0.00	0.01	0.56	0.63	0.79	0.05	0.04
12	---	---	---	0.32	0.06	0.00	0.50	0.25	2.48	4.17	0.71	0.00
13	---	---	0.00	0.02	0.00	0.00	0.58	0.99	0.27	1.06	2.92	0.78
14	---	---	0.00	0.00	4.53	0.00	0.22	0.94	0.29	0.44	0.93	0.45
15	---	---	0.07	0.00	3.39	0.00	0.95	0.48	0.53	0.80	1.35	0.07
16	---	---	0.17	0.00	0.11	0.00	0.23	0.76	0.51	0.17	0.81	0.07
17	---	---	0.01	0.00	0.53	0.00	1.22	1.02	1.18	0.04	0.24	0.01
18	---	---	0.07	0.00	0.12	0.00	0.62	0.30	1.87	0.25	0.98	0.03
19	---	---	0.00	0.00	1.87	0.02	0.58	1.04	0.77	2.51	0.16	0.03
20	---	---	0.01	0.00	0.73	0.55	2.29	0.77	0.72	0.95	0.93	0.03
21	---	---	0.00	0.00	3.79	0.17	0.37	0.08	0.88	0.14	0.30	0.01
22	---	---	0.82	0.00	0.21	0.72	2.56	1.18	0.19	0.13	0.32	0.00
23	---	---	0.83	0.00	1.51	0.08	1.00	0.37	0.43	0.02	0.70	0.00
24	---	---	0.39	0.00	0.76	0.01	1.15	0.68	1.13	0.57	0.28	0.00
25	---	---	0.00	0.00	0.22	0.01	0.36	0.00	1.20	0.07	0.05	0.00
26	---	---	0.85	0.00	0.51	0.00	1.35	0.00	0.00	0.08	0.48	0.10
27	---	---	0.72	0.00	0.58	0.00	0.20	0.00	0.00	0.00	0.59	0.00
28	---	---	0.18	0.00	1.65	0.93	0.01	0.00	0.32	0.01	0.01	0.00
29	---	---	0.12	0.00	---	0.57	0.00	0.00	0.44	0.33	0.78	0.00
30	---	---	0.00	0.00	---	0.03	0.10	0.00	1.46	0.69	0.91	0.00
31	---	---	0.00	0.00	---	0.00	---	0.00	---	0.16	2.30	---
TOTAL	---	---	---	1.84	21.50	4.36	15.93	13.08	15.66	23.44	25.14	12.11

WTR YR 2003 TOTAL 159.49 inches.

Total rainfall from Oct 8 to Dec 12 was 18.78 inches.

RAINFALL RECORDS

HAWAII, ISLAND OF HAWAII—Continued

200148155420501. State Key Number 190.4 Keanuio mano rain gage near Kamuela, Hawaii.

LOCATION.--Lat 20°01'48", long 155°42'05", Old Hawaiian Datum, 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 junction of State Highways 19 and 190.

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 housed in old gage 16756500. 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 2002 TO SEPTEMBER 2003
INTERMITTENT READINGS

Period	Rainfall
Oct. 01 to Oct. 11	0.0 a
Oct. 11 to Dec. 13	0.7
Dec. 13 to Feb. 05	2.9
Feb. 05 to Apr. 09	6.0
Apr. 09 to Jul. 11	1.5
Jul. 11 to Sep. 30	1.2 b

CAL YR 2002 TOTAL 20.1 inches

WTR YR 2003 TOTAL 12.3 inches

a Estimated value based on accumulated reading of 0.2 inches from Jul. 11 to Oct. 11, 2002.

b Estimated value based on accumulated reading of 1.2 inches from Jul. 11 to Oct. 08, 2003.

Conversion Factors

Multiply	By	To obtain
Length		
inch (in.)	2.54×10^1	millimeter (mm)
	2.54×10^{-2}	meter
foot (ft)	3.048×10^{-1}	meter (m)
mile (mi)	1.609×10^0	kilometer (km)
Area		
acre	4.047×10^3	square meter (m ²)
	4.047×10^{-1}	square hectometer (hm ²)
	4.047×10^{-3}	square kilometer (km ²)
square mile (mi ²)	2.590×10^0	square kilometer (km ²)
Volume		
gallon (gal)	3.785×10^0	liter (L)
	3.785×10^{-3}	cubic meter (m ³)
	3.785×10^0	cubic decimeter (dm ³)
million gallons (Mgal)	3.785×10^3	cubic meter (m ³)
	3.785×10^{-3}	cubic hectometer (hm ³)
cubic foot (ft ³)	2.832×10^{-2}	cubic meter (m ³)
	2.832×10^1	cubic decimeter (dm ³)
cubic-foot-per-second-per-day [(ft ³ /s/d)]	2.447×10^3	cubic meter (m ³)
	2.447×10^{-3}	cubic hectometer (hm ³)
acre-foot (acre-ft)	1.223×10^3	cubic meter (m ³)
	1.223×10^{-3}	cubic hectometer (hm ³)
	1.223×10^{-6}	cubic kilometer (km ³)
Flow rate		
cubic foot per second (ft ³ /s)	2.832×10^1	liter (L/s)
	2.832×10^{-2}	cubic meter per second (m ³ /s)
	2.832×10^1	cubic decimeter per second (dm ³ /s)
gallon per minute (gal/min)	6.309×10^{-2}	liter per second (L/s)
	6.309×10^{-5}	cubic meter per second (m ³ /s)
	6.309×10^{-2}	cubic decimeter per second (dm ³ /s)
million gallons per day (Mgal/d)	4.381×10^{-2}	cubic meter per second
	4.381×10^1	cubic decimeter per second (dm ³ /s)
Mass		
ton, short (2,000 lb)	9.072×10^{-1}	megagram (Mg) or metric ton

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

$$^{\circ}\text{F} = (1.8 \times ^{\circ}\text{C}) + 32$$

Vertical coordinate information is referenced to local mean sea level.

