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BOARD OF LAND AND NATURAL RESOURCES
FOR THE STATE OF HAWAII

IN THE MATTER OF) Case No. BLNR-CC-16-002
)
A Contested Case Hearing Re Conservation;))
Use Application (CDUA) HA-3568 For the)
Thirty Meter Telescope at the Mauna Kea) **Certificate of Service**
Science Reserve, Ka'ohe Mauka, Hamakua,)
Hawai'i TMK(3)4-4-015:009)

CINDY FREITAS SIX SUPPLEMENTAL EXHIBIT LIST

The files for submittals S-18b are too large to be emailed. The electronic copies are being submitted on a jump drive to the DLNR – Custodian of Records for this contested case hearing in order to be posted online in the Evidentiary Hearing Submittals site. Copies of Submittals S-18b are located online and can be directly downloaded from the following website:  [WaterResourcesHawaiiIsland.pdf](#)

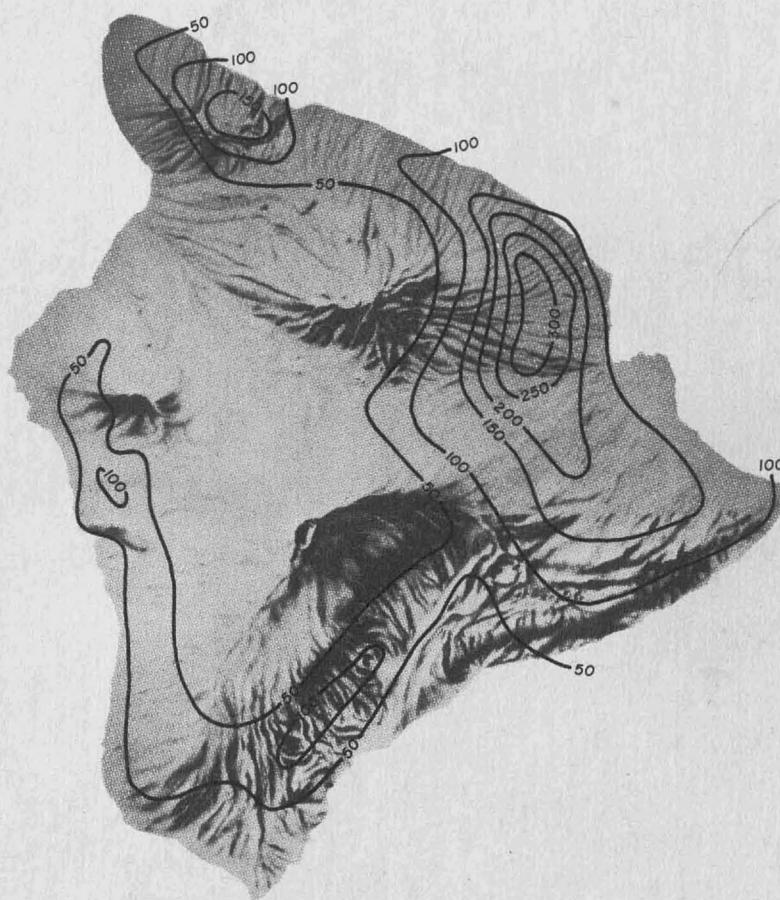
Kailua Kona HI January 18, 2017


Cindy Freitas Petitioner

AN INVENTORY OF

Basic Water Resources

Data: ISLAND OF HAWAII



STATE OF HAWAII
Department of Land and Natural Resources
Division of Water and Land Development

Report R34

AN INVENTORY OF

Report R34



Department of Land and Natural Resources

HONOLULU, HAWAII

February 1970

STATE OF HAWAII

JOHN A. BURNS, Governor

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HAW 1539

Preface

Hawaii's unprecedented economic growth during the past decade and its attendant water supply requirements have caused the legislative and executive branches of state government to broaden and intensify programs for the collection and publication of basic hydrologic data and for water resources planning, development, and management.

Chapter 176, H.R.S., provides the authority to initiate and conduct continuing water resources studies on a state-wide basis. The purpose of these studies is to formulate and publish for each major island a long-range, comprehensive plan as a general guide for the optimum development, utilization, and conservation of water resources. The Department of Land and Natural Resources, through its Division of Water and Land Development (DOWALD), is the agency responsible for implementing the state-wide water resources program.

A current objective is the formulation of a comprehensive water resources development plan for the island of Hawaii, similar in context to *Water Resources Development—Molokai*, published by DOWALD in 1966. This publication comprises an inventory of basic data on the surface and ground water resources of the island of Hawaii upon which to base the comprehensive water development plan.

The state's water resources program is consonant with the nation-wide movement to accelerate water resources development and is responsive to the federal government's efforts to encourage comprehensive water resources planning. The federal Water Resources Planning Act of 1965 (P.L. 89-80) established a national Water Resources Council and, under Title III, authorized grants to states for water resources planning. This publication has been produced with federal assistance under Title III.

Acknowledgments

Climatological and water supply data published in this report were provided by several government agencies, private organizations, and individuals, whose cooperation is gratefully acknowledged. Sources include previously published as well as hitherto unpublished data, specific acknowledgment of which would be impractical. It would also be difficult to list all of the participating individuals. Among the contributing organizations and agencies are the following:

PRIVATE ORGANIZATIONS

Bishop Estate	Kealakekua Ranch
Greenwell Ranch	Keeau Orchards
Hamakua Mill Company	Kohala Sugar Company
Hawaiian Agricultural Company	Kukaiau Ranch Company
Hawaiian Ranch Company	Laupahoehoe Sugar Company
H.S.P.A. Experiment Station	Mauna Kea Beach Hotel
Hilo Electric Company	Mauna Kea Sugar Company
Honokaa Sugar Company	McCandles Ranch
Honomalino Agricultural Company	Paaupau Sugar Company
Hualalai Ranch	Palani Ranch
Huehue Ranch	Parker Ranch
Hutchinson Sugar Company	Pepeekeo Sugar Company
Kahua Ranch	Puna Sugar Company
Kahuku Ranch	Puwaawaa Ranch
Kamehameha Development Corp.	

GOVERNMENT AGENCIES

Geological Survey, U.S. Dept. of Interior
Hawaii National Park, U.S. Dept. of Interior
Kilauea Military Camp, U.S. Dept. of Army
Soil Conservation Service, U.S. Dept. of Agriculture
Weather Bureau, U.S. Dept. of Commerce

Division of Environmental Health, Dept. of Health
Division of Forestry, Dept. of Land and Natural Resources
Kulani Prison, Dept. of Social Services

Department of Water Supply, County of Hawaii

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Hydrographic Areas

In order to facilitate the study of water resources, the island of Hawaii has been divided into five hydrographic areas based upon surface topography. These five areas are the major drainage basins of the island, each covering several watersheds.

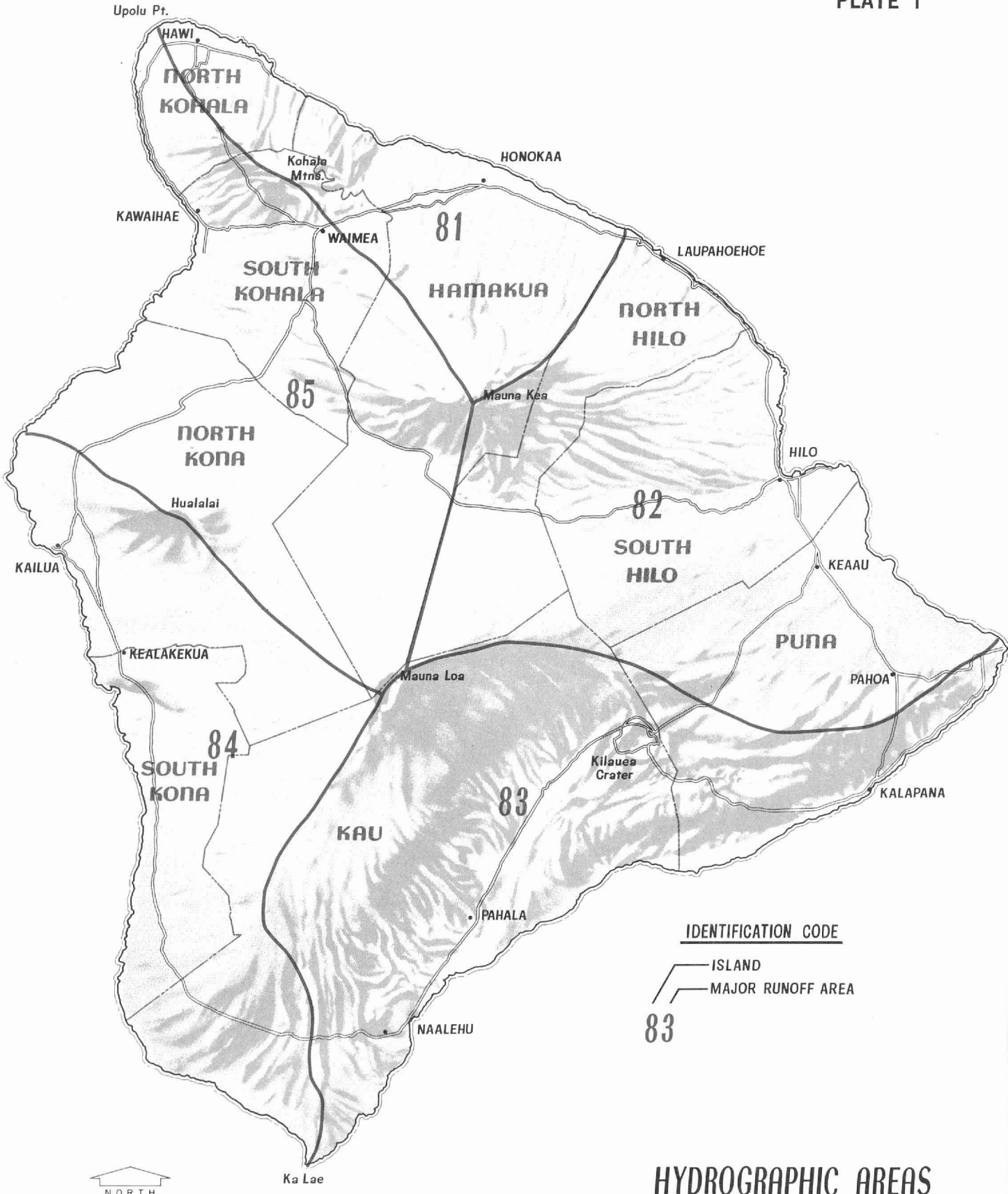
The numerical designations of hydrographic areas are part of the state-wide system of watershed identification which has been adopted for use by the Division of Water and Land Development (DOWALD) and also by the U.S. Soil Conservation Service. The first digit represents one of the eight major islands of the state, numbered consecutively from Niihau on the northwest in a southwesterly direction to Hawaii. The second digit identifies the hydrographic area, numbered from the northern tip of each island depending on the shape, size, and topography of

the island. Watersheds within a hydrographic area, when identified are designated by a third digit, numbered clockwise within the area. Decimal digits are used to identify sub-watersheds.

Hydrographic Area 81, Hamakua: the west portion of the northern slopes of the island, being also the northern slopes of Kohala Mountain and Mauna Kea, comprising an area of 375 square miles. Area 81 extends from a point on the coast about three-quarters of a mile west of Upolo Point (North Point) at the northern tip of the island, southeasterly along the coastline to a point about five-eighths of a mile southeast of the mouth of Kaula Stream; thence along the water divide southwesterly to the summit of Mauna Kea; thence northwesterly to the summit of Kohala Mountain and to the point of beginning.



View of Alakahi Canyon at head of Waipio Valley in Area 81, Hamakua in the background.



IDENTIFICATION CODE

ISLAND
MAJOR RUNOFF AREA

83

**HYDROGRAPHIC AREAS
with land districts**



Another view of Waipio Valley and Hamakua, Area 81.

Hydrographic Area 82, Hilo: the east portion of the northern slopes of the island, being also the eastern slopes of Mauna Kea and the northeastern slopes of Kilauea, comprising an area of 1,049 square miles. Area 82 extends from a point on the coast about five-eighths of a mile southeast of the mouth of Kaula Stream near Ookala, southeasterly along the coastline to Cape Kumukahi (East Cape); thence along the water divide westerly to the east rim of Kilauea volcano and to a point on the divide two-sevenths of a mile northeast of the convergence of the Kau-North Hilo and North Hilo-Hamakua district boundaries; thence northeasterly to the summit of Mauna Loa and to the point of beginning.

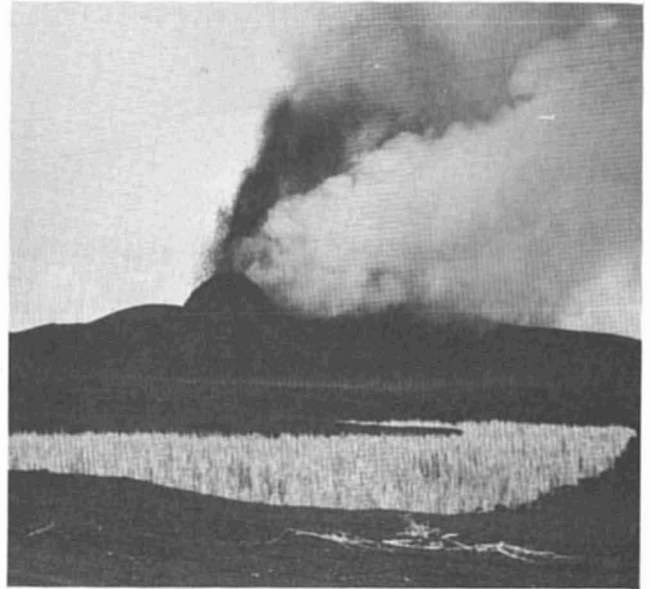
Hydrographic Area 83, Kau: the southeastern slopes of the island, being also the southeastern slopes of Mauna Loa and Kilauea, comprising an area of 908 square miles. Area 83 extends from Cape Kumukahi (East Cape) at the eastern tip of the island, southwesterly along the coastline to a point seven-tenths of a mile northwest of Kalae (South Point); thence along the watershed divide northerly to the summit of Mauna Loa; thence easterly to the east rim of Kilauea Volcano and to the point of beginning.



View of Mauna Kea from the Saddle Road, showing an expanse of Area 82.



The "boiling pots" area of Wailuku River, located near the city of Hilo in Area 82.



Eruption of Kapoho Crater in southeastern tip of Area 83, near the border of Area 82.



Halemaumau Crater from observatory, famous visitor attraction in Area 83.



Hydrographic Area 84, Kona: the southwestern slopes of the island, being also the western slopes of Mauna Loa and the southern slopes of Hualalai, comprising an area of 795 square miles. Area 84 extends from a point on the coast seventh-tenths of a mile northwest of Kalae (South Point) at the southern tip of the island, northwesterly along the coastline to Keahole Point (West Cape); thence along the water divide southeasterly to the summit of Hualalai and to the summit of Mauna Loa; thence southerly to the point of beginning.

Hydrographic Area 85, Kohala: the northeastern slopes of the island, being also the northern slopes of Hualalai, the northeastern slopes of Mauna Loa, the western slopes of Mauna Kea, and the southwestern slopes of Kohala Mountain, comprising an area of 903 square miles. Area 85 extends from Keahole Point (West Cape) at the western tip of the island, northeasterly along the coastline to a point about three-quarters of a mile west of Upolu Point (North Point); thence along the water divide southeasterly to the summit of Kohala Mountain, and to the summit of Mauna Kea; thence southerly to a point on the divide two-sevenths of a mile northeast of the convergence of the Kau-North Hilo and North Hilo-Hamakua district boundaries; thence southwesterly to the summit of Mauna Loa; thence northwesterly to the summit of Hualalai and to the point of beginning.

Above: Panoramic sweep at Kealahou, Kona, in Area 84. Below: Corral at 4,000 feet elevation on Huehue Ranch, Mt. Hualalai in background, located in Area 84 near 85.





Scenes in Area 85. Above: Pasture and small farms at Waimea. Right: Leeward slopes of Kohala Mountain, Kawaihae Harbor in background. Below: Mt. Hualalai in the distance, viewed from Waimea.



Although the island of Hawaii lies within the tropics, its climate is semi-tropical and varies locally with elevation and orientation to the tradewinds. In general, the climate is characterized by two seasons a year, by mild and fairly uniform temperatures except at higher elevations, by prevailing tradewinds, by marked differences geographically in rainfall patterns, and by typically humid and cloudy conditions except in leeward coastal areas and at higher elevations.

The island lies in the path of northeasterly tradewinds which are relatively uniform and persist throughout most of the year. Wind speeds over the ocean surrounding the island do not exceed 12 mph more than half the time. The wind pattern is a key factor in the determination of rainfall and affects humidity, evaporation, and temperature.

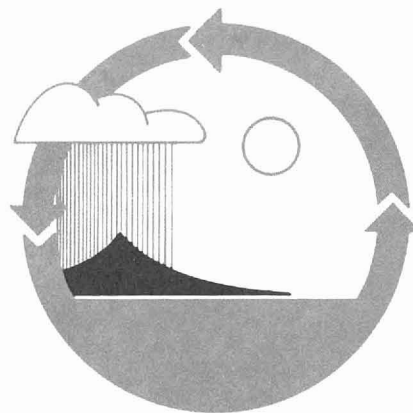
Most of the rainfall on the island's eastern side results from the cooling of the moist tradewinds as they rise and flow over Kohala Mountain and are deflected around the higher mountain masses of Mauna Kea and Mauna Loa. The leeward side of the island is generally dry, except in the Kona area where convective storms are common. Infrequent major storms of the cyclonic type, known as "Kona storms," occur principally in the winter.

Because of the mild, equable temperatures of the ocean waters surrounding the island, temperatures in the air moving across the ocean and over the island are also mild and equable. The warmest month is August and the coldest is February.

Temperatures decrease uniformly with elevation to an inversion level where the tradewinds are overlain with winds moving poleward, usually between 5,000 and 7,000 feet. Relative humidity below the inversion level is high; above the inversion, the air is drier.

Evaporation varies with rainfall, wind exposure, cloud cover, and temperature. The rate is highest in arid leeward regions.

Each aspect of climatology on the island of Hawaii is inventoried in this section, following an Alphabetical List of Climatologic Stations, pages 9-11. Records relating to and characteristics of rainfall, temperature, evaporation, wind, and humidity are discussed and illustrated, following which stations are indexed and selected records are presented.



CLIMATOLOGY



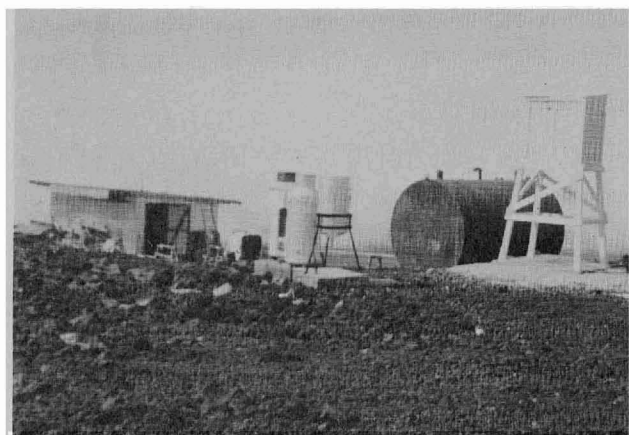
Mountain mists in rain forest exposed to moisture-laden tradewinds, Kawainui Stream, Kohala.

Alphabetical List of Climatologic Stations

State Key No.	Station Name	State Key No.	Station Name	State Key No.	Station Name	State Key No.	Station Name
191.2	A & S Farm	12.6	Field 63 (Hutchinson Sugar)	87	Hilo Airport	4.2	Kahuku Ranch
90.1	Ag Office	12.3	Field 64 (Hutchinson Sugar)	86.1	Hilo Boarding School	4.1	Kahuku Ranch House
215.3	Ahualoa	12.3	Field 64 (Hutchinson Sugar)	87.2	Hilo Breakwater	3.2	Kahuku Shed 1
207	Ahualoa Homesteads	12.3	Field 64 Makai (Hutchinson Sugar)	85	Hilo Insectory	2.2	Kahuku Shed 3
75	Ahua Umi	202.1	Field 114 (Honokaa Sugar)	85	Hilo Tree Nursery	3.1	Kahuku 2 Makai
102.4	Ahumoa	222.7	Field 116 (Hamakua Mill)	166	Hoea Mill	93.6	Kahawai
58	Ainahou	118.1	Field 127 (Hamakua Mill)	73.8	Hokukano Makai	69.7	Kailua (Yowell)
58.1	Ainahou 2	14.5	Field 135 (Hutchinson Sugar)	73.9	Hokukano Mauka	68.4	Kailua-Kona
58.1	Ainahou Makai	118.2	Field 139 (Hamakua Mill)	192.4	Holoholoku 1	68.1	Kailua Mauka
58.2	Ainahou Steel Tank #2	7.1	Field 140 (Hutchinson Sugar)	70	Holualoa	185.1	Kaimu
38	Ainapo	21.1	Field 150 (Haw'n Ag)	68.5	Holualoa (1450)	73.2	Kainaliu
77.8	Airport	91.6	Field 151 (Puna Sugar)	70.3	Holualoa (Twigg-Smith)	73.12	Kainaliu Beach
216.3	Airport	11	Field 240 (Hutchinson Sugar)	68	Holualoa Beach	222.2	Kainehe
171	Alaalae 2 & 3	13.1	Field 330 (Hutchinson Sugar)	68.1	Holualoa Loading Chute	69.5	Kaiolu
59.1	Alae Crater	11.4	Field 350 (Hutchinson Sugar)	70.4	Holualoa Mauka Camp	73.15	Kaipoi
194	Alakahi Lower	22.1	Field 351 (Haw'n Ag)	176.2	Homestead Plantation	89.4	Kaiwika
190	Alakahi Upper	13	Field 370 (Hutchinson Sugar)	73.19	Honalo	125.11	Kaiwika (2000)
194	Alakahi Waipio Lower	13.2	Field 420 (Hutchinson Sugar)	73.13	Honalo 1	1	Ka Lae
190	Alakahi Waipio Upper	13.2	Field 435 (Hutchinson Sugar)	73.6	Honalo 2	1.2	Ka Lae (South Point)
20.2	Alili	11.3	Field 450 (Hutchinson Sugar)	73.21	Honalo 3		Tracking Station
20	Alili (2800)	36.1	Field 481 (Haw'n Ag)	27	Honaunau	25.2	Kalahiki Castle
20.2	Alili (Field 8)	13.3	Field 630 (Hutchinson Sugar)	27.2	Honaunau Forest 1	25.1	Kalahiki (750)
20	Alili Tunnel	12.7	Field 656 (Hutchinson Sugar)	27.3	Honaunau Forest 2	25.2	Kalahiki (1500)
20.1	Alili Tunnel (3500)	13.4	Field 660 (Hutchinson Sugar)	31.1	Honaunau Forest 3	25.4	Kalahiki (1800)
89.5	Amauulu Camp 4	12.12	Field 715 (Hutchinson Sugar)	137	Honohina	67.6	Kalapana
89.3	Amauulu Camp 4 Mauka	12.8	Field 750 (Hutchinson Sugar)	137.3	Honohina Mauka	67.8	Kalapana 1
209	Anuenue	12.3	Field 750 (Hutchinson Sugar)	159.1	Honopu	38.5	Kalapana 2
182.1	Awini	12.12	Field 761 (810) (Hutchinson Sugar)	214	Honokaa	67.1	Kalapana (Wilson)
184.2	Awini Ranch	12.11	Field 765 (Hutchinson Sugar)	215.2	Honokaa (Richart)	80	Kaleieha
147	Beach	12.9	Field 850 (Hutchinson Sugar)	215.1	Honokaa Central	220.3	Kalopa
30.1	Big Hill	45.2	Fire Cache 2	215.1	Honokaa Mauka	220.1	Kalopa (900)
2.23	Bill Jack	2.2	First Gate	215	Honokaa Town	216.6	Kalopa (2100)
211	Bottom of 1916 Flow	2.6	Five Mile Paddock	215	Honokaa Village	178.3	Kalope
107.1	Bradshaw AAF	2.22	Furika	181.1	Honokane	29.2	Kalukalu
162.2	Camp 17 (Kohala Sugar)	116.1	Garden	185.3	Honokane (Parker)	67	Kamaile
35.2	Camp Kai	4.6	George Peck	69.3	Honokohau Ranch	67	Kamaile
93.2	Cape Kumukahi	54.3	Glenwood	93.6	Honolulu Landing	212	Kamaka Gate
2.26	Castle	54.2	Glenwood (Helbush)	168.1	Honomakau 3	5	Kamaoa 2
51.6	Castle Farm Lots	3.5	Glover	136	Honomu	4.4	Kamaoa (1000)
2.16	Castle Paddock Tank	209	Gravel Pit	144.2	Honomu (300)	4	Kamaoa (Gouveia)
192	Central	11.2	Haa Springs	144.3	Honomu (950)	4.7	Kamaoa Ranch Hq.
27.4	City of Refuge National Historical Park	214	Haina	143	Honomu 2	5	Kamaoa Ranch House
85.1	Cloud Physics Laboratory	142	Hakalau	143	Honomu Makai	203.1	Kamoku
222.1	Coffee Plantation	135	Hakalau Mauka	138	Honomu Mauka	192.2	Kamuela
127.4	Coffee Pond	38.3	Halape	138.1	Honomu Mauka (1200)	192	Kamuela (2750)
88.5	Country Club	178.4	Halawa	144.5	Honomu Seaside	191	Kamuela (Airport)
89.6	Dairy	180.1	Halawa Mill	15	Honupou	74	Kanahaha
114.1	Daily Field	52	Halemaumau	14.1	Honupou (25)	29.5	Kanakamelae
6.2	Daleico	117	Halepiula	71	Honupou	77.6	Kanekini
38.4	Desert	92.3	Halepiula 3	77.5	Hooihui Makani	36	Kapapala Ranch
54.12	Devastation Area #2	2.19	Halepiula (1670)	25.3	Hookena	66.3	Kapoho
54.13	Devastation Area #3	70.1	Halepiula Shed	2.4	Hoopulua Lower	93	Kapoho
54.14	Devastation Area #4	111	Halepohaku	2.3	Hoopulua Upper	66.2	Kapoho KLD #2264
145	Ditchman's Stable	73.16	Halewalea	114	Hope-A	93.5	Kapoho Landing Strip
111.2	Dome Site	221.3	Hamakua Makai Variety Sta.	114	Hope-A Lower	93	Kapoho Lower
183.2	East Honokane	218	Hamakua Mill	115	Hope-A Tanks	66	Kapoho Mauka
93.4	Eben Low	112	Hanaipoe	111.1	Hopukane Springs	66	Kapoho Upper
74.2	Experimental Plot #2	115	Hapea Mauka	111.1	Hopukani Springs	2.5	Kapua
92.5	Field B-15 (Hawaii Macadamia Nut Co.)	31	Hapuu	125	Hopuwai	174.3	Kapua Gulch
73.23	Field E (Kona Exp. Farm)	54.5	Haunani Road	72	Hualalai	2.14	Kapua Mauka
216.5	Field 003	54	Hawaii National Park Hqs.	71.2	Hualalai Sheep Station	210	Kapulena
130.1	Field 6 (Laupahoehoe Sug.)	90.1	Hawaii Substation Office	92.1	Huehue	2.9	Kapulipo
215.3	Field 7A (Honokaa Sug.)	168	Hawi	69.12	Huehue (2600)	2.24	Kau
118.3	Field 7A (Hamakua Mill)	168	Hawi Mill	69.13	Huehue (3100)	6.1	Kau
20.3	Field 8 (Haw'n Ag)	168	Hawi Office	69.14	Huehue (3700)	67.2	Kauleau
7.1	Field 8 (Hutchinson Sugar)	67.5	Hayhalekai	69.15	Huehue (4500)	67.3	Kauleau 2
221.1	Field 9 (Hamakua Mill)	178	Headquarters	80.1	Humuula	74.1	Kaukahoku
220.1	Field 14 (Honokaa Sugar)	17.2	Higashi Camp	127.1	Humuula (3600)	184.1	Kaukini
220.5	Field 14 (Paauihau Sugar)	12.1	Hilea	178.1	Iole 10	88.1	Kaumana
21.1	Field 015	12.13	Hilea Gulch	121	Iolehaehae Tanks	94.2	Kaumana (500)
11	Field 16 (Haw'n Ag)	38.2	Hilini Pali	77.4	J.P.	86.2	Kaumana (1960)
220.3	Field 23 (Paauihau Sugar)	94.3	Hill			86.5	Kaumana (2000)
213.1	Field 28 (Honokaa Sugar)	86.1	Hilo			88.5	Kaumana 2
218.2	Field 28 (Hamakua Mill)	85	Hilo (A&F)			88.1	Kaumana 3
221.2	Field 30 (Hamakua Mill)	86.4	Hilo (Coan)			71.3	Kaupulehu Forest Reserve
13.1	Field 35 (Hutchinson Sugar)					148	Kawaihae
130.2	Field 39 (Laupahoehoe Sugar)					148.2	Kawaihae (C of E)
13.2	Field 40-1 (Haw'n Ag)					184	Kawaihae Uka 2
13.2	Field 49 (Hutchinson Sugar)					184	Kawaihae Uka Makai
13.3	Field 51 (Hutchinson Sugar)					183.4	Kawaihae Uka Mauka
13.4	Field 56 (Hutchinson Sugar)					193	Kawainui Lower
12.3	Field 58 (Hutchinson Sugar)					185	Kawainui Upper
12.2	Field 61 (Hutchinson Sugar)					73.7	Kawainui 2
						213	Kawela
						4.2	Keaa Homesteads
						91.1	Keaa
						92	Keaa
						92.2	Keaa Orchard
						22	Keaiwa
						22.1	Keaiwa Camp
						22	Keaiwa Camp (1650)
						35.1	Keaiwa Reservoir
						26.2	Kealakekua
						29.1	Kealakekua (Davis)
						97	Keamoku
						96.1	Keamoku Grass Plot
						97	Keamuku
						124	Keanskolu
						124.2	Keanakolu Camp

State Key No.	Station Name
123.1	Keanakolu (5500)
124.1	Keanakolu (Parker)
127.3	Keanakolu Trail
77.6	Keane Kini
190.4	Keanuimano Stream
67.9	Near Kamuela
51.1	Keauhou Forest Reserve
73.3	Keauhou (1980)
73.5	Keauhou 2
74.3	Keauhou 2 #3
73.1	Keauhou 2 (1890)
73.1	Keauhou 73A
73.14	Keauhou Bay
73.4	Keauhou HWA Site
73.4	Keauhou Test Site
183.8	Keawewai
28.4	Keel Makai 2
28.2	Keel Middle Road
181.2	Kehena
66.4	Kehena Makai
176.1	Kehena Reservoir
45	Kekekaniho
102.2	Kemole House
105	Kemoli 1
104	Kemoli 2
102.2	Kemoli House
3.3	Keolakoa Forest
69.9	Keopu (McWayne)
132	Kihalani
30.3	Killae Stream
51.2	Kilauea Camp
54.9	Kilauea Iki A-AF
54.6	Kilauea Iki B-BF
54.8	Kilauea Iki C-CF
54.11	Kilauea Iki D-DF
54.7	Kilauea Iki #1
51	Kilauea North Rim
70.11	Kileo
70.9	Kileo Mauka
7	Kiolakaa
6	Kiolakaa (A & F)
89.2	Kipa
51.8	Kipuka Ki
183.6	Kohakohau #1
183.7	Kohakohau #2
190.1	Kohakohau 3
190.2	Kohakohau 4
190.3	Kohakohau 5
190.5	Kohakohau 6
190.6	Kohakohau 7
190.7	Kohakohau 8
190.4	Kohakohau Stream
179.1	Kohala
176	Kohala Mauka
176	Kohala Maulili
179.1	Kohala Mill
175.1	Kohala Mission
194.2	Kohala Mountain Pipe Line
183.5	Kohala Mountain Summit
177	Kohala Old Railroad Station
174.1	Kohala Parsonage
69.4	Kohanaiki
195.1	Koiawe
196	Koiawe Lower
195	Koiawe Upper
162.1	Kokoiki
2.18	Kole Pen
30	Komakawai
68.3	Kona Airport
93.8	Kona Village
29.3	Konawaena (Buttles)
29.4	Konawaena School
22.3	Koree Camp
29.7	Kua Pehu
222	Kukaiau
127.2	Kukaiau (3400)
123.2	Kukaiau (5000)
121.1	Kukaiau (7850)
222.7	Kukaiau Makai
222.6	Kukaiau Mill
222	Kukaiau Plant Co Office
222	Kukaiau Store
184.3	Kukui
93.7	Kukui Akau
206	Kukuihaele
199	Kukuihaele (HIC)
199	Kukuihaele Main Weir
206	Kukuihaele Mill
205	Kukuihaele Village
92.4	Kukulu Kukui
79	Kulani Camp
81	Kulani Cone
81	Kulani Ditch
76	Kulani Mauka
78	Kulani School Site
69.6	Kuona Olu
67.6	Kupaahu
91.4	Kurtistown
122	Laaumaia
178.7	Lahikiola
202	Lalakea
111.3	Lake Waiau Site
202	Lalakea Reservoir
191.1	Lalaimilo Field Office
68.2	Lanihau
69.6	Lanihau (Bartels)
68.7	Lanihau Mauka
68.7	Lanihau Mauka 1
68.8	Lanihau Mauka 2
68.9	Lanihau Mauka 3
3.7	Lanihonua
133.2	Laupahoehoe
133.1	Laupahoehoe (10)
45.1	Lava Flow
66.1	Lava Tree Park

State Key No.	Station Name
73.7	Lehuula
69.8	Lion Grass
21.1	Lower Kauhane
65.2	Lower Pahoa
89.7	Lower Piipihoua
73.1	Macadamia Nut Road
159	Mahukona
103	Makahalau
134	Makahalanaloa 2
134	Makahalanaloa Mauka
12.2	Makanau
59	Makaopuhi
59	Makaopuhi Crater
181	Makapala Nursery
11	Makino
29.9	Malukulu
94.3	Mamane Hill
94.3	Mamane Paddock
220	Manager's House
90	Manager's Residence
2	Manuka
3.6	Manuwai Nui
126	Maulua
126	Maulua Makai
126.1	Maulua Mauka
37.1	Mauna Anu
43.1	Mauna Iu
98	Mauna Kea Beach
90.2	Mauna Kea (200)
144.9	Mauna Kea (1000)
125.9	Mauna Kea (1500)
125.8	Mauna Kea (2000)
125.7	Mauna Kea (2650)
125.6	Mauna Kea (3000)
125.5	Mauna Kea (3500)
125.4	Mauna Kea (4000)
125.3	Mauna Kea (4500)
125.2	Mauna Kea (5000)
9.1	Mauna Loa
45.1	Mauna Loa (5650)
38.1	Mauna Loa Seismo Station
39	Mauna Loa Slope Observatory
39.2	Mauna Loa Summit
51.7	Mauna Loa Truck Trail (4000)
51.8	Mauna Loa Truck Trail (4250)
45.2	Mauna Loa Truck Trail (5100)
39.1	Mauna Loa Upper
25.5	McCandless Office
39.3	Menzies - Ainapo Trail
88	Middle Flume House
68.1	Middle Holualoa
147.1	Middle Pen
18	Moaula
17.1	Moaula (Wills)
17	Moaula Reservoir
18	Moaula Station
16	Moaula Tunnel
73.3	Mokuaukaia Road
39.4	Mokuawewewo Caldera
1.1	Morse Field
10	Mountain House
91	Mountain View
35.5	Mudflow
198	Muliwai
14	Naalehu
14.6	Naalehu Airport
13.7	Naalehu Airstrip
14.3	Naalehu (1725)
14.2	Naalehu (Hewitt)
14.5	Naalehu Pan Station
93.9	Nanawale
2.3	Na Ohia
28	Napoopoo
28.1	Napoopoo (16)
128	Nauhi Gulch
38.6	Naulu Forest
10.1	New Mountain House
213.1	New Stable
212.1	Nienie (Lee)
110.2	Nienie (Yates)
179	Niulii
182	Niulii 15
183.3	Niulii 23
183	Niulii Mauka
35	Noguchi Tunnel
39.6	North of Caldera
172	Nunulu Nui
52.1	Observatory
90	Office (Hilo Sugar)
192.2	Office (Parker Ranch)
44	Ohaikoa
44.1	Ohaikoa (3750)
54.1	Ohialani Dairy
69.1	Ohiia Lilihi
24	Ohiia Lodge
77.3	Oiki Heifer Paddock
2.17	Okoa
92	Olaa
91.2	Olaa (1650)
91.3	Olaa (Kurtistown)
91	Olaa (17 Miles)
51.3	Olaa (29 Miles)
92	Olaa Mill
106	Old Dairy
2.13	100 Acres
3.2	#1 Watershed
144.7	Onomea
29.6	Onouli
29.8	Onouli (1600)
223	Ookala
130	Ookala (1750)
130	Ookala Mauka
24.1	Opihihale 2
67.7	Opihihale
91.5	Orchid Land Estate



Station No. 39.0—MAUNA LOA SCOPE OBSERVATORY



Station No. 133.0—PAPAALOA



Station No. 79.0—KULANI CAMP

State Key No.	Station Name	State Key No.	Station Name	State Key No.	Station Name	State Key No.	Station Name
101	Pa Aalii	125.1	Pua Akala	84	Saddle Road 1	160	Upolu 5
217	Paaauhau	125.1	Puakala	203	Second Gate	162	Upolu 7
216.1	Paaauhau (Grieg)	161	Puakea	70.12	Shangri-La	165	Upolu 13
216	Paaauhau (Parker Ranch)	161	Puakea Ranch	70.9	Shangri-La Mauka	159.3	Upolu 19
220	Paaauhau Mauka	163	Puakea Reservoir 2	3	South Point Corral	160.2	Upolu 21
216.2	Paaauhau Mauka (1150)	164.1	Puakea 13	1.2	South Point Tracking Station	159.2	Upolu Point
221	Paaaulo	95.1	Puako	165	Station 1 (Kohala Sugar)	160.1	Upolu Point Airport
218.1	Paaaulo (Crusher)	95.3	Puako (Parker Ranch)	162	Station 2 (Kohala Sugar)	185.4	Upper Hamakua Ditch
222.4	Paaaulo (Notley)	66.3	Puakaa	163	Station 3 (Kohala Sugar)	79.4	Upper Kulani
68.11	Pacific Empress Hotel	77.3	Pump 4	165	Station 4 (Kohala Sugar)	65.3	Upper Pahoa
21	Pahala	9	Punaluu	171	Station 5 (Kohala Sugar)	79.1	Upper Waiakea
2.15	Pa Hanalei Pen	9	Punaluu Kahawai	174	Station 6 (Kohala Sugar)	52.1	Uwekahuna
2.1	Pahipa	110.1	Punohu Paddock	179.1	Station 7 (Kohala Sugar)	27.1	Uyeda-Honaunau
65	Pahoa	183.1	Puu Ahia	177	Station 8 (Kohala Sugar)	111.4	Van Site
65.2	Pahoa Makai	178.8	Puu Aiea	164	Station 9 (Kohala Sugar)	51.5	Volcano Farm Lots
65.3	Pahoe Mauka	200	Puu Alala	167	Station 10 (Kohala Sugar)	51.4	Volcano House
25	Pahoehoe	93.1	Puu Anahulu	176	Station 11 (Kohala Sugar)	54	Volcano Observatory
25.7	Pahoehoe Ranch	102	Puu Anuanu	182	Station 12 (Kohala Sugar)	70.5	Waiaha Stream
43.2	Pahua Mimi	102.3	Puu Anuanu Paddock	179	Station 13 (Kohala Sugar)	70.6	Waiaha Stream (USGS)
37	Pakao	4.8	Puuko	166	Station 14 (Kohala Sugar)	70.7	Waiaha Stream at Luawai
4.7	Pakini	113.1	Puuhala	163	Station 15 (Kohala Sugar)	65.1	Waiakeahou
106	Paleihookapapa	148.1	Puu Hanae	173	Station 16 (Kohala Sugar)	88	Waiakea
106	Palihooukapapa	96	Puuhinei 1	172	Station 17 (Kohala Sugar)	89.1	Waiakea Camp 6
30.2	Palipakika	95	Puuhinei 2 Grass Field	181	Station 18 (Kohala Sugar)	88.6	Waiakea Camp 8
93.3	Panika	95.2	Puuhinei Paddock	178.1	Station 19 (Kohala Sugar)	88.8	Waiakea Experimental Farm
116	Papa	170	Puuhue	175.1	Station 20 (Kohala Sugar)	79.3	Waiakea Forest Reserve (4000)
2.21	Papa (Coffee Land)	178.5	Puuhue Ranch	159.3	Station 21 (Kohala Sugar)	79.2	Waiakea Forest Reserve #1
133	Papaaloa	148.1	Puu Kanae	162.2	Station 22 (Kohala Sugar)	87.1	Waiakea Mill
133	Papaaloa Office	192.1	Puu Kapu	169.1	Station 23 (Kohala Sugar)	88.2	Waiakea SCD
77.1	Papai Clark	204.1	Puukapu Lot 10	160.2	Station 24 (Kohala Sugar)	182	Waiauka
144.1	Papaikou	201	Puu Kapu Reservoir 3	178.2	Station 25 (Kohala Sugar)	71.1	Waihou 1
140.2	Papaikou (A&F)	201.1	Puu Kapu (2850)	183.3	Station 26 (Kohala Sugar)	185.2	Wailikahi Cabin
144.4	Papaikou (Rogers)	120.1	Puu Kea	174.3	Station 27 (Kohala Sugar)	187.2	Wailikahi Mauka
144.1	Papaikou Makai	102.5	Puu Kee Kee	164.1	Station 28 (Kohala Sugar)	178.6	Waikanonoula
140.1	Papaikou Mauka	120	Puu Kihe	222.5	Station 29 (Kohala Sugar)	137.2	Waikaumalo
77	Papaaloa	204	Puu Kikoni	115	Stone Corral	100	Waikii
159.4	Parker Ranch Pasture #32	102.1	Puu Laau	222.6	Sugahara Camp	100.1	Waikii (4675)
77.2	Pauahi	181.2	Puu Lalau	160.1	Suiter Field	194.1	Waikoloa
144.8	Paukaa	73	Puu Lehua	28	Takahara-Napoopoo	208	Waikoloa Stream
144	Pepeekeo	127	Puu Loa	26	Takashiba	83.1	Wailuku River
140	Pepeekeo (A&F)	113	Puu Mali	26.1	Tank Field	197	Waima
144.6	Pepeekeo (Andrade)	202.1	Puu Mau	69.2	Tay Residence	197	Waima Lower
144	Pepeekeo Makai	110	Puunoho 1	77.7	#3 A Pump	187.1	Waimanu
141	Pepeekeo Mauka	110.1	Puunoho Paddock	3.1	#3 Makai Watershed	192	Waimea
89	Piihonua	73.17	Puu O Hau	2.2	#3 Mauka Watershed	192.6	Waimea Reservoir
88.3	Piihonua (1000)	137.1	Puuhua (Macey)	88.9	Thurms	145	Wainaku Camp 2
88.9	Piihonua 2	167	Puukumau	2.8	Top Coffee - Papa	13	Waiubata
88.4	Piihonua Camp 4	167	Puukumau Reservoir	2.12	Top of Terr. Boundary (1916)	218	Warehouse
88.4	Piihonua Camp 5	80.2	Puu Omaokoili	38.1	Truck Trail	12.4	Waterfall
88.7	Piihonua Mauka	82	Puu Oo	54.4	26 Miles	182	Weir
73.18	Pineapple	192.3	Puu Pa	178.2	Twin Reservoir	199	Weir #1
216.4	PMA	192.5	Puu Pa (2400)	118	Umikoa	51	Wentworth
220.2	Pohakea	113	Puu Ulaula	75	Uni Temple	39.5	West Caldera
39.7	Pohaku Hanalei	94.1	Puu Waawaa	173	Union Office	35.6	Wood Valley
107	Pohakuloa	83	Quarry at Saddle Road	174	Union Station	35.3	Wood Valley (2000)
107.1	Pohakuloa (USMC)	192.3	Range	172	Union Uka	35.2	Wood Valley (3500)
107.2	Pohakuloa (5700)	2.25	Reservoir			35.2	Wood Valley Camp
67.4	Pohoiiki	211	Reservoir 13			35.4	Wood Valley Reservoir
73.13	Poho Kala 1	70.8	Right Branch Waiaha Stream			35.2	Wood Valley Reservoir (2150)
73.6	Poho Kala 2	14.6	Rubbish Dump			35	Wood Valley Tunnel
86.3	Ponahawai						
94.2	Ponahawai (500)						

KEY TO ABBREVIATIONS

BWS - Board of Water Supply
DOWALD - Division of Water and Land Development
FRC - Federal Records Center
HAES - Hawaii Agricultural Experiment Station
HAL - Hawaiian Airlines, Ltd.
HPD - Hourly Precipitation Data, USWB
HSPA - Hawaiian Sugar Planters' Association
HWA - Hawaii Water Authority
KRGH - A Key to Rain Gages in Hawaii, 1948
NWRC - National Weather Records Center
Obsvr - Observer
PSO - Pacific Supervisory Office

RDWSB - Rainfall Data for the Waioa Stream Basin and Its Tributary Basins, 1940, Hawaii BWS
RHI - Rainfall of the Hawaiian Islands, 1959, Hawaii Water Authority
UH - University of Hawaii
USAF - United States Air Force
USCG - United States Coast Guard
USDA - United States Department of Agriculture
USGS - United States Geological Survey
USMC - United States Marine Corps
USWB - United States Weather Bureau
WSP - Water Supply Paper

Rainfall

RAINFALL STATIONS AND RECORDS

Rainfall records on the island of Hawaii have been kept for many years by the U.S. Weather Bureau, other government agencies, private companies, and individuals. The earliest records were begun at Hilo by Rev. Titus Coan in 1846 (No. 86.4), and since that time the number of rain gages has gradually increased until records from 603 rainfall stations are now available. The longest continuous records extend back about 81 years, but most of the records with an early beginning have intermittent periods of record.

The location of all rainfall stations on the island of Hawaii is shown in Plate 2. Most of the 655 stations plotted on the map are located along the windward side of the island, from the northern tip at Upolu Point (No. 159.2) to Kalae (South Point, No. 1), in Kau. On the lee side of the island, rainfall stations are located throughout

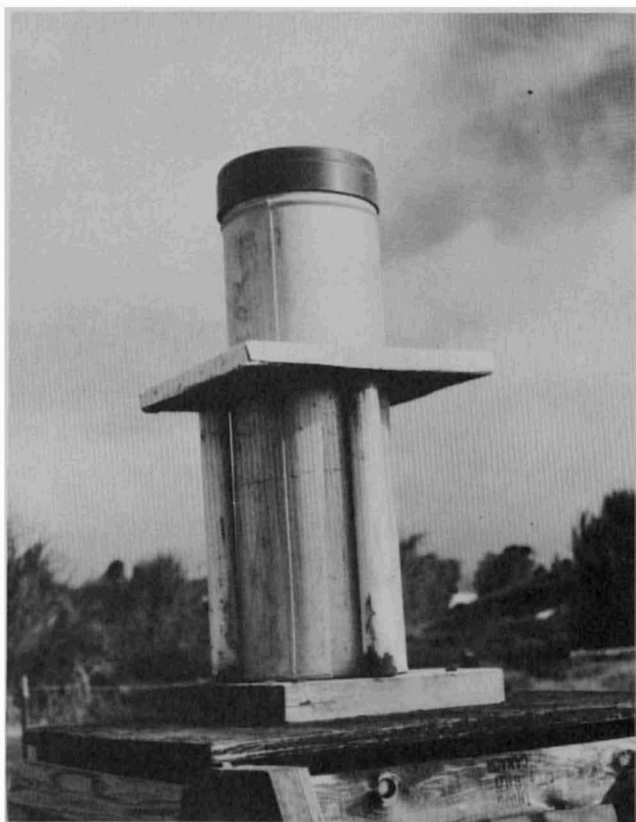
the settled central areas of the Kona District. In contrast, there are only a few stations in the central upland areas of the island and along the coastal areas of North Kona and Puna, where access is difficult.

All rain gages of record through 1967 on the island of Hawaii are listed in the Rainfall Station Index on pages 21-45. Of the 450 active gages, 151 are maintained by the 10 sugar plantation companies. The remaining 299 gages are maintained by other private entities, various government agencies, and individuals. Only the 148 listed official Weather Bureau gages, of which 66 are active, have published records.

Climatologic stations are indexed in this report in numerical order according to state key numbers assigned by DOWALD, and not according to gage names or gage numbers, commonly designated by the observers. The numbering system for climatologic stations listed in the Rainfall Station Index provides a key to their



Standard recording rain gage showing compartment housing chart for 96-hour period.



A calibrated dip stick is used to measure rainfall collected in standard 8-inch gage.

geographic location. Gages on the island of Hawaii are numbered from 1 to 223, proceeding from south to north, and from east to west within each five-minute latitude band. The decimal system is used to designate stations in areas where whole numbers have been exhausted.

A cross reference to the numerical listing of rain gages is presented in the Alphabetical List of Climatologic Stations on pages 9-11. Because the climatologic stations are located by each of their different names or gage numbers, there are more entries in the Alphabetical List than there are actual stations. If the name of a station is known and its location desired, the station number may be determined from the Alphabetical List and the station identified as to location on the rainfall station location map (Plate 2).

For many years, the observed rainfall records of official Weather Bureau stations have been published, but the records of the unofficial gages maintained by other government agencies, private companies, and individuals have not been published. These unofficial rainfall records were kept in the open files of the Weather Bureau until transferred to the Division of Water and Land Development (DOWALD) in January, 1960.

By mutual agreement with the Weather Bureau, DOWALD now has the responsibility for collecting, collating, and maintaining all rainfall records from climatologic stations throughout the state except official Weather Bureau stations. Those unpublished rainfall records since 1948 which are not retained by the observers and all records included in the Weather Bureau's publication, *Climatological Data, Hawaii*, are now kept in the open files of DOWALD in the State Office Building, Honolulu, and are available to all agencies and individuals for reference. This open file represents probably the most complete source of rainfall records in the state. Many of the records of the unofficial rainfall stations prior to 1948 are available only in the observers' files.

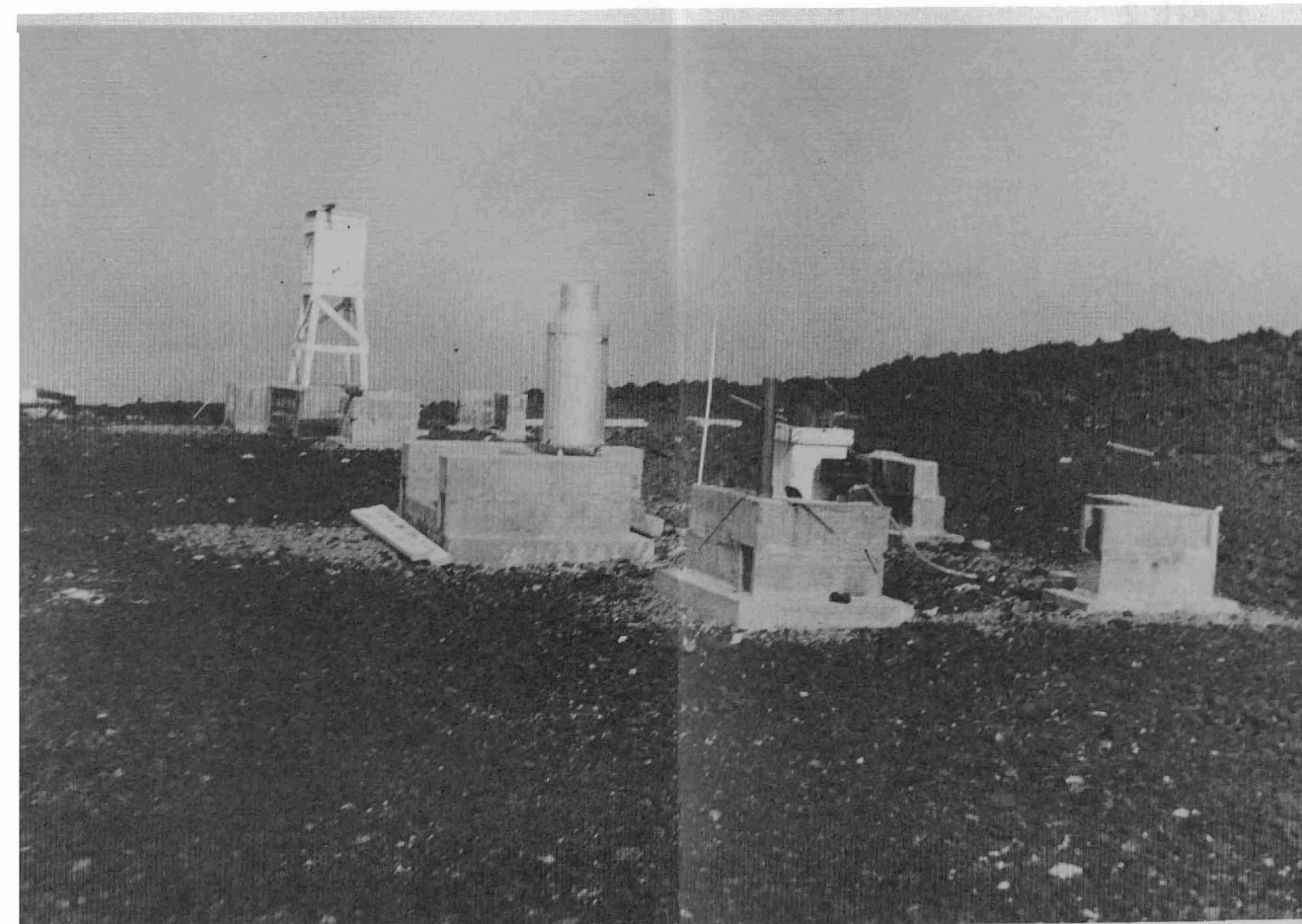
Data published in Selected Rainfall Records, pages 46-78, comprise monthly and annual rainfall at all official Weather Bureau stations on the island of Hawaii with records of 15 years or more (including some discontinued gages), together with data from other selected gages having records of 10 years or more. The latter were selected to provide more comprehensive coverage where Weather Bureau gages are sparse. Tabulations include total measured rainfall and means, maximum, and minimum rainfall for the periods of record. Mean rainfall has been computed by dividing the years of record into total rainfall.



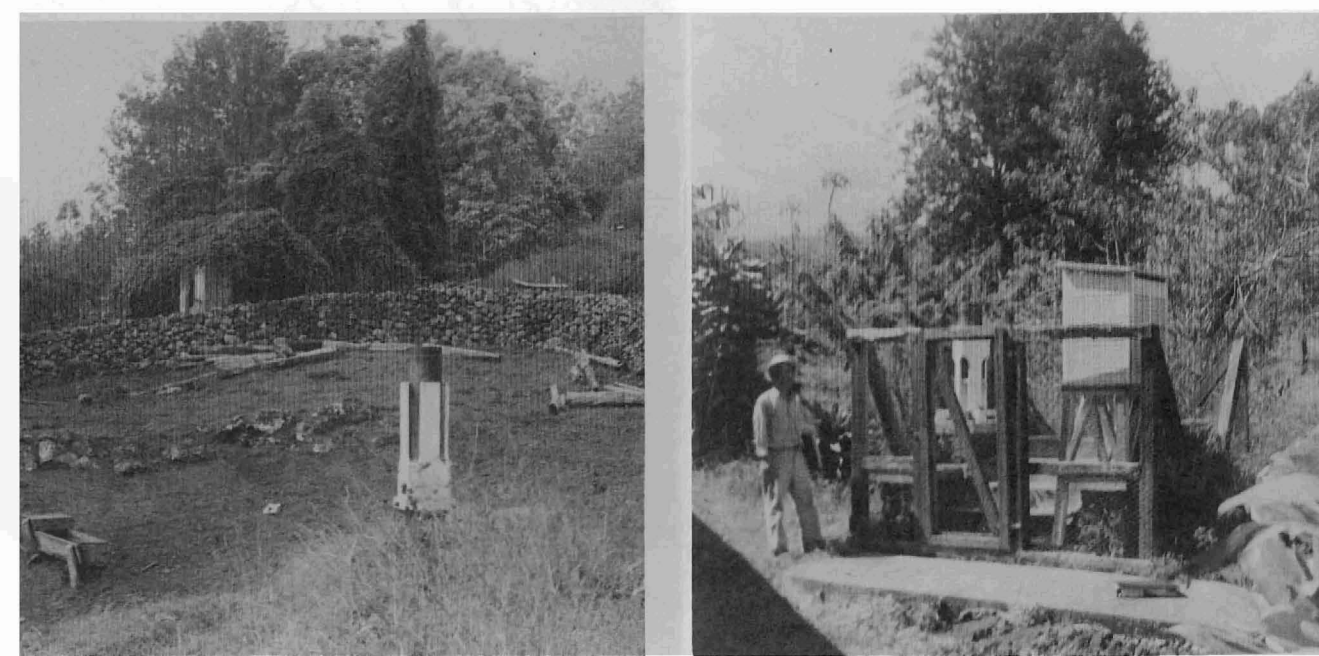
Standard 3-inch metal reduction tube also requires use of dip stick for measurement.



Typical wedge-shaped rain gage used at unofficial stations has etched calibrations.

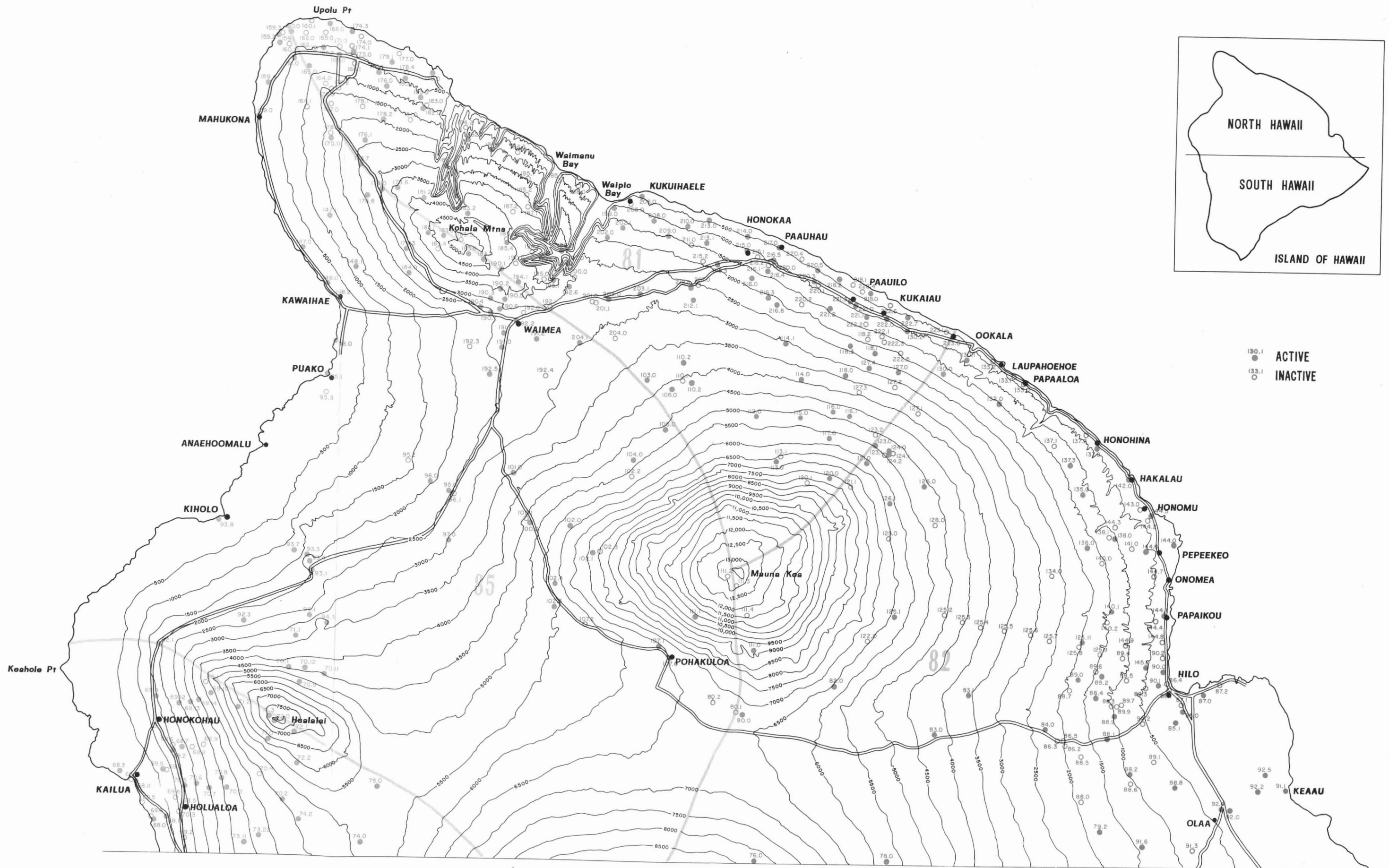


Station No. 76, Kulani Mauka, is an official U.S. Weather Bureau climatologic station which includes among its weather recording instruments both a standard 8-inch rain gage and a recording gage.



Rainfall is measured in 8-inch gage at Huehue Ranch at Kailua-Kona, Station No. 92.1.

Official climatologic station at Pahala, No. 21, includes typically mounted 8-inch gage.





Workers are silhouetted against the sky as they install a recording rain gage within a protective enclosure at Kohakohau, Station No. 190.2, located above the town of Waimea at 3,725 feet elevation.

RAINFALL CHARACTERISTICS

The island of Hawaii, lying in the path of the northeast tradewinds, has an orographic rainfall pattern typical of the larger islands in the Hawaiian chain. The moisture-laden trades are cooled as they rise up the mountain slopes and lose part of their moisture as rain. The prevalence of the trades throughout much of the year accounts for the high annual rainfall of 75 to more than 300 inches on the windward, northeast side of the island.

Orographic rainfall increases with elevation, reaching a maximum intensity from 2,000 to 3,000 feet elevation and then diminishing, so that upper slopes are semi-arid. This pattern is typical of the Hamakua coast and upper slopes of Mauna Kea, for example. In north Hawaii, the trades release much of their moisture before reaching the summit of Kohala Mountain (elevation 5,505 ft.). As the winds descend on the leeward slopes and become drier and warmer, rainfall declines accordingly and results in near-arid climate (mean annual rainfall, 10 inches) along the Kawaihae coastline.

Rainfall along the Kona coast on the west side of the island, is atypical of the general pattern. The volcanic peaks of Mauna Kea and Mauna Loa, with elevation in excess of 13,000 feet, split the trades on the windward side and divert them around the mountain masses. Similarly, the 8,200-foot peak of Hualalai in Kona diverts the limited northeast flow which has penetrated the Mauna Loa-Mauna Kea saddle. As a result, the tradewinds do not reach most of the Kona district and cause only minimal orographic rainfall. However, the difference between land and water temperatures along the Kona coast on warm days, particularly in summer, generates moderate seabreeze circulation which results in showers. This rainfall is typically spotty in distribution and highly variable in duration and intensity, but the showers are frequent and heavy enough to produce a much higher mean rainfall in Kona than in other leeward areas.

Relatively infrequent but significant cyclonic disturbances disrupt the prevailing tradewind circulation and cause heavy rainfall. These disturbances, locally called "Kona storms," usually occur during the winter months, are accompanied by winds from a southerly-southwesterly direction, and often account for most of the annual rainfall in the areas to leeward of the mountain masses.

The isohyetal map (Plate 3) shows mean annual rainfall on the island of Hawaii. The isohyetal lines (contours of equal rainfall) are based upon mean values determined from actual or

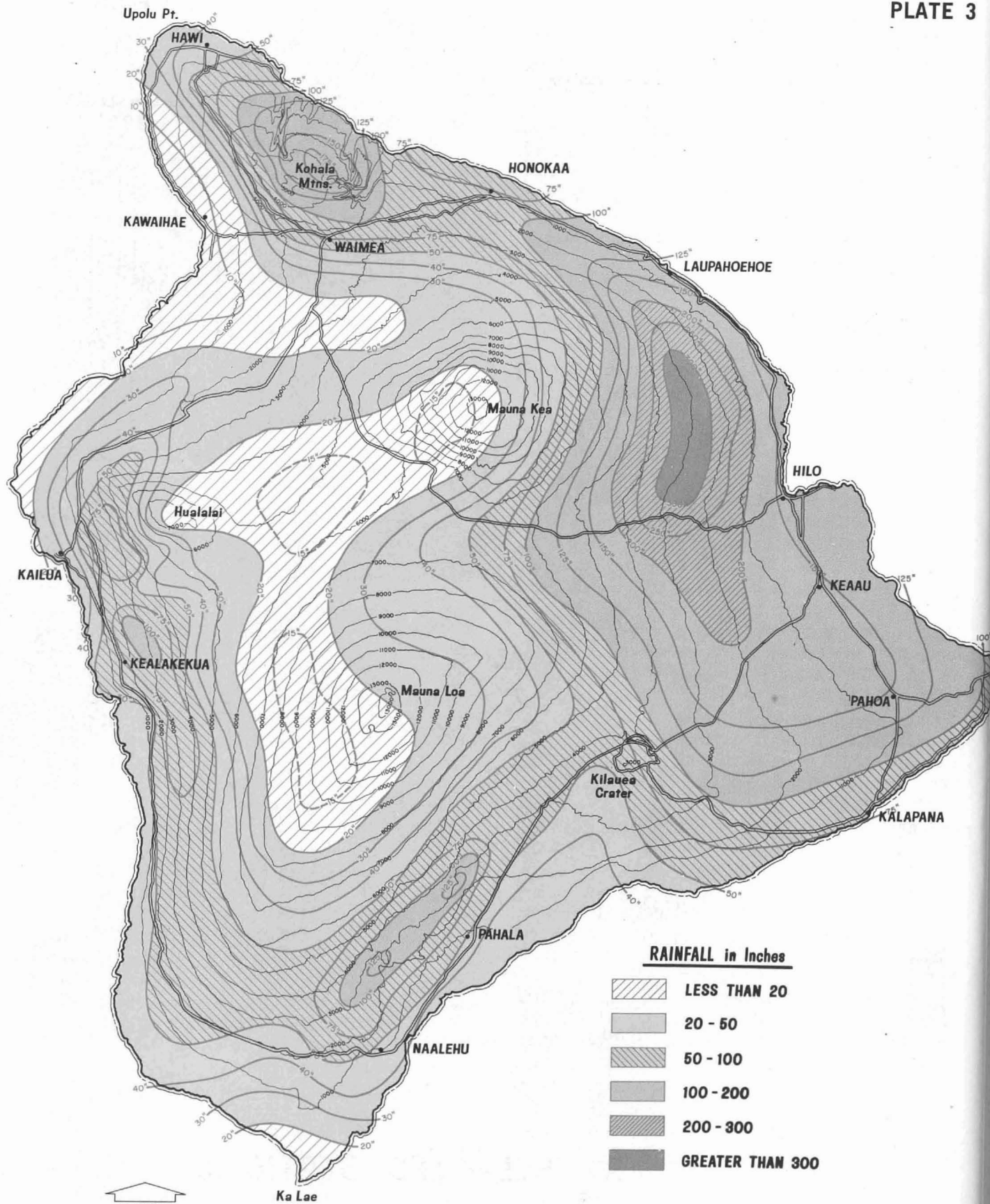


On Kohala Mountain, where mean rainfall is 175 inches, sphagnum moss enshrouds ohia.

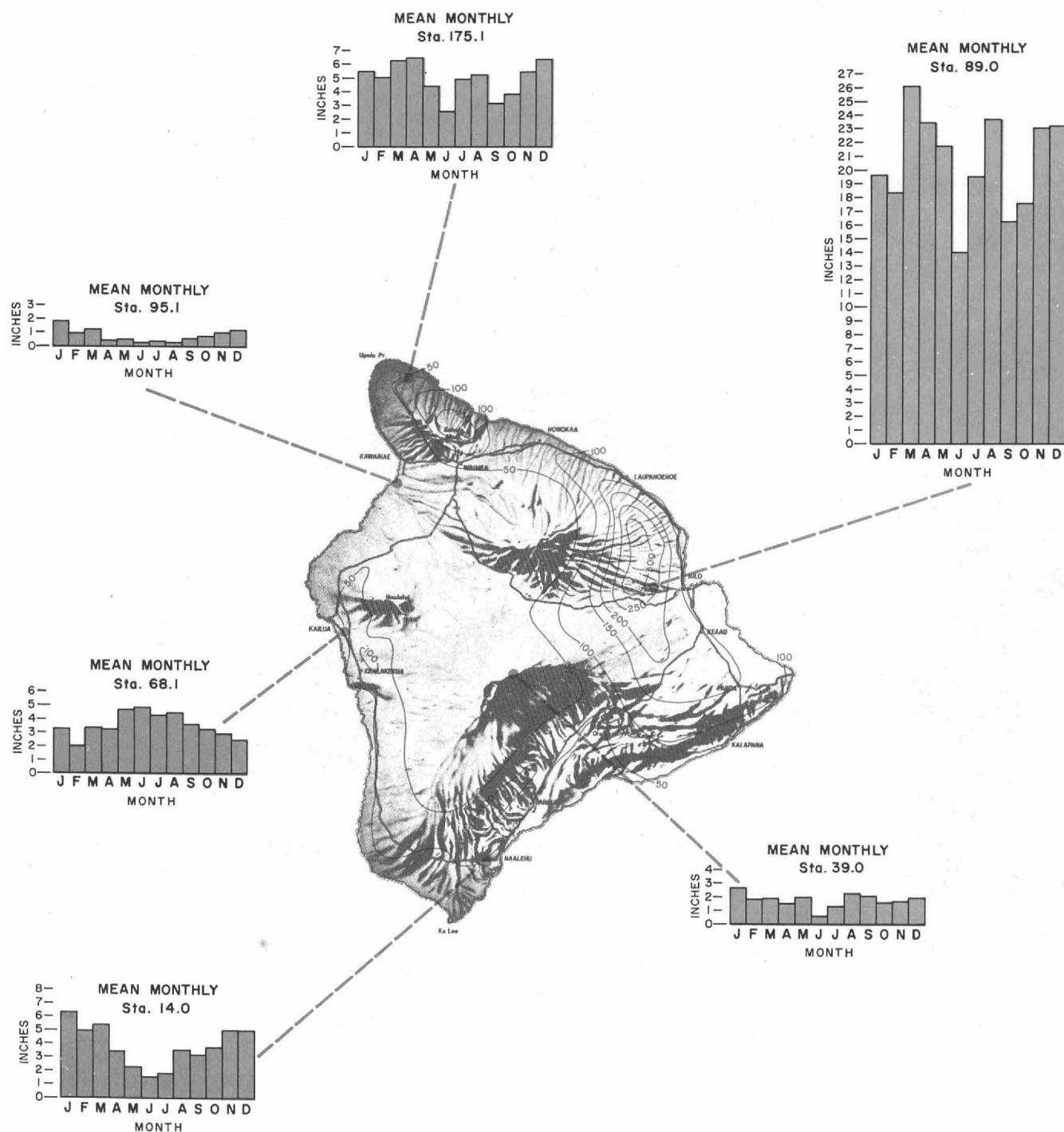
extrapolated rainfall records from 97 gages for the 25-year period 1931-1955. The selected rainfall stations and their respective mean values are plotted on the map. The distribution of rainfall illustrated by the isohyetal contours on Plate 3 remains relatively similar throughout the year, although volume varies seasonally.

The range of annual rainfall on the island of Hawaii is also typical of the Hawaiian Islands in general. On Plate 3 the interception of the prevailing northeast trades is clearly evidenced by the heavy annual rainfall in the windward areas. Heaviest annual rainfall occurs in the vicinity west of Hilo, at 2,000-3,000 feet elevation, where mean rainfall exceeds 200 inches. Annual rainfall is lightest on the leeward slopes of Kohala Mountain in the north and at higher elevations on Mauna Kea and Mauna Loa.

Generally, in areas where the trades predominate, the dry months of the year occur from May through September and the wet months from October through April. However, in the atypical Kona region, sheltered from the trades, summer rainfall predominates. Monthly rainfall patterns at selected rainfall stations are graphically illustrated in Plate 4 by bar graphs of mean rainfall for the respective periods of record.



MEAN ANNUAL RAINFALL





Rainfall deficiencies in the Mauna Kea saddle are compensated for by transferring water from the wet Kohala region, in the background, to several storage reservoirs such as the one shown above.

The volume of annual rainfall on the entire island of Hawaii and in each hydrographic area has been computed from Plate 3. Mean annual rainfall in areas between isohyets was assumed to be the average of the adjacent isohyets. Products of the areas included between adjacent isohyets and the depths of rainfall were added to obtain the average volume of rainfall in each of the hydrographic areas.

The results for each hydrographic area and for the island as a whole are summarized in the accompanying table. The table shows that the island of Hawaii receives an average of about 75 inches or approximately 5.25 billion gallons of rainfall annually.

VOLUME OF ANNUAL RAINFALL

HYD. AREA	AREA (sq.mi.)	ANNUAL RAINFALL (in.)	ANNUAL RAINFALL (m.g.)	PERCENT OF TOTAL
81	400.5	79.4	552,600	10.5
82	1,008.0	161.4	2,827,900	53.6
83	974.8	57.9	981,600	18.6
84	775.4	41.2	554,700	10.5
85	879.3	23.5	358,800	6.8
Total	4,038.0	75.2	5,275,600	100.0

Rainfall Station Index

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
1	2880W	Ka Lae	USCG	83	Kau	18 54.9 155 41	35	Daily	1925- 1949	USWB	
1.1		Morse Field	USAF	"	"	18 55 155 41	40	"	1939- 1941	DOWALD	
1.2	8679	S Pt Tracking Sta	Federal Elec- tric Corp	"	"	18 56.5 155 41	305	Daily Recorder	1959- 1965-	"	Ka Lae (S Pt Tracking Sta); hourly data pub in Haw HPD from 3/65
2	6134	Manuka	State Parks Division	84	"	19 06.7 155 49.7	1750	Daily	1928-	Obsvr USWB	Moved 3/60 50' W
2.1		Pahipa	Kahuku Ranch	83	"	19 14.3 155 42.3	7000				Disctd; no data
2.2		Kahuku Shed 3	"	"	"	19 10.4 155 41.4	5100	Twice monthly	1920-	DOWALD HSPA	#3 Mauka Watershed; no data 2/47-12/48
2.3		Hoopuloa Upper	R V S Domkowicz	84	S Kona	19 12.8 155 51.3	2425	Daily	1903- 1912	USWB	Na Ohia
2.4		Hoopuloa Lower	E H Edwards	"	"	19 12 155 52.3	1650	"	1897- 1905	"	
2.5		Kapua	Kahuku Ranch	"	Kau	19 12.4 155 45.7	6000	Twice monthly	1953-	DOWALD HSPA	
2.6		Five Mile Paddock	"	"	"	19 04.8 155 45.6	2000	"	1954- 1961	"	Sold to Hawn Oceanview Est 1961
2.7		Kahuku Plantation	W H G Arnemann	"	S Kona	19 14 155 52	2400	Unknown	1909- 1910	USWB	
2.8		Top Coffee-Papa	Holualoa Ranch	"	"	19 11.9 155 51.5	2050	Aft rain	1956- 1957	Obsvr DOWALD	
2.9		Kapulepo	"	"	"	19 11.1 155 51.5	1900	"	1956	"	
2.11		Bottom of 1916 Flow	"	"	"	19 11.2 155 50.3	2770	"	1956- 1957	"	
2.12		Top of Terr Boundary(1916)	"	"	"	19 11.4 155 49.5	3430	"	"	"	
2.13		100 Acres	"	"	"	19 12.2 155 48.6	4200	Twice weekly	1956-	Obsvr DOWALD HSPA	
2.14		Kapua Mauka	"	"	"	19 11.3 155 47.5	4620	Aft rain	1956- 1957	Obsvr DOWALD	
2.15		Pa Hanalei Pen	"	"	"	19 12.4 155 49.0	4000	"	"	"	
2.16		Castle Pad- dock Tank	"	"	"	19 13 155 47.5	5050	"	"	"	
2.17		Okoe	"	"	"	19 10.1 155 52	1590	Twice weekly	1956-	Obsvr DOWALD HSPA	
2.18		Kole Pen	"	"	"	19 08.5 155 52.7	920	"	"	"	
2.19		Halepiula (1670)	"	"	"	19 08.6 155 50.9	1670	"	1956- 1966	"	
2.21		Papa (Coffee Land)	"	"	"	19 12.5 155 50.1	3280	"	1959-	DOWALD HSPA	Moved
2.22		Furlka	"	"	"	19 11.1 155 49.7	3200	"	1958-	"	
2.23		Bill Jack	"	"	"	19 11.1 155 51.2	2060	"	1957-	Obsvr DOWALD	
2.24		Kau	Dr Howard Crawford	"	Kau	19 06.8 155 47.9	2380	Variable	1964-	Obsvr USWB	
2.25		Reservoir	Dillingham Ranch	"	S Kona	19 09.8 155 49.5	2930	Twice monthly	1966-	"	

Note: For Key to Abbreviations, see page 10.

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
2.26		Castle	Puuwaawaa Ranch	84	S Kona	19 13.7 155 46.9	5680	Twice monthly	1967-	Obsvr DOWALD USWB	
3	8675	S Pt Corral	Hawaiian Ranch Co	83	Kau	18 57.2 155 40.8	400	Weekly or aft rain	1948	USWB HSPA	Ex Hutchinson Sugar Co
3.1		#3 Hilo	Kahuku Ranch	"	"	19 08.4 155 42.2	4300	Twice monthly	1949-	DOWALD HSPA	#3 Makai Watershed; Kahuku 2 Makai
3.2		Ohiawai #1	"	"	"	19 06.9 155 42.0	3500	"	1914-	"	#1 Watershed; Kahuku Shed 1; no data 2/47-12/48
3.3		Keolakoe Forest	"	"	"	19 07.2 155 38.2	3100	"	1954-	"	
3.4	2512	Kahiawai	Russell P Smith	84	"	19 07.8 155 45.6	3700	Recorder	1965-	USWB	Hawn Oceanview Est; hourly data pub in HAW HPD from 3/65
3.5		Glover	Kahuku Ranch	"	"	19 05.8 155 42.5	3500	Twice monthly	1962-	Obsvr	
3.6		Manuwai Nui	"	83	"	19 05.5 155 41	2880	"	1963-	"	
3.7		Lanihonua	George Schattauer	84	"	19 09.6 155 46.2	4620	Variable	1966-	"	
3.8		Kahiawai Mauka	R Smith	"	"	19 08.6 155 45.7	4120	"	1965-	"	
4	3047	Kamaoa (Gouveia)	John Gouveia	83	"	19 00.7 155 39.7	1070	Daily	1945-1952	USWB	
4.1		Kahuku Ranch House	Kahuku Ranch	84	"	19 03.5 155 41.7	1950	Aft rain	1914-	DOWALD HSPA	No data 2/47-12/48
4.2		Keaa Homesteads	Mrs F Bartels	83	"	19 02.8 155 39.7	1680	Daily	1901-1906	USWB	Kahuku Ranch
4.3		Kaalualu Bay	Hawaiian Ranch Co	"	"	18 58.4 155 37	20	Wkly or aft rain	1956-	DOWALD HSPA	Ex Hutchinson Sugar Co
4.4		Kamaoa (1000)	Kahuku Ranch	"	"	19 00 155 39.8	1000	Twice monthly	1954-	"	
4.5		Kaemio	Collier C&C Corp	84	"	19 00 155 41	"	Aft rain	1957-	DOWALD	
4.6		George Peck	Kahuku Ranch	83	"	19 00 155 38	680	Twice monthly	1962-	Obsvr	
4.7		Kamaoa Ranch HQ	Hawaiian Ranch Co	"	"	19 01.6 155 40.2	1320	Wkly & aft rain	1959-	"	Ex Hutchinson Sugar Co; Pakini
4.8		Puueo	Hawaiian Orchard Co	"	"	19 03.4 155 40.5	1830	Daily	1964-	"	C Brewer
5	3048	Kamaoa 2	Hawaiian Ranch Co	"	"	19 01.6 155 40.2	1375	Weekly	1925-	Obsvr DOWALD USWB HSPA	Kamaoa Rch Hse; Kaalualu Rch HQ; annual totals only 1925-38; Ex Hutchinson Sugar Co
6	4625	Kiolakaa (A&F)	State Forestry Division	"	"	19 04.4 155 38.2	1925	Monthly	1929-	Obsvr USWB	
6.1		Kau	W H Hayselden	"	"	19 04.7 155 37.5	1850	Daily	1904-1913	USWB	
6.2		Daleico	Richard Schultz	"	"	19 05 155 39.9	2340				No records
7	4620	Kiolakaa	C H Hayselden	"	"	19 03.2 155 37.5	1050	Daily	1914-1953	USWB	
7.1		Field 8	Hutchinson Sugar Co	"	"	19 04.4 155 36	1400	Weekly	1953-	HSPA	Field 140
9		Punaluu Kahawai	State Forestry Division	"	"	19 15 155 36.5	6200	4 times yearly	1928-	Obsvr DOWALD HSPA	Punalulu
9.1		Mauna Loa	Kahuku Ranch	"	"	19 14.8 155 36.8	"	Monthly	1959-1966	DOWALD HSPA	
10		Mountain House	Hutchinson Sugar Co	"	"	19 08.8 155 36.8	3065	"	1920-	Obsvr DOWALD HSPA	Annual totals only 1925-29; no data prior 1925
10.1		New Mountain House	"	"	"	19 07.8 155 36.2 19 07.5 155 35.8	2600 2250	Weekly Recorder	1964- 1965-	Obsvr	

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
11		Makino	Hutchinson Sugar Co	83	Kau	19 05.6 155 36.1	2120	Aft rain Recorder	1939-1952-	Obsvr DOWALD USWB	Field 20; Field 240; 10/52-8/54 charts filed DOWALD; later charts filed obsvr
11.2		Haao Springs	"	"	"	19 05.4 155 37.3	2325	Weekly	1964-	Obsvr	
11.3		Field 450	"	"	"	19 06.6 155 35.8	2200	"	"	"	
11.4		Field 350	"	"	"	19 05.3 155 35.7	1920	"	"	"	
12	2249	Kaala Iki	"	"	"	19 07.7 155 33.9	1340	Daily	1939-	USWB	
12.1	1460W	Hilea	"	"	"	19 08.2 155 32.3	330	"	1885-1938	"	Kaalaiki
12.2		Field 61	"	"	"	19 08.6 155 33.1	1350	Aft rain Recorder	1953-1961 1953-1954	Obsvr	Makanau; 2/53-8/54 charts filed DOWALD
12.3		Field 64	"	"	"	19 09.9 155 34.6	1825	"	1955-	"	Field 58; Field 64 Makai; Field 750; charts filed obsvr
12.4		Waterfall	"	"	"	19 10.6 155 35.6	2325	Weekly	1953-1955	"	Repl by #12.3
12.7		Field 656	"	"	"	19 09.1 155 34.4	1710	"	1964-	"	
12.8		Field 750	"	"	"	19 09.7 155 34.7	1800	"	"	"	
12.9		Field 850	"	"	"	19 10.5 155 33.8 19 10.9 155 33.2	2000 2120	" Recorder	1962- 1965-	"	
12.11		Field 765	"	"	"	19 09.8 155 33.5	1700	Weekly	1964-	"	
12.12		Field 715	"	"	"	19 09.3 155 32.6	1150	"	1965-	"	Field 761 (810)
12.13		Hilea Gulch	USGS	"	"	19 10.6 155 36	3000	Recorder	1967-	"	
13		Waiubata	Hutchinson Sugar Co	"	"	19 05.9 155 34.2	1375	Daily	1939-	Obsvr DOWALD HSPA	Field 370
13.1		Field 35	"	"	"	19 05.2 155 35.2	1675	Weekly	1953-1964	Obsvr	Field 330
13.2		Field 435	"	"	"	19 06.6 155 34.8	1800	"	1953-	"	Field 420; Field 49
13.3		Field 51	"	"	"	19 07.4 155 34.6	1740	Recorder	1952-1965	"	Field 630; 10/52-2/53 charts filed DOWALD; later charts filed obsvr
13.4		Field 56	"	"	"	19 08.2 155 34.8	1760	Weekly	1953-1964	"	Field 660
13.7		Naalehu Airstrip	"	"	"	19 04.7 155 34.7	1180	"	1964-	"	
13.8		Kaalaiki Airstrip	"	"	"	19 07.9 155 34.7	1750	Recorder	"	DOWALD	
14	6588	Naalehu	"	"	"	19 03.8 155 35.3	673	Daily	1890-	Obsvr USWB	
14.1		Honuapo (25)	"	"	"	19 05 155 33	25	Unknown	1895-1907	USWB	
14.2		Naalehu (Hewitt)	G C Hewitt	"	"	19 04 155 35	1250	"	1896-1900	"	
14.3		Naalehu (1725)	"	"	"	19 05 155 36	1725	"	1898-1900	"	
14.5		Naalehu Pan Station	Hutchinson Sugar Co	"	"	19 04.1 155 35.5	805	Weekly	1962-	HSPA	Field 135
14.6		Rubbish Dump	"	"	"	19 03.4 155 35	630	Recorder	1968-	Obsvr	Naalehu Airport; C Brewer
15		Honuapo	"	"	"	19 05.6 155 33.1	20	Daily	1939-	Obsvr DOWALD	DOWALD data current; orig data unkn

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
16		Moaula Tunnel	Hawaiian Agricultural Co	83	Kau	19 13.1 155 32.8	3000	Aft rain	1923-1954	Obsvr HSPA	No data 4/35-12/41
17		Moaula Reservoir	"	"	"	19 12.1 155 31.8	1950	Daily	1911-	Obsvr DOWALD USWB HSPA	
17.1		Moaula (Wills)	T C Wills	"	"	19 12 155 31	1700	Unknown	1898-1902	USWB	
17.2		Higashi Camp	Hawaiian Agricultural Co	"	"	19 12.1 155 30.8	1610	Aft rain	1949-1958	Obsvr HSPA	
18	6407	Moaula	Hawaiian Ranch Co	"	"	19 11 155 29.7	600	Monthly	1920-	USWB	Kapapala Rch; Moaula Station
20		Alili Tunnel	Hawaiian Agricultural Co	"	"	19 13.7 155 31.2	2800	Aft rain Recorder	1942-1952 1952-1954	Obsvr HSPA	Alili (2800); charts filed obsvr; error: data comb with #20.2; Alili in RHI
20.1		Alili Tunnel (3500)	"	"	"	19 14.4 155 31.7	3500	Aft rain	1923-1934	"	
20.2		Alili	"	"	"	19 13.4 155 31.4	2830	Monthly Recorder	1954-1955-1962	Obsvr DOWALD HSPA	Alili (Field 8); re-placed #20 7/54; charts filed obsvr
20.3		Field 8	"	"	"	19 13.3 155 31.1	2700	"	1952-1955	Obsvr	Charts filed obsvr
21	7421	Pahala	"	"	"	19 12.1 155 28.8	870	Daily	1885-	Obsvr USWB HSPA	Moved 1/48 90' N & 170' W; prob twice before
21.1		Field 150	"	"	"	19 12.2 155 29.1	1000	Recorder	1952-1955	Obsvr	Lower Kauhane; Field 16; charts filed obsvr
22		Keaiwa	"	"	"	19 14.3 155 28.8	1650	Aft rain	1920-1952	Obsvr DOWALD HSPA	Keaiwa Camp (1650)
22.1	3825	Keaiwa Camp	"	"	"	19 14.3 155 28.9	1700	Recorder	1952-	"	Field 351; charts filed obsvr
24	6942	Ohia Lodge	Mrs A Redfearn	84	S Kona	19 16 155 52.5	1320	Daily	1948-1950	USWB	
24.1	7166	Opihihale 2	Miss C Leonard	"	"	19 16.3 155 52.6	1270	"	1955-	Obsvr DOWALD USWB	
25	7541W	Pahoehoe	L P Lincoln	"	"	19 20.8 155 52.6	1000	"	1930-1947	USWB	
25.1		Kalahiki (750)	G W McDougall	"	"	19 24.8 155 53.5	750	"	1895-1907	"	
25.2		Kalahiki (1500)	"	"	"	19 23 155 52	1500	"	1904-1907	"	Kalahiki (Castle)
25.3		Hookena	Carolyn Endo	"	"	19 23.0 155 53.0	850	"	1926-1929	"	
25.4		Kalahiki (1800)	G W McDougall	"	"	19 24.9 155 52.5	1800	Unknown	1901-1903	"	
25.5		McCandless Office	McCandless Ranch	"	"	19 22.8 155 52.8	860	Monthly	1956-	Obsvr DOWALD HSPA	
25.6		Kahauko Pen	"	"	"	19 22.8 155 53.8	230	"	1957-	"	
25.7		Pahoehoe Ranch	Magoon Estate	"	"	19 20.5 155 52.5	1100	Variable	1953-	"	
26		Takashiba	Kona Exp Station	"	"	19 29.6 155 53.9	2100	Weekly	1937-	"	Moved 1952 approx 100 yds SSW; DOWALD data current; orig date unkn
26.1		Tank Field	Kealakekua Ranch	"	"	19 29.9 155 53.3	2640	Mnthly & aft rain	1953-	Obsvr DOWALD USWB HSPA	No data 1956
26.2	3977	Kealakekua	Miss Amy Greenwell	"	"	19 29.6 155 54.9	1450	Daily Recorder	1901-1960-	DOWALD USWB	N Wallace former obsvr; error: 1919-41 data pub as Kaawaloa (#29); no data 1942-53, 1961-65; 1960 charts at USWB; hourly data pub in Haw HPD from 3/65

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
27	1665	Honaunau	Mrs M W Hua	84	S Kona	19 26.6 155 52.9	1089	Daily	1938-	USWB	Moved 1/43 approx 1/2 mi N
27.1		Uyeda Honaunau	Bishop Estate	"	"	19 26.1 155 53.4	690	Monthly	1956-	Obsvr	
27.2		Honaunau Forest 1	"	"	"	19 24.9 155 51.6	2240	Mnthly & aft rain	1954-	"	
27.3		Honaunau Forest 2	"	"	"	19 25.2 155 50.3	3450	"	1957-	"	
27.4		City of Refuge Natl Hist Park	City of Refuge Natl Hist Park	"	"	19 25.3 155 54.8	5	Daily	1962-	Obsvr USWB	
28	6697	Napoopoo	Kona Exp Station	"	"	19 28.3 155 54.5	395	Weekly	1938-	Obsvr DOWALD USWB	Takahara-Napoopoo; moved 6/39 from 600'; daily prior 2/62; error: 1919-38 data pub this sta instead #28.1
28.1		Napoopoo (16)	American Factors	"	"	19 28.6 155 55.3	15	Daily	1901-1938	USWB	Moved 7/20 approx 1/4 mi N, 11/37 300 yds N; error: 1919-38 data pub for #28
28.2		Keei Middle Road	E E Glass	"	"	19 27.9 155 54	680	"	1955-	Obsvr DOWALD	Moved 4/58 80' E
28.3		Kahauloa 2	Bishop Estate	"	"	19 28 155 52.9	1520	Monthly Recorder	1956-1955-1956	"	Charts filed DOWALD
28.4		Keei Makai 2	"	"	"	19 26.9 155 53.8	580	Monthly	1954-	"	
29	2327	Kaawaloa	Capt Cook Coffee Co	"	"	19 29.7 155 55.2	1340	Daily	1942-	USWB	Moved 12/59 250' SSW; error: 1919-41 data pub this sta instead #26.2
29.1		Kealakekua (Davis)	Rev S H Davis	"	"	19 30.6 155 55.2	1580	"	1891-1915	"	
29.2		Kalukalu	E C Greenwell	"	"	19 30.7 155 55.4	1500	Unknown	1920-1929	DOWALD	
29.3		Konawaena (Buttles)	W Buttles	"	"	19 30.7 155 55.2	1580	Daily	1955-1964	Obsvr DOWALD HSPA	
29.4		Konawaena School	Konawaena School Agri-culture Dept	"	"	19 30.7 155 55	1670	"	1957-	Obsvr DOWALD USWB HSPA	No data 1967-68
29.5		Kanakamelae	W H Greenwell Estate	"	"	19 32.2 155 53	3120	Monthly	"	Obsvr DOWALD HSPA	
29.6		Onouli	Dr J Mitchell	"	"	19 30.2 155 55.4	1350	Daily	1958-1965	"	
29.7		Kua Pehu	Mrs R Vitousek	"	"	19 29.8 155 55.2	1390	"	1960-1967	Obsvr	
29.8		Onouli (1600)	W H Greenwell Estate	"	"	19 30.3 155 55	1600	Monthly	1960-	DOWALD HSPA	
29.9		Malukalu	"	"	"	19 20.5 155 53.9	2580	"	1962-	Obsvr DOWALD HSPA	
30	4762	Komakawai	McCandless Ranch	"	"	19 24.1 155 46.3	6150	"	1944-	Obsvr DOWALD USWB HSPA	No data 2/51-6/56; moved approx 1/5 mi N
30.1		Big Hill	"	"	"	19 24.1 155 48.8	4660	"	1957-	Obsvr DOWALD HSPA	
30.2		Palipakika	"	"	"	19 23 155 51	3100	"	1958-	"	
30.3		Kiilae Stream	USGS	"	"	19 25 155 51	2898	Recorder	1958-	Obsvr	
31	1240	Hapuu	McCandless Ranch	"	"	19 25 155 48.8	4560	Monthly	1944-1952	USWB	
31.1		Honaunau Forest 3	Bishop Estate	"	"	19 25.2 155 48.8	4650	"	1957-	Obsvr	
35		Wood Valley Tunnel	Hawaiian Agricultural Co	83	Kau	19 16.4 155 29.9	3400	Aft rain	1923-1954	Obsvr DOWALD HSPA	Noguchi Tunnel; no data 1935-41

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
35.1		Keaiwa Reservoir	Hawaiian Agricultural Co	83	Kau	19 15.1 155 30.2	3060	Monthly	1954-	Obsvr DOWALD HSPA	Repl #3 7/54
35.2		Wood Valley Camp	"	"	"	19 16.3 155 28.4	2150	"	1949-1955	"	Wood Valley (2150); Wood Valley Resvr (2150); Camp Kai
35.3		Wood Valley (2000)	"	"	"	19 15 155 29	2000	"	1911-1919	Obsvr DOWALD	
35.4		Wood Valley Reservoir	"	"	"	19 16.5 155 29.3	2470	"	1948-1949	Obsvr	
35.5		Mudflow	"	"	"	19 15.4 155 28.5	1900	Recorder	1952-1955	"	Field 40-1; charts filed obsvr
35.6		Wood Valley	"	"	"	19 16.4 155 28.6	2200	Daily	1955-	Obsvr DOWALD HSPA	
36	3300	Kapapala Ranch	Hawaiian Ranch Co	"	"	19 16.8 155 27.2	2140	"	1886-	USWL	Moved 3/60 300' S; Ex Kapapala Ranch
36.1		Field 481	Hawaiian Agricultural Co	"	"	19 18.2 155 28.3	3250	Recorder	1955-1962	Obsvr	Charts filed obsvr
37	7643	Pakao	Hawaiian Ranch Co	"	"	19 22.3 155 28	5000	Monthly	1928-	USWB	Ex Kapapala Ranch
37.1		Mauna Anu	"	"	"	19 21 155 31	6600	"	1922-1928	"	"
38		Ainapo	"	"	"	19 21.6 155 25.5	3675	"	1924-	Obsvr DOWALD HSPA	
38.1		Mauna Loa Seismo Station	Hawaii Volcano Observatory	"	"	19 29.8 155 23	6600	Aft rain	1948-	"	Truck trail to 1951; moved from 6750'; no data 8/49-8/51
38.2		Halina Pali	"	"	"	19 18 155 18.5	2350	"	1958-	"	
38.3		Halape	"	"	"	19 16.4 155 15.3	10	Once or twice yearly		"	
38.4		Desert	"	"	"	19 19 155 23.4	2520	Aft rain	1958-	"	
38.5		Kalapana 2	Hawaii Natl Park	"	Puna	19 17.2 155 07.1	60	Daily	1964-	Obsvr	



Station No. 27.1—UYEDA HONAUNAU



Station No. 27.3—HONAUNAU FOREST 2

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
38.6	6731	Naulu Forest	Hawaiian Ag- ricultural Co	83	Kau	19 19 155 08.6	1400	Variable	1965-	Obsvr USWB	
39	6198	Mauna Loa Slope Obsvty	USWB	85	Hamakua	19 32.3 155 34.7	11146	Daily Recorder	1956-	USWB	Charts filed USWB
39.1		Mauna Loa Upper	"	"	"	19 32.5 155 34.5	10960	"	1955- 1956	"	"
39.2		Mauna Loa Summit	"	"	"	19 29 155 36	13455	"	1951- 1953	"	Charts filed USWB; many missing periods
39.3		Menzies Ainapo Trail	Richard Hansen	83	Kau	19 26.2 155 34.5	12700	Monthly	1966-	Obsvr	Records poor 1st yr
39.4		Mokuaweoweo Caldera	"	85	Hamakua	19 28.8 155 35.3	13000	Recorder	"	"	"
39.5		West Caldera	"	"	"	19 29 155 36.3	13650	Monthly	"	"	"
39.6		North of Caldera	"	"	"	19 30 155 34.9	13000	"	"	"	"
39.7		Pohaku Hanalei	"	82	N Hilo	19 30.5 155 33.4	12260	"	"	"	"
43.1		Mauna Iu	Hawaiian Ranch Co	83	Kau	19 25.9 155 22.0	4500	"	1925-	Obsvr DOWALD HSPA	Ex Kapapala Ranch
43.2	7546W	Pahua Mimi	"	"	"	19 25.1 155 25.1	5140	"	1922- 1944	USWB	
44		Ohaikea	"	"	"	19 24.4 155 20.7	3460	"	1924-	Obsvr DOWALD HSPA	
44.1		Ohaikea (3750)	USDA Fruit Fly Lab	"	"	19 25.5 155 19.8	3750	Weekly	1951- 1952	Obsvr	
45		Kekekaniho	Hawaiian Ranch Co	"	"	19 27.4 155 20	4700	Monthly	1925- 1949 1967-	"	New sta 1967
45.1		Mauna Loa (5550)	Hawaii Vol- cano Obsvty	"	"	19 28.5 155 22.0	5550	"	1944-	Obsvr DOWALD HSPA	Lava flow; no data prior 1948
45.2		Mauna Loa Tr Trail (5100)	USDA Fruit Fly Lab	"	"	19 28 155 21.2	5100	Weekly	1951- 1952	Obsvr	Fire Cache 2
51		Kilauea North Rim	C K Wentworth	"	"	19 26.4 155 16.4	4050	Daily	1945- 1966	Obsvr DOWALD HSPA	Wentworth; moved 1952 from 4025' elev
51.1		Keauhou	Hawaiian Ranch Co	"	"	19 26.5 155 16.9	4000	Aft rain	1938- 1952 1966-	"	Ex W H Shipman; no data prior 1948
51.2		Kilauea Camp	Hawaii Natl Park	"	"	19 24.5 155 15.6	3765	Daily	1934- 1938	USWB	
51.3		Olaa (29 Miles)	W M Giffard	"	"	19 26 155 15	3800	"	1917- 1921	"	
51.4		Volcano House	Volcano House	"	"	19 25.9 155 15.7	3975	"	1888- 1916	"	No data 5/94-12/98
51.5		Volcano Farm Lots	W R Galbraith	"	Puna	19 28.1 155 15.1	3850	"	1955- 1961	Obsvr DOWALD	No data prior 1956
51.6		Castle Farm Lots	N H Castle	"	"	19 28 155 15.5	3975	"	1955-	Obsvr	
51.7		Mauna Loa Tr Trail (4000)	USDA Fruit Fly Lab	"	Kau	19 26.5 155 18.5	4000	Weekly	1952- 1956	DOWALD	No data 1954-56
51.8		Mauna Loa Tr Trail (4250)	"	"	"	19 26.8 155 19.2	4250	"	1949- 1951	Obsvr	Kipuka Ki
52	1033	Halemaumau	Hawaii Natl Park	"	"	19 24.3 155 17	3648	Monthly	1932-	Obsvr USWB	
52.1		Uwekahuna	Hawaii Vol- cano Obsvty	"	"	19 25.3 155 17.7	4050	Daily	1948-	Obsvr DOWALD HSPA	Observatory
54	1303	Hawaii Natl Park HQ	Hawaii Natl Park	"	"	19 26 155 15.6	3971	" Recorder	1913- 1965-	Obsvr USWB	Moved 5/43 approx 400' NE; hourly data pub in Haw HPD from 3/65; 1913-18 data and sum- maries pub as Volcano Observatory

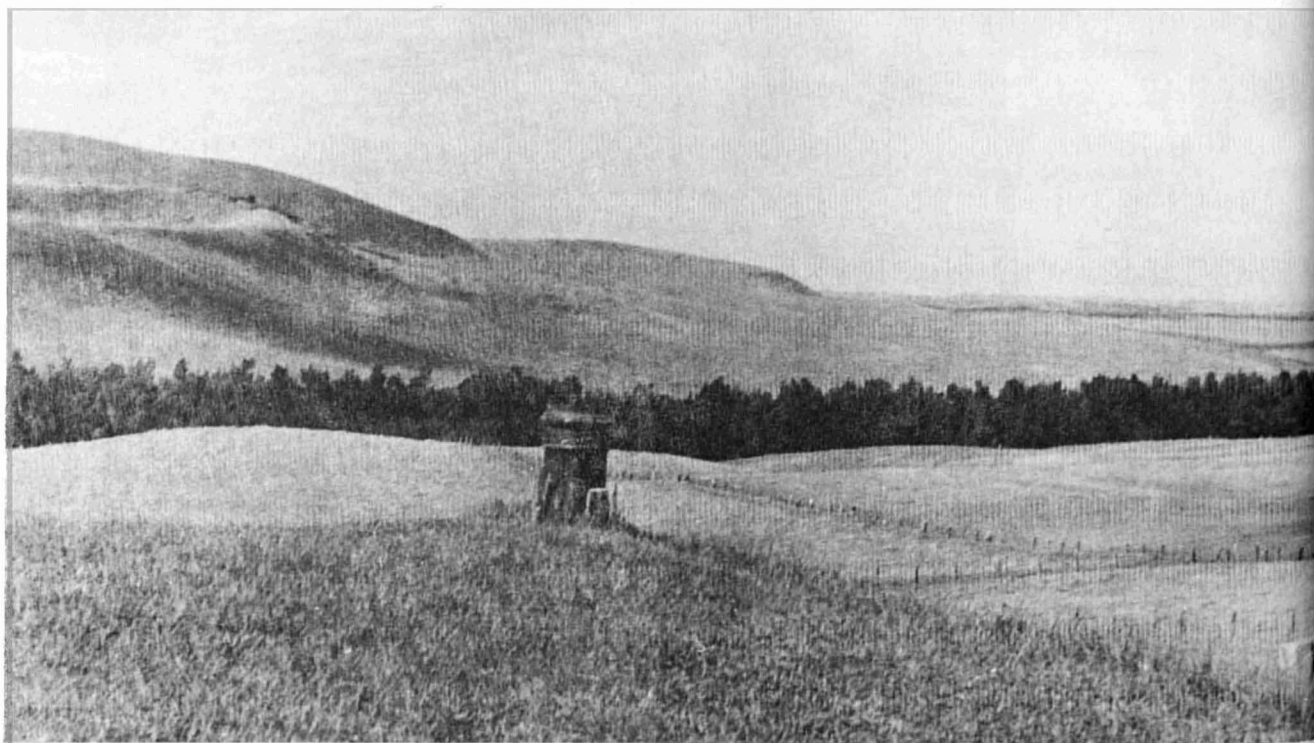
State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
54.1		Ohialani	Miss M English	83	Puna	19 26.2 155 14.4	3780	Recorder	1934-	Obsvr DOWALD HSPA	Moved 4/53 1/3 mi SE
54.2	0740W	Glenwood (Helbush)	X L Helbush	82	"	19 29.6 155 09.6	2300	"	1916-1929	USWB	
54.3		Glenwood	Puna Sugar	"	"	19 31.4 155 08.3	2150	Aft rain	1951-1959	Obsvr DOWALD	
54.4		26 Miles	W H Shipman	83	"	19 26.5 155 12.7	3400	Monthly	1951-	Obsvr DOWALD HSPA	
54.5		Haunani Road	Eugene Horner	"	Kau	19 26 155 15	3900	Daily	1954-1958	Obsvr DOWALD	
54.6		Kilauea Iki B-BF	Hawaii Natl Park	"	"	19 25.2 155 15.1	3500	Weekly	1963-	Obsvr USWB	
54.7		Kilauea Iki #1	"	"	"	19 25 155 15.1	"	"	"	"	
54.8		Kilauea Iki C-CF	"	"	"	19 25 155 15.2	"	"	"	"	
54.9		Kilauea Iki A-AF	"	"	"	19 25 155 14.7	"	"	"	"	
54.11		Kilauea Iki D-DF	"	"	"	19 24.5 155 14.9	"	"	"	"	
54.12		Devastation Area #2	"	"	"	19 24.8 155 14.9	"	"	"	"	
54.13		Devastation Area #3	"	"	"	19 24.3 155 15.7	3700	"	"	"	
54.14		Devastation Area #4	"	"	"	19 23.9 155 15.9	3645	"	"	"	
58		Ainahou	W H Shipman	"	"	19 20.7 155 13.7	2975	Daily	1942-	Obsvr DOWALD HSPA	
58.1		Ainahou Makai	"	"	"	19 20.3 155 13.4	2750	"	1944-	"	Ainahou 2; no data prior 1945
58.2		Ainahou Steel Tank #2	"	"	"	19 21.08 155 13.73	2975	"	1961-	Obsvr DOWALD	
59		Makaopuhi Crater	Hawaii Volcano Obsvty	"	"	19 21.9 155 10.6	2860	Weekly Recorder	1944-1965-	Obsvr USWB	Makaopuhi
59.1		Alae Crater	"	"	"	19 22 155 11.7	3010	Weekly	1967-	"	
65	7457	Pahoa	Puna Sugar	82	Puna	19 29.7 154 56.9	670	Daily	1902-	"	No data 1908 & 1917-21; moved 4 times; details unknown
65.1		Waiakeheula	W Goudie	"	"	19 30.2 154 56.3	750	Unknown	1894-1898	USWB	
65.2		Lower Pahoa	Puna Sugar	"	"	19 31.4 154 55.5	380	Aft rain	1951-	Obsvr DOWALD USWB	Pahoa Makai
65.3		Upper Pahoa	"	"	"	19 27.7 154 58.4	1170	"	"	"	Pahoa Mauka
66	3370	Kapoho Upper	"	"	"	19 29.5 155 52.6	440	Daily	1934-1955	Obsvr USWB	Kapoho Mauka
66.1	5460	Lava Tree Park	State Parks Division	"	"	19 29.2 154 54.4	650	" Recorder	1956-1965-	Obsvr DOWALD USWB	Hourly data pub in Haw HPD from 3/65
66.2		Kapoho KLD #2264	Puna Sugar	"	"	19 29.2 155 53.3	"	Unknown	Unkn	Unknown	
66.3		Kapoho (Pualaa)	Dr Crawford	"	"	Unknown	200	Variable	1966-	Obsvr USWB	
66.4		Kehena Makai									No sta at pub date
67	3043	Kamaile	Puna Sugar	"	"	19 26.2 154 56	560	Daily	1921-1955	"	Kamaili
67.1		Kalapana (Wilson)	W E Wilson	83	"	19 21.3 154 58.6	10	Unknown	1897-1900	USWB	
67.2		Kaueleau	A R Henderson	82	"	19 27.3 154 56.5	1000	Daily	1908-	"	
67.3	3455W	Kaueleau 2	J S Green	83	"	19 26.6 154 54.5	350	"	1917-1927	"	

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
67.4		Pohoiki	R Rycroft	83	Puna	19 27.8 154 51	10	Unknown	1891-1900	USWB	
67.5		Hayhalekai	G Hay	"	"	19 28.5 154 50.1	15	Wkly & aft rain	1946-	Obsvr DOWALD HSPA	
67.6		Kupaahu	USDA Fruit Fly Lab	"	"	19 21.4 154-59.7	100	Weekly	1950-1956	DOWALD	Kalapana
67.7		Opihikao	Hawaii Ag Exp Sta	"	"	19 26.8 154 54.4	360	Daily	1956-1957	Obsvr	Filed UH Plant Phys Dept
67.8	2894	Kalapana 1	Hawaii Natl Park	"	"	19 19.7 155 01.8	10	"	1964-	"	
67.9		Keauhana Forest Reserve	BWS	"	"	19 25 154 57.3	744	Weekly	1960-	Obsvr USWB	
68	1562	Holualoa Beach	Holualoa Ranch	84	N Kona	19 36.5 155 58.7	14	Daily	1918-	"	Moved 10/38 approx 2 1/2 mi SSE; formerly #68A in KRGH
68.1	6268	Middle Holualoa	Dillingham Ranch	"	"	19 36.6 155 57.8	485	Aft rain	1930-	Obsvr USWB HSPA	Kailua Mauka; Holualoa ldg chute; moved 1942 to 600'; no data prior 1940; KRGH #68B & #68C resp in; reptd and filed Kona Exp Sta
68.2	5330	Lanihau	Kona Exp Sta	"	"	19 39.9 155 57.7	1530	Daily	1930-	Obsvr DOWALD USWB HSPA	No data prior 1938
68.3	4764	Kona Airport	HAL	"	"	19 38.8 156 00.6	15	Daily Recorder	1949-1956	USWB	1956-57 charts only; filed PSO; no data 1957-65; hourly data pub in Haw HPD from 3/65
68.4		Kailua-Kona	G Parker	"	"	19 38.5 155 59.6	20	Daily	1956-1959	"	Moved 1956 1/6 mi NE; 1959 1/5 mi WNW; 2-12/56 & 1-4/59 data rep USWB Form 1130, filed PSO, USWB & FRC; former obsvr Kona Inn 1956, Kona Palms 1956-59
68.5		Holualoa (1450)	Kona Dev Co	"	"	19 37.1 155 57.2	1450	"	1901-1928	"	
68.6		Lanihau (Bartels)	F W Bartels	"	"	19 40 155 58	1540	Unknown	1895-1900	"	
68.7		Lanihau Mauka	Kona Exp Station	"	"	19 40.1 155 57.2	1930	Variable	1958-	Obsvr DOWALD HSPA	Lanihau Mauka 1 to 5/60; DOWALD obsvr
68.8		Lanihau Mauka 2	DOWALD	"	"	19 40.1 155 56.6	2440	Weekly	1958-1960	"	
68.9		Lanihau Mauka 3	"	"	"	19 40.2 155 56.0	2900	"	"	"	
68.11		Pacific Empress Hotel	Pacific Empress Hotel	"	"	19 38.3 155 59.4	100	Aft rain	1967-	Obsvr USWB	
69		Kahaluu Beach	Holualoa Ranch	"	"	19 34.5 155 58	20	Daily	1938-	Obsvr DOWALD USWB HSPA	No data prior 1947; USWB data current; orig date unkn
69.1		Ohia Liilii	Huehue Ranch	"	"	19 43.3 155 56	4500	Monthly	1935-1960	DOWALD HSPA	Moved 1950 160' W
69.2		Kahaluu	Kona Exp Station	"	"	19 35.6 155 57	1080	Daily	1930-1964	Obsvr DOWALD HSPA	No data prior 1938; 1944 approx 1/5 mi ESE from Tay res
69.3		Honokohau Ranch	E C Greenwell	"	"	19 41.2 155 58.6	1275	Unknown	1910-1919	DOWALD	
69.4		Kohanaiki	American Factors	"	"	19 42.6 155 58.7	1580	Daily	1956-	Obsvr DOWALD HSPA	
69.5		Kaiolu	J C Tyler, Sr	"	"	19 37.3 155 59.2	30	"	1954-1966	"	
69.6		Kuona Olu	D Ednie	"	"	19 36.5 155 59	10	Weekly	1954-1957	Obsvr DOWALD	
69.7		Kailua (Yowell)	W S Yowell	"	"	19 39 155 58	950	Unknown	1880-1902	DOWALD USWB	

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks	Sta. Key No.
69.8		Lion Grass	Holualoa Ranch	84	N Kona	19 37.5 155 57.5	1000	Aft rain	1958-1967	Obsvr DOWALD HSPA		73.
69.9		Keopu (McWayne)	Puuwaawaa Ranch	"	"	19 38.8 155 58.2	800	Variable	1958-	"		73.
69.12		Huehue (2600)	Huehue Ranch	"	"	19 42.2 155 57.3	2600	Weekly	1968-	Obsvr DOWALD USWB		73.
69.13		Huehue (3100)	"	"	"	19 42.3 155 56.7	3100	"	"	"		73.
69.14		Huehue (3700)	"	"	"	19 42.4 155 56.3	3700	"	"	"		73.
69.15		Huehue (4500)	"	"	"	19 42.7 155 55.6	4500	"	"	"		73.
70	1557	Holualoa	State Forestry Division	"	"	19 38.1 155 54.8	3220	Monthly	1929-	Obsvr USWB	Error: 1919-28 data put this sta instead #68.5	73.
70.1		Halepiula Shed	Dillingham Ranch	85	"	19 44.1 155 51.6	4500	Variable	1921-	Obsvr DOWALD USWB	No data prior 1938; orig site approx 2 mi W pres site; DOWALD data current; orig date unkn	73.
70.2		Kaalapuuuli	Palani Ranch	84	"	19 37.6 155 51.8	"	Monthly	1937-	Obsvr DOWALD HSPA	Kaalapuuuli; no data prior 1939 Honokohau Ranch	73.
70.3		Holualoa (Twigg-Smith)	Mrs Twigg-Smith	"	"	19 36.9 155 57.1	1210	Daily	1948-1963	"	Moved 1956 50' W; no data 6/48-12/53	73.
70.4		Holualoa Mauka Camp	Huehue Ranch	"	"	19 38.8 155 53.2	4440	Aft rain	1958-1965	DOWALD HSPA		73.
70.5		Waiaha Stream	BWS	"	"	19 38.1 155 57	1540	"	1953-	Obsvr DOWALD		73.
70.6		Waiaha Stream (USGS)	USGS	"	"	19 38.2 155 56.4	1920 2060	Monthly Recorder	1962-1958-	Obsvr	Moved 10/64; charts filed USGS	73.
70.7		Waiaha Stream at Luawai	"	"	"	19 38.2 155 55.8	2580	Monthly	1960-	"		73.
70.8		Right Branch Waiaha Stream	"	"	"	19 38.7 155 54.9	3300	Recorder	"	"		73.
70.9		Shangri-La Mauka	Puuwaawaa Ranch	"	"	19 43.6 155 51	5000	Twice monthly	1965-	Obsvr USWB		73.
70.11		Kileo	"	85	"	19 43.9 155 49.7	4800	"	1961-	"		73.
70.12		Shangri-La	"	"	"	19 44.2 155 50.8	4380	"	"	"		73.
71	2047	Honuaula	State Forestry Division	84	"	19 40.4 155 52.7	6250	Monthly	1928-	"		73.
71.1		Waihou 1	Dillingham Ranch	85	"	19 44.7 155 52	3850	Twice weekly	1921-	Obsvr DOWALD HSPA	No data prior 1940; moved 3/4 mi S 4/65; DOWALD data current; orig date unkn	74.
71.2		Hualalai Sheep Station	Bishop Estate	84	"	19 42.3 155 54.3	6000	Monthly	1962-	Obsvr		74.
71.3		Kaupulehu Forest Reserve	"	"	"	19 41.7 155 52.5	7780	"	"	"		74.
72	2151	Hualalai	State Forestry Division	"	"	19 41.5 155 52.4	8190	"	1929-	Obsvr USWB		74.
72.1		Kahaluu #8	Bishop Estate	"	"	19 40.9 155 51.3	6960	"	1964-	Obsvr		75
72.2		Kahaluu #6	"	"	"	19 39.7 155 50.9	6120	"	"	"		76
73	8460	Puu Lehua	Greenwell Ranch	"	"	19 34 155 48.5	4850	"	1922-	USWB		77
73.1	4163	Keauhou 73A	Bishop Estate	"	"	19 33.6 155 55.7	1890	Aft rain Recorder	1927-1960 1955-1957	DOWALD USWB	Keauhou 2 (1890); Macadamia Nut Rd charts filed DOWALD; pub as Keauhou 2; not same as #73.5	77.
73.2	2751	Kainaliu	Kona Exp Station	"	"	19 32.2 155 55.6	1500	Daily Recorder	1931-1958 1958-	Obsvr USWB	Charts filed Kona Exp Station	77.

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
73.3		Mokuauikaua Road	Bishop Estate	84	N Kona	19 34.8 155 55.7	1980	Monthly	1954-	Obsvr DOWALD	Keauhou (1980)
73.4		Keauhou Test Site	DOWALD	"	"	19 34.8 155 55.6	2040	Recorder	1958-1960	DOWALD HSPA	Keauhou HWA site; charts filed DOWALD
73.5		Keauhou 2	Bishop Estate	"	"	19 33.8 155 55.1	2100	Aft rain	1954-1960	Obsvr DOWALD	
73.6		Honalo 2	C H Wodehouse (Poho Kala Ranch)	"	"	19 33.3 155 55.6	1800	Daily	1954-	Obsvr DOWALD HSPA	Poho Kala 2
73.7		Lehuula	Wall Ranch	"	"	19 32.3 155 55.8	1410	Aft rain	1956-	"	Kawanui 2; moved 4/59 approx 200 yds SW, new name
73.8		Hokukano Makai	Ackerman Ranch	"	"	19 31.6 155 56.7	500	Once or twice weekly	1955-	"	
73.9		Hokukano Mauka	"	"	"	19 31.6 155 55.6	1410	Aft rain	1955-	"	
73.11		Kahaluu Forest	Bishop Estate	"	"	19 35.4 155 53.9	3350	Monthly	1958-	Obsvr DOWALD USWB	
73.12		Kainaliu Beach	Wall Ranch	"	"	19 31.9 155 57.4	15	Aft rain & mnthly	1959-	Obsvr DOWALD HSPA	
73.13		Honalo 1	C H Wodehouse (Poho Kala Ranch)	"	"	19 33.2 155 55.9	1480	Aft rain	1958-	"	Poho Kala 1; pub as #73.10 in RHI
73.14		Keauhou Bay	J Giacometti	"	"	19 33.7 155 58	20	"	1959-1960	Obsvr	
73.15		Kaipoi	R Spalding	"	"	19 33.9 155 58	"	"	1959-1966	"	
73.16		Halewalea	Mrs H Hahn	"	"	19 34.5 155 56.7	1160	Variable	1959-	"	
73.17		Puu O Hau	W H Greenwell Estate	"	S Kona	19 30.6 155 57.2	10	Monthly	1960-	Obsvr DOWALD HSPA	
73.18		Pineapple	"	"	"	19 30.4 155 56.2	800	"	"	"	
73.19		Honalo	Puuwaawaa Ranch	84	N Kona	19 33.5 155 57.2	420	Weekly	1958-1967	Obsvr DOWALD	
73.21		Honalo 3	Poho Kala Ranch	"	"	19 33.7 155 53.9	2840	No set time	1964-	Obsvr DOWALD HSPA	
73.22		Kahaluu Exp Plot #1	Bishop Estate	"	"	19 35.8 155 53	3800	Monthly	1960-	Obsvr	
73.23		Field E	Kona Exp Station	"	"	19 32.3 155 55.6	1594	Weekly	1966-	"	
74	3095	Kanahaha	W H Greenwell Estate	"	"	19 35.5 155 47.7	5060	Monthly	1922-	USWB	
74.1		Kaukahoku	Wall Ranch	"	"	19 34.5 155 51.7	4030	Mnthly & aft rain	1956-	Obsvr DOWALD HSPA	
74.2		Kahaluu Forest #2	Bishop Estate	"	"	19 36.4 155 50.8	4600	Monthly	1960-	Obsvr	Exp Plot 2
74.3		Keauhou 2	"	"	"	19 37.3 155 49.6	5040	Monthly	1960-	"	
75	0040	Ahua Umi	W H Greenwell Estate	"	"	19 38.2 155 46.9	5220	"	1922-	USWB	Umi Temple
76	5018	Kulani Mauka	USWB	"	N Hilo	19 35.2 155 27.3	8300	Weekly Recorder	1950-1952-	"	Charts filed USWB to 12/65; hourly data pub in Haw HPD from 1/66
77		Papaloa	Kealakekua Ranch	"	S Kona	19 30.5 155 47.8	5120	Weekly	1932-	Obsvr DOWALD USWB HSPA	No data 1936 & 1956; moved 5/60 350 ft E and up 20 ft
77.1		Papai Clark	"	"	"	19 30.4 155 46.2	5900	Aft rain & mnthly	1958-	Obsvr DOWALD HSPA	
77.2		Pauahi	"	"	"	19 30.2 155 49.6	4320	"	1952-	"	No data 1956

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
77.3		Pump 4	Kealakekua Ranch	84	N Kona	19 30.3 155 50.2	4055	Aft rain & mnthly	1953-	Obsvr DOWALD HSPA	Oiki Heifer Pdk; no data 1956
77.4		J P	"	"	S Kona	19 29.7 155 51.4	3550	Aft rain	1952-	Obsvr	No data 1956
77.5		Hoohui Makani	"	"	N Kona	19 30.4 155 42.5	8100	3 or 4 times yearly	1958-	Obsvr DOWALD HSPA	No data 4/59-4/60
77.6		Keane Kini	"	"	"	19 30 155 44.1	7100	Aft rain & mnthly	1959-	"	Kanekini
77.7		#3 A Pump	"	"	S Kona	19 30.5 155 51.3	3550	"	1962-	"	
77.8		Air Port	"	"	"	19 26.5 155 48.75	4700	"	1966-	"	
78	5021	Kulani Schl Site	State Social Services Dept	82	S Hilo	19 35.1 155 20.2	5735	Weekly	1947-	USWB	
79	5011	Kulani Camp	"	"	"	19 33.1 155 18.2	5170	Daily Recorder	1947-1954-1962	"	Moved 12/59 300' SSE; charts filed
79.1		Upper Waiakea	State Forestry Division	"	"	19 34.3 155 11.8	2910	Aft heavy rain & weekly	1963-	Obsvr DOWALD	
79.2		Waiakea Forest Reserve #1	US Forestry Service	"	"	19 36.7 155 09.2	1830	Weekly	1964-	Obsvr	
79.3		Waiakea Forest Reserve (4000)	"	"	"	19 34.2 155 15.7	4120	"	"	"	
79.4		Upper Kulani	Roy Cunningham	"	Puna	19 35.8 155 08.7	1820	Unknown	Unkn	"	
80		Kaleieha	Parker Ranch	"	N Hilo	19 42.2 155 27.8	6710	Daily	1914-	Obsvr DOWALD HSPA	Obsvr has annual totals only thru 1935
80.1		Humuula	S Parker, Jr	"	"	19 43 155 28	6685	Aft rain	1905-1914	USWB	No data 12/06-11/07



Station No. 178.0—HEADQUARTERS

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
80.2		Puu Omaokoili	State Forest-ry Division	85	N Hilo	19 42.8 155 29.5	6720	Monthly	1950-1964	Obsvr DOWALD HSPA	
81		Kulani Ditch	State Social Services Dept	82	S Hilo	19 31.5 155 17.9	5120	Aft rain	1947-1952	"	Kulani Cone
82	8550	Puu Oo	W H Shipman	"	"	19 43.6 155 23.3	6340	Daily	1907	DOWALD USWB HSPA	No data prior 1910; prob moved 3/4 mi SW, date unknown
83		Quarry at Saddle Road	USGS	"	"	19 41.3 155 17.8	4140	Monthly	1967-	Obsvr	
83.1		Wailuku River	"	"	"	19 43.3 155 16.2	3520	Recorder	"	"	
84	8590	Saddle Road	BWS	"	"	19 41.8 155 12.2	2340	Weekly	1948-	USWB	No data prior 1949
85	1488	Hilo (A&F)	State Forest-ry Division	"	"	19 42.5 155 04.5	35	Daily	1926-	Obsvr USWB	Hilo Tree Nursery; Hilo Insectory #94 in KRGH
85.1		Cloud Physics Lab	UH Geophysics	"	"	19 42.3 155 05	140	Recorder	1965-	"	
86.1	1484	Hilo	USWB	"	"	19 43.7 155 05.4	40	Daily	1880-1966	USWB	No data 1887-92; moved 8/18 from Hilo Boarding School
86.2		Kaumana (1960)	Puna Sugar	"	"	19 41 155 11	1960	Aft rain	1921-1947	Obsvr USWB	
86.3		Ponahawai	State Forest-ry Division	"	"	19 41.2 155 41.2	2150	Monthly	1950-1951	Obsvr DOWALD HSPA	
86.4		Hilo (Coan)	Rev Titus Coan	"	"	19 44 155 05	50	Unknown	1846-1847	USWB	
86.5		Kaumana (2000)	USDA Fruit Fly Lab	"	"	19 41.1 155 11.1	2000	Weekly	1950-1951	DOWALD	
87	1492	Hilo Airport	USWB	"	"	19 43.4 155 03.6	27	6 times daily Recorder	1939-1950-	DOWALD USWB	USWB 1st Ord Sta; 6 hrly obsvns daily; begin & end precptn, hrly amts; hrly data pub in Haw HPD from 3/65; charts & 1939-48 surface obsvns filed NWRC
87.1	9020W	Waiakea Mill	Waiakea Mill Co	"	"	19 42.9 155 04.7	50	Daily	1891-1948	USWB	Moved slightly 1943; dist & dir unkn
87.2		Hilo Breakwater	US Engineers	"	"	19 43.8 155 02.7	15	Monthly	1911-1916	"	
88	9014	Waiakea	Puna Sugar	"	"	19 38.5 155 10.2	1950	Aft rain or wkly	1930-1952-	Obsvr USWB	Middle Plume House
88.1	3510	Kaumana	S Masuya (Hilo Sugar)	"	"	19 41.2 155 08.6	1123	Daily Recorder	1896-1949-	DOWALD USWB	Kaumana 3; no data 1909-26 & 1940-48; charts filed US Army Eng 1949-65; hrly data pub in Haw HPD from 3/65; no data at obsvr; pub in RDWSB; prob moved 1/49, dist & dir unkn; 7/58 3/4 mi WSW
88.2	9025	Waiakea SCD	S Kaneshiro	"	"	19 39.5 155 07.4	1050	Daily Recorder	1953-1953-1954	USWB	Moved 11/58 1/2 mi NNW; charts filed FRC
88.3		Piihonua (1000)	Hawaiian Mill Co	"	"	19 43 155 08	1000	Daily	1906-1918	"	
88.4		Piihonua Camp 5	Mauna Kea Sugar	"	"	19 43.3 155 09.3	1250	"	1951-	Obsvr DOWALD HSPA	Piihonua Camp 4; moved 2/56 to Camp 5
88.5		Kaumana 2	Hilo Country Club	"	"	19 40.4 155 10	1720	"	1932-1939	Obsvr DOWALD	Country Club; no data at obsvr; pub in RDWSB
88.6		Waiakea Camp 8	Waiakea Mill Co	"	"	19 39.1 155 07.4	1050	"	1913-1939	"	Weekly or monthly prior 1930; 1913-14 data pub in WSP 373 & 430; 1915-39 data pub in RDWSB
88.7		Piihonua Mauka	USGS	"	"	19 43.6 155 10.8	1900	Irregular	1911-1912	Obsvr	Pub in WSP 318 & 336
88.8		Waiakea Exp Farm	U of H	"	"	19 38.9 155 05	605	Daily	1961-	"	

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
88.9		Thruns	R R Northwood	82	S Hilo	19 42.5 155 08.3	870	Daily	Unkn	Obsvr USWB	
89	8051	Piihonua	State Forestry Division	"	"	19 44 155 10.2	1730	Monthly	1925-	USWB	
89.1		Waiakea Camp 6	Waiakea Mill Co	"	"	19 40.1 155 06.1	615	Daily	1913-1948	Obsvr DOWALD	1913-14 data pub in WSP 373 & 430; 1915-39 data pub in RDWSB; monthly prior 1922
89.2	4632	Kipa	Mauna Kea Sugar Co	"	"	19 44.3 155 08.9	1490	Weekly Recorder	1953-1953-1962	USWB	Moved 6/53 approx 1/8 mi E; charts filed USWB
89.3		Mauka Amaulu Camp 4	"	"	"	19 43.7 155 06.7	450	Aft rain	1932-1948	Obsvr HSPA	
89.4		Kaiwiki	"	"	"	19 45.2 155 07.9	1100	Daily	1948-1967	Obsvr DOWALD HSPA	
89.5		Amaulu Camp 4	Mauna Kea	"	"	19 44.2 155 07.8	900	"	1948-1958	"	
89.6		Dairy	"	"	"	19 44.6 155 09.3	1500	"	1952-1953	"	
89.7		Lower Piihonua	W W Flagg	"	"	19 42.9 155 08	815	"	1950-1957	DOWALD	
89.9		Piihonua 2	Hilo Sugar	"	"	19 43 155 08.2	900	"	1933-1939	Obsvr DOWALD	No data at obsvr; pub in RDWSB
90		Office	Hilo Sugar Co	"	"	19 44.4 155 05.6	100	"	1893-	Obsvr DOWALD HSPA	Mgr's res; moved 1954 across st
90.1		Hawaii Substation Off	HSPA	"	"	19 43.8 155 05.9	220	"	1934-	DOWALD HSPA	Ag office; also reptd by Hilo Sugar
90.2		Mauna Kea (200)	USGS	"	"	19 45.2 155 05.7	200	Irregular	1911-1913	Obsvr	Pub in WSP 318, 336 & 37
91	6552	Mountain View	Puna Sugar Co	"	Puna	19 33.1 155 06.7	1530	Daily	1901-	USWB	Moved 1/40 1/2 mi S, 9/50 across hwy; 1901-11 data pub as Olaa 17 Mile
91.1		Keaau	W H Shipman	"	"	19 38.7 154 59.1	15	"	1920-	Obsvr DOWALD HSPA	No data prior 1948
91.2		Olaa (1650)	Dr N Russell	"	"	19 32.3 155 07.4	1650	Unknown	1893-1902	USWB	
91.3	7026W	Olaa (Kurtistown)	T A Dranga	"	"	19 35.8 155 04.2	645	Daily	1904-1926	"	
91.4		Kurtistown	Puna Sugar Co	"	"	19 34.7 155 04.2	920	"	1951-	Obsvr DOWALD HSPA	
91.5	7185	Orchid Land Estate	BWS	"	"	19 33.5 154 59.6	445	Variable	1960-	Obsvr DOWALD USWB	
91.6		Field 151	Puna Sugar Co	"	"	19 35.8 155 06.8	1360	"	1966-	Obsvr	
92	3872	Keaau	"	"	"	19 37.8 155 02	280	Daily	1901-	USWB	Pub as Olaa Mill; Olaa; moved 1/39 from mill
92.1	2156	Huehue	Huehue Ranch	84	N Kona	19 45.3 155 58.5	1960	Aft rain	1903-	USWB	Moved 2/58 90' NE
92.2		Keaau Orchard	Keaau Orchard (Castle & Cooke)	82	Puna	19 38.7 155 00.8	90	Daily	1949-	Obsvr DOWALD USWB HSPA	
92.3		Halepiula 3	Puuwaawaa Ranch	85	N Kona	19 46.1 155 54.1	2500	Weekly	1961-	"	
92.4		Kukulu Kukui	W H Shipman	82	Puna	19 38.5 155 02.5	275	Variable	1962-	Obsvr DOWALD USWB	
92.5		Field B-15	Hawaii Macadamia Nut Co	"	"	19 39.6 155 00.3	70	Recorder	1967-	Obsvr	
93	3367	Kapoho	Puna Sugar Co	"	"	19 30.6 154 50.6	110	Daily	1891-1960	Obsvr USWB	Kapoho Lower; moved 4/23 300 ft SE

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State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
93.1	8346	Puu Anahulu	Dillingham Ranch	85	N Kona	19 48.9 155 50.7	2150	Variable	1942-	Obsvr DOWALD USWB HSPA	
93.2	0298	Cape Kumukahi	USCG	83	Puna	19 31 154 49.3	65	Daily	1957-1960	USWB	
93.3		Panika	Dillingham Ranch	85	N Kona	19 49.7 155 51	2080	Monthly	1957-	Obsvr DOWALD HSPA	
93.4		Eben Low	"	"	"	19 49.3 155 50.9	2150	Variable	1957-	"	
93.5	3369	Kapoho Land- ing Strip	BWS	82	Puna	19 30.4 154 51.8	290	"	1960-	"	
93.6		Kahuwai	J B Orr	"	"	19 33.5 155 53.1	20	Daily	1966-	Obsvr USWB	Honolulu Landing
93.7		Kukui Akau	Puuwaawaa Ranch	85	N Kona	19 50.1 155 51.7	1170	Twice monthly	1961-	Obsvr DOWALD USWB	
93.8		Kona Village	Kona Village Resort	85	"	19 51.6 155 55.4	10	Daily	1966-	USWB	
93.9		Nanawale	US Forest Service	82	Puna	19 33.2 155 53.1	100	Monthly	1966-	Obsvr	
94.1	8555	Puu Waawaa	Dillingham Ranch	85	N Kona	19 46.8 155 50.7	2520	Daily Recorder	1894-1965	Obsvr DOWALD USWB	Moved slightly 1932 & 1948; hourly data pub in Haw HPD from 3/65
94.2		Kaumana (500)	J Matsunaga	82	S Hilo	19 42 155 06.9	500	Daily	1905-1940	USWB	Pub as Ponahawai (500) thru 7/26
94.3		Mamane Hill	Dillingham Ranch	85	N Kona	19 46.4 155 49.8	3450	Twice weekly	1956-	Obsvr DOWALD HSPA	Hill Mamane Paddock
95		Puuhinei 2 Grass Field	Parker Ranch	"	S Kohala	19 53 155 43.4	2560	Variable	1941-	"	
95.1	8186	Puako	E H Rapp	"	"	19 58.6 155 50	5	Daily	1939-	USWB	
95.2		Puuhine Paddock	Parker Ranch	"	"	19 54 155 46	1500	Monthly	1914-1917	"	
95.3		Puako (Parker Ranch)	"	"	"	19 57.5 155 50.1	40	Aft rain	1954-1967	Obsvr	
96		Puuhinei 1	"	"	"	19 57.5 155 44.4	2000	"	1936-	Obsvr DOWALD HSPA	
96.1		Keamoku Grass Plot	"	"	"	19 53 155 43	2600	"	1941-1943	Obsvr	
97		Keamoku	"	"	"	19 50.6 155 43.2	3120	"	1908-	Obsvr DOWALD HSPA	Keamuku; no data 1908-23; obsvr has annual totals only thru 1935
98	6180	Mauna Kea Beach	Mauna Kea Beach Hotel	"	"	20 00.6 155 49.7	103	Daily Recorder	1967-1967	Obsvr USWB	Charts filed PRH
100		Waikii	Parker Ranch	"	"	19 51.6 155 39.2	4700	Daily	1895-	Obsvr DOWALD HSPA	Obsvr has annual totals only thru 1935
100.1		Waikii (4675)	USDA Fruit Fly Laboratory	"	"	19 51.7 155 39.2	4675	Weekly	1949-1966	Obsvr	No data 1/51-4/59
101		Pa Aalii	Parker Ranch	"	"	19 54 155 39.9	3700	Variable	Unkn	"	
102		Puu Anuanu	Parker Ranch	"	Hamakua	19 51.4 155 37	5900	Aft rain	1936-	Obsvr DOWALD HSPA	No data 3/56-3/59
102.1	8452	Puu Laau	State Fish & Game Division	"	"	19 50.1 155 35.7	7440	Monthly	1932-	Obsvr USWB	
102.2		Kemoli House	Parker Ranch	"	"	19 53.9 155 33.6	5420	"	1914-1917	USWB	Pub as Kemole House
102.3		Puu Anuanu Paddock	"	"	"	19 50 155 35	7500	"	1914-1915	Obsvr	Location uncertain; pub in WSP 430
102.4		Ahumoa	State Fish & Game Division	"	"	19 48.8 155 37.8	5840	"	Unkn	"	
102.5		Puu Kee Kee	"	"	"	19 47.4 155 37.7	5490	"	"	"	

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
103		Makahalau	Parker Ranch	85	Hamakua	19 58.6 155 33.1	3820	Daily	1910-	Obsvr DOWALD USWB HSPA	Obsvr has annual totals only thru 1935
104		Kemoli 2	"	"	"	19 54.8 155 33.8	4920	"	1936-	Obsvr DOWALD HSPA	
105		Kemoli 1	"	"	"	19 56.1 155 32.1	4680	"	"	"	
106		Old Dairy	"	81	"	19 58.2 155 31.9	4160	"	1909-	"	Peleihookapapa; Palihooukapapa; obsvr has annual totals only thru 1935
107	8063	Pohakuloa	State Parks Division	85	"	19 45.1 155 31.7	6511	Variable Recorder	1938-1955-	Obsvr USWB	Charts filed USWB; to 1963; no data 1963-65; hourly data pub in Haw HPD from 3/65
107.1		Bradshaw AAF	US Army	"	"	19 45.6 155 33	6125	Daily Recorder	1956-1956-1958	USWB	Pohakuloa (USMC); 8/56-9/56 & 1/57-7/58 charts filed USWB; intermittent obsvns; surface obsvnl forms WBAN 10A & 10B filed PSO, USWB
107.2		Pohakuloa (5700)	Parker Ranch	"	"	19 47 155 36	5700	Monthly	1914-1915	Obsvr USWB	Location uncertain; pub in WSP 430
110		Puunoho 1	"	81	Hamakua	19 58.6 155 30.8	4210	Aft rain	1936-	Obsvr DOWALD HSPA	
110.1		Puunoho Paddock	"	"	"	19 59 155 31	4200	Monthly	1914-1917	USWB	Pub as Punohu Paddock
110.2		Nienie (Yates)	Dept of Hawn Homes Land	"	"	19 59.5 155 31.3	3845	"	1962-	Obsvr	
111	1065	Halepohaku	State Parks Division	82	"	19 45.8 155 27.5	9220	"	1939-	Obsvr USWB	
111.1		Hopukane Springs	"	85	"	19 47.2 155 30.2	10380	Variable	1952-	Obsvr DOWALD HSPA	Hopukani Springs
111.2		Dome Site	USWB	"	"	19 49.4 155 29	13630	"	1966-	USWB	
111.3		Lake Waiau Site	"	82	"	19 48.9 155 38.7	13160	Unknown	Unkn	"	
111.4		Van Site	"	"	"	19 47.7 155 27.9	11880	Variable	1966-	"	
112		Hanaipoe	Parker Ranch	81	"	19 56.8 155 27.6	5120	Aft rain	1910-	Obsvr DOWALD HSPA	Obsvr has annual totals only thru 1935
113	8515	Puu Mali	Kukaiau Ranch	"	"	19 54.6 155 26.4	6960	Monthly	1932-	USWB	Puu Ulaula; moved 3/51 100' NE; pub in WSP 318, 336, 373 & 430
113.1		Puuhala	"	"	"	19 55 155 26	6500	"	1914-1918	"	
114	2141	Hope-A	"	"	"	19 58.6 155 25.0	3980	"	1909-	"	Hope-A Lower; Hope-A Tanks
114.1		Dairy Field	"	"	"	20 00.3 155 26	3120	"	1965-	Obsvr DOWALD USWB	
115	8710	Stone Corral	"	"	"	19 56.8 155 25.1	5240	"	1902-	Obsvr USWB	Hope-A Upper; Hapea Mauka; pub in WSP 318, 336, 373 & 430; pub as Hope-A Upper 1914-18
116		Papa	"	"	"	19 57.2 155 23.6	4750	"	1944-	Obsvr DOWALD HSPA	
116.1		Garden	"	"	"	19 56.8 155 22.6	4960	"	1965-	Obsvr DOWALD USWB	
117	1060	Halepiula	"	"	"	19 55.9 155 23.6	5770	"	1914-	USWB	
118	8780	Umikoa	"	"	"	19 59 155 22.9	3420	Daily	1894-	"	Moved 3/55 approx 40 ft SSE; 7/59 20 ft SSE

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
118.1		Field 127	Hamakua Mill Co	81	Hamakua	20 00.1 155 21.2	2180	Weekly & aft rain Recorder	1952-	Obsvr DOWALD HSPA	No data prior 1955
118.2		Field 139	"	"	"	20 01 155 22	1770	Weekly & aft rain	1951-1952	Unknown	No data; repl by #118.1
118.3		Field 7A	"	"	"	20 00.4 155 22.4	2240	Weekly	1965-	Obsvr USWB	
120	8393	Puu Kihe	Kukaiau Ranch	"	"	19 53.9 155 23.7	7750	Monthly	1903-	"	Pub in WSP 318, 336, 373 & 430
120.1		Puu Kea	"	"	"	19 53.7 155 24.6	8540	"	1914-1932	USWB	
121		Iolehaehae Tanks	"	"	"	19 54.6 155 21.7	6300	"	1933-	Obsvr DOWALD HSPA	
121.1		Kukaiau (7850)	Unknown	"	"	19 54 155 22	7850	Unknown	1903-1905	USWB	
122		Laaumaia	Parker Ranch	82	N Hilo	19 46.2 155 21.5	6580	Aft rain	1914-1947	Obsvr HSPA	Obsvr has annual totals only thru 1935
123	2238	Kaala	Kukaiau Ranch	81	Hamakua	19 55.5 155 21.4	5460	3 times monthly	1913-	USWB	Moved 4/56 60 ft SSW; 1958 125 ft SW; no data prior 1914
123.1		Keanakolu (5500)	S Parker, Jr	"	"	19 55 155 21	5500	Daily	1905-1914	"	
123.2		Kukaiau (5000)	Unknown	"	"	19 56 155 21	5000	"	1902-1905	"	
124	4096	Keanakolu	State Forestry Division	"	N Hilo	19 55.2 155 20.5	5280	Monthly	1929-	Obsvr USWB	
124.1		Keanakolu (Parker Ranch)	Parker Ranch	82	"	19 55.1 155 20.3	5280	Daily	1914-1965	Obsvr DOWALD HSPA	Possibly #123.1 moved; obsvr has annual totals only thru 1935
124.2	4098	Keanakolu Camp	State Forestry Division	"	"	19 55.3 155 20.6	"	Recorder	1965-	USWB	Hourly data pub in Haw HPD from 3/65
125		Hopuwai	Parker Ranch	"	"	19 51 155 20.3	6425	Aft rain	1934-1947	Obsvr HSPA	Obsvr has annual totals only thru 1935
125.1	8175W	Puakala	W H Shipman	"	S Hilo	19 47.4 155 20	6300	Daily	1907-	Obsvr DOWALD USWB HSPA	Pua Akala; no data 1907-18 & 1936-47
125.2		Mauna Kea (5000)	USGS	"	"	19 47.2 155 17.3	5000	Irregular	1911-1913	Obsvr	Pub in WSP 318, 336 & 373
125.3		Mauna Kea (4500)	"	"	"	19 47 155 16.4	4500	"	"	"	Pub in WSP 318, 336 & 373
125.4		Mauna Kea (4000)	"	"	"	19 46.7 155 15.4	4000	"	"	"	
125.5		Mauna Kea (3500)	"	"	"	19 46.5 155 14.2	3500	"	"	"	
125.6		Mauna Kea (3000)	"	"	"	19 46.3 155 12.8	3000	"	"	"	
125.7		Mauna Kea (2650)	"	"	"	19 46 155 11.8	2650	"	"	"	
125.8		Mauna Kea (2000)	"	"	"	19 45.7 155 10.2	2000	"	"	"	
125.9		Mauna Kea (1500)	"	"	"	19 45.3 155 09.2	1500	"	"	"	
125.11		Kaiwaiki (2000)	US Forest Service	"	"	19 46 155 10.1	1925	Monthly	1965-	"	
126	6175	Maulua	Kukaiau Ranch	"	N Hilo	19 53.5 155 18.6	5140	Variable	1918	Obsvr DOWALD USWB	Maulua Makai
126.1		Maulua Mauka	"	"	"	19 52.6 155 20.4	6180	Monthly	1953-	Obsvr DOWALD HSPA	
127	8480W	Puu Loa	"	81	Hamakua	19 59.2 155 20	2550	Daily	1918-	DOWALD USWB HSPA	No data 1927-28; USWB data current, orig date unkn
127.1		Humuula (3000)	State Forestry Division	82	N Hilo	19 57.1 155 18.9	3600	Monthly	1950	Obsvr DOWALD HSPA	

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
127.2		Kukaiau (3400)	Unknown	81	Hamakua	19 59 155 20	3400	Unknown	1895-1905	USWB	
127.3		Keanakolu Trail	USDA Fruit Fly Laboratory	"	"	19 58.1 155 22.1	3800	Weekly	1951	Obsvr	
127.4		Coffee Pond	Kukaiau Ranch	"	"	19 59.4 155 21.6	2800	Daily	1966-	Obsvr DOWALD USWB	
128	6725	Nauhi Gulch	State Forestry Division	82	N Hilo	19 51.5 155 18	5160	Monthly	1925-1953	USWB	
130		Field 111	Laupahoehe Sugar Co	"	"	19 59.2 155 17.7	1790	Daily	1928-	Obsvr DOWALD HSPA	Ookala Mauka; Ookala (1750); moved 1939 from 1750 ft; DOWALD data current, orig date unk
130.1		Field 6	"	"	"	19 59.9 155 16.5	900	"	1951-	"	
130.2		Field 39	"	"	Hamakua	20 01.2 155 19.5	900	"	"	"	
132		Kihalani Mauka	"	"	N Hilo	19 57.7 155 14.7	1550	"	1943-	"	Kihalani; DOWALD data current, orig date unk
133		Papaaloa	"	"	"	19 58.8 155 13.4	290	"	1905-1966	Obsvr DOWALD USWB HSPA	Papaaloa Office; current orig date unk
133.1		Laupahoehe (10)	E W Barnard	"	"	19 59 155 14	10	Unknown	1892-1897	USWB	
133.2	5430W	Laupahoehe	T R Phea	"	"	20 00 155 15	30	Daily	1891-1928	"	Moved 10/24 from 110 ft
134	5776	Makahanaloa 2	State Forestry Division	"	S Hilo	19 49.2 155 11.7	2675	Monthly	1934-1953	Obsvr USWB	Makahanaloa Mauka



Station No. 69.1—OHIA LIILII

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
135	0910	Hakalau Mauka	Pepeekeo Sugar Co	82	N Hilo	19 53.2 155 10.1	1150	Daily	1905-	USWB	
136		Honomu	State Forestry Division	"	S Hilo	19 50.5 155 09.8	1750	Monthly	1926-	Obsvr DOWALD HSPA	
137	1701	Honohina	Pepeekeo Sugar Co	"	N Hilo	19 55.5 155 09.4	300	Daily	1894-	USWB	Moved 5/57 350 ft WNW
137.1		Puuohua (Macey)	B B Macey	"	"	19 55.6 155 11.8	1050	Unknown	1902-1905	"	
137.2		Waikaumalo	"	"	"	19 56.3 155 10	275	Daily	1905-1912	"	
137.3		Honohina Mauka	Pepeekeo Sugar Co	"	"	19 54.8 155 10.8	1150	"	1964-	Obsvr USWB	
138	1960	Honomu Mauka	"	"	S Hilo	19 51.1 155 08.6	1100	" Recorder	1939-1965-	USWB	Hourly data pub in Haw HPD from 3/65
138.1		Honomu Mauka (1200)	"	"	"	19 51 155 09	1200	Daily	1911-1938	"	Moved to #138; error: 1939-52 data pub this sta instead #138
140	8018	Pepeekeo (A&F)	State Forestry Division	"	"	19 50 155 09.1	1550	Monthly	1926-1966	Obsvr USWB	
140.1	7721	Papaikou Mauka	Mauna Kea Sugar Co	"	"	19 47.4 155 08.5	1270	Daily	1913-	USWB	No data prior 1926
140.2		Papaikou (A&F)	State Forestry Division	"	"	19 47 155 08.7	1425	Monthly	1926-1927	Obsvr	
140.3		Kahalii	Donn Carlsmith								No information
141		Pepeekeo Mauka	Pepeekeo Sugar Co	"	"	19 50.7 155 07.5	870	Aft rain	1947-1963	Obsvr DOWALD HSPA	
142	0905	Hakalau	"	"	"	19 54.1 155 07.8	105	Daily	1892-	USWB	Moved 5/57 175 ft WSW
143	1955	Honomu Makai	"	"	"	19 52.4 155 07	350	"	1921-1963	"	Honomu 2
144	8000	Pepeekeo Makai	"	"	"	19 50.8 155 05.3	100	"	1890-	"	Pepeekeo; moved 6/07; dist & dir unkn
144.1	7711	Papaikou	Mauna Kea Sugar Co	"	"	19 47.2 155 05.7	200	"	1899-	"	Papaikou Makai; moved 10/33 from 250 ft, dist & dir unkn
144.2		Honomu (300)	Honomu Sugar Co	"	"	19 52 155 07	300	Unknown	1992-1899	"	
144.3		Honomu (950)	"	"	"	19 52 155 08	950	"	1892-1898	"	
144.4		Papaikou (Rogers)	W H Rogers	"	"	19 47 155 06	350	"	1886-1889	"	
144.5		Honomu Seaside	Pepeekeo Sugar Co	"	"	19 52.1 155 06.1	130	Daily	1948-	Obsvr DOWALD HSPA	DOWALD data current, orig date unkn
144.6		Pepeekeo (Andrade)	"	"	"	19 50.4 155 06.7	650	"	1948-	"	
144.7		Onomea	Onomea Sugar Co	"	"	19 49.1 155 06.2	460	Aft rain	1950	Obsvr	
144.8		Paukaa	"	"	"	19 46.0 155 05.7	230	"	1950-1951	"	
144.9		Mauna Kea (1000)	USGS	"	"	19 45.9 155 07.8	1000	Irregular	1911-1913	"	Pub in WSP 318, 336 & 373
145		Wainaku Camp 2	Mauna Kea Sugar Co	"	"	19 44.7 155 06.6	500	Daily	1948-	Obsvr DOWALD HSPA	Ditchman's Stable
147		Beach	Kahua Ranch	85	N Kohala	20.04.6 155 06.6	10	Variable	1931-	"	
147.1	6270	Middle Pen	"	"	"	20.06.2 155 50.1	1380	"	"	Obsvr DOWALD USWB HSPA	
148		Kawaihae	"	"	S Kohala	20 02.7 155 50.2	50	"	1937-	Obsvr DOWALD HSPA	

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
148.1		Puu Hanae	Kahua Ranch	85	S Kohala	20 03.6 155 48.6	1290	Variable	1936-	Obsvr DOWALD HSPA	Puu Kanae
148.2		Kawaihae (C of E)	US Army Engineers	"	"	20 03 155 51	10	Aft rain	1957-1958	DOWALD	
159	5720	Mahukona	Agent, Mahukona Terminal	"	"	20 11.2 155 54.2	10	Daily	1912-1955	USWB	Moved 7/48 approx 300 ft N
159.1		Honoipu	Kahua Ranch	"	N Kohala	20 14.8 155 53	260	Variable	1942-	Obsvr DOWALD HSPA	
159.2	8830	Upolu Point	USCG	"	"	20 15.2 155 53.3	61	4 times daily	1956-	USWB	
159.3		Station 23	Kohala Sugar Co	"	"	20 15.3 155 53.1	100	Aft rain	1948-1952	Obsvr	Upolu 19
159.4		Parker Ranch Pasture #32	"	"	"	20 12.7 155 53.3	370	Daily	1964-	"	Station 32
160		Station 3	"	81	"	20 15.5 155 52.5	200	"	1940-	Obsvr DOWALD HSPA	Upolu 5
160.1	8828	Upolu Pt. Airport	HAL	"	"	20 16.1 155 51.6	90	"	1939-1957	DOWALD USWB	Suiter Field; begin & end precptn rep from WBAN 10 (CAA); data from WCH
160.2		Station 28	Kohala Sugar Co	"	"	20 14.7 155 52.5	430	Aft rain	1950-1957	Obsvr DOWALD	Upolu 21
161	8181W	Puakea	Parker Ranch	"	"	20 14.1 155 52.4	570	Daily	1902-	Obsvr DOWALD USWB HSPA	Pub as Puakea Ranch, obsvr has annual totals thru 1935
162		Station 2	Kohala Sugar Co	"	"	20 15.4 155 51.8	300	Aft rain	1941-1952	Obsvr HSPA	Upolu 7
162.1		Kokoiki	Kahua Ranch	"	"	20 14.6 155 51.4	570	"	1942-1963	Obsvr DOWALD HSPA	
162.2		Station 25	Kohala Sugar Co	"	"	20 14.5 155 50.8	625	"	1950	Obsvr DOWALD	Camp 17
163		Station 15	"	"	"	20 13.2 155 51.7	847	Weekly	1925-	Obsvr DOWALD HSPA	Puakea Reservoir 2; DOWALD data current, orig date unkn
164		Station 9	"	"	"	20 12.8 155 50.4	1390	Daily	1912-	Obsvr HSPA	Kaauhuhu Homesteads; 1912-15 data pub in WSP 336, 373 & 430; obsvr W S May; no data 1916-24
164.1		Puakea 13	"	85	"	20 12.3 155 51.4	1185	Weekly	1964-1968	Obsvr	Station 33
164.2		Station 34	"	81	"	20 12.7 155 51.2	1490	2 times weekly	1968-	Obsvr HSPA	Puu Mamo
165		Station 4	"	"	"	20 15.4 155 50.6	300	Aft rain	1940-1963	Obsvr DOWALD HSPA	Upolu 13
166		Station 14	"	"	"	20 15.9 155 50.5	125	Daily	1925-	"	Hoea Mill; DOWALD data current, orig date unkn
167	8548	Puukumau	Kohala Ditch Co	"	"	20 11.9 155 50.2	1800	"	"	Obsvr DOWALD USWB	Puukumau Reservoir; Station 10
168	1339	Hawi	"	"	"	20 14.4 155 49.8	600	"	1888-1965- Recorder	"	Hawi Off; Sta 1; moved 1937 from Mill; hourly data pub in Haw HPD from 3/65; 1899-1918 data pub as Hawi Mill
168.1		Station 26	"	"	"	20 14 155 49	650	Aft rain	1950-1952	Obsvr DOWALD	Honomakau 3
170		Puuhue	Parker Ranch	85	"	20 10.4 155 50.1	1890	Daily	1932-	Obsvr DOWALD HSPA	Obsvr has annual totals only thru 1935
171		Station 5	Kohala Sugar Co	81	"	20 14.8 155 49.6	425	Aft rain	1940-1952	Obsvr HSPA	Alaalae 2 & 3
172		Station 17	"	"	"	20 12.6 155 50.2	1450	"	1923-1949	Obsvr DOWALD HSPA	Nunulu Nui; Union UKA; no data 1/31-9/37

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
173		Station 16	Kohala Sugar Co	81	N Kohala	20 14.7 155 48.8	450	Daily	1892-	Obsvr DOWALD HSPA	Union Off; no data 1895, 1911-22, 1931-36; DOWALD data current, orig date unkn
174		Station 6	"	"	"	20 15.3 155 48.6	190	Aft rain	1923-1963	"	Union Station
174.1		Kohala Parsonage	Rev A Ostrom	"	"	20 15 155 49	350	Unknown	1890-1900	USWB	
174.3		Station 31	Kohala Sugar Co	"	"	20 15.3 155 48.8	150	Daily	1963-	Obsvr DOWALD USWB	Kapua Gulch
175.1	4680	Kohala Mission	K Lyman Bond	"	"	20 13.7 155 47.7	537	"	1890-	USWB	Station 22; moved 1/05 from 585 ft
176	4675	Kohala Maulili	Kohala Sugar Co	"	"	20 12.7 155 47.3	960	" Recorder	1908-1965	"	Kohala Mauka; Station 11; charts filed USWB
176.1	4250	Kehena Reservoir	Kohala Ditch Co	"	"	20 10 155 48.2	2520	Daily	1942-	"	
176.2	1602W	Homestead Plantation	H C Austin	"	"	20 12.7 155 49.8	1350	"	1919-1929		
177		Station 8	Kohala Sugar Co	"	"	20 14.6 155 46.5	125	Aft rain	1941-1952	Obsvr HSPA	Kohala Old RR Station
178		Headquarters	Kahua Ranch	85	"	20 07.6 155 47.4	3240	Daily	1931-	Obsvr DOWALD HSPA	Kahua Ranch
178.1		Station 21	Kohala Sugar Co	81	"	20 11.7 155 48.5	1850	Aft rain	1946-1952	Obsvr HSPA	Iole 10
178.2		Twin Reservoir	"	"	"	20 11.2 155 47.4	"	Weekly	1940-	Obsvr DOWALD HSPA	Station 29
178.3		Kalope	Kahua Ranch	85	S Kohala	20 04.7 155 46	3400	Variable	1937-	"	
178.4		Halawa	Mrs W H Patton	81	N Kohala	20 14 155 46	450	Daily	1904-1908	USWB	
178.5		Puuhue Ranch	S P Woods	85	"	20 10.5 155 50.2	1845	"	1902-1907	"	Possibly same as #170
178.6	9350	Waikanonoula	Kahua Ranch	"	"	20 07.7 155 46.7	3830	Aft rain Recorder	1957-1965-	Obsvr DOWALD USWB HSPA	Hourly data pub in Haw HPD from 3/65
178.7		Lahikiola	"	"	"	20 09 155 48	2760	Variable	1963-	Obsvr USWB	
178.8		Puu Aiea	"	"	"	20 07.5 155 48	3050	"	1962-	"	
179	6806	Niulii Office (Niulii)	Kohala Sugar Co	81	"	20 13.5 155 44.8	75	Daily	1884-	Obsvr DOWALD USWB	Station 13; moved 1/20 from 200 ft, dist & dir unkn
179.1	4670	Kohala	"	"	"	20 14 155 46.9	309	"	1889-	"	1896-1918 data pub as Kohala Mill; Station 7; moved 1/02 from 234 ft, 1/16 from 270 ft, 8/54 300 ft ENE
180.1		Station 18	"	"	"	20 13.1 155 46.1	425	"	1933-	Obsvr DOWALD HSPA	Halawa Mill; DOWALD data current, orig date unkn
181	5792	Makapala Nursery	State Forestry Division	"	"	20 11.2 155 45.9	1620	2 times monthly	1925-1952	USWB	Station 20; restd by Kohala Sugar; #177A in KRGH
181.1	1864	Honokane	Kohala Ditch Co	"	"	20 08.9 155 44	800	Daily	1905-	"	Moved 4/20 approx 500 ft N; old elev 1042 ft
181.2	4245	Kehena	"	"	"	20 07.3 155 45.1	3840	Monthly	1912-	Obsvr USWB	Puu Lalau; no data prior 1919
182		Station 12	Kohala Sugar Co	"	"	20 11.9 155 45.2	1050	Daily	1942-	Obsvr DOWALD HSPA	Niulii 15; Waiapuka; Weir; DOWALD data current, orig date unkn
182.1	0190	Awini	Kohala Ditch Co	"	"	20 10.3 155 42.9	1870	"	1905-	USWB	Moved 5/55 40 yds W
183		Station 19	Kohala Sugar Co	"	"	20 11.9 155 45	750	Aft rain	1933-1952	Obsvr HSPA	Niulii Mauka

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
183.1		Puu Ahia	Kahua Ranch	85	S Kohala	20 05.7 155 44.9	4360	Variable	1937-	Obsvr DOWALD HSPA	No data prior 1942
183.2	0450	East Hono-kane	Kohala Ditch Co	81	"	20 06.6 155 42.8	4240	Monthly	1925-	Obsvr USWB	
183.3		Station 30	Kohala Sugar Co	"	N Kohala	20 12.3 155 45.6	800	Daily	1954-	Obsvr DOWALD HSPA	Niulii 23
183.4		Kawaihae Uka Mauka	Parker Ranch	85	S Kohala	20 05 155 44	4500	Unknown	1923-1928	Obsvr	Annual totals only thru 1935
183.5		Kohala Moun-tains Summit	Hawaiian Irrigation	81	"	20 05.3 155 43.2	5505	Annually	1917-1947	DOWALD HSPA	
183.6		Kohakohau #1	USGS	85	"	20 04.7 155 42.6	4760	Recorder	1963-	Obsvr	
183.7		Kohakohau #2	"	"	"	20 04.7 155 41.8	4480	"	"	"	
183.8		Keawewai	Olohana Corp	"	"	20 05.4 155 44.1	4700	2 times monthly	1965-	Obsvr USWB	
184		Kawaihae Uka 2	Parker Ranch	"	"	20 03.3 155 45.8	2640	Aft rain	1923-	Obsvr DOWALD HSPA	Kawaihae Uka Makai; no data 1928-34; obsvr has annual totals only thru 1935
184.1	3465	Kaukini	Kohala Ditch Co	81	Hamakua	20 09.7 155 41.7	2000	Weekly	1924-	Obsvr USWB	
184.2		Awini Ranch	Awini Ranch	"	N Kohala	20 11 155 43	1100	Unknown	1896-1905	USWB	No data 6/01-2/03
184.3		Kukui	USGS	"	Hamakua	20 09.2 155 40.2	1940	Monthly	1959-1967	Obsvr	
185	3775W	Kawainui Upper	Hawaiian Irrigation	81	S Kohala	20 05.2 155 40.8	4080	Aft rain	1907-1948	Obsvr USWB	
185.1		Kaimu	USGS	"	Hamakua	20 08.4 155 39.7	2440	Several times yearly	1939-1952	Obsvr DOWALD HSPA	
185.2		Wailikahi	"	"	"	20 07.5 155 39.8	2970	"	1952-1960	"	Wailikahi Cabin
185.3		Honokane (Parker)	Parker Ranch	"	"	20 08 155 38	750	Unknown	1936-1938	HSPA	
185.4		Upper Hamakua Ditch	USGS	"	S Kohala	20 05.2 155 40.4	4020	Recorder	1964-	Obsvr	
187.1		Waimanu	"	"	Hamakua	20 07 155 39.6	3220	Several times yearly	1939-	Obsvr DOWALD HSPA	
187.2		Wailikahi Mauka	"	"	"	20 06.7 155 40.7	3850	"	1952-1960	"	
190	0137W	Alakahi Upper	Hawaiian Irrigation	"	S Kohala	20 04.3 155 40.3	3875	Daily	1913-1948	Obsvr USWB	Alakahi Waipio Upper
190.1		Kohakohau 3	USGS	85	"	20 03.9 155 41	4000	Recorder	1963-	Obsvr	
190.2		Kohakohau 4	"	"	"	20 03 155 40.8	3725	"	"	"	
190.3		Kohakohau 5	"	"	"	20 02.6 155 41.5	3200	"	1964-	"	
190.4		Keanuimano Stream near Kamuela	"	"	"	20 01.5 155 42.1	2410	"	1963-	"	Kohakohau Stream
190.5		Kohakohau 6	"	"	"	20 02.4 155 40.7	3310	Daily	1964-	"	Maint by USGS; read by State
190.6		Kohakohau 7	"	"	"	20 01.9 155 41	2800	"	"	"	"
190.7		Kohakohau 8	"	"	"	20 01.9 155 41.4	2560	"	"	"	"
191	3078	Kamuela Airport	HAL	"	"	20 00 155 40.6	2665	"	1953-	USWB	Moved 4/59 150 ft SSW
191.1	5260	Lalamilo Field Office	DOWALD	"	"	20 00.8 155 40.8	2615	Recorder	1965-	DOWALD NWRC	Hourly data pub in Haw HPD from 3/65
191.2		A&S Farm	Albert & Stella Akana	"	"	20 00.4 155 39	2800	Daily	1966-	Obsvr	

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
192	9557	Waimea	L F Pinho	85	S Kohala	20 01.7 155 39.7	2750	Daily	1891- 1950	USWB	Kamuela; Central; moved 7/09, dist & dir unkn; 1919-50 data pub as Kamuela; data 10/50- 12/52 for #192.2
192.1	8383	Puu Kapu	State Forest- ry Division	"	"	20 02 155 38.6	2870	Monthly	1932- 1967	Obsvr USWB	
192.2	3077	Kamuela	Parker Ranch	"	"	20 01.4 155 40.2	2670	Daily	1909-	Obsvr USWB HSPA	Office; repl #192 10/50 as USWB sta; obsvr has annual totals only thru 1935
192.3		Puu Pa	"	"	"	20 00 155 43	2300	Aft rain	1936- 1945	Obsvr HSPA	Range
192.4		Holoholoku 1	"	"	"	19 58.6 155 38.3	3265	"	1936- 1943	"	
192.5		Puu Pa (2400)	"	"	"	19 58.7 155 41.7	2400	"	1952-	Obsvr	
192.6		Waimea Reservoir	DOWALD	81	"	20 03.1 155 37.5	2970	Weekly	1957-	"	
193	3770	Kawainui Lower	Honokaa Sugar Co	"	Hamakua	20 05.2 155 38.8	1080	Weekly; irreg- ular	1910-	Obsvr USWB	
194	0134	Alakahi Lower	"	"	"	20 04.6 155 38.5	840	Weekly	"	"	Daily prior 1958; 1910- 18 data pub as Alakahi Waipio Lower
194.1		Waikoloa	USGS	85	S Kohala	20 03.3 155 40	3580	Monthly	1947-	Obsvr DOWALD HSPA	
194.2		Kohala Mtn Pipe Line	Parker Ranch	81	Hamakua	20 05 155 39	3700	"	1914- 1917	Obsvr USWB	
195	4690W	Koiawe Upper	Hawaiian Irrigation	"	S Kohala	20 03.3 155 38.8	3350	Weekly; irreg- ular	1912- 1948	"	
195.1		Koiawe	DOWALD	"	"	20 03.6 155 38.3	3200	Monthly	1964-	DOWALD	
196	4685	Koiawe Lower	Honokaa Sugar Co	"	Hamakua	20 04.7 155 37.9	720	Weekly	1910-	Obsvr USWB	
197	9510	Waima Lower	Hawaiian Irrigation	"	"	20 04.1 155 37.6	980	"	1913-	"	1913-18 data pub as Waima
198		Muliwai	State Forest- ry Division	"	"	20 08.1 155 37	1290	4 times yearly	1931- 1966	Obsvr DOWALD HSPA	
199	4928	Kukuihaele (HIC)	Honokaa Sugar Co	"	"	20 07.1 155 35.1	980	Daily	1909-	Obsvr USWB	Weir #1; Kukuihaele Main Weir
200	8236W	Puu Alala	Hawaiian Irrigation	81	S Kohala	20 03.7 155 37.3	2880	"	1915- 1948	USWB	
201	8385W	Puu Kapu Reservoir 3	"	"	"	20 02.4 155 36.1	2820	"	1921- 1948	Obsvr USWB	
201.1		Puu Kapu (2850)	William Payne	"	"	20 02.4 155 35.9	2880	Variable	1950- 1967	Obsvr DOWALD	
202		Lalakea Reservoir	Honokaa Sugar Co	"	Hamakua	20 05.5 155 35.4	1955	Weekly	1910-	Obsvr DOWALD HSPA	Lalakea; no data prior 1917
202.1		Puu Mau	"	"	"	20 06.1 155 34.4	1565	"	1952-	"	Field 114; Field 14
203		Second Gate	Parker Ranch	"	"	20 02.5 155 35.4	2860	Daily	1910-	"	Moved 1954 approx 2 mi W from 2750 ft; obsvr data current, orig date unkn
203.1		Kamoku	Dept of Hawn Homes Land	"	"	20 02.8 155 33.7	2800	Monthly	1962-	Obsvr	
204		Puu Kikoni	Parker Ranch	"	"	20 00.5 155 34.8	3120	Daily	1919- 1949	Obsvr DOWALD HSPA	Obsvr data current, orig date unkn
204.1		Puukapu Lot 10	Dept of Hawn Homes Land	85	S Kohala	20 00.3 155 36.8	3030	Monthly	1962-	Obsvr	
205		Kukuihaele Village	Honokaa Sugar Co	81	Hamakua	20 07.2 155 34.2	750	Daily	1890- 1964	Obsvr DOWALD HSPA	No data prior 1891 & 1911-16
206	4938	Kukuihaele Mill	"	"	"	20 07.7 155 33.7	300	"	1891-	Obsvr USWB	1891-1918 data pub as Kukuihaele

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
207	0033W	Ahualoa Homesteads	Hawaiian Irrigation	81	Hamakua	20 03.3 155 30.8	2550	Daily	1912-1948	Obsvr USWB	
208		Waikoloa Stream	Honokaa Sugar Co	"	"	20 06.3 155 31.8	975	"	1964-	Obsvr	
209		Anuenue	"	"	"	20 05.7 155 32	1470	Weekly	1964-	"	Gravel Pit
210		Kapulena	"	"	"	20 06 155 31.1	920	Daily	1890-	Obsvr DOWALD HSPA	No data prior 1917
211		Reservoir 13	"	"	"	20 05.3 155 31	1515	Aft rain	1910-1964	"	No data prior 1913 & 1914-16; 1913 data pub in WSP 373
212		Kamaka Gate	Parker Ranch	"	"	20 03.1 155 31	2530	Daily	1910-	"	First Gate; obsvr has ann totals only thru 1935
212.1		Nienie-Lee	Dept of Hawn Homes Land	"	"	20 02.7 155 30.8	2745	Monthly	1962-	Obsvr	
213		Kawela	Honokaa Sugar Co	"	"	20 06.5 155 30	400	Daily	1890-	Obsvr DOWALD HSPA	No data prior 1917
213.1		New Stable	"	"	"	20 05.6 155 30.2	1125	"	1964-	"	Field 28
214	0840	Haina	"	"	"	20 05.7 155 28.1	461	" Recorder	1885-1955-	Obsvr DOWALD USWB	No data 11/86-12/89; error: 1890-1918 data pub as Honokaa; pub as Honokaa thru 6/49; charts filed USWB
215	1856	Honokaa Town	"	"	"	20 05 155 28.2	1080	Daily	1910-	"	Honokaa Village; no data prior 1913 & 1914-16; moved 6/46 1 mi NW; 1913 data pub in WSP 373
215.1	1850W	Honokaa Mauka	Hawaiian Tel Co	"	"	20 04.6 155 27.7	1180	"	1902-1939	USWB	Honokaa Central; #215.3 in RHI
215.2		Honokaa (Richart)	Miss N Richart	"	"	20 05 155 30	1900	Unknown	1897-1901	"	
215.3		Ahualoa	Honokaa Sugar Co	"	"	20 04.5 155 29.9	1835	Daily	1964-	Obsvr HSPA	Field 7A
216		Paaupahu (Parker)	Parker Ranch	"	"	20 03.5 155 28	1860	"	1909-	Obsvr DOWALD HSPA	Obsvr has annual totals only thru 1935
216.1		Paaupahu (Grieg)	T W Grieg	"	"	20 04 155 27	1200	Unknown	1890-1901	USWB	
216.2		Paaupahu Mauka (1150)	Paaupahu Sugar Co	"	"	20 04.3 155 26.9	1150	Daily	1905-1910	"	
216.3		Airport	"	"	"	20 02.7 155 27	2075	"	1955-	Obsvr DOWALD HSPA	
216.4		PMA Plant	"	"	"	20 05 155 25	1250	"	1963-	Obsvr DOWALD USWB	
216.5		Field 003	Paaupahu Sugar Co	"	"	20 04.7 155 26.8	930	"	1964-	Obsvr	
216.6		Kalopa (2100)	US Forest Service	"	"	20 02.4 155 26.5	2120	Monthly	1966-	"	
217	7204	Paaupahu	Paaupahu Sugar Co	"	"	20 05.2 155 26.4	415	Daily	1890-	Obsvr USWB	Moved 3/07 from 300 ft, dist & dir unkn
218		Hamakua Mill	Hamakua Mill Co	"	"	20 03.2 155 21.7	275	"	1900-	Obsvr DOWALD HSPA	Warehouse; no data prior 1936; current, orig date unkn
218.1		Paaupahu (Crusher)	"	"	"	20 04 155 23	270	Unknown	1915-1923	USWB	
218.2		Field 28	"	"	"	20 03.8 155 23.4	450	Weekly	1948-	Obsvr DOWALD HSPA	No data 1952-54
220		Paaupahu Mauka	Paaupahu Sugar Co	"	"	20 04.3 155 26.8	1160	Daily	1917-1962	"	Mgr's hse; no data prior 1939; current, orig date unkn
220.1		Kalopa (900)	"	"	"	20 03.3 155 24.4	900	Aft rain	1906-1913	USWB	

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
220.2		Pohakea	C R Blacow	81	Hamakua	20 02.4 155 25.2	1600	Daily	1904-1907	USWB	
220.3		Kalopa	Paaauhau Sugar Co	"	"	20 03.3 155 24.5	900	"	1956-	Obsvr DOWALD USWB HSPA	Possibly same as #220.1; Field 23
220.4		Field 14	"	"	"	20 04.6 155 25.2	430	Recorder	1960-1962	Obsvr DOWALD	Charts filed obsvr
220.5		Field 015	"	"	"	20 04.3 155 24.2	310	"	1962-	Obsvr USWB HSPA	
221	7312	Paauiilo (Office)	Hamakua Mill Co	"	"	20 02.5 155 22.3	825	Daily	1903-	USWB	Moved 1936 from 400 ft; dist & dir unkn
221.1		Field 9	"	"	"	20 01.8 155 21.8	1450	Weekly	1950-	Obsvr DOWALD HSPA	No data prior 1955
221.2		Field 30	"	"	"	20 02.1 155 23.8	1440	"	"	"	"
221.3		Hamakua Makai Variety Sta	HSPA	"	"	20 02.7 155 22.6	750	Daily	1934-	DOWALD HSPA	
222	4815	Kukaiaiu	Hamakua Mill Co	"	"	20 01.8 155 20.7	860	"	1895-	USWB	1895-1918 data pub as Kukaiaiu Plantation Co Off; Kukaiaiu Store; moved 1/20 from 800 ft 3/47 from 950 ft; dist & dir unkn; 5/53; dist & dir unkn
222.1		Coffee Plantation	Kukaiaiu Ranch	"	"	20 01 155 21	1600	Unknown	1895-1905	"	
222.2		Kainehe	C R Blacow	"	"	20 01.6 155 21.8	1475	Daily	1894-1907	"	
222.3	4775W	Korean Camp	Hamakua Mill Co	"	"	20 00.7 155 20.8	1750	Aft rain	1920-1938	"	
222.4		Paauiilo (Notley)	C Notley	"	"	20 03 155 22	250	Unknown	1892-1902	"	
222.5	8705W	Station 39	Hamakua Mill Co	"	"	20 00.2 155 19.8	1900	Aft rain	1920-1938	"	
222.6	8718W	Sugahara Camp	"	"	"	20 02.5 155 20.4	260	"	1892-1941	"	1892-1918 data pub as Kukaiaiu Mill
222.7		Field 116	"	"	"	20 01.9 155 19.7	425	Weekly	1951-	Obsvr DOWALD HSPA	Kukaiaiu Makai; no data prior 1955
223	7131	Ookala	Laupahoehoe Sugar Co	82	N Hilo	20 01 155 17.2	430	Daily	1891-	USWB	

Selected Rainfall Records

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
Station No. 2.0—MANUKA													
1929	6.00	6.04	8.02	5.08	4.00	4.02	5.06	5.02	7.02	6.00	11.00	5.00	72.25
1930	8.00	4.00	3.00	7.00	3.00	4.00	4.00	3.00	5.04	2.00	2.04	1.00	46.08
1931	0.01	1.00	2.05	4.00	7.02	3.00	8.02	4.00	8.00	3.06	0.50	1.00	41.66
1932	8.00	6.00	5.05	12.00	8.00	4.04	3.50	4.00	7.00	1.00	1.00	5.00	64.59
1933	1.02	6.00	10.50	6.00	3.00	4.00	3.00	3.00	3.20	2.60	2.80	0.80	45.92
1934	3.40	2.40	5.60	4.00	14.60	16.00	6.80	8.00	6.40	6.80	2.00	1.00	77.00
1935	8.60	2.40	2.00	9.60	3.00	6.80	3.30	6.00	9.00	7.50	4.50	1.70	64.20
1936	3.30	5.30	11.30	2.10	10.30	3.30	8.30	6.00	7.00	7.30	1.00	2.00	67.20
1937	6.00	4.00	7.00	4.00	7.00	5.00	6.00	4.00	7.00	8.00	4.00	4.00	66.00
1938	4.00	3.00	4.00	5.00	6.00	5.00	7.00	5.00	6.00	4.00	1.00	4.00	54.00
1939	5.00	7.00	8.00	9.20	7.00	8.00	5.80	2.00	2.00	5.00	3.00	0.50	62.50
1940	0.02	4.50	6.00	4.50	5.00	6.02	2.08	6.00	8.20	7.60	6.40	1.20	59.52
1941	3.00	0.50	5.40	2.50	4.00	7.00	3.00	8.40	9.20	8.00	3.00	4.00	54.40
1942	1.50	1.50	8.00	2.00	2.50	6.00	6.00	7.00	8.00	6.00	1.00	4.00	53.50
1943	5.00	3.00	5.00	3.00	8.00	8.50	5.00	7.00	9.00	4.00	1.00	0.50	59.00
1944	6.50	4.20	3.20	5.20	8.60	5.40	3.40	5.10	5.40	4.60	3.20	7.20	62.00
1945	0.20	5.20	4.20	9.10	6.30	6.60	4.40	13.40	7.10	8.20	7.20	1.20	73.10
1946	5.20	4.40	10.20	6.60	3.40	4.20	6.10	3.20	8.00	6.10	6.10	12.10	75.80
1947	2.10	4.20	4.60	9.20	8.40	4.20	4.40	12.10	6.20	4.10	5.40	10.30	73.20
1948	5.60	9.10	8.60	1.20	4.60	2.20	4.20	4.60	8.60	3.40	6.40	5.40	63.90
1949	9.20	9.60	5.20	5.60	5.40	5.10	3.60	4.60	5.40	4.40	4.40	6.60	69.10
1950	8.20	3.20	3.40	14.10	5.60	1.80	10.10	5.40	5.10	4.40	7.60	5.20	73.50
1951	4.60	10.60	11.40	6.40	6.60	4.10	2.20	7.20	6.10	4.20	3.20	4.40	71.00
1952	4.20	2.10	5.10	5.20	6.40	7.10	2.20	3.20	2.20	3.20	4.40	5.20	50.50
1953	0.00	6.20	10.30	5.10	5.10	4.10	0.50	1.20	2.50	1.20	5.10	5.20	45.50
1954	2.60	6.10	5.40	5.40	15.20	5.40	4.40	7.20	7.12	0.00	2.10	5.20	66.12
1955	3.20	8.10	6.10	6.10	3.20	2.40	6.10	4.10	6.10	2.40	2.20	6.20	56.20
1956	12.40	10.20	5.10	6.20	—	—	—	6.20	3.10	—	—	3.00	—
1957	3.10	—	—	5.10	5.40	5.40	5.10	4.10	2.40	3.20	3.60	2.10	41.40
1958	1.10	1.40	7.10	2.10	17.40	16.40	10.20	16.10	4.40	6.40	2.40	2.20	87.20
1959	7.20	3.20	3.20	4.20	3.60	2.20	4.10	12.70	4.10	1.30	6.30	1.10	53.20
1960	0.59	1.11	3.12	2.17	5.01	1.90	1.60	2.90	3.10	2.40	1.15	3.10	28.15
1961	2.30	6.20	2.40	4.70	3.60	2.40	2.40	2.20	2.40	17.20	4.20	3.20	53.20
1962	2.13	1.97	3.20	3.40	6.40	1.76	3.16	2.65	4.67	2.65	0.64	3.68	36.51
1963	5.74	2.78	8.00	7.22	9.07	6.00	7.50	3.25	6.70	2.63	1.70	1.44	67.63
1964	2.68	3.18	5.57	9.05	5.15	3.32	2.01	3.70	6.10	5.05	1.76	1.12	53.69
1965	3.66	2.85	3.58	2.02	8.24	4.59	1.72	8.45	5.69	2.25	9.10	0.38	53.21
1966	0.93	2.74	2.79	3.16	3.60	0.70	5.60	3.80	5.50	4.93	5.32	3.58	42.65
Total	155.98	165.27	212.68	208.50	238.69	191.15	175.45	215.07	220.74	172.47	135.61	137.08	2184.79
Mean	4.10	4.47	5.75	5.49	6.45	5.17	4.74	5.66	5.81	4.66	3.67	3.61	59.05
Max.	12.40	10.60	11.40	14.10	17.40	16.00	10.20	16.10	9.20	17.20	9.10	12.10	87.20
Min.	0.00	0.50	2.00	1.20	2.50	0.70	1.60	0.50	1.20	0.00	0.50	0.36	28.15

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
Station No. 2.2—KAHUKU SHED 3													
1920	0.00	0.00	0.00	7.00	0.00	0.00	0.36	2.32	4.21	0.62	1.20	0.00	10.09
1921	6.08	3.65	1.62	2.61	2.18	0.08	0.84	6.99	4.06	1.77	4.44	3.03	37.59
1922	0.00	1.18	2.09	2.23	1.77	0.00	0.00	4.85	3.51	3.52	3.52	0.33	23.00
1923	10.36	5.35	1.27	8.89	0.00	4.09	1.25	4.11	0.58	2.26	1.46	0.00	50.31
1924	0.75	0.00	2.80	7.78	0.18	0.00	1.01	0.85	0.60	10.24	4.24	3.37	31.82
1925	0.27	0.00	5.78	1.55	2.53	5.79	0.42	0.97	3.37	2.14	0.85	3.15	26.82
1926	0.18	0.69	1.22	1.01	4.41	1.96	2.40	6.38	5.17	6.66	1.50	4.73	36.31
1927	1.67	1.15	3.63	7.19	2.07	5.79	1.92	3.34	5.83	7.56	0.64	21.50	62.29
1928	0.16	0.24	0.00	2.08	3.23	3.31	10.57	1.08	1.98	2.61	2.06	2.67	29.99
1929	6.10	4.00	5.48	2.82	4.13	1.10	3.68	2.49	2.99	2.49	14.62	4.14	55.04
1930	7.50	0.38	4.51	5.16	2.49	4.81	1.12	9.53	2.88	6.03	4.56	0.00	48.97
1931	0.44	0.45	1.45	2.75	5.79	1.19	4.95	3.08	4.24	2.88	3.62	0.42	31.26
1932	13.24	8.00	1.76	1.06	4.59	1.67	1.46	1.60	4.81	2.01	3.44	4.68	48.32
1933	3.98	7.86	3.71	4.97	2.94	1.11	1.88	0.11	1.33	3.27	5.99	0.82	37.97
1934	6.65	1.84	4.00	2.46	9.73	8.11	3.96	0.50	6.92	7.54	6.00	2.61	60.32
1935	2.54	3.36	9.32	6.05	2.79	3.92	6.70	5.90	3.59	5.08	5.44	1.52	59.18
1936	2.76	11.71	6.93	2.58	3.59	3.05	10.13	10.88	2.30	9.79	0.30	3.66	67.68
1937	11.97	8.08	4.70	2.87	6.05	3.53	2.63	10.61	10.34	4.39	1.40	2.59	69.16
1938	10.33	7.57	1.92	3.76	9.33	6.04	4.32	6.88	2.52	9.20	3.45	3.18	63.10
1939	7.20	10.58	12.50	9.73	4.25	4.35	1.14	3.01	1.95	1.18	3.89	0.00	59.82
1940	1.62	2.37	8.24	1.86	3.16	1.85	3.57	7.13	2.89	5.05	11.65	1.03	50.42
1941	1.75	1.08	2.31	2.10	2.63	4.25	1.61	3.52	9.68	7.16	0.49	1.18	36.76
1942	—	0.96	5.62	2.23	1.34	2.40	1.62	2.16	5.08	6.29	1.46	3.25	32.41
1943	10.48	2.64	5.82	1.85	4.65	7.93	4.11	4.10	3.74	0.87	0.86	1.93	48.98
1944	0.60	4.99	2.63	1.01	3.24	3.76	4.58	3.49	3.58	4.28	2.46	11.21	45.83
1945	2.48	6.35	2.38	22.02	6.11	3.88	2.81	6.43	3.99	4.88	3.34	2.72	67.39
1946	10.84	16.95	3.35	4.18	3.21	3.23	2.53	0.36	2.52	4.81	3.49	11.29	66.76
1947	6.58	—	—	—	—	—	—	—	—	—	—	—	—
1948	—	—	—	—	—	—	—	—	—	—	—	—	—
1949	2.00	2.33	—	4.28	1.27	1.49	3.17	1.75	1.60	4.24	7.00	4.00	33.13
1950	13.15	6.00	1.51	4.50	4.50	3.14	4.69	5.51	4.35	10.00	2.86	2.80	63.01
1951	6.40	10.10	11.10	2.50	1.82	1.51	0.75	4.40	4.21	2.00	0.14	0.45	45.38
1952	13.34	1.63	2.88	3.54	4.22	1.58	2.46	1.76	1.81	2.82	1.45	1.68	39.17
1953	0.34	6.45	6.13	2.77	4.47	5.11	1.11	1.06	1.92	—	2.10	1.10	—
1954	4.40	1.50	6.65	2.30	7.50	2.23	5.10	2.90	2.20	4.05	0.65	5.65	45.13
1955	7.95	6.60	2.30	2.35	2.25	1.30	2.30	3.20	2.05	1.05	2.20	9.50	43.95
1956	10.40	5.90	3.10	6.35	4.00	3.50	1.60	3.40	3.10	2.60	10.70	6.00	60.65
1957	5.00	0.00	2.00	3.80	4.10	3.20	3.00	5.40	10.14	2.80	4.50	6.50	53.44
1958	1.90	0.00	0.25	13.14	2.75	1.00	3.50	5.20	1.00	1.50	0.50	1.40	38.74
1959	7.50	12.00	1.50	2.75	3.75	2.50	1.25	2.65	2.25	2.00	7.00	0.25	64.30
1960	0.33	0.00	3.25	6.00	5.10	2.00	1.90	1.75	3.80	4.35	4.70	3.20	36.38
1961	1.50	4.50	3.10	4.30	3.30	3.80	3.00	4.00	2.30	3.95	8.50	10.55	52.90
1962	2.00	1.75	5.50	3.50	3.00	1.35	3.50	3.50	2.40	3.60	1.00	1.55	32.60
1963	6.00	1.00	4.00	12.00	4.00	4.00	4.50	0.75	4.50	1.50	2.00	1.00	45.25
1964	3.50	3.50	8.60	2.50	4.50	1.62	1.90	2.50	3.70	3.00	2.50	7.00	44.82
1965	4.00	3.50	4.50	2.50	4.00	4.00	3.00	4.00	3.00	2.00	8.00	3.50	46.00
1966	2.00	5.00	1.50	2.00	1.50	3.50	5.00	3.00	6.00	3.00	8.00	1.25	42.75

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.
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	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1936	10.02	8.04	9.00	7.04	1.00	4.00	8.00	12.00	8.00	11.00	0.10	2.00	80.20
1937	12.00	12.00	5.00	6.00	7.00	3.00	5.00	14.00	6.00	4.00	1.00	8.04	83.04
1938	8.04	12.00	4.00	8.00	6.00	0.00	10.04	7.02	4.00	3.00	6.02	4.00	78.12
1939	6.00	11.00	12.00	8.00	2.00	12.00	10.00	5.00	6.00	4.00	1.00	80.50	77.82
1940	0.50	2.50	9.00	9.00	7.00	4.00	4.02	11.60	6.60	8.00	9.60	2.00	73.82
1941	2.00	3.00	2.00	3.00	5.00	9.00	7.00	4.40	11.60	9.00	6.00	0.50	62.50
1942	17.00	4.00	8.00	3.00	6.00	7.00	0.00	6.00	8.00	7.50	3.00	8.00	51.10
1943	17.00	4.00	8.00	3.00	6.00	7.00	0.00	7.40	6.50	7.00	0.00	4.00	73.90
1944	2.00	10.40	9.60	1.00	6.10	6.20	9.20	4.20	6.00	6.20	2.60	11.40	74.90
1945	3.20	3.20	5.40	13.20	6.60	7.40	2.60	3.20	5.20	7.40	9.50	5.10	72.00
1946	25.10	16.20	2.40	0.80	4.20	4.40	2.20	6.60	2.00	1.20	4.20	0.16	65.46
1947	6.20	2.10	5.20	4.40	6.60	4.60	2.10	8.40	5.10	1.20	2.10	1.10	49.10
1948	2.20	8.20	2.10	7.10	6.20	6.20	4.60	5.40	12.40	2.10	12.60	7.20	76.30
1949	18.60	8.40	6.40	1.20	1.20	4.60	7.20	2.10	1.10	2.60	7.20	10.20	70.80
1950	10.40	8.60	2.30	11.20	6.20	2.20	7.40	4.20	5.60	2.10	14.20	3.40	77.80
1951	6.20	16.20	17.20	2.20	6.20	4.60	4.10	8.40	5.20	6.60	16.20	7.10	100.20
1952	12.60	4.20	10.20	6.60	6.60	5.20	6.40	4.10	4.10	6.40	3.10	4.10	73.60
1953	1.00	8.20	9.20	7.20	7.40	6.20	5.40	6.10	4.40	4.10	4.10	4.20	67.50
1954	3.10	6.40	6.20	6.10	3.20	7.20	3.20	9.40	12.10	4.40	18.40	5.10	84.80
1955	4.10	15.20	8.20	4.40	2.10	4.20	8.20	4.40	5.40	3.60	4.10	12.40	76.30
1956	12.60	12.10	4.40	6.10	6.20	7.10	7.10	7.40	6.10	9.10	14.40	5.20	99.80
1957	8.20	3.40	3.20	4.20	6.20	6.20	6.20	10.10	10.20	8.20	4.40	60.70	77.20
1958	4.20	4.10	10.10	4.20	9.20	10.20	7.10	9.20	4.20	6.60	4.60	78.30	77.20
1959	11.60	1.10	3.60	3.60	3.20	4.60	10.60	13.30	19.20	6.20	10.60	3.20	66.80
1960	0.60	7.60	4.60	3.40	4.15	2.60	1.72	5.10	4.40	6.20	3.10	4.40	47.87
1961	3.20	3.40	6.10	6.20	5.40	2.60	4.60	3.60	3.20	16.20	5.60	16.50	76.60
1962	3.34	2.12	4.60	6.60	4.60	4.15	4.93	5.18	6.76	5.87	0.82	1.50	50.47
1963	4.00	1.50	12.40	19.32	5.24	4.55	4.76	5.41	8.02	2.50	3.36	4.66	75.32
1964	3.31	2.37	14.84	4.36	3.60	5.04	2.04	2.41	3.69	3.92	3.74	13.14	62.56
1965	7.92	4.17	5.63	6.91	17.85	4.59	5.56	6.50	5.75	7.30	11.51	7.10	81.72
1966	3.80	8.53	3.00	4.84	5.85	3.82	5.80	7.25	11.10	6.82	12.10	10.80	83.71

Total	253.17	242.35	236.15	210.33	201.59	185.00	198.22	234.55	225.12	206.28	256.87	195.13	2603.31
Max.	6.84	6.55	6.38	5.68	5.31	4.87	5.22	6.17	5.92	5.48	6.80	5.14	68.51
Mean	25.10	16.20	17.20	19.32	17.85	12.00	10.60	14.20	16.20	21.00	16.50	100.20	77.20
Min.	0.00	1.00	2.00	0.50	0.50	0.40	1.00	1.00	0.10	0.00	0.10	37.28	—

Station No. 7.0 — KIOKLAKA

1914	4.50	1.28	4.52	2.07	4.21	4.61	5.90	7.14	5.52	3.28	6.71	8.83	58.57
1915	Trace	0.36	0.23	3.68	1.81	4.85	4.57	1.59	1.41	12.53	19.88	12.06	64.97
1916	15.06	0.65	11.42	4.44	6.41	4.24	2.74	3.42	2.82	6.97	2.98	16.18	75.33
1917	12.92	2.82	13.03	4.15	2.00	2.18	0.42	1.46	0.40	2.18	2.27	11.05	54.88
1918	11.96	20.16	5.34	9.89	1.38	3.36	4.62	2.64	1.83	1.30	10.87	10.88	74.43
1919	1.86	0.77	1.78	3.13	3.30	4.00	0.91	3.10	4.60	6.58	6.27	3.47	39.77
1920	5.51	2.69	5.64	2.04	3.08	2.01	1.19	2.56	3.63	3.87	1.03	7.34	40.79
1921	14.85	5.19	4.50	2.29	3.78	1.25	1.46	3.89	2.71	3.57	2.32	2.90	48.71
1922	6.09	10.39	2.54	2.18	2.31	1.28	2.92	1.98	3.08	4.86	3.32	4.07	45.02
1923	15.83	7.27	10.81	15.55	3.38	2.67	0.61	4.35	3.96	1.84	3.22	7.00	76.49
1924	1.08	1.59	4.41	12.61	3.89	2.45	3.78	2.29	3.65	5.31	8.35	3.50	52.91
1925	2.28	1.54	6.03	1.55	1.42	4.41	2.83	3.50	2.26	3.88	3.03	4.47	37.20
1926	2.68	1.61	0.54	1.58	1.87	2.81	1.23	6.42	2.04	5.27	2.24	11.42	41.71
1927	2.29	0.56	8.31	7.90	2.91	2.61	0.79	6.88	8.68	5.48	2.80	26.37	75.58
1928	1.77	1.76	2.11	3.20	2.75	2.03	5.96	3.03	4.02	3.76	2.80	2.28	35.30
1929	6.60	8.83	4.07	3.23	2.49	1.12	2.82	3.10	2.70	2.28	15.90	6.06	59.20
1930	6.06	1.50	6.85	3.94	1.97	2.47	2.84	6.91	6.84	8.16	2.79	2.41	53.34
1931	1.09	0.13	3.02	1.93	6.21	1.30	2.73	2.49	7.07	4.14	1.08	0.31	31.50
1932	13.74	8.37	2.02	1.86	3.46	1.74	0.99	3.03	5.24	2.13	6.01	8.10	66.69
1933	7.80	5.77	3.24	7.13	4.84	1.56	1.97	2.15	0.74	2.62	4.07	3.45	45.54
1934	7.09	1.50	2.27	3.15	3.62	5.23	2.04	1.70	3.13	3.84	4.05	3.95	41.37
1935	4.30	2.30	9.06	2.92	2.23	3.77	2.56	3.69	8.01	5.44	5.95	3.66	53.69
1936	7.17	5.73	4.48	1.56	1.03	2.77	3.38	5.12	3.20	10.58	0.95	2.69	46.89
1937	10.85	9.61	5.47	2.43	3.70	1.07	2.72	11.81	3.03	5.66	0.44	4.90	61.69
1938	9.24	9.83	2.50	3.00	5.67	3.33	3.01	3.07	3.24	2.21	5.27	5.42	55.59
1939	5.71	11.23	5.99	4.61	1.19	4.35	2.20	1.50	3.85	4.00	3.45	1.34	59.78
1940	2.99	3.56	5.99	1.03	1.99	2.61	2.06	7.28	5.02	7.53	6.95	1.88	47.99
1941	2.45	1.70	1.56	2.33	3.02	1.15	3.90	4.71	10.77	8.21	3.07	0.38	47.25
1942	0.48	1.79	5.03	2.48	2.82	2.33	1.13	3.30	5.55	3.53	2.88	5.62	36.34
1943	17.02	2.57	6.73	2.73	3.96	7.95	1.84	5.84	3.59	2.87	1.50	3.00	59.60
1944	2.47	7.25	9.69	1.33	3.25	6.23	5.70	2.42	4.38	1.19	1.66	8.60	53.17
1945	2.93	2.24	5.95	11.91	2.86	4.58	2.39	2.04	4.45	7.41	5.38	5.43	57.27
1946	21.52	17.03	1.16	2.01	1.90	0.99	2.14	4.97	2.25	3.46	3.81	10.05	71.29
1947	2.95	2.62	5.50	2.26	2.95	1.43	1.53	3.81	4.36	2.19	3.71	1.75	35.06
1948	4.58	3.79	3.62	6.04	6.24	3.84	3.82	2.79	2.25	1.03	13.06	1.44	52.50
1949	25.89	7.22	2.02	0.80	1.11	2.73	1.35	0.38	4.47	2.80	4.80	11.66	64.23
1950	9.45	7.49	1.31	7.08	1.76	1.69	5.05	7.32	2.54	2.00	15.21	3.62	64.72
1951	8.09	17.21	18.24	2.26	3.75	4.46	3.68	4.63	4.87	10.46	9.98	5.21	92.82
1952	12.76	1.98	6.22	0.25	1.94	2.09	5.04	2.11	2.74	3.76	3.41	0.70	43.00
1953	0.94	5.18	7.12	2.55	Discontinued								

Total	292.25	206.87	210.32	157.08	303.74	113.95	106.83	152.42	151.70	180.18	203.27	223.85	2114.75
Mean	7.49	5.17	5.26	3.93	3.04	2.92	2.74	3.91	3.89	4.62	5.21	5.74	54.22
Max.	25.89	20.16	18.24	15.55	14.41	7.95	5.90	11.81	10.77	12.53	19.88	26.37	92.82
Min.	Trace	0.13	0.23	0.80	1.03	0.99	0.42	0.38	0.40	1.03	0.44	0.31	31.50

Station No. 12.0 — KALAA IKI

1939	3.66	9.45	15.49	7.86	1.41	3.39	2.50	2.26	5.84	5.10	3.47	2.08	62.71
1940	2.57	4.18	8.57	3.68	4.06	2.49	2.76	3.89	5.99	9.54	7.95	3.46	63.06
1941	4.70	3.28	1.79	2.03	3.12	5.09	4.10	4.05	14.27	7.93	4.96	0.10	55.42
1942	0.94	2.19	5.77	3.36	5.85	3.88	1.97	1.81	7.07	3.98	5.16	7.62	69.40
1943	18.02	5.50	9.56	3.29	5.12	7.24	1.34	4.33	3.61	5.03	2.05	3.22	68.31
1944	3.15	13.76	5.85	1.01	6.13	3.92	5.32	2.51	6.06	3.07	1.68	12.27	64.73
1945	3.61	2.53	3.73	15.75	4.23	3.55	3.56	2.98	5.54	5.67	3.69	9.86	64.90
1946	27.56	20.73	1.54	2.33	1.75	1.26	1.99	4.72	1.88	7.37	7.20	15.01	93.34
1947	2.55	1.62	7.45	5.28	4.21	1.10	2.94	4.05	5.81	2.24	4.96	2.91	43.12
1948	4.90	3.43	5.00	6.98	7.07	3.51	3.61	4.10	3.20	9.77	8.73	7.17	60.27
1949	28.50	6.77	2.13	0.67	2.23	3.10	1.83	0.96	1.42	6.60	6.40	12.70	75.51
1950	14.94	6.51	2.27	7.40	1.57	2.56	4.18	5.01	3.49	3.20	17.29	3.99	72.51
1951	33.53	22.56	20.29	3.30	4.76	4.52	2.66	7.22	4.13	16.94	8.58	11.66	120.17
1952	14.27	1.17	6.19	0.52	3.21	0.66	5.43	1.45	3.29	4.44	4.17	0.63	45.63
1953	0.91	5.99	12.45	3.49	1.50	4.98	0.67	1.73	3.21	1.98	3.50	0.83	45.44
1954	5.07	10.08	6.40	2.50	1.94	5.07	3.30	1.26	5.24	2.32	2.79	9.92	45.46
1955	9.77	15.65	6.89	1.10	2.66	2.09	3.01	2.63	5.41	4.47	9.06	12.77	71.72
1956	16.82	6.46	3.15	7.81	5.60	1.45	8.66	11.66	1.53	8.70	25.93	4.73	104.62
1957	14.45	2.38	3.31	4.26	5.42	3.15	1.17	7.64	6.09	7.19	2.93	6.19	57.83
1958	0.99	6.42	1.35	2.88	6.74	1.68	4.74	1.35	4.85	3.56	5.19	9.67	68.62
1959	11.45	4.49	1.19	3.36	3.39	0.88	2.67	8.36	4.34	3.13	17.72	1.52	62.52
1960	5.14	1.09	3.78	3.19	4.10	2.65	1.89	4.37	3.75	6.06	4.90	3.44	43.50

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1921	16.44	4.00	3.18	1.64	2.08	0.45	0.92	2.87	2.11	1.68	1.08	2.54	39.07
1922	6.98	10.43	2.57	1.49	0.57	0.61	2.69	1.06	2.16	4.58	2.75	2.74	38.73
1923	14.57	7.97	11.59	17.34	2.34	1.29	0.45	4.16	4.58	1.94	2.08	7.22	72.61
1924	0.67	0.66	4.51	13.00	2.93	1.43	2.61	1.88	4.39	5.66	8.47	4.82	51.03
1925	1.38	0.74	7.37	0.81	0.51	2.13	1.51	1.72	2.24	3.31	2.93	3.56	28.21
1926	1.53	1.25	0.68	0.65	2.28	0.78	1.00	8.38	1.11	5.31	2.36	10.30	35.63
1927	2.14	0.90	8.09	9.49	1.35	1.71	0.72	5.87	9.36	4.10	1.59	25.71	70.83
1928	0.51	1.44	2.19	2.62	1.99	0.78	4.90	1.90	3.34	4.30	1.70	2.78	28.46
1929	5.86	9.78	3.08	2.25	1.88	0.57	1.82	1.73	1.88	2.03	14.73	4.48	50.09
1930	3.33	0.72	6.23	1.67	1.40	1.27	2.11	3.43	4.77	8.10	3.39	0.61	37.13
1931	0.19	0.08	1.95	1.80	3.05	0.80	1.74	2.00	8.05	3.20	0.80	0.45	24.11
1932	15.07	6.51	2.67	0.84	2.20	0.58	0.35	1.68	3.63	1.62	5.44	8.58	49.38
1933	9.33	7.41	4.39	5.45	5.51	0.63	0.48	1.07	1.18	2.08	3.84	5.55	42.92
1934	7.73	2.84	1.35	3.21	2.55	6.61	1.52	2.84	4.55	4.85	4.69	5.42	48.16
1935	7.30	2.33	11.99	3.68	2.02	4.02	2.45	3.44	13.62	7.96	8.38	4.37	71.56
1936	6.82	6.16	6.06	1.91	0.39	3.55	2.10	7.52	4.29	10.20	0.45	4.70	54.15
1937	15.44	18.40	6.23	3.29	4.51	0.51	1.78	15.49	3.89	3.71	0.34	3.56	79.13
1938	8.90	9.27	2.24	4.78	2.85	1.15	1.46	3.01	2.34	3.90	7.43	5.29	52.64
1939	4.82	11.83	16.69	5.00	0.92	1.26	0.49	0.92	2.99	3.55	2.37	0.80	52.04
1940	1.60	2.39	6.84	0.89	1.29	0.66	2.10	6.45	5.07	8.09	4.00	1.74	41.12
1941	2.15	1.76	0.34	1.82	1.67	3.99	2.00	4.42	10.95	6.77	1.81	0.06	37.74
1942	0.47	0.82	4.78	1.11	2.76	2.00	0.92	0.95	4.00	1.58	2.58	5.84	27.61
1943	20.42	1.62	8.30	1.54	2.67	5.90	1.03	4.46	1.87	2.24	1.38	2.97	54.40
1944	1.94	12.42	6.64	0.58	2.59	2.53	2.88	1.61	2.85	1.87	1.48	10.49	47.88
1945	2.09	1.82	5.06	12.21	1.72	2.25	2.78	1.91	3.20	4.13	5.12	6.41	48.70
1946	28.71	16.63	0.64	1.41	0.68	1.12	0.79	2.38	0.92	3.38	3.74	12.04	72.44
1947	2.47	1.71	5.85	1.69	2.07	0.43	0.89	3.75	3.98	0.87	5.96	1.74	30.41
1948	3.39	3.98	4.67	5.02	3.63	2.84	1.45	2.10	1.81	0.27	7.08	6.59	42.83
1949	23.58	5.67	1.21	0.28	0.91	1.86	0.89	0.10	0.29	5.48	6.56	11.27	58.10
1950	9.54	5.50	4.85	4.64	1.31	0.63	2.84	4.53	1.78	1.32	11.77	3.08	47.79
1951	8.89	19.73	16.64	1.18	2.86	1.11	4.09	2.91	12.48	7.76	5.33	83.60	
1952	13.11	0.38	0.38	0.82	2.14	1.27	0.49	1.18	0.70	1.83	2.36	2.91	33.19
1953	0.90	5.84	8.64	0.94	1.82	1.25	0.31	1.04	1.43	1.24	2.93	2.77	28.91
1954	2.76	0.16	4.82	0.88	0.61	0.12	0.71	4.23	1.24	1.12	4.86	4.06	34.17
1955	4.81	12.68	9.72	1.74	3.78	1.21	1.47	1.01	3.23	2.42	6.96	9.59	58.62
1956	10.37	7.24	3.99	6.11	2.23	0.66	1.88	10.08	0.45	6.92	18.82	2.89	72.61
1957	10.40	1.47	1.04	4.88	3.47	1.20	1.15	6.53	4.43	4.13	4.98	5.67	48.25
1958	0.37	1.63	12.18	0.54	2.46	1.75	1.75	8.16	0.59	3.13	3.52	1.79	37.89
1959	11.72	2.85	1.68	1.63	2.20	0.45	1.18	7.58	2.46	1.59	12.14	1.20	46.68
1960	4.86	0.53	2.94	2.30	2.12	0.59	0.57	3.41	2.00	3.54	1.74	3.43	28.03
1961	1.66	0.96	1.84	3.63	2.28	2.52	1.15	0.96	1.27	9.23	4.14	11.31	39.95
1962	7.39	1.97	7.02	4.07	3.82	1.04	1.24	1.00	5.55	1.14	0.21	3.28	36.63
1963	3.90	1.56	6.58	20.44	5.10	1.37	3.44	2.71	3.58	1.94	1.70	2.97	55.29
1964	3.37	1.09	13.56	2.16	1.88	2.62	0.62	1.15	2.08	0.93	2.60	6.22	38.28
1965	7.38	4.99	4.50	6.80	14.03	0.85	1.58	2.24	5.13	2.19	7.17	5.55	62.41
1966	3.62	6.62	1.22	2.21	2.71	0.60	2.46	3.69	5.51	3.84	8.10	9.06	49.60
Total	476.34	376.59	416.65	261.69	173.41	118.41	137.11	266.74	244.11	280.87	381.66	378.46	3466.95
Mean	6.27	4.89	5.41	3.44	2.28	1.56	1.80	3.51	3.17	3.70	5.02	4.98	46.23
Max.	28.71	20.04	20.02	20.44	14.03	6.61	6.08	15.49	13.62	12.48	18.82	25.71	87.83
Min.	0.03	0.12	0.20	0.14	0.26	0.02	0.22	0.10	0.18	0.18	0.20	0.06	19.97

Station No. 18.0 — MOAULA

1920	5.23	1.06	6.04	1.64	2.90	2.31	0.17	1.25	0.28	2.08	0.96	9.06	33.78
1921	16.16	2.84	2.43	2.08	3.97	0.00	0.20	1.45	0.35	4.28	1.51	1.63	36.90
1922	5.66	7.38	2.55	2.55	0.19	0.41	0.10	0.63	2.07	2.68	4.15	1.80	30.17
1923	20.62	14.06	11.09	18.11	1.99	0.24	0.45	2.82	3.70	0.09	0.96	11.76	86.49
1924	0.21	0.46	14.61	11.71	3.15	1.27	0.90	1.04	1.95	0.17	7.09	4.80	53.36
1925	4.57	2.78	7.06	0.23	0.90	1.10	1.47	1.05	0.65	2.72	1.40	0.38	24.31
1926	1.86	0.90	0.44	1.73	1.97	2.32	0.45	10.46	1.39	6.89	1.50	7.49	37.40
1927	1.53	0.32	9.98	8.84	0.00	0.78	0.28	1.75	0.19	1.77	0.87	43.32	78.63
1928	0.21	0.71	0.84	1.42	2.64	1.09	4.33	2.45	2.96	5.72	2.49	0.55	25.41
1929	6.05	5.92	2.20	2.30	0.00	0.30	3.86	0.36	1.24	4.90	16.26	8.68	52.07
1930	7.24	0.59	9.90	2.73	0.46	0.80	0.73	6.90	5.32	6.94	3.88	0.07	45.36
1931	0.20	0.00	2.06	2.44	3.96	1.46	4.63	0.44	7.04	5.97	0.90	0.70	29.80
1932	13.97	7.58	2.77	2.61	0.55	1.50	0.34	2.07	3.99	1.90	5.37	8.54	51.19
1933	10.90	5.74	4.31	8.41	2.47	0.48	0.13	1.55	0.20	3.24	6.74	1.14	45.31
1934	6.48	1.15	3.19	4.71	3.43	2.32	1.65	2.54	2.31	4.28	3.86	4.09	40.01
1935	4.70	3.12	14.26	4.37	1.86	1.44	1.42	3.95	12.37	10.63	8.95	4.11	72.18
1936	5.16	4.61	4.67	3.18	0.56	1.10	1.63	7.96	3.92	6.53	3.47	2.70	45.49
1937	15.68	11.66	7.07	3.08	5.27	0.37	3.98	11.70	2.43	6.71	0.54	3.11	71.60
1938	11.62	10.65	0.99	4.35	5.07	1.77	1.50	2.30	1.07	3.08	6.39	2.63	51.42
1939	4.78	20.02	21.43	11.04	0.55	0.87	0.45	0.88	5.70	5.64	2.21	0.43	74.00
1940	2.21	3.85	7.53	1.93	3.07	0.63	2.24	7.47	4.53	8.94	4.25	4.45	51.10
1941	4.15	2.43	0.59	2.51	1.23	2.33	2.44	2.16	12.62	7.73	1.38	0.10	39.67
1942	0.32	1.00	4.25	0.40	1.91	1.77	0.40	0.00	1.91	3.50	3.46	5.76	24.68
1943	16.10	3.00	5.50	2.00	2.50	0.83	1.30	0.72	1.15	0.64	2.24	3.84	38.48
1944	1.10	8.00	2.95	0.60	4.46	2.11	0.52	0.92	1.05	2.39	0.88	13.96	38.94
1945	2.37	5.53	1.58	19.03	3.85	1.87	2.80	3.80	2.41	2.73	2.80	11.35	59.92
1946	23.47	16.96	0.41	0.81	0.61	0.93	0.57	2.11	0.96	6.02	8.54	14.11	75.50
1947	2.41	1.61	7.31	1.99	1.38	1.01	1.46	3.29	4.90	0.19	3.37	2.18	31.10
1948	3.69	4.43	4.12	7.26	6.00	3.69	1.16	1.22	2.84	0.42	6.31	0.84	41.48
1949	31.73	7.00	1.42	0.17	2.24	2.23	0.40	0.40	0.48	4.05	8.65	9.60	68.17
1950	16.00	8.60	1.00	4.74	0.60	1.40	2.40	4.31	1.40	1.80	19.20	1.70	63.15
1951	16.40	15.20	25.70	3.10	2.10	3.25	0.50	4.50	2.32	19.58	4.35	8.60	105.60
1952	11.93	1.63	3.50	0.33	0.90	0.03	2.75	0.23	1.04	4.20	4.80	0.20	31.54
1953	0.56	3.60	13.50	1.70	0.00	1.09	0.00	0.29	1.15	0.61	2.65	5.76	30.91
1954	4.60	7.40	4.57	1.66	2.10	0.22	0.20	1.14	1.14	1.00	10.06	3.75	37.84
1955	6.35	18.55	12.02	0.85	0.40	0.85	0.70	0.52	1.55	2.81	11.45	8.50	64.55
1956	12.75	6.50	3.50	4.10	2.00	0.00	2.20	5.68	0.60	4.80	21.00	0.95	64.08
1957	10.50	0.42	0.00	3.23	3.63	1.80	0.49	5.00	3.47	3.48	4.18	0.09	36.29
1958	0.15	4.27	12.48	0.65	0.85	1.29	1.95	11.48	0.18	1.11	1.47	6.14	42.02
1959	14.20	4.22	1.67	2.40	1.02	0.12	4.05	3.98	2.38	11.10	7.86	0.50	53.50
1960	0.00	1.55	0.20	1.43	3.18	0.00	0.17	1.19	1.63	2.56	0.40	2.02	14.33
1961	1.54	0.50	2.00	1.98	0.67	0.66	1.42	0.96	3.95	7.65	0.60	11.3	29.31
1962	4.53	4.02	8.60	5.77	1.18	1.46	0.46	0.25	3.45	5.74	1.16	35.87	1.76
1963	2.81	0.06	6.54	2.13	1.94	0.45	0.82	0.10	0.45	3.22	1.97	4.55	27.57
1964	2.80	1.10	3.33	1.91	1.90	1.70	0.45	0.72	4.80	3.68	3.14	27.57	
1965	3.00	3.84	3.50	7.10	6.40	1.67	1.65	4.80	2.55	13.50	2.20	50.99	
1966	1.80	7.10	0.45	5.10	1.40	0.00	1.33	2.50	4.84	3.10	13.15	5.40	46.07
Total	341.00	245.14	272.11	201.51	99.21	57.49	64.27	130.24	135.04	199.18	241.53	245.29	2232.81
Mean	7.26	5.22	5.79	4.29	2.11	1.22	1.37	2.77	2.87	4.24	5.14	5.22	47.51
Max	31.73	20.02	25.70	21.33	6.40	3.69	4.63	11.70	12.62	19.58	21.00	43.32	64.55
Min	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.18	0.09	0.18	0.07	14.33

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1956	11.12	7.11	4.11	3.39	2.71	0.02	2.40	6.35	0.73	4.64	22.43	2.35	67.36
1957	12.38	1.96	1.00	3.15	3.18	1.42	0.55	5.44	3.35	4.08	2.78	7.12	46.43
1958	0.18	1.86	12.96	1.13	1.19	1.39	2.21	12.74	0.26	1.21	2.94	2.15	40.22
1959	14.20	5.06	2.05	3.00	1.89	0.15	3.63	7.49	3.13	1.12	16.09	0.67	58.48
1960	5.00	1.15	3.55	1.48	3.11	1.46	2.00	1.57	1.56	4.12	1.29	2.06	28.35
1961	2.35	0.86	1.41	2.09	1.22	0.50	1.88	0.34	1.28	11.82	4.41	12.94	41.10
1962	6.17	3.63	11.17	3.93	5.30	0.92	0.41	1.23	4.53	2.72	0.16	2.15	42.32
1963	3.35	1.09	0.03	22.75	13.48	0.62	2.31	1.10	3.64	0.99	3.23	3.68	55.27
1964	3.97	1.50	9.88	1.04	2.38	2.70	0.95	0.95	1.35	0.44	4.24	4.70	34.10
1965	4.23	6.13	4.42	4.98	15.19	1.50	1.55	0.74	5.10	5.94	15.39	3.87	69.04
1966	2.30	9.33	0.63	6.04	1.49	0.16	1.44	2.10	6.44	3.92	14.93	5.32	54.10
Total	468.54	402.24	432.48	262.16	179.87	86.47	102.25	218.16	186.28	276.32	419.24	378.23	3382.15
Mean	6.25	5.36	5.77	3.50	2.40	1.15	1.36	2.91	2.52	3.68	5.59	5.04	45.70
Max.	30.16	23.13	20.91	22.75	15.19	5.15	7.82	12.74	11.97	18.84	32.49	40.52	100.03
Min.	0.11	0.02	0.60	0.10	0.04	0.00	0.00	0.00	0.04	0.17	0.12	0.14	14.24

Station No. 24.1 — OPIHIALE 2

1955	1.55	7.61	4.10	4.56	2.71	4.97	4.92	5.80	5.60	3.00	1.49	5.35	51.66
1956	10.14	3.73	5.40	3.75	5.72	2.47	5.50	3.80	2.57	3.68	14.89	1.00	62.65
1957	6.09	2.58	1.92	3.41	3.48	4.07	3.48	3.63	2.21	4.21	3.54	1.63	40.25
1958	0.34	0.94	4.82	0.96	4.09	3.34	5.61	5.90	3.12	4.81	0.38	2.25	36.56
1959	11.41	2.46	2.41	2.60	3.47	3.06	7.57	3.00	3.75	3.70	4.77	1.53	49.73
1960	0.71	2.53	2.20	1.67	2.37	5.13	1.63	2.54	3.08	5.98	1.33	4.34	34.60
1961	2.43	2.18	4.34	2.20	7.02	4.13	4.62	4.63	3.80	7.02	9.38	2.33	56.08
1962	2.78	0.86	5.47	2.80	5.67	3.51	4.48	2.44	3.05	1.90	1.76	3.13	37.85
1963	5.47	1.21	5.91	8.45	7.05	7.46	6.10	1.61	5.18	1.41	2.05	1.61	54.71
1964	2.68	1.75	8.65	4.94	3.68	3.68	7.15	5.09	4.18	4.13	3.60	9.49	59.02
1965	3.55	3.01	2.18	4.55	5.40	4.32	4.49	6.66	4.67	1.96	7.47	1.97	50.23
1966	2.59	4.86	3.80	2.71	4.31	2.47	2.00	3.19	4.83	2.79	3.68	2.25	39.48
Total	49.74	33.72	51.20	44.60	54.97	48.61	57.55	49.49	46.04	52.59	54.34	37.97	572.82
Mean	4.14	2.81	4.27	3.72	4.58	4.05	4.79	4.12	3.84	4.39	4.53	3.16	47.74
Max.	11.41	7.61	5.91	8.45	7.05	7.46	7.57	6.66	5.60	7.02	14.89	9.49	62.65
Min.	0.71	0.94	1.92	0.96	2.37	2.47	1.63	2.44	2.21	1.41	0.38	1.00	34.60

Station No. 25.0 — PAHOEHOE

1930	—	—	—	—	—	—	—	—	—	6.74	0.86	2.15	—
1931	0.58	2.12	3.10	5.61	2.75	2.74	4.69	4.59	4.01	4.48	1.28	0.82	36.77
1932	2.45	6.16	6.99	2.95	6.99	4.15	6.28	3.83	2.49	5.71	2.66	5.30	55.02
1933	4.20	4.12	3.73	4.10	4.23	6.01	3.30	2.91	4.43	2.64	2.30	0.73	46.99
1934	6.34	1.60	1.84	1.89	7.97	7.36	6.06	8.58	3.08	6.37	2.83	4.39	58.31
1935	5.16	0.95	3.86	4.12	5.19	5.45	6.56	2.63	7.65	11.01	4.09	1.77	58.44
1936	4.00	7.83	3.90	2.01	5.29	2.14	5.04	5.77	9.99	7.36	0.98	1.96	56.07
1937	9.45	2.12	1.70	2.78	3.70	6.59	6.16	4.59	6.50	6.07	2.77	4.46	54.88
1938	4.13	4.29	6.93	2.48	4.63	7.40	4.01	4.16	4.31	4.13	2.59	0.66	49.92
1939	2.10	4.34	5.84	4.94	6.18	4.89	5.82	2.41	5.42	3.45	2.77	1.04	49.20
1940	3.43	2.03	3.76	4.07	2.91	3.97	4.32	6.04	3.28	3.26	4.69	1.50	43.26
1941	1.33	0.71	3.39	2.92	5.04	4.28	4.44	4.74	11.27	4.31	2.64	0.63	45.69
1942	0.12	5.00	4.57	1.21	2.53	5.15	3.75	4.28	9.01	4.98	3.02	7.62	51.24
1943	3.45	1.33	5.40	1.99	8.22	5.92	2.73	4.60	3.81	3.77	1.58	1.08	43.88
1944	0.67	6.26	5.11	5.51	5.16	6.01	2.04	4.83	2.97	2.17	1.23	4.85	46.81
1945	0.83	4.84	3.49	0.97	5.46	3.44	5.56	6.75	3.78	4.56	4.00	2.94	54.72
1946	7.56	2.80	3.91	4.73	1.77	6.19	3.75	4.40	7.30	5.30	3.05	8.41	58.77
1947	0.77	0.99	4.42	4.07	5.76	5.06	5.51	7.09	5.77	1.83	3.05	8.41	58.77
Total	56.57	57.29	70.94	64.45	83.78	86.75	80.02	81.79	99.07	86.33	43.34	50.57	809.88
Mean	3.33	3.37	4.17	3.79	4.93	5.10	4.71	4.81	5.83	4.80	2.55	2.97	50.82
Max.	9.45	6.26	6.93	9.07	8.22	7.40	6.56	8.58	11.27	11.01	4.69	8.41	58.77
Min.	0.12	0.71	1.70	1.21	1.77	2.14	2.04	2.41	2.49	1.83	0.86	0.63	36.77

Station No. 25.7 — PAHOEHOE RANCH

1953	—	—	—	—	—	—	4.52	3.36	2.25	3.02	0.49	3.64	—
1954	2.69	3.40	2.89	2.03	5.78	6.37	3.61	3.59	3.69	3.87	1.71	3.76	52.19
1955	1.07	4.96	3.12	3.08	3.57	6.17	6.10	5.03	3.53	5.05	1.79	3.97	47.47
1956	3.93	3.99	4.77	6.69	8.31	1.88	5.85	5.16	2.91	4.56	10.38	3.10	66.33
1957	3.39	1.14	1.64	4.32	2.76	2.61	2.89	3.17	1.53	3.28	1.51	1.97	32.21
1958	0.35	0.55	0.51	1.21	4.98	3.91	4.52	5.74	1.51	3.64	0.62	3.62	35.06
1959	5.77	2.77	2.62	3.68	4.70	2.55	9.31	6.87	2.92	1.44	6.00	3.26	52.77
1960	0.82	1.80	4.29	5.53	2.82	4.66	1.14	2.69	2.64	3.67	1.06	4.77	35.89
1961	2.94	1.52	3.51	5.19	4.60	3.78	5.79	5.67	4.53	8.36	2.70	2.66	51.25
1962	3.04	1.03	2.48	4.30	7.23	4.31	4.84	2.76	3.47	2.98	1.95	1.64	39.93
1963	3.07	0.65	7.19	7.27	8.26	4.87	3.52	7.57	6.26	2.42	0.60	—	—
1964	4.42	0.81	4.96	6.62	1.68	3.70	5.04	5.17	3.17	2.67	1.80	9.60	49.64
1965	3.98	1.78	3.50	4.02	4.65	3.26	4.78	3.99	6.64	2.93	4.23	1.77	45.43
1966	2.83	5.18	3.39	1.70	2.41	2.34	2.77	3.23	5.89	1.93	3.83	2.65	38.05
Total	45.30	29.58	49.37	55.64	61.75	50.29	64.48	65.80	50.94	49.82	39.37	46.41	546.79
Mean	3.48	2.28	3.80	4.28	4.75	3.87	4.61	4.70	3.64	3.56	2.81	3.57	45.57
Max.	8.93	5.18	7.19	7.27	8.31	4.87	6.10	7.57	6.64	8.36	10.38	9.60	66.33
Min.	0.35	0.65	1.64	1.21	2.41	1.88	1.14	2.69	1.51	1.44	0.49	1.64	32.21

Station No. 27.0 — HONAUNAU

1938	1.64	6.32	6.47	5.24	7.03	7.14	6.65	5.18	7.37	9.29	3.26	1.58	67.17
1939	3.39	2.46	6.96	8.41	7.71	10.44	7.37	5.69	5.05	6.98	4.78	0.86	70.09
1940	2.69	2.12	8.43	4.00	6.47	5.50	6.17	7.25	8.82	4.58	5.07	1.83	62.93
1941	2.01	0.30	5.25	3.52	8.89	6.80	5.73	5.62	10.07	5.86	2.96	0.72	61.46
1942	0.23	3.96	4.87	2.59	2.46	3.49	5.18	9.38	8.11	7.18	2.50	4.11	53.76
1943	0.89	0.89	2.04	1.30	4.94	5.62	1.69	1.48	2.77	1.20	0.88	0.48	27.19
1944	0.95	3.05	1.35	2.10	7.46	13.71	5.85	6.51	2.30	1.67	0.87	1.34	47.16
1945	0.66	4.02	1.92	1.85	2.07	6.16	2.44	8.37	1.54	2.00	1.07	0.29	31.79
1946	2.19	1.38	1.81	1.04	0.54	2.92	0.90	1.77	3.21	3.08	3.66	3.82	26.10
1947	0.74	0.06	7.60	3.07	5.43	5.74	7.00	5.52	2.68	2.04	3.92	2.60	46.42
1948	3.13	2.35	2.31	2.20	2.60	3.84	4.81	3.06	2.90	2.09	2.79	2.72	34.80
1949	2.68	1.96	2.70	2.09	2.65	4.73	2.98	2.74	2.14	2.54	1.94	0.71	29.86
1950	1.03	1.67	1.82	3.39	2.52	0.96	1.64	2.23	1.75	5.77	2.85	1.08	18.61
1951	0.27	0.74	1.37	1.57	2.25	2.23	2.61	1.06	2.75	2.12	1.16	0.44	20.37
1952	2.62	1.35	3.39	2.97	3.64	2.43	1.41	0.81	4.46	3.96	0.90	0.11	28.05
1953	0.66	6.56	5.46	5.27	9.62	7.49	7.47	4.31	4.67	2.09	0.87	2.29	53.46
1954	2.18	0.72	4.59	3.60	7.19	7.38	2.33	4.82	5.01	3.87	1.37	3.15	46.19
1955	2.14	5.32	0.47	2.25	4.12	8.87	8.93	4.35	2.91	3.60	0.98	6.21	50.15

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1956	4.33	2.08	—	3.19	2.93	2.68	3.65	2.16	2.46	1.41	3.13	0.58	
1957	1.59	2.24	0.66	2.42	3.25	1.89	3.01	4.80	2.61	3.34	2.83	2.98	31.62
1958	0.07	1.00	5.55	1.35	5.82	5.66	5.79	7.27	3.91	2.79	1.95	1.25	42.41
1959	6.50	3.34	1.20	6.20	4.83	2.10	4.01	6.04	2.31	2.08	1.36	1.03	41.00
1960	0.77	2.00	2.47	3.00	3.99	6.23	1.18	3.73	4.26	1.78	2.47	2.06	31.94
1961	1.85	1.78	3.34	2.34	3.20	3.45	2.95	3.69	5.02	14.88	2.97	1.09	46.56
1962	2.00	1.32	2.02	1.89	7.48	4.02	4.96	2.02	6.58	3.59	2.14	2.46	40.48
1963	6.59	1.14	2.20	6.70	6.93	7.95	3.26	6.75	2.35	1.12	1.00	1.19	47.48
1964	1.29	0.40	7.69	7.45	1.74	2.56	3.24	5.34	2.21	5.73	2.09	7.13	46.87
1965	2.68	2.93	3.06	5.34	9.66	9.48	3.34	10.81	7.67	4.09	8.27	1.24	73.57
1966	2.73	3.89	2.91	5.00	2.10	1.53	5.91	4.06	8.23	7.97	3.16	1.48	49.65
Total	62.30	67.78	101.51	101.34	139.52	150.28	130.46	136.92	126.11	112.84	79.21	57.51	1236.64
Mean	2.15	2.34	3.63	3.49	4.81	5.18	4.50	4.72	4.35	3.89	2.73	1.98	44.17
Max.	6.59	6.56	8.43	8.41	9.66	13.71	8.73	10.81	10.07	14.88	8.27	7.13	73.57
Min.	0.06	0.06	0.47	1.04	0.54	0.96	0.90	0.81	1.54	1.20	0.47	0.11	20.37

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1956	9.17	2.68	4.89	6.68	8.43	4.51	9.73	7.83	6.97	4.68	8.39	2.77	76.73
1957	4.08	2.10	2.25	6.09	4.51	4.07	5.88	5.19	3.90	5.50	2.52	2.20	46.29
1958	0.35	0.16	0.07	2.68	5.46	3.59	5.07	8.19	3.19	6.38	1.77	1.77	45.68
1959	15.37	2.75	1.25	3.49	4.67	3.34	7.63	9.06	2.93	2.41	6.18	1.09	60.17
1960	1.26	5.67	4.58	1.74	6.13	3.32	1.69	5.40	6.06	5.78	0.61	2.68	44.71
1961	1.42	2.16	8.77	5.99	10.35	4.64	3.89	5.58	4.48	4.35	1.51	1.93	62.72
1962	3.42	0.67	2.28	3.49	8.28	5.59	5.80	4.21	4.44	5.10	2.18	2.40	47.86
1963	4.06	3.22	7.18	11.18	5.12	8.92	8.38	8.34	9.24	9.25	1.36	1.87	70.52
1964	1.86	0.08	6.35	5.85	2.97	4.45	4.72	9.53	5.98	6.70	1.28	5.75	55.52
1965	1.99	1.78	2.26	4.05	5.16	7.12	6.38	11.89	8.67	4.17	6.76	1.17	61.40
1966	6.57	3.44	2.00	1.55	2.77	3.64	5.26	3.32	5.63	5.71	4.97	0.82	45.68
Total	95.15	70.90	116.39	126.70	138.57	156.25	159.26	166.99	150.08	126.14	88.20	78.30	1474.93
Mean	3.81	2.84	4.74	5.07	5.54	6.25	6.37	6.68	6.00	5.05	3.53	3.13	59.00
Max.	15.37	7.52	11.37	11.18	10.35	11.56	12.02	11.89	9.70	9.49	9.15	8.77	81.01
Min.	0.00	0.08	1.25	1.55	2.77	3.32	1.69	2.46	1.69	1.64	0.61	0.82	44.92

Station No. 36.0 — KAPAPALA RANCH

1886								0.12	7.48	3.82	34.39	3.93	
1887	6.81	13.02	6.46	4.90	2.19	1.25	0.00	2.05	3.58	7.66	8.00	23.02	78.94
1888	4.49	10.52	5.91	4.73	7.41	0.45	4.12	0.00	4.16	8.15	2.50	0.00	52.44
1889	0.95	3.50	0.00	3.30	0.00	1.85	3.15	0.00	6.00	2.50	1.65	1.03	23.93
1890	14.66	7.90	16.10	15.85	5.00	2.50	5.30	4.65	0.00	7.70	1.80	6.10	87.56
1891	4.20	1.00	6.20	1.10	0.00	4.50	0.00	3.02	5.68	13.12	1.15	6.27	49.24
1892	23.00	4.60	2.80	2.77	2.60	0.00	0.64	2.62	0.58	6.89	3.16	2.52	52.18
1893	6.01	13.65	8.30	1.62	1.35	1.27	0.98	3.00	2.60	4.09	13.30	2.65	55.22
1894	12.96	10.95	3.14	3.10	0.60	0.30	4.30	2.05	3.40	1.50	7.68	1.80	51.78
1895	4.70	3.25	1.76	2.06	14.70	0.18	1.40	10.75	4.67	2.90	7.28	7.00	60.65
1896	2.25	3.00	4.34	0.95	1.00	0.00	1.25	9.18	0.78	0.25	6.50	11.55	41.05
1897	3.00	3.20	1.35	0.00	0.00	0.93	0.04	0.76	0.83	2.67	8.39	3.70	24.87
1898	9.80	6.42	27.62	3.14	2.15	1.77	2.73	1.07	3.51	5.15	5.45	3.85	72.86
1899	1.50	1.55	16.90	6.48	2.80	0.20	1.37	0.00	0.60	1.92	0.61	2.30	36.23
1900	0.88	2.80	0.65	3.43	2.92	2.38	2.85	3.57	0.66	7.36	10.69	0.24	38.43
1901	3.75	15.92	5.17	2.62	5.72	1.32	3.00	1.23	3.88	8.35	8.25	11.71	70.92
1902	4.04	2.21	13.30	2.75	2.43	4.90	3.30	7.00	4.40	4.65	6.42	3.38	58.68
1903	4.60	4.27	13.10	4.66	2.14	2.15	3.75	0.65	3.10	4.55	5.25	2.45	45.97
1904	3.29	22.93	7.55	5.76	5.08	0.00	1.83	6.65	9.45	1.35	0.00	0.65	64.54
1905	1.76	2.45	3.09	1.71	2.00	2.14	4.24	4.28	2.91	1.43	12.48	1.45	40.94
1906	1.27	3.15	3.81	2.00	4.85	0.00	1.25	8.03	3.30	2.35	18.61	8.60	57.42
1907	13.72	4.25	6.37	2.51	4.11	1.72	1.00	12.70	10.42	9.60	1.90	4.00	68.70
1908	0.79	8.33	10.29	1.89	0.20	0.00	0.00	0.87	1.93	2.72	1.21	1.06	29.29
1909	0.24	4.91	7.52	5.79	2.69	0.50	—	0.00	0.71	2.75	2.56	11.98	—
1910	4.99	5.65	0.92	0.98	2.74	1.60	2.53	5.43	4.19	2.17	3.38	3.33	37.91
1911	6.99	7.60	17.21	6.92	4.93	0.00	1.78	2.50	6.80	3.08	1.38	2.81	62.00
1912	0.00	5.37	2.15	2.33	0.56	1.92	3.18	2.33	0.55	5.20	1.40	2.73	27.74
1913	6.97	4.05	1.65	0.60	8.90	5.46	0.42	4.24	1.93	5.81	12.66	1.75	54.54
1914	5.90	0.22	6.33	3.27	6.92	2.53	15.94	10.70	5.95	1.43	3.90	15.70	80.69
1915	0.00	0.98	1.87	5.95	4.52	7.70	5.25	3.32	3.18	7.44	25.37	15.52	80.90
1916	20.10	5.07	18.15	4.60	4.36	1.12	2.35	1.30	2.85	5.30	2.72	21.02	88.94
1917	9.35	6.26	29.03	5.93	4.67	1.53	0.60	0.55	3.14	3.52	1.45	14.72	80.75
1918	18.07	31.34	11.48	14.95	6.06	5.55	7.08	3.61	5.60	1.68	10.99	1.17	114.58
1919	1.45	0.00	7.15	1.28	5.24	1.76	1.57	5.23	2.54	2.19	4.97	2.02	35.40
1920	10.32	5.06	8.25	3.64	6.53	1.77	0.74	5.75	0.46	6.49	14.88	17.72	68.21
1921	28.54	5.95	3.97	2.32	5.72	0.00	1.51	1.36	1.00	11.41	1.42	3.08	66.28
1922	6.21	8.62	7.92	4.22	1.25	0.89	1.35	1.78	3.54	4.30	7.14	1.69	48.91
1923	29.05	18.09	16.52	25.42	1.99	0.86	0.81	5.92	10.57	2.37	2.37	11.18	125.75
1924	1.00	1.79	17.29	18.06	5.99	3.54	2.08	2.62	1.84	5.62	3.18	3.84	66.85
1925	7.29	1.64	6.12	1.19	2.15	1.72	1.78	1.20	2.79	6.71	1.68	2.26	37.37
1926	2.32	0.88	1.39	3.33	1.70	6.72	2.42	11.16	2.07	5.56	2.08	8.21	47.94
1927	1.89	3.72	9.47	10.99	1.21	1.82	1.04	2.11	11.23	3.42	1.72	41.32	89.94
1928	0.00	2.09	2.64	3.16	4.30	0.50	8.78	0.78	3.50	4.12	3.30	1.84	35.01
1929	6.11	10.25	2.73	1.95	2.48	4.40	4.45	2.81	2.68	4.87	22.12	10.20	71.05
1930	9.52	3.82	8.59	4.35	0.89	1.46	2.50	11.45	5.60	9.34	5.05	0.30	62.87
1931	0.60	0.07	6.48	4.76	5.92	2.42	4.26	1.05	8.04	11.03	1.35	1.21	47.24
1932	12.36	10.82	2.02	3.21	2.12	2.97	0.44	1.57	6.07	2.14	5.29	5.96	54.97
1933	7.50	5.21	4.20	3.63	4.00	1.16	0.00	1.48	0.22	3.83	7.93	1.53	53.39
1934	6.05	4.30	5.06	7.11	12.40	2.35	1.51	3.76	3.85	4.58	5.22	5.44	61.62
1935	7.03	3.18	15.36	5.90	2.73	4.35	2.46	4.48	7.36	11.51	15.27	1.90	81.55
1936	5.03	5.76	5.36	3.38	1.00	2.70	0.84	6.28	5.83	9.35	1.10	3.59	50.22
1937	11.00	14.06	12.30	8.47	5.20	0.30	2.86	11.28	3.10	6.35	2.28	4.32	81.52
1938	16.33	11.55	2.41	7.95	6.00	2.80	3.80	2.47	2.56	5.12	4.98	4.78	70.75
1939	6.12	16.55	22.24	9.25	2.00	2.25	1.81	2.25	7.45	2.79	3.35	0.73	76.79
1940	5.34	4.26	8.69	2.80	1.40	1.78	3.54	10.31	5.50	7.72	4.88	3.20	62.02
1941	2.71	4.37	0.92	2.68	4.75	4.78	1.23	3.15	13.23	8.65	2.48	0.00	48.93
1942	0.86	1.19	5.27	1.95	3.64	2.45	0.50	1.16	5.95	15.43	3.35	3.55	45.30
1943	17.91	4.17	9.27	2.30	8.68	3.62	2.77	3.10	5.59	1.78	0.67	2.95	62.81
1944	1.29	12.29	4.24	1.95	6.05	3.91	1.08	0.76	1.89	3.84	1.31	10.23	48.84
1945	2.53	5.40	3.50	22.34	7.90	2.03	4.87	2.14	1.31	1.98	2.46	7.98	64.44
1946	25.53	7.39	0.57	4.13	3.41	0.51	0.97	1.68	1.03	6.22	7.94	17.47	76.85
1947	3.84	2.61	9.40	1.99	2.36	0.60	2.81	2.98	5.13	1.13	2.36	4.35	39.56
1948	4.64	6.23	6.31	6.61	3.60	3.08	2.52	1.96	3.61	0.57	11.22	1.92	52.27
1949	32.33	6.47	1.98	0.40	2.41	2.18	0.61	0.55	0.42	3.80	2.61	4.91	58.76
1950	18.90	8.67	1.11	6.13	1.48	1.17	2.17	6.63	2.60	1.65	19.94	2.41	72.86
1951	11.28	20.88	20.12	3.75	3.32	4.10	0.96	5.11	3.15	11.74	6.76	8.50	99.67
1952	11.10	1.59	5.10	0.82	3.56	0.16	3.81	0.47	2.36	6.59	4.51	0.96	41.03
1953	1.32	10.64	10.15	3.56	1.37	2.79	0.15	1.61	1.50	1.21	2.22	0.60	42.09
1954	4.42	14.08	8.13	1.84	4.91	0.38	0.71	2.86	3.29	1.86	9.35	7.26	59.09
1955	4.56	14.37	8.27	2.68	1.02	0.82	2.15	3.01	3.57	3.54	6.93	7.54	58.46
1956	15.75	12.90	4.88	4.28	3.32	0.17	5.12	7.13	1.18	13.69	22.97	3.42	94.81
1957	14.60	5.00	1.54	6.56	3.12	3.06	0.94	13.75	0.66	6.28	3.97	8.93	76.81
1958	1.15	4.60	6.60	2.44	2.75	1.92	5.32	18.54	0.96	2.56	5.47	4.28	66.39
1959	13.97	6.00	2.67	4.28	3.33	0.38	1.40	7.17	5.05	6.50	13.52	1.68	65.95
1960	4.38	1.32	16.12	3.12	3.54	1.88	2.85	2.73	4.74	4.68	2.56	2.89	50.81
1961	3.33	2.62	1.34	4.32	3.84	1.86	1.97	1.87	1.87	4.32	8.09	3.30	62.50
1962	6.05	4.11	3.32	2.55	7.38	1.19	1.97	1.87	1.87	4.32	8.09	3.30	62.50
1963	5.03	2.90	15.62	20.83	6.39	2.14	3.56	4.32	4.15	1.96	4.29	2.77	74.16
1964	3.03	2.31	3.12	1.71	6.02	3.76	0.76	1.10	2.03	0.05	5.94	4.84	44.69
1965	6.27	7.20	8.93	7.83	12.70	0.19	2.93	4.51	8.02	7.37	18.14	3.51	85.70
1966	2.87	7.70	2.38	7.21	4.43	0.00	1.54	1.79	7.06	5.59	19.67	6.26	66.70
Total	602.66	537.39	623.73	406.47	317.02	148.30	192.27	315.17	319.88	403.09	529.28	482.15	4795.74
Mean	7.53	6.72	7.80	5.08	3.96	1.85	2.40	3.90	3.95	4.98	6.53	5.95	60.71
Max.	32.33	31.34	29.03	25.42	14.70	7.70	15.94	16.54	13.23	15.43	34.39	41.32	125.75
Min.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	23.02

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1961	1.70	2.15	1.62	1.28	0.65	0.60	0.55	0.00	1.15	5.86	3.30	7.38	26.24
1962	2.15	2.32	4.76	2.65	1.55	2.40	0.12	0.00	2.76	2.04	0.05	0.87	19.63
1963	2.40	1.45	6.44	14.35	6.28	1.46	2.36	0.25	1.44	0.40	2.25	0.28	39.36
1964	5.04	2.10	8.15	0.75	3.86	0.87	1.20	1.94	0.95	0.65	3.45	3.40	32.36
1965	3.50	4.00	4.00	6.72	5.40	0.25	0.50	1.50	3.10	6.59	5.50	3.50	45.06
1966	1.00	4.00	1.20	3.30	3.10	12.60	1.05	1.50	2.70	3.40	12.90	6.40	53.15
Total	241.46	239.30	238.21	185.26	139.55	79.13	92.03	148.64	166.16	228.81	221.76	205.01	2174.75
Mean	5.88	5.84	5.96	4.52	3.40	1.98	2.24	3.54	3.96	5.45	5.28	5.00	53.04
Max.	14.20	12.21	10.65	14.35	9.26	12.60	8.46	10.12	14.36	13.39	12.50	20.00	84.94
Min.	0.00	0.30	0.11	0.53	0.42	0.00	0.00	0.00	0.08	0.40	0.05	0.26	19.18

Station No. 52.0 — HALEMAUMAU

1932	—	—	—	—	—	—	—	—	—	0.17	4.49	5.76	—
1933	7.97	6.58	10.82	9.52	1.72	0.79	0.05	0.17	0.78	1.14	6.84	0.71	49.09
1934	5.29	2.18	3.05	3.33	4.51	3.64	2.51	0.66	4.88	2.42	1.67	9.21	43.33
1935	7.81	3.92	14.26	4.48	0.85	0.67	2.50	0.71	5.23	8.26	7.88	2.81	59.38
1936	3.60	2.35	7.03	1.64	0.73	0.71	1.44	5.19	3.74	7.06	0.81	8.63	42.93
1937	14.74	16.26	10.57	3.71	3.67	0.61	2.78	14.10	1.09	3.86	3.78	3.38	78.53
1938	14.91	9.13	3.61	5.49	1.54	2.05	0.71	1.33	0.56	5.52	8.20	5.75	58.50
1939	10.81	11.93	23.95	6.50	1.11	1.87	1.04	1.07	0.82	1.93	2.32	0.56	63.91
1940	4.45	1.34	7.74	1.43	0.96	0.45	0.71	12.47	3.85	5.43	9.87	2.24	50.94
1941	1.28	2.24	1.87	0.66	3.93	4.41	1.98	2.60	7.61	8.44	1.63	2.60	39.25
1942	0.59	1.67	6.08	3.04	1.57	1.56	1.06	0.49	1.87	4.19	2.94	4.15	29.21
1943	12.12	3.77	9.22	4.39	5.54	2.39	4.56	1.44	0.64	0.52	1.03	3.36	48.98
1944	1.01	3.44	3.27	2.32	3.31	0.73	1.21	0.70	0.86	3.37	3.34	15.28	39.54
1945	0.85	2.48	4.78	20.96	2.29	1.06	0.48	2.88	1.36	1.80	3.68	9.70	52.26
1946	15.02	13.19	5.39	2.67	0.52	7.88	2.05	0.72	0.17	0.08	3.98	23.75	77.32
1947	2.24	1.06	3.08	1.84	0.89	0.44	1.46	1.77	3.07	1.28	7.46	5.08	29.67
1948	4.05	2.87	4.20	4.50	2.03	0.61	1.07	0.97	0.76	2.69	6.35	4.30	34.40
1949	17.85	3.83	2.87	0.34	0.63	0.50	0.56	0.52	0.10	3.09	2.65	0.68	39.02
1950	5.32	12.43	1.73	7.34	1.76	0.67	1.25	4.69	0.57	1.11	16.90	2.92	56.69
1951	7.81	16.40	18.35	1.90	0.83	1.47	0.76	5.07	0.47	19.78	5.58	4.07	82.49
1952	21.22	2.31	7.85	0.64	1.50	0.41	0.95	0.08	0.42	1.75	3.67	0.98	42.53
1953	0.92	2.45	1.98	0.24	1.25	0.34	0.05	1.03	1.11	1.96	3.53	4.03	18.89
1954	2.70	11.53	4.47	2.35	2.40	0.54	1.08	2.08	1.55	0.86	16.90	10.58	57.04
1955	2.85	14.45	6.16	5.76	0.86	0.17	0.71	1.15	1.50	0.92	6.50	8.58	49.81
1956	12.03	16.80	4.04	2.80	2.58	0.80	0.12	0.50	0.33	8.90	15.49	3.05	73.44
1957	13.42	1.52	0.63	5.65	2.29	Trace	1.06	7.55	2.90	2.23	3.20	10.50	50.95
1958	0.35	1.39	12.00	1.45	1.05	0.15	1.80	7.75	0.15	2.27	4.70	1.70	34.76
1959	13.75	8.53	0.78	1.73	0.95	0.27	0.74	3.30	1.45	0.97	15.10	3.25	51.82
1960	4.90	1.56	8.23	3.35	2.00	0.15	Trace	1.11	1.81	2.07	1.90	0.80	27.88
1961	2.17	3.00	0.55	1.29	0.37	0.14	0.15	0.25	1.49	9.81	4.34	9.77	33.33
1962	3.54	0.80	2.01	0.58	3.50	0.87	0.09	0.06	1.29	1.12	0.61	1.09	15.56
1963	2.20	1.85	5.70	—	3.00	2.00	1.78	0.66	2.09	0.44	2.24	0.60	—
1964	5.56	2.97	11.18	0.71	2.84	0.61	0.48	1.22	0.88	0.49	3.71	7.05	37.52
1965	5.67	4.49	4.85	9.21	10.99	0.75	0.77	1.08	4.07	3.64	14.52	4.53	64.57
1966	1.28	7.72	1.96	2.66	3.54	0.76	2.72	2.35	4.17	4.46	21.94	7.80	61.36
Total	230.26	201.44	214.96	124.48	77.49	33.39	40.66	94.70	63.62	133.03	219.75	194.63	1595.27
Mean	6.77	5.92	6.32	3.77	2.28	1.01	1.23	2.79	1.87	3.80	6.28	5.56	48.34
Max.	21.22	16.80	23.95	20.96	10.99	4.41	4.56	14.10	5.23	19.78	21.94	23.75	82.49
Min.	0.35	0.80	0.63	0.24	0.37	0.14	0.05	0.06	0.10	0.17	0.61	0.56	18.89

Station No. 54.0 — HAWAII NATIONAL PARK HEADQUARTERS

1913	—	—	—	—	—	—	—	—	—	6.60	5.44	2.39	25.15	2.05	—
1914	4.48	2.68	6.57	6.51	8.96	10.10	28.38	18.22	16.91	8.13	13.85	10.06	135.21	—	—
1915	2.02	1.33	1.97	8.42	2.68	6.90	3.86	2.56	7.39	14.16	34.51	20.12	105.92	—	—
1916	—	4.11	15.04	13.89	17.06	6.58	6.76	5.66	5.92	9.33	8.11	25.32	—	—	—
1917	12.90	5.04	25.79	11.27	4.16	2.98	2.29	1.98	1.90	2.25	5.45	5.68	81.67	—	—
1918	19.02	40.65	12.75	13.82	10.86	4.30	15.51	9.27	3.60	5.44	19.13	17.18	171.53	—	—
1919	3.92	3.27	8.52	3.90	2.54	2.99	3.95	5.36	5.72	4.62	3.62	4.14	52.55	—	—
1920	8.48	2.11	9.12	3.31	2.66	2.57	3.91	3.66	4.71	7.51	6.74	14.84	69.62	—	—
1921	43.96	3.73	2.19	7.63	5.32	1.52	4.25	5.10	5.16	11.37	10.80	6.47	107.50	—	—
1922	16.93	15.78	28.13	9.38	3.45	1.28	3.69	4.45	6.14	4.50	6.74	2.34	102.81	—	—
1923	26.23	14.26	20.66	27.60	4.33	4.14	3.93	7.19	8.82	7.55	3.14	14.65	142.50	—	—
1924	0.78	3.85	10.41	13.27	6.83	1.39	4.74	3.58	2.82	8.22	9.61	4.42	69.92	—	—
1925	9.59	0.96	18.40	7.32	2.92	4.88	2.49	9.09	2.55	5.16	5.98	2.41	72.35	—	—
1926	1.76	3.50	2.23	2.53	3.02	3.60	2.11	13.46	4.92	4.19	1.67	16.50	59.49	—	—
1927	9.00	2.10	18.00	6.70	6.37	3.77	7.01	7.60	15.97	4.49	4.56	43.15	128.72	—	—
1928	6.98	2.74	2.83	5.91	5.24	7.33	7.51	3.52	5.14	8.08	7.30	9.98	72.56	—	—
1929	5.63	11.32	7.79	5.20	2.92	3.20	7.11	3.71	3.16	2.87	15.54	7.03	75.48	—	—
1930	5.92	3.71	11.72	6.35	8.38	6.82	4.14	24.46	9.62	13.83	8.04	4.87	107.86	—	—
1931	1.92	6.40	1.57	3.92	3.39	1.88	9.85	4.89	14.55	5.19	8.58	3.21	65.35	—	—
1932	24.55	14.34	4.15	8.30	6.84	3.26	3.06	1.52	7.10	1.80	0.98	8.69	90.39	—	—
1933	16.29	11.38	12.81	15.16	7.48	3.92	1.02	1.65	3.40	1.67	9.03	1.34	85.15	—	—
1934	9.01	4.63	3.91	5.74	7.73	8.90	5.67	2.38	9.41	5.90	6.75	12.52	82.55	—	—
1935	10.29	8.56	18.02	9.60	3.13	3.07	7.94	2.59	9.12	9.03	9.64	5.29	96.28	—	—
1936	4.85	3.61	9.65	3.69	4.73	3.32	6.70	7.07	10.26	7.78	8.74	2.64	18.93	84.90	—
1937	22.02	20.46	13.40	7.83	8.61	2.45	7.89	24.75	3.47	7.21	10.52	4.83	133.44	—	—
1938	21.98	9.72	9.27	9.54	7.02	4.15	3.51	3.96	2.93	7.72	14.44	12.62	106.86	—	—
1939	18.01	14.59	29.85	11.28	3.89	6.65	4.96	5.03	2.96	5.27	6.64	1.53	110.66	—	—
1940	3.25	1.85	9.22	3.87	3.29	2.51	3.05	20.77	7.99	6.34	10.49	3.08	75.71	—	—
1941	1.84	2.22	7.18	2.19	9.19	10.62	5.96	6.57	13.66	15.21	5.47	9.43	89.54	—	—
1942	0.70	3.39	17.74	5.45	5.06	4.38	3.26	2.92	5.15	8.34	4.39	6.26	67.04	—	—
1943	16.62	10.45	9.63	7.14	7.83	9.15	10.34	5.73	3.36	2.74	2.82	7.27	93.08	—	—
1944	3.44	11.58	4.87	11.70	10.09	4.40	6.57	4.74	3.31	7.99	10.82	18.08	97.59	—	—
1945	2.58	3.81	18.58	27.91	3.46	6.74	2.04	7.81	5.21	5.96	7.18	10.95	102.23	—	—
1946	17.22	16.29	17.26	11.48	2.05	3.28	8.29	2.97	1.62	14.15	6.26	27.83	128.70	—	—
1947	4.20	1.43	13.39	6.51	4.91	3.10	4.30	7.70	6.64	4.01	10.71	12.09	78.99	—	—
1948	5.37	7.20	18.92	10.26	7.07	3.31	5.80	3.28	3.39	7.14	13.59	18.63	103.96	—	—
1949	34.32	8.21	7.92	2.09	1.89	2.48	3.92	3.62	1.57	7.08	5.84	16.60	95.54	—	—
1950	13.69	18.30	6.62	14.53	7.46	4.40	5.11	6.17	2.48	3.12	16.25	4.80	102.93	—	—
1951	14.11	25.93	28.45	6.09	3.57	4.79	3.59	9.71	2.27	24.23	16.29	6.25	145.28	—	—
1952	30.55	4.60	21.67	3.86	6.19	4.74	3.95	2.94	2.82	5.88	11.23	5.84	105.27	—	—
1953	1.23	8.65	10.63	1.61	7.72	3.45	1.50	4.44	3.12	2.95	8.80	6.83	100.77	—	—
1954	4.59	11.36	7.43	2.38	7.66	6.10	5.75	9.82	5.20	4.17	15.61	2.77	106.78	—	—
1955	11.15	20.02	7.04	14.20	9.10	3.04	5.25	4.89	4.69	3.02	10.64	12.30	106.94	—	—
1956	15.99	25.96	10.16	8.23	9.46	8.28	2.87	17.17	2.04	14.49	20.56	6.02	144.23	—	—
1957	18.60	5.40	3.40	13.41	4.76	2.33	6.28	16.72	5.04	4.58	7.16	22.60	109.93	—	—
1958	1.99	1.99	2.79	17.91	5.14	5.66	4.51	7.36	14.77	3.30	5.78	11.18	82.12	—	—
1959	16.44	17.05	3.44	6.75	5.75	2.11	4.37	11.53	3.36	2.92	17.03	19.09	116.91	—	—
1960	19.83	6.25	—	—	—	—	—	—	5.50	4.33	10.07	2.37	91.17	—	—

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1916	---	2.73	19.44	14.14	16.27	10.74	10.29	---	---	---	---	---	---
1917	---	---	---	---	---	---	---	---	---	---	---	---	---
1921	27.81	11.39	41.65	12.08	7.60	3.34	6.61	10.30	14.40	8.50	16.76	4.33	164.77
1922	44.04	18.42	23.91	20.06	11.67	9.12	11.53	11.43	10.55	10.01	8.95	23.74	204.33
1924	3.30	9.12	8.67	22.14	6.30	5.56	13.49	9.99	7.64	16.67	11.12	7.81	121.81
1925	10.51	4.77	27.76	9.39	9.48	9.65	6.78	14.20	10.54	6.94	11.68	3.90	125.60
1926	4.29	7.49	3.21	3.75	8.40	3.40	6.34	10.59	11.12	7.27	5.68	19.28	98.82
1927	14.87	2.27	31.62	11.92	15.80	8.97	12.53	12.93	16.63	10.84	13.23	38.67	190.30
1928	7.68	4.55	3.57	11.08	9.95	7.07	12.56	10.14	11.90	10.55	8.43	24.19	123.30
1929	10.97	17.60	9.98	12.36	4.13	5.63	12.00	10.96	9.66	9.37	17.96	22.50	143.12
1930	7.29	3.85	16.83	22.53	9.09	14.78	10.53	19.55	13.33	12.40	32.24	8.83	171.25
1931	4.01	7.98	4.00	8.88	6.74	6.02	13.29	12.57	16.59	11.03	16.79	6.26	114.16
1932	30.48	32.05	5.89	12.58	11.22	7.20	10.91	7.51	11.13	5.87	8.00	18.47	161.31
1933	24.52	10.60	11.64	14.16	9.44	8.00	7.52	4.89	7.40	5.29	6.86	4.76	115.08
1934	14.42	6.96	4.04	8.14	16.41	14.28	16.50	8.15	16.23	15.23	21.19	21.81	157.76
1935	16.64	28.00	19.98	11.95	5.24	9.09	11.80	8.04	11.51	10.88	17.55	8.94	159.62
1936	9.13	4.19	15.62	14.71	10.06	8.63	13.31	20.37	15.34	16.89	7.58	36.90	172.73
1937	26.53	14.98	20.48	14.33	10.81	7.02	21.46	13.90	14.91	14.49	14.76	20.38	193.97
1938	23.56	7.72	24.98	30.74	10.76	6.64	8.25	7.96	7.70	11.33	15.24	16.48	177.67
1939	20.81	19.97	28.45	20.93	6.39	10.18	11.34	6.99	6.47	10.72	17.25	3.28	162.78
1940	3.52	3.39	10.54	6.57	9.97	6.56	9.23	25.34	16.17	12.07	11.62	6.66	117.64
1941	6.81	2.59	8.25	4.86	12.75	8.51	6.22	17.24	14.77	32.33	10.51	12.70	137.54
1942	1.67	7.50	45.90	12.24	8.81	10.15	6.99	11.59	11.08	9.87	8.21	14.44	148.45
1943	17.73	9.70	10.13	8.85	14.22	14.41	12.06	9.91	6.65	6.63	10.97	10.99	125.15
1944	6.03	22.68	2.25	15.46	12.31	8.91	10.77	9.33	7.48	13.45	12.28	16.84	137.79
1945	4.06	8.67	18.82	7.96	2.49	9.10	4.73	14.21	5.77	7.75	15.70	14.57	113.83
1946	14.54	14.24	13.23	13.86	3.48	6.38	15.84	7.24	5.90	12.27	53.33	29.21	140.71
1947	4.05	2.69	13.64	8.44	7.31	7.06	9.81	9.48	10.31	10.45	24.17	16.71	124.12
1948	6.93	8.59	27.86	9.98	12.84	5.31	8.31	6.87	10.24	14.34	15.14	19.57	145.98
1949	28.47	4.82	12.79	4.93	5.53	3.83	10.37	8.83	4.53	8.26	13.60	19.13	125.09
1950	10.74	11.69	2.99	28.02	14.55	6.30	7.93	7.94	6.87	6.49	12.02	17.66	139.50
1951	15.46	18.22	22.14	5.36	6.32	5.41	9.21	10.74	3.59	30.85	14.69	20.55	162.64
1952	17.88	8.00	19.12	8.67	6.13	10.02	7.29	6.93	8.04	10.78	16.97	10.53	130.36
1953	1.87	17.53	26.20	7.85	12.67	9.62	6.66	7.34	4.19	7.65	7.04	11.85	120.47
1954	6.14	9.27	17.46	26.67	16.05	8.66	10.10	15.41	9.68	8.19	15.82	45.62	162.06
1955	13.37	28.93	21.30	13.41	13.27	5.35	8.63	8.92	5.92	7.76	19.32	12.42	158.60
1956	13.39	28.43	8.54	8.17	13.61	11.01	9.57	14.73	4.63	19.85	18.10	13.08	163.11
1957	14.05	11.25	3.33	14.21	5.65	5.88	13.52	22.63	6.01	11.07	13.48	29.54	150.62
1958	5.07	7.65	11.38	6.03	12.42	8.65	12.82	18.16	8.11	12.18	10.80	5.38	123.05
1959	20.12	12.04	8.19	9.09	8.28	4.44	7.27	10.55	8.51	8.63	19.48	12.99	129.59
1960	9.57	23.71	10.78	12.59	17.16	7.33	8.47	11.20	14.33	6.63	15.23	4.43	141.43
1961	7.87	28.20	2.24	7.82	11.09	6.85	5.96	6.43	7.18	26.41	14.78	20.25	149.08
1962	4.68	4.45	15.36	6.31	14.73	10.40	10.43	4.66	7.47	4.70	6.48	3.72	88.39
1963	5.29	2.02	10.93	29.94	15.73	12.67	16.55	7.59	7.84	9.85	7.36	1.13	135.90
1964	18.07	16.87	21.64	10.25	17.69	7.58	9.04	7.21	12.24	11.47	26.77	14.72	173.51
1965	11.62	6.64	11.73	16.36	32.37	9.94	6.53	7.12	5.29	6.85	28.22	16.68	159.35
1966	16.03	11.40	5.46	5.57	5.96	8.55	14.90	6.38	13.53	12.43	16.05	15.85	132.11
Total	699.75	679.68	835.25	688.02	613.82	498.67	621.70	611.92	574.67	700.82	743.87	855.60	7281.90
Mean	12.72	11.92	14.65	12.07	10.77	8.75	11.10	10.93	10.26	12.74	14.04	15.56	145.64
Max.	44.04	42.39	45.90	30.74	32.37	24.50	22.87	25.54	21.35	32.33	32.24	45.62	204.33
Min.	1.25	2.02	2.56	1.80	2.49	0.37	4.73	1.43	3.59	3.86	3.69	1.13	88.39

Station No. 66.0 — KAPOHO UPPER

1934	13.10	4.18	6.03	5.22	11.90	10.55	14.31	7.30	10.78	10.18	9.63	14.33	117.51
1935	9.41	21.98	20.99	7.13	4.16	7.83	8.92	7.96	7.15	8.62	17.21	16.84	138.00
1936	6.11	2.38	12.41	7.85	5.54	6.22	8.59	14.77	12.73	15.15	6.49	28.84	127.08
1937	19.39	16.09	13.88	11.00	7.95	5.19	13.38	11.10	12.21	6.82	10.38	20.78	146.17
1938	17.58	4.43	16.80	18.22	10.76	6.82	7.79	9.34	9.80	10.23	13.60	11.22	136.59
1939	12.32	18.24	27.15	16.27	13.51	7.83	7.79	5.66	8.96	6.58	14.20	3.85	132.36
1940	5.37	3.22	10.69	5.05	5.69	6.63	6.38	16.61	9.51	8.85	15.72	5.39	101.11
1941	6.27	6.46	5.28	3.51	8.94	5.93	5.73	16.72	16.96	26.98	11.84	7.22	121.84
1942	1.34	4.51	30.39	6.04	6.98	11.11	7.49	10.51	7.91	7.95	12.11	15.22	121.56
1943	19.60	7.07	10.08	6.78	11.23	10.85	9.15	9.52	5.92	5.20	3.89	10.17	109.46
1944	4.44	16.13	3.34	8.63	10.54	6.24	7.80	7.12	7.33	11.50	8.63	15.92	109.62
1945	4.62	9.70	14.32	7.05	3.23	6.77	4.86	10.61	6.15	5.26	16.01	6.42	95.00
1946	12.74	12.23	9.82	12.23	2.34	4.86	14.95	5.87	4.76	12.86	7.55	22.08	122.29
1947	3.78	2.90	9.32	6.89	6.86	5.96	8.63	9.58	10.42	12.27	28.80	17.27	122.21
1948	8.18	7.42	29.40	7.58	8.96	5.84	7.65	5.88	13.70	5.43	11.69	12.87	124.60
1949	27.93	5.25	9.02	4.33	3.42	4.01	8.76	6.47	3.23	8.17	13.61	19.27	113.47
1950	15.54	6.88	7.57	17.55	9.30	6.27	6.52	7.38	9.30	5.03	13.70	20.82	125.66
1951	15.28	16.04	17.10	4.70	5.54	5.03	7.52	9.53	3.36	21.79	10.45	14.88	131.22
1952	12.49	5.40	11.17	4.26	6.24	6.68	5.51	6.64	7.28	8.55	13.10	7.55	94.87
1953	1.66	18.20	19.08	5.33	10.06	7.55	5.47	5.39	3.32	5.71	5.60	9.27	96.64
1954	4.37	6.97	20.72	3.60	10.16	7.07	10.44	12.53	8.00	6.49	12.68	41.67	145.30
1955	10.57	22.25	—	7.34	8.25	4.21	Discontinued	—	—	—	—	—	—
Total	230.09	221.73	304.56	176.76	161.56	150.05	177.64	198.49	178.78	209.35	256.69	321.68	2534.56
Mean	10.46	10.08	14.50	8.03	7.34	6.82	8.46	9.45	8.51	9.97	12.22	15.32	120.69
Max.	27.93	22.25	30.39	18.22	11.90	11.11	14.95	16.72	16.96	26.98	28.60	41.67	146.17
Min.	1.34	2.90	3.34	3.51	2.34	4.01	4.86	5.39	3.23	5.03	3.89	3.85	94.87

Station No. 67.0 — KAMAILE

1929	---	---	7.58	8.72	2.14	3.98	7.92	7.49	9.36	6.88	15.52	19.05	---
1930	7.71	4.29	13.06	10.01	6.50	8.76	5.09	12.60	9.82	14.23	26.18	7.68	125.93
1931	1.94	6.48	2.03	6.54	3.03	3.30	10.26	8.58	13.20	7.17	10.96	4.49	77.98
1932	20.76	30.19	4.98	8.20	5.75	4.93	5.66	4.24	8.56	5.39	5.71	10.89	115.26
1933	18.91	7.37	7.02	13.04	5.55	3.54	3.40	2.78	3.21	4.12	4.66	2.97	76.57
1934	11.85	3.55	2.08	3.29	8.45	10.43	10.62	5.83	10.71	11.14	9.36	12.89	100.20
1935	12.86	15.46	21.01	6.56	3.38	5.01	6.95	6.87	6.73	11.10	13.23	5.02	110.18
1936	4.60	4.39	12.18	6.66	4.80	3.83	7.50	12.23	10.49	14.29	3.24	25.31	109.52
1937	20.26	13.45	10.75	10.21	6.10	4.25	10.00	7.60	10.20	6.36	8.84	17.12	125.14
1938	16.89	5.52	14.88	20.82	8.64	5.38	4.80	5.26	5.10	7.41	11.46	11.67	117.83
1939	15.46	16.73	30.59	13.92	2.52	6.94	7.40	5.	4.04	11.45	8.86	126.49	82.45
1940	3.85	2.11	7.56	4.50	4.33	5.02	5.11	13.72	9.89	6.62	12.50	4.44	126.49
1941	4.01	1.87	6.06	3.33	8.82	6.35	4.14	13.53	11.43	17.37	6.07	6.57	89.57
1942	0.80	6.14	25.11	7.30	5.99	9.00	4.44	7.60	7.58	6.07	7.65	11.84	99.75
1943	23.34	6.43	6.43	10.18	10.19	11.96	7.73	4.95	4.33	4.53	2.87	8.97	106.17
1944	5.16	24.76	5.56	9.09	10.40	7.59	6.82	10.50	4.81	6.91	4.41	16.47	110.10
1945	4.23	10.54	13.06	7.48	2.26	5.85	4.03	8.61	5.15	6.21	14.17	15.68	97.77
1946	14.40	10.78	9.10	9.46	2.23	4.56	11.43	6.16	3.42	9.52	7.72	25.04	113.83
1947	2.61	12.7	13.32	6.12	2.83	6.28	6.55	7.62	11.23	7.40	22.86	10.16	100.07
1948	6.43	8.05	20.32	8.43	3.38	4.29	4.54	4.46	7.55	7.59	12.99	12.52	103.48
1949	30.03	4.65	8.25	1.15	3.11	3.44	5.92	4.27	2.94	9.24	10.26	20.03	105.25
1950	15.67	10.73	6.54	22.78	7.55	1.74	4.58	6.83	2.86	5.15	11.75	12.71	113.71

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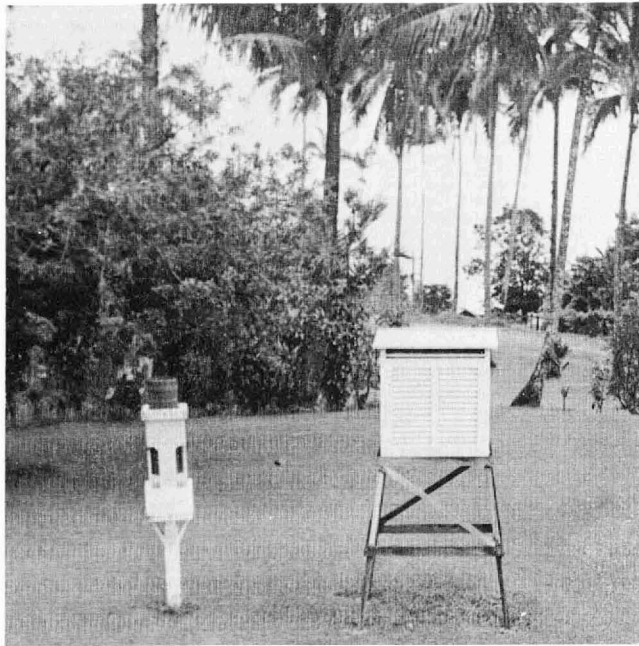
	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1901	—	—	—	—	—	—	—	—	—	—	—	—	—
1902	—	—	—	—	—	—	—	—	—	—	—	—	—
1903	—	—	—	—	—	—	—	—	—	—	—	—	—
1904	4.64	4.03	6.25	9.44	6.67	14.13	9.25	6.44	6.79	5.23	3.04	3.27	80.08
1905	2.59	1.27	9.34	10.00	7.25	9.22	8.32	9.76	9.97	2.45	2.67	1.84	74.68
1906	1.75	2.09	1.93	4.95	7.75	6.43	4.28	3.60	5.95	11.08	7.91	0.49	58.21
1907	0.00	2.64	6.00	3.16	4.66	8.46	3.39	15.36	9.25	5.27	2.69	4.46	65.36
1908	7.38	1.43	7.16	4.80	12.48	14.02	6.12	4.36	7.09	9.52	1.97	3.03	79.86
1909	0.96	4.34	9.63	5.63	9.90	16.41	7.23	8.23	4.96	4.33	2.46	3.17	77.45
1910	0.89	8.00	0.78	9.21	13.17	22.07	8.05	13.17	8.40	4.71	4.23	2.09	103.78
1911	2.92	4.07	3.75	6.84	3.61	7.68	6.05	6.08	6.39	9.40	1.92	6.88	65.59
1912	1.39	1.67	7.61	7.19	8.88	7.19	7.71	9.34	8.57	2.91	7.17	7.23	77.06
1913	7.74	6.89	6.99	5.59	11.09	9.25	13.09	10.96	4.20	4.41	5.85	4.83	88.89
1914	7.97	7.06	6.25	4.51	6.87	13.70	10.86	10.98	5.35	7.53	1.78	2.05	84.91
1915	7.86	4.52	3.10	14.05	12.22	8.46	10.23	5.39	3.76	8.72	11.57	1.38	91.26
1916	3.54	6.06	12.23	6.56	17.09	15.25	6.69	7.12	7.08	6.96	5.56	4.29	100.43
1917	9.27	2.19	3.98	4.91	6.65	9.55	3.12	1.82	8.33	8.54	6.66	2.30	67.22
1918	1.10	8.20	5.74	11.24	15.97	14.19	5.87	3.91	3.55	1.91	2.42	11.65	85.75
1919	1.75	0.62	3.05	2.44	9.22	13.30	7.13	8.08	4.64	3.99	3.13	6.25	63.60
1920	3.47	10.56	2.13	3.63	7.72	15.08	13.21	5.32	9.22	3.62	2.54	4.49	80.99
1921	6.22	4.37	3.76	12.41	12.05	7.95	11.56	7.96	6.81	8.38	9.46	4.18	95.11
1922	7.76	2.92	5.99	6.99	12.63	4.17	8.33	7.94	3.35	4.44	4.16	0.78	65.48
1923	0.61	0.29	7.50	2.87	9.37	12.51	4.31	10.77	2.79	8.13	1.93	3.29	64.37
1924	17.28	3.76	2.52	5.20	5.73	4.16	8.61	5.87	3.31	6.01	5.29	0.90	69.14
1925	0.59	0.68	6.88	6.51	11.21	7.24	1.94	8.14	6.85	5.55	2.42	2.78	60.79
1926	3.91	3.11	6.78	7.62	12.55	8.82	5.12	5.19	3.58	4.82	6.31	2.48	70.49
1927	6.18	1.60	4.55	5.70	14.70	—	—	—	—	—	—	2.73	—
1928	Discontinued	—	—	—	—	—	—	—	—	—	—	—	—
Total	116.28	116.80	171.33	184.32	284.37	285.91	204.40	215.64	178.43	186.80	120.91	100.80	1989.74
Mean	4.01	4.03	6.12	6.36	9.81	10.21	7.30	7.70	6.37	6.87	4.84	3.47	73.69
Max.	17.28	10.56	12.23	14.05	17.09	22.07	13.21	15.38	11.62	13.88	11.57	11.65	108.78
Min.	0.00	0.20	1.93	1.84	3.61	4.16	1.94	1.82	3.31	1.91	0.71	0.49	56.21

Station No. 68.3 — KONA AIRPORT

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1949	—	—	—	—	—	—	—	—	—	—	—	—	—
1950	4.44	1.51	0.18	4.84	1.82	1.68	3.06	2.98	2.70	0.41	2.00	0.74	32.59
1951	2.41	4.46	7.80	1.63	1.23	4.31	1.40	4.03	1.59	2.62	1.43	1.15	34.06
1952	5.11	0.10	2.39	0.80	1.61	3.38	0.62	0.37	2.15	1.11	0.59	0.86	19.09
1953	Trace	2.56	1.10	3.63	4.59	1.68	1.98	1.73	1.54	0.55	0.47	0.14	23.97
1954	1.74	0.81	2.06	0.73	2.32	3.89	4.90	4.22	0.68	1.32	0.18	1.89	24.74
1955	1.41	3.56	1.96	1.29	2.11	1.87	2.36	2.27	1.79	0.22	0.66	3.67	25.17
1956	4.57	2.93	0.84	1.70	3.57	2.07	3.31	1.63	4.06	3.50	2.68	2.66	33.52
1957	1.24	1.07	0.93	0.78	0.75	0.71	2.70	1.50	0.68	1.08	2.29	0.45	14.18
1958	0.05	0.07	4.40	0.82	3.22	1.83	3.44	2.34	0.71	3.99	0.50	2.12	23.49
1959	13.29	1.64	0.55	1.15	1.33	0.87	3.17	2.17	1.19	1.12	3.78	0.64	30.90
1960	0.21	0.06	0.63	0.52	2.41	1.88	0.43	2.86	4.38	1.50	0.15	2.03	17.06
1961	1.43	1.01	1.23	2.07	2.69	2.82	1.85	1.40	1.20	3.50	4.36	1.11	24.67
1962	3.34	0.17	1.15	0.53	2.67	2.24	2.16	0.29	1.32	0.43	0.25	0.60	15.15
1963	4.78	1.63	3.65	10.71	2.52	1.46	2.28	2.68	2.79	0.48	0.48	0.78	34.40
1964	0.54	0.95	3.92	2.15	1.20	3.51	0.77	1.59	1.32	1.20	1.18	0.63	20.96
1965	1.25	1.58	1.15	2.40	3.31	2.23	4.33	5.03	2.04	3.52	4.60	0.06	29.60
1966	0.20	2.54	0.20	0.66	2.92	0.94	2.54	1.39	1.33	4.56	5.17	1.25	23.70
Total	46.01	26.65	34.14	36.41	40.27	37.37	40.05	41.36	30.39	32.70	37.94	26.87	425.25
Mean	2.71	1.57	2.01	2.14	2.37	2.20	2.22	2.30	1.69	1.82	2.11	1.49	25.01
Max.	13.29	4.46	6.01	10.71	4.59	4.31	4.90	5.03	4.38	4.56	9.01	1.14	34.40
Min.	Trace	0.06	0.18	0.52	0.75	0.71	0.43	0.29	0.41	0.22	0.15	0.06	14.18

Station No. 69.2 — KAHALU

1938										7.72	0.96	0.54	
1939	2.08	4.97	5.21	9.81	4.74	12.20	7.85	5.91	5.65	2.13	4.98	0.53	66.06
1940	2.73	0.68	7.44	2.62	5.58	5.16	8.32	6.76	4.46	4.09	2.50	0.64	50.98
1941	0.30	0.44	2.88	4.30	5.09	4.47	4.95	2.27	6.01	7.39	2.59	0.51	41.20
1942	0.06	2.24	4.47	1.86	3.91	5.26	2.52	11.44	6.92	4.11	2.46	2.33	47.58
1943	4.54	0.49	5.38	3.38	6.18	11.44	4.29	6.46	7.01	4.25	2.49	2.81	58.70
1944	3.50	3.59	9.25	4.08	4.65	11.84	5.83	4.09	3.79	3.14	0.94	3.09	54.88
1945	0.68	4.30	6.69	9.05	6.61	9.90	6.66	7.70	9.93	5.04	2.85	2.53	71.94
1946	2.45	2.09	4.15	4.88	5.78	8.80	3.15	3.98	4.65	5.36	2.89	5.43	53.61
1947	0.59	0.00	3.11	6.18	4.80	9.58	5.98	7.51	5.11	4.08	6.39	2.94	57.17
1948	5.41	5.61	2.13	1.75	5.45	8.23	11.95	8.94	9.88	4.27	4.72	1.15	70.49
1949	8.51	3.38	2.77	2.09	5.62	7.77	7.21	7.85	2.12	3.99	2.27	2.43	56.01
1950	7.15	2.61	4.89	6.78	3.78	5.09	7.11	2.99	4.66	4.96	9.86	1.26	61.11
1951	3.63	6.30	9.86	9.25	9.58	8.45	4.52	11.70	7.43	7.66	3.77	4.37	86.82
1952	7.81	1.39	2.33	3.76	3.01	7.34	3.13	2.26	4.51	2.40	5.37	1.05	44.36
1953	0.23	5.56	3.19	5.41	6.74	4.51	5.49	3.63	6.49	3.71	0.97	5.61	51.54
1954	2.75	0.53	4.78	2.41	7.89	5.61	5.80	5.56	3.41	6.15	2.36	3.95	51.18
1955	1.74	6.31	2.16	2.16	6.36	7.13	7.48	5.23	6.76	2.01	2.00	3.95	53.29
1956	8.03	2.93	3.86	5.53	11.61	3.85	8.48	8.18	6.28	3.09	11.09	1.18	77.81
1957	3.97	2.03	1.99	6.65	5.52	3.66	7.52	6.08	3.34	2.37	2.72	1.35	47.20
1958	0.40	0.32	0.95	2.28	4.21	4.05	3.75	9.21	2.71	6.43	0.51	2.95	44.77
1959	14.80	2.41	1.15	4.56	3.96	3.87	11.48	11.82	1.81	4.46	4.60	2.41	67.53
1960	1.36	0.61	2.82	2.52	4.76	4.39	2.10	4.02	6.50	3.95	0.83	2.05	35.58
1961	2.06	1.65	13.59	3.68	10.41	3.85	5.40	5.26	6.48	4.96	7.36	2.29	66.69
1962	3.76	1.39	3.10	3.07	7.53	4.30	7.22	4.02	4.28	2.30	3.63	2.41	40.70
1963	4.12	2.46	7.69	7.35	6.48	6.12	7.34	9.56	7.59	1.97	2.14	2.39	65.24
1964	3.29	0.52	6.44	6.11	5.83	5.76	7.76	5.53	5.08	4.62	1.63	Discontinued	



Station No. 137.0—HONOHINA

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1961	2.00	1.06	1.06	3.04	2.08	3.02	1.04	2.10	0.29	6.18	12.04	1.04	34.93
1962	2.08	0.06	5.00	1.04	6.00	1.20	4.00	2.20	2.40	2.00	0.02	0.00	26.00
1963	8.20	2.60	6.20	9.40	7.40	6.00	5.40	2.40	5.20	3.20	0.61	0.04	56.65
1964	0.04	0.08	5.20	4.06	14.30	3.00	2.20	1.80	4.20	1.00	2.00	7.20	45.08
1965	1.50	1.00	4.40	3.30	4.16	4.40	3.20	8.00	2.20	3.00	6.40	0.00	41.56
1966	0.00	2.06	3.40	1.20	2.20	2.04	2.20	0.22	2.60	3.70	3.08	0.00	22.70
Total	152.35	115.23	152.33	113.75	178.06	153.39	136.07	123.23	138.76	93.67	86.62	61.40	1391.24
Mean	4.12	3.11	4.12	3.07	4.69	4.04	3.68	3.24	3.56	2.40	2.22	1.62	38.65
Max.	24.20	19.80	17.20	9.40	14.30	14.50	11.80	8.20	9.30	6.18	12.50	8.20	63.20
Min.	0.00	0.00	0.10	0.54	0.54	0.18	0.30	0.22	0.18	0.22	0.00	0.00	14.52

Station No. 72.0—HUALALAI

1929	3.18	3.00	1.50	0.05	0.00	0.45	0.30	0.48	0.46	0.10	2.30	4.00	15.82
1930	9.30	0.80	2.60	0.20	0.05	0.05	0.18	1.80	4.30	0.30	0.20	0.00	19.58
1931	0.00	0.25	0.15	1.50	0.30	0.40	3.10	0.30	0.48	0.30	0.00	0.00	6.78
1932	0.10	1.10	0.00	2.80	1.90	0.90	1.08	0.40	0.90	0.60	0.00	0.00	9.78
1933	0.80	2.50	2.04	3.10	0.40	2.10	0.00	0.40	0.60	0.00	0.00	0.00	11.94
1934	0.90	1.80	0.10	1.10	3.40	6.00	0.20	1.40	0.80	1.30	0.03	0.60	17.63
1935	2.10	0.00	2.90	2.60	0.60	1.05	1.40	1.20	1.60	1.80	1.20	0.00	16.45
1936	0.00	14.10	1.20	0.40	1.10	1.04	2.40	2.90	2.30	2.10	0.00	0.00	27.54
1937	0.20	7.00	1.30	1.90	0.40	1.40	0.70	1.60	0.70	1.60	0.25	0.10	21.35
1938	1.90	0.20	1.80	0.20	1.10	2.10	1.80	1.60	0.40	2.90	0.00	0.30	14.30
1939	1.40	3.20	1.10	0.60	0.90	2.08	3.60	0.40	20.00	0.30	0.40	0.00	39.38
1940	0.00	0.00	7.00	0.08	0.30	0.00	2.40	0.60	0.50	0.00	0.15	0.00	15.03
1941	0.00	0.00	0.10	0.10	0.80	0.80	0.30	1.10	1.40	1.90	0.10	0.00	6.60
1942	0.00	0.10	3.10	0.40	0.20	1.40	2.10	2.10	1.10	0.20	0.20	0.20	14.10
1943	5.00	0.00	2.40	0.80	9.80	2.50	0.40	1.30	0.80	0.00	0.00	0.00	23.30
1944	0.00	4.35	8.20	2.12	2.45	2.98	0.84	0.38	0.00	0.00	0.20	2.95	24.47
1945	0.00	0.94	0.74	2.22	2.35	1.96	2.86	0.67	0.40	0.18	0.30	0.00	12.52
1946	1.90	0.10	0.00	1.94	0.40	0.00	2.40	0.20	0.96	0.32	0.00	0.90	9.12
1947	0.06	0.00	1.10	0.60	1.00	0.00	1.00	1.02	3.20	0.20	0.02	0.00	8.20
1948	3.40	2.00	5.40	0.00	0.00	6.20	1.80	0.45	2.72	0.47	3.05	0.00	25.49
1949	8.16	0.56	1.98	0.42	0.48	3.62	1.76	1.56	0.24	1.42	0.20	0.70	21.10
1950	6.76	1.70	0.33	3.43	1.95	0.08	0.68	1.54	0.36	0.26	3.70	0.60	21.39
1951	2.10	2.35	4.40	1.98	1.24	0.62	1.43	1.20	0.31	0.58	0.29	0.61	17.11
1952	3.36	0.50	1.21	0.19	0.93	0.71	0.53	0.08	0.50	0.14	0.22	0.61	8.98
1953	0.00	—	2.72	1.10	—	3.10	0.40	—	2.00	0.08	0.00	2.20	11.60
1954	—	0.86	4.30	2.06	—	4.12	3.10	—	0.76	0.52	0.20	1.82	20.34
1955	1.46	3.40	1.86	0.50	2.30	0.50	1.22	1.08	1.20	0.50	1.86	2.48	18.36
1956	11.80	4.00	—	7.40	10.00	4.40	4.00	6.80	3.80	4.00	3.00	—	—
1957	3.14	1.60	0.54	1.74	2.66	0.30	2.50	1.80	2.40	2.60	1.70	1.86	—
1958	0.00	0.00	2.60	0.36	2.70	1.20	3.00	1.88	3.80	0.50	1.30	20.34	—
1959	4.78	2.20	0.90	0.64	1.16	0.24	—	4.02	1.10	—	1.74	0.08	16.86
1960	0.06	0.16	0.00	0.65	0.52	0.58	0.28	0.49	0.14	0.57	0.11	0.93	5.09
1961	0.07	1.29	0.24	1.63	1.60	0.52	0.88	0.44	5.02	6.06	8.04	1.36	27.15
1962	4.04	0.66	3.60	1.36	4.74	4.30	2.20	7.20	0.35	0.32	0.00	0.07	28.14
1963	3.16	0.80	4.40	0.88	4.20	4.00	4.00	0.94	1.50	2.20	0.52	0.00	34.60
1964	1.04	0.60	5.60	1.16	6.40	2.76	1.12	0.60	5.00	0.60	0.84	4.38	30.60
1965	0.95	1.10	5.00	1.40	4.60	1.08	0.68	3.28	1.35	1.40	4.60	0.12	25.56
1966	0.06	1.96	1.35	0.80	1.10	0.10	1.00	0.90	2.68	4.00	2.80	0.40	17.15
Total	81.18	64.32	81.74	56.21	76.99	57.96	58.34	56.71	76.11	44.12	37.04	28.57	663.75
Mean	2.19	1.79	2.27	1.52	2.14	1.61	1.58	2.06	1.19	1.00	0.77	18.44	—
Max.	11.80	14.10	8.20	8.88	10.00	6.20	4.00	7.20	20.00	5.06	8.04	4.38	39.38
Min.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	5.09

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
Station No. 73.0—PUU LEHUA													
1922	—	—	—	—	—	0.90	2.00	2.20	2.00	2.00	1.70	0.65	—
1923	3.00	1.90	0.80	2.00	1.30	2.50	1.17	1.00	3.40	2.20	0.35	0.70	20.2
1924	0.00	0.80	0.80	2.50	1.70	2.00	1.50	2.00	2.00	2.00	0.80	3.56	19.1
1925	0.70	0.70	4.20	2.00	1.90	0.99	1.50	3.10	3.10	2.20	1.00	0.93	22.1
1926	0.30	0.30	0.70	0.20	0.70	2.63	2.55	4.26	3.00	1.27	0.78	0.32	17.1
1927	1.12	0.60	2.90	4.80	2.65	2.72	1.41	1.59	4.30	2.20	1.42	11.45	31.1
1928	0.55	1.20	2.32	2.00	3.16	4.54	3.70	4.84	0.65	1.65	1.00	1.25	26.1
1929	4.10	5.00	2.05	2.50	1.15	1.73	2.71	4.00	1.83	2.25	5.72	9.30	42.1
1930	4.50	2.91	1.80	1.00	2.10	2.00	1.80	2.16	4.00	1.10	0.90	0.10	24.7
1931	0.28	1.22	0.40	2.40	1.20	1.10	3.70	1.70	3.00	1.90	0.60	0.15	17.1
1932	2.00	2.00	1.90	2.40	1.70	4.20	4.20	3.60	1.35	0.90	0.70	3.22	26.1
1933	2.46	1.23	1.80	1.98	2.75	2.71	1.34	1.51	1.75	1.45	0.45	0.45	15.1
1934	1.11	1.35	1.00	2.01	8.00	6.00	2.63	7.05	1.82	1.85	0.90	2.10	35.1
1935	3.10	2.05	2.15	3.50	2.25	2.57	2.22	2.00	3.17	6.50	3.98	0.22	33.7
1936	0.81	16.90	4.04	1.80	2.00	1.75	4.39	5.30	4.55	5.10	0.99	0.32	47.9
1937	8.79	2.00	2.10	2.60	6.00	2.10	4.82	4.23	4.26	1.90	0.25	2.01	41.0
1938	2.51	4.02	4.15	3.69	6.05	2.91	2.73	2.27	2.12	4.55	0.61	1.15	36.7
1939	3.01	2.50	3.80	5.92	1.90	3.35	2.15	2.35	1.52	1.17	2.32	0.45	30.4
1940	2.29	0.29	7.55	1.85	2.60	2.66	2.20	2.90	2.01	0.70	2.20	0.42	27.8
1941	0.27	0.31	1.25	1.18	2.90	2.82	0.65	5.00	6.03	3.04	1.33	0.24	25.1
1942	0.11	1.89	3.95	0.91	3.10	1.09	2.10	5.35	3.10	4.30	2.81	3.30	32.0
1943	1.29	1.92	5.41	3.10	6.60	4.24	1.10	2.11	1.95	1.75	0.75	0.93	31.1
1944	0.28	2.20	3.50	2.00	5.35	5.78	1.60	2.00	1.40	1.40	1.13	2.90	29.5
1945	0.23	2.00	3.00	5.90	2.65	4.60	2.35	2.73	1.76	1.68	1.65	0.78	29.2
1946	3.28	2.41	1.85	2.72	1.00	1.70	4.30	2.15	2.20	3.12	2.22	1.30	28.2
1947	0.60	0.81	1.85	2.90	2.12	2.85	3.00	2.35	4.00	1.56	2.00	1.57	26.3
1948	2.00	1.86	2.90	1.80	2.00	3.60	4.36	4.62	2.23	2.20	2.00	0.75	29.3
1949	3.20	2.00	2.47	1.45	1.25	2.00	1.95	1.92	1.00	1.90	1.05	1.54	21.7
1950	5.95	1.76	1.05	7.60	4.30	0.52	2.40	2.39	1.15	1.40	6.00	1.68	36.3
1951	3.86	3.70	5.60	2.50	3.83	2.46	3.10	1.46	1.35	1.85	2.00	1.52	33.2
1952	9.40	0.81	3.35	1.40	1.63	1.52	0.55	1.75	1.31	1.44	1.91	0.39	25.6
1953	0.17	3.29	5.65	2.50	3.03	1.24	1.88	0.60	0.90	1.00	0.41	2.60	22.1
1954	1.26	1.11	3.25	2.70	5.45	2.80	4.19	4.35	3.25	1.05	2.00	2.63	34.0
1955	0.95	2.77	2.12	3.05	1.03	2.80	3.33	1.75	2.02	0.35	1.07	8.28	29.2
1956	5.80	2.50	4.00	2.27	5.50	2.15	1.50	4.72	2.25	3.00	7.00	0.75	41.4
1957	2.75	3.00	6.00	2.50	1.45	1.10	2.90	4.00	0.87	2.20	1.55	2.20	30.5
1958	0.20	0.11	5.50	1.60	2.10	2.50	3.50	4.50	2.00	3.00	0.37	2.68	28.1
1959	2.05	0.43	1.17	2.00	2.80	1.30	2.50	2.90	3.50	3.50	0.41	0.43	22.8
1960	0.33	0.81	2.00	2.00	4.00	0.96	0.36	11.25	2.00	1.10	0.63	2.15	27.6
1961	0.40	1.87	2.65	2.40	3.45	3.71	1.40	1.62	1.00	5.70	4.80	1.35	30.3
1962	1.50	0.70	3.00	1.70	3.10	3.10	2.90	2.40	1.20	0.77	0.57	0.20	20.2
1963	5.87	0.60	6.46	7.60	6.30	2.70	2.90	1.58	3.40	0.60	0.17	0.19	38.8
1964	2.00	0.70	4.10	1.80	4.70	1.75	1.50	2.00	2.92	0.70	1.09	3.70	26.8
1965	1.70	1.91	1.80	2.70	4.50	3.40	2.20	2.40	1.80	0.70	3.70	0.29	27.1
1966	0.10	2.35	1.65	0.52	1.87	1.54	2.49	2.00	2.30	11.80	1.24	1.20	23.0
Total	96.18	90.69	130.01	113.95	135.12	111.09	111.03	137.96	106.72	104.20	76.55	83.91	1265.7
Mean	2.19	2.06	2.95	2.59	3.07	2.47	2.47	3.07	2.37	2.32	1.70	1.86	28.2
Max.	9.40	16.90	7.55	7.60	8.00	6.00	4.82	11.25	6.03	6.50	7.00	11.46	47.9
Min.	0.00	0.11	0.40	0.20	0.70	0.52	0.36	0.60	0.65	0.35	0.17	0.10	17.1

ANN.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1941	0.67	1.15	4.54	5.76	7.12	5.57	5.99	5.44	9.08	7.38	2.61	0.88	56.19
1942	0.06	2.41	4.33	4.18	4.04	6.14	10.79	12.79	8.83	9.34	3.02	2.74	61.98
1943	3.01	0.54	5.58	4.11	7.32	11.18	5.39	8.35	9.96	5.30	3.16	3.13	67.03
1944	0.41	3.39	7.01	4.23	6.52	12.26	5.25	8.14	5.20	7.80	1.15	4.29	65.63
1945	1.30	2.83	7.51	10.62	8.80	11.52	8.36	13.45	9.52	6.14	6.74	2.46	89.25
1946	5.20	2.49	4.11	8.14	5.38	7.48	6.24	5.48	12.86	8.30	2.09	8.91	76.68
1947	0.98	0.51	6.61	8.20	9.64	9.27	8.65	7.58	5.47	3.03	6.12	3.13	69.19
1948	7.49	4.14	2.80	2.61	6.14	6.59	12.59	9.98	7.84	6.71	4.91	3.08	74.88
1949	7.76	3.80	2.77	3.83	4.91	9.77	10.22	8.79	3.61	5.07	3.01	2.91	66.45
1950	6.88	3.92	7.42	8.21	7.67	6.51	9.84	2.45	6.34	4.45	11.84	3.34	78.87
1951	4.27	5.71	12.50	6.97	7.14	13.31	8.89	8.75	7.37	10.51	5.48	2.85	93.75
1952	8.55	3.89	4.52	5.28	6.51	8.14	6.31	3.47	8.24	2.88	4.43	2.33	64.55
1953	0.37	8.24	5.60	5.15	8.75	7.90	8.79	5.03	5.96	6.07	0.92	6.07	68.85
1954	2.74	0.88	6.28	2.62	8.93	7.77	9.39	6.83	7.27	5.37	2.45	4.52	65.05
1955	2.02	9.51	2.38	2.16	6.91	8.92	13.99	7.56	9.98	2.38	2.18	6.89	74.99
1956	10.50	2.94	5.55	9.09	9.12	6.17	12.24	10.67	6.70	4.79	11.40	2.69	92.16
1957	4.92	2.90	2.71	11.07	8.65	4.38	7.98	7.94	3.84	4.21	3.19	2.24	64.03
1958	0.46	0.10	6.52	3.01	5.33	4.10	5.78	10.15	4.32	9.43	0.53	2.41	52.14
1959	14.64	2.92	3.35	4.52	7.12	3.80	9.62	9.36	3.50	3.57	6.56	2.23	70.19
1960	0.76	2.01	2.75	9.97	9.29	6.15	2.69	7.27	8.08	6.33	1.01	7.79	57.10
1961	2.22	2.79	14.49	7.12	11.50	6.55	4.63	8.27	6.13	6.20	8.16	2.37	80.43
1962	6.03	5.56	3.66	4.58	10.74	6.11	9.44	5.13	7.65	4.82	3.80	2.59	65.11
1963	4.27	2.91	9.29	12.08	6.94	9.37	9.46	11.89	12.56	2.36	2.35	3.58	86.96
1964	2.82	0.27	7.21	7.00	4.97	6.55	7.78	9.63	9.09	5.26	2.67	7.80	70.85
1965	2.17	1.49	2.15	4.62	4.67	6.50	9.09	13.08	8.84	2.92	8.04	1.07	66.15
1966	2.38	3.54	3.33	1.63	3.86	4.55	7.76	5.07	4.38	5.93	7.00	1.12	50.55
Total	138.38	113.39	198.51	206.70	275.33	278.13	304.64	283.90	276.49	211.61	160.00	108.88	2557.76
Mean	3.84	3.15	5.51	5.74	7.65	7.73	8.46	7.89	7.68	5.88	4.44	3.02	71.05
Max.	14.64	9.51	14.49	12.08	13.84	15.06	14.20	14.45	14.50	14.41	11.84	8.91	93.75
Min.	0.06	0.10	2.15	1.63	3.32	3.30	2.69	2.45	3.50	1.40	0.53	0.83	50.55

Station No. 74.0 — KANAHANA

ANN.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1922	—	—	—	—	0.55	1.02	1.80	2.55	1.60	1.95	1.70	0.70	—
1923	3.50	1.90	0.80	3.50	2.00	2.02	0.95	1.00	3.85	2.60	0.20	1.00	23.32
1924	0.00	0.90	0.70	4.00	1.50	1.50	1.20	2.00	2.20	3.10	0.60	4.30	22.00
1925	0.50	0.80	5.10	2.60	2.40	1.45	1.30	4.10	4.50	2.40	0.85	1.16	27.16
1926	0.20	0.20	0.80	0.30	1.30	4.00	2.12	4.40	3.84	1.19	0.88	0.52	19.75
1927	0.80	1.18	3.30	5.20	2.20	2.00	1.41	1.59	4.31	2.09	1.58	11.55	38.21
1928	0.51	1.34	2.03	2.12	2.54	3.66	3.80	4.90	1.10	1.95	2.05	27.80	—
1929	4.08	5.10	2.40	2.00	2.00	2.22	3.40	3.90	1.70	2.30	5.88	8.70	44.28
1930	4.10	2.43	2.00	1.50	2.50	2.95	2.90	2.14	4.50	2.10	0.70	0.23	29.05
1931	0.21	1.09	0.50	2.25	1.82	1.40	3.30	3.00	1.80	0.62	0.15	18.24	—
1932	1.90	2.00	1.50	2.30	1.80	3.85	3.84	2.90	1.56	0.70	0.60	34.75	—
1933	2.25	1.17	1.23	1.81	2.15	2.42	1.09	1.45	0.90	1.35	0.40	0.68	16.90
1934	1.09	1.40	0.75	1.99	1.00	4.20	1.20	7.50	2.47	2.80	1.10	1.61	36.11
1935	2.91	1.80	2.15	3.50	1.75	1.75	1.83	1.95	3.34	5.25	3.99	0.22	30.44
1936	0.80	14.50	3.50	1.50	2.00	1.75	4.70	4.50	4.25	5.10	0.98	0.30	43.88
1937	7.80	2.00	2.10	3.50	5.20	2.00	4.71	3.61	4.50	1.00	0.25	1.95	38.62
1938	2.75	3.79	3.75	3.72	1.50	2.95	3.50	2.29	1.30	4.10	0.69	1.60	37.34
1939	2.22	3.53	5.80	7.43	1.31	3.15	2.70	2.79	1.09	1.27	2.56	0.35	34.20
1940	2.39	0.12	6.85	0.98	1.96	2.00	1.52	3.30	1.52	0.51	1.91	0.38	23.84
1941	0.24	0.15	0.33	0.73	2.93	2.06	0.90	2.97	6.02	3.01	1.13	0.18	20.83
1942	0.07	1.34	3.12	0.81	2.18	1.48	3.00	2.00	2.95	3.24	2.41	4.00	26.58
1943	1.91	1.88	6.89	3.62	6.58	3.25	1.42	2.55	2.00	1.11	0.42	0.72	32.33
1944	0.30	3.40	3.22	2.68	5.22	3.75	1.95	1.77	1.37	0.94	1.47	2.80	29.07
1945	0.12	2.55	3.05	5.10	3.30	5.56	2.71	2.70	1.83	1.26	1.45	0.61	30.24
1946	3.25	2.53	1.40	2.90	0.60	1.30	4.80	2.10	1.71	3.22	1.00	0.95	25.76
1947	1.26	1.53	2.29	3.02	2.44	2.20	4.88	2.10	4.50	1.05	2.96	1.42	29.65
1948	2.60	2.34	5.56	1.80	1.75	1.93	3.30	6.13	4.00	2.18	3.30	0.73	35.82
1949	2.85	2.75	2.76	1.05	1.00	3.41	2.00	1.81	0.50	1.70	0.48	1.42	21.73
1950	7.70	2.45	0.85	7.35	3.80	0.78	2.38	3.31	0.97	0.94	6.37	1.42	37.32
1951	2.10	3.80	5.00	2.75	3.93	4.71	3.10	1.80	1.25	2.00	2.20	0.91	33.55
1952	8.80	0.80	3.00	0.85	1.45	1.56	0.80	2.00	1.05	0.94	1.76	0.36	23.43
1953	0.33	4.41	5.70	1.80	5.00	0.92	1.54	0.70	0.70	0.39	0.15	1.82	18.96
1954	1.03	1.08	3.17	2.60	4.35	1.64	3.42	4.64	3.27	6.00	0.20	1.12	33.52
1955	0.76	3.30	1.90	3.11	1.06	0.50	2.00	0.92	1.37	0.56	1.13	2.00	18.61
1956	5.26	2.45	4.26	2.00	5.00	1.10	1.25	3.55	2.00	3.00	6.00	0.50	38.17
1957	2.25	1.75	1.25	2.50	1.70	0.70	3.00	4.30	0.36	2.65	1.45	2.00	23.91
1958	0.15	0.08	0.40	1.20	1.50	2.00	2.00	3.60	1.60	2.00	0.46	2.42	21.31
1959	1.65	0.35	0.93	1.00	2.00	0.92	3.30	3.20	4.40	3.55	0.45	0.21	21.96
1960	0.20	0.61	1.85	2.30	4.00	0.92	0.26	0.90	0.92	1.00	0.66	1.99	15.61
1961	0.45	1.60	3.30	1.85	3.10	1.45	0.90	1.21	1.20	3.40	4.35	1.60	24.41
1962	1.62	0.40	3.30	1.60	3.00	1.11	3.00	4.00	1.10	0.30	0.31	0.15	19.89
1963	6.00	0.50	4.58	0.80	Discontinued								
Total	88.91	87.30	117.27	109.82	112.43	89.74	101.04	119.03	96.60	88.60	68.40	71.16	1120.55
Mean	2.17	2.13	2.86	2.68	2.74	2.19	2.46	2.90	2.36	2.16	1.67	1.74	28.01
Max.	8.80	14.50	9.89	7.43	10.00	5.56	4.68	7.50	6.02	6.00	6.37	11.55	44.28
Min.	0.00	0.08	0.33	0.30	0.55	0.50	0.26	0.70	0.36	0.39	0.15	0.15	15.61

Station No. 75.0 — AHUA UMI

1922	—	—	—	—	—	0.50	1.35	0.14	2.90	2.15	1.50	0.50	—
1923	2.25	2.00	0.60	3.25	1.35	2.00	1.00	2.00	4.70	1.00	0.10	1.10	21.35
1924	0.00	1.00	1.10	4.00	0.75	0.80	0.65	1.50	2.00	3.50	0.40	3.10	19.00
1925	0.30	0.60	4.00	1.70	2.00	0.14	1.10	1.90	5.70	1.10	0.70	0.80	19.04
1926	0.10	0.40	0.40	0.10	0.80	1.10	1.90	2.60	2.85	1.14	0.56	0.46	12.41
1927	0.25	1.03	3.60	4.55	2.85	2.85	2.65	1.60	3.97	1.98	1.42	8.06	35.01
1928	0.12	1.03	2.27	2.08	6.35	6.35	3.60	4.70	0.30	0.30	1.60	0.20	38.90
1929	3.40	5.20	1.20	1.50	0.80	0.87	2.60	2.70	0.70	2.00	4.15	8.00	29.22
1930	4.00	2.65	2.90	1.60	3.50	2.30	2.60	2.16	5.00	4.10	2.00	0.12	33.13
1931	0.15	1.85	0.80	2.00	1.22	0.90	1.95	1.30	2.50	1.90	0.65	0.10	15.32
1932	1.65	1.90	1.10	2.10	1.95	3.20	2.40	3.20	1.35	0.55	0.65	2.33	22.38
1933	1.60	1.13	2.00	1.83	2.88	2.61	0.40	0.72	0.30	0.52	0.25	0.55	14.19
1934	1.25	0.65	4.00	1.80	8.95	3.00	1.97	10.30	1.84	1.64	0.65	1.25	33.65
1935	2.80	2.10	3.50	3.00	1.55	1.05	1.65	1.90	0.85	7.00	3.95	0.65	30.20
1936	0.75	10.20	2.10	1.30	0.80	0.75	2.23	6.15	1.90	6.07	0.75	0.15	33.15
1937	6.45	1.80	2.50	3.75	5.10	1.50	4.50	3.51	3.10	1.70	0.91	1.83	36.65
1938	3.09	3.76	4.10	3.82	4.95	2.75	1.65	2.16	0.70	0.08	1.67	0.90	32.67
1939	4.17	6.25	5.47	5.97	1.85	2.87	2.18	1.17	0.15	2.51	0.37	30.80	30.80
1940	2.19	0.05	6.15	0.89	1.80	1.79	2.84	4.30	1.62	0.71	1.95	0.36	24.61
1941	0.15	0.06	0.22	0.33	2.00	2.59	0.31	3.02	3.55	3.02	0.35	0.11	15.75
1942	0.05	1.81	3.80	0.72	1.15	0.57	1.03	0.65	2.75	1.93	2.36	2.30	30.12
1943	1.95	1.76	4.93	3.82	7.45	2.88	1.10	2.77	1.78	0.44	0.25	1.10	19.21
1944	0.21	3.50	3.37	1.32	3.39	3.39	1.97	1.11	1.11	1.11	1.37	2.75	24.56
1945	0.27	5.00	3.02	—	—	—	2.90	1.22	1.85	1.00	1.80	1.26	26.55

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1951	7.76	23.72	24.67	4.76	3.42	4.14	3.05	11.97	1.02	8.90	4.88	3.25	101.54
1952	14.36	6.54	23.59	4.66	4.86	2.56	5.45	2.55	3.54	5.58	17.05	4.73	95.47
1953	0.66	7.21	17.03	2.15	7.93	2.38	0.88	5.64	1.11	2.91	8.15	3.13	59.18
1954	4.54	9.92	5.78	3.04	9.96	3.71	6.59	10.24	6.19	4.62	4.33	30.02	96.94
1955	9.26	14.55	7.53	14.25	6.57	1.23	4.71	4.08	2.98	2.06	8.94	6.15	82.31
1956	12.95	34.85	6.76	8.22	8.23	6.54	3.19	24.50	2.25	12.13	14.46	3.85	137.93
1957	12.12	5.42	3.30	23.71	3.25	0.37	4.00	25.20	4.39	4.04	4.99	21.80	112.59
1958	3.11	2.24	16.89	0.80	3.99	0.76	16.82	16.55	3.44	8.02	10.91	2.41	85.94
1959	17.57	14.95	5.57	8.11	6.47	1.33	5.56	11.35	4.16	3.26	14.42	13.70	106.45
1960	15.10	11.37	9.48	15.11	6.75	3.24	2.48	9.04	5.66	3.65	16.05	2.56	100.49
1961	1.46	17.14	6.62	5.43	4.15	2.17	4.13	4.47	3.95	14.44	17.80	20.95	102.71
1962	1.00	3.59	7.54	3.29	5.06	0.32	2.09	1.58	5.48	3.35	3.74	5.07	42.11
1963	3.13	2.01	17.07	47.35	13.07	7.07	12.83	4.35	5.04	3.42	5.37	0.50	115.21
1964	11.25	17.11	28.00	7.99	24.39	3.32	1.77	5.77	7.26	6.65	16.01	5.83	135.23
1965	6.04	5.64	10.47	10.50	11.60	4.20	3.69	4.93	7.55	5.29	12.82	12.11	105.84
1966	4.20	7.56	4.55	6.67	5.63	5.39	12.23	5.85	8.82	9.50	18.74	10.31	99.45
Total	164.94	210.35	237.57	192.69	139.54	56.86	106.61	159.65	84.00	119.85	232.32	205.61	1888.14
Mean	8.68	11.07	12.50	10.14	7.34	2.99	5.61	8.40	4.42	6.31	11.62	10.28	99.38
Max.	26.71	34.85	28.00	41.35	24.39	7.07	16.82	25.20	8.82	14.44	23.62	30.02	137.93
Min.	0.66	2.01	3.30	0.80	1.50	0.32	0.88	1.58	1.02	2.06	3.74	0.50	42.11

Station No. 80.0 — KALEIEHA

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1915	0.77	3.85	0.13	2.38	0.56	2.92	1.02	0.03	2.23	6.07	10.09	4.33	34.38
1916	5.83	0.54	1.29	3.39	5.09	1.10	2.02	1.37	1.32	1.33	2.67	11.33	37.28
1917	4.05	1.23	3.13	2.27	5.30	0.48	0.52	0.62	0.64	2.11	2.91	3.61	26.87
1918	9.39	9.58	4.17	5.80	1.80	0.79	11.44	6.29	1.60	1.12	2.60	13.14	67.72
1919	0.41	0.39	0.93	0.59	0.34	0.20	0.92	1.36	1.11	0.94	0.90	0.36	8.49
1920	1.03	0.76	1.58	0.70	0.25	0.10	0.72	1.28	1.16	1.41	3.47	1.89	14.35
1921	14.34	0.67	0.33	0.87	0.78	0.12	0.77	2.36	0.77	3.71	5.12	3.31	33.15
1922	8.21	11.99	13.43	2.05	0.37	0.00	0.56	0.03	3.06	1.12	4.84	0.39	52.05
1923	9.93	2.59	7.60	5.02	1.14	0.60	1.24	10.23	4.60	1.60	2.00	3.80	48.55
1924	0.15	0.98	0.20	4.12	0.45	0.11	0.44	1.03	2.20	3.68	1.73	1.05	18.17
1925	1.92	0.56	6.79	1.45	0.33	2.80	0.97	4.62	2.61	1.27	0.86	3.02	26.80
1926	0.37	0.74	0.13	0.26	0.16	0.46	5.65	7.20	2.25	1.93	0.22	2.64	22.01
1927	3.18	0.20	6.87	4.84	1.43	0.41	1.14	3.92	9.76	0.65	0.60	8.34	41.34
1928	1.79	0.54	1.02	1.12	0.25	0.21	5.43	0.47	2.18	2.70	0.85	0.91	16.50
1929	2.11	6.26	3.99	0.26	0.09	0.00	2.26	1.77	0.40	0.25	0.68	2.41	24.18
1930	3.45	1.84	0.53	0.30	0.68	1.31	3.58	28.79	1.99	9.24	2.62	1.04	55.37
1931	3.13	3.34	0.00	2.14	0.80	1.17	5.94	1.85	7.05	3.13	2.08	0.67	28.30
1932	12.67	4.80	1.18	1.30	0.92	0.00	0.70	0.11	0.88	0.14	2.49	1.89	27.08
1933	8.93	2.04	1.11	3.46	1.47	0.69	0.12	0.34	1.67	0.59	0.58	0.17	21.37
1934	4.12	0.80	0.23	2.85	2.45	2.52	0.76	1.48	5.92	2.16	4.06	4.93	32.28
1935	3.11	4.84	5.97	3.66	1.06	1.48	9.76	0.74	5.41	8.81	4.70	2.43	51.97
1936	2.42	4.15	9.31	4.55	4.47	1.38	4.47	13.29	6.43	4.24	2.40	18.07	75.18
1937	15.57	18.25	9.37	6.49	6.32	3.83	9.60	38.04	4.00	4.87	6.24	2.38	187.77
1938	12.45	5.05	7.16	10.69	4.31	3.69	1.88	3.18	1.97	9.94	11.93	13.83	86.08
1939	24.61	10.38	13.85	8.69	1.88	2.84	4.47	3.07	2.16	1.99	6.11	1.92	81.95
1940	1.00	0.41	4.40	2.68	1.36	3.12	4.56	29.93	7.62	4.18	6.27	0.62	66.13
1941	0.62	0.09	3.53	1.08	4.47	9.49	6.24	5.52	12.75	14.64	3.46	5.84	67.73
1942	0.11	1.15	11.03	2.42	2.87	1.18	1.73	1.08	5.31	3.55	2.99	5.50	51.22
1943	8.93	6.84	7.18	10.9	5.43	1.38	10.19	4.39	1.05	0.27	1.20	3.29	51.22
1944	1.72	4.48	0.97	3.75	2.35	2.76	1.22	1.48	3.41	6.05	5.50	36.04	35.58
1945	0.52	1.22	12.75	5.68	0.49	2.14	—	1.98	2.44	2.94	3.30	2.12	35.58
1946	4.49	5.22	8.78	5.03	0.26	1.40	4.27	2.43	0.94	3.09	1.08	7.20	44.19
1947	0.31	0.03	7.75	5.15	3.31	1.44	5.55	8.33	5.55	5.91	2.47	12.20	58.00
1948	1.68	3.09	14.76	2.92	3.25	0.75	2.53	1.54	1.48	4.08	12.12	14.06	63.16
1949	2.69	2.71	2.69	1.41	—	0.38	2.11	2.46	0.98	3.50	3.36	12.02	—
1950	3.55	7.68	6.71	8.09	2.00	—	2.87	1.97	0.25	1.63	3.22	2.98	—
1951	4.74	11.27	15.23	1.23	0.74	0.75	1.30	6.33	0.47	3.19	5.06	1.08	51.37
1952	10.31	—	9.93	0.77	1.48	0.69	3.11	0.32	0.58	1.28	11.53	2.36	—
1953	0.00	7.04	6.19	1.75	2.35	0.50	0.70	4.56	0.40	0.00	2.37	3.96	26.91
1954	1.62	2.05	2.32	1.12	1.53	2.37	3.36	7.98	1.55	1.51	0.96	15.38	41.75
1955	4.17	8.94	3.22	4.82	1.90	0.20	1.93	1.38	1.38	1.27	2.46	2.75	35.42
1956	5.11	10.01	3.10	2.17	5.58	1.55	8.30	18.25	1.25	4.21	6.68	0.75	66.96
1957	5.52	2.03	0.23	0.75	0.03	1.25	18.33	15.58	6.05	1.74	1.44	0.67	50.12
1958	0.63	1.18	7.76	0.68	0.65	1.07	6.96	5.77	0.91	2.06	4.27	1.69	35.63
1959	3.04	4.22	1.29	1.56	1.28	0.15	2.17	10.82	2.05	3.06	3.37	3.50	36.51
1960	5.26	4.47	1.55	13.62	2.12	0.79	0.59	3.30	1.40	0.50	9.30	2.67	46.17
1961	—	6.37	2.10	1.25	0.91	0.41	0.80	1.59	0.18	4.48	5.99	9.80	—
1962	1.30	—	1.38	0.64	3.26	—	0.68	0.19	1.30	0.65	—	0.44	—
1963	0.98	Discontinued	—	—	—	—	—	—	—	—	—	—	—
Total	219.24	186.87	235.66	150.91	90.32	62.75	152.32	276.99	137.85	147.25	164.93	233.73	1910.40
Mean	4.57	3.98	4.91	3.14	1.92	1.36	3.24	5.77	2.87	3.07	3.93	4.87	44.43
Max.	24.61	18.25	15.23	13.62	6.32	9.49	11.44	38.04	12.75	14.64	12.12	18.07	125.47
Min.	0.00	0.03	0.00	0.12	0.03	0.00	0.12	0.11	0.18	0.00	0.20	0.17	8.49

Station No. 82.0 — PUU OO

1910	—	—	—	3.01	4.07	4.11	6.73	16.81	3.08	5.66	5.02	3.99	—
1911	9.33	29.61	7.69	9.85	8.94	4.77	2.34	12.50	8.01	2.87	8.70	9.39	114.60
1912	0.19	15.52	5.72	9.03	3.24	3.11	3.26	2.64	6.74	17.50	8.75	9.76	85.46
1913	50.59	0.95	3.95	4.98	8.06	7.24	2.80	9.87	2.81	4.66	30.12	1.77	107.60
1914	2.77	1.13	2.96	5.17	12.11	11.97	32.68	16.83	18.79	7.83	18.33	5.56	137.93
1915	1.83	2.53	0.97	6.93	3.90	6.15	6.45	2.32	8.33	13.14	30.99	8.98	92.52
1916	6.51	0.82	5.63	8.22	16.90	4.61	5.84	7.35	5.88	7.58	6.32	23.71	99.37
1917	7.25	2.27	12.91	8.13	7.20	3.09	2.49	2.15	2.26	4.44	5.64	4.99	62.88
1918	14.51	18.15	6.96	13.00	8.07	6.11	25.38	11.41	4.07	3.49	10.26	16.49	137.90
1919	1.34	1.30	4.03	3.57	2.52	3.29	3.79	5.80	5.16	4.18	3.91	1.28	39.97
1920	1.81	2.53	10.06	4.01	1.44	1.79	4.35	4.16	5.32	4.96	4.62	4.61	49.66
1921	42.19	1.79	14.33	6.30	4.41	0.93	4.06	7.90	4.62	8.46	12.89	5.56	100.54
1922	16.38	23.61	23.97	7.80	4.06	1.34	3.67	8.76	10.79	4.99	7.38	1.18	113.93
1923	18.01	3.67	14.84	12.07	6.42	3.71	4.76	16.14	9.62	7.14	13.25	11.07	97.77
1924	0.42	4.46	5.59	8.85	3.24	1.81	2.98	3.70	4.95	11.21	6.73	1.29	55.23
1925	6.34	0.72	13.94	4.90	2.97	6.26	1.60	10.92	5.69	5.10	5.55	0.29	64.26
1926	1.51	3.27	1.30	0.99	2.33	2.47	3.20	14.91	4.21	4.29	1.15	11.48	51.11
1927	6.09	14.33	10.87	10.66	5.03	2.21	3.98	8.87	17.04	3.67	3.09	13.37	86.31
1928	4.00	2.82	2.39	4.80	2.63	1.00	5.91	4.11	6.53	5.45	4.46	60.81	—
1929	4.35	14.20	5.94	4.32	1.90	0.66	6.44	5.68	1.51	2.48	6.19	5.10	60.61
1930	3.51	3.35	4.95	7.63	4.05	5.83	6.60	32.98	11.01	4.89	4.20	2.20	91.00
1931	0.44	5.03	0.79	3.54	3.60	1.47	7.14	5.67	13.88	6.86	4.51	1.57	58.00
1932	0.62	3.33	2.22	2.62	2.83	0.49	1.01	4.34	2.97	5.24	0.72	48.35	—
1933	13.83	3.96	3.87	6.09	3.89	2.60	9.66	1.67	3.70	2.23	2.72	7.35	65.23
1934	7.91	2.59	1.81	2.26	—	7.02	3.63	5.14	0.64	6.18	8.13	8.29	—
1935	—	—	9.67	7.80	Discontinued								



Station No. 28.2—KAHAUOIA 2

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1941	6.41	9.76	4.23	18.37	9.07	8.85	15.44	18.02	28.54	10.37	13.47	143.86	
1942	1.61	5.43	46.25	19.60	9.98	5.56	6.51	11.76	8.44	12.71	10.78	143.42	
1943	10.72	8.99	7.56	6.90	8.90	13.13	14.01	8.74	6.99	2.82	3.48	10.31	102.55
1944	2.96	18.08	4.78	13.65	10.71	6.63	14.57	8.44	6.06	12.73	14.51	17.93	131.05
1945	2.98	6.25	28.20	14.77	1.10	9.10	3.72	14.94	2.95	6.58	11.57	16.63	118.79
1946	21.83	10.21	11.30	12.18	5.01	4.64	11.63	4.79	5.09	6.02	4.37	38.77	134.94
1947	2.89	1.34	22.93	9.00	8.26	3.38	7.43	13.00	14.04	14.63	19.23	23.22	139.35
1948	6.55	8.79	34.43	11.27	11.65	5.56	7.72	7.24	9.00	16.97	20.14	25.23	164.55
1949	38.35	7.69	11.44	6.79	4.20	3.36	9.34	7.49	4.40	10.91	11.82	15.95	132.14
1950	7.88	24.14	6.59	34.97	19.01	4.47	8.22	4.83	5.86	8.14	11.17	11.84	146.92
1951	10.85	26.40	18.23	7.53	3.46	5.18	13.02	11.34	2.74	23.82	18.66	18.18	159.41
1952	16.01	8.45	24.00	10.30	8.26	9.71	6.97	7.30	7.20	9.17	13.35	8.57	131.29
1953	0.14	11.60	21.63	4.81	11.44	6.08	5.96	5.86	3.34	6.35	9.53	7.79	94.73
1954	5.83	14.57	15.25	3.96	10.70	7.32	12.70	15.42	11.15	8.94	12.74	54.99	173.57
1955	13.70	24.92	9.62	20.30	13.95	5.41	10.70	10.78	5.04	5.98	15.63	7.21	143.24
1956	9.20	42.00	16.01	7.28	16.26	10.88	6.30	20.35	3.12	14.80	22.47	9.20	177.87
1957	12.54	9.58	3.41	20.44	7.05	4.20	13.84	30.39	3.87	13.79	13.45	21.39	153.95
1958	2.85	4.12	5.62	4.76	7.44	7.55	14.44	19.32	7.34	13.24	15.04	2.96	104.48
1959	8.20	13.81	7.81	10.86	8.32	3.20	6.63	9.52	7.73	5.54	11.11	17.03	129.76
1960	27.94	16.90	7.20	16.20	11.45	6.71	8.93	10.88	13.77	11.71	16.50	3.30	151.49
1961	2.07	20.65	7.17	6.99	8.16	4.98	5.31	8.18	7.13	27.12	15.71	11.39	124.88
1962	2.11	3.67	10.31	3.80	14.56	3.67	7.78	4.37	9.88	2.18	6.78	2.44	71.55
1963	1.78	1.58	16.41	32.98	14.15	11.36	12.17	7.74	10.98	11.10	7.69	1.63	129.58
1964	13.96	18.44	22.35	13.19	28.49	8.08	5.09	8.53	12.34	11.88	23.24	10.85	176.44
1965	9.45	3.52	8.20	15.46	20.10	9.53	7.76	5.15	5.88	6.16	20.78	15.39	127.38
1966	10.92	7.56	5.93	5.43	5.07	7.25	Discontinued						
Total	905.19	900.02	1242.63	1032.29	789.11	564.05	766.35	918.81	767.56	884.45	1094.45	1051.11	10399.39
Mean	11.36	11.25	15.53	13.07	9.99	7.23	9.95	11.93	9.97	11.20	13.85	13.48	138.66
Max.	50.76	32.52	66.96	34.97	28.49	25.47	25.45	37.77	26.28	28.54	38.69	54.99	207.40
Min.	0.25	0.73	0.85	2.00	1.31	2.30	3.72	2.42	2.50	2.18	2.78	1.73	71.55

Station No. 87.1—WAIKAEKA MILL

1891			10.10	10.68	5.07	5.71	9.75	12.34	14.92	25.27	10.46	25.42	
1892	12.48	11.29	10.89	2.64	3.21	8.24	10.48	10.73	9.35	10.97	6.98	11.83	109.09
1893	1.71	9.33	15.05	20.74	10.73	4.80	9.17	6.03	5.20	8.53	14.37	6.73	113.59
1894	16.81	25.71	17.11	17.25	1.87	4.58	0.37	3.64	5.66	7.50	13.28	17.18	139.93
1895	3.22	2.10	5.23	28.42	8.63	6.08	7.38	14.71	19.57	9.80	12.70	12.51	129.03
1896	3.02	12.00	13.42	18.05	13.85	7.57	5.84	19.63	10.83	7.05	2.68	5.34	119.28
1897	3.59	11.20	12.69	3.11	6.43	3.46	6.42	9.42	5.38	9.20	16.59	9.76	97.25
1898	41.51	6.34	49.75	6.95	7.25	4.30	10.32	6.83	8.31	9.41	6.25	2.04	161.86
1899	4.78	8.80	22.80	16.51	19.61	7.70	5.42	15.31	6.38	22.04	4.58	0.83	134.76
1900	2.72	6.14	5.58	5.47	16.41	3.78	8.73	14.87	6.92	19.37	15.44	5.65	111.08
1901	9.53	7.32	26.28	12.85	3.53	3.45	4.76	6.86	4.69	11.60	36.09	12.79	139.75
1902	2.63	3.56	55.16	9.48	13.35	3.09	12.82	18.39	10.18	12.37	10.36	15.40	166.79
1903	3.39	9.18	3.55	17.69	6.74	4.90	20.13	7.32	13.46	12.37	14.06	6.10	118.89
1904	22.87	11.17	0.90	22.78	7.80	8.73	11.45	14.73	8.49	3.95	5.19	4.50	122.56
1905	0.78	5.93	6.04	5.69	7.79	7.76	6.41	11.53	20.06	10.08	26.03	13.22	123.32
1906	4.91	1.89	1.63	7.72	9.45	6.01	12.31	19.51	6.54	4.12	15.55	9.88	99.59
1907	4.63	12.29	12.68	6.56	5.90	8.50	9.43	31.87	25.06	19.94	10.89	4.51	152.28
1908	7.84	22.30	5.43	15.69	8.87	6.01	6.24	10.56	14.29	9.83	5.58	14.37	127.01
1909	6.04	9.69	27.98	6.20	11.52	5.85	13.18	5.18	8.03	8.29	7.77	11.49	117.22
1910	16.10	2.48	13.17	9.35	12.20	11.55	10.43	16.11	5.25	7.96	10.87	14.12	129.59
1911	15.76	15.61	12.13	15.23	15.04	10.48	5.13	8.11	14.47	7.43	12.88	14.38	146.63
1912	0.75	12.31	11.51	13.93	7.29	5.08	5.61	5.29	7.34	15.83	14.84	17.45	116.65
1913	31.01	6.06	6.78	21.47	17.42	10.67	7.89	8.28	6.32	5.87	31.86	8.61	140.90
1914	6.98	4.97	7.13	21.47	17.42	23.56	19.60	35.50	24.38	17.74	17.74	17.74	85.95
1915	3.17	8.53	2.36	11.36	4.85	8.96	9.60	4.88	7.61	17.98	40.09	14.82	144.32

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1916	11.09	4.08	10.56	13.98	21.87	11.09	10.17	12.86	10.39	10.58	16.55	35.37	165.97
1917	16.57	3.15	22.27	13.98	6.85	9.07	7.17	3.58	3.45	4.74	16.24	10.26	117.33
1918	20.83	31.98	25.49	28.05	17.14	9.64	27.05	14.20	6.55	8.69	20.04	20.15	228.81
1919	6.34	5.65	11.24	3.94	5.67	4.48	7.21	9.96	9.79	10.03	11.27	4.59	90.17
1920	5.07	5.53	27.82	5.98	1.61	4.40	6.47	7.94	9.66	19.77	8.31	13.18	115.74
1921	48.32	5.31	4.73	10.75	2.74	3.32	7.85	8.60	7.24	14.49	27.03	13.98	154.36
1922	27.48	12.43	52.97	12.61	7.06	2.46	5.94	8.01	15.39	8.38	18.84	3.14	174.71
1923	42.46	8.35	23.51	20.56	10.63	8.24	9.65	12.27	14.24	14.95	6.25	31.92	203.03
1924	2.96	8.48	7.31	30.95	7.34	3.43	13.59	11.68	8.03	22.96	10.09	2.63	129.45
1925	16.50	2.02	27.24	11.77	9.16	8.71	5.09	17.72	8.95	4.58	10.19	14.42	123.35
1926	3.59	6.00	2.04	1.45	7.52	2.00	5.63	18.66	11.31	5.79	2.97	15.96	82.92
1927	12.38	2.26	17.36	10.26	11.98	6.12	10.93	14.92	11.20	8.76	11.97	54.12	172.26
1928	7.08	4.13	3.79	8.34	8.01	8.31	10.94	8.04	11.73	16.68	5.89	24.55	117.49
1929	7.64	17.17	18.38	12.92	3.56	4.50	13.11	7.30	4.94	4.30	17.15	15.54	126.51
1930	4.87	5.60	11.69	27.41	9.62	17.05	10.32	21.76	15.12	8.42	18.87	7.74	158.47
1931	2.43	9.06	2.31	11.75	5.41	3.89	14.89	12.66	22.71	8.79	17.26	6.35	117.51
1932	27.28	27.55	5.17	12.14	12.42	7.43	10.99	6.23	6.53	2.38	9.03	15.59	142.74
1933	29.07	9.60	7.90	9.05	8.03	5.60	4.26	4.31	7.02	2.99	3.52	2.02	93.37
1934	15.46	3.58	2.49	10.28	16.32	11.12	7.67	7.89	11.22	16.59	11.41	15.11	129.14
1935	8.39	26.46	9.89	11.14	4.66	6.79	8.16	6.41	8.23	6.80	17.30	4.17	116.40
1936	4.92	3.34	15.36	12.40	14.62	6.12	12.70	26.26	21.26	16.51	6.22	40.59	180.30
1937	29.18	9.46	26.27	12.78	14.17	5.31	18.73	14.82	8.45	8.53	17.74	9.89	175.33
1938	24.42	11.91	29.00	33.57	15.44	8.56	6.20	9.04	6.92	9.58	13.52	16.25	184.41
1939	20.32	18.68	38.00	19.45	4.81	9.63	13.06	6.82	5.26	6.68	10.65	2.35	157.61
1940	1.00	2.25	4.56	5.24	4.79	4.00	11.62	23.56	8.63	16.61	9.27	3.04	95.67
1941	5.99	0.89	8.51	5.15	15.42	11.77	7.42	15.74	16.53	28.15	11.32	12.01	138.90
1942	1.76	7.88	49.23	18.36	7.69	5.71	7.19	9.45	7.37	9.35	4.45	11.46	139.90
1943	10.41	9.71	9.75	9.15	6.92	15.45	11.31	8.65	7.68	2.61	3.04	11.48	106.16
1944	3.52	20.25	2.29	14.60	12.82	7.95	13.04	8.31	8.21	12.57	15.72	19.63	136.91
1945	3.13	5.67	28.98	15.29	1.17	8.65	4.52	15.93	5.17	7.28	10.01	21.85	127.65
1946	21.35	9.99	13.71	12.90	4.65	4.38	11.65	6.58	6.58	9.25	4.13	47.32	152.69
1947	3.35	2.14	19.43	10.47	11.15	6.04	10.85	13.65	12.49	15.76	20.36	23.24	148.93
1948	5.36	3.51	33.72	11.04	11.66	5.95	7.15	Discontinued					
Total	676.75	535.84	928.32	764.88	530.46	421.99	570.93	691.62	587.14	630.38	746.75	789.37	9658.29
Mean	11.87	9.40	16.01	13.19	9.15	7.28	9.84	12.13	10.30	11.08	13.10	13.85	136.76
Median	41.51	31.98	55.16	33.57	21.87	23.56	27.05	35.50	25.06	28.15	36.09	54.12	229.81
Min.	0.78	0.89	0.80	1.45	1.17	2.00	4.28	3.61	4.45	2.38	2.97	0.83	82.92

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1961	3.60	37.40	18.40	17.95	14.25	8.00	16.80	13.00	12.03	24.77	34.60	36.80	237.60
1962	40.40	5.00	20.00	13.20	27.40	7.40	14.60	7.80	15.60	5.10	11.00	12.40	179.90
1963	2.10	2.16	30.40	50.00	26.80	20.40	29.60	17.80	18.80	16.00	14.10	4.40	232.66
1964	24.00	33.40	40.20	29.80	51.21	15.60	13.00	18.20	15.20	33.40	14.60	31.10	311.61
1965	14.26	4.20	21.00	22.00	20.90	11.80	13.00	9.00	8.40	7.40	37.20	30.20	199.96
1966	20.04	9.60	10.81	5.00	12.26	10.40	14.00	8.60	15.00	30.40	23.00	191.11	
Total	820.30	769.01	1068.01	959.85	865.42	540.88	796.63	969.46	661.99	716.49	944.08	970.43	10345.55
Mean	19.53	18.31	26.05	23.41	21.64	13.87	19.43	23.65	16.15	17.48	23.03	23.11	246.32
Max.	59.00	54.00	74.60	55.20	64.00	40.72	32.24	68.02	61.60	42.50	43.00	66.74	386.07
Min.	0.80	1.00	2.50	5.00	4.20	5.60	8.20	7.80	3.00	4.26	4.81	2.20	167.57

Station No. 91.0 — MOUNTAIN VIEW

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1901	13.50	10.92	25.10	13.71	9.05	4.81	9.17	7.34	8.61	12.28	45.86	15.22	175.66
1902	2.99	6.85	63.54	15.45	17.26	5.33	15.70	36.09	13.89	10.52	18.83	19.29	225.74
1903	7.77	10.92	6.44	30.91	13.53	7.48	36.02	27.74	26.74	22.60	21.30	9.05	223.40
1904	46.75	11.17	1.31	35.44	15.21	11.05	14.68	16.93	8.66	6.16	6.15	4.89	178.40
1905	2.08	3.73	10.14	13.06	14.35	13.93	15.35	18.85	22.43	15.66	29.12	16.51	176.24
1906	5.84	3.50	4.42	13.02	14.18	7.64	14.20	23.19	10.40	7.02	21.13	18.54	143.08
1907	8.55	19.86	21.38	8.56	10.66	16.26	16.79	51.33	22.97	20.25	15.19	8.93	222.73
1908	12.91	25.78	8.17	28.06	17.83	9.95	10.93	17.87	26.01	14.02	16.32	28.59	214.44
1909	8.66	14.09	33.94	5.18	16.18	8.42	21.19	8.93	13.07	9.34	6.78	23.24	169.02
1910	26.45	6.96	22.80	20.80	19.75	21.49	17.73	24.86	8.03	15.09	18.14	16.62	218.72
1911	17.96	45.10	15.71	28.39	26.31	21.00	12.29	18.01	22.06	14.65	23.25	22.12	266.45
1912	1.47	17.34	18.99	25.60	10.01	9.59	10.17	7.43	14.57	31.29	22.84	24.92	194.22
1913	39.48	5.84	11.00	22.13	10.73	19.99	13.49	11.82	8.64	9.06	37.65	8.33	197.18
1914	12.19	15.45	7.88	13.13	29.61	31.23	41.15	45.98	44.02	12.61	25.51	15.98	284.74
1915	4.59	11.58	3.67	23.91	6.48	12.41	11.62	6.12	12.14	21.99	41.14	16.27	172.82
1916	13.50	3.30	14.64	30.56	26.22	15.00	15.47	15.39	13.10	15.89	20.11	46.71	229.89
1917	15.83	2.89	29.50	18.73	11.32	9.84	6.03	3.82	4.06	4.10	17.54	5.93	129.59
1918	9.02	7.24	24.48	28.04	23.04	12.69	38.32	18.54	8.03	11.99	24.50	36.85	302.59
1919	9.02	7.24	24.48	9.11	6.08	7.02	9.08	18.33	8.34	11.37	9.67	7.91	171.05
1920	9.13	8.23	24.06	9.77	3.15	7.08	11.91	10.08	11.44	17.64	13.64	13.58	139.71
1921	70.66	5.89	9.29	13.21	5.51	4.91	16.71	14.11	11.98	14.99	31.38	23.14	216.26
1922	29.52	23.59	69.59	19.35	13.68	9.96	9.18	14.97	20.66	9.15	15.26	4.14	233.05
1923	37.06	16.03	33.39	11.85	14.32	11.86	15.00	13.57	16.62	16.31	8.74	29.68	246.43
1924	3.47	11.67	11.92	22.52	9.86	7.75	15.55	13.45	10.83	23.10	17.65	5.07	150.85
1925	20.74	2.07	33.40	21.31	13.65	12.75	7.44	27.83	11.16	8.06	14.90	2.52	175.83
1926	5.16	10.16	2.71	3.85	10.12	3.74	7.33	22.13	14.92	7.74	4.11	23.68	115.65
1927	18.85	9.19	24.00	13.91	15.15	9.42	14.86	22.72	16.60	11.68	13.82	44.95	209.15
1928	11.39	7.25	6.27	11.14	10.92	12.73	18.10	12.61	17.14	13.79	13.10	23.49	157.93
1929	6.87	21.72	17.31	16.30	5.06	7.68	11.11	8.22	7.20	5.42	17.11	14.04	138.04
1930	4.75	8.33	17.21	23.11	14.28	22.92	16.09	32.35	23.11	12.21	22.50	8.37	205.23
1931	3.60	10.63	3.47	8.02	5.48	5.63	15.48	14.90	20.89	12.50	22.71	7.49	130.80
1932	34.12	26.26	6.60	19.10	15.61	8.88	12.51	7.55	9.11	3.66	12.12	16.24	171.76
1933	29.00	13.75	14.90	20.21	13.63	8.74	7.29	5.67	9.97	4.57	7.80	2.69	138.22
1934	18.12	7.48	4.05	13.24	23.47	15.91	13.78	8.94	16.40	14.80	14.28	16.54	166.65
1935	13.79	25.21	14.80	20.68	6.95	9.00	15.05	9.46	11.00	9.00	17.13	8.69	161.86
1936	5.82	2.78	21.07	14.46	18.42	8.36	19.77	29.82	19.75	22.81	8.21	46.34	217.61
1937	35.16	23.15	27.37	17.79	20.17	7.88	27.37	24.66	11.08	12.16	19.37	3.96	235.52
1938	30.16	11.54	31.96	34.44	19.07	13.15	12.22	12.46	10.51	10.38	17.90	23.76	227.55
1939	29.69	27.08	42.36	29.97	9.08	13.92	15.61	12.00	10.41	14.99	17.27	3.33	233.84
1940	1.77	7.38	8.22	7.21	8.62	8.64	13.07	39.98	16.42	13.18	12.41	5.00	142.50
1941	9.29	2.02	16.89	8.78	25.51	13.70	16.67	20.29	25.36	35.03	12.87	19.09	205.50
1942	2.06	7.53	57.56	23.46	14.54	12.23	13.75	12.64	11.95	13.89	9.80	11.16	190.57
1943	16.76	14.53	14.46	12.43	12.03	20.55	24.57	17.81	9.85	9.66	6.89	11.00	171.14
1944	5.94	23.36	2.84	22.87	21.48	11.79	20.23	11.06	10.54	12.34	19.05	21.54	183.04
1945	5.46	7.16	31.99	20.08	3.56	14.03	5.66	18.50	9.50	12.54	13.67	20.66	162.81
1946	26.76	14.31	26.84	25.17	6.71	7.07	25.13	9.29	7.76	15.83	5.89	40.33	211.09
1947	6.18	25.27	23.01	13.36	13.77	8.22	15.14	15.10	15.74	11.31	24.82	21.32	170.54
1948	7.70	9.78	42.49	17.60	17.56	8.26	14.34	10.71	12.69	22.16	31.63	31.32	226.24
1949	36.63	13.52	18.07	9.33	6.85	5.29	15.80	12.41	7.13	14.96	19.00	28.53	187.52
1950	9.80	19.42	17.63	48.13	24.01	10.47	13.09	7.18	7.05	8.55	14.47	15.14	194.94
1951	15.29	30.30	22.60	8.54	7.74	9.14	12.62	17.41	5.11	29.61	29.65	18.94	206.95
1952	24.15	12.19	34.62	13.96	11.73	14.54	12.01	9.02	10.83	14.74	24.09	13.80	195.88
1953	1.38	15.31	32.98	4.96	17.44	9.58	6.09	9.71	5.98	8.20	13.59	11.64	197.66
1954	7.22	12.00	16.75	7.03	19.25	13.28	15.89	24.62	11.64	11.13	21.05	58.53	217.41
1955	16.74	31.94	17.12	24.40	20.10	10.07	15.49	12.23	8.40	9.46	22.00	10.23	198.18
1956	11.15	41.18	16.05	13.27	26.18	17.05	8.44	31.63	6.07	24.85	25.75	10.33	231.95
1957	17.01	12.94	6.85	27.12	13.89	6.50	19.29	40.70	9.50	13.32	16.24	34.21	217.87
1958	4.62	4.86	10.45	11.78	17.36	10.52	22.54	28.20	10.21	15.60	19.65	4.68	161.17
1959	12.84	21.35	8.12	14.15	14.02	7.35	8.80	17.21	13.97	8.38	27.07	22.94	176.20
1960	23.45	16.87	15.39	28.28	16.98	9.35	9.65	15.94	12.64	9.07	24.57	4.29	168.58
1961	3.42	30.04	12.49	9.69	12.32	7.30	6.84	11.36	7.01	27.45	23.44	28.63	180.19
1962	3.37	5.54	13.33	6.78	21.36	5.45	11.73	7.14	11.85	5.77	7.54	7.40	107.26
1963	2.57	16.99	20.03	40.57	19.99	18.11	19.63	13.94	12.83	12.08	8.94	2.21	169.57
1964	20.10	31.67	28.43	16.99	39.57	9.55	8.97	9.79	14.42	13.56	24.84	9.89	227.78
1965	10.11	4.41	12.04	20.32	23.92	12.69	9.81	9.26	9.45	6.87	27.01	20.37	162.06
1966	15.04	8.04	8.97	6.95	7.95	9.48	19.57	11.36	16.30	21.67	26.79	17.20	169.32
Total	1012.31	928.38	1286.82	1210.23	986.82	729.11	1000.44	1140.75	875.72	910.38	1242.45	1166.01	12491.32
Mean	15.34	14.07	19.53	18.34	14.95	15.16	17.28	13.27	13.79	18.83	17.67	18.92	266.26
Max.	70.66	47.92	69.59	48.13	39.57	31.23	45.98	53.33	44.02	31.29	45.86	58.53	302.59
Min.	1.38	1.69	1.31	3.85	3.15	3.15	3.82	3.82	4.06	3.66	5.89	2.21	107.26

Station No. 91.1 — KEAAU

1920 to 1947	—	—	—	—	—	—	—	—	—	—	—	—	—
1948	5.47	8.03	31.16	10.71	10.65	4.04	8.64	7.30	10.04	15.90	12.14	20.20	144.28
1949	21.59	6.65	10.46	4.12	2.62	3.35	9.76	6.74	3.52	11.61	12.09	15.46	107.97
1950	11.58	11.20	7.45	25.58	11.57	5.71	5.33	6.20	6.34	6.48	11.11	18.05	126.29
1951	8.88	19.36	17.76	4.58	4.11	4.65	7.70	8.35	3.10	29.52	9.93	11.05	123.99
1952	23.50	4.81	18.16	6.49	7.00	4.86	4.55	8.81	8.37	9.14	12.01	7.45	115.75
1953	1.64	14.19	22.12	3.16	9.42	6.93	4.66	5.18	4.09	4.57	7.65	8.93	92.41
1954	6.09	11.44	13.95	2.94	10.37	7.71	10.90	14.87	9.22	7.60	16.97	44.18	156.14
1955	11.55	21.38	9.59	13.10	9.80	4.37	7.69	8.40	5.69	5.37	15.50	6.00	116.44
1956	6.72	32.00	10.23	6.13	15.51	10.23	8.01	11.22	4.66	17.29	11.75	15.75	158.00
1957	12.04	13.02	3.99	13.17	5.76	5.87	11.63	25.69	4.76	10.31	11.29	21.07	136.60
1958	3.77	8.47	6.04	5.58	8.57	7.42	10.39	13.32	8.41	12.78	15.75	4.97	105.45
1959	7.33	7.66	7.31	5.61	6.25	4.43	5.50	7.25	6.26	8.04	30.32	13.32	106.44
1960	12.09	14.41	6.60	10.42	19.34	6.18	6.75	8.58	11.96	6.35	11.71	2.92	111.31
1961	3.05	23.68	6.02	7.33	8.52	5.88	4.50	7.19	8.02	2.90	10.44	20.21	125.74
1962	2.38	42.33	14.33	3.50	12.33	3.05	8.48	5.71	10.19	2.90	5.51	3.02	75.65
1963	1.41	17.16	16.93	27.99	8.86	10.17	12.57	5.60	5.99	7.96	8.41	0.77	106.44
1964	13.82	11.18	14.08	6.58	15.02	6.19	6.19	7.13	11.35	11.92	27.05	9.57	130.93
1965	—	—	—	12.34	34.65	9.06	5.17	11.17	8.96	11.27	23.39	12.14	126.16

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1931	0.58	1.50	1.89	5.82	6.02	2.17	4.48	0.63	2.78	2.66	1.20	0.54	30.27
1932	2.99	4.10	3.92	6.26	4.38	4.76	3.35	2.75	2.38	2.31	3.19	0.78	41.17
1933	4.45	2.55	2.27	2.80	3.12	4.98	1.69	2.07	1.64	3.92	0.86	0.91	31.26
1934	1.28	0.60	1.40	0.86	5.59	9.88	2.52	4.59	8.29	3.62	2.07	1.51	42.21
1935	2.83	1.41	5.41	1.65	3.86	1.77	3.81	1.63	2.45	6.58	11.05	0.47	42.92
1936	0.73	6.77	3.03	2.58	3.91	1.29	5.54	3.02	2.04	9.76	1.09	0.51	40.27
1937	6.66	1.73	1.43	1.32	3.66	3.65	1.74	0.88	4.33	3.63	0.78	2.24	32.25
1938	8.50	3.09	5.22	1.87	6.63	1.40	4.00	7.04	1.42	5.69	0.00	1.45	46.31
1939	3.78	4.37	7.05	6.97	1.12	6.46	2.06	2.50	3.71	1.35	5.27	1.84	46.28
1940	4.70	0.58	8.02	2.84	3.60	4.92	4.22	2.83	2.53	0.96	3.12	1.50	41.72
1941	0.94	0.28	0.13	1.78	4.10	2.56	0.00	2.53	4.15	5.76	1.41	0.07	23.71
1942	0.38	0.36	3.35	3.28	0.50	3.13	0.32	6.90	4.78	8.39	1.98	2.69	36.06
1943	10.10	0.40	7.92	1.70	13.12	7.97	2.51	1.69	5.23	7.82	1.62	1.89	61.97
1944	0.68	5.80	7.37	2.01	2.74	9.30	2.04	1.82	2.24	3.82	0.70	3.83	42.35
1945	0.35	3.94	2.30	6.87	10.84	10.05	3.50	1.85	5.47	2.04	5.65	1.19	54.05
1946	6.22	4.81	1.00	2.66	0.99	1.82	2.31	1.07	7.33	4.15	1.74	6.63	40.73
1947	0.76	1.69	6.87	4.81	3.70	6.23	4.41	2.14	5.19	2.68	6.33	1.02	45.83
1948	6.62	5.19	3.47	1.92	6.76	3.02	2.40	1.65	1.97	0.80	4.02	1.07	38.89
1949	8.93	3.63	1.64	0.21	4.18	3.18	4.28	2.40	1.00	0.83	0.00	4.21	35.49
1950	6.85	1.80	1.23	6.99	4.89	2.88	2.35	4.48	2.74	2.92	14.55	2.14	53.82
1951	3.20	5.75	12.02	1.52	6.80	6.85	1.05	1.55	4.04	4.91	3.30	6.24	57.23
1952	8.73	0.12	2.35	2.59	3.71	6.00	0.13	0.02	5.43	0.75	0.92	0.87	31.62
1953	0.43	5.18	2.82	2.64	8.96	4.90	1.79	2.20	0.06	1.65	0.28	5.48	36.37
1954	1.01	1.63	2.35	1.27	4.97	3.79	2.18	2.86	2.00	1.76	1.20	4.10	29.32
1955	1.99	5.71	2.09	2.76	2.52	9.55	1.77	1.51	7.17	0.09	3.77	6.80	45.73
1956	6.57	3.33	2.32	6.12	6.17	3.76	4.52	3.27	1.32	7.30	5.36	3.19	55.23
1957	2.33	1.67	1.00	4.06	3.00	0.03	1.11	3.29	1.97	3.01	3.40	2.39	27.28
1958	0.27	0.62	7.76	1.24	2.86	4.64	2.09	3.14	0.69	4.23	1.27	1.57	30.38
1959	17.74	2.16	1.59	1.85	2.54	2.46	1.87	2.44	1.60	1.81	1.31	0.63	38.00
1960	4.42	0.19	1.33	1.13	4.82	1.51	0.89	5.87	0.99	2.60	0.37	3.33	23.35
1961	3.04	4.52	4.36	4.54	5.59	3.15	2.19	1.57	0.88	0.86	6.50	2.37	39.57
1962	5.33	1.26	4.67	1.74	6.15	2.69	1.85	2.22	1.87	2.77	2.38	1.39	34.32
1963	8.63	2.95	5.81	10.36	2.98	3.18	3.32	1.18	5.36	1.19	1.70	2.63	49.29
1964	1.43	1.54	7.43	4.29	5.78	2.04	1.55	0.67	2.56	1.73	3.91	5.57	38.80
1965	3.94	1.59	4.27	3.52	4.51	3.32	1.10	7.92	3.56	2.47	10.80	0.24	47.14
1966	1.85	1.76	1.33	1.20	3.72	1.40	2.31	1.03	6.38	11.38	4.63	0.80	37.89

Total 260.69 164.53 239.22 205.45 269.25 237.78 142.26 172.97 199.31 202.24 179.37 191.38 244.93

Mean	4.14	2.61	3.80	3.26	4.27	3.72	2.22	2.70	3.11	3.16	2.80	2.99	38.88
Max.	17.74	13.32	12.02	11.21	13.12	10.05	5.54	9.2	9.43	11.38	14.55	21.59	63.61
Min.	0.00	0.19	0.13	0.00	0.50	0.03	0.00	0.02	0.06	0.01	0.00	0.00	11.92

Station No. 93.0 — KAPOHO

1991	—	—	—	—	—	—	—	6.71	9.15	15.03	3.28	8.88	—	
1992	13.45	3.95	5.69	2.52	2.33	5.92	6.10	6.15	5.18	9.50	5.20	5.50	71.49	
1993	2.55	10.05	9.53	11.88	7.62	4.04	3.54	2.12	3.09	5.44	18.42	5.64	83.92	
1994	22.35	24.79	9.60	4.30	1.11	2.75	3.80	2.45	5.09	6.60	7.28	8.48	98.80	
1995	4.13	6.45	3.24	7.21	5.58	4.63	6.11	5.94	9.49	9.82	8.64	12.20	83.41	
1996	5.43	6.80	10.29	6.89	5.58	2.57	3.02	5.13	4.58	4.38	4.24	4.01	62.92	
1997	5.41	3.36	6.18	3.25	2.76	2.39	4.77	5.29	5.99	7.13	12.41	9.74	68.88	
1998	15.64	11.41	24.86	3.26	4.17	4.19	4.99	4.12	6.55	6.11	7.22	4.05	96.57	
1999	2.63	7.29	8.77	9.40	8.37	4.45	1.65	5.60	2.90	15.48	2.46	3.19	74.39	
2000	2.76	7.75	3.14	3.53	8.59	6.13	5.96	10.64	6.98	15.38	7.45	2.13	80.44	
2001	9.80	11.26	8.15	6.16	3.41	3.59	4.89	4.80	4.77	5.09	14.80	9.43	85.95	
2002	3.04	1.43	64.32	4.40	6.82	5.45	8.64	10.58	10.80	8.63	10.26	16.14	150.51	
2003	11.07	2.28	7.78	10.16	1.80	2.17	9.54	4.62	8.52	3.03	10.28	2.16	72.41	
2004	19.69	20.40	2.43	8.16	7.27	5.18	8.52	10.89	12.49	5.87	3.78	3.96	108.44	
2005	0.84	3.72	4.03	2.14	5.40	7.40	5.07	6.35	8.93	8.08	11.25	7.61	70.83	
2006	5.39	2.47	2.25	6.94	6.43	6.28	6.80	10.24	6.50	3.91	13.04	12.14	82.48	
2007	9.31	12.73	9.91	4.09	3.23	7.59	4.42	25.28	15.53	9.02	7.03	3.83	111.97	
2008	5.17	11.27	6.70	6.02	4.53	3.88	1.19	5.75	6.90	5.95	3.46	6.62	72.96	
2009	3.90	8.84	15.83	6.78	5.93	4.47	5.04	4.01	4.93	5.53	2.59	14.60	82.45	
2010	21.42	4.19	5.25	3.89	6.21	5.90	6.76	6.24	6.99	6.34	6.31	15.46	94.96	
2011	9.39	15.39	13.18	12.10	11.44	8.28	4.08	4.91	10.80	3.33	8.23	10.92	112.05	
2012	1.68	5.45	3.55	8.14	3.23	3.28	1.91	2.22	3.17	9.09	7.29	11.43	60.44	
2013	20.48	4.65	3.22	5.13	8.71	4.01	3.77	5.03	8.14	5.53	14.40	3.67	86.74	
2014	10.41	7.57	7.34	6.78	7.96	17.50	11.31	20.44	15.43	5.46	12.08	27.73	148.98	
2015	2.91	3.28	1.43	9.56	4.46	5.12	6.03	5.53	6.85	9.68	31.49	20.20	106.82	
2016	10.37	2.75	13.58	9.00	12.78	5.20	5.08	7.79	7.95	6.98	9.85	19.21	119.54	
2017	12.15	3.65	26.65	7.24	15.50	5.47	4.52	4.63	2.83	6.29	5.39	6.32	100.84	
2018	18.25	14.47	19.13	37.79	14.32	5.69	8.32	5.99	3.76	6.44	8.44	5.10	137.88	
2019	3.79	2.57	6.46	2.30	4.51	4.53	4.11	4.76	1.94	5.81	3.91	6.19	50.88	
2020	13.56	7.53	27.89	2.06	2.68	2.61	3.95	5.79	7.78	7.92	3.85	4.20	89.82	
2021	19.29	5.30	2.25	6.33	2.71	3.69	6.66	5.10	6.63	6.92	6.34	8.27	79.49	
2022	16.47	10.40	29.22	5.39	3.78	2.29	3.06	4.01	8.02	6.30	15.41	5.88	110.03	
2023	28.20	8.27	16.96	9.73	7.1	8.43	5.00	7.76	6.54	7.85	5.57	4.71	9.45	118.45
2024	3.75	5.58	6.51	11.23	2.60	8.80	8.82	6.41	4.59	12.43	6.09	7.12	78.93	
2025	8.38	3.47	16.63	5.09	5.18	6.53	3.91	5.90	9.25	4.46	7.57	4.80	80.97	
2026	3.76	4.61	2.79	3.00	6.29	1.60	4.74	12.72	6.36	5.83	5.38	13.23	70.31	
2027	6.92	2.02	22.34	6.43	14.08	5.22	8.93	7.27	14.60	9.24	7.46	31.07	137.58	
2028	5.08	2.77	2.40	6.94	4.96	5.85	5.81	7.25	8.13	6.13	4.29	17.15	76.76	
2029	10.65	17.13	7.39	9.53	3.84	5.10	11.18	9.40	10.08	4.71	17.99	25.64	132.64	
2030	11.95	2.75	14.02	19.50	4.83	10.68	10.74	11.99	13.04	8.00	26.73	7.63	141.84	
2031	2.53	4.69	3.20	7.07	7.71	4.03	12.36	13.09	9.73	13.05	16.91	3.61	97.98	
2032	18.69	32.49	4.04	8.03	5.63	6.21	6.59	4.20	9.93	5.26	5.88	15.15	122.10	
2033	13.11	6.23	10.32	11.50	3.47	5.25	3.50	2.49	3.27	4.38	5.87	3.24	72.63	
2034	15.73	2.62	5.39	6.09	11.02	7.79	10.84	6.29	13.22	10.24	9.48	17.11	116.02	
2035	9.46	26.80	23.52	5.57	3.26	9.14	6.33	4.82	8.11	14.34	20.70	7.17	142.82	
2036	4.44	1.94	12.73	5.20	5.28	5.08	7.44	15.47	11.22	14.40	6.41	32.75	122.36	
2037	21.53	18.40	14.90	10.28	9.07	4.92	12.46	10.76	13.89	9.15	10.82	23.46	159.54	
2038	22.60	6.43	17.60	21.25	9.52	7.50	7.31	8.76	9.03	11.23	16.76	11.55	149.54	
2039	11.24	19.48	37.02	15.50	2.63	8.85	7.73	5.20	8.50	7.12	18.37	2.69	144.33	
2040	6.79	2.72	9.79	4.43	4.82	4.80	7.02	14.46	6.94	8.73	20.74	4.11	95.35	
2041	2.82	2.34	4.10	2.31	8.45	3.82	4.54	16.35	12.68	20.27	11.18	4.86	93.73	
2042	1.01	3.57	24.57	3.42	7.72	7.61	6.12	9.19	5.01	7.59	9.14	13.39	98.98	
2043	16.96	5.98	11.62	7.02	8.81	10.85	8.24	7.05	3.81	4.57	2.92	8.13	93.67	
2044	3.68	14.98	2.39	6.19	9.43	7.71	6.19	5.55	6.44	10.91	8.50	16.67	80.26	
2045	3.76	8.52	11.36	5.84	3.15	5.77	4.43	9.08	5.68	4.36	14.86	5.77	84.24	
2046	10.23	9.40	7.16	9.44	1.81	4.47	11.54	5.01	3.92	9.73	4.08	19.78	97.38	
2047	6.72	2.85	7.76	5.01	6.94	5.03	7.34	7.22	9.53	9.18	23.69	16.34	102.33	
2048	8.77	1.18	28.29	7.21	6.21	5.28	4.81	4.08	10.15	6.42	5.56	9.96	96.54	
2049	21.67	3.31	6.93	2.42	3.16	3.70	6.47	4.18	1.06	8.55	9.11	18.65	88.58	
2050	8.82	7.03	6.29	17.34	6.01	3.88	4.98	6.00	7.64	4.58	12.04	17.29	101.91	
2051	13.53	16.56	18.18	3.67	4.34	3.87	5.58	7.94	2.86	17.86	7.37	13.74	115.54	
2052	10.67	3.91	18.80	3.05	5.03	4.75	3.89	5.53	5.28	7.63	10.14	6.26	75.56	
2053	15.60	12.93	11.80	4.74	7.87	5.76	4.05	3.38	3.27	5.88	3.76	7.11	72.68	
2054	4.06	5.51	16.10	1.82	8.40	5.42	8.26	4.85	8.22	4.56	12.51	35.99	118.91	
2055	8.16	12.61	—	—	—	—	—	—	—	—	—	—	—	
2056	4.06	5.51	16.10	1.82	8.40	5.42	8.26	4.85	8.22	4.56	12.51	35.99	118.91	
2057	8.16	12.61	—	—	—	—	—	—	—	—	—	—	—	
2058	4.06	5.51	16.10	1.82	8.40	5.42	8.26	4.85	8.22	4.56	12.51	35.99	118.91	
2059	8.16	12.61	—	—	—	—	—	—	—	—	—	—	—	
2060	4.06	5.51	16.10	1.82	8.40	5.42	8.26	4.85	8.22	4.56	12.51	35.99	118.91	
2061	8.16	12.61	—	—	—	—	—	—	—	—	—	—	—	
2062	4.06	5.51	16.10	1.82	8.40	5.42	8.26	4.85	8.22	4.56	12.51	35.99	118.91	
2063	8.16	12.61	—	—	—	—	—	—	—	—	—	—	—	
2064	4.06	5.51	16.10	1.82	8.40	5.42	8.26	4.85	8.22	4.56	12.51	35.99	118.91	
2065	8.16	12.61	—	—	—	—	—	—	—	—	—	—	—	
2066	4.06	5.51	16.10	1.82	8.40	5.42	8.26	4.85	8.22	4.56	12.51	35.99	118.91	
2067	8.16	12.61	—	—	—	—	—	—	—	—	—	—	—	
2068	4.06	5.51	16.10	1.82	8.40	5.42	8.26	4.85	8.22	4.56	12.51	35.99	118.91	
2069	8.16	12.61	—	—	—	—	—	—	—	—	—	—	—	
2070	4.06	5.51	16.10	1.82	8.40	5.42	8.26	4.85	8.22	4.56	12.51	35.99	118.91	
2071	8.16	12.61	—	—	—	—	—	—	—	—	—	—	—	
2072	4.06	5.51	16.10	1.82	8.40	5.42	8.26	4.85	8.22	4.56	12.51	35.99	118.91	
2073	8.16	12.61	—	—	—	—	—	—	—	—	—	—	—	
2074	4.06	5.51	16.10	1.82	8.40	5.42	8.26	4.85	8.22	4.56	12.51	35.99	118.91	
2075	8.16	12.61	—	—	—	—	—	—	—	—	—	—	—	
2076	4.06	5.51	16.10	1.82	8.40	5.42	8.26	4.85	8.22	4.56	12.51	35.99	118.91	
2077	8.16	12.61	—	—	—	—	—	—	—	—	—	—	—	
2078	4.06	5.51	16.10	1.82	8.40	5.42	8.26	4.85	8.22	4.56	12.51	35.99	118.91	
2079	8.16	12.61	—	—	—	—	—	—	—	—	—	—	—	
2080	4.06	5.51	16.10	1.82	8.40	5.42	8.26	4.85	8.22	4.56	12.51	35.99	118.91	
2081	8.16	12.61	—	—	—	—	—	—	—	—	—	—	—	
2082	4.06	5.51	16.10	1.82	8.40	5.42	8.26	4.85	8.22	4.56	12.51	35.99	118.91	
2083	8.16	12.61	—	—	—	—	—	—	—	—	—	—	—	
2084	4.06	5.51	16.10	1.82	8.40	5.42	8.26	4.85	8.22	4.56	12.51	35.99	118.91	
2085	8.16	12.61	—	—	—	—	—	—	—	—	—	—	—	
2086	4.06	5.51	16.10	1.82	8.40	5.42	8.26	4.85	8.22	4.56	12.51	35.99	118.91	
2087	8.16	12.61	—	—	—	—	—	—	—</					

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
Station No. 95.1 — PUA KO													
1939	—	—	—	—	—	—	—	—	—	—	0.22	0.17	—
1940	1.92	Trace	2.04	0.10	0.18	0.08	0.00	0.26	0.98	0.35	1.96	0.02	7.89
1941	0.00	0.17	0.64	Trace	0.35	Trace	0.41	Trace	1.60	3.75	0.00	0.00	6.92
1942	0.25	Trace	0.89	0.59	0.00	0.52	Trace	0.72	0.77	1.58	1.79	0.74	7.85
1943	4.29	0.41	2.34	0.41	2.17	0.35	0.26	0.00	0.02	0.78	0.00	0.16	11.19
1944	Trace	1.33	3.88	Trace	0.02	0.85	Trace	0.05	0.35	0.57	Trace	1.84	8.89
1945	0.00	0.01	0.00	2.70	0.05	0.06	0.95	Trace	1.64	0.34	0.91	6.66	—
1946	4.13	0.12	0.00	Trace	0.00	0.05	0.06	0.10	1.13	1.01	0.02	2.60	9.22
1947	0.00	0.80	Trace	0.00	0.03	0.05	0.06	0.40	0.40	0.00	2.30	0.06	4.10
1948	1.72	6.90	0.00	0.09	Trace	0.87	Trace	Trace	1.10	0.15	2.67	0.00	13.50
1949	4.41	Trace	0.00	0.00	0.23	0.05	0.05	0.10	0.25	0.00	0.00	1.52	6.61
1950	0.65	0.68	0.01	1.27	0.10	Trace	0.19	0.77	0.00	0.00	5.35	3.76	12.60
1951	0.00	2.32	5.55	0.00	Trace	0.15	0.28	0.01	1.50	3.01	0.02	0.06	12.90
1952	6.85	Trace	0.00	0.00	0.10	0.60	1.00	0.06	0.31	Trace	Trace	0.00	8.92
1953	0.06	1.72	1.78	0.16	0.59	0.00	0.01	0.17	0.03	Trace	0.07	1.97	6.56
1954	Trace	0.50	1.92	0.30	0.53	0.00	Trace	0.35	0.00	0.00	1.59	5.19	—
1955	0.60	0.89	0.63	Trace	0.09	0.00	0.95	0.15	0.51	0.00	1.00	2.14	6.96
1956	3.51	0.74	0.34	0.59	1.78	0.00	0.76	0.65	0.05	3.27	0.44	2.18	14.31
1957	1.31	0.02	0.35	0.98	1.76	0.97	0.22	1.54	0.62	0.36	0.94	1.42	10.51
1958	0.00	0.10	3.38	0.00	0.00	0.82	0.95	0.37	0.80	0.75	0.01	0.22	7.41
1959	11.94	1.10	0.02	Trace	0.73	0.05	1.76	0.00	0.11	0.00	2.42	0.09	18.22
1960	Trace	0.30	1.43	—	0.00	0.00	0.00	0.00	0.33	0.18	0.32	1.92	—
1961	1.53	0.10	0.76	0.43	0.50	0.10	0.25	0.00	0.00	1.10	1.50	1.27	7.54
1962	0.62	1.31	0.75	0.52	0.30	—	—	—	—	—	—	—	—
1963	3.83	1.32	2.30	0.84	0.41	0.05	0.25	0.46	0.55	0.00	0.00	1.78	11.79
1964	0.31	0.00	2.30	0.58	0.00	0.00	0.00	0.18	0.29	0.03	1.63	3.77	8.59
1965	1.30	1.31	0.76	0.63	1.29	0.27	0.59	1.25	1.44	0.08	3.19	0.13	12.04
1966	0.03	2.34	0.08	0.53	1.23	0.04	0.23	0.42	0.14	0.30	1.04	0.88	7.26
Total	49.26	24.49	32.15	10.72	12.44	5.93	9.03	8.01	13.28	18.92	27.23	30.72	233.83
Mean	1.82	0.91	1.19	0.41	0.46	0.23	0.35	0.31	0.51	0.73	1.01	1.14	9.35
Max.	11.94	6.90	5.55	2.70	2.17	0.97	1.76	1.54	1.60	3.75	5.35	3.78	13.50
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	4.10

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
Station No. 97.0 — KEAMOKU													
1924	0.23	1.20	1.07	5.29	1.01	2.92	0.00	0.00	1.82	2.08	0.68	1.35	17.65
1925	0.00	3.09	2.03	0.92	0.81	0.26	0.11	0.54	4.64	6.86	0.00	0.86	20.12
1926	0.18	1.31	2.34	0.20	1.57	5.50	1.82	0.23	4.12	5.05	0.95	0.32	23.59
1927	0.85	1.81	3.81	11.90	4.28	3.97	1.20	0.37	3.81	0.57	2.03	9.54	44.14
1928	0.07	1.76	2.04	0.80	0.40	0.37	0.25	5.04	1.03	1.47	0.95	0.78	14.96
1929	2.17	3.96	0.67	1.04	1.05	0.33	0.21	1.73	0.47	5.19	6.93	3.47	27.22
1930	4.93	2.38	2.50	0.00	0.13	0.00	2.28	2.86	9.14	5.40	2.92	0.19	32.73
1931	0.00	0.00	2.85	2.30	4.24	0.64	1.89	1.44	1.70	3.57	0.28	1.69	20.60
1932	0.86	2.36	4.43	2.20	1.86	0.38	0.24	1.40	2.70	1.27	3.66	1.46	22.62
1933	3.12	3.43	1.92	3.22	0.70	0.01	0.00	2.20	0.00	0.40	0.15	0.06	15.21
1934	0.55	0.91	1.00	2.36	1.17	2.06	1.03	4.41	2.37	1.77	0.81	0.28	24.52
1935	2.22	2.42	3.42	0.48	1.63	0.93	0.03	0.82	1.77	7.06	2.13	0.10	23.01
1936	4.66	9.49	2.95	0.50	0.08	0.64	0.00	1.86	2.35	2.94	1.57	1.41	28.45
1937	2.58	3.16	0.55	3.65	2.59	0.46	0.19	2.95	1.55	0.10	3.70	21.83	—
1938	2.66	2.49	2.82	0.65	4.20	0.99	0.13	5.66	0.20	3.08	1.12	0.58	24.58
1939	3.12	3.05	5.58	6.78	0.74	0.43	0.25	0.35	0.43	1.06	0.98	1.40	24.06
1940	3.35	0.58	6.08	2.46	1.94	3.74	0.25	1.85	1.14	0.65	2.35	1.22	35.02
1941	0.40	1.11	0.77	0.55	0.38	0.19	1.15	1.27	1.83	4.39	0.94	0.00	12.98
1942	0.47	1.04	1.58	0.63	0.70	0.31	1.77	1.10	4.57	3.24	1.93	4.91	22.25
1943	0.70	0.59	0.75	0.68	0.10	0.66	0.10	2.06	0.36	2.54	0.37	0.86	39.86
1944	0.27	4.29	3.14	0.08	1.55	2.14	0.25	0.20	0.73	0.52	0.33	2.69	16.19
1945	0.79	1.63	3.31	6.51	4.17	1.32	2.66	0.52	1.79	0.81	1.86	1.39	26.76
1946	3.38	2.20	0.05	1.95	1.17	0.17	2.48	3.13	0.62	7.28	1.22	3.78	27.43
1947	0.00	0.72	2.14	2.39	0.99	0.18	1.30	1.39	2.82	0.39	5.02	0.66	18.00
1948	3.63	2.25	4.54	2.85	2.12	4.91	1.05	0.42	2.11	0.00	4.55	0.00	28.43
1949	4.91	1.88	0.03	0.00	2.12	2.79	0.20	0.00	0.03	1.44	0.59	2.70	16.69
1950	1.46	1.56	0.15	6.30	1.16	1.06	0.13	3.54	1.79	0.15	7.86	0.77	25.93
1951	1.66	2.72	7.83	2.21	2.36	0.00	0.79	0.42	3.45	4.38	2.16	2.18	34.36
1952	6.95	0.25	4.14	0.70	0.76	0.00	0.81	0.36	0.27	0.17	2.09	0.74	17.24
1953	0.31	5.69	7.93	1.27	2.28	0.39	0.00	0.23	0.46	0.50	0.10	2.81	21.97
1954	0.57	1.23	3.86	0.49	2.18	0.86	0.76	1.45	0.27	1.01	0.37	4.15	17.20
1955	1.74	4.07	1.53	2.03	0.71	0.35	1.28	0.97	1.38	0.34	3.72	2.32	20.44
1956	6.23	6.72	1.54	3.46	1.38	0.08	3.35	3.72	0.39	8.77	4.17	3.21	43.02
1957	2.24	0.95	1.84	2.01	2.68	0.96	0.40	5.12	1.24	0.37	1.50	3.56	22.87
1958	0.19	0.86	4.12	0.23	1.71	1.76	1.67	1.06	0.00	1.51	2.20	1.26	16.57
1959	5.47	0.60	0.70	1.47	2.03	0.25	0.32	0.88	2.07	1.99	3.76	2.04	21.63
1960	0.08	0.46	3.91	3.31	0.53	1.37	1.25	0.89	0.30	0.14	3.29	23.45	—
1961	1.20	1.09	3.58	2.41	0.50	0.72	0.54	0.55	0.36	0.28	2.34	2.30	15.87
1962	1.49	1.57	3.51	3.34	1.90	0.84	0.16	0.24	0.09	1.56	—	0.98	—
1963	6.46	Discontinued	—	—	—	—	—	—	—	—	—	—	—
Total	86.15	86.88	113.00	89.59	92.77	48.94	31.17	63.59	65.56	94.69	74.83	75.01	909.45
Mean	2.15	2.23	2.90	2.30	2.38	1.25	0.80	1.63	1.68	2.43	1.97	1.02	23.93
Max.	6.95	9.49	7.93	11.90	20.19	5.50	3.35	5.66	9.14	8.77	7.86	9.54	44.14
Min.	0.00	0.00	0.03	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.98

	Station No. 102.1 — PUU LAAU												
1932	3.00	2.65	0.10	1.00	1.38	0.68	1.10	0.70	1.25	1.60	0.45	0.39	14.30
1933	2.04	1.15	3.20	2.15	0.15	0.18	0.04	0.90	0.10	0.00	0.32	0.50	10.73
1934	0.00	2.30	1.00	1.40	3.30	1.85	1.11	8.00	3.00	3.20	1.65	1.43	28.04
1935	1.30	1.00	3.60	1.00	1.50	0.70	0.42	4.50	0.80	3.36	2.65	0.00	20.83
1936	3.70	7.43	4.96	0.12	0.43	0.96	0.78	3.40	3.43	2.26	0.65	1.47	29.59
1937	5.40	1.81	2.30	1.70	2.47	0.26	3.58	5.60	1.45	2.38	0.67	0.60	28.22
1938	3.37	1.37	1.08	1.61	1.61	1.00	1.70	5.15	0.54	1.40	0.00	2.60	21.43
1939	3.32	4.10	3.62	5.13	0.68	0.36	1.80	0.37	0.26	0.12	1.45	0.00	20.41
1940	0.80	0.10	3.16	0.85	0.38	0.76	0.45	4.63	0.57	1.40	2.00	0.00	15.10
1941	0.00	0.00	0.00	0.00	0.62	0.86	0.57	1.15	2.42	5.90	0.21	0.00	11.73
1942	0.00	0.00	1.15	0.40	1.79	2.20	1.92	2.25	2.54	1.98	1.73	0.39	15.85
1943	4.37	1.12	5.80	2.75	8.11	1.46	1.05	1.87	0.78	0.68	0.00	0.66	28.65
1944	0.00	6.33	1.83	3.77	0.75	1.21	0.59	0.27	0.46	0.90	0.98	2.94	15.83
1945	0.10	1.24	3.00	4.35	2.60	1.20	0.85	0.91	0.51	1.88	0.89	0.29	17.82
1946	2.17	2.26	1.06	3.10	1.10	0.16	3.20	2.14	0.30	1.30	3.33	2.95	19.07
1947	0.38	0.68	2.08	1.54	1.23	0.20	4.00	2.58	5.03	1.26	0.58	1.38	21.86
1948	3.20	6.45	7.10	1.17	1.85	1.07	0.93	0.95	2.62	0.10	4.69	0.88	31.01
1949	4.86	1.86	3.32	0.06	0.00	2.94	0.80	0.04	0.11	0.37	1.01	1.17	13.54
1950	1.67	2.45	0.05	7.32	2.32	0.20	2.10	5.67	1.62	0.00	7.07	0.98	31.65

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1946	6.79	6.19	0.23	0.91	1.01	1.14	1.25	1.47	0.61	1.38	2.78	9.31	33.07
1947	2.75	2.30	2.62	2.31	1.23	0.56	1.12	1.19	2.83	0.98	3.08	4.96	25.93
1948	8.27	4.08	3.24	2.78	1.30	0.63	1.15	0.71	1.31	1.10	4.75	1.66	30.98
1949	3.99	2.28	0.51	0.43	0.88	1.39	1.03	0.28	0.43	1.12	3.77	1.66	17.77
1950	1.87	1.61	3.61	10.18	0.80	0.94	2.24	6.93	0.76	0.76	5.92	9.64	45.26
1951	1.63	3.22	7.12	1.54	1.52	1.17	0.64	3.33	1.43	4.36	1.07	2.15	29.18
1952	5.63	1.88	2.48	0.58	2.64	1.07	2.01	2.11	0.44	2.15	1.64	0.75	23.38
1953	-0.23	2.37	3.33	1.64	1.53	0.71	0.83	0.53	0.18	0.93	0.74	1.04	14.19
1954	3.44	2.57	0.62	2.89	3.18	1.82	1.38	2.62	0.15	0.39	1.17	12.21	36.84
1955	3.68	9.70	4.24	0.39	1.34	1.28	1.01	1.13	0.70	0.76	1.35	2.35	27.93
1956	4.08	7.09	2.38	4.38	2.76	1.25	3.56	3.59	0.92	4.88	2.50	3.93	41.32
1957	0.76	1.82	2.63	2.81	2.22	1.24	1.53	4.31	0.91	3.74	1.71	4.53	28.21
1958	2.76	1.35	7.07	1.33	1.67	2.84	9.85	8.63	2.01	5.78	1.57	4.78	49.64
1959	7.87	2.11	1.03	2.54	2.49	0.65	1.13	4.85	1.43	3.62	2.56	4.04	34.32
1960	0.16	15.64	6.39	1.80	3.58	1.32	0.42	1.50	2.54	1.14	1.12	1.48	37.09
1961	0.75	—	—	—	—	—	—	—	—	—	—	—	—
1962	Discontinued	—	—	—	—	—	—	—	—	—	—	—	—
Total	165.15	182.46	179.31	140.56	80.95	43.82	72.58	102.76	62.46	94.94	125.48	171.22	1419.46
Mean	3.12	3.51	3.45	2.65	1.56	0.97	1.40	1.98	1.20	1.83	2.41	3.29	27.30
Max.	10.80	17.18	16.20	10.18	5.93	3.27	9.85	8.63	4.87	5.78	9.30	12.21	49.64
Min.	0.16	0.03	0.23	0.14	0.00	0.00	0.05	0.00	0.04	0.00	0.10	0.03	9.49

Station No. 107.0 — POHAKULOA

1938	1.99	1.90	2.00	3.00	2.00	0.00	1.40	1.40	0.42	0.50	0.00	1.20	15.81
1939	4.20	5.20	3.00	2.00	3.00	0.00	0.00	0.75	0.00	0.00	1.20	0.00	19.35
1940	0.70	0.00	3.00	0.10	0.00	0.00	0.50	3.80	0.10	0.85	0.90	0.00	9.95
1941	0.00	0.00	0.00	0.00	0.40	2.20	0.65	0.60	3.40	3.65	0.00	0.00	10.90
1942	0.00	0.10	2.16	1.00	0.00	7.00	0.10	0.07	8.00	0.24	1.30	0.60	20.57
1943	3.40	1.10	3.20	1.10	5.20	0.60	2.20	0.00	2.40	0.00	0.10	0.00	19.30
1944	0.00	3.64	1.60	0.20	1.20	1.62	0.00	0.10	0.00	1.00	0.00	2.80	12.16
1945	0.00	0.20	2.80	0.10	0.60	0.90	0.60	0.70	0.84	0.20	0.35	0.25	7.54
1946	0.69	1.00	0.00	1.10	0.00	0.29	0.91	0.77	0.06	0.00	0.17	23.45	27.44
1947	0.52	0.28	0.88	1.11	0.88	0.01	1.93	1.17	1.41	0.60	0.66	0.92	10.37
1948	1.70	3.48	0.92	0.65	0.34	0.31	0.94	2.67	0.67	2.37	0.91	0.62	21.58
1949	3.45	0.41	0.14	0.00	0.00	0.47	0.00	0.25	0.00	2.38	0.66	1.00	8.76
1950	1.28	2.45	0.34	3.42	0.05	0.00	0.29	0.29	0.75	0.68	2.99	1.33	15.67
1951	1.48	2.99	8.66	0.28	0.19	0.46	0.18	2.96	0.31	2.97	0.26	0.72	21.46
1952	5.58	0.21	2.23	0.00	0.31	0.00	0.20	0.00	0.00	2.06	2.96	0.00	13.55
1953	0.00	3.18	3.27	0.00	0.12	0.11	0.02	0.69	0.00	0.00	0.34	0.84	8.57
1954	0.16	1.88	1.46	1.10	1.80	0.99	1.43	2.38	0.69	0.34	0.15	7.28	19.66
1955	0.37	3.80	1.20	0.60	0.05	0.00	1.00	0.84	0.05	0.65	0.20	1.40	10.16
1956	4.10	1.50	1.04	0.11	1.25	0.00	0.79	2.86	1.04	1.90	1.59	1.89	18.07
1957	1.43	0.93	0.00	0.26	0.64	0.77	0.44	4.72	3.44	0.90	0.96	2.64	17.13
1958	0.00	0.22	1.48	0.00	0.14	0.00	5.01	1.18	0.41	0.97	0.09	1.31	10.81
1959	5.24	1.47	0.09	0.72	0.00	0.00	0.18	3.20	1.30	1.48	1.43	0.18	15.29
1960	0.04	0.54	1.49	1.46	1.84	0.09	0.00	0.40	0.96	0.58	0.45	1.98	9.63
1961	0.11	0.87	0.77	0.49	0.71	0.00	0.63	0.70	0.91	1.60	3.84	2.65	13.08
1962	0.31	0.29	1.74	1.03	0.48	0.23	0.19	0.02	1.73	0.00	0.00	0.02	6.04
1963	0.48	0.80	3.64	6.00	2.92	1.40	4.15	0.65	2.65	0.65	0.76	0.00	26.90
1964	3.50	0.83	4.40	0.00	1.93	0.00	2.02	0.34	0.10	0.72	1.76	3.00	16.00
1965	1.60	2.20	1.82	3.25	6.19	1.00	3.47	0.44	0.08	0.77	1.56	0.00	19.28
1966	0.00	2.19	0.34	0.53	0.60	0.03	2.30	2.05	1.27	0.91	2.82	1.10	14.14
Total	42.33	43.26	57.07	29.61	32.64	18.48	28.43	37.80	32.99	28.97	31.41	56.18	439.17
Mean	1.46	1.49	1.97	1.02	1.13	0.64	0.98	1.30	1.14	1.00	1.08	1.94	15.14
Max.	5.58	5.20	8.66	6.00	6.19	7.00	5.01	4.72	8.00	3.65	3.97	22.45	27.44
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	6.04

Station No. 111.0 — HALEPOHAKU

1939	—	—	—	—	—	—	—	—	0.20	0.00	0.20	0.00	—
1940	2.60	0.00	3.70	0.21	0.00	0.00	0.60	11.75	1.27	2.75	3.20	0.00	26.08
1941	0.00	0.00	0.00	0.00	0.50	4.10	2.10	2.30	7.80	5.40	0.00	0.70	22.90
1942	0.00	0.60	5.30	1.00	0.40	0.70	0.50	1.35	2.30	2.00	1.30	2.50	17.95
1943	6.90	3.90	4.90	1.80	4.90	1.40	5.25	0.60	0.30	0.00	0.00	0.30	30.25
1944	0.00	12.91	0.95	0.10	1.35	1.10	0.00	0.00	0.20	2.20	1.09	3.00	22.90
1945	0.10	0.50	5.80	4.00	0.00	0.00	0.00	0.20	0.50	0.50	1.40	1.50	14.80
1946	0.75	5.30	1.40	2.10	0.00	0.60	0.50	0.70	0.00	1.50	0.00	7.20	20.05
1947	0.40	0.06	1.76	1.70	0.20	0.00	1.90	4.00	3.20	2.20	1.30	7.60	24.32
1948	3.07	3.11	4.82	1.64	0.23	0.24	0.77	1.24	1.45	8.41	3.99	30.70	18.34
1949	7.56	1.13	0.95	0.00	0.55	0.24	0.00	0.22	0.00	1.44	1.43	4.78	16.70
1950	3.02	4.87	3.55	5.74	1.10	0.00	1.65	2.30	1.15	0.51	4.10	1.95	29.43
1951	3.68	9.67	14.49	0.12	0.65	0.80	0.45	4.44	0.50	2.46	1.86	1.24	40.36
1952	9.81	0.66	5.13	0.00	0.00	0.00	0.78	0.00	0.00	0.62	4.21	0.00	21.21
1953	0.00	5.87	0.70	0.70	0.34	0.00	0.00	1.79	0.00	0.16	1.42	1.18	16.53
1954	1.02	—	5.48	1.90	1.73	0.00	1.85	4.53	0.07	0.80	13.70	32.61	61.00
1955	0.90	6.21	1.55	0.64	0.08	0.00	0.07	0.00	0.00	0.50	1.17	4.20	15.32
1956	6.55	7.35	1.78	2.19	1.48	0.44	1.02	8.06	0.46	2.39	4.99	1.82	38.53
1957	3.55	1.33	0.11	1.28	0.78	0.46	1.78	11.39	3.68	1.84	1.63	4.02	31.65
1958	0.00	1.35	3.63	Trace	—	0.12	6.46	—	7.42	2.65	1.69	1.71	25.03
1959	6.93	3.33	0.22	2.20	0.31	0.23	1.78	7.84	1.52	1.70	1.70	—	—
1960	0.24	3.45	3.24	5.30	1.67	1.05	0.00	0.10	2.40	0.67	3.61	2.34	—
1961	0.65	2.19	1.03	1.34	1.18	0.00	0.53	0.21	0.27	3.73	7.91	11.14	30.18
1962	0.73	0.52	2.37	0.47	0.98	1.09	0.00	0.00	0.31	0.00	0.00	0.23	6.70
1963	4.53	0.39	5.19	17.15	4.02	1.00	4.02	1.00	0.15	1.50	0.90	0.00	39.85
1964	0.70	2.40	6.70	0.50	4.20	1.10	1.43	1.15	0.85	1.50	6.00	1.90	28.43
1965	0.98	2.65	2.25	4.55	4.65	0.95	0.48	0.40	0.55	0.92	2.40	1.00	21.78
1966	0.00	0.40	0.75	0.99	1.20	0.03	3.09	2.00	3.29	3.05	4.83	8.00	27.63
Total	64.67	80.15	86.64	57.62	32.50	15.53	37.01	68.10	33.67	43.51	67.55	86.00	633.23
Mean	2.40	3.08	3.33	2.13	1.25	0.60	1.37	2.62	1.25	1.55	2.41	3.19	25.33
Max.	9.81	12.91	14.49	17.15	4.90	4.10	6.46	11.75	7.80	5.40	8.41	11.14	39.85
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	6.70

Station No. 113.0 — PUU MALI

1932	—	—	—	—	—	—	—	—	—	—	—	—	—
1933	3.20	2.10	2.20	2.18	0.75	0.00	0.00	0.00	0.20	5.40	0.00	16.03	—
1934	2.21	2.80	3.00	6.10	3.00	0.60	2.03	1.43	2.00	1.60	1.00	1.40	27.17
1935	2.35	7.20	7.20	1.00	0.73	0.00	2.05	1.00	1.77	8.05	3.00	0.00	34.35
1936	3.80	2.87	3.00	5.00	0.00	0.00	0.75	1.00	1.80	2.00	2.00	34.43	42.36
1937	5.20	8.60	3.40	4.00	2.63	0.20	1.25	9.40	1.40	1.05	0.95	20.20	40.28

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1921	12.33	0.02	4.44	2.66	2.01	0.00	0.12	0.29	0.00	4.56	25.86	7.74	60.23
1922	8.43	10.30	19.32	2.44	0.51	0.14	0.83	1.68	4.42	0.26	5.13	0.01	53.47
1923	16.92	2.31	14.54	6.45	0.27	0.22	0.53	12.04	3.01	2.09	0.86	13.45	72.69
1924	0.60	2.79	3.56	8.30	1.98	0.12	0.70	0.13	1.11	7.13	17.63	1.95	46.00
1925	3.71	2.12	5.51	1.37	0.33	0.21	1.15	3.71	1.61	2.87	2.15	0.37	25.21
1926	0.50	2.05	0.24	1.98	0.36	1.05	2.47	2.14	1.98	2.53	6.52	1.01	22.83
1927	5.27	0.73	4.57	10.62	1.92	0.45	0.16	0.85	7.86	0.81	2.35	6.00	41.39
1928	0.70	2.46	5.85	0.65	1.52	0.08	0.24	0.27	1.28	1.77	3.19	6.91	31.92
1929	11.30	12.88	3.98	2.73	1.59	0.09	1.17	3.00	0.43	0.84	20.11	12.72	70.84
1930	3.31	8.70	6.72	6.68	0.19	0.45	1.20	5.18	2.93	4.10	15.01	1.46	56.13
1931	0.00	1.50	0.68	7.74	2.87	1.20	5.94	1.05	3.10	4.25	0.50	2.20	31.03
1932	3.87	7.30	1.59	1.42	0.16	0.95	0.14	0.71	0.75	0.00	1.95	1.49	20.33
1933	2.23	2.51	4.49	2.12	0.60	0.04	0.15	0.22	0.15	0.74	9.92	0.50	23.87
1934	2.59	5.25	4.40	7.65	2.01	1.20	3.25	1.64	3.58	2.30	3.14	1.30	38.31
1935	2.77	3.80	9.00	2.45	1.60	0.21	1.60	0.43	1.32	5.98	2.55	1.22	33.83
1936	2.10	3.10	3.35	3.09	0.65	0.30	0.85	1.80	3.45	2.51	2.40	21.05	44.85
1937	7.43	12.66	5.30	1.40	1.92	0.23	2.25	10.00	1.00	1.72	2.18	1.65	48.04
1938	0.67	1.80	2.84	7.25	1.35	0.86	0.40	3.21	0.08	1.83	0.22	2.20	28.11
1939	9.05	4.00	5.77	6.75	0.40	0.18	0.95	0.21	0.72	0.36	1.25	0.76	30.40
1940	7.14	1.44	4.67	0.57	0.35	0.08	1.65	14.24	2.60	1.36	7.73	1.90	37.33
1941	3.49	2.45	1.53	0.28	6.57	8.14	0.21	2.35	2.80	8.78	1.88	2.04	40.52
1942	0.35	3.65	29.42	2.32	0.66	1.16	1.52	0.25	3.34	5.75	1.15	2.53	52.30
1943	3.94	7.05	5.33	5.15	7.00	0.04	1.12	1.70	0.45	0.00	0.23	0.25	32.26
1944	0.59	5.98	2.11	1.10	0.45	0.74	0.11	0.27	0.58	3.43	0.02	1.52	16.90
1945	1.60	0.38	4.71	5.12	1.72	0.15	0.35	0.20	0.18	2.55	2.75	3.77	23.48
1946	5.25	10.15	0.26	0.65	0.61	0.48	0.64	0.27	0.34	2.23	1.45	15.74	38.05
1947	3.02	4.30	4.10	2.56	0.78	0.03	0.70	1.89	0.81	2.50	3.05	7.76	31.50
1948	0.80	3.60	6.74	4.15	0.85	1.42	0.14	0.10	2.70	2.37	4.48	1.25	37.60
1949	5.20	0.85	1.02	0.50	0.62	0.07	0.00	0.03	0.30	0.69	5.12	3.73	18.73
1950	2.65	0.95	6.01	11.89	0.34	0.15	0.60	7.45	0.23	0.42	6.28	13.53	50.50
1951	1.80	4.05	4.52	1.05	0.15	0.35	0.54	2.09	1.75	3.90	2.72	1.75	24.67
1952	1.65	1.90	5.36	0.25	3.32	0.00	1.81	0.17	0.12	4.35	4.95	0.07	28.45
1953	0.37	4.99	5.50	0.83	1.38	0.20	0.00	0.85	0.28	0.10	0.52	1.12	16.12
1954	3.40	1.40	6.20	3.71	2.90	0.10	0.30	1.40	0.50	0.00	0.55	28.69	48.65
1955	4.75	14.72	5.04	0.35	0.10	0.10	0.30	1.09	0.82	0.55	1.56	1.30	30.68
1956	2.25	7.95	2.24	2.65	1.32	0.33	1.74	4.72	0.08	3.31	2.57	0.75	29.91
1957	0.84	4.34	2.45	2.25	2.14	0.58	0.66	1.54	1.02	4.55	0.45	6.15	26.97
1958	1.85	1.87	6.40	0.38	1.26	0.19	7.99	15.40	0.97	6.80	0.78	4.71	48.60
1959	4.72	2.16	0.69	2.12	1.52	0.00	0.30	2.63	0.28	0.65	5.26	11.59	31.22
1960	0.16	15.59	9.00	0.90	1.33	0.57	0.43	0.56	2.71	1.17	0.55	1.55	35.92
1961	1.10	2.04	0.40	11.67	0.42	0.07	0.17	0.01	0.90	3.22	7.78	2.90	30.68
1962	1.31	2.00	5.85	0.24	2.06	0.19	0.09	0.07	0.38	0.49	0.00	0.16	12.84
1963	6.14	1.10	4.67	5.91	Discontinued								
Total	187.29	214.25	260.80	176.70	89.15	26.43	66.27	126.47	73.47	115.40	216.93	250.33	1809.42
Mean	3.82	4.37	5.32	3.61	1.86	0.55	1.35	2.58	1.50	2.36	4.43	5.11	36.93
Max.	16.92	15.59	29.42	16.42	16.69	23.75	8.24	15.40	7.86	8.78	25.86	28.69	83.77
Min.	0.00	0.02	0.24	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.01	0.01	12.23

Station No. 117.0 — HALEPIULA

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1914													
1915	1.27	3.89	1.26	4.92	0.00	0.00	3.30	0.50	6.00	4.30	8.20	3.10	36.73
1916	6.20	2.30	5.60	0.00	22.80	0.00	0.00	1.53	0.30	1.00	4.41	18.12	62.26
1917	2.65	10.15	0.15	2.40	6.00	0.14	0.00	0.00	0.80	1.68	2.89	3.48	25.29
1918	11.00	17.90	7.20	15.07	5.53	2.00	8.13	7.10	1.70	0.50	6.80	20.40	103.33
1919	1.81	1.70	5.90	1.15	2.05	0.30	0.00	0.76	0.61	0.25	0.10	1.45	16.08
1920	1.78	0.85	7.48	2.14	0.25	0.00	0.25	1.89	0.52	1.27	3.16	4.35	23.94
1921	15.61	0.51	4.25	2.50	0.80	0.00	0.95	1.30	0.04	3.15	23.53	4.97	57.61
1922	7.53	11.81	18.66	2.99	0.48	0.01	0.92	2.01	6.72	0.34	5.48	0.00	56.95
1923	17.05	2.62	20.79	7.64	0.69	0.20	1.01	10.73	4.27	2.52	1.37	22.44	91.31
1924	0.68	4.89	3.37	9.70	1.73	0.32	0.00	0.33	1.21	10.30	18.54	1.69	52.76
1925	5.66	0.70	10.28	3.40	0.45	0.82	1.81	6.72	3.08	3.19	4.50	0.19	40.80
1926	0.56	2.97	0.40	2.37	0.25	1.68	2.05	4.54	3.12	3.46	6.86	1.60	29.86
1927	5.79	0.90	7.64	14.10	0.81	0.52	1.10	2.15	8.20	0.65	2.57	5.78	50.21
1928	1.89	2.70	5.96	1.55	1.72	0.15	10.50	0.98	1.86	1.90	5.55	8.99	43.75
1929	11.63	13.81	4.61	3.46	1.88	0.25	1.17	4.06	1.40	0.84	21.08	10.03	74.02
1930	3.79	7.40	7.60	3.44	0.60	0.85	2.12	9.65	4.60	1.21	6.26	2.45	49.97
1931	0.50	1.84	1.19	9.63	3.40	2.62	7.42	1.10	4.40	4.40	2.31	6.06	44.87
1932	6.51	10.22	1.45	2.51	0.82	1.75	0.55	0.86	0.85	0.03	3.45	2.97	31.97
1933	3.76	4.33	4.75	3.70	0.85	0.15	0.04	0.24	0.08	1.17	10.74	1.30	31.11
1934	3.60	6.46	4.45	7.50	5.91	2.00	2.26	1.68	4.75	2.72	3.44	4.00	46.77
1935	4.92	6.30	13.25	9.87	1.65	2.83	2.60	0.42	4.57	12.14	3.20	1.02	60.17
1936	2.10	2.95	4.88	4.73	1.33	1.18	0.77	3.45	4.22	3.40	2.65	23.70	55.66
1937	10.20	12.55	6.90	2.53	3.43	1.74	2.76	17.58	1.16	3.90	3.77	2.45	67.97
1938	6.64	2.25	8.82	9.64	2.55	1.24	0.47	2.61	0.17	2.80	1.15	2.60	37.94
1939	13.72	5.67	8.37	9.92	7.77	0.52	2.05	0.32	0.86	0.90	3.03	0.62	46.75
1940	1.03	1.89	5.15	1.96	1.22	0.10	0.99	20.35	2.20	3.02	7.50	2.70	48.11
1941	4.46	3.15	2.15	2.24	0.84	11.30	0.35	2.85	3.60	10.08	1.97	3.36	52.37
1942	0.26	4.95	42.70	3.65	0.87	1.00	1.73	0.72	3.72	4.21	1.39	3.41	68.61
1943	3.23	7.14	9.30	4.53	6.15	0.42	3.20	1.81	0.50	0.40	0.63	1.40	36.71
1944	0.80	7.76	5.93	1.61	0.42	1.01	0.00	0.40	0.88	3.45	0.32	2.37	25.85
1945	1.06	0.21	7.50	6.87	1.80	0.42	0.63	0.32	0.25	2.90	1.90	5.19	28.85
1946	5.70	11.20	1.95	1.94	0.88	0.31	1.35	1.25	0.32	3.42	2.60	19.17	49.77
1947	3.57	3.81	6.02	2.67	1.88	0.01	0.69	3.12	2.60	3.41	2.36	3.90	34.34
1948	7.93	5.46	8.35	3.72	1.05	1.16	1.55	0.51	2.56	4.00	5.75	5.64	47.68
1949	4.51	1.72	2.54	0.70	1.00	0.67	0.04	0.00	0.25	0.70	5.60	4.25	21.98
1950	1.79	1.20	7.56	14.62	0.68	0.10	1.00	9.50	0.34	1.00	6.42	10.63	54.84
1951	3.35	3.30	7.64	1.13	0.55	0.50	1.46	2.53	0.88	2.80	5.90	2.15	34.29
1952	3.40	2.60	9.58	0.35	3.76	0.00	1.85	0.48	0.12	7.02	5.68	0.44	35.88
1953	0.19	3.42	7.35	0.90	1.22	0.10	0.00	1.45	0.20	0.39	0.85	1.50	17.57
1954	3.41	2.81	6.33	3.40	5.10	0.10	1.10	2.05	1.05	0.11	10.34	54.60	60.30
1955	4.10	16.25	5.52	0.54	0.44	0.02	0.30	0.97	0.75	1.38	2.39	1.15	33.81
1956	2.47	11.85	2.53	3.48	1.95	0.77	1.19	0.54	0.06	5.21	2.67	0.50	42.22
1957	1.63	5.95	2.53	3.80	2.42	0.62	0.84	2.73	1.09	7.59	0.50	7.11	37.41

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1941	1.74	1.79	1.65	0.22	5.56	13.25	0.08	3.40	5.82	9.55	2.10	1.25	46.21
1942	0.10	5.52	34.25	3.87	0.86	1.06	1.22	0.87	1.63	3.50	1.30	3.95	58.13
1943	4.55	5.85	5.18	2.68	1.15	1.07	4.77	1.28	0.32	0.20	0.30	1.71	33.06
1944	0.20	6.31	2.85	1.17	1.50	3.37	0.00	0.27	0.71	3.55	1.07	2.54	23.54
1945	0.49	0.18	11.97	7.97	0.45	0.71	0.61	0.85	0.55	1.33	2.68	4.41	31.80
1946	6.30	12.25	4.12	2.45	0.48	0.40	1.28	0.82	0.36	2.00	1.52	17.84	49.82
1947	0.33	2.59	7.02	1.22	1.78	0.11	1.51	7.13	3.61	4.53	1.60	10.50	41.93
1948	5.20	3.95	9.46	5.00	1.67	0.71	1.11	1.84	3.25	3.85	7.45	7.35	49.04
1949	5.47	0.11	2.75	0.35	1.22	0.42	0.06	0.00	0.30	1.36	5.36	6.25	23.65
1950	2.57	2.10	4.05	10.95	3.37	0.00	1.83	7.52	0.45	1.02	7.90	6.10	47.40
1951	3.65	6.08	8.18	0.62	0.15	0.15	1.69	4.17	0.40	4.75	5.40	2.78	38.02
1952	2.61	2.01	11.01	0.43	2.41	0.00	3.79	0.05	0.31	5.77	8.78	0.45	37.82
1953	0.00	3.80	9.08	0.84	1.59	0.16	0.00	2.96	0.13	0.62	1.36	1.52	21.66
1954	3.55	2.83	5.35	3.05	4.18	0.07	1.75	3.50	1.62	0.21	0.25	31.09	57.45
1955	4.30	12.97	5.25	1.56	0.64	0.00	0.65	1.18	0.71	0.52	1.93	2.15	31.86
1956	3.60	13.43	1.16	2.96	2.71	1.02	1.73	13.15	0.44	5.06	3.12	0.15	48.53
1957	2.61	3.75	1.60	6.27	2.68	1.49	2.05	3.80	1.07	8.43	0.57	7.31	42.33
1958	1.20	2.55	3.97	0.42	2.00	1.10	13.69	14.40	1.22	5.40	1.40	3.06	50.41
1959	4.49	2.42	2.77	2.85	1.30	0.00	2.01	10.63	1.63	0.57	4.95	11.68	45.30
1960	1.49	14.40	7.39	2.00	2.07	0.42	0.49	1.48	1.80	1.33	5.00	39.87	
1961	0.28	6.77	1.49	8.94	0.60	0.14	0.18	0.78	1.86	8.89	13.48	10.15	53.55
1962	1.67	0.96	2.75	0.44	2.25	0.92	0.04	0.00	0.63	0.24	0.33	0.26	10.69
1963	3.67	0.86	1.26	15.79	5.60	1.16	5.20	0.29	2.68	0.76	0.95	0.34	38.76
1964	1.57	2.14	13.57	0.53	6.05	0.09	0.20	0.27	1.95	2.17	10.25	4.99	45.45
1965	4.35	2.54	5.96	7.36	7.57	0.57	1.00	0.21	1.29	3.44	3.83	6.45	44.57
1966	0.66	4.32	1.85	2.13	3.69	0.11	1.78	1.30	3.28	2.87	2.28	5.68	29.95
Total	198.37	220.79	313.24	205.54	120.71	44.66	105.55	207.00	103.39	148.44	233.00	280.85	2181.82
Mean	3.81	4.25	6.02	3.95	2.32	0.86	2.03	3.98	1.99	2.85	4.48	5.40	41.96
Max.	16.63	19.40	34.25	15.79	19.80	13.25	13.69	28.51	8.65	12.94	19.86	31.09	98.10
Min.	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.95

Station No. 123.0 — KAALA

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1914	—	—	—	—	—	—	14.60	17.80	10.60	5.60	15.60	5.30	—
1915	1.90	4.40	1.90	4.40	0.00	2.20	1.78	0.50	2.20	13.50	9.33	4.99	47.08
1916	7.07	3.20	5.95	0.00	25.55	1.20	0.84	2.59	1.24	1.07	6.96	16.82	72.29
1917	2.40	4.80	3.45	2.30	4.26	0.47	0.00	1.19	1.55	2.05	4.72	3.70	29.69
1918	9.80	20.70	10.25	15.57	5.30	2.73	12.35	8.41	2.31	1.30	10.20	30.25	129.17
1919	2.52	1.48	7.90	1.13	1.90	0.17	0.48	2.43	0.60	0.52	0.68	1.97	21.78
1920	1.75	0.97	6.25	2.55	0.14	0.00	0.55	1.42	2.29	2.40	5.87	10.80	34.79
1921	25.05	0.43	6.25	2.83	1.18	0.23	2.05	2.51	0.78	4.90	31.42	5.59	83.22
1922	11.92	17.09	21.57	4.97	0.72	0.00	0.44	2.41	10.37	0.71	7.09	0.20	77.49
1923	18.42	3.20	25.95	7.49	2.22	0.54	1.80	4.98	3.33	4.68	2.16	19.53	98.80
1924	0.96	6.75	3.33	12.11	3.28	0.26	0.39	1.26	1.54	12.03	21.24	2.25	65.40
1925	11.33	16.00	16.90	6.24	0.77	2.19	1.77	10.22	3.78	3.19	2.88	0.19	60.06
1926	0.63	4.53	0.42	2.26	0.56	1.55	1.14	7.22	4.69	3.79	7.64	2.10	36.73
1927	9.15	7.26	14.70	1.82	0.57	3.22	4.00	9.11	1.33	7.67	8.05	67.93	
1928	4.59	3.42	6.25	1.74	3.37	0.77	12.72	1.54	4.27	3.30	8.87	11.79	62.63
1929	13.85	16.73	3.42	5.65	3.27	0.65	1.84	1.13	0.18	1.24	20.62	13.59	85.17
1930	4.35	8.01	8.23	9.66	2.20	4.70	2.45	18.79	6.34	4.90	8.30	1.85	79.78
1931	0.80	4.59	0.85	9.97	3.70	0.89	11.24	4.15	6.58	5.00	3.20	5.25	55.32
1932	9.49	14.85	3.98	3.03	1.29	1.50	1.57	1.23	2.63	0.85	4.60	6.20	51.22
1933	7.69	2.83	7.75	3.68	0.87	0.75	0.11	0.33	0.12	1.44	7.95	2.20	35.72
1934	3.90	6.89	5.01	9.06	8.02	1.20	1.77	2.01	5.43	1.50	4.38	6.04	55.21
1935	8.80	9.43	14.60	7.20	1.60	0.54	4.46	1.58	3.10	12.45	4.40	1.50	69.66
1936	1.48	1.50	8.35	7.65	3.14	0.72	2.65	6.05	2.10	3.55	3.41	30.43	71.03
1937	12.80	22.22	7.10	4.00	5.35	1.75	6.22	16.00	1.02	6.19	6.03	3.42	92.01
1938	13.23	2.44	11.87	13.05	5.15	2.61	0.74	3.10	0.40	4.60	3.19	7.80	68.18
1939	13.05	6.45	10.29	12.43	0.93	1.05	3.25	0.98	1.36	1.72	4.15	0.74	56.40
1940	0.64	1.89	5.45	1.81	2.25	0.45	0.30	32.67	2.90	4.80	7.14	1.94	65.00
1941	6.05	3.90	4.19	0.32	11.11	18.20	0.64	4.19	5.61	14.22	3.21	7.22	78.46
1942	0.73	8.22	45.35	5.95	1.48	1.10	2.49	1.90	1.63	3.10	2.40	3.80	78.15
1943	5.92	9.15	9.76	6.20	6.61	1.92	3.37	2.03	1.13	0.19	1.02	3.50	52.80
1944	1.00	0.60	2.76	5.15	1.20	2.73	0.45	1.54	1.05	5.45	2.25	3.80	33.98
1945	1.55	0.82	13.64	3.53	2.45	1.05	2.58	2.20	2.37	4.10	6.90	43.94	
1946	7.35	13.90	6.45	4.52	1.12	0.55	1.60	0.80	0.65	3.82	5.93	29.88	76.17
1947	7.43	4.55	9.95	3.90	1.14	1.25	5.98	4.68	5.95	4.19	14.33	3.33	66.90
1948	8.90	5.84	14.50	6.40	1.45	0.68	1.74	1.39	4.15	9.84	7.60	12.50	74.99
1949	5.85	2.39	5.85	2.27	1.67	1.05	1.30	0.11	1.14	2.11	8.72	7.02	39.38
1950	2.60	2.70	13.23	21.40	1.42	0.30	3.40	9.95	1.12	1.68	8.85	13.25	79.90
1951	3.25	7.15	9.05	1.30	0.75	1.25	3.22	5.23	1.11	3.65	11.72	2.80	50.48
1952	4.92	4.48	17.60	2.09	4.95	0.00	0.45	0.62	1.61	10.35	10.15	2.30	62.88
1953	0.16	5.18	11.15	1.45	3.25	0.55	0.11	2.90	0.38	1.68	3.00	1.72	31.53
1954	5.36	3.65	9.60	5.25	7.85	0.53	3.25	5.69	3.50	0.95	0.21	38.96	84.80
1955	7.80	18.65	8.25	3.25	1.92	0.10	0.95	1.64	1.71	2.39	4.71	1.77	53.14
1956	3.52	2.24	2.86	5.18	3.28	3.10	1.17	15.38	0.45	6.57	3.47	0.90	68.27
1957	2.64	8.76	3.31	9.51	1.71	1.84	2.17	5.26	1.68	10.87	0.50	15.15	63.40
1958	3.25	4.09	9.65	1.08	3.83	0.38	9.96	17.31	2.03	9.95	3.30	5.23	70.05
1959	4.56	5.65	3.55	4.99	2.34	0.00	3.30	7.64	1.24	0.96	8.01	14.61	56.85
1960	1.42	17.12	12.43	6.25	2.16	0.72	0.85	2.15	3.61	2.63	6.71	2.60	58.65
1961	1.00	8.48	1.06	19.16	1.21	0.38	1.85	0.72	1.62	8.88	17.33	9.30	70.99
1962	1.75	2.70	5.20	0.66	3.92	0.43	0.33	0.25	0.85	0.98	1.15	1.35	19.57
1963	4.34	0.69	5.15	15.79	Discontinued								
Total	289.13	336.29	435.07	301.13	158.30	67.27	143.37	257.76	133.97	217.00	337.13	403.18	2987.13
Mean	5.90	6.92	8.88	6.15	3.23	1.40	2.93	5.26	2.73	4.43	6.88	8.23	62.23
Max.	25.05	22.41	45.35	21.40	25.55	18.20	14.60	32.67	10.60	14.22	31.42	38.96	129.17
Min.	0.16	0.43	0.42	0.00	0.00	0.00	0.00	0.11	0.12	0.19	0.68	0.19	19.57

Station No. 124.0 — KEANAKOLU

1905	—	—	—	—	—	2.82	4.37	14.29	14.57	2.74	8.35	0.54	—	
1906	0.58	0.59	3.47	1.20	3.69	0.92	3.17	18.92	1.40	—	—	—	—	
1907	—	—	—	—	—	—	—	—	—	—	2.22	—	—	
1908	—	—	—	8.10	1.37	0.14	1.23	5.17	4.65	3.57	13.76	12.68	—	
1909	2.39	5.64	18.24	5.21	0.96	1.17	2.95	0.94	0.65	3.11	0.79	10.01	53.05	
1910	14.19	2.10	7.74	8.55	5.68	3.88	2.18	3.98	1.75	6.22	6.10	10.42	72.79	
1911	13.41	5.15	4.38	13.67	7.91	3.60	2.89	6.39	6.67	3.04	9.69	11.79	135.55	
1912	0.36	13.16	16.05	12.74	2.49	0.36	0.69	0.78	7.43	17.35	11.71	6.84	89.95	
1913	13.37	1.66	1.47	6.11	8.99	5.27	2.90	9.74	1.71	1.86	24.06	10.04	86.75	
1914	15.55	0.21	Discontinued											
1929	8.40	19.00	5.60	6.80	2.40	0.08	2.40	2.00	0.10	1.90	16.20	14.20	79.05	
1930	4.00	13.00	12.00	17.00	2.80	6.60	4.00	22.20	6.00	7.00	4.60	9.00	5.20	

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1951	9.32	16.09	17.97	2.24	1.53	0.39	7.36	10.56	2.26	5.05	18.64	3.92	95.33
1952	12.45	5.90	33.27	4.44	6.40	2.20	6.85	1.95	4.20	15.33	19.00	7.03	119.02
1953	0.38	7.25	17.29	2.26	7.33	1.70	1.01	12.14	2.65	2.57	7.12	7.75	65.45
1954	4.91	4.52	7.50	3.52	9.13	3.34	8.97	13.11	7.06	4.07	10.3	50.42	117.58
1955	18.91	22.05	0.73	11.78	5.50	1.75	5.16	4.06	3.43	1.69	6.97	3.21	94.24
1956	4.69	31.32	12.43	4.29	7.72	8.12	2.54	25.47	7.07	5.19	10.88	2.20	122.62
1957	4.86	12.85	3.86	15.12	4.65	2.54	4.68	26.98	1.84	11.59	5.55	28.06	122.58
1958	2.19	4.55	16.11	3.19	5.98	3.04	17.18	26.87	3.95	12.58	5.84	1.91	106.09
1959	5.09	15.75	9.85	7.25	5.67	1.28	7.64	14.86	3.15	2.77	8.28	26.73	108.32
1960	5.20	1.01	15.99	26.00	5.90	4.60	Discontinued						
Total	434.58	398.20	659.12	407.96	233.52	165.43	275.08	459.92	271.28	294.05	419.33	540.16	4499.93
Mean	10.35	9.48	15.69	9.71	5.56	3.94	6.71	11.22	6.62	7.17	10.23	13.17	109.74
Max.	45.83	43.64	61.58	28.56	12.58	35.54	21.21	45.65	20.82	26.27	40.33	50.42	201.74
Min.	0.38	0.98	0.64	2.24	0.27	0.39	1.04	1.45	0.96	1.12	1.03	0.25	46.50

Station No. 133.2 — LAUPAHOEHOE

1981	—	—	—	—	4.07	3.66	3.63	11.76	11.85	18.33	5.11	19.72	—
1982	15.95	9.65	17.18	2.00	5.49	5.79	7.44	9.47	8.71	8.41	4.83	16.10	111.02
1983	8.80	6.49	21.73	19.32	8.90	7.40	7.66	4.00	3.83	8.14	4.36	5.16	105.99
1984	5.73	14.53	23.65	11.21	3.91	5.28	8.85	7.26	15.50	7.76	14.70	30.49	134.90
1985	6.32	12.92	21.26	54.77	8.67	6.67	10.55	15.85	13.23	5.70	8.87	4.00	168.81
1986	13.58	17.14	21.00	19.48	11.75	13.83	7.93	15.03	7.49	8.71	1.75	14.52	152.21
1987	7.91	11.34	8.11	3.99	4.85	1.34	14.72	17.89	3.90	3.77	13.94	10.20	101.96
1988	41.60	8.28	34.70	7.50	11.56	4.80	16.79	7.99	5.76	8.32	8.54	6.73	161.07
1989	1.04	5.58	33.54	9.74	12.00	10.15	11.98	16.21	7.01	29.82	10.43	0.60	148.10
1990	5.69	—	—	—	4.57	16.66	3.38	4.94	11.22	5.92	15.98	21.99	5.55
1991	9.76	8.20	31.15	6.18	1.01	0.95	2.74	3.10	1.97	10.01	28.30	49.07	152.42
1992	5.08	9.89	88.92	18.50	27.99	9.75	9.72	27.88	11.26	11.78	24.05	27.20	272.00
1993	13.76	11.95	10.81	38.48	4.31	1.75	27.26	9.50	10.01	17.80	17.82	6.85	170.30
1994	24.67	7.80	10.95	47.37	8.45	5.57	27.61	14.70	5.63	3.62	13.30	5.03	176.89
1995	9.00	5.25	22.50	12.91	10.50	8.00	15.52	20.05	23.55	14.45	29.85	12.55	183.13
1996	2.45	3.70	6.40	20.38	—	5.20	11.57	16.87	5.39	5.72	11.05	17.77	106.50
1997	2.63	16.08	20.40	11.92	5.85	11.09	11.99	33.64	27.70	10.43	8.70	4.74	165.14
1998	5.87	14.29	5.32	13.14	9.25	5.71	14.53	11.74	14.68	13.04	10.75	13.77	137.15
1999	8.80	9.12	30.62	16.07	8.35	4.93	11.46	2.99	5.03	3.98	5.77	11.99	119.11
1990	16.75	6.07	15.15	8.03	10.88	15.19	9.84	7.34	4.31	9.84	9.22	22.54	135.66
1991	15.60	21.99	6.74	20.85	14.83	19.70	9.64	9.47	16.51	5.11	11.40	13.92	167.79
1992	2.31	11.65	11.82	16.63	6.49	4.40	5.48	7.74	10.02	14.18	12.15	10.47	113.34
1993	12.86	9.62	5.82	9.65	6.72	8.50	4.45	9.58	4.12	1.73	28.11	16.12	117.58
1994	14.47	2.05	11.06	26.87	20.78	27.30	35.83	25.86	8.36	18.47	10.43	215.40	215.40
1995	6.51	10.25	5.85	12.13	3.67	6.76	7.66	1.50	6.42	10.42	19.08	8.55	98.80
1996	11.31	2.88	9.45	10.45	21.88	10.18	10.71	13.45	7.34	4.97	11.51	27.46	141.62
1997	11.99	7.72	11.60	5.73	3.37	4.77	4.01	1.10	0.92	4.30	14.54	6.09	70.76
1998	16.50	27.52	23.18	48.16	18.99	13.07	23.95	13.48	3.51	6.88	16.88	24.56	236.70
1999	9.07	5.70	15.54	7.55	5.40	2.16	3.49	7.55	6.50	11.02	2.33	7.87	82.38
1990	6.70	3.79	25.71	9.56	0.01	1.65	5.64	6.29	7.96	9.96	7.85	7.29	92.31
1991	40.41	2.82	12.53	8.29	2.06	1.27	9.55	9.79	6.07	10.94	28.38	15.51	147.62
1992	17.01	24.11	28.37	10.11	7.19	2.25	3.95	6.66	12.16	13.48	18.12	2.41	137.68
1993	25.45	11.73	24.61	17.40	6.69	8.23	9.20	13.99	8.41	11.21	7.85	3.27	177.51
1994	2.86	9.79	8.24	23.23	—	—	—	—	—	—	—	—	—
1995	9.84	1.24	24.37	11.69	8.15	7.53	2.31	12.76	4.98	4.95	7.81	1.11	96.74
1996	2.46	5.44	0.91	13.30	4.71	2.79	3.16	11.79	4.79	8.22	9.64	5.87	73.08
1997	13.73	4.87	10.72	16.18	4.88	—	—	—	—	—	—	—	—
1998	—	5.21	6.21	—	7.08	5.34	Discontinued						
Total	423.47	346.66	663.25	576.12	328.14	249.98	377.23	425.45	307.20	351.06	473.94	484.96	4678.35
Mean	11.76	9.63	18.42	16.00	9.12	6.94	10.78	12.16	8.78	9.75	13.17	13.47	141.77
Max.	41.60	27.52	88.92	54.77	29.57	20.78	27.61	35.83	27.70	29.82	29.85	49.07	272.00
Min.	1.04	1.24	0.91	2.00	0.01	0.95	2.31	1.10	0.92	1.73	1.75	0.60	78.14

Station No. 135.0 — HAKALAU MAUKA

1995											22.10	46.18	20.43	
1996	6.82	4.14	8.48	23.72	20.73	9.48	20.08	33.87	10.13	7.17	21.01	29.54	195.15	
1997	10.61	25.74	37.27	18.48	10.30	17.87	23.92	29.82	35.37	26.17	16.82	18.12	2.41	260.67
1998	23.68	15.11	10.77	27.35	15.77	5.90	11.54	15.40	14.73	13.42	8.75	32.43	233.74	
1999	13.87	18.33	51.00	26.03	26.60	29.87	23.55	32.13	9.82	16.71	23.63	38.02	209.03	
1910	33.27	9.11	30.29	26.03	26.60	29.87	23.55	32.13	9.82	16.71	23.63	38.02	209.03	
1991	35.56	51.30	19.83	33.74	29.15	32.74	21.02	32.85	35.12	15.05	29.44	23.88	359.68	
1992	0.80	29.21	27.82	38.48	12.97	11.29	20.29	11.44	12.94	15.24	20.44	23.88	359.68	
1993	36.64	13.70	12.46	26.10	16.87	17.50	14.01	23.62			56.78	29.45		
1994	13.73	5.91	14.01	25.53	59.04	43.35	62.26	62.82	55.24	14.72	52.77	59.84	465.79	
1995	9.01	21.03	4.50	28.38	6.21	15.18	17.65	5.54	8.17	20.83	55.82	22.18	214.50	
1996	10.01	3.47	12.81	14.57	49.93	20.81	23.47	26.04	21.29	17.20	35.50	60.41	295.34	
1997	22.27	3.24	21.51	24.80	10.70	14.25	1.97	0.00	1.26	6.34	18.46	7.74	132.54	
1998	19.72	56.81	29.36	45.94	28.47	17.17	21.47	8.58	13.68	24.38	33.23	340.14		
1999	10.94	7.89	12.49	7.86	6.87	4.71	7.86	12.30	3.87	15.02	4.48	12.66	111.45	
1990	7.61	6.40	36.99	10.83	2.09	4.31	7.39	5.17	8.49	19.54	11.29	17.68	137.79	
1991	60.31	4.49	10.93	16.89	8.14	4.40	10.60	18.34	9.04	7.39	46.03	10.98	215.64	
1992	26.30	26.97	67.55	21.38	11.09	4.20	9.72	12.60	14.06	7.83	28.60	3.40	238.20	
1993	68.03	12.83	16.43	31.02	6.67	11.81	14.30	15.25	10.66	12.52	6.26	3.75	239.53	
1994	3.59	12.47	10.25	41.89	8.55	3.78	16.96	16.45	9.01	26.22	12.56	3.57	165.30	
1995	11.98	2.55	34.66	17.77	24.19	8.95	5.97	26.88	15.53	9.28	9.18	2.05	169.59	
1996	4.90	8.34	1.18	4.46	5.82	6.08	5.51	18.04	10.23	5.87	7.62	13.41	91.46	
1997	26.36	3.49	24.41	19.00	5.67	5.14	14.34	15.59	24.65	9.14	11.31	35.46	195.16	
1998	11.74	6.27	5.33	6.34	9.03	5.51	16.27	11.46	13.83	11.76	7.94	29.39	137.47	
1999	15.42	21.90	26.95	18.24	5.02	6.45	11.81	9.62	4.29	7.06	16.30	24.54	167.60	
1990	7.41	11.18	18.38	40.36	18.45	28.09	11.77	31.99	21.30	11.76	22.84	10.94	234.45	
1991	2.76	13.60	6.22	19.76	10.17	5.41	16.75	16.59	26.52	19.85	20.89	15.80	174.32	
1992	28.17	51.53	9.61	24.98	10.87	20.65	8.22	9.45	3.78	13.90	18.61	21.97	297.97	
1993	28.68	14.93	13.09	16.53	15.17	8.77	6.87	7.77	0.17	6.16	5.65	3.25	138.44	
1994	16.78	15.40	8.46	20.00	25.94	13.63	15.87	9.15	17.46	22.65	17.97	14.40	195.71	
1995	15.73	33.62	10.67	21.78	6.77	8.23	14.89	9.30	11.23	8.09	15.62	8.13	164.04	
1996	8.16	3.00	21.72	29.61	27.41	9.93	23.33	36.14	19.59	23.21	14.41	47.68	266.19	
1997	37.99	31.45	46.22	32.57	20.85	14.27	28.49	14.62	8.75	17.23	21.16	17.93	280.43	
1998	30.80	16.85	13.82	24.84	10.98	11.35	12.60	11.88	12.69	17.25	17.40	27.97	257.95	
1999	31.09	24.13	29.72	26.10	10.37	12.25	18.61	14.01	10.78	16.30	22.84	6.93	223.74	
1990	2.63	11.44	8.69	8.30	9.54	7.74	18.61	41.03	13.48	21.66	16.76	3.93	166.76	
1991	12.63	6.61	18.50	12.53	29.01	21.80	18.19	23.56	24.71	35.58	15.29	23.79	236.95	
1992	3.31	8.61	75.33	36.50	13.77	7.53	9.49	18.86	10.93	4.88	6.99	15.90	216.90	
1993	30.80	16.85	13.82	24.84	10.98	11.35	12.60	11.88	12.69	17.25	17.40	27.97	257.95	
1994	5.99	18.22	4.88	25.51	20.54	10.59	19.48	14.32	12.43	25.43	14.49	21.37	193.16	
1995	8.68	6.89	34.33	8.96	2.66	14.29	6.20	14.20	6.36	10.20	11.19	22.24	138.22	
1996	25.60	9.03	24.40	19.86	8.43	6.38	17.84	9.82	11.53	17.32	10.14	41.81	201.66	
1997	5.02	4.51	28.86	10.20	10.20	9.20	11.27	9.49	11.71	18.07	12.09	25.44	184.35	
1998	10.90	7.66	5.05	20.80	17.35	7.79	12.72	15.63	14.20	25.55	23.31	39.43	304.30	
1999	29.09	23.40	22.74	12.46	8.83	4.36	15.50	14.76	11.16	12.78	22.03	22.78	187.83	
1990	11.47	18.23	13.84	46.14	20.82	5.71	16.64	5.73	7.49	13.68	13.77	19.91	193.45	

ANN.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.																																																																									
204. 210. 218. 221. 231. 238. 243. 245. 248. 250. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 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642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 841. 842. 843. 844. 845. 846. 847. 848. 849. 850. 851. 852. 853. 854. 855. 856. 857. 858. 859. 860. 861. 862. 863. 864. 865. 866. 867. 868. 869. 870. 871. 872. 873. 874. 875. 876. 877. 878. 879. 880. 881. 882. 883. 884. 885. 886. 887. 888. 889. 890. 891. 892. 893. 894. 895. 896. 897. 898. 899. 900. 901. 902. 903. 904. 905. 906. 907. 908. 909. 910. 911. 912. 913. 914. 915. 916. 917. 918. 919. 920. 921. 922. 923. 924. 925. 926. 927. 928. 929. 930. 931. 932. 933. 934. 935. 936. 937. 938. 939. 940. 941. 942. 943. 944. 945. 946. 947. 948. 949. 950. 951. 952. 953. 954. 955. 956. 957. 958. 959. 960. 961. 962. 963. 964. 965. 966. 967. 968. 969. 970. 971. 972. 973. 974. 975. 976. 977. 978. 979. 980. 981. 982. 983. 984. 985. 986. 987. 988. 989. 990. 991. 992. 993. 994. 995. 996. 997. 998. 999. 1000.	1916 12.27 5.16 17.72 15.27 38.32 14.38 10.37 20.86 12.24 8.91 20.58 44.57 220.65	1917 25.34 4.44 22.18 13.22 8.43 7.99 6.09 2.01 4.26 6.23 21.94 15.17 137.90	1918 36.73 76.86 25.44 34.10 37.76 16.22 39.59 24.30 11.38 19.08 26.12 35.35 177.31	1919 13.59 16.02 27.95 12.40 14.30 7.14 14.40 22.18 11.92 14.73 11.17 11.83 177.50	1920 10.01 10.01 35.89 13.51 3.55 9.04 10.67 10.77 18.08 21.04 15.64 23.05 181.28	1921 82.87 6.63 14.88 20.20 9.28 5.38 16.41 21.34 16.21 14.91 59.32 27.05 294.48	1922 35.72 39.09 67.66 23.49 16.07 6.62 12.90 16.84 27.24 17.62 34.81 4.09 292.15	1923 55.34 14.08 31.73 37.86 17.81 19.82 25.48 26.06 29.33 24.17 27.81 71.84 379.33	1924 6.85 14.85 11.67 48.59 10.55 6.70 21.51 21.07 14.00 33.64 17.69 6.51 213.63	1925 17.39 3.43 37.39 23.39 16.41 11.64 6.71 28.59 13.44 10.32 19.30 2.46 190.47	1926 5.49 18.57 3.16 5.32 13.08 8.13 8.05 25.54 13.00 10.31 8.61 23.80 143.06	1927 26.04 3.15 28.31 20.93 12.63 11.01 23.73 24.02 19.84 10.54 23.02 56.15 261.47	1928 14.19 12.10 6.61 9.94 16.55 11.89 25.59 14.00 19.84 18.62 15.14 37.99 203.86	1929 18.65 22.73 40.71 23.11 5.64 4.19 15.00 10.49 5.85 10.94 13.65 32.54 203.50	1930 6.84 12.35 21.20 35.60 17.12 30.34 12.43 30.10 24.94 9.40 15.74 12.75 228.81	1931 4.33 14.51 6.07 16.83 7.57 4.56 16.62 14.66 28.19 16.52 33.61 13.81 180.28	1932 45.19 48.99 9.93 21.40 25.34 14.41 15.92 8.13 7.46 3.61 17.35 30.15 246.91	1933 39.43 23.42 13.44 15.38 14.76 7.04 7.96 5.53 11.94 4.14 4.90 8.80 152.74	1934 16.89 11.67 8.22 17.80 19.45 12.95 10.83 5.89 19.56 14.96 19.10 18.83 176.35	1935 14.21 27.84 15.61 22.62 6.05 10.65 16.84 8.63 15.57 29.48 9.34 181.42	1936 9.27 4.64 25.29 26.89 25.83 10.90 29.27 36.56 18.08 25.35 13.47 57.87 283.42	1937 46.28 36.10 41.70 17.60 22.97 13.55 29.09 16.45 9.32 24.87 21.38 294.92	1938 28.45 19.01 35.58 26.97 17.48 7.48 12.85 13.94 13.41 16.64 27.09 29.54 258.69	1939 28.36 21.67 31.26 22.67 9.87 11.56 17.40 12.26 7.79 14.33 19.19 6.73 202.59	1940 2.09 13.22 8.24 9.11 8.10 7.48 18.28 34.54 11.48 19.40 15.91 5.66 153.49	1941 10.38 2.86 15.31 11.03 25.79 18.05 11.48 22.96 20.11 35.89 12.73 21.31 207.90	1942 10.38 2.86 15.31 11.03 25.79 18.05 11.48 22.96 20.11 35.89 12.73 21.31 207.90	1943 8.63 9.68 11.71 16.87 11.54 11.55 17.29 19.27 13.17 10.08 5.04 4.22 136.66 136.41	1944 6.44 18.89 4.32 23.99 17.22 13.28 21.11 13.38 10.54 21.28 17.97 24.35 192.77	1945 4.04 8.78 34.91 11.89 3.02 11.77 6.89 18.22 8.24 8.64 13.07 25.43 156.50	1946 21.80 18.03 22.18 19.25 7.83 6.63 16.72 10.45 10.61 14.13 11.74 52.73 211.60	1947 6.04 4.43 28.34 16.71 16.45 7.73 15.44 9.98 9.64 17.14 10.10 12.91 194.08	1948 9.47 7.51 43.82 19.71 18.48 7.27 13.57 12.80 13.63 22.22 25.06 34.12 225.66	1949 33.87 12.05 21.11 14.11 7.76 4.28 13.93 12.72 8.79 12.33 22.10 177.99	1950 11.25 24.02 14.81 37.77 23.95 7.66 14.95 6.63 6.77 13.89 15.18 18.71 195.59	1951 11.85 34.27 23.95 8.04 6.40 6.94 16.61 18.54 3.74 23.89 22.34 21.23 197.89	1952 23.89 13.85 28.92 17.24 16.46 13.51 15.44 9.98 9.64 17.14 10.10 12.91 194.08	1953 1.12 12.39 24.93 6.94 19.06 7.06 9.14 11.56 5.53 8.73 12.56 11.00 130.02	1954 7.12 14.72 20.20 5.85 18.74 13.54 16.97 26.66 12.86 11.77 7.69 62.62 218.84	1955 15.91 32.88 12.31 24.55 17.90 10.58 14.94 14.41 8.70 9.84 21.32 10.74 193.98	1956 15.23 40.97 18.61 11.72 20.50 16.95 9.00 34.16 4.50 16.48 23.75 11.33 223.20	1957 16.09 9.81 5.74 33.01 11.88 5.56 19.11 3.84 6.28 25.65 15.73 33.14 220.04	1958 4.96 7.66 7.15 9.93 17.77 11.70 22.86 34.81 12.40 16.54 16.90 6.38 168.69	1959 12.16 17.66 12.27 20.66 17.38 5.83 9.38 14.51 11.97 6.43 27.27 22.77 172.88	1960 24.99 26.54 18.78 27.48 16.05 9.68 9.39 18.71 22.09 18.54 23.79 5.77 221.79	1961 4.29 32.68 11.61 12.57 13.47 7.30 10.53 9.86 9.29 33.42 25.32 22.85 193.19	1962 2.60 5.66 18.12 35.87 24.31 13.31 7.28 11.77 9.42 12.98 6.18 9.40 9.00 122.49	1963 2.47 5.34 25.48 44.06 32.23 27.88 23.08 12.47 20.23 19.00 16.43 3.83 222.28	1964 22.77 26.73 30.44 19.17 51.19 11.72 12.43 15.59 22.11 18.20 32.85 15.58 278.78	1965 17.11 7.47 18.37 24.82 21.28 12.74 13.95 6.80 5.77 9.60 30.73 28.68 197.38	1966 26.75 10.39 12.65 11.11 12.13 14.31 24.73 21.27 17.97 27.85 27.97 20.59 227.72	Total 978.71 963.26 1201.59 1121.52 919.94 631.42 900.34 1038.89 847.77 901.38 1183.97 1256.39 11782.92	Mean 17.79 17.51 21.85 20.39 16.73 11.48 16.08 18.55 15.14 16.10 21.14 22.44 214.24	Max. 82.87 78.86 70.98 48.59 51.19 31.95 47.65 84.61 63.17 35.89 59.32 71.84 379.33	Min. 1.00 2.86 3.16 5.32 3.02 4.19 6.09 2.01 3.74 3.61 4.22 2.46 130.02	Station No. 140.0 — PAPAIAU MAUKA	1926 3.86 13.51 1.89 4.14 10.46 6.63 7.86 24.98 11.37 11.78 6.51 25.77 126.76	1927 22.81 2.94 23.55 16.31 17.12 9.81 21.40 25.29 20.79 12.60 20.19 67.86 152.67	1928 17.05 15.77 9.40 12.32 15.60 13.33 30.64 18.18 28.95 26.28 23.78 42.92 254.22	1929 10.39 22.94 30.49 27.84 10.56 5.25 13.60 12.42 7.68 9.86 16.09 28.25 196.25	1930 5.17 7.60 20.71 44.13 27.95 39.16 16.51 43.59 32.27 14.21 31.11 12.09 294.50	1931 6.22 16.49 6.09 13.94 6.95 6.32 23.81 16.35 31.90 15.08 24.59 11.66 181.40	1932 33.93 36.99 9.38 23.45 22.80 14.95 20.00 10.38 10.62 5.76 15.99 25.57 229.82	1933 33.86 25.93 16.19 22.99 22.79 9.86 10.60 10.54 18.06 6.96 8.03 3.55 191.16	1934 19.92 11.28 3.70 16.79 24.13 14.66 15.24 11.54 21.38 20.64 18.00 19.59 198.87	1935 14.97 29.66 12.14 24.83 7.18 10.78 15.48 9.06 5.60 8.51 20.97 9.35 168.53	1936 9.22 3.56 25.56 23.47 23.36 10.32 25.07 40.42 5.10 24.14 26.74 13.87 56.89 281.62	1937 36.63 26.05 35.77 17.13 16.92 8.12 20.99 42.37 11.47 14.03 21.19 18.80 289.67	1938 32.63 24.97 39.09 46.95 24.38 13.91 13.31 11.39 8.07 12.09 20.20 22.83 258.82	1939 30.02 32.85 36.04 28.67 7.26 17.73 19.36 10.94 9.12 13.85 19.33 3.57 226.74	1940 1.06 11.89 8.09 8.98 7.32 7.69 18.88 39.27 16.87 26.60 13.66 2.97 163.28	1941 9.95 1.19 17.68 9.23 22.44 26.53 9.79 20.44 25.04 33.17 12.27 20.82 208.55	1942 2.68 8.74 61.05 36.79 18.63 9.68 10.79 14.96 10.02 16.78 5.17 12.69 211.58	1943 12.42 11.16 9.68 16.53 9.01 20.07 17.28 17.68 11.77 4.77 5.25 14.79 149.51	1944 6.89 20.28 3.23 23.32 19.61 12.77 23.80 14.81 15.36 26.91 22.09 23.04 210.31	1945 4.77 11.28 38.26 11.58 1.69 14.85 5.15 18.85 8.06 10.70 15.47 23.98 164.64	1946 28.59 11.06 29.07 32.48 12.58 5.66 16.68 11.75 10.61 14.44 9.39 47.61 229.92	1947 5.50 2.93 20.74 15.13 17.11 9.27 14.81 27.35 14.35 18.02 18.37 29.59 202.59	1948 8.58 10.58 14.88 47.76 22.60 18.08 8.74 16.42 15.39 12.46 25.09 39.59 252.34	1949 38.98 14.67 23.81 15.15 13.11 9.71 16.51 17.28 13.08 17.50 22.37 30.70 232.87	1950 13.24 24.75 19.44 46.90 33.72 11.01 18.58 8.20 8.65 13.80 10.76 13.24 222.29	1951 14.69 33.81 25.73 11.41 6.84 10.95 19.25 22.76 5.48 31.46 31.05 23.37 236.80	1952 28.96 16.54 37.92 19.84 19.63 18.80 16.20 12.72 12.87 13.28 18.91 23.95 155.34 240.48	1953 0.75 11.82 31.99 9.52 21.71 9.93 10.70 13.20 6.68 11.11 16.54 12.71 156.16	1954 9.51 16.69 18.89 6.06 20.26 14.22 23.47 32.86 13.33 13.74 9.72 75.71 254.64	1955 20.55 34.34 16.07 31.54 23.89 11.49 18.33 18.51 12.40 10.77 28.19 12.53 238.65	1956 16.41 46.22 21.61 15.24 29.07 19.17 10.24 30.38 6.08 19.93 27.11 13.68 264.14	1957 19.96 12.16 5.72 33.74 12.13 7.11 21.56 54.34 3.21 28.47 21.64 37.21 262.25	1958 5.64 8.46 9.86 11.94 17.52 15.45 27.69 41.47 16.16 20.89 20.36 5.07 198.51	1959 13.91 26.84 11.67 20.92 15.35 5.67 11.57 20.12 15.40 8.91 30.10 28.36 202.82	1960 33.31 20.52 20.08 31.08 17.37 11.20 10.92 14.23 23.35 16.19 26.41 6.02 241.58	1961 4.07 3.96 15.99 13.68 14.71 8.77 12.93 14.12 11.11 41.58 28.18 29.42 231.52	1962 4.07 5.08 20.77 8.06 27.25 5.85 12.52 9.95 9.66 5.22 11.41 11.37 136.51	1963 2.29 3.87 25.53 47.00 30.51 16.72 23.78 15.12 19.32 17.22 12.62 3.63 217.61	1964 20.77 27.95 33.98 22.16 51.35 12.15 11.38 14.53 20.11 16.13 34.60 17.36 278.87	1965 16.44 4.12 16.10 21.30 21.23 12.11 14.43 7.05 6.47 7.79 27.41 29.40 183.85	1966 24.86 12.18 11.64 10.90 14.01 14.02 28.65 15.72 16.92 28.28 27.88 21.58 226.68	Total 647.53 706.63 882.96 879.54 750.59 504.42 696.25 849.65 595.09 701.77 802.31 936.19 8952.98	Mean 15.79 17.23 21.54 21.45 18.45 12.30 16.98 20.72 14.51 17.12 19.57

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1946	17.45	7.12	11.84	13.47	3.87	4.72	12.25	5.44	4.53	10.56	8.46	42.48	142.21
1947	4.87	4.04	14.32	9.08	12.09	6.30	9.80	10.87	7.65	12.44	23.79	20.54	135.79
1948	9.22	5.51	34.04	13.59	12.32	5.35	8.54	9.07	9.80	16.39	21.17	25.81	170.81
1949	27.00	7.42	14.78	5.54	5.93	2.49	12.74	8.69	5.76	7.96	14.99	19.75	133.05
1950	7.29	20.44	7.46	28.52	14.78	6.24	9.71	5.37	6.85	9.39	15.99	19.85	151.89
1951	10.17	27.84	23.64	6.85	3.49	5.60	10.03	10.88	3.30	17.85	9.84	19.95	149.44
1952	13.09	7.68	22.75	11.43	10.75	9.69	10.78	7.32	6.73	11.40	11.23	9.17	132.22
1953	0.26	14.37	15.73	5.44	10.80	5.10	5.44	6.69	3.82	4.92	7.03	7.18	86.26
1954	4.52	11.96	21.79	4.41	15.77	7.75	11.32	17.26	11.15	7.19	6.11	43.23	162.46
1955	10.71	26.40	11.46	16.48	10.20	6.29	11.62	12.00	6.09	7.39	12.21	7.90	138.75
1956	10.68	32.95	14.49	7.01	13.83	11.22	5.06	15.70	3.67	15.32	18.66	8.39	156.98
1957	9.91	8.82	3.58	23.37	7.80	5.78	13.29	27.44	3.62	18.59	9.53	19.85	151.58
1958	3.26	10.47	6.61	6.73	10.94	8.75	13.71	21.58	9.27	11.33	15.21	5.76	123.62
1959	8.92	10.95	6.92	11.46	9.22	3.82	6.57	7.84	8.28	4.66	22.03	13.41	114.08
1960	14.05	19.71	13.00	15.14	13.97	7.62	8.56	11.04	14.66	13.71	13.64	4.33	149.43
1961	6.12	23.67	5.91	8.89	7.62	4.76	7.39	5.90	5.52	26.23	15.59	13.82	31.42
1962	7.28	3.76	13.96	2.46	13.93	3.43	7.22	5.94	9.33	3.19	5.21	3.62	74.83
1963	2.60	4.88	12.64	24.26	16.42	8.52	15.48	6.31	10.95	12.18	12.66	3.54	130.44
1964	14.53	11.76	18.94	9.00	25.78	5.17	5.90	8.02	12.54	14.32	24.11	9.60	159.67
1965	11.59	4.24	10.57	16.10	14.73	7.55	6.85	6.02	5.72	8.96	22.11	17.11	133.55
1966	14.68	8.86	8.99	7.27	4.57	9.29	16.30	10.88	9.95	18.92	15.04	12.90	137.05
Total	859.50	819.82	1145.59	958.61	747.05	529.63	743.81	895.25	729.67	827.26	1021.07	994.37	10173.66
Mean	11.46	10.93	15.27	12.78	9.96	7.06	9.92	11.94	9.73	11.03	13.61	13.26	135.65
Max.	39.97	34.97	61.84	34.30	30.16	18.86	27.35	37.21	37.31	30.05	46.49	43.75	222.65
Min.	0.26	1.23	1.54	2.22	0.23	1.93	3.62	2.90	3.30	1.83	1.98	0.95	31.42

Station No. 143.0 — HONOMU MAKAI

1892	16.74	11.96	12.53	1.42	1.74	10.18	8.32	12.09	12.94	10.94	10.37	9.94	121.47
1893	6.80	7.95	15.64	16.94	6.42	8.71	6.25	5.15	6.74	8.85	13.54	8.62	111.61
1894	21.22	20.34	16.55	16.16	3.87	4.64	7.10	7.30	3.40	4.41	7.00	22.02	145.91
1895	3.92	1.41	6.95	21.51	8.28	6.02	8.19	13.97	20.27	7.09	12.71	10.50	123.55
1896	8.36	15.16	11.68	15.91	—	6.99	8.65	17.53	10.81	8.75	21.54	—	—
1897	3.01	10.16	9.73	3.37	3.83	2.42	4.35	11.63	6.16	10.24	13.01	7.45	85.36
1898	35.44	7.28	49.99	5.84	7.27	4.31	11.38	7.62	8.68	11.36	10.96	7.96	168.09
1899	2.63	8.43	25.11	12.71	19.90	7.74	3.25	Discontinued					
1900	41.24	3.43	7.56	9.00	2.17	2.63	6.80	12.20	6.60	13.69	30.19	16.90	152.41
1901	25.31	22.21	44.81	16.33	9.57	3.09	6.83	10.20	18.93	8.64	19.44	4.32	189.68
1902	43.40	6.92	22.38	26.40	11.28	10.91	13.39	15.93	17.71	20.67	11.03	49.66	249.68
1903	4.76	9.57	9.88	23.28	7.82	4.44	15.17	12.10	7.88	21.15	7.17	3.56	126.78
1904	11.48	1.43	25.83	11.54	11.69	9.66	5.82	17.68	9.56	7.87	12.46	1.82	126.84
1905	4.41	6.86	2.05	4.62	7.64	2.97	5.87	19.29	8.08	6.13	6.92	13.56	88.40
1906	17.19	2.46	20.28	14.32	12.27	8.12	14.50	14.79	14.20	7.43	15.13	57.36	198.05
1907	8.96	7.01	4.43	6.33	11.59	7.53	13.70	10.60	12.66	8.95	4.03	20.77	116.58
1908	12.73	16.50	15.96	11.35	3.59	4.39	14.82	9.11	6.16	9.08	12.08	21.96	137.73
1909	8.02	6.99	15.96	29.89	13.67	19.44	8.05	22.10	16.42	8.52	20.82	6.60	176.48
1910	2.58	10.76	3.88	16.13	8.28	4.91	17.04	14.40	24.39	18.54	22.13	8.58	151.62
1911	37.47	48.47	7.44	16.55	15.31	9.51	16.04	5.72	7.30	2.57	7.11	15.89	189.38
1912	24.19	15.49	8.49	13.81	10.37	7.61	5.77	4.65	9.04	4.06	3.76	3.45	110.69
1913	16.40	6.67	8.30	13.19	19.11	11.96	9.50	7.15	14.25	17.32	13.45	11.74	149.04
1914	11.14	26.60	10.05	12.16	4.76	9.20	9.45	10.00	8.05	8.97	15.08	3.86	129.32
1915	5.05	2.01	16.78	18.78	13.35	6.96	14.65	25.52	15.08	14.88	10.21	34.53	177.80
1916	26.69	14.95	29.72	11.09	14.73	6.47	14.64	15.97	5.71	9.38	11.61	13.40	174.36
1917	11.47	19.46	25.13	29.50	15.44	6.89	6.44	5.36	6.64	5.69	8.49	9.82	150.33
1918	17.25	17.79	30.03	19.56	5.88	9.15	11.65	8.56	7.02	6.99	11.30	3.28	148.46
1919	2.30	6.85	5.34	5.37	5.33	3.80	10.33	23.10	7.13	15.42	8.11	2.23	95.31
1920	2.36	2.63	10.15	7.05	17.76	9.70	7.66	15.95	14.13	28.28	10.03	15.09	140.79
1921	1.24	6.61	43.37	19.23	8.57	9.47	6.48	14.35	5.50	11.72	3.89	12.09	142.52
1922	4.58	7.09	8.56	10.88	5.85	12.19	14.09	10.24	5.72	2.94	2.27	9.87	95.28
1923	3.85	17.97	2.23	13.17	12.59	6.96	15.10	8.97	8.71	13.38	12.60	20.34	135.87
1924	1.78	4.45	23.64	11.19	2.46	8.79	3.69	13.10	5.63	5.56	10.79	19.59	110.67



Station No. 70.5 — WAIHAHA STREAM

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1946	13.28	7.94	11.67	10.88	3.86	5.24	11.98	5.46	5.10	10.59	9.13	44.92	140.05
1947	4.35	3.01	0.00	8.78	11.69	6.45	9.76	11.55	9.67	13.94	14.29	23.69	130.70
1948	8.54	6.17	31.87	14.78	12.97	5.11	9.98	7.48	9.65	17.85	17.21	26.75	168.15
1949	29.19	7.50	15.03	6.30	5.91	2.87	8.68	5.86	7.42	8.57	12.09	20.41	133.83
1950	7.58	22.94	7.00	29.94	14.67	5.17	8.60	5.61	4.36	10.63	14.47	22.27	148.54
1951	9.66	28.53	18.58	6.54	3.45	3.98	10.85	10.19	3.07	21.90	11.08	18.58	148.41
1952	16.09	7.34	22.79	11.13	9.03	10.57	7.95	7.87	6.83	11.58	12.71	8.84	133.63
1953	0.24	11.75	19.30	5.85	11.76	4.98	4.63	6.81	3.47	5.12	6.92	7.23	88.08
1954	5.06	14.39	18.96	2.81	13.93	7.07	9.72	17.87	11.60	8.58	7.36	46.47	163.82
1955	11.50	25.78	10.05	15.29	9.63	7.26	11.14	10.36	4.90	7.63	12.33	8.63	134.84
1956	10.30	32.83	17.33	6.74	14.21	11.31	4.88	15.08	3.45	14.66	22.12	9.19	182.10
1957	9.86	7.92	3.73	24.82	9.05	4.19	13.00	27.38	3.33	21.83	10.80	20.34	156.25
1958	9.77	10.65	7.73	11.39	8.56	3.45	5.82	9.42	9.00	4.24	25.78	14.04	120.06
1959	3.08	8.09	5.95	6.51	10.60	6.68	14.59	22.03	8.59	12.58	13.59	4.76	119.45
1960	16.85	21.50	11.32	16.16	12.75	7.01	4.89	14.44	15.65	15.82	15.02	4.09	157.50
1961	3.04	24.68	6.50	9.18	8.64	5.12	6.08	6.83	5.49	28.46	16.39	15.34	136.31
1962	3.64	2.93	13.00	3.13	13.79	3.57	7.16	5.83	4.62	4.32	5.93	3.78	76.56
1963	1.41	7.07	29.34	20.47	8.79	16.01	8.15	17.12	13.84	Discontinued			
Total	610.97	625.25	783.26	675.49	498.26	358.58	492.29	599.25	465.23	574.20	602.87	734.96	6732.71
Mean	11.98	12.26	15.36	13.24	9.96	7.03	9.65	11.98	9.30	11.46	12.30	15.31	140.27
Max.	43.40	48.47	49.99	29.94	20.47	19.44	17.04	27.38	24.39	28.46	30.19	57.36	249.68
Min.	0.24	1.43	0.00	1.42	1.74	2.42	3.25	3.30	3.33	2.57	2.27	1.82	85.36

Station No. 144.0 — PEPEKEO MAKAI

1890	22.59	13.35	22.07	10.09	13.47	14.63	30.80	21.67	10.76	11.16	12.13	22.14	204.88	
1891	18.18	6.35	7.56	8.20	5.96	5.92	10.61	9.26	17.60	20.15	7.74	20.85	138.38	
1892	14.53	8.50	10.95	1.99	2.02	8.48	11.21	9.78	13.48	9.45	6.02	16.32	112.73	
1893	5.16	0.40	13.60	14.30	7.33	5.97	7.25	5.50	7.20	8.57	13.89	9.26	104.07	
1894	20.58	25.02	18.04	15.22	5.18	4.32	8.40	3.29	4.39	6.44	12.59	12.76	141.23	
1895	4.56	1.44	8.81	19.55	6.18	6.36	9.34	14.08	19.77	6.97	12.90	12.17	126.83	
1896	4.06	15.58	12.34	15.05	12.05	5.34	7.50	17.51	10.03	7.31	3.06	6.09	115.42	
1897	4.62	9.28	10.29	3.02	4.92	2.36	1.53	9.72	6.08	10.20	12.97	6.85	85.96	
1898	33.14	8.66	42.37	5.94	8.87	4.17	9.98	9.07	7.02	10.77	10.78	16.88	153.80	
1899	3.27	7.46	23.87	9.31	11.85	5.29	11.11	15.14	6.53	21.82	2.56	1.14	118.86	
1900	3.56	5.96	4.56	6.92	11.61	2.50	7.82	12.02	7.76	17.54	14.04	2.89	96.32	
1901	7.09	7.04	26.34	15.04	4.26	2.16	2.85	4.97	5.82	5.07	9.03	26.56	14.11	120.78
1902	3.25	4.07	67.29	7.90	12.55	5.09	11.75	17.25	12.25	11.52	18.01	19.15	184.57	
1903	7.14	8.23	7.71	11.86	6.96	3.37	16.39	9.42	12.90	11.13	14.26	3.25	112.82	
1904	24.24	8.58	1.36	24.65	5.29	11.11	16.32	8.32	3.79	7.29	4.22	121.31	120.87	
1905	4.43	6.58	7.18	7.00	8.35	6.76	9.35	12.63	14.29	9.49	24.84	10.87	120.87	
1906	4.53	1.77	4.00	6.26	7.86	6.66	9.01	17.43	8.13	3.84	18.58	13.53	98.90	
1907	5.93	12.81	11.41	6.33	5.35	9.06	7.67	28.31	24.74	14.70	10.20	5.04	143.56	
1908	7.09	22.91	6.59	14.21	5.63	5.31	8.27	8.77	14.26	9.87	13.31	122.56		
1909	7.08	6.15	30.77	12.47	12.68	5.64	12.07	5.84	9.07	5.90	10.33	19.07	127.96	
1910	19.78	4.87	13.91	6.55	9.29	11.10	7.67	13.59	4.45	7.83	10.46	17.01	126.51	
1911	15.34	12.52	11.81	12.06	16.35	10.71	6.35	7.73	14.90	8.63	12.13	9.60	139.73	
1912	0.95	10.08	11.75	15.89	6.59	15.81	5.30	13.37	15.92	12.03	17.07	11.42		
1913	31.86	5.70	6.14	9.87	7.74	6.92	4.00	6.57	5.29	5.47	19.88	9.44	121.62	
1914	8.48	4.89	9.39	15.18	22.92	6.18	10.22	29.75	28.15	8.20	15.95	10.36	180.21	
1915	3.98	7.20	2.74	21.17	3.26	10.71	8.95	5.21	7.26	13.31	34.74	15.00	133.53	
1916	11.00	1.18	10.01	12.15	18.30	8.81	7.57	12.70	12.62	12.08	12.94	27.47	147.49	
1917	14.04	4.01	20.46	12.67	8.49	7.83	6.07	4.06	3.26	8.87	12.84	7.60	107.03	
1918	20.80	26.77	24.04	23.98	9.04	10.24	20.94	9.57	6.15	8.35	10.20	18.44	184.14	
1919	4.63	6.23	10.46	10.46	10.46	10.46	10.46	10.46	10.46	10.46	10.46	10.46	77.76	
1920	5.48	4.15	23.77	6.11	1.22	3.49	2.27	9.15	6.33	12.36	21.62	7.00	11.67	110.11
1921	33.28	5.09	5.76	10.24	4.14	4.25	8.64	9.28	5.89	12.59	20.80	16.52	136.43	
1922	23.37	17.65	34.87	12.70	7.38	2.31	6.42	7.10	13.35	6.84	18.62	9.90	156.41	
1923	43.36	7.54	23.71	22.55	8.43	8.33	6.28	11.84	17.95	14.41	6.01	27.03	203.22	
1924	4.20	7.02	6.66	18.28	6.28	3.28	11.27	10.36	8.26	16.92	6.33	3.06	106.00	
1925	11.48	2.21	25.70	9.15	11.40	7.88	4.40	12.40	14.04	5.08	10.70	1.14	115.58	
1926	4.28	5.94	2.21	3.73	5.90	2.73	4.95	15.21	9.17	5.88	5.14	13.08	78.22	
1927	12.99	2.96	19.25	10.99	10.69	5.33	4.57	14.34	11.05	8.64	12.27	42.33	159.05	
1928	6.31	5.01	3.81	5.50	10.69	5.26	11.51	7.83	13.33	11.96	5.88	22.65	109.08	
1929	11.50	13.75	11.11	10.60	3.74	3.42	14.46	8.07	6.92	3.40	10.94	18.64	116.55	
1930	7.25	5.59	14.04	26.62	8.73	14.68	4.65	16.66	13.11	6.81	10.62	4.57	140.04	
1931	1.70	5.91	2.96	10.27	5.47	3.46	11.25	8.73	14.76	10.10	12.42	6.40	94.43	
1932	20.05	31.19	5.14	12.12	12.68	6.45	9.61	8.36	4.48	3.01	4.81	10.66	126.86	
1933	19.02	9.13	4.86	10.96	8.04	5.26	8.91	4.32	7.03	3.27	3.16	3.66	82.28	
1934	14.36	4.42	5.12	11.25	13.54	11.07	8.37	6.00	11.07	15.43	13.17	9.72	123.50	
1935	10.58	21.36	12.18	9.98	4.67	5.74	11.60	7.52	6.89	9.50	19.42	6.34	123.08	
1936	4.06	1.00	15.58	11.41	6.66	4.75	13.12	23.27	13.35	17.65	19.41	34.75	157.81	
1937	19.95	13.03	26.65	10.95	13.53	6.81	16.03	11.33	5.94	8.59	12.69	10.98	155.06	
1938	14.36	14.36	29.59	10.66	6.27	4.75	7.64	6.96	7.04	13.23	12.62	159.56		
1939	18.74	17.27	39.75	21.79	6.47	9.02	10.83	6.49	6.58	6.04	10.42	3.66	157.06	
1940	2.25	5.54	5.92	5.09	4.58	4.48	11.22	21.51	10.35	9.91	11.47	4.88	97.20	
1941	6.28	2.83	8.87	6.86	15.53	7.42	8.80	14.31	14.37	25.84	9.97	9.57	130.65	
1942	0.75	5.74	36.82	13.41	2.33	5.81	16.07	12.51	7.33	10.54	4.09	12.00	125.59	
1943	8.47	6.86	7.86	9.57	4.69	11.55	14.50	10.03	5.82	2.91	4.70	9.88	97.60	
1944	4.99	20.20	21.00	10.58	11.33	6.28	14.47	8.82	9.27	10.11	13.11	17.25	128.01	
1945	3.39	6.88	23.01	11.64	2.17	9.39	4.03	12.78	5.86	7.89	10.41	15.68	113.13	
1946	19.09	8.86	10.38	13.41	2.33	5.19	11.45	6.02	4.94	9.67	7.12	44.23	142.65	
1947	3.45	2.36	12.72	8.48	11.25	5.64	10.05	12.42	10.35	10.27	16.59	20.57	124.49	
1948	8.60	6.16	32.22	13.51	5.53	3.95	8.50	9.05	16.28	18.87	23.28	164.74		
1949	28.42	1.46	3.22	5.16	4.61	2.99	8.48	8.22	6.05	8.55	11.39	18.38	122.61	
1950	8.22	19.50	5.48	26.45	13.04	4.76	7.90	5.59	5.10	9.41	12.61	18.75	136.81	
1951	8.25	28.31	17.76	5.28	3.59	3.88	9.78	9.49	3.35	22.04	9.89	19.29	141.31	
1952	18.12	16.14	20.42	8.48	15.55	8.87	7.36	8.33	6.45	9.49	11.73	8.09	122.35	
1953	8.60	12.43	17.50	4.80	10.94	5.47	4.19	4.88	4.67	6.31	6.40	12.37	86.46	
1954	9.19	15.67	17.85	3.48	12.47	6.06	11.33	15.04	4.99	7.49	11.57	45.55	160.83	
1955	11.41	21.67	9.54	13.40	9.87	6.16	9.83	10.33	5.85	5.69	11.98	7.40	123.13	
1956	8.86	35.34	17.99	6.06	13.87	8.80	5.82	11.08	6.88	16.35	19.14	9.78	157.77	
1957	9.27	6.30	4.18	13.92	6.54	8.99	13.50	24.95	3.56	16.87	11.20	18.72	140.39	
1958	8.47	7.35	5.52	5.86	8.99	7.29	13.10	17.77	7.46	11.56	13.61	3.97	105.10	
1959	10.05	10.78	7.45	8.14	7.11	3.17	5.79	7.61	7.14	3.60	26.05	13.11	110.00	
1960	18.88	16.31	7.97	13.16	10.23	7.03	4.68	11.83	12.41	14.18	11.69	3.26	133.43	
1961	3.26	24.47	6.70	7.82	8.61	5.59	6.23	6.98	6.68	28.95	11.79	14.95	132.03	
1962	4.08	2.74	13.89	12.14	3.12	7.44	4.58	9.95	4.27	6.46	10.01	75.21		
1963	14.73	12.06	16.84	29.40	15.04	9.37	14.47	7.29	9.88	13.18	10.60	3.15	130.26	
1964	4.73	7.29	16.84	11.48	24.97	6.35	6.68	8.54	13.40	11.57	20.53	9.43	155.26	
1965	9.70	3.29	8.29	19.77	18.11	10.26	9.81	6.15	4.67	7.70	23.82	15.99	137.36	
1966	13.92	5.02	6.42	9.58	5.84	9.50	14.32	8.21	10.16	19.06	15.27	12.29	126.69	
Total	858.99	776.30	1125.55	881.83	912.56	737.76	829.67	728.60	816.35	948.61	1011.90	9929.45		
Mean	11.16	10.08	14.62	11.41	10.26	6.86	9.58	7.07	9.46	10.60	12.32	13.14	128.95	
Max.	43.36	35.34	67.29	29.40	24.97	15.92	30.80	29.75	28.15	28.95	34.74	45.55	204.88	
Min.	0.60	1.00	1.38	1.99	1.22	2.31	2.11	4.06	3.35	2.87	2.56	1.14	75.21	

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
Station No. 144.1 — PAPAIIKOU													
1899	3.49	8.21	20.24	14.97	19.60	8.36	4.51	12.74	6.52	21.20	3.97	1.01	124.82
1900	1.22	6.37	6.23	6.04	16.85	3.42	11.91	8.17	8.13	22.54	18.96	2.57	118.41
1901	10.08	10.91	35.78	13.35	3.34	3.01	6.01	6.97	15.28	51.04	20.11	185.35	
1902	4.75	4.51	81.29	13.97	27.16	6.87	17.18	25.11	16.29	19.23	23.42	26.04	265.62
1903	8.91	11.72	7.63	23.86	9.31	5.85	26.64	9.54	17.08	10.06	20.08	8.18	158.86
1904	32.52	12.88	1.62	38.04	8.78	9.60	20.36	17.10	10.16	5.20	8.91	4.71	169.88
1905	2.58	8.81	8.65	8.57	10.04	10.49	11.63	17.12	24.39	12.34	35.99	15.92	166.33
1906	6.36	2.69	3.21	10.73	10.87	7.24	14.45	25.60	9.59	6.87	18.45	19.47	135.33
1907	8.13	17.81	17.78	6.66	8.03	14.51	10.41	44.50	37.83	19.29	13.24	6.06	204.25
1908	11.86	26.33	7.54	23.29	13.17	9.77	11.75	15.81	21.83	16.65	9.87	18.23	185.51
1909	9.61	12.70	38.59	11.80	16.16	10.39	18.76	7.42	11.15	11.94	4.65	27.39	180.56
1910	26.87	4.62	21.44	14.15	17.56	14.74	14.47	18.65	7.47	9.79	15.51	18.03	183.50
1911	22.09	18.18	13.30	20.83	19.33	14.99	13.64	11.04	21.41	10.55	19.57	10.04	202.98
1912	0.97	18.56	16.54	25.69	9.34	11.60	8.07	9.97	8.20	23.51	17.23	21.05	170.75
1913	36.72	9.23	10.54	15.38	9.65	11.48	7.83	10.15	6.57	4.44	27.88	13.52	163.39
1914	10.97	4.43	12.41	11.04	32.53	29.24	32.28	48.67	39.02	11.50	20.63	15.60	267.15
1915	5.55	14.58	4.10	31.90	4.51	13.16	13.36	6.57	8.26	21.65	51.99	22.04	197.87
1916	14.05	2.58	15.81	16.22	30.95	15.57	12.26	24.00	16.29	13.62	25.10	45.28	231.73
1917	24.29	4.54	29.14	18.28	8.22	9.85	9.71	4.11	4.54	6.06	23.28	8.77	150.79
1918	27.13	41.10	39.88	36.00	24.31	12.57	34.63	18.03	9.70	11.92	24.14	28.73	308.14
1919	8.91	8.26	17.35	6.36	7.61	6.72	10.34	14.20	13.16	12.47	12.37	5.84	121.59
1920	5.80	6.19	36.65	8.36	2.11	5.04	10.98	8.76	15.01	19.99	11.49	14.93	145.31
1921	63.88	5.89	5.74	13.98	4.36	3.17	10.30	11.25	8.01	18.19	35.12	31.12	211.01
1922	31.96	29.50	69.73	18.69	11.32	3.64	7.64	11.97	21.21	17.73	27.17	3.90	248.46
1923	59.14	8.73	35.86	34.15	14.45	15.22	17.20	25.18	17.84	10.12	41.28	293.92	
1924	3.47	9.08	8.54	34.91	9.97	4.31	18.11	17.72	10.69	26.37	10.63	4.56	158.36
1925	14.12	2.49	34.70	15.09	15.18	11.99	4.17	17.70	12.59	5.14	12.24	1.21	145.62
1926	3.56	6.56	1.71	2.05	7.76	4.10	5.20	17.57	9.97	7.12	5.00	15.85	86.55
1927	12.91	4.14	17.98	10.88	10.37	6.01	14.52	14.07	12.49	8.27	14.88	49.06	175.58
1928	8.46	5.48	5.27	7.22	10.16	7.27	16.22	9.38	11.40	13.43	7.24	26.88	128.41
1929	9.12	15.75	20.29	13.27	3.84	2.92	14.23	8.62	4.21	4.70	11.95	14.48	129.32
1930	5.64	4.38	12.20	30.52	11.51	20.62	9.41	21.30	15.04	10.33	19.43	6.79	167.17
1931	2.66	9.08	2.28	10.09	6.14	3.91	15.99	13.40	19.97	9.86	14.04	5.77	113.19
1932	29.02	30.95	4.84	12.03	13.05	7.55	12.43	6.89	6.05	2.74	10.70	14.87	151.12
1933	24.79	14.18	7.20	10.90	10.02	8.64	4.30	5.00	8.12	1.94	2.86	3.29	98.54
1934	14.45	4.77	3.12	10.03	14.08	9.30	8.47	5.71	13.67	16.91	9.50	18.31	128.32
1935	8.25	26.15	8.45	10.75	3.75	7.85	8.52	6.92	9.03	7.87	18.56	2.83	119.93
1936	5.35	4.40	19.51	15.37	13.78	5.57	14.11	27.42	21.97	16.19	7.65	39.71	189.13
1937	28.86	8.34	28.05	13.09	13.89	5.51	19.32	14.99	7.41	11.14	14.83	13.09	178.52
1938	22.10	14.65	31.17	27.66	14.70	6.75	8.74	6.26	4.69	9.20	14.59	13.29	173.80
1939	22.88	22.37	39.89	25.54	4.62	11.08	13.48	6.21	6.48	9.55	11.57	26.68	171.35
1940	1.06	5.05	4.41	3.87	5.41	4.65	11.40	23.88	9.97	17.93	9.21	3.60	100.44
1941	6.41	1.62	9.63	4.85	17.84	14.05	7.52	17.51	16.45	25.91	8.48	12.37	142.64
1942	1.64	5.57	43.31	19.59	9.53	6.17	6.41	12.14	6.32	10.39	3.59	15.09	139.75
1943	8.99	8.84	8.08	8.91	5.14	15.27	11.57	9.95	7.99	3.25	3.17	12.41	103.57
1944	3.43	20.30	1.76	14.34	13.05	5.95	14.00	7.41	8.39	13.93	14.62	20.42	137.60
1945	2.87	6.43	25.54	13.51	1.19	0.91	4.86	14.26	5.80	6.88	13.92	18.89	122.76
1946	23.62	9.33	12.56	12.97	2.87	4.06	12.03	7.70	5.65	9.49	5.86	48.17	153.61
1947	3.30	3.26	18.11	8.75	10.62	6.04	9.66	14.79	10.60	13.97	16.13	25.09	140.32
1948	6.12	10.16	34.97	12.89	13.11	4.60	8.19	7.44	7.92	15.08	18.45	25.90	164.83
1949	33.17	8.45	12.10	7.65	4.43	3.48	8.88	7.80	6.97	10.71	11.74	16.44	131.62
1950	9.71	25.47	6.81	28.37	18.65	4.84	9.10	6.17	4.71	10.42	9.44	14.20	147.89
1951	9.06	27.05	17.76	5.81	3.62	4.31	12.26	11.24	3.18	24.24	14.58	16.84	149.95
1952	18.63	8.18	18.02	8.99	9.33	10.18	7.08	7.31	7.94	10.52	13.63	8.58	128.59
1953	0.15	11.75	21.56	4.63	11.97	4.98	5.21	5.84	4.16	6.95	7.03	8.97	93.20
1954	4.93	15.33	17.09	3.12	11.84	7.03	14.59	15.45	9.80	9.40	11.61	49.96	170.15
1955	12.84	23.99	10.24	18.32	10.71	5.90	10.74	9.31	6.72	6.22	15.09	7.77	137.85
1956	9.94	37.90	16.88	7.96	16.02	9.41	5.92	17.08	2.80	14.69	23.66	9.99	172.25
1957	11.64	7.71	3.95	21.89	8.88	4.66	12.62	31.22	3.16	20.40	11.47	20.37	157.79
1958	2.60	4.30	5.56	5.88	9.28	7.65	15.16	21.05	7.94	15.20	15.09	3.70	113.41
1959	10.07	11.82	10.46	9.93	8.58	4.25	6.70	8.71	8.84	4.67	29.78	14.17	127.98
1960	22.12	16.23	9.37	16.95	12.62	6.58	7.78	13.31	14.29	14.07	15.16	4.43	153.13
1961	3.17	24.00	5.90	7.34	9.66	8.35	8.75	7.99	28.68	15.55	17.63	14.25	85.85
1962	2.72	5.33	12.13	4.32	15.46	3.49	7.81	5.98	11.75	2.87	6.35	3.06	81.27
1963	1.66	2.21	16.93	34.54	15.47	11.10	15.15	8.57	13.07	13.75	11.75	16.44	145.86
1964	16.60	17.28	21.10	11.50	30.24	6.07	8.09	8.00	14.67	11.42	24.87	9.86	179.50
1965	9.60	5.56	6.81	18.51	17.54	9.04	10.99	4.46	6.30	8.57	21.26	17.84	136.68
1966	11.80	6.21	6.44	5.71	6.52	7.52	17.62	10.12	10.57	17.04	18.98	12.67	131.20
Total	900.63	811.25	1179.73	1007.81	800.46	562.20	119.30	926.66	771.50	862.67	1084.63	1089.48	1086.07
Mean	13.24	11.93	17.35	14.82	11.77	8.27	11.93	13.63	11.35	12.68	15.95	16.02	158.01
Max.	63.88	41.10	81.29	38.00	32.53	29.24	34.63	44.50	39.02	28.68	51.99	49.96	308.14
Min.	0.97	1.62	1.62	2.05	1.19	2.92	4.17	4.41	2.80	2.74	2.86	1.01	81.27

Station No. 147.0 — BEACH

1931	0.00	0.00	0.21	0.91	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.34
1932	0.80	0.38	0.00	0.40	0.00	0.50	0.00	0.20	1.00	0.50	0.75	0.63	5.16
1933	1.00	0.00	0.00	0.50	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.03	1.63
1934	0.00	0.50	0.00	0.00	0.00	0.85	0.36	0.23	0.25	0.27	0.36	0.10	4.92
1935	0.65	0.00	0.58	0.15	0.04	0.07	1.00	0.02	0.29	1.39	0.66	0.09	4.94
1936	3.99	2.38	0.59	0.04	0.00	0.02	0.22	0.00	0.15	1.14	0.42	0.00	8.95
1937	1.10	0.63	0.09	0.81	0.06	0.18	1.31	0.00	0.00	0.50	0.00	1.25	7.93
1938	1.37	0.94	0.45	0.39	2.18	0.50	0.25	0.03	0.06	1.72	0.00	0.76	8.59
1939	0.54	0.08	0.70	1.39	0.11	0.09	0.20	0.00	0.00	0.23	0.00	0.34	3.34
1940	1.21	0.00	1.51	0.28	0.81	0.00	0.31	0.69	0.19	0.00	1.50	0.00	6.50
1941	0.00	0.29	0.48	0.00	0.19	0.33	0.20	1.30	0.61	1.52	0.00	0.00	4.92
1942	0.28	0.00	0.87	0.23	0.00	0.00	0.55	0.16	1.30	0.65	1.67	0.91	6.42
1943	3.20	0.20	1.00	0.67	0.27	1.74	0.42	0.13	0.17	0.12	0.35	0.00	9.07
1944	0.00	1.02	2.88	0.00	1.55	0.34	0.00	0.00	0.62	0.00	0.00	0.13	6.54
1945	0.42	0.22	0.00	1.45	0.76	1.15	0.00	0.00	0.18	0.20	0.12	0.30	4.48
1946	1.45	0.00	0.00	0.00	0.00	0.14	0.14	0.54	0.18	0.58	0.13	2.54	5.75
1947	1.50	0.30	0.00	0.00	0.00	0.61	0.00	0.40	0.00	0.50	0.00	0.00	4.92
1948	1.77	2.01	0.31	0.00	0.87	0.62	0.00	0.00	0.65	0.00	1.68	0.00	7.68
1949	1.77	0.72	0.00	0.00	0.00	0.88	0.00	0.00	0.00	0.00	0.00	0.70	4.41
1950	0.32	0.00	0.00	1.50	0.35	0.00	0.00	0.65	0.00	0.00	3.08	1.95	7.48
1951	1.05	0.45	2.63	0.00	0.70	0.50	0.00	0.00	0.00	2.90	0.50	0.18	8.42
1952	2.60	0.00	0.00	0.74	0.00	0.00	0.00	0.28	0.38	0.10	0.00	0.41	4.92
1953	0.00	0.05	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1954	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82	0.00	0.00	2.29	2.29
1955	0.51	0.92	1.24	0.26	0.09	0.00	0.00	0.00	0.00	0.00	0.98	2.00	6.00
1956	4.65	3.20	0.53	0.53	2.30	1.53	1.34	1.36	0.35	2.96	0.65	3.40	22.40
1957	1.66	0.25	0.58	0.35	0.28	0.34	0.38	0.05	0.26	0.30	0.68	7.71	7.71
1958	0.00	0.22	3.38	0.18	0.27	1.41	0.38	1.30	0.38	0.83	0.00	0.00	8.88
1959	9.81	1.22	0.00	0.00	0.18	0.27	0.66	0.08	0.00	0.15	1.19	0.00	13.34
1960	0.00	0.87	1.77	0.00	0.20	0.33	0.34	0.04	0.00	0.00	1.04	4.45	4.45

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1946	1.31	0.61	0.00	0.00	0.46	0.15	0.60	1.28	0.77	1.73	0.10	1.01	8.02
1947	1.76	0.38	0.00	0.00	0.35	0.00	0.60	0.65	0.60	0.00	0.91	0.20	4.85
1948	1.63	3.35	0.00	0.22	1.09	1.50	0.60	1.11	0.74	0.00	1.76	0.00	12.00
1949	2.03	0.30	0.00	0.37	0.00	2.30	0.00	0.25	0.00	0.27	0.00	0.45	5.97
1950	0.38	0.00	0.00	1.65	1.71	0.00	0.50	1.43	0.60	0.00	2.95	1.30	10.90
1951	0.88	1.10	2.92	0.00	0.15	1.43	0.00	0.00	0.50	0.25	1.20	1.05	9.48
1952	2.40	0.00	0.55	0.00	0.35	0.00	0.15	0.20	2.55	0.02	0.88	0.02	7.12
1953	0.00	0.22	1.57	0.00	1.72	0.00	0.00	0.00	0.00	0.00	0.82	4.33	
1954	0.15	0.00	0.96	0.15	0.80	0.00	0.56	0.00	0.60	0.31	0.08	0.71	4.32
1955	0.19	5.00	0.88	0.00	0.00	0.42	0.12	1.34	0.30	0.00	0.51	1.60	10.36
1956	2.18	1.15	0.72	0.30	1.38	1.45	1.17	0.12	0.12	0.95	0.25	2.43	12.22
1957	0.60	0.00	0.18	0.37	0.96	0.20	0.58	0.35	0.15	0.45	0.89	0.69	5.42
1958	0.00	0.04	1.54	0.05	0.46	2.01	1.72	0.82	0.32	0.20	0.20	0.48	7.84
1959	7.46	0.71	0.00	0.24	0.58	0.00	0.22	0.00	0.62	0.00	1.26	0.08	11.16
1960	0.00	0.36	1.35	1.10	0.68	0.94	0.24	1.61	0.19	0.93	0.65	0.64	8.69
1961	1.20	0.45	0.56	0.96	0.00	0.62	0.55	0.00	1.83	0.94	1.60	0.50	9.21
1962	1.42	0.41	0.61	0.12	1.85	0.00	0.33	0.00	0.00	1.24	0.00	0.85	6.83
1963	3.04	0.28	1.99	0.93	0.78	0.06	0.14	0.00	1.03	0.28	1.76	0.27	10.56
1964	0.10	0.10	1.84	0.78	0.84	0.00	0.34	0.38	1.97	0.00	0.24	2.97	9.56
1965	1.44	0.08	1.55	0.42	1.77	0.52	0.73	0.50	0.09	0.64	1.37	0.00	9.11
1966	0.00	1.23	0.00	0.22	1.84	0.00	0.76	0.57	0.65	0.40	0.52	0.76	6.95
Total	39.98	24.57	31.48	18.26	35.16	21.27	19.14	16.01	20.29	14.88	22.31	20.84	282.12
Mean	1.33	0.82	1.05	0.61	1.17	0.71	0.64	0.53	0.68	0.50	0.74	0.69	9.40
Max.	7.46	5.00	5.22	3.47	4.48	3.65	2.90	1.66	2.55	1.73	2.95	2.97	16.07
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	4.32

Station No. 159-0 — MAHUKONA

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1912	—	—	—	—	0.10	0.40	0.09	0.00	0.18	0.05	0.25	0.40	—
1913	0.79	0.94	0.09	1.08	2.69	1.33	0.11	0.26	0.22	0.18	2.15	0.52	10.36
1914	4.23	0.26	4.00	0.63	0.86	0.56	1.15	2.37	0.23	1.13	2.28	4.29	20.99
1915	0.90	0.58	0.12	2.00	1.15	0.29	0.00	0.47	1.05	0.50	0.94	1.31	8.41
1916	9.33	2.01	1.96	6.84	2.07	0.32	0.26	0.32	—	—	0.00	3.80	—
1917	1.75	2.00	0.46	0.81	2.05	0.93	0.12	0.00	0.06	0.61	0.45	3.72	12.96
1918	2.74	4.62	1.53	6.35	1.11	0.00	0.00	0.00	0.15	0.00	2.99	3.22	25.32
1919	1.23	0.00	0.07	0.43	0.00	0.09	0.26	0.37	1.41	0.00	0.00	3.00	6.91
1920	6.59	0.15	1.07	0.35	4.01	0.00	0.38	0.18	0.06	0.09	0.69	2.65	16.11
1921	3.63	3.28	1.23	0.00	0.06	0.41	0.30	0.08	0.61	0.62	2.47	3.64	16.33
1922	4.26	4.84	0.63	0.00	0.00	0.73	0.43	0.13	1.70	0.34	0.23	0.21	13.50
1923	6.76	0.84	3.17	7.79	0.00	0.00	0.00	0.46	0.42	0.53	0.82	3.05	23.84
1924	0.53	1.98	0.51	0.37	0.00	0.10	0.00	0.00	0.25	1.25	1.70	4.59	11.28
1925	0.00	0.11	0.79	0.10	0.09	1.34	0.32	0.00	0.03	0.18	0.20	0.49	3.65
1926	0.00	2.39	0.08	0.59	0.09	1.17	0.12	0.84	0.09	0.64	0.82	0.81	7.64
1927	2.38	0.90	1.06	1.77	0.01	0.30	0.30	0.00	0.75	0.00	2.25	14.35	22.07
1928	0.44	0.16	0.98	0.13	0.30	0.46	0.00	0.00	0.42	0.88	1.25	4.21	9.23
1929	3.94	1.42	0.00	2.32	0.35	0.20	0.00	0.75	0.48	5.09	5.26	19.81	
1930	5.79	1.30	0.82	0.00	0.45	0.00	0.50	0.65	2.20	0.60	3.30	0.20	15.81
1931	0.30	0.20	0.72	3.37	0.48	0.60	2.50	1.30	0.00	1.00	0.00	0.40	10.87
1932	3.95	3.69	0.70	1.95	0.05	0.20	0.00	0.25	0.00	0.92	0.39	12.13	
1933	0.73	1.00	1.50	0.93	0.00	0.74	0.00	0.00	0.10	1.00	1.25	7.25	
1934	0.04	1.15	0.00	0.39	2.18	0.85	0.22	1.46	1.88	0.55	0.35	1.69	10.76
1935	2.00	1.02	0.70	0.00	0.59	0.16	2.68	0.00	1.49	0.47	2.78	0.66	12.55
1936	4.89	3.52	1.44	1.04	0.00	0.00	0.00	0.82	0.33	0.95	1.46	2.19	16.64
1937	5.46	1.93	2.20	2.27	0.00	0.82	0.78	0.00	0.80	0.00	0.15	13.64	
1938	3.04	1.37	0.57	1.43	0.65	0.00	0.15	0.00	2.50	0.00	0.65	13.56	
1939	1.49	0.36	3.28	3.55	0.28	0.00	0.44	0.00	0.00	1.07	0.00	10.07	
1940	3.33	0.00	3.86	1.35	0.00	0.18	1.29	0.66	0.00	2.23	1.78	0.00	14.68
1941	0.41	0.41	0.00	0.54	0.00	2.09	0.00	1.57	0.94	3.19	0.00	0.00	9.15
1942	0.84	1.38	5.35	0.32	0.00	0.55	0.00	0.54	0.77	2.12	0.00	1.83	13.70
1943	4.82	0.71	1.60	0.07	0.99	0.00	1.90	0.21	0.30	0.43	0.17	0.87	12.07
1944	0.00	1.87	7.62	0.70	0.60	1.56	0.00	0.40	0.70	0.20	0.30	2.38	16.33
1945	0.13	0.40	0.35	5.06	0.10	1.09	1.18	0.00	0.00	0.30	0.10	1.80	10.51
1946	5.08	1.35	0.98	0.10	0.27	0.09	0.15	0.00	0.05	1.67	0.10	7.24	17.08
1947	1.03	0.50	2.21	0.08	0.40	0.00	0.13	0.50	1.69	0.40	0.71	1.67	9.32
1948	4.56	1.93	1.52	0.32	0.00	1.30	0.00	0.31	1.40	0.61	6.15	0.65	18.75
1949	5.96	0.00	0.00	0.13	0.19	1.40	0.00	0.10	0.40	0.30	1.66	0.30	10.44
1950	2.45	1.72	0.72	3.80	0.45	0.89	0.32	0.70	0.00	0.22	6.09	4.64	22.00
1951	3.48	3.74	3.59	0.10	Trace	1.70	0.05	0.10	1.65	3.40	0.59	1.30	19.70
1952	4.30	0.48	0.84	0.38	0.26	0.35	0.67	0.44	0.35	0.35	1.34	0.45	10.41
1953	0.15	1.30	1.75	0.09	0.75	0.14	0.15	0.05	0.35	0.05	1.02	2.65	8.45
1954	1.58	0.15	2.18	0.39	0.05	0.09	0.26	0.69	0.40	0.21	0.07	3.73	9.80
1955	0.92	4.59	1.48	0.35	0.62	0.13	0.08	0.12	0.15	0.22	1.32	Discontinued	
Total	115.33	63.05	62.28	60.25	27.77	23.84	17.01	19.45	22.93	29.26	54.86	96.61	554.08
Mean	2.66	1.47	1.45	1.40	0.63	0.54	0.39	0.44	0.53	0.68	1.25	2.20	13.51
Max.	9.33	4.84	5.35	7.79	4.01	2.09	2.68	2.37	2.20	3.40	6.15	14.35	25.32
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	3.65

Station No. 161-0 — PUAKEA

										2.43	3.29	6.39	10.43
1902													
1903	2.88	3.96	2.98	6.38	1.93	0.56	5.31	3.53	1.73	2.28	4.82	1.71	38.07
1904	4.18	12.02	4.18	12.25	2.29	1.15	3.98	0.75	1.48	1.64	4.71	1.93	50.56
1905	1.70	1.33	7.33	5.72	4.36	2.68	1.93	5.70	6.21	4.40	3.72	4.86	49.94
1906	2.67	2.36	2.94	8.81	4.62	2.12	5.66	3.52	1.92	2.72	3.23	13.20	53.77
1907	3.18	8.89	3.85	4.00	1.60	2.84	3.51	3.88	4.65	2.45	4.55	1.47	49.38
1908	1.36	2.07	2.24	2.71	3.85	4.45	6.54	6.22	4.17	2.08	4.37	8.54	48.60
1909	3.44	6.94	7.53	3.74	1.88	2.02	9.29	4.48	2.43	2.16	2.42	6.03	48.36
1910	8.40	1.46	5.28	3.98	3.42	4.85	5.28	3.74	1.01	3.20		6.44	
1911	5.59	6.74	5.86	4.52	2.02	5.81	2.44	2.99	3.31	0.57	4.16	1.81	45.82
1912	1.28	4.18	2.68	6.80	2.30	2.21		0.87	1.68	2.25	4.47	2.45	
1913	1.55	2.63	1.70	3.86	1.62	3.70	2.41	2.29	1.89	5.88	7.05	2.60	35.08
1914	5.38	0.60	4.33	2.22	3.96	6.78	10.03	12.64	4.51	4.50	7.54	5.41	67.00
1915	2.91	3.17	1.29	6.03	1.05	2.03	2.22	0.98	2.62	3.10	6.72	5.59	37.71
1916	12.58	1.21	4.59	9.89	8.71	5.06	3.81	4.82	2.63	0.62	1.43	6.04	62.34
1917	3.94	2.26	3.65	2.21	1.92	2.02	0.45	0.98	0.46	0.47	3.25	2.67	24.28
1918	5.03	9.40	4.77	16.83	4.40	3.63	6.22	4.20	0.91	2.86	7.14	9.83	75.22
1919	1.92	2.26	3.04	2.80	1.88	1.35	2.62	2.63	2.95	0.59	0.85	0.58	27.97
1920	8.27	1.13	2.51	8.81	0.42	0.52	2.49	2.78	3.23	1.71	4.79	5.44	35.10
1921	13.35	1.37	3.46	5.28	0.14	1.92	3.40	2.67	2.00	1.73	12.13	56.95	
1922	6.93	6.91	7.61	0.42	2.27	0.92	2.44	4.61	4.73	1.55	2.67	0.72	45.40
1923	11.57	1.33	4.24	15.60	1.97	3.28	3.34	3.86	2.92	4.13	3.76	8.82	64.62
1924	1.10	5.69	2.20	6.14	1.42	0.70	2.52	4.83	1.97	4.65	5.36	7.30	43.86
1925	2.99	0.91	5.34	5.60	3.81	6.81	1.90	6.20	1.09	1.56	2.54	1.85	40.00
1926	2.26	3.43	0.81	2.81	2.02	1.06	2.48	4.31	1.06	2.93	3.95	0.95	46.80
1927	5.80	2.46	2.60	4.11	2.69	2.00	2.48	4.02	1.06	2.53	15.52	53.52	53.40
1928	4.28	2.52	6.66	3.39	4.30	3.31	2.95	1.65	3.70	0.62	5.40	2.33	41.71
1929	6.34	4.04	1.91	4.28	—	1.16	1.60	1.78	2.00	2.48	5.98	9.01	—
1930	7.05	3.97	3.78	6.44	2.07	3.05	1.98	4.12	2.56	1.45	10.34	0.86	45.87

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1921	16.12	3.64	3.57	5.60	0.06	1.65	3.39	3.31	2.17	3.05	12.32	10.32	65.20
1922	9.36	4.72	7.93	3.00	2.29	0.29	1.45	2.83	5.87	1.85	4.42	1.34	45.35
1923	11.04	1.22	7.96	9.38	1.04	3.78	2.67	4.52	2.63	3.07	3.59	7.94	54.40
1924	0.29	5.79	2.23	5.63	1.35	0.41	2.26	4.59	2.29	4.62	2.95	7.88	40.29
1925	3.57	1.53	4.16	4.52	3.51	3.69	1.64	4.41	1.48	1.26	2.31	1.52	39.60
1926	1.99	2.78	0.62	4.86	2.34	1.79	2.62	4.28	1.41	1.55	1.65	1.10	26.99
1927	3.37	3.08	2.60	9.76	2.51	1.60	3.63	3.57	2.95	1.27	2.99	14.50	51.83
1928	3.04	2.31	1.12	2.26	3.00	1.26	3.71	1.67	3.53	0.58	4.40	5.33	32.15
1929	5.36	5.70	2.78	2.82	1.45	1.41	2.15	1.94	2.26	4.69	6.11	9.34	44.01
1930	7.79	5.11	3.91	6.91	2.79	3.49	2.79	5.63	2.65	1.53	13.82	1.84	58.26
1931	0.53	1.05	1.91	7.58	2.13	2.22	2.69	1.75	5.01	1.88	3.87	3.57	34.19
1932	4.79	11.03	3.24	7.70	3.90	2.93	3.12	1.27	1.30	0.66	2.57	3.75	46.26
1933	4.55	4.74	2.38	2.29	2.59	1.31	2.69	1.12	2.08	1.13	2.43	2.41	29.72
1934	2.67	2.17	3.14	2.98	4.57	2.14	2.37	1.58	3.64	1.46	5.45	3.06	35.23
1935	5.26	5.16	2.05	3.55	1.68	2.89	2.14	1.25	1.91	2.06	3.34	2.13	33.42
1936	5.70	7.73	5.69	8.62	5.39	4.57	2.74	6.19	3.57	4.37	4.47	9.46	68.50
1937	5.16	14.16	5.64	1.88	5.58	4.76	3.31	8.70	3.36	3.72	2.13	6.34	61.04
1938	5.22	3.08	6.03	9.03	7.75	2.65	1.74	1.43	1.08	3.97	1.12	7.25	50.35
1939	6.22	2.27	5.20	10.76	2.02	3.23	5.98	3.18	2.07	2.24	4.14	3.94	51.25
1940	4.16	3.74	6.31	3.92	7.70	2.77	3.56	7.66	4.82	3.27	6.86	4.09	53.86
1941	2.63	2.30	4.07	6.86	2.64	7.27	6.81	4.56	3.15	10.92	2.53	5.65	60.39
1942	1.96	3.83	14.48	7.19	4.50	2.20	3.81	5.60	1.07	2.92	1.99	3.60	53.15
1943	5.86	3.16	4.66	3.06	4.47	3.30	6.68	3.54	0.94	0.65	1.06	6.40	43.78
1944	1.06	3.27	7.77	4.33	3.14	4.77	7.26	3.32	1.11	4.76	2.99	4.42	50.20
1945	1.06	1.53	9.60	4.48	2.23	1.78	0.85	4.18	1.32	1.91	3.18	5.93	36.05
1946	7.02	1.96	7.59	4.23	0.90	1.77	5.38	1.65	1.05	2.07	3.45	14.16	51.23
1947	1.25	1.71	4.34	0.67	5.40	1.58	2.23	2.64	3.48	3.02	0.67	4.66	31.65
1948	5.92	2.23	8.28	3.90	2.10	1.44	4.78	1.24	3.87	3.68	5.55	6.80	49.79
1949	5.36	0.80	2.26	3.24	2.77	1.12	5.43	2.57	1.90	2.84	9.79	2.82	36.90
1950	3.95	1.83	5.03	9.25	1.79	1.93	4.95	2.57	1.10	2.35	11.20	14.79	60.74
1951	3.38	4.28	6.13	1.87	1.28	1.58	2.86	3.35	2.87	2.92	5.65	2.96	39.13
1952	10.46	6.22	6.05	4.45	2.65	5.66	4.33	5.51	2.58	8.44	4.57	3.54	64.46
1953	0.28	2.46	3.40	1.85	4.62	1.57	3.55	2.41	0.36	1.10	4.50	7.79	33.89
1954	1.87	0.64	3.88	2.68	4.95	2.51	4.45	7.64	1.29	1.50	1.58	14.14	47.13
1955	4.49	8.29	5.98	5.94	6.46	3.13	4.75	3.16	1.97	2.84	3.15	5.25	44.51
1956	8.48	9.84	—	11.36	3.63	5.92	2.76	7.31	0.98	9.39	3.18	6.15	69.00
1957	4.41	3.31	0.86	6.71	1.86	1.49	5.60	13.02	1.25	10.28	5.80	8.52	63.11
1958	4.74	2.67	9.54	2.59	5.56	6.46	5.21	11.30	3.31	9.23	6.43	8.31	73.35
1959	18.00	5.09	3.23	4.72	4.99	1.63	4.32	2.95	2.33	0.98	4.27	6.29	58.80
1960	4.48	9.55	5.36	6.03	2.59	2.36	1.68	2.99	3.20	1.79	6.59	3.43	50.05
1961	4.67	6.13	3.02	3.39	2.90	3.74	1.14	1.69	0.82	1.93	5.80	2.96	39.18
1962	2.11	3.20	2.54	1.58	2.86	1.07	1.55	2.46	1.67	1.51	1.47	3.64	25.66
1963	4.66	2.70	7.80	5.47	4.18	3.56	2.93	1.93	3.02	3.01	2.15	1.45	42.94
1964	2.96	5.69	3.98	2.10	6.47	1.76	8.99	2.72	2.90	3.56	7.17	5.43	53.73
1965	5.68	2.19	4.71	2.48	0.87	1.56	5.63	0.91	0.53	2.91	1.18	4.38	39.09
1966	5.98	7.31	3.28	2.19	3.65	5.30	3.64	6.84	3.42	3.32	3.33	3.63	51.89
Total	328.84	297.31	338.11	363.84	244.54	208.97	273.61	282.47	175.21	219.85	319.53	384.04	3406.68
Mean	4.91	4.44	5.12	5.51	3.65	3.12	4.08	4.22	2.62	3.28	4.77	5.82	51.62
Max.	18.00	14.16	28.20	19.22	12.32	10.07	14.18	18.20	6.69	10.92	13.82	14.79	104.55
Min.	0.28	0.38	0.62	0.67	0.06	0.29	0.76	0.66	0.26	0.58	0.67	0.90	25.66

Station No. 175.1 — KOHALA MISSION

1890	13.75	5.98	17.56	7.48	6.95	9.16	10.05	9.88	3.18	4.61	4.93	6.63	100.16
1891	11.87	8.85	5.94	7.55	2.56	2.01	4.19	9.79	6.25	9.14	1.79	4.46	74.40
1892	9.94	1.96	3.70	1.14	4.61	2.50	2.14	4.07	3.31	2.24	1.80	5.19	42.60
1893	5.29	4.53	5.72	6.43	4.06	4.09	4.30	2.16	1.03	1.50	1.84	2.34	43.69
1894	2.22	7.91	5.87	3.46	2.20	2.35	3.69	3.79	1.09	2.73	10.72	10.98	57.01
1895	2.79	4.08	3.31	11.84	3.06	2.96	3.55	5.53	3.70	3.44	10.04	2.06	56.36
1896	5.18	5.70	5.32	3.46	2.22	4.05	5.25	3.13	1.78	3.27	0.67	3.77	43.80
1897	4.20	3.16	1.56	1.60	1.18	0.01	1.60	5.35	1.64	2.01	3.85	2.30	29.36
1898	5.83	2.10	15.98	2.43	3.98	2.76	3.55	3.65	2.55	2.54	4.12	4.45	53.94
1899	1.16	2.56	6.86	2.66	2.24	1.84	5.01	3.59	4.13	5.36	3.77	0.82	40.00
1900	2.17	4.83	2.11	5.71	8.37	2.51	3.11	3.26	1.07	6.33	5.00	0.81	45.28
1901	2.04	12.67	6.92	3.59	0.44	1.03	1.37	0.69	0.64	3.54	6.90	5.01	44.84
1902	2.75	3.39	26.09	—	10.84	7.36	3.13	6.80	4.63	5.93	7.40	13.62	—
1903	3.72	3.71	5.21	8.62	1.82	1.01	6.85	5.38	2.65	3.96	6.79	2.20	51.92
1904	6.63	13.62	4.14	16.49	3.25	1.48	5.93	3.20	3.96	0.99	6.47	1.56	67.72
1905	3.06	2.34	7.70	5.53	6.10	2.72	2.92	5.90	7.84	3.83	4.96	5.47	58.37
1906	5.19	1.81	3.50	8.40	6.10	1.85	7.68	5.69	2.76	2.49	3.87	13.71	63.05
1907	3.63	9.46	5.26	4.12	2.18	3.80	5.37	8.87	7.05	4.98	6.15	1.70	62.59
1908	1.75	3.20	2.55	3.43	4.57	5.23	8.46	6.55	6.28	3.45	4.21	8.24	57.92
1909	3.17	6.29	8.40	6.17	4.10	2.21	7.71	0.68	3.13	2.23	5.51	6.25	53.85
1910	6.27	2.44	6.49	4.95	4.56	5.48	6.53	5.13	2.06	4.16	5.11	9.93	63.11
1911	7.92	1.88	6.42	7.90	2.93	6.94	3.14	3.59	4.62	2.72	4.72	1.83	60.91
1912	0.78	5.24	3.54	6.85	3.80	2.69	2.30	1.71	1.70	3.45	6.69	3.54	41.29
1913	2.45	4.18	1.98	4.42	4.95	6.12	2.69	3.57	2.05	0.70	7.10	7.04	47.25
1914	6.48	0.61	6.12	3.06	10.29	7.85	12.72	19.88	7.04	5.09	11.91	8.49	99.54
1915	3.09	5.25	2.27	7.97	1.69	2.53	3.62	1.25	3.15	5.36	9.39	5.41	50.98
1916	14.61	0.47	5.00	10.40	10.56	7.20	5.16	7.39	4.67	2.05	1.75	9.08	78.34
1917	5.13	3.57	4.68	1.63	2.88	2.16	1.08	1.00	4.07	0.88	4.84	3.18	31.50
1918	7.49	10.40	8.40	21.86	9.88	6.40	10.25	7.34	1.01	3.62	7.55	12.82	107.02
1919	2.81	1.59	4.88	3.45	2.76	1.74	3.29	5.06	3.14	1.47	1.44	6.15	37.78
1920	5.87	1.68	6.13	4.43	1.13	0.76	2.11	3.57	3.18	3.46	3.59	6.70	42.61
1921	14.46	3.56	5.69	5.26	0.64	1.78	5.22	4.70	3.07	2.85	12.61	11.88	71.72
1922	8.82	5.45	12.13	4.70	3.19	1.04	2.26	4.37	8.60	1.58	7.19	1.90	61.23
1923	15.08	1.32	5.20	11.18	2.87	5.95	4.28	5.52	3.84	4.39	4.97	9.88	74.48
1924	2.03	7.39	3.17	9.52	1.98	0.55	3.65	6.38	2.92	6.70	4.92	4.80	54.01
1925	4.02	1.26	6.11	6.46	5.41	5.51	2.94	7.06	1.68	2.17	2.64	1.34	46.60
1926	2.07	4.00	1.07	6.32	3.51	1.98	4.05	4.91	1.41	1.90	3.22	1.47	36.91
1927	5.73	3.46	3.63	12.43	3.25	2.73	5.32	5.59	4.00	2.17	4.35	16.57	69.23
1928	4.45	3.40	1.49	3.19	5.69	2.91	5.54	3.45	5.14	1.24	6.54	7.16	50.20
1929	6.74	9.25	4.47	4.81	2.48	2.08	2.76	2.77	0.52	4.54	11.24	11.72	63.38
1930	7.23	7.40	5.84	11.16	4.45	5.38	4.27	7.96	3.52	2.07	15.44	2.82	77.54
1931	0.78	1.78	1.85	10.82	4.39	2.18	3.95	3.32	7.72	2.72	5.50	5.96	50.97
1932	5.83	16.51	3.73	9.54	6.90	4.47	4.54	1.77	2.17	0.68	2.86	2.86	64.36
1933	4.07	4.47	2.86	4.14	3.70	1.66	5.13	2.11	3.18	1.80	4.35	8.11	50.20
1934	4.09	3.05	4.91	5.98	6.22	2.62	4.00	3.39	5.13	2.82	4.73	2.99	52.00
1935	4.09	7.06	2.82	6.25	3.42	5.17	2.89	1.54	3.57	6.61	4.77	1.75	46.34
1936	6.65	8.42	2.32	13.01	8.68	5.92	4.57	8.79	4.95	6.16	6.29	11.91	93.50
1937	10.48	11.96	8.65	13.31	3.37	3.21	0.02	8.31	4.14	4.90	3.32	0.90	71.72
1938	6.62	3.54	8.21	12.35	8.32	3.73	2.64	2.79	1.80	3.31	1.78	11.47	67.40
1939	9.03	2.30	4.97	13.92	2.10	4.39	6.62	4.75	0.20	3.22	6.53	1.44	63.40
1940	3.66	3.77	7.94	6.08	3.59	2.98	5.68	12.57	4.37	4.26	10.37	4.64	69.91
1941	4.01	2.50	5.93	7.36	6.37	9.07	8.39	5.87	3.67	13.31	3.18	6.82	75.46
1942	2.52	3.11	19.67	9.38	5.00	3.19	3.96	6.92	1.63	9.96	2.23	4.86	68.05
1943	7.45	5.15	7.23	4.74	5.89	4.53	8.15	4.80	1.80	1.13	1.96	6.75	59.47
1944	0.47	4.58	10.72	5.30	4.40	6.00	9.74	3.33	1.53	6.16	3.70	5.44	63.48
1945	1.92	2.53	9.72	4.85	1.00	9.06	8.96	5.38	1.73	2.16	3.49	6.68	41.41

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1941	5.56	4.59	7.95	10.62	7.27	11.18	10.45	9.32	6.00	15.89	4.86	8.94	102.63
1942	3.77	5.15	35.26	13.09	7.71	3.50	4.38	8.00	2.15	3.61	1.87	4.02	92.31
1943	8.99	6.05	9.29	6.96	9.14	5.75	8.73	5.83	2.50	1.13	2.08	8.86	75.31
1944	1.98	3.21	4.49	7.94	6.16	6.47	9.80	5.84	1.71	9.86	4.63	5.85	71.75
1945	1.31	2.23	10.98	6.53	1.23	2.92	1.51	5.46	3.07	1.13	4.27	10.27	52.89
1946	9.80	3.29	11.78	9.09	2.31	3.05	7.66	3.20	2.57	4.97	8.03	15.40	81.15
1947	2.39	3.06	10.04	2.13	11.31	3.70	5.65	5.89	7.21	5.26	2.08	9.88	68.60
1948	10.61	3.01	16.66	5.26	4.01	3.99	6.55	3.75	5.64	7.03	7.37	11.56	85.44
1949	6.70	2.01	4.25	5.91	5.26	2.35	6.55	4.81	2.51	5.59	10.48	6.43	62.85
1950	5.89	3.44	7.27	15.62	4.27	3.10	9.07	4.99	1.74	2.49	14.19	23.51	95.58
1951	5.19	7.87	6.59	2.38	3.27	2.40	5.02	6.36	4.10	5.86	10.17	7.76	66.97
1952	10.11	9.20	9.28	6.00	6.99	7.94	7.97	7.28	3.65	9.59	5.86	6.92	90.76
1953	0.25	4.14	4.66	3.40	7.84	3.14	6.94	5.86	1.14	2.38	6.40	8.89	54.84
1954	1.59	0.95	6.81	3.76	8.59	6.09	7.24	11.63	1.56	2.55	1.38	21.29	73.44
1955	5.36	16.26	6.63	10.90	10.49	6.85	6.56	6.42	2.80	5.17	5.09	4.62	87.17
1956	10.64	10.91	3.34	13.06	6.23	9.29	4.21	9.74	1.29	10.19	4.67	7.25	90.82
1957	6.81	3.85	1.14	11.24	4.05	3.71	7.98	15.98	2.72	21.01	7.74	14.37	100.60
1958	7.45	4.42	11.03	5.35	6.23	8.30	8.98	15.79	5.71	11.63	5.67	11.89	102.45
1959	16.90	7.10	5.41	7.59	7.66	2.59	6.56	4.62	3.60	1.81	5.82	10.47	80.13
1960	7.29	10.98	10.04	11.73	5.73	4.65	4.43	4.13	5.20	3.18	9.88	7.23	84.57
1961	4.17	10.80	4.56	8.07	6.20	6.05	2.43	3.58	1.61	4.76	8.37	4.30	64.90
1962	4.19	4.98	7.57	2.76	4.81	1.78	2.59	4.33	3.15	1.52	2.18	5.99	45.85
1963	6.01	4.38	6.52	10.32	10.50	3.33	5.31	4.19	4.43	4.24	4.10	2.22	67.55
1964	5.54	7.31	5.11	4.11	11.79	3.04	6.17	4.51	5.02	7.63	15.58	5.00	81.31
1965	6.56	4.06	9.78	5.32	1.61	2.57	8.27	1.14	0.57	3.47	10.74	6.09	60.18
1966	7.76	9.85	5.59	4.83	2.61	7.61	5.63	10.03	4.51	4.49	3.71	6.33	72.25
Total	416.84	382.90	453.98	531.85	370.88	293.59	382.00	408.66	237.54	298.22	415.56	510.38	4645.49
Mean	7.19	6.60	7.83	9.01	6.29	4.98	6.47	6.93	4.03	5.05	7.04	8.65	80.09
Max.	16.90	23.63	35.26	30.31	16.44	11.18	14.27	32.96	11.10	21.01	18.54	23.51	146.80
Min.	0.25	0.95	1.04	2.13	1.07	1.38	2.04	1.14	0.57	0.81	0.97	2.22	41.80

Station No. 176.1 — KEHENA RESERVOIR

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1942	—	—	—	—	—	—	3.87	4.66	2.63	2.42	4.28	3.49	—
1943	10.29	8.64	8.61	11.91	9.25	4.54	10.08	3.97	2.18	0.71	3.95	6.71	80.84
1944	2.14	4.06	11.03	9.05	5.18	4.57	6.97	5.87	2.34	6.26	4.16	5.59	67.82
1945	2.21	1.54	9.38	7.62	2.62	3.95	2.52	7.73	1.80	5.57	2.39	6.40	51.13
1946	16.42	5.57	14.06	9.04	2.73	5.00	7.94	2.29	3.11	3.78	5.06	23.38	98.38
1947	5.17	6.81	13.58	6.27	8.05	2.82	3.44	6.50	4.41	4.55	2.37	11.46	75.43
1948	19.43	7.42	15.43	8.61	4.43	2.09	6.59	1.79	3.98	6.83	6.96	9.94	67.55
1949	8.11	1.93	5.11	5.58	3.50	3.42	6.88	3.89	1.94	3.65	12.21	8.15	64.37
1950	5.70	4.18	14.75	22.51	3.68	5.62	8.00	8.28	0.98	2.29	14.61	24.59	113.19
1951	5.99	9.52	7.88	4.11	3.42	1.13	4.80	3.53	3.74	6.29	6.66	6.65	68.15
1952	12.41	6.86	9.96	6.18	6.14	8.17	8.71	6.33	1.85	5.45	9.15	7.86	89.07
1953	0.35	4.10	4.88	4.94	9.24	3.79	5.69	4.82	0.78	2.55	7.00	7.55	55.73
1954	5.11	1.20	6.15	5.27	6.63	6.10	6.91	9.24	2.03	2.88	1.59	21.37	76.48
1955	7.35	18.26	8.10	8.56	8.95	4.50	5.45	4.66	3.66	2.91	4.36	5.34	78.10
1956	10.50	13.56	6.51	12.11	5.34	8.48	3.28	6.73	2.08	10.47	4.20	9.65	92.89
1957	5.62	3.77	2.36	8.72	5.20	2.45	3.77	14.98	3.11	9.52	5.20	24.93	108.23
1958	7.62	3.77	12.55	5.24	7.44	8.29	13.91	16.10	3.53	10.71	5.40	13.70	108.26
1959	20.09	11.52	5.68	9.33	9.69	2.74	7.31	6.68	2.02	1.38	9.91	13.22	99.57
1960	5.78	16.00	9.17	10.37	4.67	3.77	4.65	3.36	3.76	1.02	8.55	4.99	76.09
1961	5.09	13.30	2.72	15.42	2.89	4.00	2.07	3.11	1.25	3.87	9.86	3.96	67.54
1962	7.14	4.22	7.33	2.00	4.69	2.25	2.98	2.97	1.74	2.77	2.95	6.82	47.82
1963	5.98	3.33	8.57	11.22	7.00	2.99	4.81	1.85	5.31	5.52	5.00	4.05	65.63
1964	5.74	8.10	5.12	4.90	10.85	2.89	5.01	3.69	4.99	9.76	11.76	7.41	81.12
1965	7.11	6.70	7.83	4.74	1.30	2.33	7.37	1.34	0.80	3.44	8.70	11.33	62.99
1966	9.06	9.28	4.38	3.38	4.81	7.43	5.98	7.30	3.85	3.53	3.24	9.55	71.79
Total	190.41	173.74	201.14	197.48	137.10	104.72	151.48	139.67	67.84	120.36	159.72	258.09	1881.12
Mean	7.93	7.24	8.38	8.23	5.71	4.36	6.06	5.59	2.71	4.81	6.39	10.32	78.38
Max.	20.09	18.26	15.43	22.51	10.85	8.48	13.91	16.10	3.53	10.71	14.61	24.93	113.19
Min.	0.35	1.20	2.36	2.00	1.30	2.09	2.07	1.34	0.78	0.71	1.59	3.49	47.82

Station No. 179.0 — NIULI OFFICE (NIULI)

1885	6.86	5.84	4.75	9.35	11.61	5.63	8.67	3.30	8.71	3.56	7.63	9.95	86.06
1886	3.63	2.22	1.96	4.80	7.71	6.06	4.17	3.74	7.22	1.28	2.43	4.70	49.92
1887	7.46	4.96	7.16	6.43	4.44	1.94	6.00	5.42	2.52	2.53	2.91	2.55	48.92
1888	2.01	2.64	4.06	4.77	6.06	4.24	5.16	4.93	3.10	1.75	4.91	4.61	46.32
1889	2.74	2.00	3.06	2.00	2.42	3.08	3.98	5.45	3.90	6.56	8.23	7.40	50.82
1890	—	—	—	—	—	—	—	—	—	—	—	—	—
1891	11.44	5.61	4.42	6.30	1.84	1.08	—	9.42	3.90	7.38	1.12	3.27	—
1892	7.89	0.91	3.78	0.58	3.91	2.04	1.70	4.33	3.32	2.18	1.94	5.54	38.12
1893	4.99	3.34	5.12	4.64	3.71	3.46	4.17	1.41	0.62	1.21	1.47	1.05	35.19
1894	1.50	7.24	5.63	3.43	2.37	2.28	3.74	3.07	0.82	2.61	8.20	10.25	51.19
1895	2.14	2.53	2.85	11.96	3.41	3.20	3.46	5.07	3.67	2.49	10.60	1.31	52.69
1896	2.79	5.46	6.52	4.07	2.49	4.19	4.43	3.11	1.65	3.96	0.53	4.40	43.50
1897	2.86	2.51	1.35	1.42	1.17	0.85	1.48	4.80	1.52	1.90	3.48	2.93	26.27
1898	6.19	2.82	13.34	2.34	3.91	2.80	3.26	3.17	2.38	2.94	5.27	—	—
1899	0.93	1.85	7.07	2.94	2.38	2.43	5.88	4.21	3.90	7.31	3.11	0.66	42.67
1900	2.28	3.82	2.70	4.90	9.39	2.07	3.31	4.05	1.76	6.48	4.15	1.45	46.36
1901	2.52	13.14	7.11	6.62	0.07	0.65	1.01	1.21	0.65	4.44	8.41	2.80	48.63
1902	3.02	3.28	27.43	6.28	11.48	4.47	3.44	7.72	5.37	5.83	7.54	14.87	100.73
1903	4.10	3.53	4.61	8.80	1.66	1.07	7.34	5.25	3.54	4.96	6.87	1.87	53.66
1904	6.99	14.26	5.12	16.85	3.77	2.15	5.95	3.77	4.43	1.33	6.32	1.68	70.60
1905	2.68	2.26	6.90	6.14	6.78	3.02	4.49	6.83	8.34	4.34	5.16	4.47	62.41
1906	4.89	1.90	3.39	7.62	4.65	2.01	8.19	7.10	3.35	1.50	4.61	14.28	63.49
1907	3.14	7.39	6.73	3.68	2.63	3.30	5.51	8.12	7.94	4.63	5.62	2.14	60.83
1908	2.00	3.26	2.61	2.82	4.53	4.90	8.14	7.16	5.53	2.86	3.61	7.56	54.98
1909	3.14	5.66	9.90	7.20	5.02	2.48	6.60	0.87	3.13	2.40	3.61	6.51	56.52
1910	7.01	2.65	7.82	5.85	4.35	5.41	8.95	5.26	1.91	4.38	4.87	11.89	71.25
1911	8.00	8.72	7.44	7.89	3.79	5.56	3.83	4.91	8.23	3.17	6.55	2.22	73.31
1912	1.01	5.54	3.31	9.48	4.07	3.54	2.71	2.61	2.11	5.30	5.85	4.66	50.99
1913	3.19	2.91	2.25	5.57	4.14	4.84	3.10	4.40	2.92	0.91	7.20	7.88	49.31
1914	6.10	0.54	5.57	3.84	14.56	11.56	14.78	19.53	9.20	6.14	12.01	10.66	113.89
1915	3.06	5.23	2.17	9.85	1.11	3.27	4.30	1.74	4.66	5.53	8.59	5.30	54.81
1916	10.02	4.40	0.90	9.38	11.24	6.55	4.47	7.86	4.02	2.16	2.56	11.25	76.88
1917	5.09	5.53	3.70	1.97	2.21	1.98	1.34	1.25	0.50	5.01	2.00	32.57	—
1918	7.45	9.79	9.42	18.80	11.21	7.46	11.43	5.72	1.07	4.40	7.09	15.11	109.34
1919	3.74	1.47	6.27	3.71	2.49	2.49	5.63	3.63	1.50	5.11	5.52	4.00	40.00
1920	4.36	1.73	8.47	4.26	0.48	0.76	1.82	4.52	3.89	1.90	3.07	4.23	39.46
1921	11.13	2.13	7.83	7.70	0.91	0.94	4.41	4.41	3.94	3.36	13.94	10.25	67.49
1922	8.36	4.14	11.62	5.16	2.20	0.93	1.88	3.33	3.53	2.21	17.17	8.79	76.10
1923	18.06	1.83	7.92	4.45	2.77	3.40	4.03	4.33	4.70	5.41	4.27	8.79	77.07
1924	1.55	7.26	2.81	9.97	2.75	1.15	3.98	6.81	3.49	5.98	4.76	2.89	53.60
1925	6.16	1.21	8.79	5.79	5.91	4.35	1.96	0.70	2.30	1.13	1.92	0.44	46.46

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1936	8.49	17.09	19.32	17.67	18.27	14.10	10.10	14.39	6.19	11.82	11.15	37.38	136.38
1937	16.07	21.96	15.24	8.55	9.51	7.58	15.94	16.02	5.57	5.81	10.57	5.48	139.63
1938	13.17	6.46	13.51	21.38	12.50	5.92	4.74	6.42	1.97	5.50	4.04	13.26	108.87
1939	22.35	7.01	11.33	17.48	6.59	8.07	12.94	7.25	3.21	7.75	12.18	6.71	118.87
1940	9.55	6.09	7.74	7.56	6.08	5.74	6.28	22.46	6.52	4.97	8.01	6.06	97.15
1941	8.59	5.85	14.11	8.59	13.68	15.80	10.90	9.99	8.59	18.88	6.77	17.07	138.74
1942	3.26	6.75	53.55	14.64	7.16	5.81	5.74	5.97	4.19	3.90	4.84	5.51	121.33
1943	10.18	11.19	13.52	14.43	11.39	7.44	14.44	8.39	7.18	1.62	6.28	9.00	111.63
1944	4.10	5.90	8.88	15.94	7.75	7.47	11.83	8.29	4.11	8.27	8.31	8.62	99.48
1945	2.11	3.03	17.71	10.19	1.98	5.59	3.97	8.81	2.86	6.67	4.38	7.15	74.47
1946	19.04	11.07	19.99	12.99	4.31	5.64	11.55	4.74	4.49	4.91	5.50	28.56	134.69
1947	7.36	6.88	13.34	7.59	11.29	5.33	5.66	8.04	7.50	7.12	2.63	15.34	97.99
1948	13.40	10.20	19.07	9.51	6.78	3.77	9.11	3.23	6.20	10.24	9.23	16.23	130.97
1949	6.13	3.16	9.44	7.88	4.43	3.53	14.40	7.21	4.02	5.80	18.52	12.24	96.00
1950	7.87	4.32	27.60	19.58	7.86	7.34	14.53	14.93	3.12	4.09	8.81	30.57	151.16
1951	8.36	12.02	10.42	6.52	5.10	7.67	4.49	8.56	4.68	3.14	11.06	6.23	88.76
1952	6.72	6.78	10.78	15.72	7.95	7.06	4.41	8.58	3.37	5.16	12.11	12.05	123.25

1954	12.21	1.18	12.74	6.44	8.77	9.98	11.65	12.25	3.60	6.67	2.35	19.26	107.1
1955	10.82	16.26	8.95	11.87	10.73	8.05	6.45	7.35	3.10	3.95	5.80	8.20	101.5

1956	10.20	10.25	5.60	12.65	7.15	11.00	16.75	10.20	2.29	10.30	6.25	11.30	103.4
1957	5.25	8.00	3.89	10.00	7.45	3.85	10.95	15.70	3.65	10.95	6.20	20.95	104.8
1958	8.70	5.05	14.98	7.75	10.60	11.12	12.20	15.60	5.90	13.40	6.35	14.25	131.1
1959	10.09	11.52	5.68	9.33	9.69	2.74	3.11	6.68	2.02	1.38	9.91	13.22	99.5
1960	8.05	24.65	8.75	14.75	8.52	5.90	6.00	5.75	5.65	2.20	12.25	5.00	107.4
1961	4.84	20.35	2.95	17.32	3.60	5.10	3.00	4.10	1.75	6.80	17.00	6.75	93.5
1962	5.25	5.00	7.70	13.70	3.80	6.75	2.60	5.45	3.25	2.45	4.50	7.35	80.0
1963	10.60	2.30	10.00	17.72	7.60	4.40	9.41	2.70	6.85	5.90	14.00	5.40	92.8
1964	8.65	13.60	8.05	6.00	14.70	4.90	10.00	5.52	6.30	10.45	12.40	12.50	114.0
1965	8.00	10.70	11.25	6.65	2.60	4.10	7.00	2.15	0.88	4.95	10.75	15.30	84.3
1966	10.23	9.25	4.65	6.22	3.72	12.10	7.65	10.32	5.50	5.95	4.15	11.08	91.0
Total	610.30	509.58	633.34	620.47	426.68	359.39	486.58	475.28	271.84	319.37	527.53	648.21	5912.3
Mean	12.71	10.61	13.19	12.92	8.89	5.40	12.14	9.90	5.66	6.65	10.99	13.50	123.1
Max.	40.62	29.70	53.55	31.49	21.97	26.89	25.58	22.46	14.78	16.88	50.39	37.38	257.8
Min.	0.64	1.18	2.95	3.80	1.98	2.60	3.00	2.15	0.88	1.38	2.35	3.44	71.2
Station No. 182.1—AWINI													
1905	—	—	—	—	6.02	12.36	20.62	21.83	12.28	9.62	9.63	—	—
1906	7.09	3.03	5.88	21.25	11.92	4.43	12.73	15.32	4.32	4.08	7.73	25.32	124.1
1907	1.42	13.38	14.10	11.81	4.65	6.47	14.89	31.25	15.22	13.42	10.52	6.50	145.6
1908	8.15	5.79	6.50	10.16	13.10	13.89	24.16	22.73	18.70	7.89	14.52	27.38	172.9
1909	8.61	14.19	28.11	26.01	11.86	2.66	21.93	4.25	6.27	4.47	5.45	11.40	154.8
1910	17.16	18.60	16.09	15.24	15.85	21.32	18.32	15.00	4.72	13.00	16.28	25.25	197.9
1911	21.66	35.72	12.74	17.48	16.45	24.53	12.17	15.18	19.99	6.19	12.06	8.67	203.2
1912	3.47	10.60	18.01	27.51	8.42	6.72	7.59	6.40	14.29	12.47	10.52	13.52	153.7
1913	8.19	6.89	6.00	31.25	8.32	14.42	8.57	9.47	3.54	2.72	22.19	21.15	144.8
1914	21.90	3.12	17.44	12.49	37.13	28.30	44.37	57.40	19.25	15.51	23.42	11.88	292.2
1915	9.71	15.92	8.85	24.44	6.56	2.64	17.77	5.07	6.38	12.02	15.90	11.90	134.7
1916	16.83	25.50	11.68	18.04	25.10	16.66	10.16	13.45	7.81	4.42	6.35	23.19	156.2
1917	4.67	7.14	8.65	7.21	6.11	7.11	4.02	3.90	1.32	3.08	9.57	9.86	99.9
1918	10.46	26.84	16.82	57.42	27.65	15.47	22.58	15.08	3.18	6.41	16.30	36.86	253.8
1919	8.11	5.69	15.18	9.71	7.62	5.66	9.60	12.33	5.51	1.84	28.93	100.7	100.7
1920	8.64	2.67	15.54	8.93	1.89	3.10	11.12	8.67	7.78	5.67	7.92	13.09	97.9
1921	48.21	4.97	17.90	15.52	3.19	5.42	18.20	11.82	9.34	10.90	41.02	27.22	211.7
1922	15.61	15.90	35.38	12.29	8.11	2.14	6.99	14.88	17.99	5.39	12.72	3.81	151.2
1923	29.26	6.22	16.08	20.52	7.31	11.48	17.13	12.49	11.15	11.35	40.24	10.24	190.8
1924	9.40	20.12	6.46	14.13	5.95	3.44	8.61	9.83	5.62	19.82	16.45	4.86	112.2
1925	4.64	3.71	16.50	18.85	12.82	17.90	5.19	15.87	5.82	4.71	8.32	2.82	122.3
1926	6.52	19.91	2.81	23.51	9.10	4.93	9.36	15.64	6.76	9.28	10.98	5.70	125.5
1927	24.50	6.17	6.27	21.89	7.65	7.54	13.50	15.86	7.40	5.29	9.74	19.31	154.4
1928	14.78	8.65	7.87	8.97	18.66	7.60	14.57	10.28	13.43	4.19	14.19	22.43	145.8
1929	21.82	22.53	15.99	16.59	7.39	5.61	6.55	10.43	2.28	3.21	31.48	31.36	174.3
1930	11.31	22.94	15.27	28.85	12.41	19.31	14.09	24.27	13.09	5.25	30.40	7.60	204.7
1931	4.11	5.85	6.64	35.21	11.61	6.21	12.94	12.62	14.21	13.80	10.45	18.03	157.5
1932	8.37	47.11	11.41	22.76	14.37	10.00	11.32	4.72	4.30	1.83	9.39	12.24	157.8
1933	12.22	5.73	14.38	12.77	12.23	3.47	15.74	7.28	9.19	3.22	6.04	6.41	108.6
1934	10.04	17.40	11.65	19.65	19.42	6.61	11.44	4.12	8.03	6.05	15.26	6.50	136.1
1935	12.22	16.29	9.35	18.13	12.00	10.16	14.12	4.90	7.94	7.26	10.49	8.14	130.1
1936	4.84	13.98	18.99	36.30	30.31	12.20	12.01	17.08	7.75	13.31	13.40	27.46	211.1
1937	20.01	26.13	20.20	7.30	14.81	11.89	12.69	18.55	7.62	8.33	13.37	7.89	168.7
1938	15.21	5.35	20.86	23.57	16.62	6.91	6.61	7.18	3.37	9.84	4.10	17.19	131.4
1939	17.49	6.05	9.32	19.76	4.75	9.35	19.20	8.00	3.64	7.15	16.12	9.87	130.5
1940	4.27	10.18	16.10	10.63	9.09	6.10	9.39	30.86	9.15	7.69	15.59	10.60	139.0
1941	12.36	10.82	14.18	16.99	16.82	24.77	17.14	22.65	9.56	24.28	14.22	16.25	200.6
1942	7.36	6.63	82.61	25.71	13.55	7.83	7.21	12.95	6.74	6.53	4.73	4.41	185.9
1943	5.82	11.08	24.71	24.32	10.60	11.01	14.93	13.28	6.72	2.14	6.13	11.75	142.4
1944	2.54	6.94	7.70	16.66	9.33	13.97	23.46	8.22	4.22	20.19	8.77	8.27	130.2
1945	3.36	3.51	15.69	10.46	5.76	5.86	3.93	8.34	3.79	7.17	9.55	16.05	89.6
1946	15.96	3.44	17.77	12.73	3.49	6.78	12.88	8.26	4.72	4.16	9.19	21.29	118.6
1947	9.03	11.30	15.27	11.84	13.07	3.66	10.28	8.00	8.09	8.64	3.93	15.54	118.6
1948	22.43	8.02	25.87	9.87	6.73	3.88	12.15	7.24	8.73	13.48	8.92	13.64	106.9
1949	10.62	3.81	12.43	8.77	9.38	3.00	11.14	7.45	2.97	8.92	12.36	16.43	106.3
1950	4.47	6.38	11.16	26.68	6.96	3.38	18.39	7.01	1.60	3.32	13.56	23.46	126.3
1951	8.31	11.80	8.23	4.67	3.96	5.17	5.25	10.19	7.16	3.23	15.25	12.35	95.7
1952	15.23	16.32	18.22	5.62	19.10	10.10	20.63	10.40	4.86	12.35	16.71	12.12	161.6
1953	0.04	11.92	20.22	7.38	19.14	4.24	16.74	10.52	1.65	4.41	10.57	10.82	113.3

1954	4.18	1.37	9.31	11.07	12.80	11.09	15.41	22.11	3.69	5.39	2.72	23.23	122.37
1955	19.07	13.25	10.46	14.59	19.11	9.64	12.39	10.30	4.38	5.17	7.32	5.09	129.71

1950	9.54	14.12	10.83	27.42	11.75	11.04	6.12	12.21	2.90	11.82	10.77	9.98	138.76
1957	7.67	8.33	3.21	19.40	10.76	3.48	8.14	28.50	6.78	14.80	12.55	25.85	149.43
1958	16.84	7.51	10.16	9.29	12.49	13.40	18.84	29.03	7.25	17.00	10.99	18.06	170.84
1959	20.74	14.68	6.78	17.54	15.00	4.13	9.60	9.11	5.99	4.21	10.67	20.88	139.73
1960	13.76	17.72	16.06	20.87	11.30	6.03	10.57	10.07	12.89	4.18	3.42	13.92	140.76
1961	4.41	20.22	5.81	10.41	10.38	8.42	5.61	5.95	4.82	6.35	16.51	7.62	106.59
1962	10.23	4.32	22.13	3.65	12.20	5.09	9.53	16.34	7.21	1.83	4.81	15.55	115.15
1963	5.57	4.73	10.97	13.64	25.67	6.51	10.59	12.94	7.54	14.20	17.41	6.22	133.29
1964	12.65	16.35	9.60	10.44	23.74	7.13	10.55	8.61	12.49	27.36	29.40	12.29	180.92
1965	13.33	6.57	15.41	11.91	2.54	4.63	6.81	2.44	1.73	8.02	19.96	14.98	108.33
1966	16.07	21.69	13.17	16.33	1.90	4.70	19.03	18.13	9.55	8.98	8.06	9.64	146.55
Total	723.74	726.86	896.96	1035.89	743.16	558.07	794.91	828.85	486.22	533.07	792.07	920.08	8947.43
Mean	11.86	11.92	14.70	16.98	12.18	9.00	12.82	13.37	7.64	8.60	12.76	14.84	144.46
Max	48.21	47.11	82.61	57.42	37.13	28.30	44.37	57.40	21.83	27.36	41.02	40.24	292.26
Min	0.04	1.37	2.81	3.65	1.89	2.14	3.93	3.00	1.32	1.83	2.72	2.82	69.94

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
Station No. 183.2 — EAST HONOKANE													
1925	—	—	—	—	—	—	—	—	—	—	10.95	4.25	—
1926	6.25	13.93	5.42	10.61	16.48	5.06	9.30	18.69	11.20	9.52	10.85	7.74	127.05
1927	22.57	6.74	9.36	13.28	9.28	10.11	22.03	22.20	10.26	8.38	10.08	14.1	157.40
1928	26.45	10.57	13.58	14.78	20.65	9.45	21.81	12.01	6.01	5.59	18.65	28.99	193.14
1929	24.24	18.63	21.21	17.08	7.36	8.99	6.80	8.03	2.29	3.17	24.83	32.77	175.45
1930	14.45	20.98	23.28	26.33	19.71	23.21	12.60	30.47	18.66	7.53	18.94	11.73	228.09
1931	5.57	12.74	6.79	34.45	9.56	12.85	14.71	13.74	14.37	8.80	10.16	24.55	168.29
1932	9.82	29.55	13.58	29.74	17.13	15.46	14.19	9.59	4.42	3.21	14.55	11.42	172.66
1933	24.74	14.17	21.76	15.26	13.49	8.15	15.21	9.84	11.39	4.37	10.79	5.35	154.52
1934	8.92	12.80	6.82	14.46	18.39	9.83	8.85	7.14	12.17	6.99	15.47	6.36	128.20
1935	23.03	20.64	12.05	23.44	9.21	9.19	19.82	8.49	9.49	5.84	8.35	8.15	157.70
1936	11.94	14.28	26.22	19.53	26.96	20.29	18.29	20.00	12.17	16.86	13.34	43.65	245.53
1937	23.74	22.35	19.31	11.15	13.82	12.57	22.69	23.03	9.63	6.74	13.60	8.32	186.95
1938	17.50	7.43	23.47	27.29	19.28	14.39	9.97	10.72	5.73	8.74	5.73	15.02	165.27
1939	28.72	9.55	14.40	23.73	12.60	16.38	26.59	16.86	8.07	8.75	21.89	7.90	193.97
1940	10.64	8.62	9.27	11.77	13.21	9.46	13.80	32.63	12.14	8.82	9.76	7.30	147.42
1941	11.00	6.94	22.47	15.14	23.79	22.42	22.79	19.48	14.49	11.34	26.95	220.99	—
1942	3.04	13.31	102.66	26.57	14.20	11.17	11.52	15.82	12.18	4.04	9.27	9.79	233.57
1943	11.06	13.61	18.55	25.56	12.87	22.80	19.07	21.95	8.73	3.30	9.22	15.87	182.61
1944	6.98	10.20	7.36	25.10	17.36	16.81	27.37	16.40	7.77	15.41	17.75	18.87	182.38
1945	4.07	4.66	27.21	10.90	4.14	14.84	6.02	18.38	7.32	4.91	14.30	10.28	124.03
1946	19.96	14.46	26.11	26.87	9.21	10.23	17.05	11.84	7.00	12.07	11.77	29.31	193.01
1947	10.55	3.29	20.03	8.86	20.27	7.93	12.89	14.10	7.54	12.07	7.71	17.97	143.21
1948	25.46	12.53	23.40	13.86	12.93	6.94	14.99	5.73	9.94	17.90	8.85	22.53	174.30
1949	14.31	3.53	9.66	19.11	4.56	7.36	20.08	13.08	7.37	0.99	14.81	27.21	150.17
1950	8.32	7.35	23.23	38.88	12.42	8.86	18.95	20.77	6.33	7.24	9.94	37.31	199.60
1951	8.06	14.46	11.36	9.63	7.78	10.02	9.33	18.39	6.25	6.72	17.72	7.61	127.33
1952	18.33	9.41	25.97	9.16	19.25	17.31	17.60	15.82	6.34	10.97	16.74	14.83	181.73
1953	0.74	5.55	9.72	6.59	18.23	8.03	19.65	12.13	2.68	7.03	14.52	10.33	116.20
1954	13.33	1.48	15.26	8.27	10.60	15.19	20.65	16.72	8.15	9.68	4.25	33.61	157.19
1955	12.18	21.66	11.85	22.58	19.45	11.90	12.60	13.00	7.60	7.00	10.60	8.25	158.07
1956	10.00	20.07	8.65	14.10	12.90	22.50	10.30	20.80	4.00	17.40	8.10	14.60	163.42
1957	7.60	12.20	6.33	14.60	6.45	6.20	18.35	22.85	5.30	17.00	3.90	48.75	174.93
1958	11.20	5.60	16.70	13.80	18.55	20.10	10.55	35.20	11.70	18.00	9.15	19.60	203.35
1959	19.65	24.00	10.98	13.60	16.00	7.00	20.72	17.20	8.80	13.10	26.50	172.90	—
1960	13.50	31.50	13.20	22.30	11.50	7.75	8.80	11.95	10.65	3.70	17.45	6.80	160.10
1961	5.42	24.50	8.05	20.30	7.20	8.42	5.10	10.30	4.50	9.90	22.40	10.80	132.89
1962	3.40	6.65	8.32	5.20	11.35	4.05	9.05	8.82	8.15	2.85	6.25	8.95	83.04
1963	11.25	1.74	12.80	16.70	15.50	9.40	17.40	10.85	11.45	10.15	14.35	4.20	135.79
1964	12.15	20.42	10.65	10.20	19.85	7.60	15.80	11.10	12.00	15.48	17.95	10.28	163.48
1965	9.10	11.60	11.50	8.70	7.80	9.90	10.60	4.05	1.40	5.42	15.60	21.40	113.12
1966	13.73	10.25	7.15	6.68	5.70	17.72	14.55	17.85	8.10	10.82	6.90	14.82	134.27
Total	542.99	534.00	698.15	703.16	569.04	492.86	632.95	642.02	356.22	374.58	537.26	711.73	6782.35
Mean	12.92	12.71	16.62	16.74	13.55	11.73	15.07	15.29	8.48	8.91	12.49	16.55	165.42
Max.	28.72	31.50	102.66	38.88	26.96	23.21	27.37	33.20	18.86	24.19	43.65	48.75	245.53
Min.	0.74	1.48	5.42	5.20	4.14	5.06	5.10	5.73	1.40	2.85	4.25	4.20	83.04

Station No. 184.1 — KAUUKINI

1924																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1916	11.69	1.46	4.67	3.80	9.83	3.58	2.24	2.15	1.45	2.17	2.65	8.16	53.85
1917	2.34	2.78	2.38	3.02	2.50	2.55	0.81	1.06	4.34	4.48	2.90	2.24	31.40
1918	7.17	9.55	9.31	9.80	3.01	3.04	4.49	3.05	2.25	1.39	3.27	12.22	67.65
1919	3.25	1.59	2.86	2.79	1.89	2.85	3.18	3.06	2.04	0.24	0.64	6.78	29.17
1920	7.06	1.55	3.15	2.98	1.22	2.20	2.26	2.71	2.27	1.34	3.79	4.51	36.04
1921	6.63	0.65	3.51	3.73	1.78	0.93	4.07	2.44	2.60	1.68	12.98	5.14	46.14
1922	6.61	8.91	9.06	3.05	1.47	2.37	2.27	4.75	5.09	2.67	2.86	0.93	50.04
1923	12.60	2.79	8.43	8.96	2.26	2.87	3.70	3.49	2.32	3.29	2.49	9.05	62.25
1924	1.85	3.60	2.34	4.46	1.60	0.58	2.82	1.55	0.98	1.14	8.95	3.40	36.27
1925	2.86	1.35	7.39	6.44	2.80	3.94	2.11	4.00	2.23	3.04	2.07	2.20	40.43
1926	1.84	2.31	1.18	3.06	3.62	1.77	4.07	4.09	3.11	4.45	3.58	0.92	35.00
1927	5.08	1.07	7.83	6.53	2.08	2.20	3.94	2.88	3.19	2.11	2.87	7.84	47.62
1928	4.89	3.18	7.04	2.78	5.65	1.63	5.88	1.71	1.46	0.89	4.70	6.06	45.87
1929	8.24	8.76	3.11	5.93	2.29	1.31	2.15	2.83	0.35	1.07	5.44	11.98	53.46
1930	7.06	5.63	6.33	5.45	2.24	3.61	2.98	4.20	6.36	3.03	8.47	2.54	57.90
1931	1.60	2.19	2.33	8.57	4.83	1.16	3.62	3.51	3.18	1.93	1.30	6.14	40.36
1932	1.14	5.90	3.10	5.96	2.59	2.79	2.23	1.83	1.18	0.59	1.49	1.30	30.10
1933	1.84	3.98	5.79	4.62	1.91	0.63	3.92	1.79	1.89	1.51	3.47	1.60	32.93
1934	2.12	5.42	1.72	1.12	7.17	1.78	1.01	5.62	2.20	2.06	2.99	0.67	36.88
1935	7.03	3.16	4.90	5.12	2.26	1.05	3.47	1.57	1.14	4.39	2.41	1.88	38.38
1936	4.94	12.52	7.17	5.99	7.00	2.49	2.34	3.47	1.60	5.91	4.55	1.63	73.01
1937	6.14	7.23	4.58	4.10	4.15	2.31	4.71	5.40	3.28	2.48	1.74	3.02	48.24
1938	7.13	2.97	6.29	6.94	3.04	1.81	1.66	3.77	0.68	1.12	0.98	2.47	40.12
1939	7.48	1.14	3.81	7.27	0.82	1.34	3.77	2.23	1.19	1.92	3.03	2.16	38.16
1940	6.08	1.40	3.31	2.84	2.52	1.70	1.22	6.29	1.30	1.54	2.92	1.78	32.90
1941	2.96	0.81	3.99	2.48	7.04	4.66	2.89	2.47	2.05	5.47	1.35	3.47	39.34
1942	1.00	2.74	16.69	4.78	1.90	1.26	1.20	1.43	1.49	1.92	5.88	2.22	42.51
1943	7.50	3.91	4.82	3.10	5.50	1.62	1.87	2.47	0.74	0.35	1.87	1.49	35.24
1944	1.43	4.10	2.89	3.34	1.69	4.10	3.95	1.24	1.00	2.96	1.09	4.18	31.97
1945	1.68	1.58	2.49	3.48	1.57	0.75	0.97	1.51	1.40	2.73	1.89	2.27	22.12
1946	9.43	6.44	1.61	3.18	1.12	1.70	2.88	1.54	0.99	1.81	2.32	12.63	45.65
1947	1.86	0.47	2.79	2.78	2.61	1.59	1.65	1.82	2.62	1.83	2.51	6.03	28.56
1948	9.58	8.56	3.89	3.55	1.49	2.51	2.27	0.82	1.70	2.49	5.21	3.42	45.49
1949	6.17	0.41	1.75	1.91	1.70	1.35	3.35	1.28	0.37	1.47	5.36	4.97	30.09
1950	2.34	1.25	7.32	12.64	2.65	1.32	3.90	7.59	1.69	0.65	6.90	8.80	57.05
1951	1.82	2.89	8.36	1.58	1.13	1.85	1.83	1.26	1.49	5.20	1.66	1.45	30.32
1952	6.94	2.67	3.08	1.93	1.84	3.30	3.48	1.37	0.25	1.17	2.66	1.46	29.15
1953	0.40	2.15	4.47	1.64	1.65	1.28	2.67	1.25	0.43	0.76	2.53	2.55	21.78
1954	3.73	0.74	5.27	1.78	2.23	2.23	2.26	0.67	0.74	0.72	0.04	13.29	36.70
1955	3.71	7.94	2.49	1.44	1.75	1.68	1.17	2.07	0.94	0.51	1.82	3.31	28.83
1956	6.56	6.63	1.47	2.53	1.89	1.85	1.81	4.29	0.62	5.83	2.10	6.65	42.03
1957	1.23	4.12	1.16	2.59	1.38	0.62	1.34	5.59	0.54	3.58	2.48	11.10	35.73
1958	2.97	1.40	5.20	1.64	3.43	2.07	9.32	9.47	1.11	4.84	1.54	1.17	46.16
1959	12.12	6.55	0.93	2.12	2.55	0.64	0.94	4.48	0.98	0.26	4.56	0.99	45.22
1960	0.79	13.31	4.37	2.64	1.59	0.85	1.40	1.16	1.13	0.81	1.72	1.92	31.69
1961	2.80	3.83	0.68	6.22	0.67	1.05	0.51	0.46	0.26	1.32	4.66	1.64	24.10
1962	1.30	2.84	2.51	1.43	1.90	0.72	0.95	1.23	0.78	0.38	0.17	3.68	18.57
1963	7.41	2.23	5.19	4.11	1.65	0.78	2.32	1.23	1.95	1.31	1.74	0.93	30.85
1964	1.94	3.54	3.69	1.69	1.96	0.86	2.66	1.29	1.31	2.36	3.93	4.27	28.70
1965	2.76	2.90	3.57	2.52	3.38	1.13	1.24	1.76	0.87	1.94	4.45	4.96	32.48
1966	2.41	4.15	1.43	1.31	1.63	2.12	2.64	4.56	1.33	1.27	2.39	4.41	29.65
Total	346.20	317.41	346.94	292.52	210.79	153.72	209.79	231.38	139.40	181.53	254.96	374.20	3061.24
Mean	4.59	4.18	4.57	3.85	2.77	2.02	2.76	3.04	1.83	2.39	3.35	4.92	40.28
Max.	16.32	15.15	27.34	12.04	9.83	5.23	7.44	10.29	7.03	7.96	12.98	16.33	80.14
Min.	0.40	0.41	0.94	1.12	0.76	0.51	0.32	0.82	0.26	0.24	0.04	0.30	21.78

Station No. 192.1 — PUU KAPU

1932	—	—	—	—	—	1.35	1.25	2.00	0.60	0.65	2.00	1.00	—
1933	1.10	2.00	7.00	3.00	2.00	1.30	2.70	0.60	1.10	0.50	5.00	1.00	27.30
1934	4.00	3.00	2.00	3.00	4.00	2.10	2.50	4.00	2.50	4.00	2.00	2.00	35.10
1935	6.00	3.15	7.00	4.00	3.00	2.00	2.50	1.00	1.00	4.00	3.00	3.00	39.65
1936	6.00	8.20	6.40	6.40	5.00	2.00	2.00	3.00	1.40	2.40	4.20	15.00	62.00
1937	8.00	7.20	8.00	3.00	4.10	2.20	6.00	5.20	2.60	3.00	3.00	6.00	58.30
1938	8.40	2.20	8.20	9.00	6.20	2.00	2.60	3.00	1.30	1.20	1.00	3.00	48.10
1939	10.10	2.20	6.00	10.00	2.20	2.20	6.20	5.00	1.00	2.10	6.30	3.00	56.30
1940	8.00	2.00	6.20	4.20	3.20	1.50	4.20	12.60	2.00	2.20	3.40	2.60	52.10
1941	4.60	1.60	6.00	2.65	6.20	8.40	5.20	4.20	4.00	7.40	2.40	6.00	58.65
1942	1.20	4.40	25.20	9.00	4.60	4.20	4.00	3.20	2.40	3.00	4.20	2.10	67.50
1943	7.20	4.10	5.90	6.30	7.60	2.40	3.20	4.20	2.20	0.80	1.60	1.20	46.70
1944	0.00	3.20	2.70	5.00	1.60	3.40	5.40	2.40	3.00	3.40	2.60	3.60	35.30
1945	1.00	0.80	1.40	4.20	1.60	1.00	0.80	0.80	1.28	1.50	2.40	0.00	15.78
1946	10.20	7.00	2.40	2.60	0.00	2.00	2.10	3.70	2.50	1.20	2.90	15.80	52.20
1947	3.80	2.00	2.40	2.50	4.00	2.30	1.80	2.00	4.80	2.10	3.30	7.00	37.70
1948	11.60	6.70	9.00	5.60	6.52	2.40	2.60	1.20	4.12	3.00	6.84	4.47	64.25
1949	8.20	2.35	3.02	2.72	3.46	2.08	5.61	2.33	1.08	2.45	7.58	4.17	45.05
1950	3.91	2.45	10.06	15.92	4.07	1.07	0.98	8.00	1.59	1.16	8.86	16.21	74.28
1951	3.10	3.91	7.64	3.62	0.91	1.63	2.96	2.93	1.96	4.60	2.48	2.36	38.10
1952	7.27	4.83	4.66	3.81	5.84	4.80	6.27	2.90	0.66	5.42	2.79	1.97	51.22
1953	0.26	3.41	3.89	1.96	3.76	1.78	4.15	2.74	0.55	1.02	3.28	2.30	29.10
1954	3.97	0.66	8.07	3.83	3.48	3.78	3.76	5.74	1.42	1.51	3.99	17.88	54.49
1955	1.80	17.24	2.77	1.65	4.49	3.49	2.04	3.39	1.13	0.78	2.25	3.95	44.98
1956	6.59	7.74	3.86	3.24	4.14	2.97	3.84	6.58	1.37	7.52	2.57	4.76	55.58
1957	0.45	2.24	2.15	4.19	1.70	1.05	1.72	7.48	0.75	5.84	2.70	3.05	49.02
1958	4.38	1.23	7.69	2.67	4.93	3.80	11.72	11.55	2.01	7.42	1.59	5.41	64.60
1959	9.46	6.82	1.20	3.16	4.32	0.73	1.81	8.42	1.63	1.34	4.54	13.97	51.40
1960	11.10	16.35	4.93	4.57	3.99	1.64	2.17	2.06	2.70	0.94	1.84	2.46	44.55
1961	2.64	4.02	1.08	10.54	1.14	1.69	1.14	0.95	0.44	1.21	6.04	2.88	33.77
1962	1.69	1.64	3.99	1.67	3.70	1.03	1.28	1.73	1.29	0.68	0.14	3.49	22.33
1963	6.18	3.14	4.58	4.46	3.24	1.13	1.13	2.33	0.98	3.22	2.54	1.48	36.41
1964	1.44	1.91	3.04	1.78	2.41	0.90	1.95	1.50	2.21	4.04	3.55	6.12	33.13
1965	3.50	3.73	3.92	2.88	2.43	1.29	1.49	1.25	0.55	3.94	5.18	3.79	33.95
1966	2.37	3.13	2.71	2.28	2.05	1.27	3.19	5.20	1.50	2.32	1.37	4.21	31.60
Total	153.91	151.93	185.06	155.60	121.88	78.88	114.46	129.18	61.62	97.86	115.53	187.43	1550.45
Max	4.53	4.47	5.44	4.58	3.58	2.25	3.27	3.69	1.76	2.80	3.30	5.36	45.60
Mean	11.60	17.24	25.20	10.54	7.60	8.40	11.72	12.60	4.80	7.52	8.86	16.21	74.28
Min.	0.00	0.66	1.20	1.65	0.00	0.73	0.80	0.60	0.44	0.50	0.14	0.00	16.78

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1961	2.98	17.09	2.43	28.14	3.24	3.48	3.11	2.97	2.14	5.95	10.77	6.78	89.08
1962	3.08	4.26	9.37	5.30	4.16	1.95	4.03	7.15	4.00	1.48	1.55	5.13	51.46
1963	6.63	5.40	8.33	7.29	Discontinued								
Total	506.34	536.02	654.06	716.83	503.42	356.19	491.78	523.61	296.83	361.71	523.96	660.43	6079.29
Mean	9.55	10.11	12.34	13.53	9.68	6.85	9.46	10.07	5.60	6.82	9.89	12.46	116.91
Max.	32.19	35.86	72.98	34.82	30.63	21.33	36.99	42.49	22.00	30.61	33.83	42.05	239.59
Min.	0.17	0.80	1.81	5.00	1.53	1.91	1.95	2.02	0.80	0.44	0.72	2.04	51.46

Station No. 195.0 — KOIOWE UPPER

1912	2.05	14.91	21.61	22.61	10.21	9.56	9.93	8.32	7.19	5.87	16.57	6.18	135.01
1913	—	—	—	7.60	10.10	13.50	5.08	9.00	3.38	2.63	22.76	8.93	—
1914	15.46	1.14	8.00	13.48	17.32	20.55	37.19	37.83	21.23	14.91	17.54	12.17	216.82
1915	6.31	13.58	6.82	13.71	8.48	13.30	15.17	6.65	7.68	14.17	13.53	13.66	133.06
1916	14.75	2.82	14.58	19.13	32.48	18.94	13.91	10.85	7.79	4.67	5.89	20.03	165.84
1917	3.26	4.64	6.62	12.49	6.34	7.87	2.99	3.43	3.56	2.91	9.33	4.18	67.62
1918	9.98	17.57	17.54	26.38	18.53	12.75	16.69	11.01	4.03	5.89	9.33	33.33	183.03
1919	8.90	3.69	9.12	8.74	4.85	6.59	8.44	13.80	2.26	0.67	2.64	9.54	79.24
1920	7.00	3.84	11.03	9.14	2.33	3.95	8.40	10.56	8.53	6.98	10.02	9.57	91.35
1921	19.74	2.80	7.70	10.12	3.47	4.75	16.47	10.20	11.06	5.41	26.56	16.22	134.50
1922	11.51	14.88	17.71	9.93	8.08	7.60	15.66	14.09	5.76	7.70	1.99	118.80	—
1923	22.01	2.56	15.81	20.68	6.48	9.17	16.73	9.71	11.33	10.58	6.91	18.61	152.38
1924	3.81	11.83	7.38	10.35	5.56	2.61	9.06	8.38	4.16	16.00	19.83	3.75	102.72
1925	6.77	3.33	13.52	17.53	12.35	12.84	6.89	16.89	8.59	4.05	6.63	3.07	112.46
1926	3.74	9.80	2.80	10.63	12.45	3.34	11.35	12.77	9.73	8.09	8.99	2.43	96.12
1927	10.23	4.03	5.02	13.29	6.29	7.34	16.03	13.82	6.18	7.05	7.55	9.99	106.82
1928	12.91	7.08	10.29	8.53	13.83	9.90	13.45	12.23	7.10	5.40	17.36	15.50	133.58
1929	17.63	17.79	13.69	14.13	7.83	5.33	5.29	6.04	1.44	2.68	18.12	30.80	140.77
1930	10.13	12.01	13.60	24.58	12.18	16.69	16.47	16.48	17.30	5.99	21.85	7.27	174.75
1931	3.16	5.71	8.99	20.17	10.54	5.36	13.16	12.19	10.23	12.39	6.48	21.07	131.45
1932	6.19	21.66	7.71	14.50	11.75	11.38	11.33	6.75	4.05	1.96	8.11	6.30	111.65
1933	7.29	5.28	16.07	11.46	8.97	3.71	19.93	7.77	8.00	4.24	12.29	3.41	108.42
1934	11.47	8.78	6.10	16.21	30.44	7.77	6.82	7.99	6.40	6.88	10.45	3.02	121.13
1935	12.98	11.26	10.97	25.61	8.08	7.99	15.01	6.48	8.93	3.38	4.91	5.74	119.34
1936	9.63	9.54	20.76	23.96	23.95	10.32	9.21	18.29	6.86	12.70	17.16	33.28	206.46
1937	22.19	17.75	20.39	9.71	17.13	10.43	15.00	19.07	9.87	7.50	8.13	9.14	166.31
1938	15.73	4.87	16.34	22.74	19.23	7.98	9.05	11.16	2.75	4.61	3.04	8.46	125.96
1939	19.21	5.53	7.44	19.21	7.88	9.37	20.53	13.09	4.43	8.71	17.17	6.42	138.99
1940	4.84	5.34	8.37	8.96	11.64	6.11	14.37	27.75	8.41	6.25	6.95	5.66	114.65
1941	14.36	4.65	19.51	16.11	26.15	26.53	19.90	17.74	10.20	18.76	6.83	15.92	200.46
1942	5.73	12.78	79.08	36.32	18.46	7.62	6.42	11.23	9.73	5.01	6.39	4.15	202.92
1943	6.66	7.85	14.36	18.30	11.84	9.97	14.27	13.65	6.98	1.35	3.87	5.50	114.60
1944	5.33	5.88	2.70	20.38	11.21	15.69	25.61	8.55	6.27	18.04	6.58	14.20	141.34
1945	3.19	2.03	12.48	7.20	4.46	4.92	5.32	8.39	5.09	6.50	5.81	8.95	75.14
1946	19.80	14.42	12.44	13.64	5.86	8.17	13.48	10.86	7.38	6.23	7.73	30.75	147.56
1947	6.00	4.75	15.13	7.18	16.28	4.92	14.78	11.22	6.03	6.91	4.55	15.73	113.46
1948	19.52	12.07	22.43	10.61	10.76	4.22	11.80	Discontinued					
Total	379.67	308.45	502.67	575.32	487.67	348.13	483.33	446.81	276.24	259.13	383.76	424.92	4668.51
Mean	10.55	8.57	13.96	15.55	12.37	9.41	13.06	12.41	7.67	7.20	10.66	11.80	133.33
Max.	22.19	21.66	79.08	36.32	32.48	26.53	37.19	37.83	21.23	18.76	26.76	33.83	216.82
Min.	2.05	1.14	2.70	7.18	2.33	3.34	2.99	3.43	1.44	1.35	2.64	1.99	67.62

Station No. 196.0 — KOIOWE LOWER

1910	—	—	—	—	—	—	—	—	1.54	6.50	7.60	10.00	—
1911	11.65	20.43	7.36	10.54	10.93	17.28	8.21	9.95	9.66	4.51	5.02	7.56	123.11
1912	1.26	10.66	14.32	16.44	6.60	6.82	6.37	4.66	3.82	3.21	12.73	5.89	94.61
1913	4.45	4.44	4.67	6.77	6.58	7.41	4.37	4.08	3.96	1.49	18.13	14.04	81.17
1914	17.89	0.99	9.46	8.93	21.54	16.56	36.24	36.34	20.11	11.14	19.95	12.13	211.28
1915	4.65	11.82	5.16	14.11	3.99	9.45	7.28	5.10	5.29	8.73	7.62	9.73	92.93
1916	14.50	2.22	8.46	11.63	28.67	9.86	7.74	6.71	5.31	2.51	4.00	18.44	120.03
1917	2.32	5.00	2.19	7.69	3.15	4.13	1.56	1.86	1.83	2.45	7.04	3.09	42.31
1918	6.94	15.92	14.90	35.03	13.74	9.31	12.67	9.10	2.05	8.55	6.41	32.55	162.17
1919	6.01	4.11	7.71	6.26	4.35	4.29	14.36	3.84	1.13	0.30	2.29	8.10	59.15
1920	5.23	3.18	11.96	5.92	1.24	1.62	6.42	10.91	6.54	6.06	8.51	6.90	72.49
1921	16.07	2.02	10.14	7.30	3.37	2.55	12.78	6.87	6.83	4.45	24.39	13.88	110.65
1922	11.93	14.80	24.93	8.34	6.23	2.55	5.44	9.09	13.77	4.80	6.93	1.67	110.48
1923	22.94	1.67	13.89	19.93	4.62	5.71	11.27	8.92	8.62	9.68	5.29	21.21	133.75
1924	3.02	11.57	7.32	10.11	4.56	1.82	5.85	5.80	2.67	16.17	24.93	1.82	95.5
1925	5.73	2.15	11.00	12.76	6.42	7.08	3.79	11.53	6.73	3.36	4.88	2.33	77.76
1926	3.31	10.53	1.51	9.16	7.31	3.37	6.63	9.60	7.17	4.93	9.42	2.01	74.95
1927	11.98	4.20	3.00	14.47	7.15	5.60	11.57	9.77	4.22	3.94	7.67	6.79	92.96
1928	9.68	7.60	7.91	12.99	7.67	11.85	9.15	4.37	2.69	16.49	17.38	115.27	—
1929	16.92	17.02	12.14	15.31	6.97	3.28	4.32	6.78	0.82	0.64	23.57	33.71	143.48
1930	5.57	13.00	14.19	22.33	7.10	9.87	10.18	10.07	11.06	3.83	23.17	6.00	136.37
1931	1.88	3.84	12.64	26.03	10.52	2.57	15.50	8.45	6.58	10.17	4.80	18.93	121.91
1932	5.11	26.77	6.86	15.53	6.36	6.26	7.22	4.98	2.22	1.13	5.72	4.75	92.91
1933	3.58	4.10	15.92	5.97	4.87	2.32	12.71	3.64	3.03	1.03	8.30	2.45	68.08
1934	11.74	8.05	6.18	16.51	17.71	4.52	5.08	5.19	3.71	5.63	8.42	2.25	95.90
1935	11.02	9.74	8.97	16.86	6.19	5.61	8.41	2.87	5.42	5.01	4.98	5.22	90.30
1936	11.85	14.85	16.37	22.74	18.78	10.39	6.17	11.53	4.75	13.10	8.74	30.97	170.28
1937	16.79	16.17	18.15	6.13	13.99	6.40	9.90	13.74	6.25	5.04	6.69	8.68	128.83
1938	14.39	3.13	15.12	21.48	14.88	5.65	6.22	8.28	1.13	3.76	1.10	8.16	103.15
1939	15.02	3.90	6.34	14.81	4.40	5.46	14.78	8.76	2.08	4.34	12.79	4.08	97.77
1940	2.86	5.00	7.44	6.75	7.68	4.61	9.42	24.66	4.50	4.15	4.58	2.04	83.69
1941	13.48	3.18	15.18	8.55	19.86	23.26	11.24	14.25	5.46	17.80	5.85	9.43	147.54
1942	5.41	7.84	69.01	22.39	10.17	5.07	5.98	5.78	5.19	3.49	4.85	3.67	148.94
1943	4.69	6.87	11.72	18.83	7.40	5.11	9.63	7.74	5.08	9.97	4.03	4.57	87.04
1944	2.72	5.47	3.08	13.90	6.85	8.19	16.57	4.84	3.37	11.85	4.33	7.87	88.84
1945	3.01	3.27	9.70	6.75	4.10	4.55	3.55	5.75	3.60	4.68	4.64	8.01	61.61
1946	19.94	8.36	8.38	11.20	4.52	5.32	9.57	5.88	4.52	2.79	8.01	33.59	122.08
1947	6.64	3.77	14.18	7.16	17.74	2.14	5.07	5.82	4.67	4.74	10.49	88.35	—
1948	19.90	10.34	24.15	9.30	7.51	2.31	7.76	3.94	6.65	2.79	5.61	9.21	122.08
1949	5.46	3.52	7.86	7.09	5.79	3.12	10.81	5.51	2.28	4.57	15.47	8.09	79.55
1950	4.45	3.31	20.45	26.95	8.81	3.91	17.23	8.75	2.60	2.78	19.59	24.65	139.22
1951	3.91	7.63	5.49	4.47	3.56	5.35	8.16	10.58	4.38	4.77	10.19	8.26	74.47
1952	6.12	11.56	10.73	9.51	11.29	9.72	11.00	11.08	2.77	12.32	8.47	9.55	112.55
1953	0.01	7.58	8.62	6.37	9.85	5.15	10.26	11.26	1.06	9.24	7.25	7.77	112.55
1954	7.82	0.49	12.59	8.46	13.52	8.15	11.15	20.53	0.83	3.69	0.98	30.86	118.84
1955	10.20	23.99	5.60	8.48	11.82	9.72	7.74	8.76	3.22	3.07	4.83	4.48	101.48
1956	8.78	20.93	6.87	10.42	13.89	9.32	10.55	18.36	0.92	12.69	6.86	9.44	129.03
1957	3.86	11.07	2.85	11.93	8.33	2.18	10.91	23.85	5.17	25.82	4.47	27.88	138.38
1958	23.23	4.56	10.42	11.83	16.00	20.55	20.26	36.40	8.11	22.42	4.86	13.93	195.77
1959	17.45	23.53	7.45	16.78	17.79	3.84	6.64	10.33	7.55	16.49	9.37	14.77	167.72
1960	5.19	47.45	16.54	26.45	11.06	6.14	7.53	8.89	10.48	2.04	6.09	9.29	157.11

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1945	11.91	2.93	9.13	4.79	2.94	1.93	4.85	1.83	3.20	1.93	8.47	18.83	72.74
1947	4.70	5.61	8.49	5.42	9.53	1.45	2.06	4.19	2.03	4.02	3.32	10.87	61.69
1948	15.41	7.74	16.29	6.46	3.26	0.58	4.61	1.53	6.84	10.70	8.17	8.05	89.64
1949	3.79	1.65	5.56	4.93	3.86	0.82	4.18	2.41	2.27	4.12	11.27	6.19	51.05
1950	2.80	1.63	11.45	15.68	2.23	1.90	6.47	4.11	1.63	1.97	17.51	28.23	97.61
1951	5.23	10.84	4.85	2.38	2.92	2.07	3.95	5.31	3.23	3.19	7.42	4.85	56.24
1952	5.74	8.76	8.99	5.27	8.53	3.06	8.17	5.61	1.84	12.81	8.31	3.35	81.04
1953	0.03	6.20	5.07	5.45	6.45	1.21	4.40	5.49	0.86	2.26	6.75	6.46	50.36
1954	3.43	1.23	8.84	6.20	14.65	3.13	6.55	9.17	1.84	1.66	0.51	24.06	81.27
1955	6.42	16.10	6.59	4.53	6.23	4.01	5.80	4.66	1.45	2.21	3.71	2.34	61.85
1956	6.17	13.53	4.53	13.41	6.03	6.80	5.48	11.30	0.96	5.56	2.04	5.66	81.47
1957	3.38	7.97	2.55	9.11	4.73	1.23	4.21	14.17	3.35	23.90	9.45	21.90	105.95
1958	7.34	6.47	7.81	4.81	9.44	5.96	16.78	10.31	3.59	12.72	3.50	11.51	100.44
1959	10.12	6.88	2.88	10.48	7.23	0.77	3.04	6.87	2.93	3.27	7.24	10.87	72.58
1960	3.67	10.82	11.72	9.20	5.28	2.52	2.91	2.63	5.75	1.57	7.29	3.96	65.30
1961	1.38	12.01	0.77	19.15	2.48	3.48	1.92	1.75	0.86	3.05	8.23	3.02	58.10
1962	3.38	5.23	9.25	0.98	1.12	0.82	1.66	1.96	2.19	1.47	1.24	5.88	35.14
1963	4.66	4.10	5.46	7.77	2.75	3.49	2.87	5.51	4.10	5.03	2.49	59.08	
1964	4.19	7.14	3.96	2.09	10.89	2.58	3.34	5.52	6.02	14.06	8.30	7.27	73.54
1965	7.49	9.81	12.15	5.49	1.60	1.81	3.82	1.56	5.62	3.14	10.12	6.23	63.74
1966	6.40	11.58	9.07	10.56	1.32	4.15	4.41	8.39	5.83	4.77	3.36	9.70	79.54
Total	434.37	441.39	549.29	557.72	370.11	196.38	307.51	355.22	206.11	287.58	477.72	528.04	4711.37
Mean	7.76	7.88	9.81	9.96	6.61	3.51	5.49	6.34	3.68	5.14	8.53	9.43	84.13
Max.	30.46	28.47	53.00	48.63	24.60	14.73	28.04	35.54	14.92	23.90	35.75	212.99	
Min.	0.03	1.23	0.77	0.98	0.06	0.58	0.99	0.85	0.18	0.20	0.51	0.99	35.14

Station No. 200.0 — PUU ALALA

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1915	—	—	—	—	—	—	5.61	1.65	3.58	6.51	7.53	6.65	—
1916	12.99	1.46	8.36	7.59	16.78	5.82	4.71	3.95	2.98	2.18	6.69	28.48	102.99
1917	2.97	6.41	6.42	12.31	4.57	4.47	4.07	1.24	1.90	1.12	4.76	3.53	50.47
1918	5.98	14.27	11.88	19.74	6.85	5.97	6.66	5.60	2.32	3.05	4.02	24.93	111.27
1919	5.78	2.69	6.23	4.55	3.55	1.82	3.33	6.11	0.75	0.29	1.56	6.41	43.27
1920	5.64	2.53	7.93	4.38	0.97	1.20	2.36	3.71	4.05	4.13	4.90	6.47	48.27
1921	9.44	1.17	6.93	4.21	1.16	1.99	5.67	4.06	3.69	2.69	19.24	11.04	71.29
1922	7.78	11.79	13.87	4.47	2.89	1.75	3.63	4.76	8.31	24.52	5.54	2.23	69.64
1923	22.91	2.81	13.26	12.01	2.89	3.65	6.51	7.68	5.50	7.21	4.19	5.91	104.43
1924	3.46	6.08	6.71	9.26	3.00	1.34	5.27	4.67	2.07	14.60	19.94	2.85	81.25
1925	5.31	2.93	13.12	15.48	7.04	6.16	5.36	9.14	5.82	2.72	5.15	2.92	81.15
1926	3.77	7.18	2.16	9.16	7.99	3.30	5.95	7.90	6.53	7.94	9.69	2.89	78.46
1927	12.58	3.57	4.91	14.32	4.99	4.68	10.77	7.65	5.21	4.98	6.97	3.31	91.14
1928	12.12	6.30	11.68	6.58	11.86	7.63	11.42	6.85	5.73	2.27	17.75	10.02	120.37
1929	19.89	18.42	12.65	13.69	7.15	3.98	3.94	5.78	0.72	1.46	17.70	37.93	140.01
1930	10.47	13.69	16.24	23.32	7.19	11.13	10.86	9.75	13.35	5.40	24.07	7.20	152.67
1931	3.28	4.81	11.05	22.73	13.10	3.19	11.24	8.49	7.67	8.80	5.31	21.33	121.00
1932	3.86	22.24	7.00	11.63	7.55	7.49	8.70	5.09	2.83	1.47	6.05	3.74	87.55
1933	5.81	3.24	11.20	5.12	4.02	1.65	9.39	3.41	3.97	2.17	10.15	2.93	63.06
1934	7.62	7.00	4.98	13.35	12.41	3.47	3.30	3.45	3.19	5.74	6.33	1.71	72.45
1935	8.81	8.02	9.71	11.66	6.14	3.80	6.20	3.29	3.39	6.34	4.12	3.79	74.25
1936	9.12	15.51	11.99	16.16	14.23	6.43	4.86	8.28	3.97	10.03	8.42	25.04	134.04
1937	12.98	11.44	11.50	5.24	9.11	5.23	6.03	12.02	4.69	4.30	4.34	4.46	92.34
1938	12.71	3.17	9.24	14.61	9.30	4.11	3.77	4.95	0.65	2.67	1.67	5.31	72.22
1939	11.98	5.24	3.81	12.37	2.25	3.25	9.26	5.86	2.32	4.95	7.74	4.09	71.12
1940	3.96	3.11	5.76	4.81	5.35	3.11	5.32	14.36	3.21	3.20	3.98	3.82	59.39
1941	7.17	3.23	9.55	4.87	14.57	12.92	6.41	7.68	4.84	10.76	5.32	7.53	94.85
1942	3.08	6.98	42.92	13.81	6.09	2.12	3.42	6.84	3.95	3.55	2.55	2.74	101.95
1943	6.09	6.59	9.72	12.04	6.89	3.83	4.22	5.64	3.20	1.01	2.38	2.29	64.10
1944	2.35	6.32	3.73	5.61	4.03	5.39	10.36	3.10	2.63	7.84	2.40	6.45	62.13
1945	2.43	1.42	5.05	6.82	3.53	2.58	2.24	3.52	2.15	3.67	2.58	5.71	41.70
1946	15.55	9.82	3.81	5.92	3.93	3.06	6.80	5.40	3.71	2.29	7.21	23.93	91.03
1947	4.99	4.56	10.09	5.42	9.14	2.39	4.40	4.50	4.80	3.62	3.25	9.41	66.07
1948	16.53	8.61	13.48	7.46	4.91	1.29	6.17	Discontinued					
Total	278.51	235.21	327.84	342.60	225.19	141.10	209.03	196.56	133.63	152.37	245.40	319.25	2715.93
Mean	8.44	7.13	9.93	10.38	6.82	4.28	6.15	5.96	4.05	4.82	7.44	6.77	84.87
Max.	22.91	22.24	42.92	23.32	16.78	12.92	14.12	14.36	13.35	14.60	24.07	33.93	152.67
Min.	2.35	1.17	2.16	4.21	0.97	1.20	0.77	1.24	0.62	0.29	1.56	1.71	41.70

Station No. 206.0 — KUKUHALE MILL

1991	14.51	7.93	9.41	8.78	—	0.96	—	—	5.60	7.27	1.97	5.66	—
1992	10.09	0.83	9.06	0.26	2.77	0.82	2.49	4.70	2.17	2.82	1.47	7.82	45.30
1993	7.60	7.27	7.35	4.19	3.88	2.36	4.01	1.00	0.58	1.02	1.10	3.52	43.88
1994	1.09	7.30	9.07	3.66	1.26	1.65	4.47	6.78	1.14	2.92	15.53	14.38	98.95
1995	2.07	6.45	8.74	19.00	3.33	3.36	3.82	8.68	4.81	4.54	8.70	0.32	73.91
1996	10.35	9.15	9.64	5.86	1.90	7.34	7.97	4.22	1.44	5.51	1.97	7.14	72.49
1997	1.93	2.59	1.74	3.21	1.78	0.71	2.51	7.15	1.69	1.05	7.99	3.24	35.59
1998	12.40	3.87	12.56	6.69	4.93	3.54	5.07	2.36	2.49	2.79	3.08	7.76	67.54
1999	1.16	0.59	12.46	4.74	1.95	3.20	6.39	4.54	2.07	10.29	5.25	0.35	52.90
2000	3.53	7.23	3.82	10.02	8.00	2.90	2.75	3.40	0.55	6.13	6.10	8.52	62.95
2001	5.13	13.53	14.40	2.18	0.40	0.66	0.65	1.52	0.45	2.72	7.74	6.43	55.81
2002	4.22	5.49	42.61	9.36	16.24	6.86	2.22	11.15	5.12	5.49	9.15	17.92	135.83
2003	11.44	3.09	8.70	13.18	0.84	1.35	7.90	3.06	2.99	5.94	13.25	24.40	75.04
2004	12.24	0.00	4.14	22.42	3.28	1.87	10.21	3.30	6.88	1.83	8.99	2.72	86.88
2005	5.50	1.88	10.25	8.35	8.28	4.13	7.24	6.99	12.54	5.16	6.95	5.31	82.58
2006	4.20	1.81	2.84	8.54	6.57	1.69	7.64	9.21	2.82	0.79	7.91	12.54	66.59
2007	2.10	9.96	7.35	6.85	2.80	2.34	6.91	15.70	8.04	7.52	5.08	7.88	78.11
2008	4.98	3.40	5.66	4.97	4.10	3.83	10.75	7.81	9.00	4.26	6.97	16.47	82.20
2009	4.05	9.57	13.54	17.35	4.47	2.29	6.88	1.70	3.26	3.27	3.65	9.25	79.28
2010	6.55	9.58	5.13	6.09	7.02	7.96	6.89	5.25	1.96	6.01	7.31	15.14	87.41
2011	12.13	20.18	6.75	10.06	9.10	7.09	4.43	6.21	9.53	3.24	5.53	5.78	100.05
2012	1.99	3.38	9.46	12.50	3.09	2.62	2.36	—	—	3.21	9.00	3.26	—
2013	1.99	3.61	1.89	4.84	3.58	2.41	2.01	4.12	2.35	0.81	9.29	13.43	50.33
2014	12.39	1.52	12.80	4.99	16.64	7.59	16.42	24.45	8.90	4.96	13.27	7.79	131.72
2015	2.88	7.03	4.63	8.88	6.67	2.68	3.33	0.67	3.31	6.02	6.98	4.57	51.65
2016	12.39	0.40	4.68	9.90	12.14	3.49	2.45	4.39	2.91	2.96	2.79	12.04	70.54
2017	1.62	3.52	1.33	2.67	1.53	0.78	0.67	0.30	0.11	0.43	5.74	1.79	17.49
2018	6.48	15.63	10.63	29.29	13.68	7.40	7.41	5.27	0.88	1.61	8.96	14.22	121.16
2019	3.19	1.07	6.55	3.18	3.51	0.35	1.73	6.91	0.19	0.11	0.53	9.47	34.69
2020	4.35	1.74	12.47	2.47	0.06	0.84	2.07	3.85	3.14	2.47	5.28	4.46	43.20
2021	19.96	0.95	12.85	4.53	0.38	0.73	5.25	3.54	2.41	5.68	27.20	16.71	100.19
2022	11.04	7.83	15.36	3.29	2.42	0.52	0.66	1.50	8.90	1.62	0.62	0.90	63.06
2023	20.93	1.21	12.53	6.61	2.04	3.07	7.30	10.23	4.08	6.81	6.00	16.37	94.68
2024	1.59	8.21	12.53	5.61	2.04	3.07	2.32	4.83	2.20	6.94	7.72	50.39	50.39
2025	7.90	1.21	1.21	—	—	1.07	2.32	4.83	2.20	6.94	7.72	50.39	50.39
2026	1.90	8.21	12.53	5.61	2.04	3.07	2.32	4.83	2.20	6.94	7.72	50.39	50.39

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1901	4.10	10.63	13.78	2.78	0.47	0.41	0.57	0.39	0.47	2.56	10.15	6.86	53.17
1902	3.34	2.59	49.24	7.57	13.45	6.63	1.22	9.59	6.00	4.75	8.96	19.64	132.98
1903	9.07	5.24	9.42	10.20	1.28	0.34	6.20	2.22	2.87	5.62	13.95	2.04	68.45
1904	12.24	8.82	4.47	20.80	4.30	1.56	10.00	2.51	8.08	0.89	8.56	2.88	85.11
1905	5.31	3.21	10.38	8.43	6.95	3.72	5.82	6.53	12.06	4.72	5.53	6.49	79.15
1906	1.54	0.84	2.63	7.82	2.84	1.22	7.08	8.48	1.52	1.04	3.50	18.24	56.75
1907	2.89	8.71	9.17	5.39	1.48	2.32	7.92	17.85	7.22	8.15	4.86	3.20	79.16
1908	3.63	3.80	5.87	4.14	2.05	1.91	6.82	7.23	7.59	3.75	9.87	12.11	68.77
1909	5.54	7.15	13.95	11.88	3.10	1.90	4.76	1.02	2.13	2.24	2.57	6.62	62.86
1910	10.30	6.88	5.73	6.23	7.85	6.12	4.34	5.66	0.98	5.87	14.81	16.01	83.71
1911	9.44	20.11	6.77	7.94	7.74	7.29	2.77	4.74	7.68	2.54	6.95	5.50	89.47
1912	1.39	8.13	8.16	10.47	2.09	1.96	0.95	2.54	3.69	4.30	7.82	3.27	54.77
1913	2.41	4.57	2.33	5.83	4.11	2.55	1.80	4.09	1.76	0.20	13.38	19.47	62.50
1914	13.13	2.91	10.53	8.77	18.66	7.78	19.45	24.26	7.47	4.37	14.98	9.35	141.66
1915	3.51	9.05	4.04	13.44	2.83	5.52	3.39	0.37	3.38	6.06	11.34	6.14	68.94
1916	13.00	0.57	8.16	12.42	17.22	4.38	2.58	4.15	3.36	2.08	3.89	14.37	86.18
1917	3.61	3.92	1.83	1.36	1.08	1.96	0.98	0.15	0.13	0.78	7.98	2.32	26.10
1918	8.35	24.32	13.57	37.63	16.07	8.32	10.07	6.52	0.91	3.20	11.04	17.74	157.74
1919	5.76	1.66	9.43	3.65	3.89	0.25	1.94	4.27	0.36	0.25	1.56	7.51	40.53
1920	3.22	2.15	13.43	3.02	0.05	0.19	1.30	4.03	2.60	3.07	4.08	3.59	40.71
1921	19.00	0.75	12.40	3.79	0.37	0.22	4.61	3.14	1.62	4.70	24.79	14.13	89.52
1922	10.35	8.24	15.54	2.14	1.42	0.43	0.45	1.04	0.90	1.31	8.42	0.22	58.46
1923	13.41	4.66	15.99	4.77	2.18	2.17	3.31	11.77	4.48	6.37	3.77	18.85	91.73
1924	1.43	8.18	4.43	6.58	2.92	0.99	2.06	3.12	1.84	5.60	6.52	0.77	44.44
1925	5.39	1.18	9.44	6.60	3.62	2.52	1.50	7.76	2.15	2.13	3.03	0.46	45.78
1926	1.21	2.66	1.41	8.31	1.53	4.69	2.29	5.01	2.69	5.74	5.23	1.99	42.76
1927	10.62	2.28	2.10	11.43	0.86	1.08	0.99	3.19	3.78	2.33	8.14	7.93	60.73
1928	3.73	3.05	7.88	1.75	4.57	2.00	5.83	2.51	4.29	1.32	6.56	7.79	47.18
1929	12.03	14.98	10.31	8.29	2.75	1.13	2.50	6.27	0.34	0.48	13.65	17.54	90.97
1930	10.53	4.87	8.69	17.88	3.92	6.29	3.17	5.26	5.64	2.16	17.68	2.87	88.24
1931	1.62	2.79	7.08	16.33	8.24	0.91	6.38	3.64	7.17	6.15	3.35	7.28	70.94
1932	5.13	28.14	5.64	8.27	3.31	1.71	2.85	1.19	1.08	0.99	3.59	5.14	66.14
1933	4.72	0.96	6.93	6.15	1.80	0.41	1.26	0.74	2.33	0.50	5.62	2.92	34.34
1934	4.53	4.86	6.89	11.30	11.52	2.53	2.93	1.61	4.56	5.72	4.29	2.77	63.51
1935	4.34	11.29	4.27	7.05	3.93	2.21	2.10	0.94	4.56	4.45	7.93	3.67	56.74
1936	4.06	2.01	10.50	18.01	8.82	5.36	3.30	8.21	2.75	8.59	12.30	21.90	105.81
1937	16.59	18.93	12.51	1.60	7.91	2.44	5.36	7.21	2.68	4.01	6.16	7.77	93.17
1938	6.13	2.34	15.52	13.42	7.89	1.11	1.53	3.58	0.29	4.56	1.68	6.81	39.86
1939	13.21	2.65	4.44	9.76	1.13	1.21	5.60	2.46	1.85	4.07	11.88	3.06	61.30
1940	1.59	5.91	6.91	6.13	5.03	1.68	3.51	17.85	2.29	5.21	9.09	7.77	70.97
1941	10.08	5.42	5.98	4.86	8.56	11.66	4.44	6.45	5.79	16.73	7.44	8.10	95.51
1942	2.14	7.24	43.15	14.52	4.32	2.24	2.72	4.98	1.83	3.88	1.83	3.10	91.95
1943	2.46	7.90	9.99	10.39	2.98	1.98	6.01	4.28	2.52	0.17	2.17	5.38	56.21
1944	1.01	6.97	3.31	6.17	3.11	1.10	3.91	5.13	1.31	7.68	2.48	3.83	46.01
1945	0.25	4.00	13.40	4.87	1.32	2.42	1.01	3.74	1.21	5.80	3.42	11.50	52.94
1946	12.97	2.61	8.84	5.27	2.82	0.45	3.33	1.26	2.21	2.49	8.04	19.09	69.38
1947	2.82	5.01	7.13	5.11	8.08	1.13	1.82	3.12	1.82	2.88	2.64	11.20	52.76
1948	10.99	5.39	15.62	6.81	3.77	0.13	4.12	0.36	2.81	10.48	9.66	11.25	81.39
1949	2.36	1.12	5.52	3.45	2.11	0.50	3.04	1.71	1.44	2.79	10.32	4.43	38.78
1950	2.52	1.07	8.65	13.69	1.84	0.39	5.23	2.51	1.03	1.61	10.03	23.93	73.50
1951	2.39	8.93	4.42	2.73	0.61	1.28	5.99	4.41	2.80	3.35	7.89	4.31	49.11
1952	6.21	4.85	10.69	5.20	7.69	1.39	4.43	2.48	1.34	14.29	6.14	3.49	88.20
1953	0.25	4.85	5.38	3.76	4.53	0.67	2.28	3.34	0.33	1.88	6.37	5.37	39.01
1954	2.12	0.87	6.03	3.42	10.99	1.82	5.23	7.71	1.16	1.80	0.09	22.34	63.56
1955	5.11	12.60	6.73	3.68	3.15	1.35	1.45	2.13	1.32	1.53	2.41	0.78	42.24
1956	4.05	13.51	3.10	7.57	3.52	4.55	1.52	10.50	0.31	6.14	1.72	2.79	59.28
1957	3.74	4.06	2.81	8.95	2.34	0.38	2.83	14.83	1.32	17.42	5.32	16.52	80.52
1958	5.89	6.81	7.86	2.69	4.60	3.07	9.35	8.58	1.59	11.61	8.40	12.19	92.64
1959	8.33	9.51	2.25	8.76	5.90	0.06	2.27	3.96	1.62	2.27	5.11	10.95	60.99
1960	4.09	15.10	10.27	11.15	5.63	1.97	1.94	2.01	4.20	0.58	7.28	4.30	67.12
1961	1.53	13.04	0.62	24.92	1.36	1.85	1.90	1.23	1.16	6.99	8.70	4.15	67.45
1962	2.26	4.45	6.18	0.54	0.93	0.37	1.10	0.99	1.40	1.03	1.59	3.25	24.09
1963	5.89	3.26	3.48	6.88	13.70	1.76	3.83	1.93	6.59	2.44	4.56	2.44	56.74
1964	4.26	8.51	6.34	2.97	11.44	1.58	2.51	3.90	4.77	9.99	8.94	4.56	89.77
1965	8.70	5.84	10.07	11.28	1.35	2.05	1.68	1.19	0.45	4.50	9.73	5.42	62.24
1966	5.74	10.24	5.00	10.14	1.04	3.08	3.65	4.77	4.46	3.84	2.10	10.38	64.44
Total	470.57	507.59	669.25	596.75	353.29	185.40	303.22	377.23	220.69	331.79	526.42	606.26	5087.63
Mean	6.11	8.59	8.69	7.85	4.59	2.41	3.94	4.90	2.87	4.31	6.86	7.87	66.94
Max.	19.00	28.14	49.24	37.63	18.66	11.52	19.45	24.26	12.06	16.73	24.79	23.93	157.74
Min.	0.25	0.57	0.62	0.15	0.05	0.06	0.45	0.15	0.13	0.09	0.09	0.22	24.09

Station No. 215.0 — HONOKAA TOWN

1919	6.65	2.38	10.91	5.24	4.84	0.09	2.00	4.43	0.19	0.25	0.82	9.68	47.48
1920	6.14	2.06	14.13	4.30	0.05	0.50	2.02	4.70	4.24	3.35	5.84	5.03	52.36
1921	30.93	0.68	13.69	6.29	0.99	0.39	8.30	4.59	1.84	6.30	33.82	16.18	124.00
1922	11.86	12.12	22.72	3.55	2.43	0.86	1.14	3.29	11.03	1.30	11.11	0.61	82.02
1923	17.22	6.83	16.91	10.97	3.10	3.32	5.36	15.95	4.20	8.77	6.63	24.07	123.33
1924	1.96	10.56	5.00	9.27	4.13	0.76	3.31	3.88	1.75	8.58	17.74	1.15	68.07
1925	7.70	1.68	13.40	12.63	4.87	4.38	3.25	11.43	5.14	2.09	4.35	2.52	73.44
1926	3.04	7.70	2.71	10.36	2.09	4.19	2.38	7.74	4.71	6.30	7.96	3.12	62.30
1927	20.81	2.95	3.29	16.15	1.33	1.82	9.80	6.04	4.83	2.40	9.89	8.32	87.63
1928	8.71	5.78	6.38	3.10	8.26	3.47	7.90	4.16	6.37	1.78	9.73	12.57	78.21
1929	15.03	19.03	13.27	10.55	4.61	1.74	2.35	5.93	0.08	0.56	23.32	29.20	125.67
1930	8.40	9.72	13.56	24.21	7.78	10.06	6.29	9.48	11.70	2.63	28.75	5.39	137.97
1931	2.85	4.26	7.00	22.53	11.58	1.65	9.18	6.56	8.38	7.52	5.18	12.60	99.29
1932	5.57	40.20	8.02	11.51	4.71	2.37	4.96	2.35	1.58	0.13	4.14	5.91	91.45
1933	5.81	1.41	12.61	7.57	3.06	0.91	2.90	1.44	2.76	0.63	9.18	1.56	49.84
1934	12.43	4.98	10.34	16.05	16.11	2.51	7.60	1.64	5.04	6.85	7.03	3.67	94.25
1935	6.26	15.15	7.34	16.32	5.68	3.00	4.14	1.85	6.83	4.88	10.51	6.34	88.30
1936	5.95	3.08	15.75	28.71	17.91	8.75	4.24	10.73	3.91	14.04	13.91	38.42	165.40
1937	23.83	32.23	19.10	3.19	10.33	6.35	10.54	8.47	3.10	6.09	12.67	8.80	144.70
1938	13.28	3.40	12.41	17.34	16.09	3.17	2.13	5.37	0.15	6.01	2.48	10.14	91.97
1939	15.52	3.79	5.30	12.45	1.89	1.61	9.49	4.14	2.23	5.98	13.09	4.61	80.20
1940	2.10	6.43	8.03	4.78	5.21	0.90	5.59	21.29	1.99	6.70	8.15	8.12	79.29
1941	14.00	8.44	9.49	6.75	12.44	17.18	5.88	9.44	7.64	20.58	10.98	10.50	133.62
1942	3.53	10.32	78.43	20.46	5.42	2.15	3.80	5.87	3.17	4.16	2.52	3.26	143.09
1943	2.18	12.25	12.23	13.53	3.55	2.57	6.69	4.99	2.79	0.34	3.27	5.72	70.21
1944	2.13	5.07	4.44	9.23	3.28	0.96	4.73	5.74	2.17	14.31	3.97	4.82	59.95
1945	0.57	4.36	15.05	7.81	3.99	2.47	1.32	4.49	1.44	7.21	4.64	15.93	69.13
1946	14.31	3.89	9.93	6.29	5.26	0.67	5.99	0.91	2.85	2.10	9.41	21.73	83.54
1947	3.68	6.50	9.88	7.45	10.65	1.36	1.62	3.59	1.88	3.80	2.06	11.40	66.57
1948	15.99	6.37	17.37	10.10	4.84	0.33	4.66	0.04	4.28	11.76	17.08	11.43	98.35
1949	3.41	1.46	7.51	5.16	2.67	0.68	4.68	1.77	2.10	3.58	14.33	4.67	52.02
1950	3.77	1.32	14.30	15.75	2.57	0.88	7.92	3.60	1.28	2.41	12.88	29.32	96.00

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
Station No. 217.0 — PAAUHAU													
1880	10.13	11.73	12.25	4.63	5.20	11.75	20.62	11.32	2.31	9.27	12.29	14.06	127.54
1891	14.46	5.38	9.57	7.28	2.41	0.70	3.80	11.14	2.36	6.22	2.02	5.96	73.84
1892	9.32	1.35	6.74	0.10	2.21	0.53	1.65	3.00	1.63	2.23	1.01	6.32	36.09
1893	6.85	6.23	6.99	5.31	2.13	1.67	2.35	0.71	0.32	1.02	0.84	2.59	37.01
1894	0.81	8.67	10.96	2.05	0.25	0.33	3.14	2.96	0.26	1.63	8.29	15.12	54.47
1895	3.06	2.00	8.28	14.88	1.85	1.20	2.65	5.55	3.85	3.67	0.04	0.30	59.53
1896	8.17	10.57	8.62	3.44	7.97	4.44	4.68	5.08	0.87	3.20	1.68	3.95	64.87
1897	2.58	4.38	1.12	2.58	1.44	0.32	1.68	5.27	0.76	0.72	0.62	3.81	30.68
1898	18.31	2.90	12.23	4.46	3.52	2.73	3.93	1.77	1.43	2.56	3.03	4.01	60.88
1899	0.49	0.90	14.38	3.82	2.17	2.18	3.55	3.38	0.72	11.45	3.36	0.06	46.76
1900	3.14	9.29	2.02	6.01	6.72	1.86	1.32	2.64	0.70	5.01	7.38	3.71	49.80
1901	5.48	9.89	12.05	3.62	0.76	0.10	0.44	0.08	0.34	2.73	10.39	6.70	52.58
1902	2.49	2.84	48.45	6.36	11.90	6.22	1.49	8.20	5.30	4.62	8.79	19.00	126.75
1903	8.42	5.04	9.05	8.87	0.85	0.25	3.34	1.83	1.83	4.93	12.24	1.72	60.37
1904	10.68	7.85	2.07	20.37	3.35	1.36	8.33	2.44	5.08	0.79	5.50	2.61	71.43
1905	5.10	2.34	7.52	7.36	5.00	3.10	5.07	6.48	11.19	3.97	5.81	6.38	69.32
1906	0.96	0.85	2.02	7.60	2.94	1.39	7.03	9.10	1.47	1.09	6.02	15.31	55.78
1907	3.02	9.62	9.45	6.79	1.87	2.40	8.84	18.42	7.68	4.43	3.76	1.75	80.03
1908	3.13	4.52	6.71	3.91	1.82	1.64	5.67	6.04	5.19	3.12	8.63	9.90	60.28
1909	4.16	7.62	15.43	14.33	3.67	2.14	4.17	0.90	1.90	1.87	2.61	7.00	65.80
1910	10.24	5.91	5.04	6.38	7.11	6.97	2.79	5.20	0.68	5.47	7.57	15.25	79.61
1911	10.58	18.53	7.49	4.88	7.67	6.45	3.93	4.87	7.60	2.39	6.83	4.91	88.32
1912	1.30	8.22	7.68	6.68	1.99	1.46	0.69	2.10	3.33	4.09	6.80	3.70	51.04
1913	2.06	2.93	1.80	6.22	2.92	2.92	1.43	3.60	3.23	1.77	12.96	15.51	55.75
1914	12.71	3.28	12.21	7.26	24.20	6.54	19.62	25.90	9.05	3.99	16.39	9.23	150.38
1915	2.98	8.27	2.91	11.62	2.45	4.98	2.64	0.33	3.29	5.16	11.40	4.49	61.72
1916	12.10	0.84	6.68	6.58	11.00	3.56	2.18	3.19	1.85	1.35	3.51	11.56	64.40
1917	2.99	3.28	2.10	1.12	4.99	1.58	0.93	0.06	0.09	0.71	8.17	3.70	25.22
1918	6.84	22.61	12.91	31.19	17.48	6.85	7.89	5.13	0.69	2.34	6.77	15.15	135.85
1919	5.28	11.5	7.64	3.04	2.97	0.70	1.18	3.01	0.23	0.29	0.70	5.85	31.41
1920	3.44	1.60	13.21	2.56	0.00	0.26	1.25	3.40	2.57	3.21	3.72	3.83	39.05
1921	15.94	0.73	6.81	4.75	0.56	0.19	4.52	3.10	1.37	4.99	21.51	14.02	78.49
1922	10.59	6.82	16.09	1.99	1.46	0.37	0.66	1.59	8.38	1.11	8.00	0.17	57.23
1923	14.14	5.01	12.85	7.07	2.99	1.89	3.67	10.53	3.54	3.88	3.63	17.75	91.45
1924	1.80	8.41	3.34	9.30	3.44	1.07	2.10	2.97	1.99	5.66	6.92	1.10	48.10
1925	6.35	1.01	11.41	8.20	4.17	3.02	2.31	8.81	2.93	0.66	0.40	0.57	54.38
1926	2.13	3.09	2.95	6.04	1.75	4.26	2.13	5.59	2.86	5.26	6.22	1.82	44.10
1927	12.44	2.89	3.04	11.77	1.15	1.34	7.56	3.57	3.81	1.63	8.89	7.27	65.36
1928	5.23	3.58	4.88	2.04	4.94	2.90	6.87	5.50	5.15	1.26	5.93	8.75	55.03
1929	13.85	17.33	12.60	8.65	4.00	1.58	2.37	5.18	0.51	0.77	13.29	20.61	100.74
1930	12.44	5.49	9.78	18.97	4.80	7.78	4.02	7.24	6.39	2.71	20.43	3.06	103.11
1931	1.91	3.18	5.58	16.71	10.37	1.05	6.61	4.29	0.87	6.51	4.05	7.77	76.11
1932	6.34	27.00	5.83	8.54	3.45	2.15	3.06	1.25	0.95	0.06	3.86	7.27	69.76
1933	5.69	2.00	7.07	6.09	2.26	0.61	1.41	0.85	2.26	0.49	8.00	0.96	37.97
1934	7.29	3.16	7.38	11.51	13.16	1.80	4.02	0.76	4.82	6.73	3.78	2.97	67.38
1935	3.82	11.80	3.70	8.39	4.56	2.46	2.01	1.16	4.17	4.41	9.18	3.77	59.43
1936	4.31	1.90	11.50	17.96	9.07	5.40	4.30	9.78	2.49	8.67	9.02	20.96	105.36
1937	14.81	17.90	14.16	2.04	7.50	2.26	5.85	8.35	2.81	3.97	6.72	8.13	94.50
1938	7.40	1.79	11.83	16.52	9.22	1.26	1.44	2.85	0.11	3.38	2.21	7.09	65.10
1939	14.51	3.73	5.22	12.49	1.39	1.42	5.34	2.67	1.59	3.57	10.57	3.40	65.90
1940	1.95	6.82	6.07	5.09	5.36	1.71	3.44	14.72	1.69	6.46	8.89	8.43	69.93
1941	8.41	4.41	5.97	4.09	8.64	9.77	3.88	5.85	5.78	16.89	6.96	7.97	88.62
1942	2.27	8.54	44.90	15.46	4.10	1.66	3.88	4.86	1.24	4.05	1.94	3.00	95.90
1943	2.22	7.83	10.42	11.22	2.46	1.98	5.12	4.73	2.55	0.14	1.97	5.29	55.93
1944	1.14	5.67	3.44	6.56	2.85	0.88	2.92	3.14	1.22	7.65	2.34	4.50	42.31
1945	0.70	4.77	11.68	4.16	2.12	2.08	0.99	3.11	0.99	6.50	3.25	6.73	46.97
1946	8.71	1.96	8.03	5.69	2.79	0.31	3.33	0.57	2.02	1.98	7.22	17.60	60.21
1947	3.36	5.27	8.10	3.58	7.64	1.13	1.85	2.88	1.08	3.23	2.10	11.08	53.08
1948	12.07	6.11	17.09	6.50	3.94	0.10	3.48	0.90	4.89	9.28	10.96	10.54	84.86
1949	2.55	1.04	6.34	3.29	2.05	0.29	3.06	1.60	2.00	2.82	10.58	3.41	39.03
1950	2.21	1.36	6.73	14.69	1.59	0.72	4.73	2.16	0.76	2.45	11.68	21.92	71.00
1951	5.24	8.08	5.59	2.87	0.38	0.74	6.59	3.85	2.31	3.76	6.36	5.29	51.06
1952	6.44	3.29	8.89	4.28	7.28	1.35	3.43	1.86	1.48	14.30	4.96	2.63	60.19
1953	0.33	5.89	4.64	3.59	3.35	0.37	1.93	2.25	0.27	1.57	5.34	4.28	33.81
1954	2.88	1.42	5.89	4.46	10.01	1.36	4.48	6.67	1.21	1.53	0.29	26.33	66.53
1955	4.74	16.30	7.75	3.28	3.71	1.70	1.69	2.42	2.05	2.15	0.35	1.18	50.92
1956	4.07	13.20	3.92	7.75	3.94	4.91	1.52	10.33	0.30	6.51	1.97	2.65	61.07
1957	3.83	5.80	4.25	9.39	2.75	1.00	4.87	17.60	1.67	12.70	6.74	10.44	87.04
1958	7.41	8.37	7.85	4.64	7.44	2.85	10.81	8.89	3.54	12.01	9.01	12.07	94.89
1959	8.41	10.16	3.89	8.93	6.25	0.10	2.36	4.10	1.62	2.46	6.21	10.01	64.50
1960	4.13	15.80	10.18	10.67	6.35	1.99	1.72	2.40	4.69	0.45	7.01	5.21	70.60
1961	4.19	10.66	0.49	26.81	1.50	1.59	2.05	0.90	1.26	7.09	10.07	3.29	69.90
1962	1.75	4.25	7.68	0.66	1.27	0.48	1.17	0.62	1.50	0.98	1.85	2.83	25.31
1963	4.93	3.68	3.27	6.67	11.93	1.63	3.72	1.62	5.78	2.64	4.30	3.05	53.48
1964	4.24	9.20	6.29	2.84	10.85	1.50	2.44	3.68	4.75	9.07	8.73	4.74	66.33
1965	8.64	5.68	9.75	7.90	1.68	1.78	1.09	1.11	0.43	5.44	7.69	6.46	57.63
1966	6.11	9.69	6.50	7.73	0.96	2.64	3.61	4.17	4.94	4.50	2.37	10.11	63.23
Total	475.20	506.13	667.43	600.71	359.74	176.94	300.89	365.72	215.92	325.03	514.68	578.92	5089.31
Mean	6.17	6.57	8.67	7.80	4.67	2.30	3.61	4.75	2.80	4.22	6.68	7.52	66.09
Max.	18.31	27.00	48.45	26.81	24.20	11.75	20.60	25.90	11.19	10.89	21.51	26.33	150.38
Min.	0.93	0.73	0.49	0.10	0.00	0.07	0.44	0.08	0.00	0.06	0.29	0.06	25.22

Station No. 221.0 — PAAULO (OFFICE)

1903	11.42	6.55	9.31	13.32	0.95	0.27	9.37	2.64	1.89	6.64	10.71	2.27	75.34
1904	13.68	10.28	9.98	31.26	4.49	1.41	14.58	3.76	5.05	1.10	8.24	2.58	99.41
1905	7.52	2.60	10.68	7.23	5.24	4.00	5.30	9.16	12.55	5.79	9.59	8.56	88.22
1906	0.76	1.43	3.11	10.65	4.59	2.40	8.38	10.42	2.37	1.46	6.21	17.34	69.12
1907	2.90	9.53	13.25	8.89	3.02	3.92	9.35	26.07	14.15	7.07	3.94	4.40	106.13
1908	4.70	1.38	2.78	8.60	4.41	2.02	7.21	7.13	6.58	6.58	9.75	12.89	78.52
1909	5.93	7.54	23.51	18.79	4.10	2.93	5.12	1.17	1.96	2.39	2.81	8.03	84.19
1910	14.60	6.07	9.18	7.81	9.80	9.43	4.85	9.38	1.90	5.91	10.68	17.14	106.93
1911	10.06	23.04	8.65	11.22	8.80	6.83	4.46	6.25	9.64	2.65	8.72	7.46	109.91
1912	2.28	4.58	10.56	13.93	3.10	1.50	1.17	2.35	8.07	10.10	7.32	76.19	75.58
1913	4.88	4.58	3.87	0.91	4.70	2.56	2.56	2.91	0.71	16.01	51.65	7.34	73.53
1914	16.18	2.44	3.21	28.14	11.35	26.60	33.10	14.04	6.52	16.39	8.69	68.17	181.74
1915	4.01	7.50	3.22	10.59	2.86	5.16	5.67	0.27	4.61	7.40	17.18	7.39	75.58
1916	9.13	1.22	6.27	13.88	21.02	4.33	4.65	3.58	2.60	3.14	5.04	19.15	95.82
1917	4.77	3.19	3.36	2.28	2.75	3.07	1.80	0.21	1.01	2.03	13.30	5.24	43.83
1918	7.22	24.93	14.31	43.69	20.78	8.87	13.53	8.53	1.50	3.35	12.32	24.49	181.31
1919	5.27	2.82	9.87	3.77	2.59	0.20	1.18	2.46	1.30	0.93	0.50	7.94	38.84
1920	5.61	18.00	17.04	4.06	0.03	0.38	0.21	3.79	3.49	4.00	5.33	5.60	51.11
1921	26.37	1.22	9.55	6.11	1.30	0.40	5.96	4.00	2.67	6.78	23.93	15.97	104.34
1922	14.90	9.45	22.72	4.14	2.73	1.19	1.26	3.32	7.89	1.72	10.76	0.14	80.43
1923	21.71	5.75	16.71	8.15	3.95	2.64	4.40	15.11	6.43	3.72	3.41	23.32	120.53
1924	1.89	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
1925	8.25	1.87	5.44	14.00	1.90	0.55	3.96	3.68	2.05	0.83	0.58	0.58	59.23

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1956	6.43	25.29	7.06	13.05	9.50	8.21	3.76	25.00	0.80	10.80	4.48	7.55	121.93
1957	4.23	6.94	6.73	17.38	5.63	1.62	6.16	29.73	2.59	18.41	7.80	28.59	135.81
1958	6.67	14.78	11.03	5.66	11.68	5.25	15.64	17.52	5.66	18.81	10.08	13.17	135.95
1959	8.63	18.53	4.12	17.22	9.87	0.15	4.20	8.60	2.42	1.07	13.58	14.11	102.70
1960	10.51	22.55	15.85	22.65	8.29	3.57	4.40	3.91	8.30	1.46	15.09	6.71	123.29
1961	4.48	19.54	1.53	25.70	4.13	2.15	4.01	1.44	2.17	11.12	17.64	9.73	103.64
1962	1.99	6.50	9.26	1.53	2.30	0.64	1.01	1.98	2.94	1.10	3.50	5.02	37.77
1963	8.35	3.80	6.36	16.75	20.93	2.66	8.59	3.32	7.53	3.12	8.43	3.62	98.46
1964	7.48	17.12	8.14	7.29	20.65	2.66	3.73	4.89	6.95	14.60	15.10	6.20	114.81
1965	11.73	7.93	12.43	6.05	2.78	2.65	1.79	1.15	0.21	6.27	11.55	12.24	78.78
1966	8.08	11.25	10.62	13.97	2.47	5.88	6.33	9.76	6.36	9.50	4.67	16.50	105.39
Total	622.19	719.92	953.62	938.88	563.69	269.17	457.82	565.17	324.37	477.67	740.82	826.99	7462.92
Mean	8.64	10.00	13.24	13.04	7.83	4.74	6.36	7.85	4.51	6.63	10.29	11.49	103.65
Max.	32.62	41.10	74.79	47.19	34.52	15.82	32.37	39.27	15.02	24.28	32.29	42.30	222.44
Min.	0.33	0.52	0.39	1.46	0.00	0.15	0.67	0.28	0.21	0.28	0.32	0.06	37.77

Station No. 222.6 — SUGAHARA CAMP

1892	—	—	—	—	—	—	—	—	—	—	—	—	5.24	—
1893	6.38	5.12	9.33	10.89	3.32	2.08	2.85	1.57	1.36	1.69	2.21	2.64	49.44	—
1894	1.62	12.56	16.52	4.41	0.89	2.24	4.57	4.37	0.66	3.41	17.73	16.17	85.15	—
1895	5.73	7.88	10.28	20.01	2.72	1.81	4.75	7.13	6.52	4.99	10.70	1.26	83.78	—
1896	10.42	16.25	12.15	12.36	6.80	7.17	4.37	7.11	1.91	4.91	1.01	5.32	89.83	—
1897	2.68	6.02	3.25	3.71	2.24	0.78	3.16	7.19	0.65	1.87	6.65	5.18	43.38	—
1898	28.20	4.72	20.59	4.96	3.96	3.88	6.44	2.99	2.03	4.98	3.99	4.42	91.16	—
1899	0.27	1.23	1.84	6.88	3.98	2.35	4.28	6.59	1.99	14.25	5.32	—	—	—
1900	4.62	10.31	4.87	7.53	9.53	2.08	2.01	4.29	1.21	8.05	13.75	3.97	72.84	—
1901	3.94	8.08	18.12	2.88	0.29	0.33	0.70	0.27	0.38	4.00	13.35	9.79	63.03	—
1902	3.29	3.52	62.76	8.23	17.51	5.99	2.69	14.66	8.34	6.95	13.45	24.99	172.38	—
1903	12.96	8.13	11.60	21.72	1.40	0.55	12.73	4.78	2.43	6.73	11.61	2.67	97.29	—
1904	15.03	9.86	2.97	33.10	5.70	1.94	15.52	5.35	5.62	1.22	8.71	3.14	108.16	—
1905	7.20	3.59	11.67	7.57	5.97	4.32	6.24	10.30	14.25	8.62	12.61	8.54	100.88	—
1906	0.23	1.64	3.61	11.81	4.72	2.81	8.11	11.30	2.38	1.81	6.90	15.60	70.72	—
1907	2.81	10.34	13.60	9.81	2.34	4.40	9.26	24.52	13.40	7.19	4.11	2.74	104.52	—
1908	3.05	7.25	2.12	8.23	3.67	2.96	7.58	7.86	7.61	5.84	8.56	16.74	81.47	—
1909	6.10	7.04	24.54	16.09	3.77	2.94	4.17	0.90	1.85	2.75	2.47	6.53	79.15	—
1910	14.34	5.16	6.89	4.91	9.34	7.33	4.45	4.80	9.67	17.98	9.87	17.98	94.13	—
1911	12.15	22.72	8.48	13.00	8.64	8.14	4.70	6.27	2.78	6.99	8.43	114.57	—	—
1912	1.51	10.41	10.64	12.94	3.64	2.52	1.85	2.89	5.32	8.19	7.73	8.50	76.96	—
1913	6.11	4.28	4.00	7.77	5.35	4.35	1.64	3.85	2.30	0.63	22.52	15.35	78.15	—
1914	13.22	1.93	10.00	7.73	25.92	11.30	25.87	31.34	17.54	6.12	17.60	9.55	178.12	—
1915	4.67	6.91	4.49	12.63	2.57	5.12	4.58	0.53	4.50	7.35	16.79	7.74	78.78	—
1916	8.86	1.25	6.87	11.79	18.49	4.97	5.92	4.17	2.98	2.06	5.98	19.50	92.84	—
1917	4.94	4.76	5.26	2.72	1.73	2.74	1.62	—	0.30	2.06	15.05	5.99	—	—
1918	9.46	25.81	14.68	54.21	26.39	17.05	18.06	9.31	1.74	3.68	24.37	40.16	238.62	—
1919	16.09	5.48	11.27	5.59	3.18	2.03	1.88	3.19	3.01	2.54	0.42	8.59	63.07	—
1920	1.12	3.74	18.87	5.35	0.05	0.45	2.16	0.57	4.51	4.80	6.17	6.58	57.37	—
1921	31.48	1.80	11.23	4.29	0.66	0.43	6.89	4.13	3.84	8.03	28.57	17.13	118.48	—
1922	14.98	6.85	22.15	5.25	1.99	1.89	1.79	7.08	1.57	11.42	0.35	57.93	—	—
1923	18.52	7.60	12.38	4.64	3.33	3.77	3.25	11.52	6.63	5.23	4.27	19.12	100.26	—
1924	1.20	6.54	4.71	13.46	2.00	0.15	2.92	5.75	1.11	13.04	6.46	1.08	58.42	—
1925	6.90	0.87	9.48	8.41	2.39	2.46	1.95	7.49	2.22	0.41	4.71	0.17	47.46	—
1926	1.20	3.45	0.12	8.40	1.16	4.01	1.17	4.97	1.65	3.24	9.13	1.26	39.76	—
1927	10.87	3.15	4.42	10.55	0.83	0.84	8.09	3.00	1.09	0.80	4.75	8.10	56.49	—
1928	0.78	2.22	4.00	2.20	4.40	4.06	3.95	2.60	3.93	2.41	3.37	8.67	42.59	—
1929	10.51	15.09	12.60	9.14	1.46	1.94	3.31	5.26	0.70	2.18	15.53	19.26	96.98	—
1930	10.84	7.80	11.89	18.71	4.61	8.64	3.62	13.89	5.81	1.51	12.33	3.29	102.94	—
1931	2.51	4.22	2.91	20.06	13.28	1.30	8.83	3.99	6.77	6.22	7.78	6.23	84.10	—
1932	7.75	30.67	6.07	8.55	4.55	2.46	5.22	1.79	1.06	0.53	4.47	7.61	80.73	—
1933	17.71	5.16	8.46	5.58	4.31	1.35	1.74	1.51	3.86	0.71	4.75	3.86	59.00	—
1934	5.63	4.37	8.47	18.98	12.56	2.36	3.63	2.22	6.60	7.22	6.82	4.65	83.51	—
1935	6.66	22.22	5.34	10.39	4.34	3.45	4.21	1.84	6.77	6.46	12.24	4.15	88.07	—
1936	4.23	1.51	14.89	18.04	12.16	4.82	8.19	14.05	3.02	9.56	13.46	27.85	131.78	—
1937	18.53	23.48	18.30	3.93	8.55	4.24	10.57	11.42	2.67	9.56	8.58	8.23	128.06	—
1938	12.90	3.02	22.39	18.53	11.81	3.78	2.08	2.08	0.77	5.17	4.48	9.14	98.33	—
1939	19.33	9.47	9.48	19.37	2.31	3.07	7.97	4.82	3.03	5.26	13.91	2.94	100.96	—
1940	2.06	6.94	8.35	4.23	5.50	1.63	5.15	18.80	3.35	7.53	10.34	10.20	84.06	—
1941	9.45	7.52	8.16	6.20	10.94	10.16	4.20	8.77	8.92	23.37	8.46	11.27	117.43	—
1942	Discontinued	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	424.04	389.94	553.69	547.54	297.18	170.32	271.45	325.83	207.44	257.88	475.25	457.87	4185.98	—
Mean	10.87	10.00	14.20	14.04	7.62	4.37	6.96	8.57	5.32	6.61	12.19	11.74	113.13	—
Max.	31.48	30.67	62.78	54.21	26.39	11.30	25.87	31.34	17.54	23.37	28.57	40.16	238.62	—
Min.	0.23	0.87	0.12	2.20	0.05	0.15	0.70	0.27	0.30	0.41	0.42	0.17	39.76	—

Station No. 223.0 — OOKALA

1891	25.87	3.73	13.71	10.93	4.16	3.06	9.99	9.03	8.07	26.78	14.36	33.94	163.63	—
1892	18.01	—	—	—	—	1.12	2.43	4.22	6.59	5.20	5.70	9.16	5.58	—
1893	8.13	6.25	13.74	14.96	5.07	4.42	5.62	2.50	3.09	3.39	1.93	2.60	71.70	—
1894	3.56	11.73	12.16	6.93	1.31	2.91	4.51	4.64	0.60	4.58	19.18	24.71	97.42	—
1895	5.76	5.91	12.85	24.93	4.46	4.14	5.78	9.72	9.58	5.86	11.44	2.14	102.57	—
1896	7.91	7.78	—	11.02	7.23	—	5.32	6.14	4.81	6.07	1.79	7.28	—	—
1897	4.29	8.61	5.90	5.48	2.03	—	4.33	9.42	2.55	2.04	9.39	6.72	—	—
1898	32.65	6.52	28.43	6.33	—	—	11.71	5.27	3.99	5.63	7.32	4.39	—	—
1899	0.49	3.61	22.87	8.26	5.54	10.31	11.47	4.32	20.22	8.87	—	—	—	—
1900	4.97	9.17	5.48	7.92	12.99	3.46	3.62	7.46	2.13	9.62	14.87	2.73	84.42	—
1901	4.72	6.99	17.53	4.13	0.55	0.57	1.45	1.34	0.59	5.94	29.47	—	—	—
1902	4.41	9.29	94.35	7.57	23.62	4.17	4.48	20.11	9.38	10.14	15.61	23.48	226.61	—
1903	11.34	10.98	8.37	23.57	2.24	0.33	10.60	5.55	6.75	9.85	13.15	2.80	105.53	—
1904	19.05	10.30	8.60	25.75	6.55	3.35	16.75	6.15	5.40	1.45	9.58	2.84	115.77	—
1905	6.50	4.02	15.11	8.59	7.87	6.36	9.84	15.47	—	16.12	16.24	9.22	—	—
1906	1.67	2.00	5.93	14.06	8.27	4.47	9.53	13.79	3.61	3.14	8.05	16.15	90.67	—
1907	2.98	11.95	15.94	15.41	3.69	9.44	11.23	30.38	20.35	8.66	7.57	3.73	139.53	—</

Temperature

TEMPERATURE STATIONS AND RECORDS

Like rainfall records, temperature records on the island of Hawaii have been kept for many years by the U.S. Weather Bureau, other government agencies, private companies, and individuals. Temperature stations on the island are not as numerous as rainfall stations, however, nor are the periods of record as long-term.

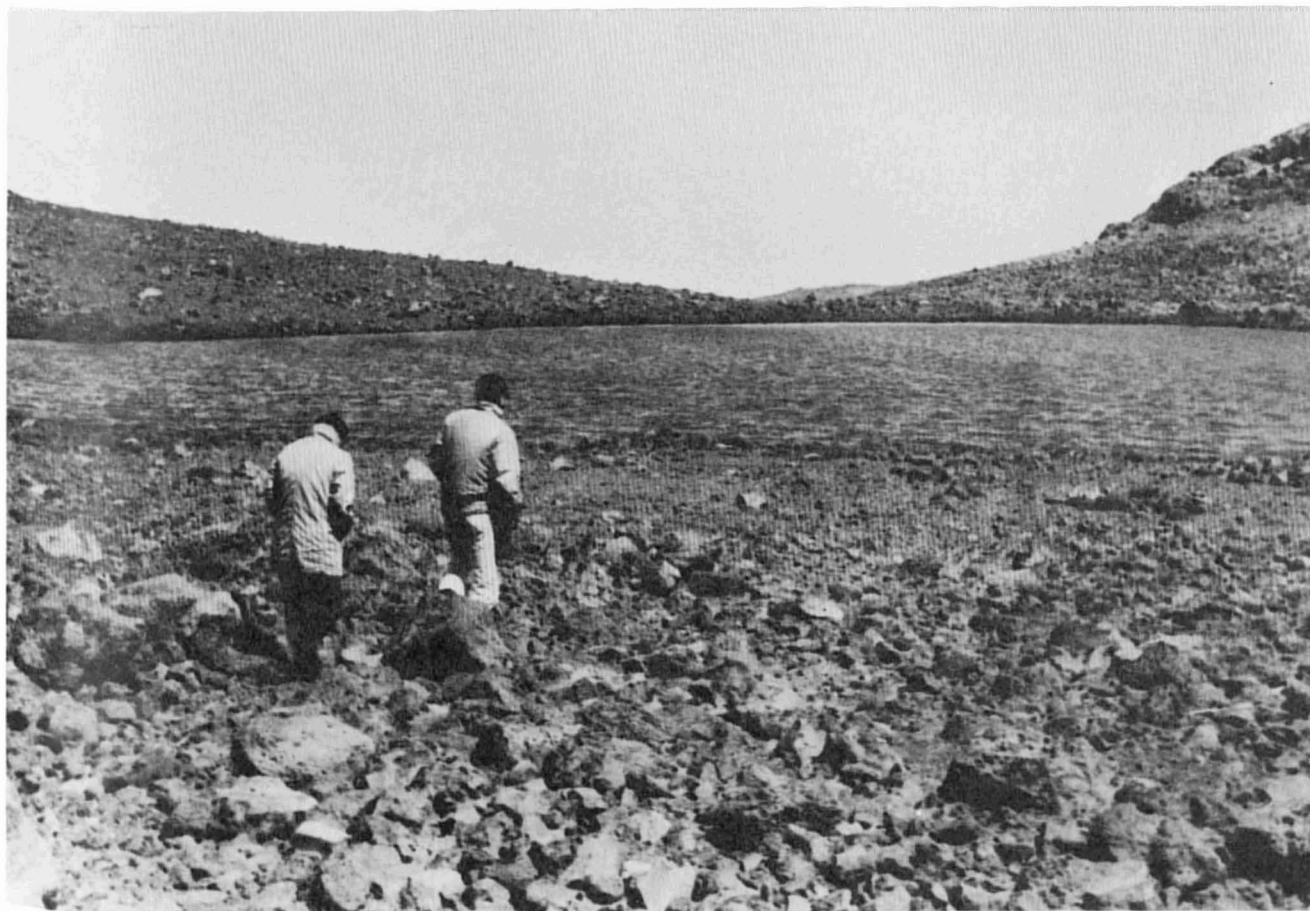
The earliest temperature records were begun in 1893 at several stations: Kealakekua-Davis (No. 29.1), Volcano House (No. 51.4), Holualoa-1450 (No. 68.5), Laaloa (No. 69.11), Pepeekeo Makai (No. 144), and Kohala Mission (No. 175.1). Of the foregoing pioneer stations, all except the Kohala Mission station have been discontinued.

Presently there are 121 active temperature

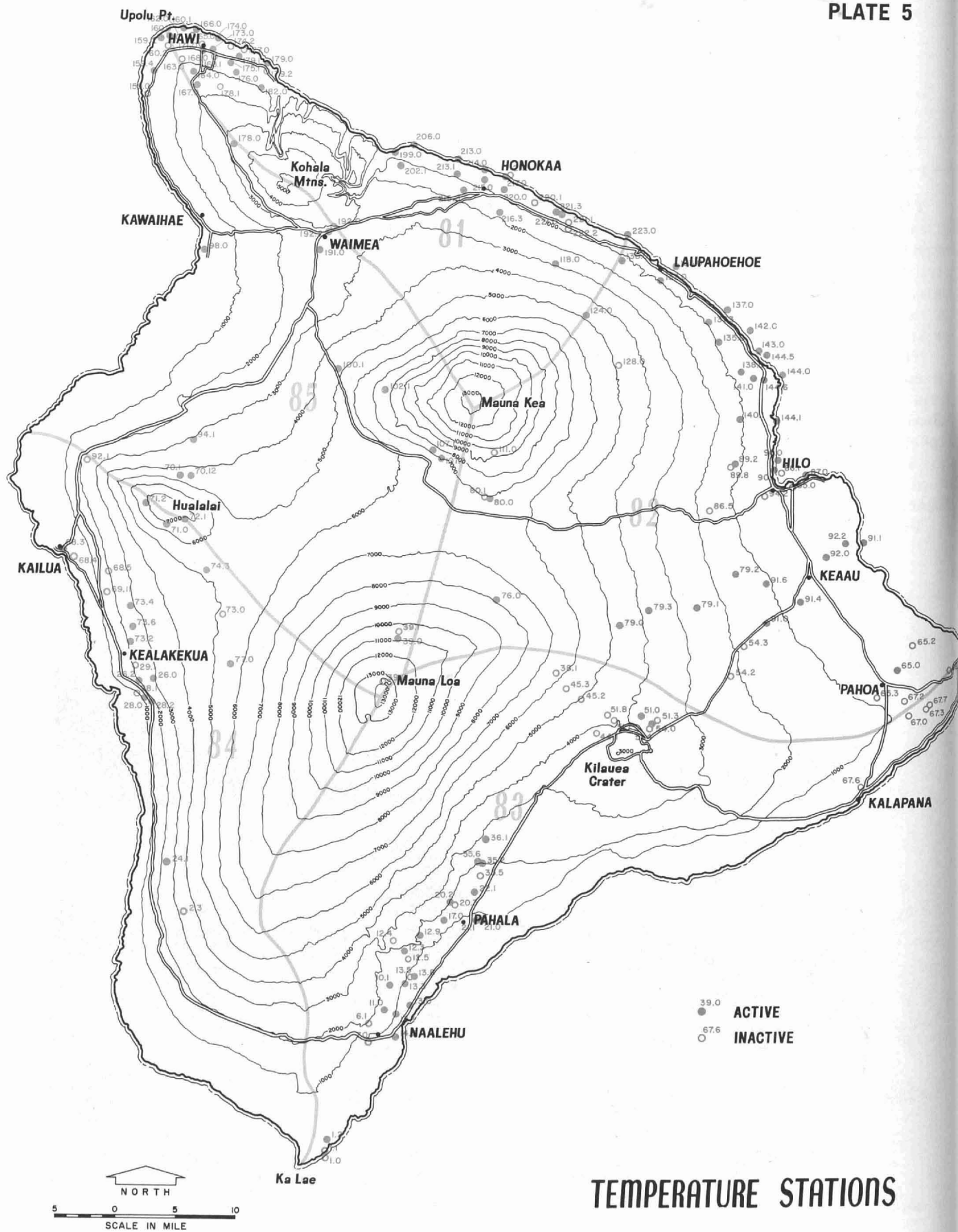
stations on the island, their distribution shown on Plate 5. Also shown are the locations of stations for which temperature observations are no longer being made.

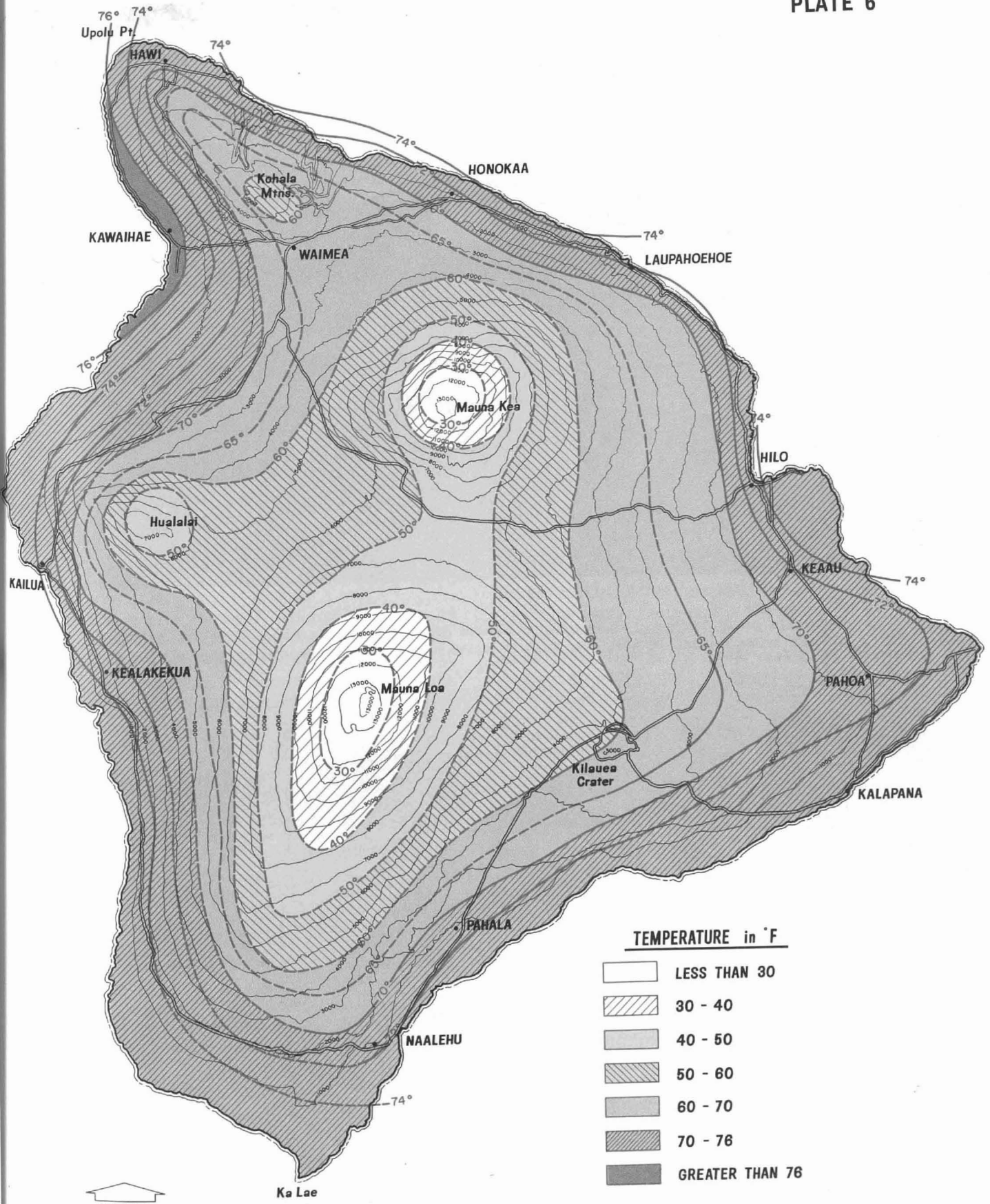
Temperature Station Index, pages 85-91, provides a complete reference to all temperature stations with available records, current through 1967. Temperature stations totalling 167 are listed in numerical order according to assigned state key numbers. A cross reference to this numerical listing is presented in the Alphabetical List of Climatologic Stations, pages 9-11. (See Rainfall section of this report for climatologic station numbering system.)

Tabulated monthly and annual temperature data, together with mean maximum and minimum temperatures, are presented in Selected Temperature Records, pages 92-102. All available station records are included.

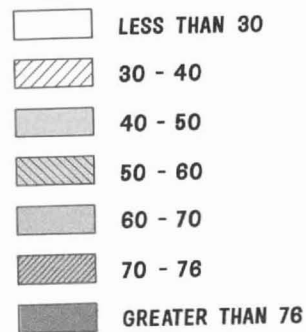


Barren lava atop Mauna Kea at Lake Waiau, where estimated average temperature is less than 45°F.

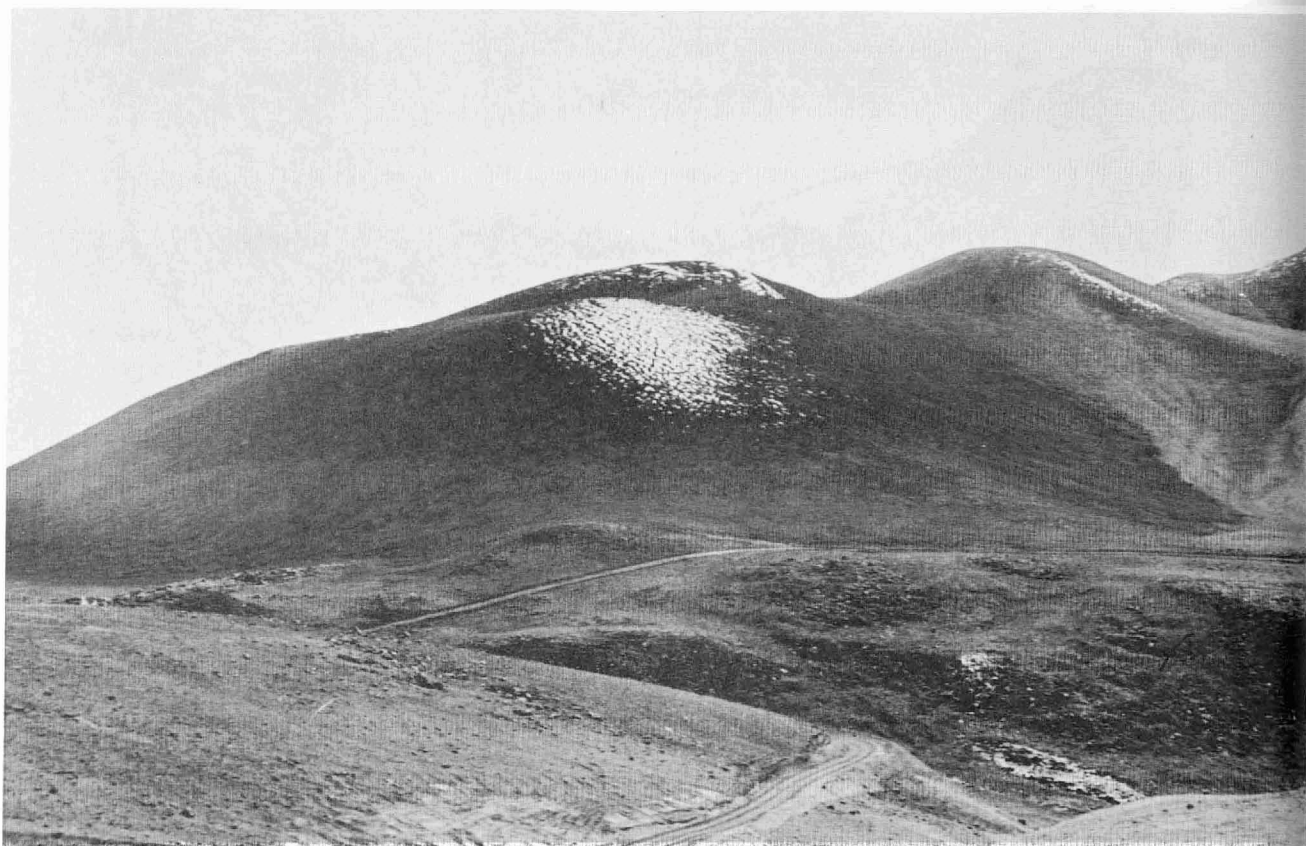




TEMPERATURE in °F

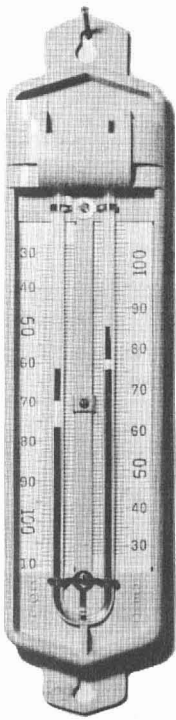


MEAN TEMPERATURE



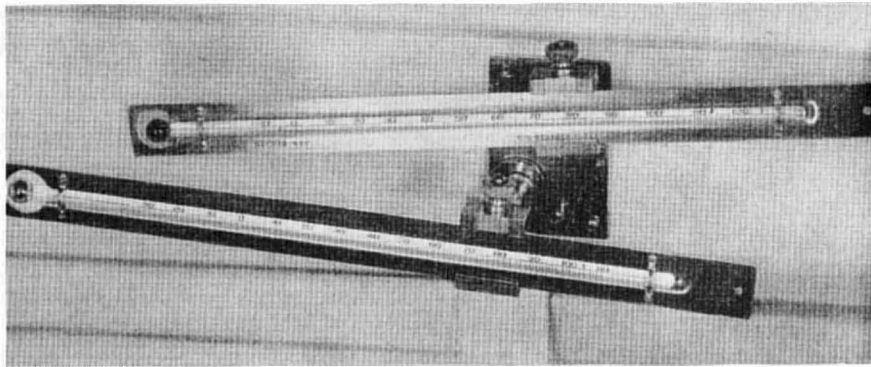
Mauna Kea wears patches of snow, while at Hapuna Beach at Kawaihae, about 13,000 feet below and some 25 miles distant, bathers find respite in the surf from temperatures ranging into the 90's.





Left: Single max-min thermometer is U-shaped tube, the left leg indicating minimum and the right leg maximum temperature.

Below: Separate maximum and minimum thermometers properly mounted and in correct "set" position.



TEMPERATURE CHARACTERISTICS

Temperature depends almost entirely on elevation, although affected somewhat by slope, wind exposure, and cloud cover. Thus, regular sequences, dissimilar to those typical of rainfall, are characteristic of monthly temperatures on the island of Hawaii.

Records show that mean temperature decreases at an approximate rate of 1°F for each 300 feet increase in elevation, the rate being somewhat greater at the lower elevations. The daily temperature range increases approximately 1°F for each 300 feet increase in elevation.

The level at which the uniform rate of temperature change is halted or reversed usually ranges from 5,000 to 7,000 feet elevation. This "temperature inversion" is generally associated with tradewind air circulation, warm air rising at the Equator, flowing toward the North Pole above the inversion level, and returning below the inversion level from the northeast (rather than due north, because of the earth's rotation on its axis). The ceiling of tradewind clouds is generally at the inversion level.

Highest daily temperature in leeward areas, having less cloudiness, are usually greater than in windward areas. The range of mean monthly temperature from summer to winter is slight, also increasing with elevation. August and September are the warmest months; January and February are the coolest. Mean annual temperature variations are also slight.

Temperatures above 90°F are very unusual, except in the dry leeward area of South Kohala where maximum temperatures in the low 90's are moderately common. The island's highest recorded temperature, 96°F , occurred in 1967 at Mauna Kea Beach (No. 98), elevation 103 feet, where the mean annual temperature is 78.4°F .

Except at elevations above 2,500 feet, temperatures less than 55°F are uncommon. The lowest temperature of record on the island, 22°F , also occurred in 1967, at Mauna Loa Slope Observatory (No. 39), elevation 11,145 feet, where mean annual temperature is 43.8°F . Atop Mauna Loa (No. 39.1), elevation 13,455 feet, mean annual temperature is 42.9°F . The summits of Mauna Kea and Mauna Loa are frequently covered with snow in winter. Frost rarely occurs below 4,000 feet elevation.

Mean temperature on the island of Hawaii is graphically depicted in Plate 6. The spaces between isotherms (lines of equal temperature) from the coast to mountain peaks indicate the decrease of mean temperature with elevation, the more widely spaced isotherms generally coinciding with similar contour intervals denoting less slope. Four distinct temperature lows occur at mountain peaks.

Plate 7 plots maximum and minimum temperatures at selected stations, showing decrease with elevation and only slight seasonal variations. Minimum temperatures, occurring at night, are characteristically more regular than maximum temperatures, the latter fluctuating to the extent that a typical pattern is not discernible.

PLATE 7



TEMPERATURES AT SELECTED STATIONS

Temperature Station Index

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
1.0	2880W	Ka Lae	US Coast Guard	84	Kau	18 54.9 155 41.0	35	Daily	1936-1946	USWB	
1.1		Morse Field	US Air Force	"	"	18 55 155 41	40	More than once daily	1940-1941	"	
1.2		Ka Lae	Space Tech Lab	"	"	18 56.5 155 41	305	Daily	1959-	"	
2.3		Hoopuloa Upper	RVS Dom-kowicz	"	S Kona	19 12.8 155 51.3	2425	"	1908-1912	"	Na Ohia
6.1		Kau	W H Hayselden	83	Kau	19 04.7 155 37.5	1850	"	1905-1909	"	
7.0	4620	Kiolakaa	C H Hayselden	"	"	19 03.2 155 37.5	1050	"	1916-1953	"	
10.1		New Mountain House	Hutchinson Sugar Co	"	"	19 07.8 155 36.2	2600	Weekly	1964-	Obsvr	
11.0		Makino	"	"	"	19 05.6 155 36.1	2120	Recorder	1952-	"	Field 20, Field 240 10/52-8/56 charts DOWALD
12.3		Field 64	"	"	"	19 09.9 155 34.6	1825	"	1955-	"	Field 58, Field 64 makai, Field 750; charts at plantation
12.4		Waterfall	"	"	"	19 10.6 155 35.6	2325	"	1954-1955	"	Replaced by #12.3
12.5		Field 740	"	"	"	19 09.3 155 34.2	1740	"	1953-1954	"	
12.9		Field 850	"	"	"	19 10.6 155 33.8	2000	Weekly	1962-	"	
13		Waiubata	"	"	"	19 05.9 155 34.2	1375	Weekly or twice weekly	1954-	Obsvr HSPA	Field 370
13.1		Field 35	"	"	"	19 05.2 155 35.2	1675	Weekly	1954-	Obsvr	
13.3		Field 51	"	"	"	19 07.4 155 34.6	1740	Recorder	1954-	"	Field 630 10/52-2/53 charts at DOWALD; rest charts at plantation
13.5		Field 640	"	"	"	19 08 155 34.3	1650	"	1952-1953	"	
13.8		Kaalaiki Airstrip	"	"	"	19 07.9 155 34.7	1925	Weekly	1964-	"	
14.0	6588	Naalehu	"	"	"	19 03.8 155 35.3	675	Daily except weekends Recorder	1900-1948	Obsvr USWB HSPA	
17.0		Moaula Reservoir	Hawaiian Agricultural Co	"	"	19 12.1 155 31.8	1950	Daily	1950-	Obsvr USWB	
20.2		Alili	"	"	"	19 13.4 155 31.4	2830	Recorder	1955-	Obsvr	Alili (Field 8), replaced by #20; charts at plantation
20.3		Field 8	"	"	"	19 13.3 155 31.1	2700	"	1952-1955	"	Charts at plantation
21.0	7421	Pahala	"	"	"	19 12.1 155 28.8	860	Daily	1905-	USWB	Moved 1/48 90' N & 170' W; probably moved twice before
21.1		Field 150	"	"	"	19 12.1 155 29.1	1000	Recorder	1952-	Obsvr	Lower Kauhane Field 16; charts at plantation
22.1		Keaiwa Camp	"	"	"	19 14.3 155 28.9	1700	Daily Recorder	1952-1955	"	Field 351; charts at plantation
24.1	7166	Opihihale 2	Miss C Leonard	84	S Kona	19 16.3 155 52.6	1300	Daily	1956-	USWB	

Note: For Key to Abbreviations, see page 10.

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
26		Takashiba	Kona Experiment Station	84	S Kona	19 29.6 155 53.9	2100	Weekly Recorder	1938-1938-1945	USWB Obsvr	Moved 1952 100 yds SSW
26.2	3977	Kealakekua	Miss Amy Greenwell	"	"	19 29.6 155 54.9	1450	Daily	1954-	USWB	No data prior 1956
28.0	6697	Napoopoo	Kona Experiment Station	"	"	19 28.3 155 54.5	400	Daily Recorder	1938-1938-1945	USWB Obsvr	Takahama-Napoopoo; moved 6/39 from 600' elev
28.1		Napoopoo	American Factors Inc	"	"	19 28.6 155 55.3	15	Daily	1918-1938	USWB	Moved 7/20 1/4 mile N; moved 11/37 300 yds N
28.2		Kei Middle Rd	E E Glass	"	"	19 27.9 155 54.0	680	"	1955-	"	Moved 4/58 80' E
29.1		Kealakekua (Davis)	Reverend S H Davis	"	"	19 30.6 155 55.2	1580	"	1893-1915	"	No data 1900-1904
35.2		Wood Valley Camp	Hawaiian Agricultural Co	83	Kau	19 16.3 155 28.4	2200	"	1949-	"	Wood Valley (2150) Wood Valley Reservoir (2150)
35.5		Mudflow	"	"	"	19 15.4 155 28.5	1900	Recorder	1952-1955	Obsvr	Camp Kai Field 40-1; charts at plantation
35.6		Wood Valley	"	"	"	19 16.4 155 28.6	2200	Daily	1955-	USWB	
36.1		Field 481	"	"	"	19 18.2 155 28.3	3250	Recorder	1955-1965	Obsvr	Charts at plantation
38.1		Mauna Loa Seismo Sta	Hawaii Volcano Observatory	"	"	19 29.8 155 2.3	6600	"	1951-1955	DOWALD USWB	
39.0	6198	Mauna Loa Slope Obs	USWB	85	Hamakua	19 32.3 155 34.7	11145	"	1956-	"	Trk trail until 1951; moved from 6750'
39.1	6198	Mauna Loa Upper	"	"	"	19 32.5 155 34.5	10960	"	1951-1956	USWB	No data 1951-54
39.2		Mauna Loa Summit	"	"	"	19 29 155 36	13455	"	1951-1957	"	No data after 1953 except 9/56 to 1/57
44.1		Ohaikea (3750)	USDA Fruit Fly Lab	83	Kau	19 25.5 155 19.8	3750	"	1951-1952	"	
45.2		Mauna Loa Trk Trail (5100)	"	"	"	19 28.0 155 21.2	5100	"	1951-1956	Obsvr DOWALD USWB	Fire Cache #2
45.3		Mauna Loa Trk Trail (5900)	"	"	"	19 28.9 155 22.3	5900	"	1952-1956	DOWALD USWB	
51.0		Kilauea North Rim	C K Wentworth	"	"	19 26.4 155 16.4	4050	Daily	1952-	Obsvr DOWALD HSPA	Wentworth moved 1952 from 4025' elevation
51.3		Olaa (29 miles)	W M Giffard	"	"	19 26 155 15	3800	"	1912-1921	USWB	
51.4		Volcano House	Volcano House	"	"	19 25.9 155 15.7	3975	"	1893-1916	"	No data 1894-1904
51.7		Mauna Loa Trk Trail (4000)	USDA Fruit Fly Lab	"	"	19 26.5 155 18.5	4000	Recorder	1952-1956	Obsvr DOWALD USWB	
51.8		Mauna Loa Trk Trail (4250)	"	"	"	19 26.8 155 19.2	4250	"	1949-1958	"	Kipuka Kai
54.0	1303	Hawaii Natl Park Hdqs	Hawaii Natl Park	"	"	19 26.0 155 15.6	3970	Daily Recorder	1913-1913-1938	USWB DOWALD	Volcano Observatory moved 5/43 400' NE
54.2	0740W	Glenwood (Helbush)	X L Helbush	82	Puna	19 29.6 155 09.6	2300	Daily	1916-1928	USWB	
54.3		Glenwood	Puna Sugar	"	"	19 31.4 155 08.3	2150	"	1951-1959	Obsvr HSPA	
65.0	7457	Pahoa	"	"	"	19 29.7 154 56.9	670	"	1921-	Obsvr USWB HSPA	4 relocations; unkn
65.2		Lower Pahoa	"	"	"	19 31.4 154 55.5	380	"	1951-1959	"	Pahoa makai
65.3		Upper Pahoa	"	"	"	19 27.7 154 58.4	1170	"	1951-1959	"	Pahoa mauka
66.0	3370	Kapoho Upper	"	83	"	19 29.5 154 52.6	440	"	1934-1955	"	Kapoho mauka
67.0	3043	Kamaile	"	"	"	19 26.2 154 56.0	560	"	1921-1955	"	Kamaili

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
67.2		Kaueleau	A R Henderson	83	Puna	19 27.3 154 56.5	1000	Daily	1907-1917	USWB	
67.3	3455W	Kaueleau 2	J S Green	"	"	19 26.6 154 54.5	350	"	1917-1927	"	
67.6		Kupaahu	USDA Fruit Fly Lab	"	"	19 21.4 154 59.7	100	Recorder	1950-1956	Obsvr DOWALD USWB	Kalapana; 1954-56 charts only
67.7		Opihikao	Hawaiian Ag Exp Sta	"	"	19 26.8 154 54.4	360	"	1956-1957	Obsvr	
68.3	4764	Kona Airport	Hawaiian Airlines	84	N Kona	19 38.8 156 00.6	15	More than once a day	1949	USWB	
68.4		Kailua Kona	G Parker	"	"	19 38.5 155 59.6	20	Daily	1956-1959	"	No data 1957-58; moved 1956 1/6 mi NE; moved 1959 1/5 mi WNW
68.5		Holualoa (1450)	Kona Dev Co	"	"	19 37.1 155 57.2	1450	"	1893-1928	"	No data 1894-1904
69.11		Laaloa	C D Miller	"	"	19 35.8 155 57.3	800	"	1893-1895	"	
70.1		Halepiula Shed	Dillingham Ranch	85	"	19 44.1 155 51.6	4500	Monthly	1964-	Obsvr	
70.12		Shangrila	Puuwaawaa Ranch	"	"	19 44.2 155 50.8	4380	"	1964-	"	
71	2047	Honuauala	State Forestry Division	84	"	19 40.4 155 52.7	6250	"	1928-	"	
71.2		Hualalai Sheep Sta	Bishop Estate	"	"	19 42.3 155 54.3	6800	"	1963-	"	
72.1		Kahaluu 8	"	"	"	19 40.9 155 51.3	7000	"	1964-	"	
73.0	8460	Puu Lehua	W H Greenwell Estate	"	"	19 34.0 155 48.5	4850	"	1959-1961	"	
73.2	2751	Kainaliu	Kona Exp Sta	"	"	19 32.2 155 55.6	1500	Daily Recorder	1931-1937-1945-1954-	USWB Obsvr	Charts at Kona Exp Sta
73.4		Keauhou Test Site	DOWALD	"	"	19 34.8 155 55.6	2040	"	1958-	DOWALD	Keauhou; HWA Site; charts at DOWALD
73.6		Honalo 2	C H Wodehouse (Poho Kala Rch)	"	"	19 33.3 155 55.6	1800	Daily	1954-	Obsvr	Poho Kala 2
74.3		Keauhou 2 #3	Bishop Estate	"	"	19 37.3 155 49.6	5050	Monthly	1962-	"	
76.0	5018	Kulani Mauka	USWB	82	N Hilo	19 35.2 155 27.3	8300	Recorder	1951-	USWB	No data 1951-55; Mauka Maunaloa; Maunaloa
77.0		Papaloa	Kealakekua Ranch	84	S Kona	19 30.5 155 47.8	5120	"	1960-	Obsvr DOWALD HSPA	Moved 5/60 350' E & 20' higher
79.0	5011	Kulani Camp	State Dept of Soc Ser	82	S Hilo	19 33.1 155 18.2	5170	Daily Recorder	1951-1951	USWB	No data 7/53-12/56; moved 12/59 300' SSE; charts missing 1951-56
79.1		Upper Waiakea	U.S. Forestry Service	"	"	19 34.3 155 11.8	2910	Weekly	1963-	Obsvr	
79.2		Waiakea Forest Reserve #1	"	"	"	19 36.7 155 09.2	1830	"	1964-	"	
79.3		Waiakea Forest Reserve (4000)	"	"	"	19 34.2 155 15.7	4120	"	1964-	"	
80		Kaleieha	Parker Ranch	"	N Hilo	19 42.2 155 27.8	6710	Daily	1936-	"	
80.1		Humuula	S Parker Jr	"	"	19 43 155 28	6685	"	1905-1913	USWB	No data 1906-07
85.0	1488	Hilo (A&F)	State Forestry Division	"	S Hilo	19 42.5 155 04.5	35	Monthly Recorder	1946-1952-1949-	"	Hilo Tree Nursery; Hilo Insectory
86.1	1484	Hilo	C Chaves	"	"	19 43.7 155 05.4	40	Daily	1903-1962	"	No data 1904; moved 8/18 from Hilo Boarding School
86.5		Kaumana (2000)	USDA Fruit Fly Lab	"	"	19 41.1 155 11.1	2000	Recorder	1949-1951	DOWALD	

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
87.0	1492	Hilo Airport	USWB	82	S Hilo	19 43.5 155 03.6	30	Hourly Recorder	1943-1949-1953	USWB	Charts at NWRC
89.2	4632	Kipa	Mauna Kea Sugar Co	"	"	19 44.3 155 08.2	1500	Daily	1966-	"	Field 22
89.8		Field 14	"	"	"	19 44.2 155 09.1	1350	Recorder	1950-1951	DOWALD	
90.0		Office	"	"	"	19 44.4 155 05.6	100	Daily except weekends	1949-	HSPA	Mgr's res moved across street 1954
90.1		Hawaii Sub-Sta Office	HSPA	"	"	19 43.8 155 05.9	220	"	1934-	"	
91	6552	Mountain View	Puna Sugar	"	Puna	19 33.1 155 06.7	1530	Daily Recorder	1914-1952	Obsvr USWB	Data doubtful prior 1934; moved 150' across hiway Olaa 17 mi; moved 1/4 mi S
91.1		Keaau	W H Shipman, Ltd	"	"	19 38.7 154 59.1	15	Daily	1920	Obsvr	
91.4		Kurtistown	Puna Sugar	"	"	19 34.7 155 04.2	920	"	1951-	"	
91.6		Field 151	"	"	"	19 35.8 155 06.8	1360	Periodically	1966	"	
92	3872	Keaau	"	"	"	19 37.8 155 02	250	Daily Recorder	1905-1952-1957	USWB Obsvr HSPA	Olaa Mill moved 1/39 from mill
92.1	2156	Huehue	Huehue Ranch	84	N Kona	19 45.3 155 58.5	1960	Daily	1905-1912	USWB	Moved 2/58 90' NE
92.2		Keaau Orchard	Castle & Cooke	82	Puna	19 38.7 155 00.8	90	Daily except weekends	1949	Obsvr HSPA	
93.0	3367	Kapoho	Puna Sugar	83	"	19 30.6 154 50.6	110	Daily	1905-1960	Obsvr USWB HSPA	Kapoho lower; moved 4/23 300' SE
93.2	0298	Cape Kumukahi	US Coast Guard	"	"	19 31 154 49.3	65	More than once daily	1957-1960	USWB	
94.1	8555	Puuwaawaa	Dillingham Ranch	85	N Kona	19 46.8 155 50.7	2520	Daily	1967	Obsvr USWB	
94.2		Kaumana (500)	J Matsunaga	82	S Hilo	19 42 155 06.9	500	Monthly	1964	Obsvr	
98	6180	Mauna Kea Beach	Mauna Kea Beach Hotel	85	S Kohala	20 00.6 155 49.7	60	"	1967	Obsvr USWB	No data 1937-38; pub as Ponohawaii (500)
100.1		Waikii (4675)	USDA Fruit Fly Lab	"	"	19 51.7 155 39.2	4675	Recorder	1949	Obsvr DOWALD USWB	No data 1951-58
102.1	8452	Puu Laau	State Div of Fish & Game	"	Hamakua	19 50.1 155 35.7	7440	Monthly	1932	Obsvr	
107.0	8063	Pohakuloa	"	"	"	19 45.1 155 31.7	6510	"	1938	Obsvr USWB	
								Recorder	1949-1951	USWB DOWALD	
107.1		Pohakuloa (USMC)	USMC	"	"	19 45.6 155 32.3	6375	More than once daily	1956	USWB	
111.0	1065	Halepohaku	State Forestry Division	82	"	19 45.8 155 27.5	9220	Monthly	1939-1965	Obsvr	
								Recorder	1950-1951	DOWALD USWB	
118.0		Umikoa	Kukaiau Ranch	81	"	19 59.0 155 22.9	3420	Daily	1965	Obsvr	
124	4096	Keanakolu	State Forestry Division	82	N Hilo	19 55.2 155 20.5	5280	Monthly Recorder	1929-1949-1950	DOWALD USWB	
128	6725	Nauhi Gulch	"	"	"	19 51.5 155 18.0	5160	Monthly	1925-1953	Obsvr	
130		Ookala Mauka	Laupahoehoe Sugar Co	"	"	19 59.2 155 17.7	1780	Daily	1951-	Obsvr USWB	Moved 1939 from 1750' Ookala (1750)

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
132		Kihalani	Laupahoehoe Sugar Co	82	N Hilo	19 57.7 155 14.7	1500	Daily	1950-	Obsvr USWB HSPA	
133		Papaaloa	"	"	"	19 58.8 155 13.4	290	"	"	"	Papaaloa Office
135	0910	Hakalau Mauka	Hakalau Plantation	"	"	19 53.2 155 10.1	1150	"	1900-	"	No data prior 1908
137	1701	Honohina	"	"	"	19 55.5 155 09.4	300	"	1954-	"	Moved 5/57 350' WNW
137.3		Honohina Mauka	Pepeekeo Sugar Co	"	"	19 54.8 155 10.8	1165	"	1964-	Obsvr	
138	1960	Honumu Mauka	"	"	S Hilo	19 51.1 155 08.6	1100	"	1939	Obsvr USWB	
140.1	7721	Papaikou Mauka	Mauna Kea Sugar Co	"	"	19 47.4 155 08.5	1400	"	1938-	Obsvr USWB HSPA	
141.0		Pepeekeo Mauka	Pepeekeo Sugar Co	"	"	19 50.7 155 07.5	870	"	1947-	"	
142	0905	Hakalau	Hakalau Plantation	"	"	19 54.1 155 07.8	175	"	1905	"	Moved 5/57 175' WSW
143	1955	Honumu Makai	Pepeekeo Sugar Co	"	"	19 52.4 155 07.0	350	"	1947-	"	Honumu 2
144	8000	Pepeekeo Makai	"	"	"	19 50.8 155 05.3	100	"	1893-	USWB HSPA	No data 1904
144.1	7711	Papaikou	Mauna Kea Sugar Co	"	"	19 47.2 155 05.7	200	"	1934-	Obsvr USWB HSPA	
144.5		Honumu Seaside	Pepeekeo Sugar Co	"	"	19 52.1 155 06.1	130	Recorder	1948-	Obsvr USWB	
144.6		Pepeekeo (Andrade)	"	"	"	19 50.4 155 06.7	650	Daily	1948-	Obsvr USWB HSPA	
159.0	5720	Mahukona	Agt Mahukona Terminal	85	N Kohala	20 11.2 155 54.2	10	"	1912-1955	USWB	Moved 7/48 150' N
159.2	8830	Upolu Point	US Coast Guard	"	"	20 15.2 155 53.3	40	More than once daily	1956-	"	
159.4		Parker Ranch	Kohala Sugar Co	"	"	20 12.7 155 53.3	370	Daily	1964-	Obsvr HSPA	
160.0		Station 3	"	"	"	20 15.5 155 52.5	200	"	1940-	"	Upolu 5
160.1	8828	Upolu Point Airport	Hawaiian Airlines	81	"	20 16.1 155 51.6	90	More than once daily	1939-	USWB	Suiter Field; no data prior 1940
160.2		Station 28	Kohala Sugar Co	85	"	20 14.7 155 52.5	430	Recorder	1952-1953	Obsvr	Upolu 21
162.0		Station 2	"	81	"	20 15.4 155 51.8		Daily	1941-1952	"	Upolu 7
163		Station 15	"	85	"	20 13.7 155 51.7	850	"	1948-1949	"	Puakea Reservoir 2
164		Station 9	"	81	"	20 12.8 155 50.4	1390	Daily except weekends	1942-	Obsvr USWB	Kaauhuhu Homestead
165		Station 4	"	"	"	20 15.4 155 50.6	300	"	1940-1963	Obsvr	Upolu 13
166		Station 14 Hoea Mill	"	"	"	20 15.9 155 50.5	125	"	1963-	Obsvr HSPA	
167	8548	Station 10 Puuokumau	"	"	"	20 11.9 155 50.2	1800	"	1942-	Obsvr	Puuokumau Reservoir
168	1339	Station 1 Hawi	"	"	"	20 14.4 155 49.8	600	"	1925	Obsvr USWB	Hawi Mill, Station 1 moved from mill 1937
168.1		Station 26	"	"	"	20 14.0 155 49.0	650	Recorder	1950-1952	Obsvr	Honomakau 3
171.0		Station 5	"	"	"	20 14.8 155 49.6	425	Daily	1940-1952	"	Alaalae 243

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
173		Station 16 Union Park (Union Office)	Kohala Sugar Co	81	N Kohala	20 14.7 155 48.8	450	Daily except weekends	1963	Obsvr HSPA	
174		Station 6	"	"	"	20 15.3 155 48.6	190	Daily	1940-1963	Obsvr	
174.2		Station 27	"	"	"	20 14.7 155 47.7	275	Recorder	1950-1951	Obsvr USWB	
175.1	4680	Kohala Mission	C S Bond Estates (Kohala Sugar Co)	"	"	20 13.7 155 47.7	535	Daily except weekends	1893	"	Station 22; moved 1/05 from 585; no data 1904
176	4675	Kohala Maulili	Kohala Sugar Co	"	"	20 12.7 155 47.3	960	"	1942	Obsvr USWB	Kohala mauka Sta 11
177		Station 8	"	"	"	20 14.6 155 46.5	100	"	1941-1952	Obsvr	Kohala old RR Station
178		Headquarters	Kahua Ranch	85	"	20 07.6 155 47.4	3240	Daily	1965	"	
178.1		Station 21	Kohala Sugar Co	81	"	20 11.7 155 48.5	1850	Recorder	1948-1949	"	Iole 10
179	6806	Station 13 Niulii Office	"	"	"	20 13.5 155 44.8	75	Daily except weekends	1905	USWB HSPA	Sta 13; moved 1/20 from 200'
179.1	4670	Station 7 Kohala	"	"	"	20 14.0 155 46.9	309	"	1905	"	Kohala Mill, Sta 7; moved 1/02 from 234; 1/16 from 270, 8/54 300' ENE
179.2		Station 24	"	"	"	20 12.9 155 44.8	400	Recorder	1948-1949	Obsvr	
182		Station 12	"	"	"	20 11.9 155 45.2	1000	Daily	1942-	Obsvr USWB	Niulii 15; Waipuka Weir
191	3078	Kamuela Airport	Hawaiian Airlines	85	S Kohala	20 00.0 155 40.6	2665	"	1953-	USWB	Moved 4/59 150' SSW
192	9557	Waimea	L F Pinho	"	"	20 01.7 155 39.7	2750	"	1899-1950	"	Moved 7/09 unkn; no data 1904-06 Kamuela, Central
192.2	3077	Kamuela	Parker Ranch	"	"	20 01.4 155 40.2	2670	"	1936-	Obsvr USWB	Office replaced #192
199.0	4928	Kukuihaele (HIC)	Honokaa Sugar Co	81	Hamakua	20 07.1 155 35.1	980	"	1931-	Obsvr USWB HSPA	No data 1936 & 1943-49 Kukuihaele Main Weir
202.1		Field 114	"	"	"	20 06.1 155 34.4	1565	Recorder	1957-	USWB	Field 14
206.0	4938	Kukuihaele Mill	"	"	"	20 07.7 155 33.7	280	Daily except weekends	1916-	"	Kukuihaele
213		Kawela	"	"	"	20 06.5 155 30.0	400	"	1964-	Obsvr	
213.1		New Stable	"	"	"	20 05.6 155 30.2	1125	"	1964-	"	
214	0840	Haina	"	"	"	20 05.7 155 28.1	460	"	1905-	USWB	Honokaa
215	1856	Honokaa Town	"	"	"	20 05.0 155 28.2	1070	"	1950-	Obsvr USWB HSPA	Established earlier but data lost; Honokaa Village moved 6/46 1 mi NW
215.3		Ahualoa	"	"	"	20 04.5 155 29.9	1835	"	1964-	Obsvr	
216.3		Airport	Paaupau Sugar Co	"	"	20 02.7 155 27.0	2075	"	1959-	Obsvr USWB	
217	7204	Paaupau	"	"	"	20 05.2 155 26.4	400	"	1921-	"	Moved 3/07 from 300'
217.1		Paaupau Mill	"	"	"	20 05.4 155 26.3	200	"	1956-1958	Obsvr	
220		Paaupau Mauka	"	"	"	20 04.3 155 26.8	1160	"	1959-	Obsvr USWB	Moved to PMA 1962
220.1		PMA Plant (Mid Bolt)	"	"	"	20 05.0 155 25.0	1250	Daily	1900-	Obsvr	Moved from mgr's hse 1962

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
221	7312	Paauilo	Hamakua Mill	81	Hamakua	20 02.5 155 22.3	800	Daily except weekends	1938-	Obsvr USWB	Moved 1936 from 400'
221.1		Field 9	"	"	"	20 01.8 155 21.8	1000	"	1950-1951	Obsvr HSPA	
221.3		Hamakua Makai Variety Sta	HSPA	"	"	20 02.7 155 2-.6	750	"	1934-	"	
222.2		Kainehe	C R Blacon	"	"	20 01.6 155 21.8	1475	"	1906-1907	USWB	
223	7131	Ookala	Laupahoehoe Sugar Co	82	N Hilo	20 01.0 155 17.2	430	"	1905-	"	

Selected Temperature Records

JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.

Station No. 70 — KIOIAKAA

1905	—	—	—	—	—	—	—	—	—	—	—
1915	—	—	—	—	—	—	—	—	—	—	—
1916	—	—	—	—	—	—	—	—	—	—	—
1917	75.2	59.2	77.4	57.8	74.6	60.2	76.8	61.1	77.5	63.0	78.0
1918	77.7	61.0	74.9	60.0	75.3	59.8	74.8	63.2	77.5	64.4	78.0
1919	76.3	58.0	77.4	60.1	76.1	60.1	79.6	61.8	78.3	61.8	77.9
1920	78.5	60.4	76.2	58.8	78.1	58.7	77.2	60.8	78.6	62.7	—
1921	—	—	—	—	—	—	—	—	—	—	—
1922	76.3	59.7	77.1	60.8	77.5	58.8	78.0	61.6	79.0	62.4	77.9
1923	74.9	60.7	77.4	59.8	77.2	60.2	77.6	62.3	78.9	62.8	—
1924	—	—	—	—	—	—	—	—	—	—	—
1925	—	—	—	—	—	—	—	—	—	—	—
1926	—	—	—	—	—	—	—	—	—	—	—
1927	76.5	62.0	80.6	60.6	77.2	62.7	77.0	63.1	78.2	64.1	79.1
1928	75.7	60.1	77.2	58.5	79.7	59.9	78.7	61.5	78.2	62.3	79.6
1929	—	—	—	—	—	—	—	—	—	—	—
1930	—	—	—	—	—	—	—	—	—	—	—
1931	72.6	62.5	74.9	60.6	—	—	—	—	—	—	—
1932	—	—	—	—	—	—	—	—	—	—	—
1933	—	—	—	—	—	—	—	—	—	—	—
Mean	75.9	60.4	77.1	59.8	77.0	60.1	77.6	61.7	78.4	63.0	78.4

Station No. 140 — NAALIEHU

1905	—	—	—	—	—	—	—	—	—	—	—
1915	—	—	—	—	—	—	—	—	—	—	—
1916	—	—	—	—	—	—	—	—	—	—	—
1917	78.2	63.3	77.0	64.8	77.7	63.3	76.0	63.7	78.4	65.1	79.1
1918	78.2	63.3	77.0	64.8	77.7	63.3	76.0	63.7	78.4	65.1	79.1
1919	78.2	63.3	77.0	64.8	77.7	63.3	76.0	63.7	78.4	65.1	79.1
1920	78.2	63.3	77.0	64.8	77.7	63.3	76.0	63.7	78.4	65.1	79.1
1921	78.2	63.3	77.0	64.8	77.7	63.3	76.0	63.7	78.4	65.1	79.1
1922	78.2	63.3	77.0	64.8	77.7	63.3	76.0	63.7	78.4	65.1	79.1
1923	78.2	63.3	77.0	64.8	77.7	63.3	76.0	63.7	78.4	65.1	79.1
1924	78.2	63.3	77.0	64.8	77.7	63.3	76.0	63.7	78.4	65.1	79.1
1925	78.2	63.3	77.0	64.8	77.7	63.3	76.0	63.7	78.4	65.1	79.1
1926	78.2	63.3	77.0	64.8	77.7	63.3	76.0	63.7	78.4	65.1	79.1
1927	78.2	63.3	77.0	64.8	77.7	63.3	76.0	63.7	78.4	65.1	79.1
1928	78.2	63.3	77.0	64.8	77.7	63.3	76.0	63.7	78.4	65.1	79.1
1929	78.2	63.3	77.0	64.8	77.7	63.3	76.0	63.7	78.4	65.1	79.1
1930	78.2	63.3	77.0	64.8	77.7	63.3	76.0	63.7	78.4	65.1	79.1
1931	78.2	63.3	77.0	64.8	77.7	63.3	76.0	63.7	78.4	65.1	79.1
1932	78.2	63.3	77.0	64.8	77.7	63.3	76.0	63.7	78.4	65.1	79.1
1933	78.2	63.3	77.0	64.8	77.7	63.3	76.0	63.7	78.4	65.1	79.1
Mean	75.9	60.4	77.1	59.8	77.0	60.1	77.6	61.7	78.4	63.0	78.4

Station No. 210 — PAHALA

1905	77.8	58.0	80.5	57.9	80.6	59.0	82.3	59.7	83.8	61.5	83.4
1906	79.1	58.4	79.3	58.6	80.4	57.6	82.1	60.3	82.3	62.2	83.2
1907	77.9	62.0	78.7	59.5	77.2	59.2	79.0	56.0	80.7	60.9	82.8
1908	80.8	56.6	77.8	58.1	77.3	57.4	77.5	59.0	81.3	61.1	82.3
1909	77.6	58.6	78.5	55.5	78.3	57.2	78.9	58.2	80.7	58.5	82.4
1910	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1911	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1912	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1913	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1914	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1915	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1916	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1917	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1918	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1919	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1920	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1921	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1922	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1923	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1924	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1925	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1926	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1927	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1928	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1929	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1930	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1931	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1932	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
1933	77.7	59.5	77.5	59.3	77.4	60.0	78.9	63.4	81.9	60.4	82.1
Mean	76.9	63.6	77.4	62.9	77.3	63.6	77.5	64.4	78.8	65.3	79.5

JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.			
Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.		
76.4	57.1	75.4	55.7	76.5	58.3	75.8	59.3	76.7	62.3	77.0	62.4	77.8	62.1	78.9	63.6	78.9	62.2	—	—	76.6	58.7	74.5	57.2		
76.2	57.4	76.0	55.9	76.9	56.7	76.2	59.2	76.5	61.6	76.7	62.0	77.6	62.0	78.8	62.8	78.2	62.3	—	—	76.5	58.1	74.5	57.5		
76.3	57.4	74.0	53.6	76.8	60.9	76.3	61.5	77.1	62.4	78.3	62.8	78.4	63.9	78.6	63.8	79.1	61.8	78.5	60.9	79.1	61.8	78.5	58.3		
76.4	57.4	74.0	54.9	74.7	56.7	77.5	58.8	78.1	63.2	80.0	61.1	78.5	59.7	78.6	61.7	78.8	60.9	78.5	60.1	77.5	60.1	77.5	59.2		
75.8	57.3	73.8	55.1	75.2	55.9	76.7	59.3	76.2	62.5	76.9	62.1	78.3	62.6	78.5	62.6	78.3	62.5	77.1	61.0	74.1	57.0	—	—		
76.6	57.3	74.8	54.8	74.9	57.5	76.6	57.8	77.9	61.0	79.4	62.1	79.5	62.2	81.1	63.4	81.0	63.1	80.2	62.1	78.7	60.8	76.8	58.0		
Mean	73.2	56.7	74.8	56.2	75.7	57.4	76.1	59.4	76.7	61.4	78.0	62.5	78.5	62.4	79.6	63.3	79.2	62.7	79.0	62.0	77.7	60.2	75.8	57.8	
0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
05	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
19	78.3	65.3	78.3	65.3	78.3	65.9	78.7	67.8	76.9	67.7	78.0	69.1	77.1	69.4	81.5	71.3	85.3	72.4	83.7	73.0	82.7	66.6	81.2	86.5	
20	84.7	70.4	83.7	67.3	—	—	—	—	—	—	—	—	84.9	70.2	85.5	70.0	86.1	69.3	84.5	67.9	81.7	66.3	79.1	89.2	
21	—	—	80.6	62.8	82.1	64.9	83.7	66.6	84.1	66.9	85.2	69.7	86.5	69.8	86.5	69.9	86.2	68.9	84.3	68.5	81.8	65.9	80.1	65.3	
22	—	—	78.6	62.7	79.0	61.9	82.3	67.3	82.8	64.7	83.9	66.7	85.3	68.2	85.5	66.3	87.7	69.5	84.5	70.2	83.1	70.1	80.7	70.8	
23	80.0	69.5	81.4	65.7	83.6	67.4	87.5	70.0	—	—	—	—	84.6	71.7	86.1	70.5	88.4	71.6	85.5	69.0	80.9	68.5	78.8	66.3	
24	77.2	67.3	79.0	65.4	81.3	65.0	82.5	67.1	82.4	67.0	82.9	69.8	—	83.3	68.9	84.3	69.2	83.8	69.1	83.7	67.7	82.8	67.5	80.5	65.5
25	79.6	65.3	80.9	65.3	82.0	64.7	81.7	64.3	81.9	65.4	84.1	68.0	84.0	68.1	86.3	69.6	84.4	67.8	83.9	66.8	—	—	81.8	64.6	
26	79.3	65.0	80.5	65.0	81.9	63.8	82.7	64.7	83.3	67.0	83.9	67.3	85.5	67.3	86.2	67.7	84.8	66.8	83.5	65.7	82.6	67.1	82.6	67.1	
27	80.2	69.3	82.4	72.9	84.2	83.6	—	—	83.1	69.2	83.0	69.6	79.8	70.2	81.7	70.7	80.4	68.9	79.5	68.9	79.1	68.2	—	—	
28	76.8	64.4	75.2	63.0	76.9	66.3	77.9	67.9	78.8	69.9	77.7	68.7	—	70.1	84.5	71.5	84.9	70.2	82.7	70.0	80.8	68.2	—	—	
29	77.6	65.4	78.8	64.8	81.3	66.7	82.7	67.7	82.5	68.3	84.9	70.5	85.2	69.7	85.0	70.3	—	—	—	—	—	—	—		
30	78.7	63.4	80.2	65.4	81.7	65.4	82.4	67.0	83.4	67.4	83.2	67.8	69.5	85.8	72.3	85.7	71.5	84.1	69.0	81.9	69.8	80.6	65.7		
31	78.3	66.4	77.9	65.7	79.4	65.3	82.9	67.2	84.7	69.5	83.8	68.3	85.5	69.7	84.9	69.6	83.5	69.9	81.0	66.8	79.8	64.1	—		
931	79.4	64.6	79.1	63.4	80.4	64.3	81.7	65.2	82.1	65.0	83.1	65.8	84.3	67.1	83.8	—	83.6	81.9	68.9	81.0	66.8	78.0	66.1		
932	79.4	64.6	79.1	63.4	80.4	64.3	81.7	65.2	82.1	65.0	83.1	65.8	84.3	67.1	83.8	—	83.6	81.9	68.9	81.0	66.8	78.0	66.1		
933	77.8	65.4	79.4	65.4	80.4	65.9	82.0	66.2	83.2	67.3	83.9	68.2	85.2	68.8	85.1	70.4	85.1	69.1	83.9	68.8	82.2	68.4	81.0	66.9	
934	79.4	65.6	79.4	65.4	80.4	65.9	82.0	66.2	83.2	67.3	83.9	68.2	85.2	68.8	85.1	70.4	85.1	69.1	83.9	68.8	82.2	68.4	81.0	66.9	
935	79.9	65.5	79.4	66.3	80.1	66.5	81.4	67.1	82.5	68.7	82.4	69.3	84.4	70.4	85.0	70.8	84.5	70.7	82.6	68.5	81.6	66.4	80.5	65.9	
936	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
937	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
946	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
950	79.9	61.6	81.0	62.3	82.2	62.5	80.7	61.8	80.5	62.8	—	—	82.0	63.9	82.4	65.9	82.6	64.7	84.1	65.4	83.0	82.3	80.3	62.1	
951	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
959	81.1	60.5	80.3	60.8	80.2	59.9	81.6	59.9	82.0	61.7	82.7	64.7	83.3	65.4	83.7	64.9	83.7	64.7	83.3	65.2	81.4	62.8	80.5	61.0	
952	78.2	60.1	79.7	59.2	80.0	60.0	79.6	60.0	80.6	61.6	80.5	—	82.6	—	83.5	—	82.5	—	83.9	66.8	82.2	65.2	80.3	63.3	
953	80.2	60.1	80.3	62.8	80.8	62.4	81.5	62.0	81.7	64.1	81.4	64.5	82.4	64.1	83.5	64.3	82.6	62.7	82.5	62.2	80.7	61.0	79.7	59.3	
954	79.5	56.8	81.5	68.8	80.7	56.2	83.0	60.6	82.5	61.0	—	—	83.9	61.6	87.9	64.2	66.6	83.0	64.9	82.8	64.2	80.3	60.3	—	
955	79.5	58.7	78.2	58.3	76.2	59.5	80.8	61.9	80.2	62.0	79.7	63.0	81.3	62.1	81.8	61.8	81.9	64.3	81.4	65.1	81.4	65.0	—	—	
956	80.3	62.2	80.1	62.8	80.7	62.9	80.3	64.6	81.1	64.7	82.4	64.8	84.4	66.4	83.8	65.2	83.6	65.4	81.3	63.1	80.4	60.6	—	—	
957	80.1	60.0	79.0	57.0	80.3	58.3	82.0	61.3	81.0	60.7	83.4	62.4	84.0	63.3	85.2	64.5	85.4	64.4	84.8	63.2	84.2	62.3	—	—	
958	80.7	57.8	81.0	59.0	81.0	59.9	82.5	61.1	83.1	59.9	82.5	61.8	84.6	62.7	85.8	62.7	85.8	62.0	84.3	60.9	82.6	60.1	81.9	62.6	
959	80.8	63.9	80.9	63.5	82.2	63.9	81.5	64.9	82.2	64.9	83.2	65.2	84.0	66.4	86.9	64.9	85.9	64.7	84.0	64.8	82.9	63.7	—	—	
960	79.8	60.6	79.1	60.4	81.0	60.8	81.6	62.4	82.1	63.7	82.1	64.7	84.8	66.2	85.2	67.6	84.2	66.5	84.5	66.3	83.0	64.6	—	—	
961	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
962	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
966	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Mean	79.6	63.6	79.9	63.3	80.8	63.8	81.7	64.4	81.9	65.4	82.6	66.7	83.0	67.4	84.4	68.0	84.3	67.6	83.5	67.0	82.0	65.8	80.4	64.8	

Station No. 39.0 — MAUNA LOA SLOPE OBSERVATORY																								
951	49.0	29.8	44.3	29.0	52.2	51.3	53.0	33.8	56.5	35.7	58.8	37.1	59.7	38.2	56.7	37.1	56.8	35.1	54.3	35.1	53.7	32.0	51.7	32.0
956	49.0	29.8	44.3	29.0	52.2	51.3	53.0	33.8	56.5	35.7	58.8	37.1	59.7	38.2	56.7	37.1	56.8	35.1	54.3	35.1	53.7	32.0	51.7	32.0
957	54.9	31.2	56.0	35.7	51.1	32.8	57.1	33.5	59.9	37.1	62.5	38.9	58.6	36.3	57.8	35.7	57.7	34.7	57.7	34.7	56.9	35.7	53.8	31.1
958	54.9	31.2	56.0	35.7	51.1	32.8	57.1	33.5	59.9	37.1	62.5	38.9	58.6	36.3	57.8	35.7	57.7	34.7	57.7	34.7	56.9	35.7	53.8	31.1
959	52.5	34.1	50.8	31.8	56.4	33.7	57.6	30.5	58.8	36.6	58.8	36.6	58.8	36.6	58.8	36.6	58.8	36.6	58.8	36.6	58.8	36.6	58.8	36.6
960	52.2	32.0	51.1	30.2	50.1	28.2	53.6	31.1	57.6	35.3	58.6	36.1	57.2	37.3	57.3	37.3	58.0	38.9	53.6	36.7	52.5	34.8	50.5	32.3
961	51.6	32.2	49.8	34.4	52.4	34.0	53.3	35.6	53.0	34.5	58.7	39.5	57.8	38.9	56.6	39.6	55.2	37.9	51.5	36.8	50.3	33.3	49.2	32.1
962	49.5	32.4	47.0	29.8	47.2	29.8	51.9	34.1			56.5	37.1	57.6	38.8			56.4	37.6	56.4	37.3	52.8	35.3		54.2
963	49.5	32.4	47.0	29.8	47.2	29.8	51.9	34.1			56.5	37.1	57.6	38.8			56.4	37.6	56.4	37.3	52.8	35.3		54.2
964	48.6	32.3	52.1	34.0	47.2	32.4	50.3	48.8	33.4	53.5	37.7	57.0	38.2	55.2	36.9	53.1	54.0	53.6	35.8	54.0	53.6	35.8		54.5
965	49.2	32.0	48.8	30.1	47.2	30.8	50.4	33.2	51.9	35.5	58.3	39.3	55.6	37.2	56.0	38.6	55.6	37.6	54.5	36.0	49.0	33.4	48.9	33.5
966	49.2	32.0	48.8	30.1	47.2	30.8	50.4	33.2	51.9	35.5	58.3	39.3	55.6	37.2	56.0	38.6	55.6	37.6	54.5	36.0	49.0	33.4	48.9	33.5
967	49.4	32.7	43.6	27.5	48.1	30.9	50.8	33.1	52.0	35.5	58.1	55.5	36.6	55.9	37.0	55.6	36.3	53.1	36.4	51.5	36.5	49.9	33.5	
968	51.9	32.7	47.6	37.5	54.0	34.4	52.2	33.8	55.6	37.1	61.0	42.5	59.5	40.6	57.7	39.9	56.3	36.9	53.7	38.0	50.9	35.2	49.1	32.5
969	51.9	32.7	47.6	37.5	54.0	34.4	52.2	33.8	55.6	37.1	61.0	42.5	59.5	40.6	57.7	39.9	56.3	36.9	53.7	38.0	50.9	35.2	49.1	32.5
970	50.9	32.4	49.1	31.4	50.6	31.9	53.0	34.1	54.4	35.5	58.4	38.3	57.6	37.8	57.0	38.2	57.1	37.5	55.3	37.7	52.7	34.8	50.8	33.2

Station No. 54.0 — HAWAII NATIONAL PARK HEADQUARTERS (VOLCANO OBSERVATORY)																							
JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1905																							
68.3	50.3	69.8	50.1	67.4	49.1	70.7	51.9	69.7	52.5	73.5	53.5	73.7	53.3	73.4	55.7	74.9	54.6	73.7	54.7	72.3	52.5	67.9	53.5
69.7	52.7	68.0	48.9	—	—	65.6	49.3	73.8	51.0	75.0	53.9	75.0	53.5	—	—	—	—	—	—	—	—	—	—
1906	69.5	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1907	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1908	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1909	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1910	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1911	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1912	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1913	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1914	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1915	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1916	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1917	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1918	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1919	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1920	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1921	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1922	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1923	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1924	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1925	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1926	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1927	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1928	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1929	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1930	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1931	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1932	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1933	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1934	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1935	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1936	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1937	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1938	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1939	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1940	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1941	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1942	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1943	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1944	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1945	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1946	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1947	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1948	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1949	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1950	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1951	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1952	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1953	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1954	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1955	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1956	69.7	52.7	68.0	48.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Station No. 542 — GLENWOOD																								
1958	67.6	46.7	68.5	47.8	64.3	49.3	86.2	50.9	67.3	52.6	70.0	53.6	71.0	55.6	71.7	57.4	71.4	55.1	70.0	54.5	68.5	54.4	67.9	49.9
1959	67.2	52.7	63.8	50.4	67.8	50.6	88.2	53.2	71.5	53.7	72.9	55.2	72.5	56.5	72.5	56.1	73.1	54.3	68.4	53.5	66.4	52.2	68.2	49.6
1960	65.0	47.9	66.9	48.6	65.1	52.3	69.7	52.8	70.0	54.2	71.6	54.5	71.6	55.8	71.9	54.8	72.3	54.5	70.4	52.2	68.2	49.6		
1961	67.4	49.4	68.2	50.6	68.9	49.8	87.8	50.1	68.1	51.9	70.5	52.3	70.4	53.1	71.2	53.8	70.8	52.8	70.8	54.4	68.1	52.3	63.9	49.9
1962	67.5	50.0	67.9	47.7	64.9	44.0	89.3	52.3	70.1	53.5	71.4	52.6	70.2	52.7	70.4	51.7	66.7	51.9	66.7	51.9				
1963	67.5	50.6	68.0	50.6	68.1	54.0	86.5	53.6	66.7	53.9	68.1	53.3	69.5	54.8	68.1	52.6	70.2	54.7	69.0	52.4	69.0	51.5		
1964	65.1	50.9	64.2	49.7	64.0	51.4	84.5	51.4	84.5	51.4	71.1	54.4	70.6	54.9	70.1	54.7	69.0	55.1	68.4	54.2	67.3	52.6	67.6	50.9
1965	65.9	51.3	63.4	48.7	65.0	48.6	85.9	52.7	68.5	52.7	68.7	54.9	67.6	53.8	70.4	54.8	72.9	54.6	70.8	54.2	67.3	55.3	62.4	50.9
1966	64.5	49.6	63.8	48.4	65.5	50.4	69.6	53.5	69.1	54.9	71.6	55.7	71.6	55.9	70.8	55.9	68.2	53.7	66.5	52.6				
Mean	66.0	50.0	66.1	49.7	65.7	50.4	66.7	51.6	68.5	52.8	69.9	53.8	70.7	54.7	71.4	55.4	71.3	55.0	70.5	54.6	68.5	53.3	66.5	51.5
1916	72.6	54.4	74.8	53.5	72.5	56.7	72.5	57.6	72.9	58.0	71.4	58.9	72.8	57.9	72.6	58.1	73.5	57.8	70.7	55.7	68.2	55.4		
1917	69.5	53.4	72.9	50.1	68.1	54.5	71.2	54.7	73.0	56.4	72.8	57.0	74.3	57.3	75.5	57.5	76.6	55.2	77.6	57.0	75.1	56.3	73.3	55.4

1918	12.9	53.6	66.6	53.8	11.0	53.8	69.8	56.2	72.5	57.7	73.3	58.3	73.1	61.2	73.5	59.9	74.5	59.9	70.8	59.8	73.8	58.6	70.1	56.0
1919	68.6	51.5	70.9	52.1	70.8	53.3	72.7	50.8	73.2	48.3	75.3	56.0	75.4	56.3	74.4	60.2	77.4	57.2	74.8	58.7	74.9	56.1	72.8	53.6
1920	65.4	52.9	64.4	53.1	62.3	53.0	68.7	54.3	78.3	55.5	76.1	54.1	75.3	53.9	76.7	52.1	75.1	54.5	75.3	54.8	71.5	52.7	70.5	55.9

JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.

1959	73.5	59.0	71.3	58.3	73.1	58.4	73.2	60.5	74.3	60.6	75.2	61.8	76.0	62.5	78.1	63.7	77.0	62.4	76.7	60.9	75.3	60.8	71.3	59.1
1960	72.3	56.9	74.3	56.3	73.1	57.2	72.2	60.4	74.8	59.8	73.1	62.5	76.3	62.9	77.9	63.0	78.7	60.9	75.3	60.8	71.3	59.1		
1961	75.9	58.6	73.9	59.1	75.0	58.5	73.5	57.9	74.3	59.9	77.1	60.7	77.3	61.5	78.0	60.5	78.7	61.1	75.1	60.2	72.0	58.5		
1962	75.9	58.6	73.9	59.1	75.0	58.5	73.5	57.9	74.3	59.9	77.1	60.7	77.3	61.5	78.0	60.5	78.7	61.1	75.1	60.2	72.0	58.5		
1963	75.9	58.6	73.9	59.1	75.0	58.5	73.5	57.9	74.3	59.9	77.1	60.7	77.3	61.5	78.0	60.5	78.7	61.1	75.1	60.2	72.0	58.5		
1964	74.8	59.0	72.9	57.9	73.2	58.5	73.4	60.3	78.0	60.3	77.8	62.2	77.9	62.3	77.9	61.2	76.7	60.5	76.9	59.8				
1965	74.7	58.0	71.6	57.4	74.9	58.2	74.0	56.9	73.7	60.1	76.7	60.1	77.3	60.5	78.0	61.2	77.1	57.8	75.7	60.5	70.5	57.3		
1966	75.1	57.0	72.4	57.4	74.9	58.2	74.0	56.9	73.7	60.1	76.7	60.1	77.3	60.5	78.0	61.2	77.1	57.8	75.7	60.5	70.5	57.3		
Mean	75.0	56.3	74.6	59.9	73.7	56.7	74.4	58.2	75.0	59.2	76.7	60.5	77.1	61.2	77.9	61.7	78.4	61.2	76.0	60.3	76.1	59.9	74.4	57.6

Station No. 914 — KURTISTOWN

JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.

1951 to 1954

1955

1956

1957

1958

1959

1960

1961

1962

1963

1964

1965

1966

Mean

Station No. 920 — KEAUA

JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.

1951 to 1954

1955

1956

1957

1958

1959

1960

1961

1962

1963

1964

1965

1966

Mean

Station No. 910 — MOUNTAIN VIEW

JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.

1951 to 1954

1955

1956

1957

1958

1959

1960

1961

1962

1963

1964

1965

1966

Mean

JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.

1956	80.5	64.6	76.3	64.8	78.9	65.2	78.9	65.7	78.9	65.7	81.1	67.7	78.0	66.0	80.7	64.6	80.7	64.6	80.7	64.6	80.7	64.6
1960	79.1	63.9	75.9	64.8	81.1	69.3	85.2	70.1	83.7	69.3	83.1	68.2	82.1	67.5	82.1	67.5	82.1	67.5	82.1	67.5	82.1	67.5
1961	82.4	65.7	78.2	63.3	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7
1962	82.4	65.7	78.2	63.3	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7
1963	82.4	65.7	78.2	63.3	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7
1964	82.4	65.7	78.2	63.3	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7
1965	82.4	65.7	78.2	63.3	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7
1966	82.4	65.7	78.2	63.3	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7
Mean	82.4	65.7	78.2	63.3	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7	82.4	65.7

Station No. 901 — HAWAII SUBSTATION

JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.

1951 to 1954

1955

1956

1957

1958

1959

1960

1961

1962

1963

1964

1965

1966

Mean

Station No. 910 — MOUNTAIN VIEW

JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.

1951 to 1954

1955

1956

1957

1958

1959

1960

1961

1962

1963

1964

1965

1966

Mean

Station No. 910 — MOUNTAIN VIEW

JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.

1951 to 1954

1955

1956

1957

1958

1959

1960

1961

1962

1963

1964

1965

1966

Mean

	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1896	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1897	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1898	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1899	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1901	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1902	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1903	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1904	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1905	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1906	75.5	57.6	74.0	57.4	73.4	56.3	72.6	50.7	78.7	61.6	82.9	63.3	81.2	64.2	82.7	63.9	80.1	62.5	78.4	62.1	76.3	58.6	—	—
1907	73.4	56.7	72.4	55.8	71.5	56.3	70.6	50.1	79.4	63.8	81.7	64.0	81.4	65.3	81.7	64.2	79.5	64.1	77.1	62.2	74.7	61.9	—	—
1908	73.0	56.3	72.3	55.1	71.5	56.3	70.6	50.1	79.4	63.8	81.7	64.0	81.4	65.3	81.7	64.2	79.5	64.1	77.1	62.2	74.7	61.9	—	—
1909	73.0	56.3	72.3	55.1	71.5	56.3	70.6	50.1	79.4	63.8	81.7	64.0	81.4	65.3	81.7	64.2	79.5	64.1	77.1	62.2	74.7	61.9	—	—
1910	73.0	56.3	72.3	55.1	71.5	56.3	70.6	50.1	79.4	63.8	81.7	64.0	81.4	65.3	81.7	64.2	79.5	64.1	77.1	62.2	74.7	61.9	—	—
1911	71.7	57.5	72.5	56.8	73.5	58.3	75.9	60.6	77.6	59.4	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1912	72.4	58.1	72.3	58.6	73.5	59.1	75.0	61.7	78.5	61.7	81.0	64.3	82.1	64.5	79.2	64.2	77.7	61.9	76.4	61.1	74.9	58.8	—	—
1913	74.5	56.5	73.4	58.7	74.1	57.4	75.7	58.7	Discontinued	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1914	73.5	58.1	73.4	58.0	74.3	58.2	75.9	59.6	77.1	61.1	78.3	61.5	80.9	63.2	81.2	64.2	80.9	63.9	78.8	62.6	77.2	61.3	75.1	59.5
Mean	73.5	58.1	73.4	58.0	74.3	58.2	75.9	59.6	77.1	61.1	78.3	61.5	80.9	63.2	81.2	64.2	80.9	63.9	78.8	62.6	77.2	61.3	75.1	59.5

Station No. 135.0 — HAKALAU MAUKA																								
1905	76.4	62.0	76.8	62.1	78.2	62.9	78.5	65.1	79.7	66.2	80.9	66.4	81.9	68.0	82.2	69.5	82.2	69.8	81.2	67.2	80.6	67.0	78.0	64.4
1906	79.7	63.3	79.6	63.5	79.1	62.9	79.7	64.5	78.5	62.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1907	71.6	60.3	71.5	60.2	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1
1908	71.6	60.3	71.5	60.2	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1
1909	71.6	60.3	71.5	60.2	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1
1910	71.6	60.3	71.5	60.2	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1
1911	71.6	60.3	71.5	60.2	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1
1912	71.6	60.3	71.5	60.2	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1
1913	71.6	60.3	71.5	60.2	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1
1914	71.6	60.3	71.5	60.2	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1
1915	71.6	60.3	71.5	60.2	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1
1916	71.6	60.3	71.5	60.2	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1
1917	71.6	60.3	71.5	60.2	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1
1918	71.6	60.3	71.5	60.2	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1
1919	71.6	60.3	71.5	60.2	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1
1920	71.6	60.3	71.5	60.2	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1
1921	71.6	60.3	71.5	60.2	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1
1922	71.6	60.3	71.5	60.2	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1
1923	71.6	60.3	71.5	60.2	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1
1924	71.6	60.3	71.5	60.2	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1	70.6	60.1
to	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1929	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1930	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mean	75.7	63.8	76.0	63.2	76.3	63.7	76.9	64.1	79.5	65.9	79.9	66.9	80.7	68.1	81.0	68.5	80.6	68.2	79.5	67.0	78.4	66.1	76.6	64.9

Station No. 94.2 — PONAHAUAI (KAUMANA)																								
1908	75.7	58.1	74.2	59.1	72.3	59.4	76.2	61.4	75.5	61.0	76.4	63.0	77.4	64.7	78.9	65.4	78.0	65.2	77.8	64.0	77.6	61.7	73.2	60.3
1909	71.9	58.3	74.7	56.9	74.1	58.8	73.5	60.0	76.1	61.1	76.7	62.3	79.0	62.4	79.5	64.0	81.2	63.2	79.1	62.4	—	—	—	—
1910	71.9	58.3	74.7	56.9	74.1	58.8	73.5	60.0	76.1	61.1	76.7	62.3	79.0	62.4	79.5	64.0	81.2	63.2	79.1	62.4	—	—	—	—
1911	75.3	58.4	73.5	59.0	75.3	58.6	75.1	62.2	76.0	61.3	76.5	63.2	78.7	64.1	80.1	64.4	78.2	64.0	78.3	62.0	76.8	61.0	75.3	59.2
1912	75.3	58.4	73.5	59.0	75.3	58.6	75.1	62.2	76.0	61.3	76.5	63.2	78.7	64.1	80.1	64.4	78.2	64.0	78.3	62.0	76.8	61.0	75.3	59.2
1913	74.7	58.2	72.7	57.4	71.5	58.0	70.6	59.1	73.2	59.8	75.7	61.7	81.1	63.1	82.3	63.7	82.3	63.0	83.0	63.0	77.4	62.0	78.5	59.5
1914	74.4	57.1	72.7	57.1	71.7	58.3	70.3	61.8	73.3	62.8	76.7	62.5	79.1	65.3	80.6	66.1	79.9	66.0	79.7	62.6	77.4	62.0	78.5	59.5
1915	75.8	55.9	72.3	55.8	78.3	58.4	78.3	58.8	81.6	61.8	81.8	62.8	80.8	63.0	81.8	63.6	82.0	63.0	82.3	62.5	76.4	61.1	77.1	59.8
1916	77.8	59.7	80.0	59.7	77.8	60.8	78.3	61.2	79.3	62.0	78.1	62.9	79.6	62.9	79.6	62.9	79.7	62.5	78.8	62.4	78.0	59.5	75.3	59.0
1917	76.2	58.4	78.8	57.0	75.2	59.4	77.5	58.7	79.7	61.5	79.3	62.5	81.8	61.8	82.7	61.7	85.4	61.9	84.0	62.2	80.4	61.2	79.1	60.3
1918	77.0	5																						
													</											

Station No. 144.1 — PAPAIAKOU

JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.
1934	—	—	—	—	—	—	—	—	—	—	—
to	—	—	—	—	—	—	—	—	—	—	—
1949	78.0 64.7	77.5 64.6	78.3 63.9	76.8 64.7	79.2 65.1	79.5 66.7	81.2 67.1	82.6 68.0	82.9 67.8	82.7 67.0	81.8 66.8
1950	78.0 64.7	77.5 64.6	78.3 63.9	76.8 64.7	79.2 65.1	79.5 66.7	81.2 67.1	82.6 68.0	82.9 67.8	82.7 67.0	81.8 66.8
1951	78.7 64.3	77.5 64.3	78.4 64.5	79.9 64.5	81.8 65.8	82.5 67.3	83.5 68.2	83.0 68.2	84.2 68.1	83.0 67.9	80.8 66.8
1952	76.1 64.1	77.3 63.1	77.9 63.1	77.3 63.1	78.3 63.8	80.0 66.4	81.0 67.3	82.4 66.8	82.5 67.3	82.5 67.3	81.3 66.7
1953	80.3 63.5	78.6 63.1	77.9 63.0	79.9 63.0	80.7 67.6	81.5 66.6	82.0 67.6	83.3 68.4	82.9 67.0	82.2 66.3	79.9 65.4
1954	78.4 63.0	79.0 63.3	77.6 62.9	80.7 65.4	80.4 66.5	82.1 67.9	82.0 67.6	82.8 67.8	83.2 67.1	82.1 66.5	82.1 66.5
1955	77.0 62.7	79.0 63.3	77.6 62.9	80.7 65.4	80.4 66.5	82.1 67.9	82.0 67.6	82.8 67.8	83.2 67.1	82.1 66.5	82.1 66.5
1956	79.4 65.1	76.3 62.7	78.1 63.0	79.5 64.4	79.1 65.1	80.3 66.3	81.9 66.8	81.5 66.8	82.5 67.1	—	—
1957	78.0 64.1	77.0 62.2	78.1 63.0	78.6 64.4	80.1 65.7	82.2 67.3	81.9 66.8	82.0 66.9	82.9 66.9	82.9 66.9	82.9 66.9
1958	78.7 63.1	77.9 63.0	77.2 63.3	78.1 65.1	78.6 66.3	81.4 67.3	81.7 66.8	82.9 68.9	82.9 68.9	82.9 68.9	82.9 68.9
1959	78.6 65.0	77.2 64.7	77.9 63.0	78.1 65.1	80.1 66.6	82.4 68.0	82.9 68.7	83.2 68.4	82.9 68.4	82.9 68.4	82.9 68.4
1960	76.5 63.0	77.1 63.6	78.4 63.6	78.4 63.6	80.9 66.3	81.6 66.7	82.3 66.9	82.7 66.7	82.8 67.1	82.3 66.9	82.3 66.9
1961	79.8 64.1	77.1 63.5	79.5 64.7	79.6 65.0	80.2 67.1	82.1 67.1	82.6 67.6	83.1 68.9	83.1 67.8	82.3 69.0	80.2 67.3
1962	80.3 63.5	78.6 63.8	77.5 63.9	79.6 65.9	79.6 65.9	81.4 67.2	81.5 66.9	82.0 67.8	81.8 68.1	82.8 67.3	80.3 65.8
1963	79.9 65.6	80.6 65.8	79.1 65.4	79.7 66.6	79.5 66.8	81.0 67.2	81.4 66.3	82.4 67.3	82.7 68.4	81.2 66.7	81.3 65.7
1964	79.2 65.3	77.4 63.7	77.5 64.5	77.5 64.5	81.0 68.0	81.3 68.5	81.5 67.9	81.9 68.4	80.0 67.5	79.9 68.2	81.3 66.4
1965	78.6 63.6	77.5 63.1	76.8 63.5	78.6 64.1	80.9 67.4	81.0 67.3	—	83.3 68.0	84.3 68.3	83.8 68.0	80.2 68.8
1966	76.4 63.3	76.9 64.4	79.2 64.8	78.8 64.4	81.9 66.8	82.4 68.2	82.1 66.7	83.2 69.2	83.4 69.3	82.7 69.0	80.8 67.9
Mean	78.4 64.0	77.7 63.6	78.3 63.9	78.9 65.0	79.8 66.0	81.2 67.2	81.8 67.7	82.4 68.4	82.7 68.0	82.4 67.8	80.3 66.7

Station No. 159.0 — MAHUKONA

JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.
1912	—	—	—	—	—	—	—	—	—	—	—
1913	84.9 68.5	84.2 66.0	86.4 67.1	86.0 67.0	88.9 67.7	87.1 66.8	87.9 66.7	89.2 67.2	88.4 67.0	88.8 67.0	87.0 67.0
1914	82.3 64.2	84.9 64.9	83.5 63.7	85.4 66.7	85.9 66.5	86.2 71.8	88.5 72.9	89.7 67.4	88.6 73.9	85.5 71.4	83.0 68.2
1915	—	—	—	—	—	—	—	—	—	—	—
1916	83.3 64.5	85.6 64.6	85.8 65.5	85.2 67.3	85.8 65.8	88.0 68.3	90.1 71.2	91.0 69.6	91.9 70.1	89.7 72.0	87.4 72.9
1917	85.6 67.5	88.5 67.4	90.5 69.0	90.0 68.5	91.1 70.4	91.6 70.5	91.1 70.8	91.0 69.6	91.9 70.1	89.7 72.0	87.4 72.9
1918	87.1 67.0	80.2 63.4	81.2 64.3	82.8 63.1	91.4 69.8	90.3 68.9	90.0 68.5	90.5 68.3	91.5 71.0	90.4 68.2	87.6 67.2
1919	81.6 63.5	84.3 64.8	86.7 64.8	86.4 67.7	90.4 68.1	89.9 72.9	88.8 69.5	88.1 68.3	88.8 67.4	90.4 67.8	88.3 68.9
1920	73.4 55.2	79.0 62.1	80.3 62.4	84.3 65.6	88.3 67.0	91.3 70.4	90.0 68.5	89.1 70.4	89.7 69.2	89.5 69.4	86.7 65.8
1921	—	—	—	—	—	—	—	—	—	—	—
1922	80.6 65.2	76.4 59.8	80.3 61.2	82.6 62.8	88.0 68.5	88.7 68.8	—	89.4 70.2	90.4 69.8	—	—
1923	—	—	—	—	—	—	—	—	—	—	—
1924	—	—	—	—	—	—	—	—	—	—	—
to	—	—	—	—	—	—	—	—	—	—	—
1949	84.7 65.8	85.2 66.7	84.2 68.3	86.9 66.7	87.2 67.9	86.2 68.2	86.0 69.0	87.5 68.3	87.6 68.9	87.5 68.3	85.5 65.6
1950	80.6 64.4	81.6 62.9	84.3 65.1	84.5 67.6	85.7	86.8	88.5	89.0	88.5	86.5 71.4	82.3 70.1
1951	78.6 64.9	80.7 65.8	80.6 65.3	84.4 66.2	87.0 67.0	88.2 69.3	89.0 69.1	88.5 70.4	87.9 70.0	85.3 67.0	81.4 67.4
1952	81.0 63.8	82.4 64.1	82.4 64.1	82.4 64.1	82.4 64.1	82.4 64.1	82.4 64.1	82.4 64.1	82.4 64.1	82.4 64.1	82.4 64.1
1953	80.3 64.9	84.0 66.8	80.5 64.7	86.2 66.7	87.0 68.7	89.4 71.2	89.8 71.2	89.8 71.2	89.8 71.2	89.8 71.2	89.8 71.2
1954	79.8 65.6	77.9 65.0	83.6 66.1	83.8 66.9	84.0 67.2	86.3 68.7	87.9 68.5	88.0 69.3	86.8 72.4	85.3 67.8	83.6 67.5
1955	Discontinued	—	—	—	—	—	—	—	—	—	—
1956	—	—	—	—	—	—	—	—	—	—	—
Mean	81.7 64.5	82.1 64.2	83.5 65.0	85.2 66.2	87.3 67.9	88.4 69.5	88.9 69.8	89.4 70.1	89.2 70.0	87.8 69.4	86.0 68.5

Station No. 159.2 — UPOLU POINT U.S. COAST GUARD

JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.
1956	78.2 65.5	76.4 64.1	76.9 64.7	81.7 64.7	82.3 66.9	84.0 67.8	82.9 67.8	82.0 67.8	82.0 67.8	82.0 67.8	82.0 67.8
1957	78.2 65.5	76.4 64.1	76.9 64.7	81.7 64.7	82.3 66.9	84.0 67.8	82.9 67.8	82.0 67.8	82.0 67.8	82.0 67.8	82.0 67.8
1958	78.2 65.5	76.4 64.1	76.9 64.7	81.7 64.7	82.3 66.9	84.0 67.8	82.9 67.8	82.0 67.8	82.0 67.8	82.0 67.8	82.0 67.8
1959	78.2 65.5	76.4 64.1	76.9 64.7	81.7 64.7	82.3 66.9	84.0 67.8	82.9 67.8	82.0 67.8	82.0 67.8	82.0 67.8	82.0 67.8
1960	78.2 65.5	76.4 64.1	76.9 64.7	81.7 64.7	82.3 66.9	84.0 67.8	82.9 67.8	82.0 67.8	82.0 67.8	82.0 67.8	82.0 67.8
1961	81.1 64.2	78.7 66.4	81.8 66.0	82.6 66.8	81.8 66.7	82.5 66.8	84.0 69.6	84.8 71.4	86.3 70.0	86.4 69.6	81.1 66.3
1962	82.9 66.3	82.0 65.5	81.5 69.5	83.7 68.3	83.4 68.6	85.1 69.0	84.9 71.3	85.1 70.9	85.9 71.7	83.4 69.4	82.2 68.3
1963	82.7 66.5	82.0 65.5	81.5 69.5	83.7 68.3	83.4 68.6	85.1 69.0	84.9 71.3	85.1 70.9	85.9 71.7	83.4 69.4	82.2 68.3
1964	80.5 67.9	79.3 66.1	81.5 67.9	80.3 68.0	82.5 68.3	85.3 69.7	84.3 70.8	83.3 70.9	83.9 70.3	80.6 70.1	80.9 69.8
1965	81.4 66.3	79.3 65.7	80.1 66.9	82.5 68.4	84.3 70.5	82.7 70.5	83.1 70.5	82.7 70.5	83.1 70.5	80.8 70.2	79.1 66.4
1966	77.7 65.7	77.5 65.4	80.0 65.3	81.0 65.4	83.7 68.3	83.4 68.7	83.0 69.2	82.6 70.4	83.5 70.4	83.7 69.1	82.8 69.2
Mean	80.1 65.9	79.1 65.6	80.2 66.2	81.3 67.2	82.2 68.5	83.3 69.4	84.2 69.3	84.2 70.7	84.8 70.8	84.2 70.5	81.8 68.8

Station No. 160.1 — UPOLU POINT AP

JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.
1949	—	—	—	—	—	—	—	—	—	—	—
1950	77.6 65.3	77.5 66.1	79.0 65.6	77.7 66.6	80.3 67.2	82.2 68.6	83.4 69.9	84.8 71.0	85.3 71.3	84.0 70.7	81.9 69.6
1951	78.6 66.4	78.1 66.5	80.0 66.8	81.1 66.2	82.9 67.9	84.5 68.6	82.0 69.1	82.6 69.7	82.9 69.9	81.6 68.5	78.6 66.6
1952	77.0 65.2	77.4 65.3	77.9 63.0	79.5 63.5	80.4 66.2	81.4 68.2	82.9 68.2	83.3 68.8	83.8 67.7	83.3 68.7	80.3 65.7
1953	80.6 64.0	79.4 63.5	80.0 65.2	80.6 65.9	81.3 67.9	81.8 68.2	82.4 68.0	83.0 68.2	83.9 68.5	82.9 68.5	79.5 67.7
1954	79.2 64.3	80.5 63.0	78.9 63.3	81.1 65.8	81.7 66.9	83.8 68.9	83.2 68.4	83.8 68.8	84.8 67.8	84.3 70.2	83.3 67.6
1955	78.3 64.7	77.0 67.9	77.4 66.2	77.4 66.2	78.2 66.2	80.3 68.6	80.5 68.8	81.8 65.0	80.8 64.1	79.4 66.4	79.1 64.8
Mean	78.4 64.0	77.7 63.6	78.3 63.9	78.9 65.0	79.8 66.0	81.2 67.2	81.8 67.7	82.4 68.4	82.7 68.0	82.4 67.8	80.3 66.7

Station No. 169.0 — HAWAII

JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.
1956	—	—	—	—	—	—	—	—	—	—	—
to	—	—	—	—	—	—	—	—	—	—	—
1966	—	—	—	—	—	—	—	—	—	—	—
Mean	78.5 64.2	78.4 65.2	78.9 65.2	79.4 65.6	80.7 66.7	82.0 67.8	82.0 68.3	82.8 68.8	83.7 68.1	82.9 68.2	80.7 67.3

Station No. 175.1 — KOHALA MISSION

JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.
1905	74.6 61.8	75.4 61.8	75.6 63.2	74.8 64.1	76.5 65.6	78.1 66.6	79.4 68.4	79.2 69.3	78.9 68.6	78.0 67.6	79.2 66.5
1906	75.6 64.1	77.1 64.0	77.6 63.2	77.6 63.2	79.2 68.2	79.2 68.2	79.2 68.2	79.2 68.2	79.2 68.2	79.2 68.2	79.2 68.2
1907	77.8 65.4	74.4 62.4	73.5 63.1	75.3 63.0	79.6 66.7	79.9 68.1	79.5 68.1	77.5 68.7	79.9 69.4	79.7 67.4	75.7 66.2

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.
1941	76.3 55.9	74.1 54.0	70.4 51.8	72.9 54.6	73.5 55.7	75.6 59.1	77.2 59.5	77.9 58.6	79.5 59.2	77.1 57.5	74.8 56.4	68.8 57.9
1942	75.2 54.9	71.4 53.1	67.1 51.6	69.0 52.5	75.6 56.4	75.1 55.9	75.8 58.7	76.2 59.7	78.0 59.5	79.3 59.5	74.8 56.4	68.8 57.9
1943	74.4 54.2	72.5 53.5	73.7 55.9	76.0 57.4	75.7 58.6	75.9 57.8	75.5 58.2	77.3 58.0	78.5 60.1	75.7 58.2	—	—
1944	74.4 54.5	74.8 —	76.3 51.5	71.9 53.5	73.0 53.5	73.3 —	73.1 —	74.5 —	76.8 54.3	76.1 53.6	73.6 —	—
1945	—	—	—	—	—	—	—	—	—	—	—	—
to	—	—	—	—	—	—	—	—	—	—	—	—
1946	—	—	—	—	—	—	—	—	—	—	—	—
1947	—	—	—	—	—	—	—	—	—	—	—	—
1948	—	—	—	—	—	—	—	—	—	—	—	—
1949	—	—	—	—	—	—	—	—	—	—	—	—
1950	73.8 —	72.5 —	—	69.0 —	70.0 —	73.4 —	71.2 —	74.1 —	75.0 —	74.3 56.1	73.1 —	73.1 —
Mean	70.2 54.0	70.7 53.8	70.6 54.0	72.3 55.7	72.6 56.6	72.9 57.0	73.9 58.2	75.0 58.4	74.8 57.5	72.7 56.7	70.6 54.9	—

Station No. 1922 — KAMUELA

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.
1949	—	—	—	—	—	—	—	—	—	—	—	—
to	—	—	—	—	—	—	—	—	—	—	—	—
1951	72.6 —	70.9 51.3	70.9 51.3	—	71.7 52.5	72.5 55.3	76.7 56.3	77.7 56.5	75.0 53.0	75.3 55.0	73.3 54.1	74.1 51.7
1952	72.6 —	70.9 51.3	70.9 51.3	—	71.7 52.5	72.5 55.3	76.7 56.3	77.7 56.5	75.0 53.0	75.3 55.0	73.3 54.1	74.1 51.7
1953	72.6 —	70.9 51.3	70.9 51.3	—	71.7 52.5	72.5 55.3	76.7 56.3	77.7 56.5	75.0 53.0	75.3 55.0	73.3 54.1	74.1 51.7
1954	72.6 —	70.9 51.3	70.9 51.3	—	71.7 52.5	72.5 55.3	76.7 56.3	77.7 56.5	75.0 53.0	75.3 55.0	73.3 54.1	74.1 51.7
1955	72.6 —	70.9 51.3	70.9 51.3	—	71.7 52.5	72.5 55.3	76.7 56.3	77.7 56.5	75.0 53.0	75.3 55.0	73.3 54.1	74.1 51.7
1956	72.6 —	70.9 51.3	70.9 51.3	—	71.7 52.5	72.5 55.3	76.7 56.3	77.7 56.5	75.0 53.0	75.3 55.0	73.3 54.1	74.1 51.7
1957	72.6 —	70.9 51.3	70.9 51.3	—	71.7 52.5	72.5 55.3	76.7 56.3	77.7 56.5	75.0 53.0	75.3 55.0	73.3 54.1	74.1 51.7
1958	72.6 —	70.9 51.3	70.9 51.3	—	71.7 52.5	72.5 55.3	76.7 56.3	77.7 56.5	75.0 53.0	75.3 55.0	73.3 54.1	74.1 51.7
1959	72.6 —	70.9 51.3	70.9 51.3	—	71.7 52.5	72.5 55.3	76.7 56.3	77.7 56.5	75.0 53.0	75.3 55.0	73.3 54.1	74.1 51.7
1960	72.6 —	70.9 51.3	70.9 51.3	—	71.7 52.5	72.5 55.3	76.7 56.3	77.7 56.5	75.0 53.0	75.3 55.0	73.3 54.1	74.1 51.7
1961	72.6 —	70.9 51.3	70.9 51.3	—	71.7 52.5	72.5 55.3	76.7 56.3	77.7 56.5	75.0 53.0	75.3 55.0	73.3 54.1	74.1 51.7
1962	72.6 —	70.9 51.3	70.9 51.3	—	71.7 52.5	72.5 55.3	76.7 56.3	77.7 56.5	75.0 53.0	75.3 55.0	73.3 54.1	74.1 51.7
1963	72.6 —	70.9 51.3	70.9 51.3	—	71.7 52.5	72.5 55.3	76.7 56.3	77.7 56.5	75.0 53.0	75.3 55.0	73.3 54.1	74.1 51.7
1964	72.6 —	70.9 51.3	70.9 51.3	—	71.7 52.5	72.5 55.3	76.7 56.3	77.7 56.5	75.0 53.0	75.3 55.0	73.3 54.1	74.1 51.7
1965	72.6 —	70.9 51.3	70.9 51.3	—	71.7 52.5	72.5 55.3	76.7 56.3	77.7 56.5	75.0 53.0	75.3 55.0	73.3 54.1	74.1 51.7
1966	72.6 —	70.9 51.3	70.9 51.3	—	71.7 52.5	72.5 55.3	76.7 56.3	77.7 56.5	75.0 53.0	75.3 55.0	73.3 54.1	74.1 51.7
Mean	71.6 49.4	71.3 51.9	73.5 50.3	73.2 51.3	76.9 54.4	74.8 57.4	74.1 56.8	74.3 59.5	76.0 59.2	75.7 57.7	74.9 56.0	71.4 54.9

Station No. 1990 — KUKUIHALE (HIC)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.
1931	—	—	—	—	—	—	—	—	—	—	—	—
to	—	—	—	—	—	—	—	—	—	—	—	—
1949	—	—	—	—	—	—	—	—	—	—	—	—
1950	74.5 62.2	73.7 62.3	71.6 61.1	71.7 62.3	73.6 63.1	75.4 63.4	75.1 65.0	82.8 67.4	77.9 65.9	77.0 64.5	71.6 62.4	—
1951	73.0 62.2	72.3 61.5	74.5 62.4	73.8 62.2	75.5 63.8	77.5 65.1	77.8 67.2	76.8 67.0	78.0 66.2	74.0 65.0	73.5 62.5	—
1952	71.6 61.1	71.2 61.5	70.7 60.8	72.2 61.6	73.7 64.4	74.1 65.3	75.3 66.3	77.3 64.4	76.3 65.5	75.1 64.9	72.4 61.8	—
1953	75.6 59.7	73.5 59.7	72.8 61.5	73.7 62.2	74.3 64.3	75.0 65.1	75.5 66.3	77.5 64.4	76.3 65.5	73.9 63.6	72.7 61.4	—
1954	73.5 60.1	75.5 60.0	71.8 60.0	75.1 61.5	73.2 64.0	76.1 66.1	76.0 65.5	76.1 66.0	77.3 65.5	77.3 65.5	71.6 62.3	—
1955	72.7 60.3	70.8 59.8	71.3 59.6	72.3 61.9	72.1 62.5	72.6 63.2	73.8 63.9	74.7 63.9	74.6 63.5	77.7 63.9	76.8 62.8	—
1956	71.4 64.0	71.0 64.1	70.7 62.5	73.2 63.4	73.2 63.7	76.1 64.0	75.2 65.9	76.3 64.9	76.7 64.8	76.5 63.4	74.3 62.3	—
1957	73.9 60.3	72.9 58.7	73.3 58.4	73.9 59.8	74.9 61.3	76.9 62.2	77.6 63.1	78.7 66.4	78.7 66.4	76.5 65.5	73.5 63.8	—
1958	74.0 60.3	75.6 59.6	75.0 59.5	71.9 61.2	72.4 62.3	73.8 63.5	76.4 64.3	77.8 66.7	77.8 66.7	77.6 65.7	73.9 61.1	—
1959	76.2 63.2	71.6 60.4	73.4 61.1	73.9 62.4	73.8 63.5	76.4 64.3	77.8 66.7	78.7 66.7	77.8 66.7	77.6 65.7	73.9 61.1	—
1960	75.5 61.2	72.4 60.7	73.4 61.3	72.2 63.5	75.1 64.4	75.6 65.0	76.9 65.7	77.1 67.4	77.0 66.0	78.0 65.8	74.8 62.5	—
1961	75.1 61.5	72.3 61.2	73.9 62.0	73.9 62.0	75.0 64.0	76.2 65.0	77.5 65.0	78.8 66.8	79.3 66.4	77.9 65.7	71.0 62.7	—
1962	74.1 61.7	73.8 61.7	72.4 61.6	76.1 63.9	76.5 64.3	77.9 64.8	77.6 65.4	78.6 65.9	77.7 64.9	78.1 64.5	77.0 64.0	73.7 62.2
1963	76.1 61.8	78.5 62.9	77.2 62.7	76.0 64.2	74.2 63.6	77.8 64.5	77.5 65.2	78.1 65.8	78.4 65.9	77.3 66.0	76.1 64.2	73.1 63.0
1964	75.2 62.8	72.8 62.4	73.6 62.6	74.6 63.2	74.2 63.9	76.5 65.1	76.9 65.7	78.2 65.5	77.6 65.4	76.1 64.8	76.9 62.8	78.4 63.4
1965	77.5 62.1	72.2 59.6	72.6 59.0	76.1 62.9	77.5 64.6	77.0 64.1	77.8 65.2	78.6 65.4	81.8 66.3	78.6 65.1	73.5 63.3	72.1 61.5
1966	72.1 60.5	72.6 61.0	75.0 62.4	72.8 62.3	76.7 64.6	76.9 65.5	75.7 66.1	76.2 66.1	77.7 66.3	78.6 69.4	78.0 65.0	74.9 62.9
Mean	74.4 61.4	73.2 60.9	73.4 61.1	73.5 62.3	74.4 63.5	76.0 64.4	76.4 65.4	77.3 66.2	77.8 65.7	77.3 65.6	75.7 64.4	73.8 62.5

Station No. 2050 — KUKUIHALE MILL

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.
1916	76.6 63.1	75.7 63.1	77.2 65.5	77.7 65.7	77.9 66.5	77.9 66.5	78.3 66.2	77.4 67.0	78.8 66.9	78.3 67.7	75.5 65.9	74.2 64.2
1917	73.4 63.3	78.4 —	77.8 —	75.8 64.1	76.5 63.9	73.5 63.6	83.5 68.6	84.5 66.2	85.1 66.2	84.7 59.8	80.8 58.5	80.1 58.3
1918	77.7 55.6	75.9 55.0	75.3 54.9	78.1 53.4	80.0 53.6	80.7 53.6	82.7 53.7	82.1 53.6	82.7 53.7	82.1 53.6	80.1 58.3	80.1 58.3
1919	75.0 62.4	76.0 62.2	76.3 62.4	78.9 62.4	78.9 62.4	78.9 62.4	82.1 62.6	82.1 62.6	82.1 62.6	82.1 62.6	82.1 62.6	82.1 62.6
1920	76.1 63.2	77.1 63.1	77.3 63.2	78.2 63.3	82.3 65.0	83.1 65.3	83.8 65.8	83.5 67.9	81.9 67.1	81.3 66.2	79.0 64.5	76.8 64.0
1921	—	78.4 61.8	78.3 62.5	78.3 62.5	82.0 64.5	83.7 66.7	82.2 66.5	81.5 66.8	81.5 66.3	81.8 64.7	78.3 63.0	74.8 62.7
1922	69.5 60.3	69.0 60.4	71.7 60.7	78.3 62.4	82.1 64.6	84.5 66.3	83.9 66.6	82.6 66.2	82.6 66.2	82.6 66.2	80.5 63.0	79.3 61.4
1923	76.7 60.5	79.5 80.5	80.2 61.1	81.3 62.3	81.4 85.6	—	—	—	—	—	—	—
to	—	—	—	—	—	—	—	—	—	—	—	—
1949	—	—	—	—	—	—	—	—	—	—	—	—
1950	77.5 64.5	77.4 65.8	76.3 64.4	75.6 65.7	77.4 67.1	75.2 68.2	79.4 68.6	80.5 70.0	80.4 69.6	80.2 69.5	79.7 68.5	73.7 65.1
1951	76.9 64.1	74.6 65.1	76.1 67.1	76.8 65.9	79.4 68.9	79.7 69.6	79.4 68.9	79.7 69.6	80.3 69.4	79.3 68.6	76.8 65.7	76.5 64.6
1952	77.1 64.3	75.1 63.3	73.9 65.9	73.8 64.4	75.1 64.5	77.8 67.7	79.4 68.5	78.2 69.3	79.8 69.3	79.8 69.3	77.9 65.7	75.9 65.3
1953	78.3 63.6	76.4 64.4	75.9 64.6	76.8 65.1	77.5 66.5	79.5 68.9	79.7 69.6	81.1 69.1	81.2 69.1	81.2 69.1	77.1 66.4	76.5 64.6
1954	78.3 63.6	76.4 64.4	75.9 64.6	76.8 65.1	77.5 66.5	79.5 68.9	79.7 69.6	81.1 69.1	81.2 69.1	81.2 69.1	77.1 66.4	76.5 64.6
1955	78.3 63.6	76.4 64.4	75.9 64.6	76.8 65.1	77.5 66.5	79.5 68.9	79.7 69.6	81.1 69.1	81.2 69.1	81.2 69.1	77.1 66.4	76.5 64.6

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.	Max. Min.
1956	75.0 63.8	76.2 61.9	78.6 62.6	77.7 62.4	76.9 65.6	77.2 67.0	80.0 68.0	80.5 65.7	78.7 68.2	80.4 68.7	79.1 68.6	78.9 67.8
1957	76.7 64.0	74.5 62.4	75.5 62.9	76.0 64.0	76.7 65.7	77.2 67.4	80.0 68.0	80.5 65.7	78.7 68.2	80.4 68.7	79.1 68.6	74.5 61.7
1958	77.7 62.1	76.5 61.4	76.7 62.2	76.2 64.0	76.7 65.7	77.2 67.4	80.0 68.0	80.5 65.7	78.7 68.2	80.4 68.7	79.1 68.6	73.1 63.6
1959	77.7 62.1	76.5 61.4	76.7 62.2	76.2 64.0	76.7 65.7	77.2 67.4	80.0 68.0	80.5 65.7	78.7 68.2	80.4 68.7	79.1 68.6	73.1 63.6
1960	74.1 64.6	74.1 63.0	75.7 64.8	76.4 64.7	77.7 65.1	80.4 67.4	81.0 69.0	81.2 70.0	81.2 69.1	81.9 68.7	79.6 67.5	74.5 63.6
1961	74.5 63.0	75.3 62.1	76.0 63.2	74.5 65.5	77.8 65.5	79.7 67.7	80.4 69.0	80.5 68.4	80.1 68.1	80.9 69.4	76.6 67.5	76.3 64.5
1962	76.9 63.2	77.7 62.3	78.1 61.5	80.0 67.1	79.7 67.8	81.2 67.6	81.5 67.0	82.3 69.5	82.4 68.8	82.4 68.7	79.4 65.7	76.3 63.9
1963	76.6 60.9	78.6 60.3	78.0 59.7	80.0 60.3	82.3 68.3	80.9 65.5	81.2 66.5	82.2 66.7	81.5 66.5	81.4 65.2	79.9 65.0	76.2 63.1
1964	76.1 62.0	79.4 63.4	78.8 63.3	77.3 64.7	78.3 64.0	79.4 65.5	80.1 67.1	81.0 67.0	82.9 66.1	82.2 65.1	79.3 63.7	80.5 61.6
1965	77.4 62.6	75.1 61.5	76.8 63.4	77.8 62.3	77.2 63.4	80.7 65.8	81.1 67.9	81.6 63.5	82.3 67.0	79.5 67.0	79.2 65.3	80.8 66.1
1966	80.0 62.9	75.4 60.7	76.0 62.0	70.5 67.1	81.8 68.7	81.1 68.6	81.2 69.3	82.0 70.0	84.7 70.5	82.9 69.5	79.3 69.3	72.3 62.5
1967	76.8 62.6	75.3 62.4	78.4 63.1	77.3 62.1	81.5 64.6	81.4 66.2	81.1 67.6	81.6 63.8	82.3 65.3	82.6 66.9	83.0 67.7	79.2 65.0
1968	76.8 62.6	76.2 62.8	77.7 63.3	78.6 64.3	79.6 64.8	80.8 67.4	81.0 67.8	81.2 67.7	81.1 67.7	81.1 67.9	79.1 65.9	76.4 63.7

	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.

1961	76.3	61.1	75.2	63.4	77.1	61.7	77.2	62.8	78.3	65.6	80.2	66.8	80.6	66.4	81.8	68.7	81.6	65.9	79.7	65.9	76.3	64.9	74.1	63.9
1962	76.9	62.9	76.3	61.9	76.2	62.3	78.3	64.9	78.1	65.4	79.8	65.7	80.6	67.2	81.4	68.1	80.9	67.8	80.1	67.1	78.7	65.7	76.8	63.9
1963	75.8	62.6	76.8	62.8	77.1	63.1	77.2	63.4	77.1	63.1	77.2	63.4	78.2	66.2	79.9	67.1	79.2	67.7	79.7	67.1	78.1	65.2	76.1	63.9
1964	76.3	62.6	76.8	62.8	77.1	63.1	77.2	63.4	77.1	63.1	77.2	63.4	78.2	66.2	79.9	67.1	79.2	67.7	79.7	67.1	78.1	65.2	76.1	63.9
1965	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1966	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1967	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1968	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1969	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1970	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1971	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1972	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1973	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1974	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1975	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1976	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1977	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1978	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1979	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1980	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1981	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1982	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1983	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1984	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1985	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1986	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1987	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1988	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1989	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1990	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1991	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1992	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1993	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1994	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1995	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1996	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1997	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1998	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
1999	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9
2000	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9	77.2	63.9

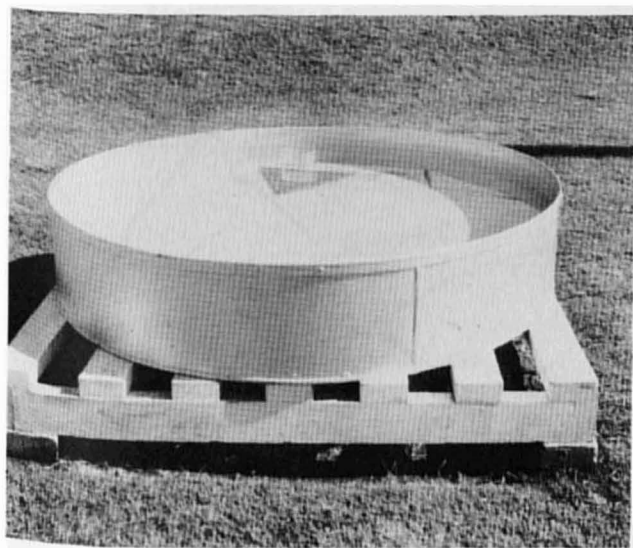
Station No. 2230 — OOKA

1905	75.7	60.5	75.5	60.8	75.6	61.7	75.4	62.7	78.2	63.8	79.1	64.6	80.4	66.0	80.1	67.1	78.7	66.8	79.6	64.7	—	—	—	76.9	62.7
1906	77.3	60.8	78.3	60.6	76.0	60.0	77.7	63.6	76.9	65.0	81.3	66.6	81.9	67.5	80.8	68.7	81.5	69.3	82.4	68.1	81.1	66.6	78.7	65.1	
1907	79.7	63.7	78.3	62.3	75.0	62.3	75.0	62.3	75.0	62.3	75.0	62.3	75.0	62.3	75.0	62.3	75.0	62.3	75.0	62.3	75.0	62.3	75.0	62.3	
1908	—	—	75.7	61.7	78.9	63.2	78.3	63.7	78.3	63.7	78.3	63.7	78.3	63.7	78.3	63.7	78.3	63.7	78.3	63.7	78.3	63.7	78.3	63.7	
1909	78.3	62.9	78.3	62.9	78.3	62.9	78.3	62.9	78.3	62.9	78.3	62.9	78.3	62.9	78.3	62.9	78.3	62.9	78.3	62.9	78.3	62.9	78.3	62.9	
1910	—	—	75.4	61.8	76.5	62.6	77.4	63.6	76.9	63.9	—	—	—	—	—	—	—	—	—	—	—	—	—	85.4	63.2
1911	82.3	61.5	80.9	61.8	81.8	61.9	76.4	64.5	76.7	64.5	77.4	65.7	78.6	66.1	80.7	67.5	78.7	66.3	78.4	64.8	77.4	64.7	75.3	63.1	
1912	78.3	60.8	76.0	61.8	74.0	60.5	—	—	78.5	64.1	80.2	66.0	81.2	66.4	82.1	68.0	82.1	67.4	80.4	67.0	77.3	64.7	75.8	63.1	
1913	74.5	62.8	75.8	62.2	76.7	63.1	76.7	62.6	78.5	64.1	80.3	66.3	81.4	67.0	82.8	68.3	82.5	67.5	82.4	68.5	77.4	66.4	76.1	64.8	
1914	73.6	61.1	76.1	62.2	76.1	62.9	78.5	63.8	76.6	63.3	78.1	65.9	78.9	66.4	78.8	64.4	78.8	64.4	78.8	64.4	78.8	64.4	78.8	64.4	
1915	74.4	62.5	72.5	60.3	76.2	62.1	76.0	63.8	78.5	66.8	81.2	67.2	83.3	66.8	83.1	66.8	83.1	66.8	83.1	66.8	83.1	66.8	83.1	66.8	
1916	78.3	63.5	78.9	63.7	78.3	63.6	78.9	63.6	78.8	66.0	81.7	67.5	83.8	67.2	84.9	68.0	84.9	68.0	84.9	68.0	84.9	68.0	84.9	68.0	
1917	80.6	65.3	79.5	61.5	77.9	62.5	78.6	63.8	80.2	64.1	82.1	66.5	82.7	68.5	87.7	85.5	87.2	84.3	66.3	80.8	65.2	80.9	64.1		
1918	79.5	62.3	77.7	61.7	76.2	63.3	77.9	64.3	81.0	65.5	81.8	68.8	86.5	81.7	67.8	83.1	68.4	82.6	67.7	79.7	65.9	76.6	64.1		

Evaporation

EVAPORATION STATIONS AND RECORDS

Measurement of unrestricted and unlimited natural evaporation of water from a shallow pan provides data useful in estimating water loss through evaporation from larger bodies of water and transpiration from plants. Evaporation data are necessary for water resources planning and are especially helpful to the hydrologist and agriculturist. The evaporation stations maintained by sugar plantations provide data to estimate the consumptive use of water by sugar cane and to determine the volume and scheduling of irrigation applications.



U.S.W.B. standard Class "A" pan, 48 inches in diameter and 10 inches deep, with stilling well to minimize water surface variations and fluctuations.

In comparison with other climatological records, evaporation data for the island of Hawaii are meager. The first pan evaporation gaging station on the island was established in 1911 at Naalehu (No. 14). Since no great importance was then attached to evaporation measurements, only a few stations were maintained and only for short

periods. More stations have been established on the island in recent years, however, with recognition of the value of evaporation data for agricultural purposes.

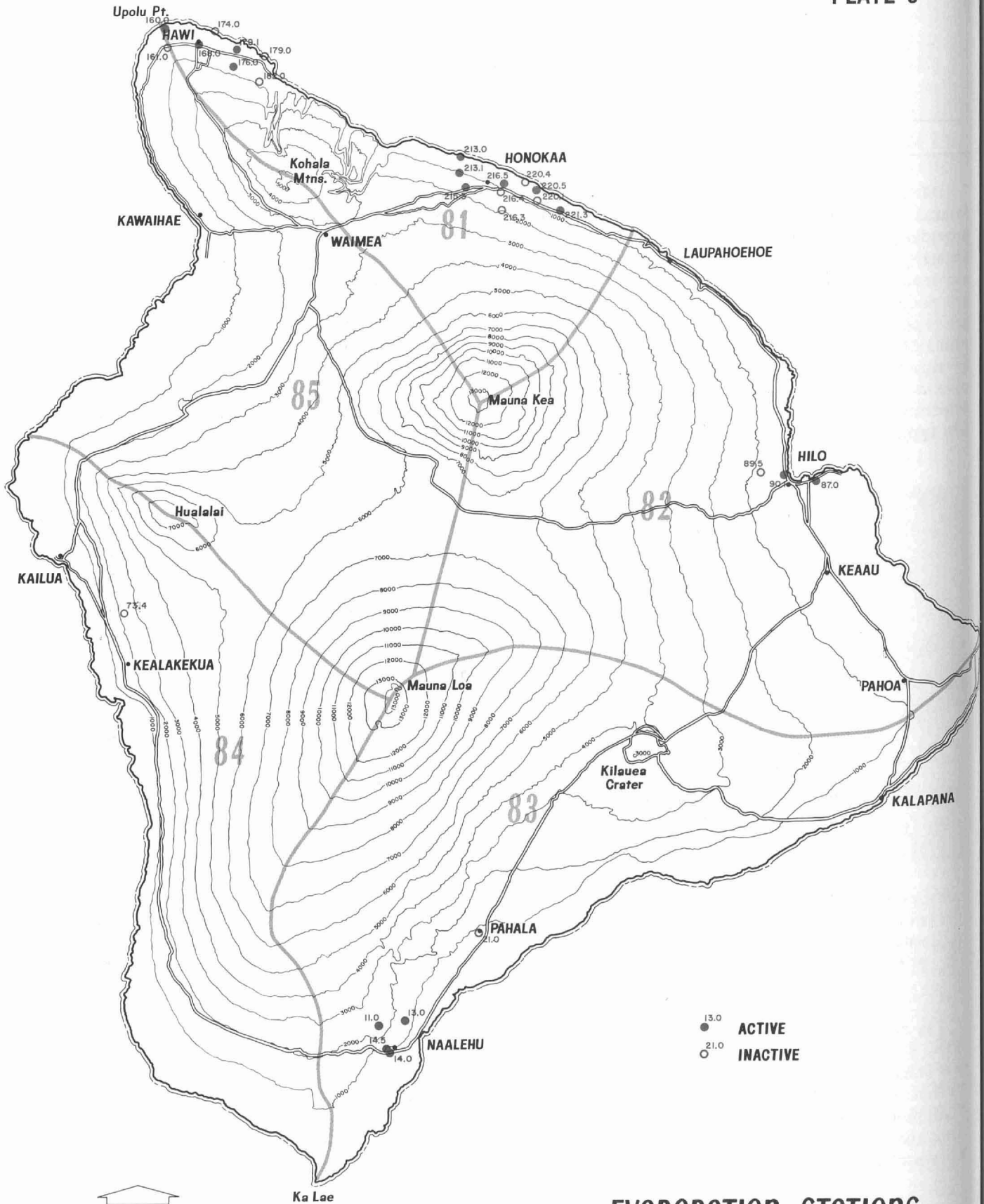
There are at present 18 active evaporation stations, sparsely scattered throughout the island of Hawaii, primarily in the lower elevations (see Plate 8). Most stations are located on sugar plantations along the Hamakua and North Kohala coasts. All of the island's evaporation stations, with the exception of the U.S. Weather Bureau's station at Hilo Airport (No. 87), are maintained by the Hawaiian Sugar Planters Association or its member plantations.

A compilation of all 33 pan evaporation gaging stations on Hawaii having available records is presented in the Evaporation Station Index, pages 106-107. Many of the stations have short periods of record, the longest period being 14 years. The station established at Naalehu (No. 14) in 1911, was discontinued after half a year of operation and reactivated in 1962. A cross reference to the numerical listing is presented in the Alphabetical List of Climatologic Stations, pages 9-11. (See Rainfall section of this report for climatologic station numbering system.)

Because of the sparsity of evaporation data, records of unofficial stations, even those with short periods of record, have been published with official U.S. Weather Bureau data in Selected Evaporation Records, pages 108-109. Those records reported in thousandths have been rounded to the nearest hundredths. Monthly and annual totals and means are included.

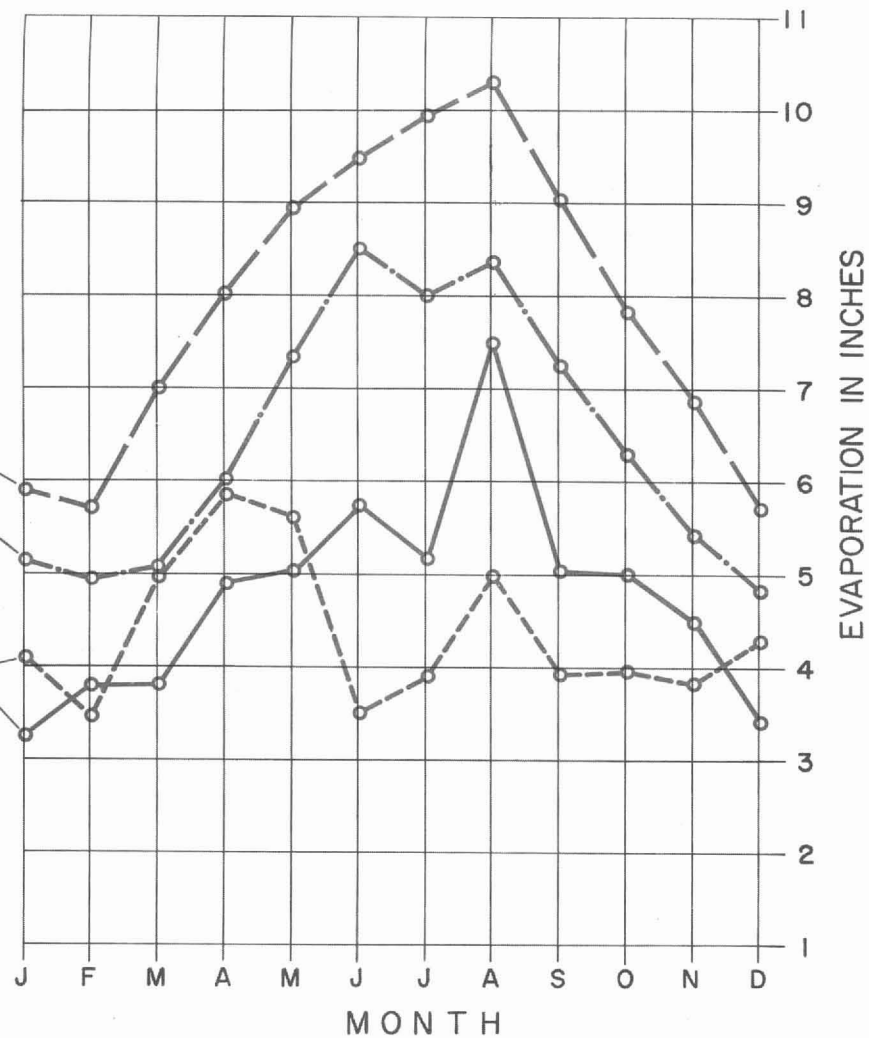
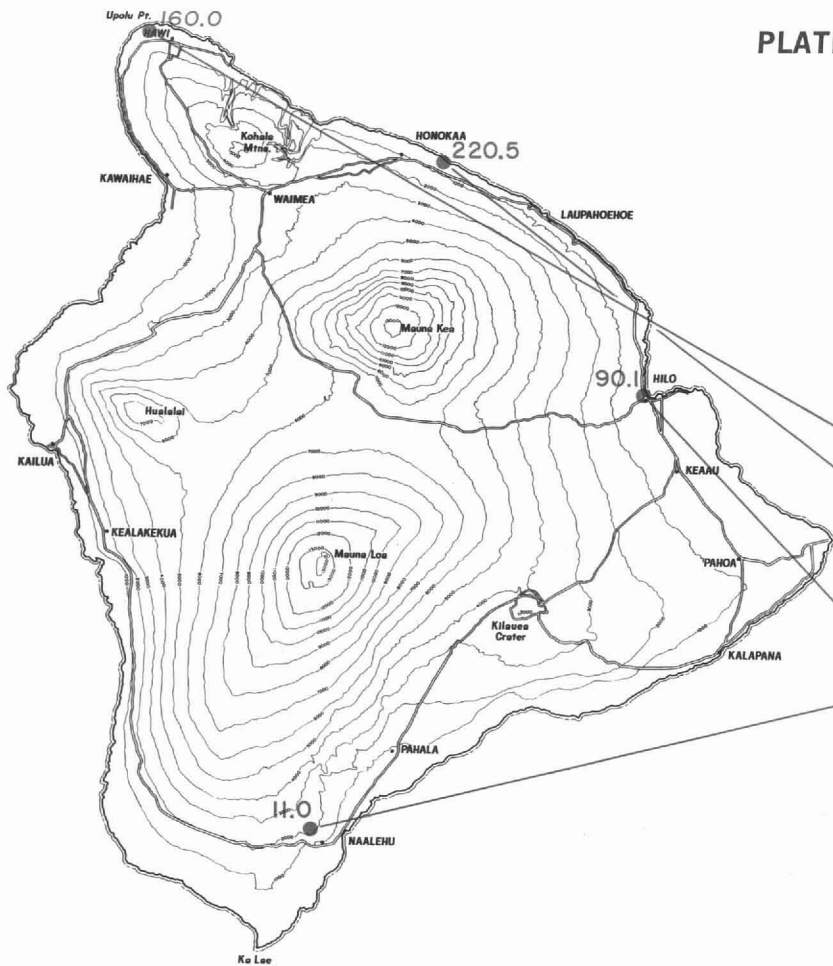
EVAPORATION CHARACTERISTICS

Evaporation is generally correlated with seasonal and local variations in rainfall, as illustrated in Plate 9. Minimum evaporation occurs in the wet month of February and the maximum during the dry summer months of June through August, the seasonal difference being substantial. Evaporation at wet windward stations follows a characteristic pattern, whereas there is no predictable pattern among leeward stations.



EVAPORATION STATIONS

PLATE 9



EVAPORATION AT SELECTED STATIONS

Evaporation Station Index

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
11		Makino	Hutchinson Sugar Co	83	Kau	19 05.6 155 36.1	2120	Weekly	1962-	HSPA	
12.14		Field 712-700	"	"	"	19 08.4 155 32.5	650	"	1962-1965	"	
13		Waiubata	"	"	"	19 05.9 155 34.2	1375	"	1962-	"	
14	6588	Naalehu	"	"	"	19 03.8 155 35.3	675	"	1911-	Obsvr DOWALD	Reactivated 1962
14.5		Naalehu Pan Sta (Field 135)	"	"	"	19 04.1 155 35.5	805	"		Obsvr	
21	7421	Pahala	Hawaiian Ag Co	"	"	19 12.1 155 28.8	860	Daily	1931-1945	DOWALD USWB	Moved 1/48 90' N & 170' W; moved twice before
73.4		Keauhou Test Site	DOWALD	84	N Kona	19 34.8 155 55.6	2040	Weekly	1958-1960	DOWALD	Keauhou HWA Site
87	1492	Hilo Airport	USWB	82	S Hilo	19 43.4 155 03.6	30	Daily	1955-	DOWALD USWB	Charts on file NWRC
89.5		Hilo Mauka Hawaii Sub Sta	HSPA Exp Sta Hilo	"	"	19 44.2 155 07.8	900	Weekly	1963-1966	HSPA	
90.1		Hilo Makai Hawaii Sub Sta	"	"	"	19 43.8 155 05.9	220	"	1963-	"	Known as Hawaii Sub Sta Office
159.4		Parker Ranch Pasture	Kohala Sugar Co	85	N Kohala	20 12.8 155 53.3	370	"	1960-1967	Obsvr	
160.0		Sta 3	"	"	"	20 15.5 155 52.5	200	"	1960-	Obsvr HSPA	Upolu 5
161.0		Puakea	"	"	"	20 14.1 155 52.4	570	"	1961-1968	HSPA	
164.2		Station 34	"	"	"	20 12.7 155 51.2	1490	"	1968-	Obsvr HSPA	Puu Mamoo
168.0		Station 1 Hawi Office	"	81	"	20 14.4 155 49.8	600	"	1960-	HSPA	
171.0		Alaalae	"	"	"			"	1962-1963	"	
174		Station 16	"	"	"	20 15.3 155 48.6	190	"	1960-1965	Obsvr HSPA	Union Office; Union Mill; Union Station
176		Maulili	"	"	"	20 12.7 155 47.3	960	"	1960-	HSPA	
179		Niulii Camp	"	"	"	20 13.5 155 44.8	75	"	1960-1967	"	
179.1		Kohala Mill	"	"	"	20 14.0 155 46.9	310	"	1960-	"	
182		Waiapuka	"	"	"	20 11.9 155 45.2	1000	"	1962-1965	"	
206.0		Kukuihaele Landing	Honokaa Sugar Co	"	Hamakua	20 07.8 155 33.7	300	"	1963-1964	"	
211.1		Honokaa Pasture	"	"	"	20 05.3 155 31.0	1520	"	1961-1964	"	Moved from 215.3
213		Kawela	"	"	"	20 06.5 155 30.0	400	"	1963	"	Moved from Field 26
213.1		New Stable	"	"	"	20 05.7 155 30.2	1125	"	1963-	"	Was Field 28B and Field 26
214.1		Field 34-35	"	"	"	20 05.9 155 28.3	350	"	1961-1964	"	
215.3		Ahualoa	"	"	"	20 04.5 155 29.9	1835	"	1964	"	Moved from pasture; Field 7A

Note: For Key to Abbreviations, see page 10.

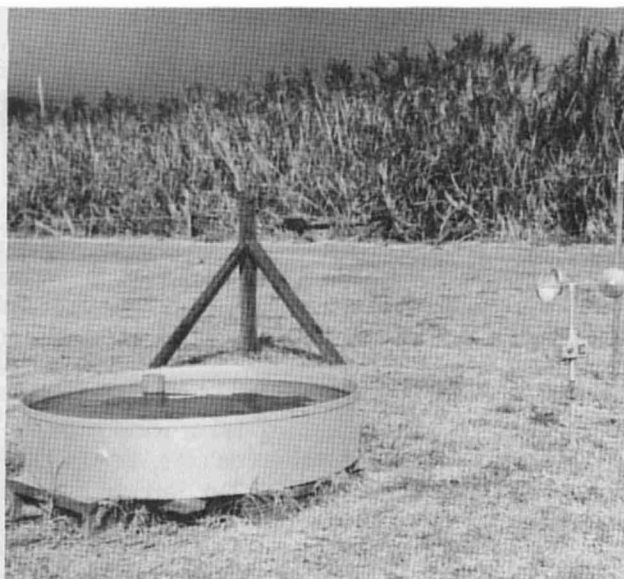
State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
216.3		Airport	Paauhau Sugar Co	81	Hamakua	20 02.7 155 27.0	2075	Weekly	1962- 1965	HSPA	
216.4		PMA Plant	"	"	"	20 05.0 155 25.0	(1100) 1250	"	1962- 1966	"	Known as mgr's res; was State Key No. 220.1
216.5		Field 003	"	"	"	20 04.7 155 26.8	930	"	1964-	"	
220.4		Field 14	"	"	"	20 04.6 155 25.2	430	"	1960- 1961	Obsvr HSPA	Moved to Field 15; charts at plantation
220.5		Field 015	"	"	"	20 04.3 155 24.2	310	"	1962-	HSPA	
221.3		Hamakua Var- iety Sta	HSPA Exp Sta Hilo	"	"	20 02.7 155 22.6	750	"	1963-	"	

Selected Evaporation Records

	JAN.	FEB.	MAR.	APR.	MAY.	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
Station No. 11 — MAKINO													
1962													3.587
1963	5.797*	—	5.797*	5.130	5.487*	2.040*	4.495*	3.060	3.030*	3.414	2.953	2.573*	—
1964	4.869	4.320	6.944*	6.133	7.336	4.335	3.824	4.502	3.852	3.547	3.822	4.681*	57.605
1965	5.626	4.047	4.397	7.175	4.805	3.816	4.311	4.391	5.027	5.704	4.170*	4.965*	58.434
1966	1.488*	2.074	3.267	5.562	6.448*	3.830*	3.875*	4.292*	3.870*	2.852*	5.580*	2.263*	45.201
1967	3.193*	3.500*	4.526*	5.292	4.061*	3.690*	3.438	8.738	4.160	4.393	2.998*	7.792	55.761
Total	20.973	13.941	24.931	29.292	26.137	17.511	19.942	24.983	19.639	19.910	19.223	25.861	262.072
Mean	4.195	3.485	4.986	5.858	5.627	3.502	3.988	4.997	3.928	3.982	3.845	4.310	65.518
Station No. 12.14 — FIELD 712-700													
1962													5.066
1963	5.952*	6.356*	6.185*	6.480	5.865	4.391	6.873	4.860	5.277	5.333	5.497	4.345	—
1964	5.107	7.195	5.208	5.166	5.609	4.500	5.972	7.475	6.292	5.037	—	—	67.245
1965	Discontinued												—
Total	11.059	13.551	11.393	11.646	11.295	8.891	12.565	12.355	11.569	10.370	5.467	9.411	67.245
Mean	5.530	6.776	5.697	5.823	5.648	4.446	6.283	6.178	5.785	5.185	5.487	4.706	67.245
Station No. 13 — WAIUBATA													
1962													5.145
1963	5.821*	4.900*	4.505*	6.330*	5.133	4.289	5.292	4.946	4.837	4.837	4.645	4.538	59.580
1964	5.077	5.520	5.549*	4.522	5.223	4.500	5.703	5.422	5.013	4.822	4.572	—	—
1965	—	6.416	4.464	6.363	4.991*	4.798	6.023	5.554	4.032	4.614	3.660*	4.154*	—
1966	5.673*	4.788*	3.740	3.863	5.951	5.937	6.066	5.468	6.553	4.929*	5.670*	5.890*	64.438
1967	3.658*	4.760*	6.296	5.643	5.704*	5.708	5.164	9.094	5.046	5.598	3.874*	8.790	69.707
Total	20.236	26.384	24.954	26.521	27.002	25.232	28.238	30.204	25.563	24.600	22.421	28.287	193.725
Mean	5.059	5.277	4.991	5.304	5.400	5.046	5.648	6.041	5.117	4.920	4.484	5.857	64.575
Station No. 14.0 — NAALEHU													
1911							6.57	7.24	7.96	9.52	7.50	8.50	—
1912	Discontinued												—
1962													6.238
1963	7.471*	4.948	5.873	9.860*	6.033	5.287	6.007	5.572	5.651	5.804	3.944	3.348	69.996
1964	5.717	6.041*	5.394*	6.021	6.631	4.904	7.550	8.221	7.380	6.835	6.380	7.502*	79.279
1965	6.314	5.214	5.609	7.003	7.069*	7.043	7.275	5.683	6.205	5.824	5.301*	4.898*	73.468
1966	4.831	2.686	5.863	6.470	6.347	5.370	1.206	6.656	7.826	5.681	5.340*	4.774*	63.250
1967	5.363*	5.432*	5.395	5.550*	5.465	5.484	5.784	8.388	6.428	5.904	4.550*	5.134	68.877
Total	29.696	24.921	26.134	35.004	31.575	28.088	34.392	41.860	41.450	39.768	36.015	40.392	354.767
Mean	5.339	4.984	5.627	7.001	6.315	5.618	5.732	6.977	6.908	6.628	6.003	5.770	70.953
Station No. 21.0 — PAHALA													
1931	6.304	7.43	6.12	5.41	4.75	7.14	5.61	6.59	6.60	4.79	4.07	4.55	89.10
1932	4.54	4.02	4.79	6.45	6.47	6.47	5.73	5.00	5.00	5.47	4.55	4.30	62.79
1933	4.72	3.73	5.00	4.62	5.59	5.31	6.69	6.40	6.84	5.12	3.67	5.76	63.45
1934	4.03	4.44	4.88	4.58	5.82	5.70	6.53	5.43	5.07	6.27	4.93	4.78	62.46
1935	5.19	4.37	3.87	5.31	6.27	5.70	6.60	6.14	5.53	3.57	3.62	4.10	60.27
1936	3.86	4.67	5.16	4.76	6.79	6.43	6.67	6.84	4.94	4.54	4.69	5.68	65.13
1937	3.66	3.79	3.64	3.36	5.12	6.28	6.27	6.34	5.71	4.87	5.50	3.74	60.48
1938	4.42	3.98	5.10	5.76	4.32	5.39	5.64	5.71	5.31	5.60	4.13	4.64	60.20
1939	5.08	4.12	4.61	4.29	6.30	5.15	6.42	6.35	5.56	4.90	4.13	4.12	61.06
1940	3.96	4.63	4.93	5.02	5.82	5.97	6.57	6.35	4.63	4.68	4.05	3.94	59.95
1941	4.22	4.00	6.30	6.57	5.74	7.04	6.58	6.45	4.91	4.81	4.46	6.06	67.24
1942	4.65	5.49	5.06	5.55	6.18	6.46	6.85	6.38	5.80	5.26	4.34	3.98	66.00
1943	3.72	5.09	4.19	6.36	4.99	5.54	6.84	6.49	5.92	5.76	5.51	4.79	65.20
1944	5.63	4.30	4.70	6.79	5.42	5.03	6.12	6.82	5.88	5.13	5.20	4.30	65.30
1945	4.17	4.01	6.26	4.15	4.48	Discontinued							—
Total	68.10	68.07	74.61	80.98	84.06	83.21	82.38	87.29	77.70	70.77	62.85	64.74	888.82
Mean	4.55	4.54	4.97	5.40	5.60	5.94	6.37	6.24	5.55	5.06	4.49	4.62	63.33
Station No. 87 — HILO AIRPORT													
1955							5.84	5.84	4.65	4.10	4.58	—	—
1956	5.38	4.14	5.17	5.49	4.94	5.78	6.68	5.56	6.43	4.65	3.93	4.91	63.06
1957	4.86	4.71	6.39	5.31	6.41	7.51	6.34	5.65	6.48	6.52	3.74	3.87	67.49
1958	7.04	5.17	6.15	5.69	5.70	6.66	6.00	5.86	5.05	5.29	3.86	5.87	68.54
1959	4.27	5.20	6.28	5.26	6.59	7.73	7.61	7.10	4.86	5.70	4.22	3.37	66.19
1960	4.48	5.75	6.29	4.94	6.28	6.52	7.42	5.77	5.58	6.18	3.85	4.96	66.01
1961	5.37	4.24*	5.64	6.23	5.59	7.55	7.47	6.30	—	—	—	2.75*	—
1962	5.95	5.87	4.66*	6.85	4.50	7.24	5.77	7.11	4.84*	6.50	4.42	4.79	68.80
1963	5.14	6.49	4.33*	7.51*	5.57*	6.16*	6.36	5.76	5.56*	5.81	5.31	5.80	70.80
1964	5.00*	4.16*	3.90*	5.15*	4.93*	5.98*	7.05	6.85	5.17	4.31*	4.51*	4.38*	61.19
1965	4.69*	4.71	4.65	4.93*	6.22*	5.64*	6.98*	6.65	7.79*	5.84*	6.56*	2.87*	64.62
1966	3.38*	3.51*	5.82	5.42	7.10	6.21	6.21*	6.41	5.75*	4.71*	3.86*	4.68*	62.86
Total	56.26	54.05	59.27	62.78	63.63	73.18	73.89	74.66	63.35	60.13	45.45	52.83	683.38
Mean	5.11	4.91	5.39	5.71	5.80	6.65	6.72	6.22	5.76	5.46	4.14	4.40	60.31
Station No. 89.5 — HILO MAUKA													
1963		3.416*	4.774*	3.150*	3.992	3.930*	3.602	2.869	2.610*	5.270*	3.357	3.694	—
1964	4.413	4.964	3.410*	4.346	2.635*	3.617	4.645	8.270*	3.328	2.674	3.760*	3.048	46.130
1965	4.094	3.574	4.309*	5.730*	4.932	3.909	5.550	4.786	3.277	3.348*	2.580*	5.425*	51.514
1966	3.224*	2.248	3.317*	3.090*	Discontinued								—
Total	11.731	14.202	15.810	16.286	11.559	11.456	13.797	12.925	9.215	12.292	9.717	12.077	97.644
Mean	3.910	3.551	3.952	4.072	3.853	3.819	4.599	4.308	3.072	4.097	3.239	4.026	48.822

*Indicates built-up total where record is poor or there is an overflow.

	JAN.	FEB.	MAR.	APR.	MAY.	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
Station No. 90.1 — HILO MAKAI													
1963			4.836*	7.020*	3.320	2.663	5.425*	3.611	5.559	4.526*	4.456	4.762	—
1964	5.165	3.890	2.790*	3.196	4.495*	5.810	5.797	5.735*	4.193	4.929*	5.520*	5.374	54.86
1965	3.556	4.490	4.161	4.524	7.505	5.717	5.319	6.153*	5.250*	5.233	4.440*	1.550*	59.88
1966	1.830	2.721	4.154*	4.830*	6.045	5.041	5.859*	5.828*	4.440*	3.813*	4.680*	3.647	52.18
1967	2.429	4.108	5.231	5.129	3.999*	9.420*	3.658*	5.270*	5.850*	6.545	3.696	3.938*	57.38
Total	12,980	15,209	19,172	24,669	25,364	28,651	26,058	28,597	25,282	25,046	22,792	17,271	224.89
Mean	3.245	3.802	3.834	4.934	5.073	5.730	5.212	7.519	5.068	5.009	4.558	3.454	54.12
Station No. 160 — STATION 3													
1960						6.89	8.24	8.45	9.01	7.51	7.05	4.86	4.03
1961	4.70	4.26	6.80	7.81	8.48	8.03	10.21	11.29	11.09	8.21	8.44	7.09	95.61
1962	5.50	6.60	7.51	8.67	9.27	10.42	10.25	11.15	9.85	8.44	8.90	5.48*	101.78
1963	7.39*	5.12	6.60*	6.79	8.54	9.03	9.73	11.06	9.00	8.69	7.50	5.57	95.61
1964	7.57	7.47	7.96	8.67	8.95	9.36	10.30	9.91	8.19	6.89	4.04	5.55	65.58
1965	4.34	5.60	7.04	8.14	10.10	10.95	10.88	11.16	9.26	8.07	5.57	6.03	66.16
1966	5.45	4.17	7.37	8.25	9.20	9.42	9.55	8.80	7.86	7.13	6.99	6.87	61.16
1967	6.41	6.75*	6.05	8.06	10.59	10.54	10.15	9.91	9.44	8.07	6.74	5.84	100.14
Total	41,136	39,97	49,15	56,18	71,71	76,01	79,53	82,29	72,20	62,55	55,04	45,66	675.00
Mean	5.91	5.71	7.02	8.03	8.96	9.50	9.94	10.29	9.03	7.82	6.88	5.71	96.50
Station No. 161.0 — PUAKA													
1961								9.38	9.61	9.60	7.13	7.90	5.97
1962	3.97	6.80	6.70	7.58	8.63	9.41	10.60	11.78	10.27	8.63	9.35	4.65*	98.93
1963	5.50*	5.07	4.96*	5.66	7.00	7.83	7.84	8.68	6.98	7.06	5.48	4.32*	75.00
1964	5.85	5.61	6.44	6.98	8.98	8.96	9.96	10.15	8.41	7.44	4.73*	4.80	84.61
1965	4.07	4.88	6.24	6.80*	7.94	10.32*	11.05*	10.23*	8.88*	7.22	4.98	4.65	87.61
1966	4.85	3.14	5.47	6.69	8.47	7.59	7.94	6.97	6.93	5.94	5.30	2.06	72.21
1967	3.60	4.81	5.22	6.71	8.54	9.21	8.29	5.98	8.86	7.85	7.34	4.56	80.97
Total	27,64	30,31	35,53	40,32	40,54	52,82	64,07	63,40	59,39	50,97	45,08	30,21	499.91
Mean	4.91	5.05	5.82	6.72	8.26	8.80	9.15	9.06	8.48	7.28	6.44	4.32	83.31
Station No. 168 — STATION 1													
1963											5.28*	3.84	—
1964	6.42	6.55	6.17	6.69	7.99	7.07	8.47	7.93	6.63	6.00	4.04*	4.58	72.58
1965	4.10	4.73	5.25	6.24	7.01	7.47	8.68	8.56	8.44	6.28	4.58	5.31	77.73
1966	5.31	3.60	5.77	6.07	7.32	7.60	7.08	6.85	6.23	5.39	4.76	4.45	70.03
1967	4.48	4.70	3.92	5.42	6.88*	6.68	6.09	6.07	8.15	7.01	6.76	3.85	71.81
Total	20,31	19,48	21,11	24,42	28,90	29,82	30,34	30,41	29,45	24,68	25,42	22,03	297.25
Mean	5.08	4.87	5.28	6.11	7.23	7.46	7.59	7.60	7.36	6.17	5.08	4.41	74.31
Station No. 171.0 — ALAALAE													
1962								11.4*	10.09	8.69	9.91	6.24	—
1963	7.08	6.15	5.44*	6.78*	6.78	7.41	7.52	10.14*	Discontinued				70.68
Total	—	—	—	—	—	—	—	21.54	—	—	—	—	70.68
Mean	7.08	6.15	5.44	6.78	6.78	7.41	7.52	10.77	10.09	8.69	9.91	6.24	70.68
Station No. 174 — STATION 16													
1960						5.62	6.26	5.89	7.72	4.89	5.27	3.87	3.44
1961	3.70	3.52	5.36	6.14	6.71	6.65	7.88	7.54	7.73	5.98	7.36*	4.79	73.19
1962	5.03	5.86	6.40	7.80	8.45	9.02	8.68	9.30	7.84	7.12	5.16*	4.92*	75.16
1963	5.82	4.83	5.45*	5.91	6.73	7.27	7.36	7.83*	8.71	6.98	Discontinued	—	75.16
Total	14,55	14,21	17,21	19,85	27,51	29,20	29,79	32,39	27,17	25,35	16,39	13,15	158.62
Mean	4.85	4.74	5.74	6.62	6.88	7.30	7.45	8.10	6.79	6.34	5.16	4.38	79.46
Station No. 176 — MAULILI													
1961								8.33	8.38	7.87	5.50	6.08	5.00
1962	4.85	5.11	5.78	7.30	8.13	7.92	8.56	9.01	7.95	6.87	7.85	4.65*	86.33
1963	6.78	4.76	4.85*	5.70*	7.13	7.22	6.93	7.70	5.58	5.37	4.99	3.29	73.19
1964	5.87	5.59	5.26	5.77	7.08*	6.43	6.67	7.02	5.93	4.96*	4.88*	5.12*	70.68
1965	4.03*	4.19	4.34*	5.80*	6.97	8.49	8.16	8.49	8.94	6.41	6.35	4.64	77.73
1966	5.41	3.44	5.92	5.31	7.64	8.04*	7.37	8.14	6.63	5.74	4.83	4.99*	74.36
1967	5.30*	5.04	4.84	5.48	6.98	7.98	7.27	7.29	7.10	5.66	6.02	3.35	72.37
Total	31,44	28,04	30,79	34,46	43,89	46,04	55,29	55,30	50,20	40,51	38,61	31,04	452.71
Mean	5.24	4.67	5.13	5.74	7.32	7.67	7.90	7.90	7.17	5.79	5.52	4.43	75.43
Station No. 179 — NIULI													
1962													—
1963	5.78	4.25	6.38*	6.75	8.17	8.12	8.57	8.62	7.55	6.55	8.37	4.96*	80.67
1964	7.25*	6.59	5.77	6.73	8.04	8.27	8.67	7.20	6.22	5.10*	4.89*	—	78.68
1965	4.76*	4.57	4.96	7.17	8.10	9.47	9.35	9.51	9.05	7.19	5.75	5.76	75.64
1966	5.40	4.07	6.90	8.09	8.54	7.81	8.26	7.00*	6.18*	6.41	5.62	5.64	88.61
1967	5.41	5.63	5.40	6.07	7.28	8.19	7.96	8.36	8.21	6.68	6.92	4.08	80.10
Total	28,60	25,11	30,42	36,61	47,99	49,97	50,63	51,75	44,82	39,95	37,39	30,37	403.80
Mean	5.72	5.02	6.08	6.10	8.00	8.33	8.44	8.83	7.47	6.66	6.23	5.06	80.80



Typical pan evaporation station. Left, placing hook gage on stilling well of evaporation pan.

	JAN.	FEB.	MAR.	APR.	MAY.	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
Station No. 179.1 — KOHALA MILL													
1966			6.69	5.15	8.33	8.08	7.71	7.40	8.02	5.96	5.27	—	
1967	5.55	6.19*	5.77	6.66	8.52	9.25	8.98	9.02	9.43	7.54	7.85	4.47	88.66
Total	—	—	12.46	11.81	16.85	18.33	16.69	16.42	17.45	13.50	13.02	9.75	86.66
Mean	5.55	6.19	6.23	5.91	8.43	9.17	8.35	8.21	8.73	6.75	6.51	4.88	86.66
Station No. 182 — WAIAPUKA													
1962			5.81	5.54	6.49	5.96	6.07	5.63	5.20	5.44	4.03*	—	
1963	3.75	4.25	4.42*	4.18	4.99	6.33	6.13	6.58	4.31	4.63	4.34	4.07	57.65
1964	4.30	4.35*	5.30	6.42	7.75*	7.30	7.76	8.15	6.82	4.96*	—	4.34*	
1965	4.01	3.52	5.00	5.70*	6.69	8.38	9.54	8.68*	Discontinued				
Total	12.66	12.12	14.72	22.11	24.64	28.50	29.39	29.48	16.76	14.79	9.78	12.44	—
Mean	4.02	4.04	4.91	5.53	6.16	7.13	7.35	7.37	5.59	4.93	4.89	4.15	57.65
Station No. 206.0 — KUKUIHALE LANDING													
1963		5.572*	6.508	6.606	6.386	7.942	7.754	8.245	6.511	6.611	5.820*	5.464	—
1964	6.304	5.806	Discontinued										—
Total	6.304	11.378	6.508	6.606	6.386	7.942	7.754	8.245	6.511	6.611	5.820	5.464	—
Mean	6.304	5.689	6.508	6.606	6.386	7.942	7.754	8.245	6.511	6.611	5.820	5.464	—
Station No. 211.1 — HONOKAA PASTURE													
1961										4.371*	4.620	—	—
1962	3.751*	3.864*	5.704*	4.154	5.574	6.714	6.479*	5.673	5.388	5.549*	5.829	5.270*	63.949
1963	6.138*	4.502	3.394	4.470*	4.681*	4.970	4.343	3.528	3.360*	3.720*	3.900*	5.177*	52.613
1964	4.650*	3.219*	Discontinued										
Total	14.539	11.985	9.098	8.624	10.255	11.684	10.822	9.601	8.748	13.640	14.379	10.447	116.562
Mean	4.846	3.862	4.549	4.312	5.128	5.842	5.411	4.801	4.374	4.547	4.793	5.224	58.281
Station No. 213 — KAWELA													
1953		5.678	4.914	6.430	6.882*	7.120	6.725	8.068	6.753	6.862	5.624	4.887	—
1954	5.732	5.295	6.175	6.744	6.210	6.848	6.707	7.568	6.780*	4.371*	4.020*	5.456*	71.906
1955	6.231*	4.760*	8.060*	6.270*	7.187	9.156	9.265	9.324	8.000	7.490	5.564*	7.041	92.288
1956	7.760	4.175*	6.604	5.453	7.059	8.849	7.430*	7.135	7.233*	6.945*	6.804	5.825*	79.296
1957	6.186*	6.104*	5.146*	5.850*	8.278	7.980	7.350*	6.896*	7.772	8.951	11.467*	7.907	90.039
Total	25.811	28.012	30.799	30.747	36.419	39.534	37.362	39.079	36.250	34.478	35.867	31.219	333.831
Mean	6.470	5.202	6.160	6.149	7.613	7.907	7.472	7.816	7.250	6.876	7.177	6.244	83.458
Station No. 213.1 — NEW STABLE													
1961										7.748	4.800*	—	—
1962	4.185*	4.653	5.332*	5.492	6.512					5.199	4.618	4.065	—
1963	4.564	5.354	4.813	5.138	6.324*	7.164	6.311	6.862	4.412	4.602	4.802	3.769	65.131
1964	4.464	5.476	5.215	6.860	8.495	8.141	6.103	7.254	6.751	3.410*	5.801	4.586*	70.763
1965	3.585*	4.172*	4.092*	9.060*	7.092	11.487	12.035	10.887	9.246	6.448*	6.240*	6.343	87.760
1966	6.791	3.732*	6.138*	4.795*	7.977	8.061	7.829	6.461*	6.306*	6.137	4.942	5.084*	77.671
1967	5.642*	6.356*	5.332*	6.120*	8.186	7.824	8.316	7.440*	8.583	7.309*	10.380*	7.199	88.657
Total	30.320	29.745	31.522	34.469	43.006	41.680	39.594	38.904	35.298	40.850	41.583	31.018	385.984
Mean	5.053	4.958	5.254	5.744	7.296	8.372	7.919	7.761	7.060	5.836	5.979	5.170	77.197
Station No. 214.1 — FIELD 34-35													
1961										6.566	4.630*	—	—
1962	3.959*	5.049	6.479*	6.326	7.539	8.550*	—	—	7.893	—	—	—	—
1963	5.869	5.993	5.035	6.075	6.107*	7.555	8.596	6.796	5.672	5.368	4.863	3.861	69.820
1964	4.545	5.478	Discontinued										
Total	14.443	16.519	11.514	12.401	13.646	16.105	6.596	6.786	13.565	11.934	14.463	6.497	69.820
Mean	4.844	5.506	5.757	6.201	6.823	8.053	6.596	6.786	6.783	5.967	5.821	4.249	69.820

	JAN.	FEB.	MAR.	APR.	MAY.	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
Station No. 215.3—AHUALOA													
1964			4.123*	6.130	7.660	4.575	4.696*	4.309*	5.220*	3.286*	7.244	4.061*	
1965	5.611	3.136	3.472	5.700*	5.469	7.585	6.708	7.590	5.060	4.650*	6.870*	5.206*	67.957
1966	3.799*	2.867*	4.629*	3.369*	5.493	5.070*	4.560	4.042*	4.188*	4.203*	3.630*	3.503*	49.350
1967	4.433*	4.340*	3.348	4.230*	5.301*	5.130*	5.384*	5.315*	6.041	5.154	5.480*	5.159	59.305
Total	13,840	10,343	15,572	19,429	23,943	22,360	21,560	21,254	21,409	17,293	23,204	17,929	176,811
Mean	4.613	3.447	3.893	4.857	5.986	5.590	5.390	5.314	5.352	4.323	5.801	4.482	58.871
Station No. 216.3—AIRPORT													
1962				4.890*	5.595	5.019	5.373	5.233	3.478	4.208	4.630*	3.782*	
1963	5.301*	4.256*	4.123*	4.710*	4.931*	5.874	4.650*	5.101	3.180*	4.667*	3.000*	3.288*	53.339
1964	3.675*	4.234*	4.216*	4.260*	4.980*	4.680*			4.170*	2.914*	2.430*	3.007*	
1965	2.604*	1.960*	2.666*	4.320*	5.828*	6.540*	6.138	7.628*	5.398	3.876*	5.150*	Discontinued	
Total	11,760	10,420	11,005	18,180	21,374	22,113	16,158	17,957	17,964	15,864	13,410	10,075	53.339
Mean	3.927	3.473	3.668	4.545	5.344	5.528	5.386	5.986	4.491	3.968	3.353	3.358	53.339
Station No. 216.4—PMA PLANT													
1962				6.810*	8.516	7.865	6.681	8.137	7.229	6.399	7.355	7.140	
1963	6.122*	5.544*	4.216*	4.050*	6.200*	6.510*	6.665*	5.859*	5.220*	4.759	4.530*	4.060*	65.735
1964	5.518*	7.163*	5.859*	7.020*	5.556*	7.530*	6.696*	6.045*	5.040*	4.189*	3.390*	3.565*	70.567
1965	3.844*	3.360*	3.844*	5.340*	8.921*	6.603	6.975*	8.153*	7.852	4.402*	3.480*	3.751	63.625
1966	3.534*	4.732*	Discontinued										
Total	21,518	20,799	13,919	23,220	29,193	26,508	26,017	28,164	25,341	19,745	18,755	18,516	196,827
Mean	5.255	5.200	4.440	5.805	7.298	7.127	7.254	7.049	6.335	4.936	4.689	4.629	66,609
Station No. 220.5—FIELD 003													
1964		7.076*	5.084*	6.540*	7.812*	6.267	6.015	6.401	5.880*	5.487*	4.020*	4.619*	
1965	4.216*	3.416*	4.433*	4.770*	5.921*	6.969	7.290	7.797	8.265	6.262*	4.980*	4.805*	69.124
1966	5.033*	3.780*	5.828*	4.440*	6.127	4.740	6.250	5.515*	5.100*	4.929*	4.170*	6.045*	64.710
1967	4.898*	5.152*	4.898*	5.460*	6.934*	6.537	6.696*	5.859*	6.673	7.484	5.627	4.425	70.543
Total	14,167	19,424	20,243	21,210	26,494	27,263	26,251	25,575	26,118	24,162	19,397	19,894	204,377
Mean	4.722	4.856	5.061	5.303	6.623	6.815	6.563	6.394	6.330	6.041	4.849	4.976	69.129
Station No. 220.5—FIELD 015													
1962				6.809	9.796	10.231	9.866	9.256	7.712	7.145	7.494	5.363*	
1963	5.735*	5.488*	5.244	6.120*	3.944*	8.043*	7.440*	8.370*	6.060*	5.456*	5.550*	4.619*	75.069
1964	6.479*	6.409*	5.518*	7.140*	8.060*	8.297	7.688*	6.375	7.110*	5.735*	5.220*	5.206*	81.239
1965	4.619*	3.340	4.586*	5.850*	7.099*	8.190*	8.277*	9.170	8.114	5.983*	4.770*	4.433*	74.433
1966	4.371*	3.968*	5.298*	4.200*	7.450	9.080	7.872*	7.533*	6.750*	6.634*	5.122*	5.285*	73.383
1967	4.526*	5.880	4.898*	5.880	7.656*	7.393*	9.967*	7.595*	6.871	6.931	4.494	4.076	74.063
Total	25,730	24,785	25,467	36,099	44,097	51,244	48,179	50,301	43,617	37,894	32,644	29,124	376,187
Mean	5.146	4.957	5.097	6.017	7.395	8.541	8.830	8.394	7.270	6.314	5.461	4.954	75.938
Station No. 221.3—HAMAKUA VARIETY STATION													
1964	6.267	6.351*	6.913*	7.001	7.843*	7.887	7.161*	7.169	5.460*	5.425*	6.840*	5.603	79.720
1965	4.278*	3.220*	6.169*	6.180*	8.234	9.877	10.538	10.773	9.727	9.005	6.300*	7.285*	81.696
1966	4.355	4.144*	6.189*	4.209*	5.896	9.930	8.509	5.983*	6.900*	5.952*	4.897*	6.801*	88.012
1967	4.216*	5.890	6.758*	3.960*	8.711*	8.708	9.591	8.091*	9.592	6.361	5.814	7.922	87.334
Total	19,116	19,650	26,009	21,941	30,484	35,332	33,799	32,018	31,679	26,763	23,551	24,747	329,792
Mean	4.779	4.901	6.502	5.260	7.621	8.908	8.450	8.004	7.191	5.963	6.187	6.816	81.696

*Indicates built-up total where record is poor or there is an overflow.

Wind

WIND STATIONS AND RECORDS

There is scant published wind information for the island of Hawaii. Airport and harbor weather stations traditionally maintain continuous wind records for operational requirements and provide much of the long-term wind data.

The first wind station on the island was established by the U.S. Weather Bureau in 1917 at Hawi (No. 161), near the northern tip of the island. At present, there are 20 active wind stations on Hawaii, shown on Plate 10, together with 27 stations now inactive.

Most of the recently installed wind stations are located at lower elevations on sugar plantations in the Kau, Hamakua, and North Kohala Districts, where overhead sprinklers are used for supplemental irrigation. Wind data are obtained at the Mauna Loa Observatory Station (No. 39) maintained by the U. S. Weather Bureau at 11,145 feet. Readings at low elevation on the lee side of the island are obtained by stations at Kawaihae (No. 148) and Kona Airport (No. 68.3).

Wind Station Index, pages 113-114, lists 45 stations having available records, of which 20 are active. Many stations having records of short duration were established for specific projects, such as the location of an air strip, or determination of wave action in planning harbor channels, or for scientific research. A cross reference to the numerical listing in the Index is presented in the Alphabetical List of Climatologic Stations, pages 9-11. (See Rainfall section of this report for climatologic station numbering system.)

There is little uniformity in the records kept by various wind stations on the island. If all record variations were to be published, a different format would be required for practically every station. Therefore, only representative records have been published in Selected Wind Records, page 115. Monthly average wind velocity is given, together with the maximum velocity for each month and the direction from which it originates. Monthly and annual means have been derived for average velocity.

WIND CHARACTERISTICS

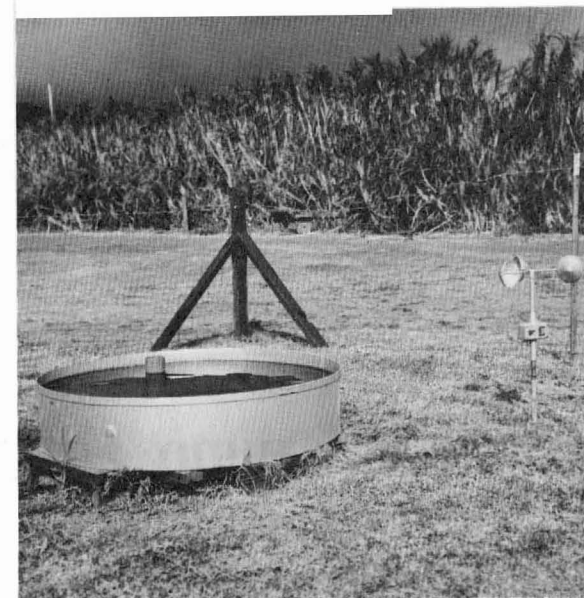
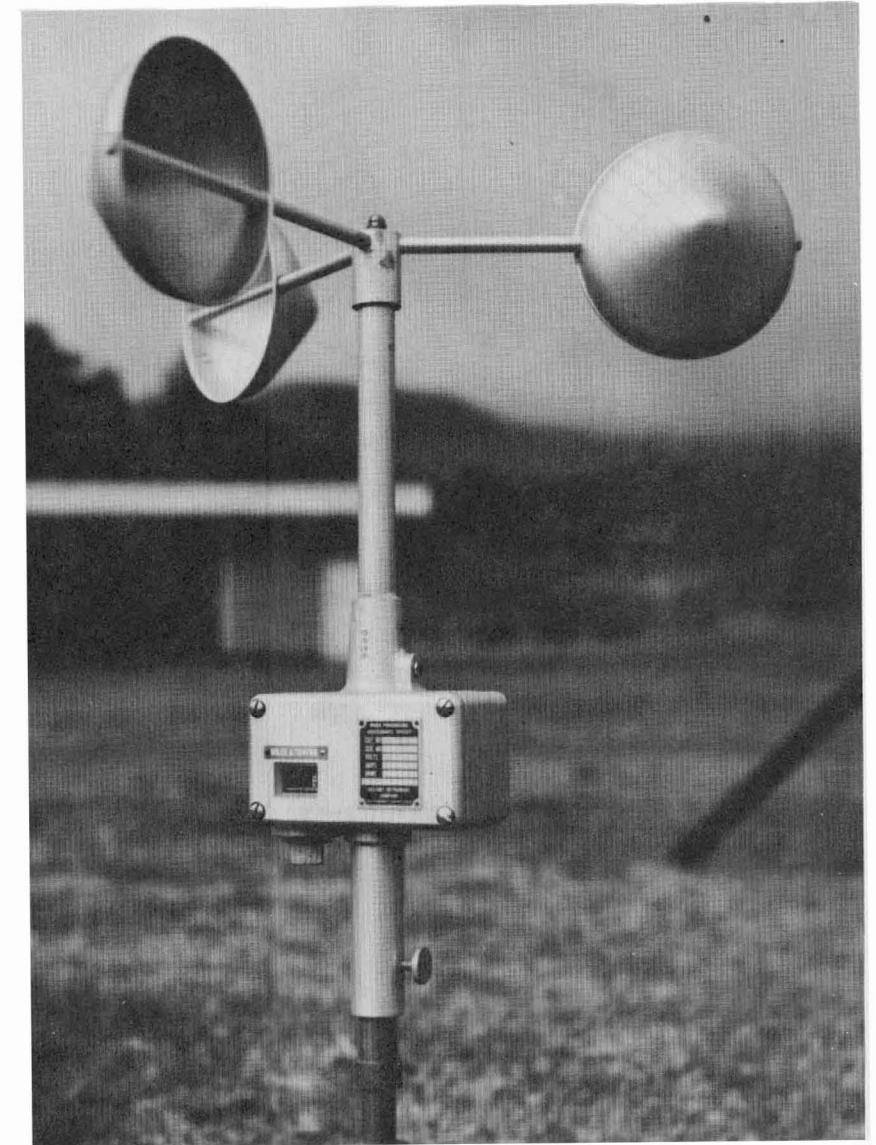
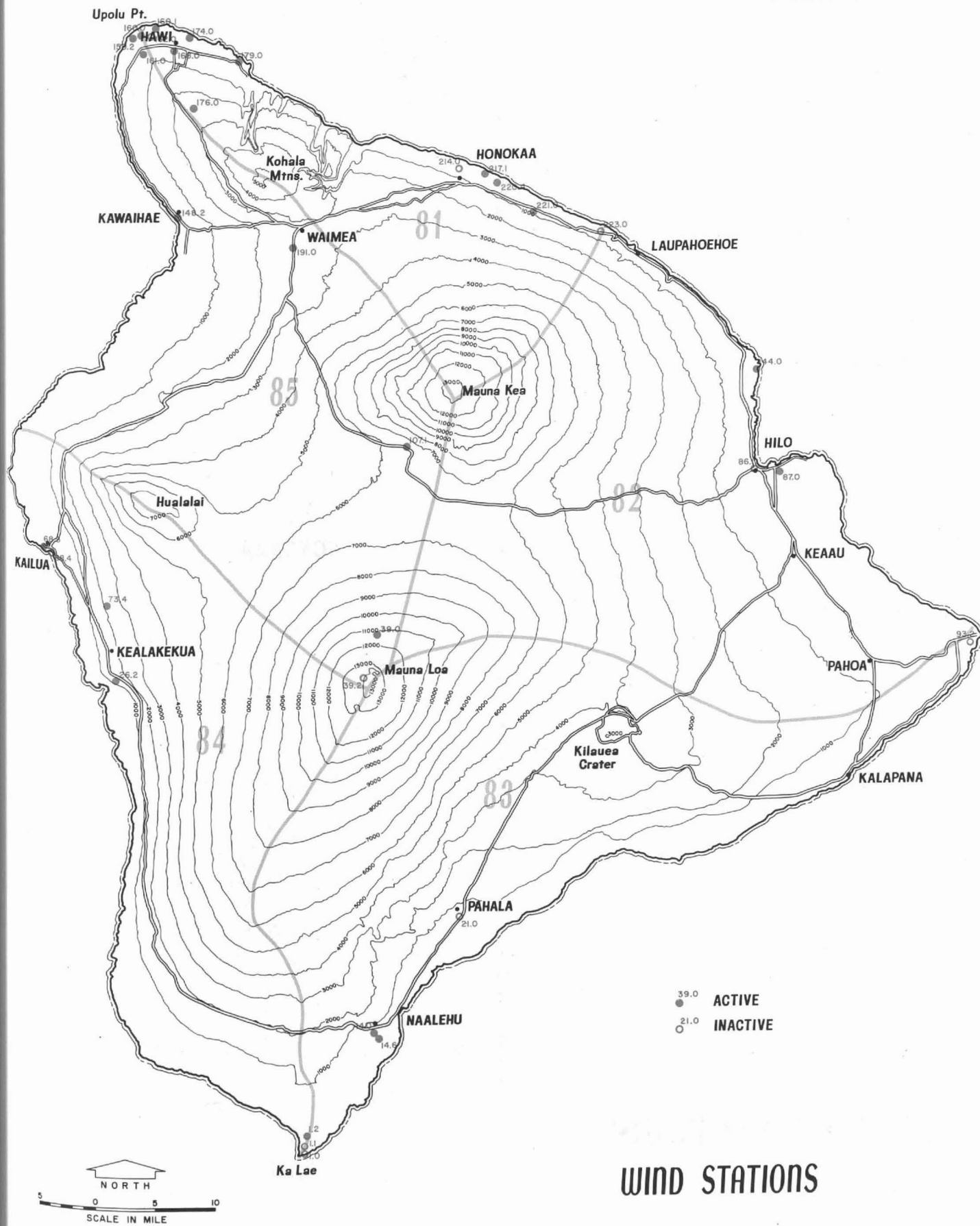
Northeasterly tradewinds prevail much of the time on the island of Hawaii, as elsewhere in the state. Although these winds approach the island at a fairly constant speed, the uniform flow is distorted as the tradewinds traverse the island and combine with local winds on the mountain slopes and lowlands to form complex wind patterns.

The characteristic inversion level of 5,000 to 7,000 feet elevation is the tradewind ceiling. (See Temperature section of this report.) Tradewinds are forced around the mountain masses of Mauna Loa and Mauna Kea, which penetrate the inversion level, losing velocity laterally along the slopes with distance from the northeasterly impact area. Tradewinds pass over Kohala Mountain, the summit of which is generally below the inversion level, losing velocity down the leeward slopes with distance from the summit.

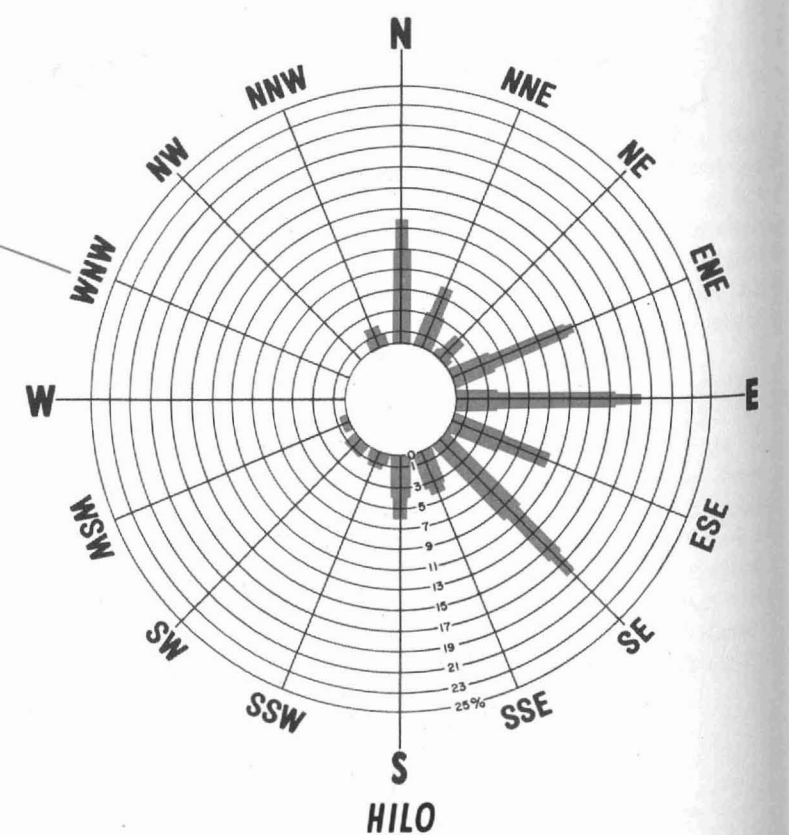
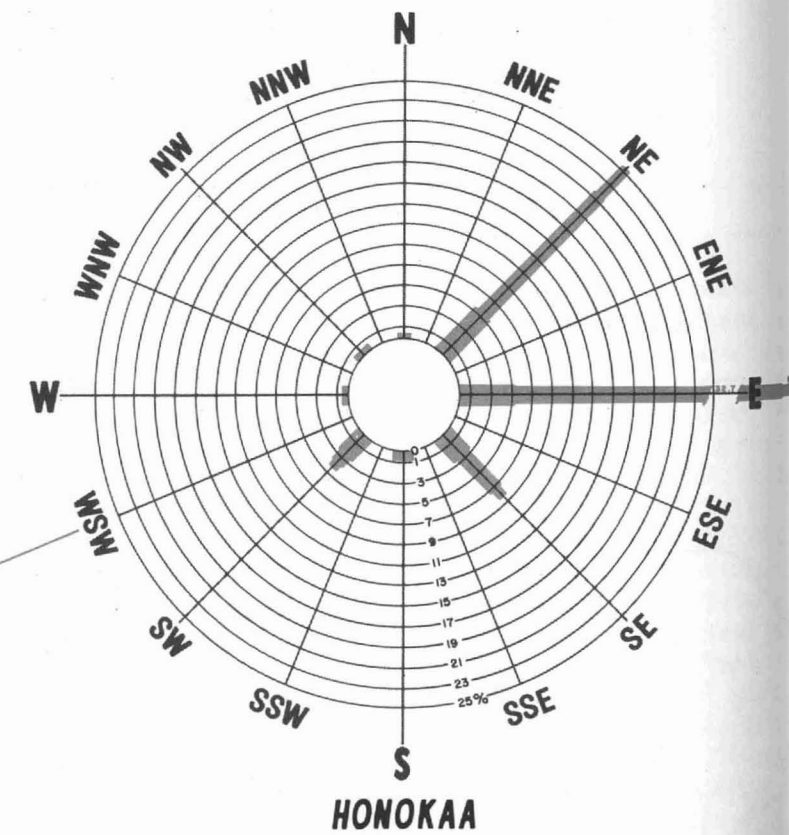
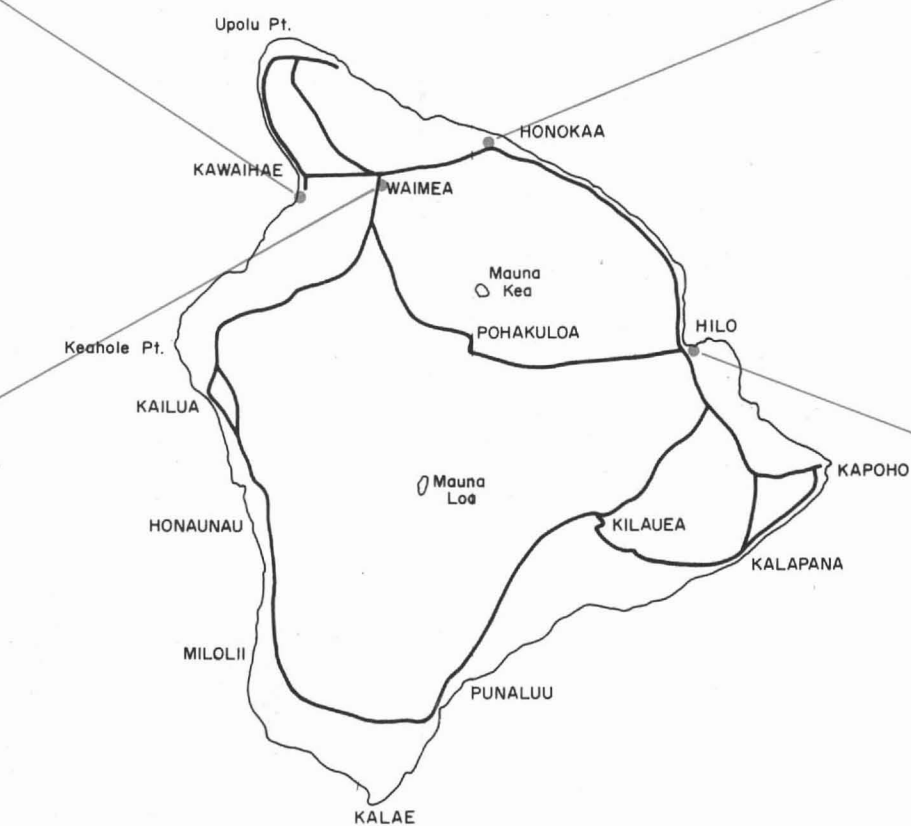
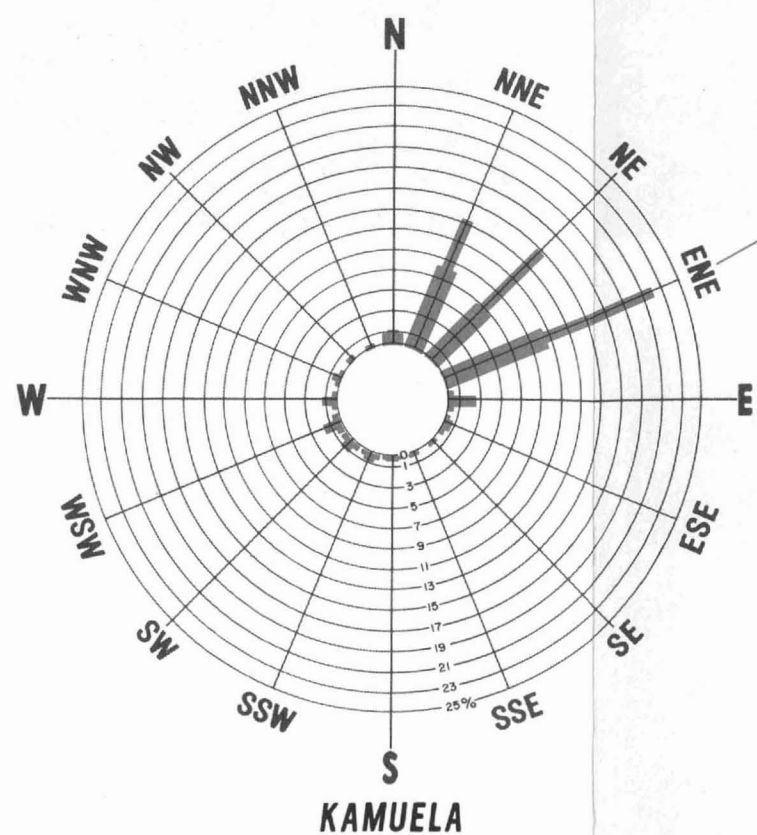
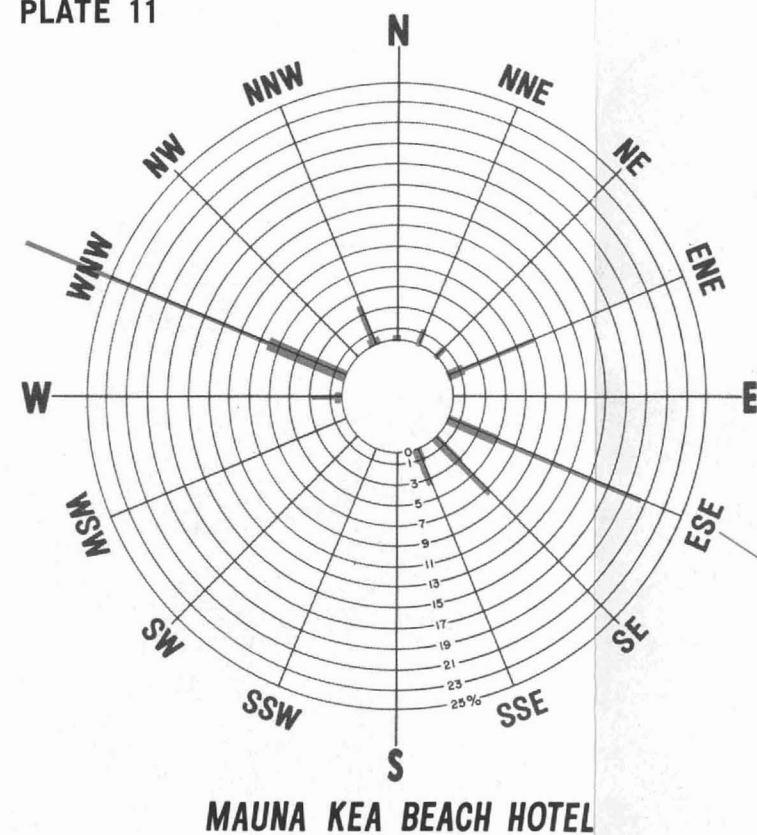
During the cooler winter months, especially, the trades are replaced by other general winds, primarily the southerlies. Occasional tropical storms also generate winds from various directions.

Over the ocean surrounding the island, average wind speeds are highest during the summer tradewind period, exceeding 12 miles per hour 50 percent of the time. During the winter months, wind speeds exceed 12 miles per hour about 40 percent of the time. However, occasional high winds with speeds exceeding the summer trades occur during the winter months.

Wind roses depicting speed and direction at selected stations are shown in Plate 11. The wind roses for Hilo and Honokaa, lying on the windward side of the island, reflect the direct impact of the dominant tradewinds. At Kamuela, located in the saddle of Mauna Kea and Kohala Mountain, distortion of the trades by the mountain masses is evident. A pronounced variation in wind direction is shown at the leeward Kawaihae station, where velocities are comparatively low.



Anemometer at Waimea, Station No. 191.4, measures wind velocity near evaporation pan for correlation of climatologic data.

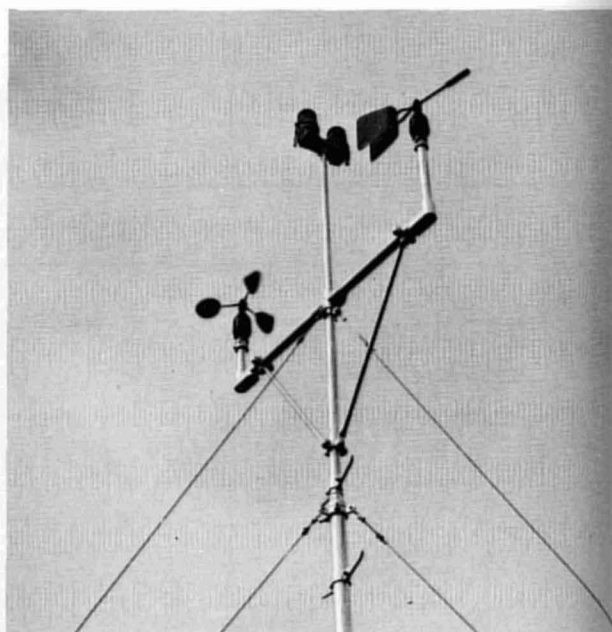
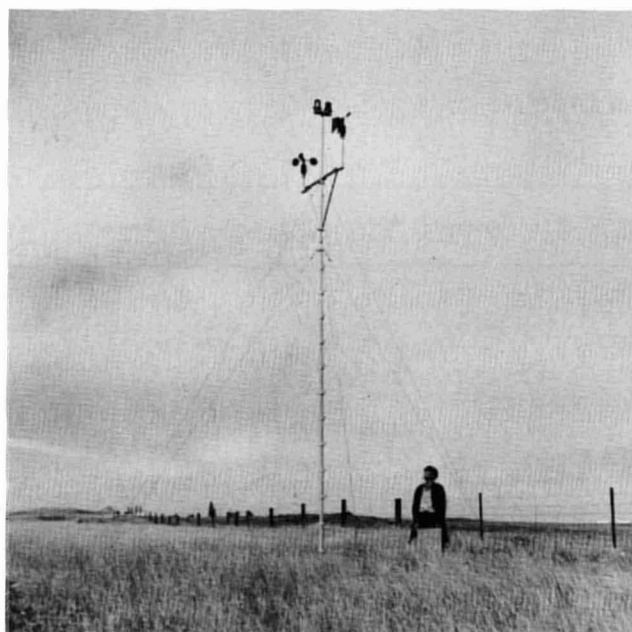


WIND ROSES FOR SELECTED STATIONS

Wind Station Index

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
1.0	2880W	Ka Lae	USCG	84	Kau	18 54.9 155 41.0	35	Daily	1924-1947	USWB	Wind dir only; no data 1926-1935
1.1		Morse Field	USAF	"	"	18 55 155 41	40	"	1940-1941	"	
1.2		Ka Lae	Space Tech Lab	"	"	18 56.5 155 41	305	"	1959-	"	
14	6588	Naalehu	Hutchinson Sugar Co	83	"	19 03.8 155 35.3	675	Daily except weekends	1948-	Obsvr USWB	
14.6		Naalehu Airport	"	"	"	19 03.4 155 35.0	630	Unknown	1968-	Obsvr	
21.0	7421	Pahala	Hawaiian Agriculture Co	"	"	19 12.1 155 28.8	860	"	1931-1945	USWB	Probably moved twice; total mi only
26.2	3977	Kealahakua	Miss A Greenwell	84	S Kona	19 29.6 155 54.9	1450	Daily	1959-	"	
39	6198	Mauna Loa Slope Obs	USWB	85	Hamakua	19 32.3 155 34.7	11145	Recorder	1956-	"	
39.2		Mauna Loa Summit	"	"	"	19 29 155 36	13455	"	1951-1953	"	Many missing periods
68.3	4764	Kona Airport	HAL	84	N Kona	19 38.8 156 00.6	15	Daily	1949-	"	
68.4		Kailua Kona	G Parker	"	"	19 38.5 155 59.6	20	Twice daily	1956-1960	"	Readings at Kona Inn 1956; at Kailua Kona Pier 1959-1960
73.4		Keauhou Test Site	DOWALD	"	"	19 34.8 155 55.6	2040	Weekly	1958-1960	DOWALD	Total mi of wind only
86.1	1484	Hilo	USWB	82	S Hilo	19 43.7 155 05.4	40	Daily	1933-1942	Obsvr USWB	
87.0	1492	Hilo Airport	"	"	"	19 43.4 155 03.6	30	Hourly	1943-	USWB	Charts on file NWRC
93.2	0298	Cape Kumukahi	USCG	83	Puna	19 31 154 49.3	65	Daily	1957-1960	"	
107.1		Pohakuloa (USMC)	USMC	85	Hamakua	19 45.6 155 32.3	6375	"	1956-	"	Intermittent program 8/56-9/56 & 1/57-7/58
144	8000	Pepeekeo Makai	Pepeekeo Sugar Co	82	S Hilo	19 50.8 155 05.3	100	"	1958-	Obsvr	Wind equip at factory; elev 50'; moved 6/07 unkn
148.2		Kawaihae (USCE)	USCE	85	S Kohala	20 02.6 155 50.3	10	Unknown	1962-	"	
159.2	8830	Upolu Pt	USCG	"	N Kohala	20 15.2 155 53.3	40	Daily	1956-	USWB	
160		Station 3	Kohala Sugar Co	"	"	20 15.5 155 52.5	200	Unknown	Unkn	HSPA	Upolu 5
160.1	8828	Upolu Pt Airport	HAL	"	"	20 16.1 155 51.6	90	Daily	1939-1957	USWB	Suiter Field; no data prior 1940
161	8181W	Puakea	Parker Ranch	81	"	20 14.1 155 52.4	570	Unknown	Unkn	HSPA	Puakea Ranch
162		Station 2	Kohala Sugar Co	"	"	20 15.4 155 51.8	300	"	"	"	Upolu 7
168	1339	Hawi	"	"	"	20 14.4 155 49.8	600	Daily except weekends	1917-	Obsvr USWB	Discon 1938; resumed 1959, Hawi Mill, Sta 1 moved 1937 from mill
174		Station 6	"	"	"	20 15.3 155 48.6	190	Unknown	Unkn	HSPA	Union Station
176	4675	Kohala Maulili	"	"	"	20 12.7 155 47.3	960	"	"	"	
179	6806	Niulii Office (Niulii)	"	"	"	20 13.5 155 44.8	75	"	"	"	

Note: For Key to Abbreviations, see page 10.



Station No. 191.0—KAMUELA AIRPORT (showing typical wind instruments: anemometer and vane).

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
191.0	3078	Kamuela Airport	HAL	85	S Kohala	20 00.0 155 40.6	2665	Daily	1953-	USWB	Moved 4/59 150' SSW
214.0	0840	Haina	Honokaa Sugar Co	81	Hamakua	20 05.0 155 28.2	461	Daily except weekends	1920-1951	Obsvr USWB	Honokaa
217.1		Paaauhau Mill	Paaauhau Sugar Co	"	"	20 05.4 155 26.3	200	"	1956-	Obsvr	
220.4		Field 14	"	"	"	20 04.6 155 25.2	430	Recorder	1960-	Obsvr HSPA	Charts on file obsvr
221.0	7312	Paauiilo	Hamakua Mill	"	"	20 02.5 155 22.3	800	Daily	1959-	Obsvr	Moved 1936; unknown
223	7131	Ookala	Laupahoehoe Sugar Co	82	N Hilo	20 01.0 155 17.2	430	"	1953-1956	Obsvr USWB	Equip on garage
		Alaalae 5	Kohala Sugar Co	Unkn	N Kohala	Unknown	Unkn	Unknown	Unkn	HSPA	
		Alaalae 7	"	"	"	"	"	"	"	"	
		Hoea Pasture	"	81	"	"	"	"	"	"	
		Niulii 10	"	"	"	"	"	"	"	"	
		Puakea	"	Unkn	"	"	"	"	"	"	
		Union 4	"	81	"	"	"	"	"	"	
		Union Mill	"	"	"	"	"	"	"	"	
		Puuhuluhulu	Hawaii Volcano Natl Pk	82	N Hilo	"	6400	"	1954-1954	DOWALD	
		Sisal Mauka	Hawaiian Orchards	83	Kau	19 10.7 155 30.5	900	Daily	1961-	Obsvr	
		Ford	"	"	"	19 14.2 155 27.6	1380	"	1962-	"	
		John Bull #1	"	"	"	19 13.3 155 28.2	1150	"	1966-	"	
		199	Honokaa Sugar Co	81	Hamakua	20 05 155 28.2	461	Twice daily	1967-	Unknown	

Selected Wind Records

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
Station No. 86.1—HILO													
1933	Max. —	—	—	—	6.1	7.0	5.5	7.5	6.9	7.2	6.0	7.3	—
1934	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1935	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1936	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1937	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1938	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1939	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1940	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1941	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1942	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1943	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1944	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1945	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1946	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1947	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1948	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1949	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1950	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1951	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1952	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1953	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1954	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1955	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1956	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1957	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1958	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1959	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1960	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1961	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1962	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1963	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1964	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1965	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
1966	Max. —	—	—	—	—	—	—	—	—	—	—	—	—
Mean	7.5	7.7	7.7	7.5	7.3	7.2	7.1	7.1	7.0	6.9	6.9	7.3	7.3

Station No. 168 — HAWI MILL														
1918	Max.	26	26	24	25	24	21	8.8	11.2	9.6	22 NE	24 NE	30 SW	—
	Ave.	6.9	9.1	7.6	7.6	8.3	8.8	—	—	—	8.8	10.6	9.3	12.3
1919	Max.	27 E	24 NE	—	21 NE	22 NE	19 NE	24 NE	—	21 NE	26 NE	28 NE	34 NE	—
	Ave.	9.6	10.6	9.1	8.0	8.3	8.7	9.8	9.2	8.9	8.3	8.9	9.2	9.0
1920	Max.	33 SW	—	—	29 NE	—	37 E	29 NE	27 NE	27 NE	28 NE	32 NE	36 SW	—
	Ave.	8.0	7.1	—	8.1	10.2	15.7	14.9	14.4	14.9	11.6	14.6	13.1	12.1
1921	Max.	—	30 S	31 NE	30 NE	27 NE	36 NE	42 NE	28 NE	33 NE	27 NE	35 NE	32 NE	—
	Ave.	15.7	9.6	11.2	14.3	8.3	15.4	16.8	13.7	13.4	10.3	11.4	11.4	12.6
1922	Max.	35 NE	36 NE	—	23 NE	19 NE	25 NE	33 NE	34 NE	31 NE	26 NE	26 NE	29 NE	—
	Ave.	13.1	7.5	5.0	4.2	12.5	14.2	14.7	14.9	13.0	10.6	9.4	9.1	11.0
1923	Max.	45 SW	24 NE	35	30	—	—	38 NE	28	24 E	29	34	28	—
	Ave.	11.2	7.5	12.9	11.2	—	14.0	14.5	12.5	11.7	11.1	11.6	10.3	—
1924	Max.	36	38	34	21	27	—	32	33	20	36	27	—	—
	Ave.	10.1	10.9	12.3	7.8	10.4	—	15.2	12.7	9.8	12.3	8.3	10.5	—
1925	Max.	—	24	28	30	28	33	29	31	23	21	—	34	—
	Ave.	10.8	9.3	12.6	13.7	13.9	16.2	12.9	15.7	10.3	8.9	13.2	8.1	12.1
1926	Max.	—	37	36	42	40	26	36	32	28	30	32	38	—
	Ave.	9.9	9.7	11.9	11.1	15.3	8.8	14.4	13.8	12.3	7.0	9.0	9.8	11.1

		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1927	Max.	46	37	30	24	26	20	38	42	27	29	28	—	
	Ave.	11.6	9.9	10.1	6.9	8.1	4.9	18.1	14.9	9.9	10.7	8.8	7.7	10.1
1928	Max.	36	—	—	30	34	31	36	31	34	30	38	46	
	Ave.	10.1	13.3	1.3	9.0	13.6	13.0	16.9	14.2	13.6	12.6	13.4	17.0	11.5
1929	Max.	26	34	32	28	26	34	31	33	30	—	28	27	
	Ave.	10.6	10.3	11.6	13.0	11.7	14.7	15.8	13.4	12.8	13.1	7.9	10.0	12.1
1930	Max.	36	29	34	31	34	34	31	35	29	31	42	41	
	Ave.	9.0	8.6	12.5	13.9	16.2	15.6	14.4	16.2	12.5	10.3	10.9	14.1	12.8
1931	Max.	38	39	30	40	31	36	37	29	29	—	—	—	
	Ave.	11.7	18.4	8.7	14.1	9.5	15.6	12.9	13.7	12.9	—	—	—	—
1932		—	—	—	—	—	—	—	—	—	—	—	—	—
1933	Max.	—	—	—	—	29	27	26	24	—	—	—	—	
	Ave.	—	—	—	—	13.3	14.1	15.3	12.4	—	—	—	—	—
1934	Max.	—	—	—	—	—	—	—	—	14	—	—	24	
	Ave.	—	—	—	—	—	—	—	—	21.0	10.5	10.6	9.5	—
1935	Max.	29	25	23	24	23	25	25	21	25	19	25	28	
	Ave.	13.8	11.7	8.3	12.0	11.8	12.1	13.1	11.5	9.9	7.6	8.5	9.4	10.8
1936	Max.	26	30	32	22	21	22	21	24	21	20	21	28	
	Ave.	9.5	10.0	11.7	10.3	12.9	11.9	12.7	13.5	10.8	8.6	10.5	14.1	11.4
1937	Max.	32	23	21	25	21	21	28	26	22	21	24	22	
	Ave.	9.5	9.9	10.1	11.9	10.2	11.4	12.7	11.8	10.0	9.8	10.9	8.5	10.6
1938	Max.	27	24	24	22	21	21	24	22	18	23	—	13	
	Ave.	10.2	8.5	11.9	12.1	10.0	11.1	11.6	10.5	9.8	9.8	—	—	—
Mean		10.6	10.1	9.9	10.5	11.4	12.6	14.1	13.1	11.4	10.2	10.4	10.8	11.2

Station No. 214—HONOKAA																			
1920	Max.	30	SW	24 E	25 NE	24 E	20 E	33 E	20 E	28 NE	25 E	23 E	25 NE	25 E					
	Ave.	6.5		7.7	7.8	8.1	8.4	12.2	10.3	9.5	9.0	7.8	8.4	8.2	8.7				
1921	Max.	—		8.0	30 E	27 E	27 E	24 SE	27 E	27 E	25 E	25 E	27 E	26 E	30 E				
	Ave.	11.2		30 E	7.6	10.9	7.8	11.5	10.9	9.4	10.0	7.6	7.1	7.4	9.1				
1922	Max.	31 E	33 E	24 NE	25 E	23 E	27 SE	25 NE	25 NE	23 SE	26 SE	26 E	26 E	25 E					
	Ave.	9.3	9.2	8.2	8.9	9.3	9.4	8.1	10.5	8.5	8.3	6.9	7.3	8.8	8.7				
1923	Max.	35 NE	29 SW	29 E	26 E	29 E	—	29 E	25 E	28 E	22 E	26 NE	18 E						
	Ave.	8.6	5.3	7.5	8.5	9.9	9.3	9.4	8.6	8.7	6.7	7.4	5.3	8.0					
1924	Max.	21 E	15 SW	17 E	25 E	24 E	13 E	24 E	10 E	21 E	30 E	27 NE	25 E						
	Ave.	5.0	4.9	4.9	6.4	6.5	5.8	6.2	4.1	4.6	8.4	6.5	7.2	5.9					
1925	Max.	28 E	27 E	23 E	27 E	21 E	26 NE	24 E	30 E	18 NE	19 E	—	27 SW						
	Ave.	8.6	7.0	8.3	8.7	8.1	10.5	7.5	9.3	5.8	6.2	4.5	3.7	7.4					
1926	Max.	14 E	8 NE	8 NE	—	—	30 NE	20 E	24 E	29 E	22 NE	24 E	20 NE	36 E					
	Ave.	—	—	—	—	—	10.5	6.3	8.6	8.1	6.0	4.5	5.3	6.8	—				
1927	Max.	27 E	34 SW	31 E	19 E	26 E	25 E	23 E	25 E	25 E	22 E	27 E	—						
	Ave.	8.5	7.0	9.5	5.0	10.3	9.0	9.0	8.9	7.6	8.0	8.0	7.7	8.2					
1928	Max.	31 NE	23 NE	29 E	25 E	30 E	23 E	31 SE	22 E	24 E	24 SE	23 E	24 E						
	Ave.	10.9	6.9	7.6	7.9	8.8	8.4	9.8	8.1	8.0	8.4	7.7	9.4	8.5					
1929	Max.	16 E	30 SE	32 SE	24 E	22 E	23 E	24 E	28 E	23 E	—	23 E	27 E						
	Ave.	5.3	6.9	7.3	8.8	7.1	8.6	9.3	7.8	8.1	8.2	5.0	5.0	7.3					
1930	Max.	28 W	20 E	24 E	19 E	26 E	26 E	25 E	28 SE	22 E	23 E	25 NW	24 E						
	Ave.	4.8	5.9	6.5	6.4	8.4	8.9	7.8	10.1	7.8	6.1	5.4	7.7	7.2					
1931	Max.	23 E	27 E	24 E	20 E	18 E	22 E	26 E	19 E	22 E	20 SE	24 E	25 NE						
	Ave.	7.2	11.0	5.9	6.2	4.5	7.9	6.2	5.9	6.2	3.8	5.6	6.6	6.4					
1932	Max.	—	28 SW	25 NE	24 SE	—	19 E	20 E	18 E	19 E	23 E	20 E	26 E						
	Ave.	8.9	7.6	8.5	10.5	10.1	8.8	9.5	8.3	7.2	9.2	8.1	8.7	8.8					
1933	Max.	27 E	—	25 E	21 E	26 NE	21 E	19 E	18 E	18 E	14 E	13 N	14 E						
	Ave.	9.4	—	8.2	8.0	9.7	10.0	9.4	8.4	8.7	6.3	5.1	5.5	—					
1934	Max.	21 E	24 E	17 E	16 E	14 SE	13 E	20 E	19 E	21 SE	20 E	21 E	21 E						
	Ave.	6.5	7.0	6.3	5.9	6.7	6.6	7.2	8.2	7.5	7.4	8.2	7.9	7.1					
1935	Max.	34 SW	33 E	25 E	21 E	20 E	21 E	25 E	21 E	—	15 E	21 E	21 E						
	Ave.	8.7	8.4	6.6	8.7	9.3	9.4	9.9	8.3	7.7	5.8	6.8	7.2	8.1					
1936	Max.	26 SW	32 SW	22 E	17 E	19 NE	21 E	20 E	24 E	23 E	12 E	11 E	24 NE						
	Ave.	8.2	8.6	8.4	6.7	8.9	8.6	9.3	9.3	7.6	6.5	6.4	7.9	8.0					
1937	Max.	24 E	21 NE	21 SE	22 SE	18 NE	21 E	24 NE	19 E	17 NE	18 E	21 E	21 NE						
	Ave.	7.3	7.4	7.4	9.5	7.4	8.6	9.5	8.6	7.7	7.1	8.3	6.5	7.9					
1938	Max.	24 SE	24 SW	22 NE	20 NE	21 E	24 SE	19 E	19 E	16 E	21 E	24 E	23 E						
	Ave.	7.5	6.9	8.3	8.9	7.8	8.7	8.8	8.1	8.1	8.0	8.5	9.6	8.3					
1939	Max.	21 E	22 SE	22 E	21 E	21 E	25 NE	23 NE	21 E	19 NE	20 E	22 NE	21 SW						
	Ave.	8.7	8.4	8.1	7.6	8.8	9.2	9.0	8.8	7.3	7.8	7.9	6.0	8.1					
1940	Max.	30 S	19 NE	21 E	21 E	18 E	19 E	20 E	25 SE	19 SE	20 E	21 SE	18 E						
	Ave.	6.9	7.1	6.5	8.8	7.8	8.4	8.5	9.8	7.2	6.9	6.5	6.2	7.5					
1941	Max.	16 E	18 NE	19 NE	23 NE	21 E	19 NE	18 E	19 E	24 NE	21 E	21 E	24 E						
	Ave.	5.9	6.2	8.3	8.4	8.7	8.3	7.4	7.5	7.4	7.5	7.0	9.9	7.5					
1942	Max.	—	—	19 NE	17 SE	17 SE	19 NE	18 NE	18 E	21 NE	20 NE	21 E	22 NE						
	Ave.	5.9	7.2	7.8	8.4	7.6	8.5	8.3	7.9	7.0	6.5	6.3	6.4	7.3					
1943	Max.	—	—	—	18 NE	21 NE	18 NE	21 NE	21 NE	17 NE	21 NE	21 NE	21 E						
	Ave.	5.7	8.3	6.0	8.1	7.0	9.0	9.1	8.3	7.4	7.7	7.5	7.3	7.6					
1944	Max.	24 NE	20 NE	22 SW	21 NE	20 E	21 NE	21 NE	22 NE	20 NE	20 NE	28 E	30 NE						
	Ave.	8.6	7.0	6.1	10.4	9.0	9.1	9.6	8.9	8.2	7.5	8.8	6.8	8.3					
1945	Max.	22 E	21 NE	29 SE	25 E	25 NE	29 NE	—	21 NE	20 NE	18 NE	24 E	25 E						
	Ave.	6.7	6.9	10.5	7.1	7.2	10.1	8.4	9.0	7.5	6.6	6.3	5.9	7.7					
1946		—	—	—	—	—	—	—	—	—	—	—	—						
Mean		7.6	7.4	7.4	7.6	8.1	8.3	8.8	8.8	8.4	7.6	7.1	6.9	7.1	7.3				

Humidity

HUMIDITY STATIONS AND RECORDS

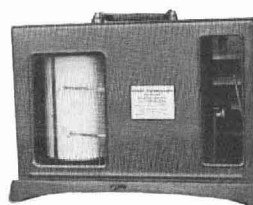
Humidity measurements are expressed in relative terms, the volume of moisture in the air compared to the volume in totally saturated air. There are 24 active humidity stations on the island of Hawaii, 16 of which are located in the coastal band below the 2,000-foot contour; the remainder lie on the upper slopes of Mauna Kea and Mauna Loa. The highest concentration of both active and inactive humidity stations is in the Kau District, where instruments are maintained by Hutchinson Sugar Co. and Hawaiian Agriculture Co.

Many humidity stations on the island utilize hygrothermographs for data collection, and practically all measure other climatological elements as well. Humidity measurements, in conjunction with temperature measurements, provide a temperature-humidity index useful in scientific research and experimentation.

The 54 climatologic stations recording humidity information, 30 of which are inactive, are listed in the Humidity Station Index, pages

119-120. A cross reference to the numerical listing is presented in the Alphabetical List of Climatologic Stations, pages 9-11. (See Rainfall section of this report for climatologic station numbering system.)

The earliest indexed station was established in 1939 at the Upolu Point Airport, North Kohala (No. 160.1), and the most recently was established in 1968 by Hutchinson Sugar Co. at Naalehu Airstrip, Kau (No. 13.7). Although most stations have short periods of record, those maintained



Hygrothermograph for measuring humidity.

by the U.S. Weather Bureau at the airports have comparatively long periods.

Humidity station data were not available for publication in this report.

HUMIDITY CHARACTERISTICS

Like other climatological elements measured on the island of Hawaii, humidity is affected by topography. Under prevailing trade-wind conditions, from 50 to 70 percent of the time, moisture distribution in the air surrounding the island mass is greatly influenced by the characteristic temperature inversion. (See Temperature section of this report.) Moisture is high and well distributed below the inversion level, which varies between 5,000 and 7,000 feet elevation; air above the inversion is comparatively dry.

Relative humidity below the inversion is roughly 70 to 80 percent in windward areas, as compared to 60 to 70 percent in the drier leeward areas. Above the inversion, relative humidity is generally less than 40 percent, often declining to 10 or even 5 percent.



Shelter houses hygrothermograph and thermometer at Waimea, Station No. 191.4.



Humidity Station Index

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
1.1		Morse Field	US Air Force	84	Kau	18 55 155 41	40	Daily	1940-1941	USWB	
1.2		Ka Lae	Space Tech Lab	"	"	18 56.5 155 41	305	"	1959-	"	
11.0		Makino	Hutchinson Sugar Co	83	"	19 05.6 155 36.1	2120	Recorder	1952-1960	Obsvr	Field 20; Field 420
12.3		Field 64	"	"	19 09.9 155 34.6	1825	"	1955-1960	"	"	Field 58; Field 64 makai; Field 750
12.4		Waterfall	"	"	19 10.6 155 35.6	2325	"	1954-1955	"	"	Replaced by #12.3
12.5		Field 740	"	"	19 09.3 155 34.2	1740	"	1953-1954	"	"	
13.3		Field 51	"	"	19 07.4 155 34.6	"	"	1954-1960	"	"	Field 630
13.5		Field 640	"	"	19 08.0 155 34.3	1650	"	1952-1953	"	"	
14.0	6588	Naalehu	"	"	19 07.9 155 34.5	1720	"	1948-1960	"	"	
14.6		Naalehu Airport	"	"	19 03.4 155 35.0	630	Unknown	1968-	Unknown		Rubbish Dump
20.2		Alili	Hawaiian Agriculture Co	"	"	19 13.4 155 31.4	2830	Recorder	1955	Obsvr	Alili (Field 8); replaced #20 on 7/54
20.3		Field 8	"	"	19 13.3 155 31.1	2700	"	1952-1955	"	"	
21.1		Field 150	"	"	19 12.2 155 29.1	1000	"	1952-	"	"	Lower Kauhane; Field 16
22.1		Keaiwa Camp	"	"	19 14.3 155 28.8	1650	"	1955-	"	"	Field 35
28.2		Keel Middle Road	E E Glass	84	S Kona	19 27.9 155 54.0	680	Daily	1955-	USWB	Moved 4/58 80' E
35.5		Mudflow	Hawaiian Agriculture Co	83	Kau	19 15.4 155 28.5	1900	Recorder	1952-1955	Obsvr	Field 40-1
38.1		Mauna Loa Seismo Sta	Hawaii Volcano Observatory	"	"	19 29.8 155 23.0	6600	"	1951-1955	USWB	Truck trail until 1951; moved from 6750
39.0	6198	Mauna Loa Slope Obs	USWB	85	Hamakua	19 32.3 155 34.7	11145	"	1956-	"	
39.1	6198	Mauna Loa Upper	"	"	19 32.5 155 34.5	10960	"	1951-1956	"	"	
39.2		Mauna Loa Summit	"	"	19 29 155 36	13455	"	1951-1957	"	"	No data after 1953 except 9/56-1/57
44.1		Ohaikea (3750)	USDA Fruit Fly Lab	83	Kau	19 25.5 155 19.8	3750	"	1951-1952	Obsvr USWB	
45.3		Mauna Loa Trk Trail (5900)	"	"	19 28.9 155 22.3	5900	"	1952-1956	"	Obsvr	
51.7		Mauna Loa Trk Trail (4000)	"	"	19 26.5 155 18.5	4000	"	"	"	"	
51.8		Mauna Loa Trk Trail (4250)	"	"	19 26.8 155 19.2	4250	"	1949-1958	Obsvr USWB	"	Kipuka Ki Observer
67.6		Kupaahu	"	"	19 21.4 154 59.7	100	"	1950-1956	"	Obsvr	1954-56 charts for elevation of 50'; Kalapana
67.7		Opihikao	HAES	"	"	19 26.8 154 54.4	360	"	1956-1957	"	
68.3	4764	Kona Airport	Hawaiian Airlines	84	N Kona	19 38.8 156 00.6	15	Daily	1949-	USWB	

Note: For Key to Abbreviations, see page 10.

State Key No.	USWB Index No.	Station	Observer	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Readings	Record Years	Data Location	Remarks
68.4		Kailua Kona	G Parker	84	N Kona	19 38.5 155 59.6		Twice daily	1956-1959	USWB	Moved 1956 1/6 mi NE; moved 1959 1/5 mi NW
73.2	2751	Kainaliu	Kona Exp Sta	"	"	19 32.2 155 55.6	1500	Recorder	1954-	"	Charts on file Kona Exp Sta
76.0	5018	Kulani Mauka	USWB	82	N Hilo	19 35.2 155 27.3	8300	"	1951-	"	Mauka Maunaloa; no data Maunaloa 1951-1955
79.0	5011	Kulani Camp	State Dept of Soc Services	"	S Hilo	19 33.1 155 18.2	5170	"	1951-	"	Moved 12/59 300' SSE
85.0	1488	Hilo (A&F)	State Forestry Division	"	"	19 42.5 155 04.5	35	"	1949-	Obsvr USWB	Hilo Tree Nursery; Hilo Insectory
86.5		Kaumana (2000)	USDA Fruit Fly Lab	"	"	19 41.1 155 11.1	2000	"	1949-1951	Obsvr	
87.0	1492	Hilo Airport	USWB	"	"	19 43.4 155 03.6	30	Hourly	1943-	USWB	
90.1		Hilo Makai Haw Sub Sta	HSPA	"	"	19 43.8 155 05.9	220	Recorder	1960-	HSPA	Photo chemical
93.2	0298	Cape Kumukahi	US Coast Guard	83	Puna	19 31 154 49.3	65	More than once daily	1957-1960	USWB	
100.1		Waikii (4675)	USDA Fruit Fly Lab	85	S Kohala	19 51.7 155 39.2	4675	Recorder	1949-	Obsvr USWB	
107.0	8063	Pohakuloa	State Forestry Division	"	Hamakua	19 45.1 155 31.7	6510	"	1949-1951	"	
107.1		Pohakuloa (USMC)	US Marine Corps	"	"	19 45.6 155 32.3	6375	More than once daily	1956-	USWB	
111.0	1065	Halepohaku	State Forestry Division	82	"	19 45.8 155 27.5	9220	Recorder	1950-1951	Obsvr	
118.3		Field 7A	Hamakua Mill	81	"	20 00.4 155 22.4	2240	Weekly	1965-	"	
124	4096	Keanakolo	State Forestry Division	82	N Hilo	19 55.2 155 20.5	5280	Recorder	1949-1950	"	
159.2	8830	Upolu Point	USCG	85	N Kohala	20 15.2 155 53.3	40	More than once daily	1956-	USWB	
160.1	8828	Upolu Pt Airport	HAL	81	"	20 16.1 155 51.6	90	4 times daily	1939-1957	"	No data prior 1940
160.2		Station 28	Kohala Sugar Co	85	"	20 14.7 155 52.5	430	Recorder	1952-1953	Obsvr	Upolu 21
168.1		Station 26	"	81	"	20 14 155 49	650	"	1950-1952	Obsvr DOWALD	Honomakau 3
174.2		Station 27	"	"	"	20 14.7 155 47.7	275	"	1950-1951	DOWALD	
178.1		Station 21	"	"	"	20 11.7 155 48.5	1850	"	1948-1949	Obsvr	Iole 10
179.2		Station 24	"	"	"	20 12.9 155 44.8	400	"	1948-1949	"	Halawa Mill
191.0	3078	Kamuela	HAL	85	S Kohala	20 00 155 40.6	2665	More than once daily	1953-	USWB	Moved 4/59 100' SW
202.1		Field 114	Honokaa Sugar Co	81	Hamakua	20 06.1 155 34.4	1565	Recorder	1957-	"	Field 14
		Sisal Mauka	Hawaiian Orchards	83	Kau	19 10.7 155 30.5	900	Daily	1961-	Obsvr	
		Ford	"	"	"	19 14.2 155 27.6	1380	"	1962-	"	
		John Bull #1	"	"	"	19 13.3 155 28.2	1150	"	1966-	"	

Whether occurring as surface water or ground water, all water supplies on the island of Hawaii are derived from rainfall. Surface water includes runoff flowing in streams and ditches; ground water is percolated rainfall perched on impervious media, confined by dikes, or stored in basal aquifers. High-level ground water issuing as springs or developed by tunnels also contributes to stream and ditch flow. Basal water is developed by dug wells along the coast, by drilled wells, and by shafts (Maui-type wells) which skim the basal aquifers.

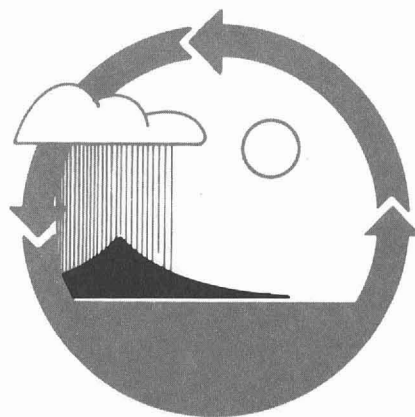
Stream flow occurs and ditches have been developed mainly in windward areas. There are few perennial streams because of the high rate of percolation into young lavas, sparse vegetation, and steep-sided stream beds. Most of the water developed at high levels by ditches and tunnels has been used by the sugar industry for fluming cane, irrigation, power generation, and mill operations. With improved technology, most of the tunnels and ditches have been abandoned.

Drilled wells at Kahaluu and Keei in the Kona region and at Pahoa supply domestic water needs. Elsewhere, well water supplements other domestic supplies. Most shafts on the island of Hawaii were developed by plantations primarily for industrial use, but also supply domestic water. Shaft No. 7 at Olaa serves Keaau, Kurtistown, and Mountain View.

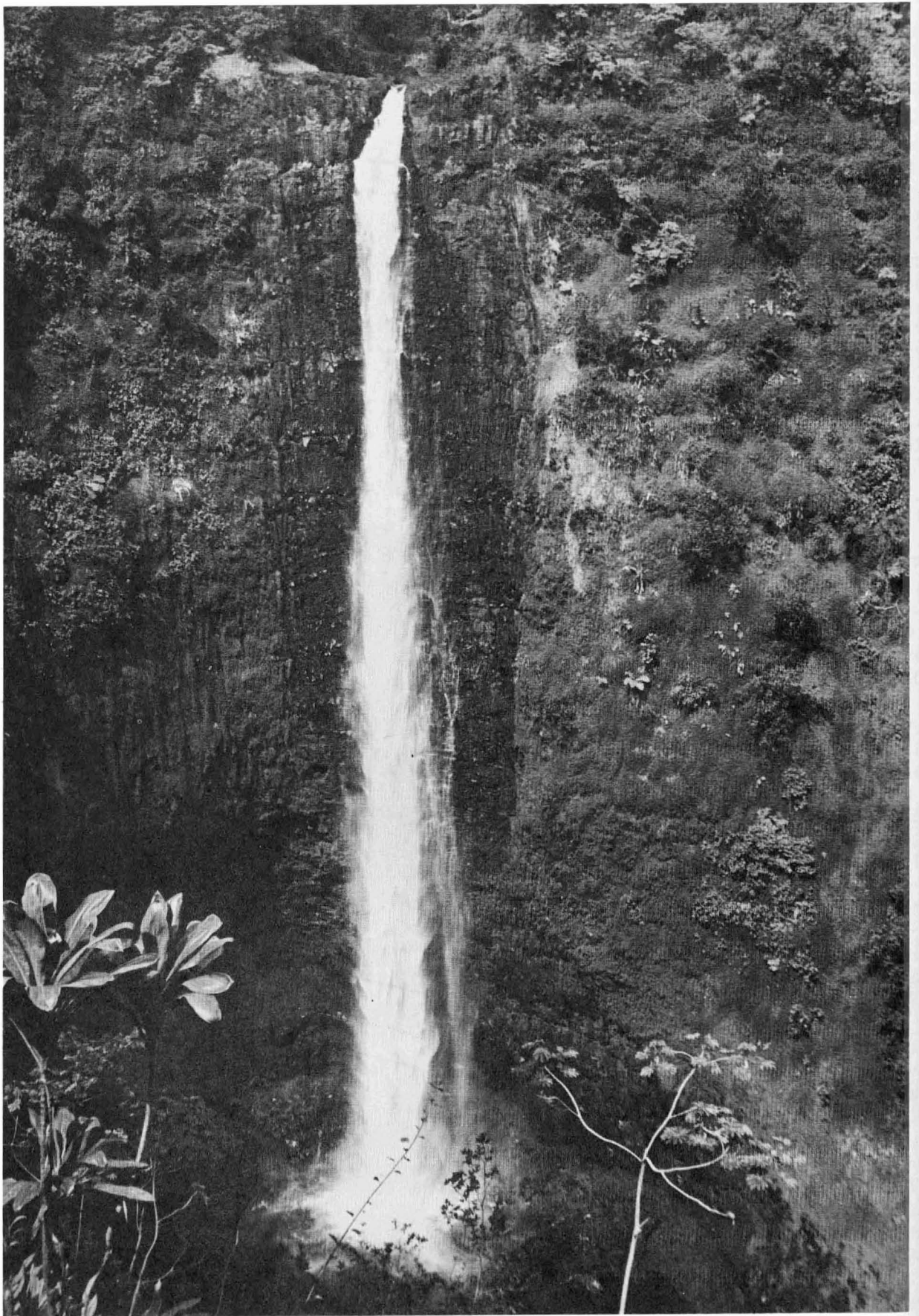
In periods of low rainfall, stream flow along the windward coast is sustained largely by springs. Spring water supplies the domestic requirements of small communities along the Hamakua coast, and Kaumana Spring (No. 133) is a principal source for the city of Hilo.

Water quality characteristics vary physically, chemically, and bacteriologically, depending largely upon organic substances present in surface supplies and geologic conditions prevailing at ground water sources. Domestic water supplies are generally colorless and odorless, except for colored surface water from Kohala Mountain used at Kamuela and Kawaihae.

This section inventories surface water and ground water sources on the island of Hawaii, including discussion of records relating to and characteristics of stream flow, ground water, and water quality. Stream gage stations, ground water sources, and water quality sampling sites are separately indexed, and selected records are presented.



WATER SUPPLY



Stream flow from runoff and perched springs plunges over Akaka Falls in Kolekole Stream.

Stream Flow

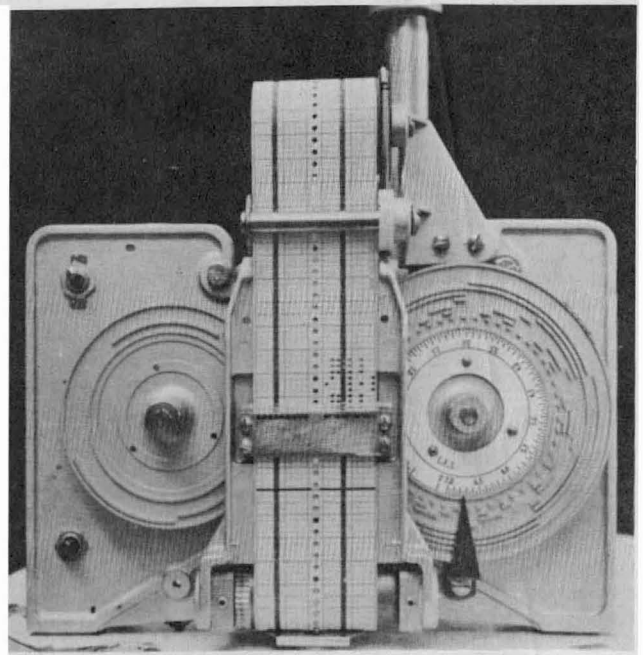
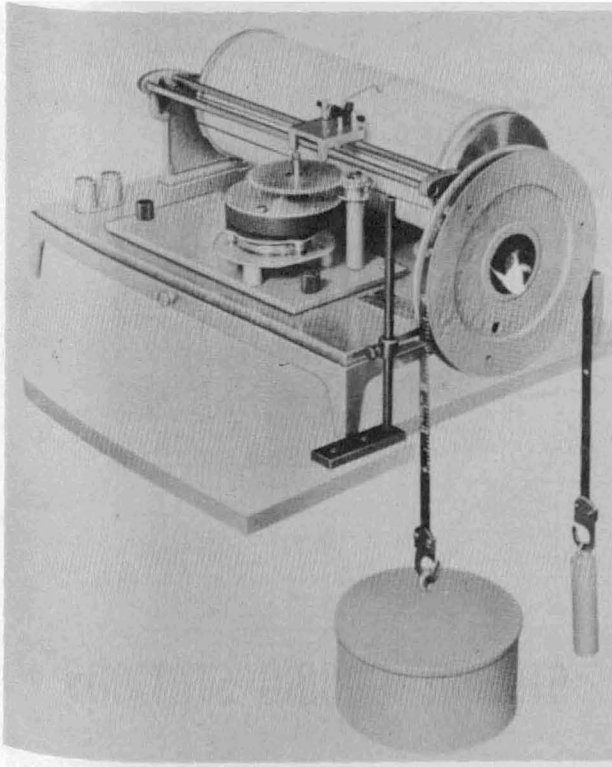
STREAM GAGE STATIONS AND RECORDS

Stream flow records on the island of Hawaii have been kept since April 1911 by the U.S. Geological Survey (U.S.G.S.). Several other agencies had previously obtained stream flow records, including sugar plantations and ditch companies whose stream flow measurements are geared to sugar production programs. Many still maintain records of stream and ditch flows. The U.S.G.S. currently operates 35 stream and ditch flow gaging stations on the island of Hawaii as part of its state-wide program of surface water measurement, which is financed by federal and state matching funds.

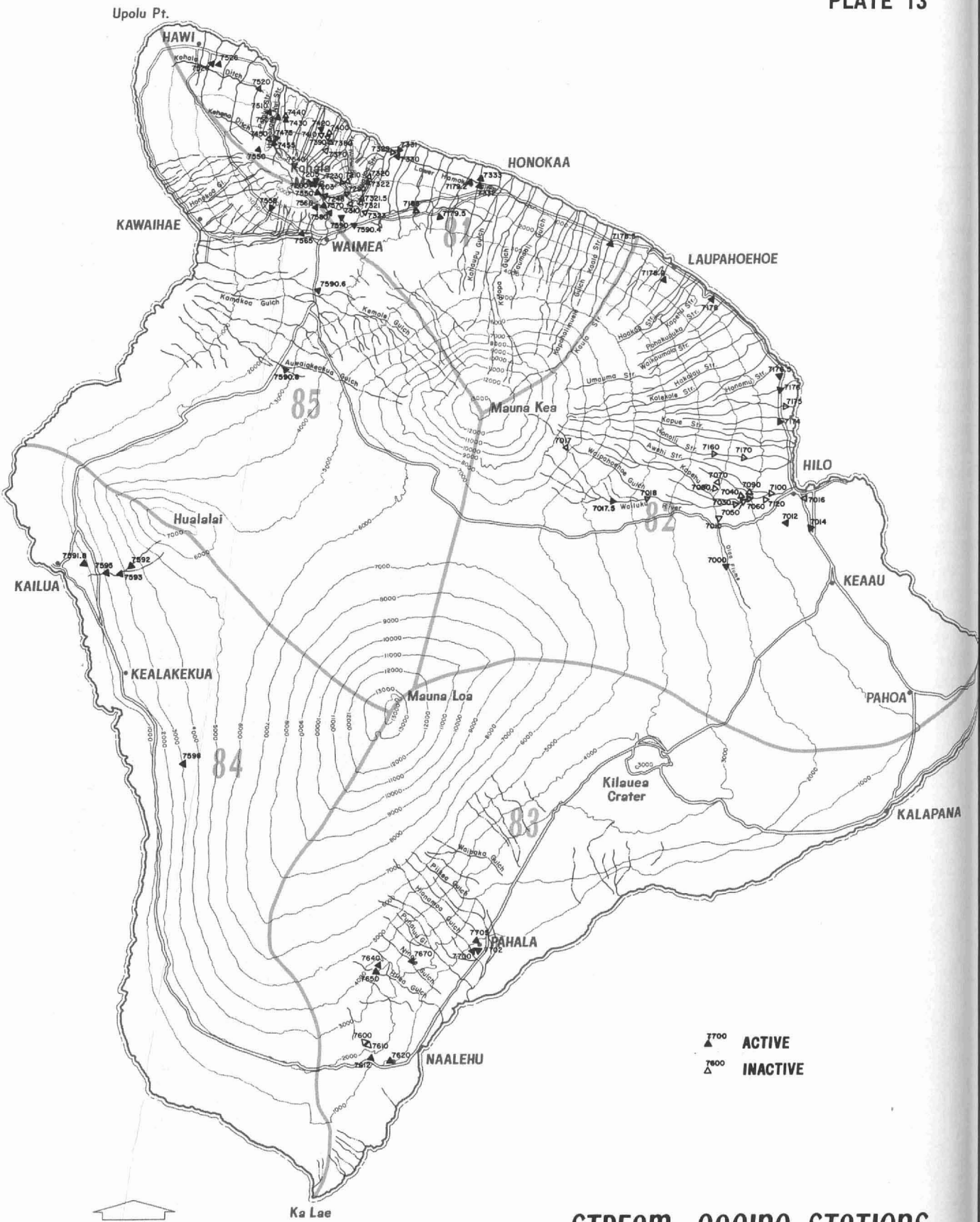
Through June 1960, records of daily discharge and stage of streams were published by the U.S.G.S. in an annual series of Water Supply Papers entitled *Surface Water Supply of Hawaii*. Beginning with the 1961 fiscal year, daily discharge records have been published annually in the same format, but in a new series entitled *Water Resources Data for Hawaii and Other Pacific Areas*. Records of peak flows during

each fiscal year, obtained from stream gages and crest gages, have been published annually by the U.S.G.S. since 1958 in *An Investigation of Floods in Hawaii*. Annual reports, unlike the U.S.G.S. Water Supply Papers, are primarily for local needs, and distribution is limited. At 5-year intervals, compiled stream flow records are published as U.S.G.S. Water Supply Papers.

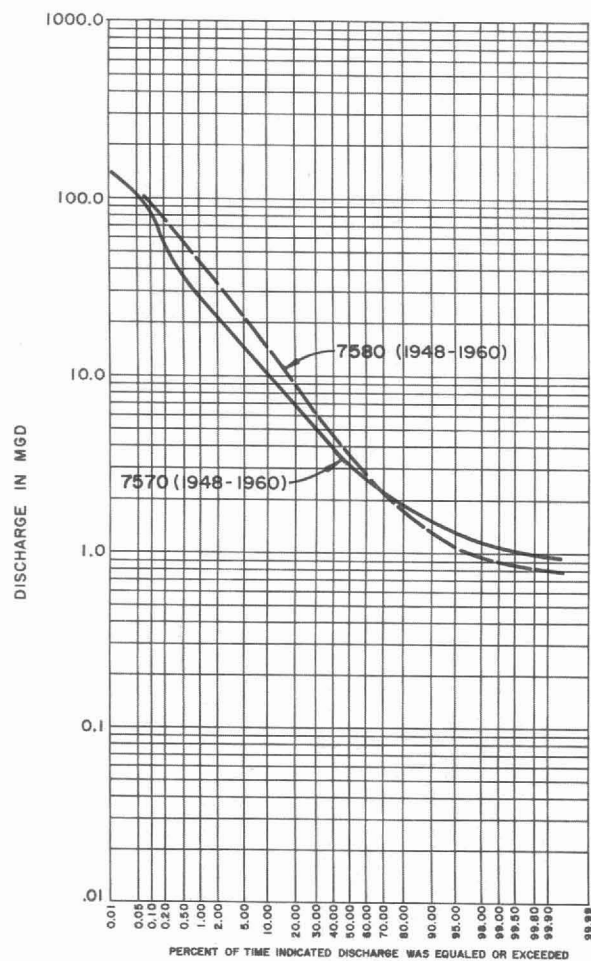
Stream flow records for the gaging stations in the state, summarized on a monthly and yearly basis, have been published in several reports to date. In 1939 the Territorial Planning Board published a summary of records of stream and ditch flow in *Surface Water Resources of the Territory of Hawaii, 1901-1938*, which includes hitherto unpublished as well as published records available to December 1938. Monthly and yearly summaries of stream flow data collected by the U.S.G.S. are presented in its Water Supply Paper 1319, *Compilation of Records of Surface Waters of Hawaii through June 1950*. Included in this publication are some records furnished by other agencies. A supplemental summary covering the period July 1950 to June 1960 is presented in the U.S.G.S. Water Supply Paper 1739.



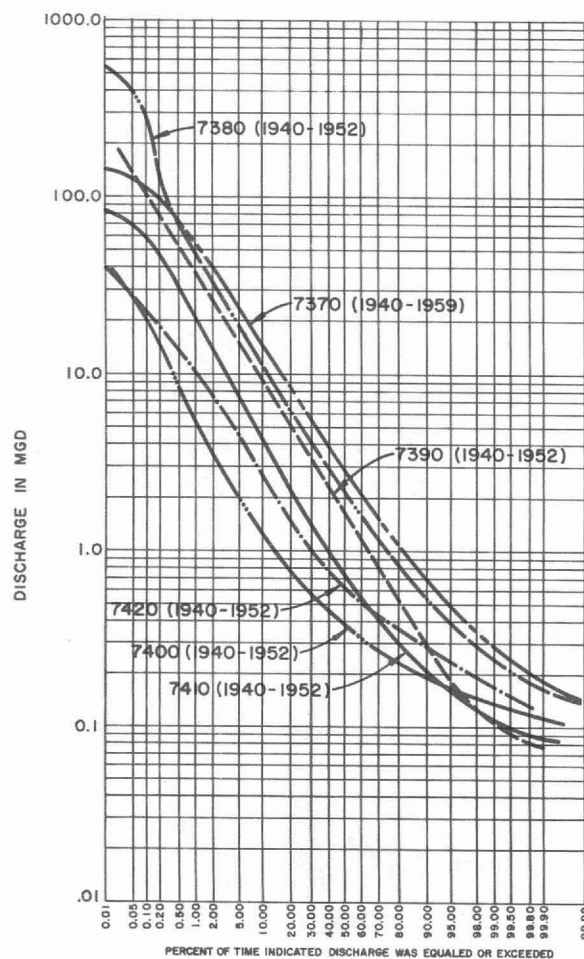
Horizontal drum water-stage recorder, left, and digital water-stage recorder, above.



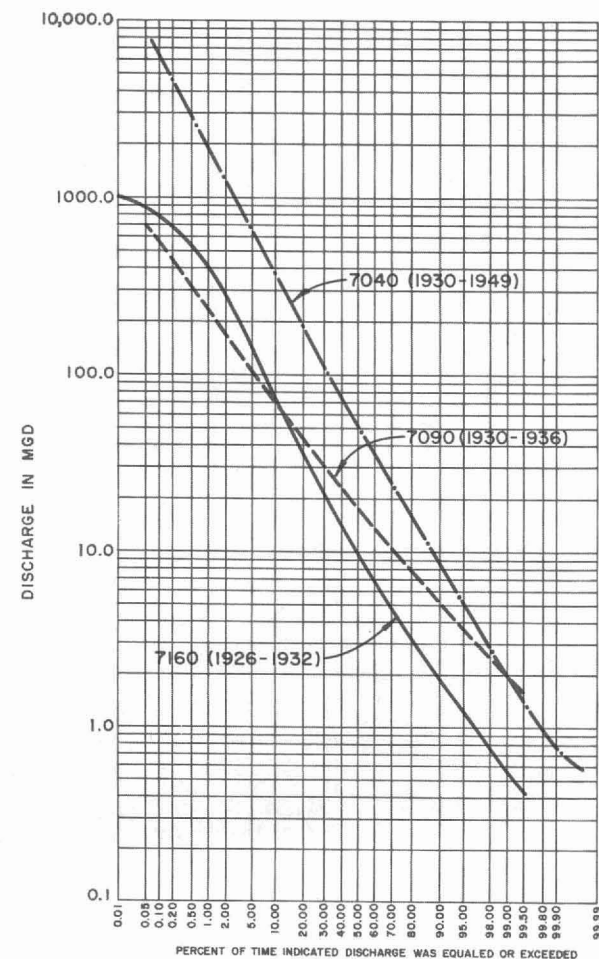
STREAM GAGING STATIONS



WAIMEA STREAMS



WAIMANU STREAMS



HILO STREAMS

FLOW DURATION CURVES FOR SELECTED STREAMS



Station No. 7590, Hanani Stream, South Kohala, showing dam for water-stage recorder.

The locations of stream gage stations for which records are regularly published, most of which are official stations maintained by the U.S.G.S., are shown on Plate 13. Of the 92 stream gage stations plotted, 35 are active and 57 are discontinued.

As Plate 13 shows, the majority of the active stream gages are located in the Kohala and Hilo areas. Elsewhere on the island, the collection of stream flow data is sparse. This is particularly evident along the Hamakua coast south of Waipio Valley and in the Kau area, where the existence of intermittent and some perennial streams might warrant expansion of the streamflow measurement network.

Continuous collection of data on every stream is neither physically possible nor economically justifiable. Yet, burgeoning land developments in various locations about the island indicate the need for a broadened gaging network to better assess the island's surface water resources. The existing distribution of stream gage stations carries over from earlier years when principle emphasis was upon the sta-

tions' usefulness in the development and operation of special projects, primarily irrigation water supplies for sugar production. A study to determine the adequacy of the stream gage station network on the island of Hawaii is part of a current project to re-evaluate the state's overall stream flow measurement program.

Stream Gage Station Index, pages 129-133, lists the 35 stations on the island of Hawaii which are active and 108 which are inactive. Stations are listed numerically in accordance with an 8-digit system used by the U.S.G.S. Each station is assigned 6 digits, following the Pacific area number "40". Stations are numbered, by islands, from Kauai in a southwesterly direction to Hawaii. On each island, stations are numbered counter-clockwise. Gaging stations on the island of Hawaii begin with the number 40-7000.00. (In this report, the nonessential zeros are omitted.) Stations along any one stream are numbered in downstream order.

The Index does not present an absolutely complete list of all stream gage stations. Inactive crest gage stations are not included, nor are many of the sugar plantation ditch flow measuring stations maintained for operations management. Also excluded from the Index are stations where non-scheduled "miscellaneous" measurements are made for special purposes. Information on these latter stations may be obtained from U.S.G.S. Water Supply Papers.

Selected stream flow data and available ditch flow data on the island of Hawaii are presented in Selected Stream Flow Records, pages 134-137. Stream flow records include data for streams having at least one complete year of record, including discontinued stations. The figures represent flows passing the respective stations, with no adjustments for possible storage or diversions. The mean monthly discharge for a station is the average of the tabulated monthly mean discharges; the mean annual discharge is the average of all complete years of record.

STREAM FLOW CHARACTERISTICS

Runoff on the island of Hawaii varies locally and from time to time in response to variations in rainfall. The relatively young, slightly dissected domes comprising the island have gentle slopes and little soil. The unweathered and highly permeable lavas allow much of the rainfall to percolate to the water table. Hence, there are few perennial streams on the island. Many in areas of moderate rainfall are perennial in their upper reaches, with flows reaching the coast only during periods of sustained rainfall.

Streams of any consequence are located in the windward areas of higher rainfall, and practically all of the perennial streams are on the windward slopes of Kohala Mountain and Mauna Kea. Elsewhere, streams are intermittent or non-existent. Runoff is greatest in the Wailuku River drainage area, where average daily stream flow at 1,070 feet elevation is about 177 mgd.

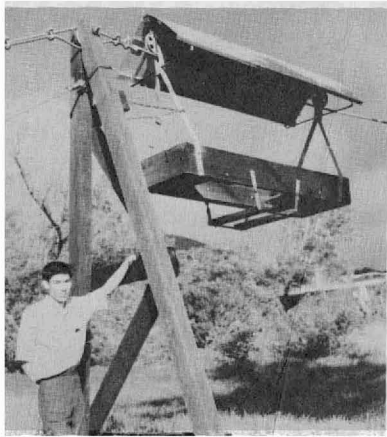
Plate 14 shows flow duration curves for neighboring streams in the Hilo and Waimea areas and the Waimanu basin in Kohala. The several streams plotted on each graph indicate the similarity of flow characteristics within each area, and a comparison of the respective graphs reveals the general similarity of flow characteristics on the island. The curves are derived

from tables in the U.S.G.S. publication, *Flow Characteristics of Selected Streams in Hawaii*.

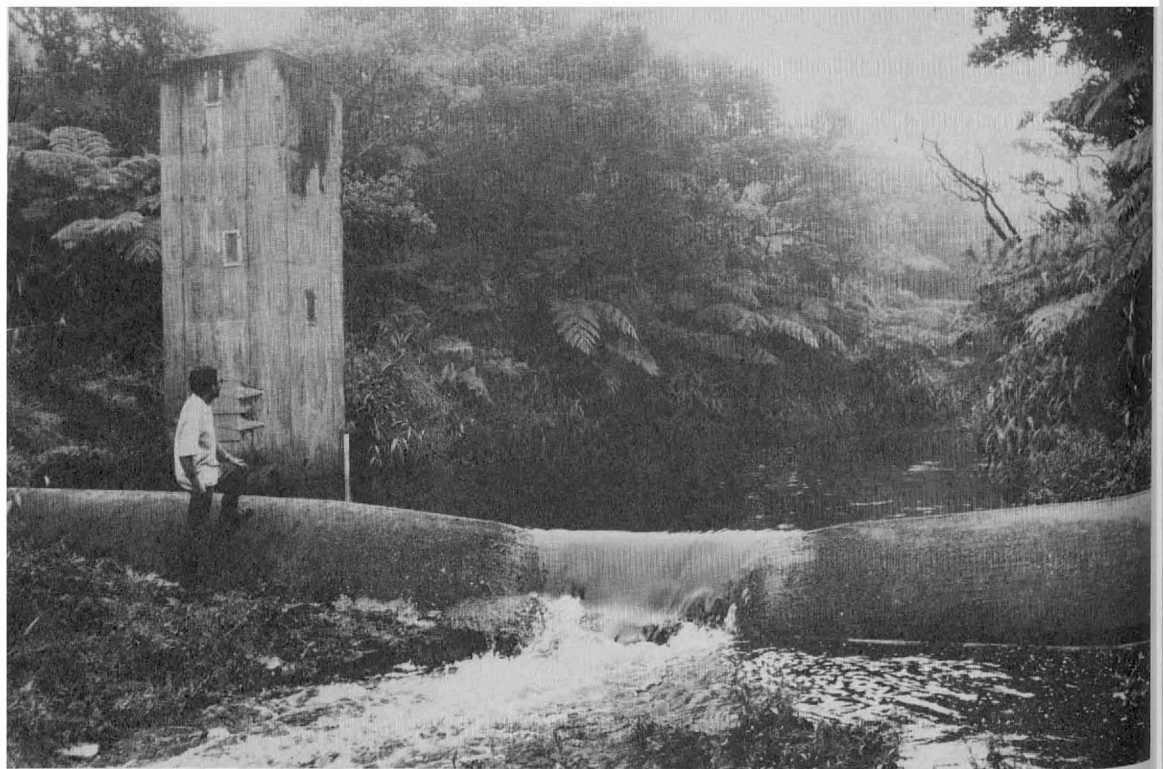
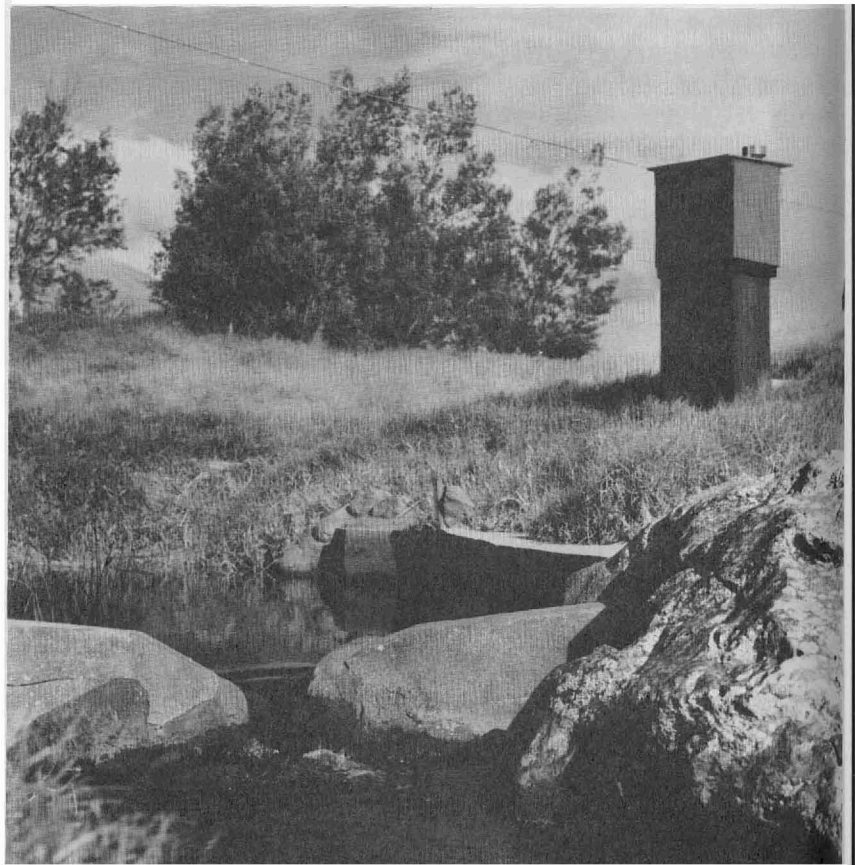
The shape of the duration curve is an index of the natural storage within a drainage area, including ground water storage, utilized by the stream. The more nearly horizontal the curve, the greater the storage effect. During dry weather, stream flow is almost entirely from ground water sources, primarily seepage near ground surface. A flow duration curve with a well sustained lower end suggests large ground water bodies with high yield draining slowly into the streams. The lower ends of duration curves, therefore, generally indicate the characteristics of the shallower ground water bodies in the watershed above the gaging station.



Picturesque Luawai Reservoir in North Kona, used by Huehue Ranch for domestic water supply and livestock purposes, is one of the very few water storage facilities located along Waiaha Stream.



At Station No. 7560, Kohakohau Stream, South Kohala, digital water-stage recorder is housed at right. Cable car is used to obtain stream velocity measurements for determination of flood flow.



Installation at Station No. 7580, Waikoloa Stream at Marine Dam, South Kohala, includes a concrete control dam and, to the left, structure housing a water-stage recorder.

Stream Gage Station Index

USGS No.	Station	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Drainage Area (sq. mi.)	Readings	Record Years	Remarks
7000	Waiakea Stream, near Mountain View	82	S Hilo	19 38 30 155 10 28	1934	17.4	Graphic recorder	1930-	
7010	Olaa Flume at Kaumana near Hilo	"	"	19 41 20 155 11 00	1960		"	1917-1920	
7012	Waiakea Stream, near Hilo	"	"	19 41 35 155 05 55	369	33.6	"	1957-1967	Diversion above station
7014	Palai Stream at Hilo	"	"	19 40 56 155 04 04	160	5.08	Staff gage	1965-	
7017	Wailuku River, near Pua Akala	"	N Hilo	19 46 24 155 22 01	6840	10.2	Graphic recorder	1964-1965	
7017.5	Wailuku River, near Humuula	"	S Hilo	19 42 55 155 18 36	4250	34.8	"	1965-	
7018	Wailuku River, near Kaumana	"	"	19 43 15 155 16 08	3520	43.4	"	1966-	
7020	Hamakua stations at altitude 2,700 ft, near Hilo	"	"					1911-1913	
7030	Wailuku River at Pukamaui, near Hilo	"	"	19 42 45 155 09 25	1280	97.2	"	1923-1940	
7040	Wailuku River at Piihonua	"	"	19 42 58 155 09 13	1070	125	Graphic recorder Digital recorder	1928-1964	Diversion above station
7050	Hilo Boarding School ditch at intake, near Hilo	"	"	19 43 00 155 08 55	980		Graphic recorder	1931-1940	
7060	Hilo Boarding School ditch, near Hilo	"	"	19 43 00 155 08 20	910		"	1918-1919	
7070	Kapehu ditch diversion, near Hilo	"	"	19 43 45 155 11 05	2000		"	1954-1962	
7080	Kapehu ditch, near Hilo	"	"	19 43 40 155 11 00	2000		"	1938-1962	
7090	Kapehu Stream at Piihonua, near Hilo	"	"	19 43 15 155 08 30	950	4.84	"	1928-1936	
7100	Wailuku River, near Hilo	"	"	19 43 20 155 06 45	400	15	Staff gage Graphic recorder	1911-1913-1918-1919	
7120	Stations 1-4 at Piihonua, near Hilo	"	"	19 42 50 155 07 40	1000			1912-	
7160	Honolii Stream, near Hilo	"	"	19 46 12 155 11 13	2350	8.0	Graphic recorder	1924-1932	
7170	Honolii Stream, near Papaikou	"	"	19 45 50 155 09 00	1425	11.6	Staff gage Graphic recorder Digital recorder	1911-1913-1967	
7174	Kalaoa Mauka Stream, near Hilo	"	"	19 48 10 155 06 10	200	.24	Staff gage	1963-	
7175	Kawainui Stream, near Pepekeo	"	"	19 49 25 155 05 45	200	9.2	"	1912-	
7176	Alia Stream, near Hilo	"	"	19 50 38 155 06 21	489	.58	Graphic recorder	1962-	
7176.5	Kapehu Stream, near Pepekeo	"	"	19 51 52 155 06 11	340	1.09	Staff gage	1963-	
7178	Pohakupuka Stream, near Papaaloa	"	N Hilo	19 57 20 155 11 20	250	2.76	Graphic recorder Digital recorder	1962-1967-1967-	
7178.2	Manowaiopae Stream, near Laupahoehoe	"	"	19 58 35 155 14 45	900	1.04	Graphic recorder Digital recorder	1965-1967-1967-	



KOHA KOHAU STREAM at elevation 3750.

USGS No.	Station	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Drainage Area (sq. mi.)	Readings	Record Years	Remarks
7178.5	Keehia Gulch, near Ookala	81	Hamakua	20 01 08 155 18 45	850	.62	Staff gage	1963-	
7179.2	Ahualoa Gulch at Honokaa	"	"	20 05 12 155 29 17	1130	2.27	"	1963-	
7179.5	Honokaia Gulch tributary, near Honokaa	"	"	20 02 58 155 32 19	2690	2.42	"	1963-	
7200	Kawainui Stream, near Kamuela	"	S Kohala	20 05 18 155 40 58	4060	1.58	Digital recorder	1964-	Former sta 7200 now sta 7329
7203	Kawaiki Stream, near Kamuela	"	"	20 05 13 155 40 59	4090	0.45	"	1968-	
7205	Upper Hamakua ditch below Kawaiki Stream, near Kamuela	"	"	20 05 15 155 40 42	4020		Graphic recorder	1964-	
7210	Kawainui Stream at altitude 2,120 ft, near Waipio	"	Hamakua	20 05 20 155 38 40	2120			1901-1902	
7215	Branch 3 Kawainui Stream at altitude 1,700 ft, near Waipio	"	"		1700			1901-1902	
7220	Kawainui Stream at altitude 1,435 ft, near Waipio	"	"		1435			1901-1902	
7223	Branch 2 Kawainui Stream at altitude 1,405 ft, near Waipio	"	"		1405			1901-1902	
7226	Branch 1 Kawainui Stream at altitude 1,380 ft, near Waipio	"	"		1380			1901-1902	
7230	Kawainui Stream, near Waipio	"	"					1911-1912	

USGS No.	Station	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Drainage Area (sq. mi.)	Readings	Record Years	Remarks
7240	Kawainui Stream at altitude 775 ft, near Waipio	81	Hamakua		775			1901-1902	
7248	Upper Hamakua ditch above Alakahi Stream, near Kamuela	"	S Kohala	20 04 31 155 40 26	3890		Digital recorder	1968-	
7250	Alakahi Stream, near Kamuela	"	"	20 04 27 155 40 25	3900	.87	"	1964-	Diversion above station
7280	Alakahi Stream at altitude 1,200 ft, near Waipio	"	Hamakua		1200			1901-1902	
7290	Alakahi Stream at altitude 730 ft, near Waipio	"	"	20 04 30 155 37 00	730			1901-1902	
7300	Koiawe Stream at altitude 1,120 ft, near Waipio	"	"		1120			1901-1902	
7310	Koiawe Stream at altitude 610 ft, near Waipio	"	"	20 04 00 155 36 00	610			1901-1902	
7320	Waipio Stream below Koiawe Stream, near Waipio	"	"					1911-1912	
7321	Waima Stream at altitude 790 ft, near Waipio	"	"	20 04 00 155 35 00	790			1901-1902	
7321.5	Waima Stream at altitude 385 ft, near Waipio	"	"	20 04 00 155 35 00	385			1901-1902	
7322	Wailoa Stream, near Waipio	"	"	20 05 28 155 37 01	150	14.3	Graphic recorder Digital recorder	1964- 1964-	Diversion above station
7323	Upper Hamakua ditch at Puualala and reservoir No. 3 weirs, near Kukuihaele	"	"	20 03 16 155 37 06	2820			1913-1920	
7329	Lower Hamakua ditch at main weir, near Kukuihaele	"	"	20 07 05 155 35 10	980		Graphic recorder	1910-1920	Formerly Station 7200; published as New Hamakua Ditch, 1911-13
7330	Lower Hamakua ditch wasteway, near Kukuihaele	"	"	20 07 07 155 35 09	980		"	1964-	
7331	Lower Hamakua ditch below main weir, near Kukuihaele	"	"	20 07 07 155 35 09	990		"	1964-	
7332	Honokaa diversion at Honokaa	"	"	20 05 12 155 28 36	950		"	1964-	
7333	Lower Hamakua ditch below Honokaa diversion at Honokaa	"	"	20 05 12 155 28 34	950		"	1964-	
7370	Wailikahi Stream, near Waimanu	"	"	20 07 40 155 39 55	2740	0.4	"	1939-1960	
7380	Kaimu Stream, near Waimanu	"	"	20 08 30 155 39 40	1980	.90	"	1939-1947 1950-1952	
7390	Punalulu Stream, near Waimanu	"	"	20 08 50 155 39 40	1870	1.4	"	1939-1952	
7400	Waiaalala Stream, near Waimanu	"	"	20 09 05 155 39 55	1880	0.2	"	1939-1952	
7410	Paopao Stream, near Waimanu	"	"	20 09 05 155 40 05	1910	.6	"	1939-1952	
7420	Kukui Stream, near Waimanu	"	"	20 09 14 155 40 15	1940	.21	"	1939-1952 1959-1966	
7430	Awini ditch at East Honokane Iki gulch, near Niulii	"	N Kohala	20 09 55 155 43 10	2000		"	1927-	
7440	East Honokane Iki intake to Awini ditch, near Niulii	"	"	20 09 55 155 43 15	2000		"	1927-	

USGS No.	Station	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Drainage Area (sq. mi.)	Readings	Record Years	Remarks
7450	Awini ditch above Honokane Gulch, near Kohala	81	N Kohala					1918	
7455	Awini ditch at Awini weir, near Kohala	"	"	20 08 20 155 43 55	1840		Graphic recorder	1907- 1917 1963-	
7470	East Branch Honokane Nui Stream at altitude 1,300 ft, near Honokane	"	"					1901	
7475	East Branch Honokane Nui Stream, near Niulii	"	"	20 08 18 155 44 00	1080	4.96	Graphic recorder	1963-	Records poor
7480	East Branch Honokane Nui Stream at altitude 770 ft, near Honokane	"	"					1901	
7490	West Branch Honokane Nui Stream at altitude 1,370 ft, near Honokane	"	"					1901	
7495	West Branch Honokane Nui Stream at altitude 775 ft, near Honokane	"	"					1901	
7500	Kohala ditch at Honokane weir, near Kohala	"	"					1907- 1912	
7509	Kohala ditch at Honokane, near Niulii	"	"	20 09 50 155 43 50	960		Graphic recorder	1963-	
7510	Kohala ditch at Pololu, near Niulii	"	"	20 10 19 155 44 20	960		"	1927-	
7520	Kohala ditch at Niulii weir, near Kohala	"	"	20 11 50 155 45 10	1000		Staff gage	1907- 1917	
7526	Hapahapai Gulch at Kapaau	"	"	20 14 00 155 48 02	450	1.52	"	1963-	
7540	Kehena ditch at Honokane mauka, near North Kohala	"	"	20 06 40 155 42 50	4200		"	1912- 1913	
7550	Kehena ditch, near Kohala	"	"	20 07 25 155 45 05	3850		Graphic recorder	1917- 1919 1928- 1966	
7558	Luahine Gulch, near Waimea	85	S Kohala	20 03 11 155 44 35	3160	.32	Staff gage	1963-	
7560	Kohakohau Stream, near Kamuela	81	"	20 02 38 155 41 10	3273	2.51	Graphic recorder Digital recorder	1956- 1966 1966-	Diversion above station
7565	Keanuiomano Stream, near Kamuela	85	"	20 01 48 155 42 05	2410	4.30	" Graphic recorder	1963-	Diversion above station
7570	Waikoloa Stream, near Kamuela	81	"	20 03 17 155 40 01	3570	.78	"	1947-	
7580	Waikoloa Stream at Marine Dam, near Kamuela	"	"	20 02 48 155 39 58	3460	1.18	" Digital recorder	1947- 1964 1964-	Diversion above station
7590	Hauani Gulch, near Kamuela	"	"	20 02 28 155 39 05	3117	0.47	Graphic recorder Digital recorder	1956- 1964 1964-	Diversion above station
7590.4	Paiaakuli Reservoir tributary, near Waimea	"	"	20 02 15 155 38 07	2910	.27	Staff gage	1963-	
7590.6	Kamakoa Gulch, near Waimea	85	"	19 57 32 155 41 02	2500	50.6	"	1963-	
7590.8	Popoo Gulch, near Waikii	"	"	19 52 11 155 43 51	2510	33.1	"	1963-	
7591.8	Keopu Stream, near Kailua	84	N Kona	19 38 54 155 58 15	750	2.61	"	1963-	
7592	Right Branch Waiaha Stream, near Holualoa	"	"	19 38 41 155 54 55	3280	1.89	Graphic recorder	1960-	



Station No. 7580—WAIKOLOA STREAM at Marine Dam.

USGS No.	Station	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Drainage Area (sq. mi.)	Readings	Record Years	Remarks
7593	Waiaha Stream at Luawai, near Holualoa	84	N Kona	19 38 12 155 55 45	2580	8.74	Graphic recorder	1960-	Entire low flow diverted
7595	Waiaha Stream, near Holualoa	"	"	19 38 12 155 56 40	1910	9.35	"	1957-	Diversion above station
7598	Kiilae Stream, near Honaunau	"	S Kona	19 24 52 155 50 56	2898	0.67	"	1958-	
7600	Waiohinu Springs; mauka station, near Naalehu	83	Kau	19 05 25 155 37 25	2300		"	1917-1918	
7610	Waiohinu Springs; makai station, near Naalehu	"	"	19 05 20 155 37 25	2300		"	1917-1918	
7612	Kahilipali Nui Gulch at Waiohinu	"	"	19 04 10 155 36 30	1020	.47	Staff gage	1962-1965	
7620	Alapai Gulch at Naalehu	"	"	19 04 00 155 35 19	730	2.90	"	1963-	
7640	Hilea Gulch tributary, near Honuapo	"	"	19 10 27 155 35 58	2940	11.7	Graphic recorder Digital recorder	1966-1967 1967-	
7650	Hilea Gulch tributary No. 2, near Honuapo	"	"	19 10 17 155 36 05	2880	4.53	Graphic recorder	1966	
7670	Ninole Gulch, near Punaluu	"	"	19 10 44 155 33 46	2080	14.0	Graphic recorder Digital recorder	1966-1967 1967-	
7700	Hionamoa Gulch at Pahala	"	"	19 11 45 155 29 11	750	5.87	Staff gage	1963-	
7702	Hionamoa Gulch tributary at Pahala	"	"	19 11 28 155 28 53	500	.42	"	1963-	
7705	Paaau Gulch at Pahala	"	"	19 12 39 155 28 48	972	1.42	Graphic recorder	1962-	

Selected Stream Flow Records

AVERAGE DAILY DISCHARGE in Millions of Gallons											
JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.

Station No. 7000—WAIKAEKA STREAM NEAR MOUNTAIN VIEW

1930											
1931	0.842	1.49	1.41	0.425	0.431	0.30	3.02	5.78	7.42	7.43	8.24
1932	10.1	8.67	4.69	7.97	7.00	4.51	4.32	3.13	2.32	0.496	1.45
1933	9.03	5.70	6.20	4.20	7.17	3.88	1.95	1.53	1.74	1.27	0.602
1934	4.46	6.10	2.18	3.51	10.1	4.91	6.36	5.58	6.92	6.95	10.3
1935	14.2	6.91	10.1	14.7	4.22	3.77	6.39	5.76	6.94	3.93	4.78
1936	0.997	0.289	6.03	9.45	9.81	4.91	8.58	17.1	9.52	10.6	5.98
1937	24.9	21.5	15.7	7.88	13.3	5.31	10.3	17.5	3.80	6.38	11.1
1938	12.7	11.2	13.5	15.9	11.2	9.20	6.81	5.66	4.67	5.31	10.0
1939	16.8	15.1	18.3	12.0	6.10	5.82	11.0	5.22	5.62	8.83	8.70
1940	0.379	0.274	0.330	1.19	2.32	1.57	6.22	13.8	10.7	7.38	9.98
1941	1.14	0.082	2.25	4.79	8.59	6.97	9.19	8.69	18.5	20.4	8.05
1942	1.59	0.740	20.5	13.3	10.4	4.10	3.32	1.93	5.57	5.42	2.84
1943	5.42	4.54	4.19	6.36	5.11	7.23	14.2	4.20	3.92	1.35	0.246
1944	1.90	3.10	3.16	9.86	7.62	7.28	9.23	5.48	2.59	7.53	17.5
1945	3.46	0.360	15.3	6.40	1.12	2.21	2.59	4.65	5.0	1.38	7.94
1946	3.11	11.4	10.3	16.0	5.34	0.807	5.24	4.61	2.50	4.35	8.57
1947	3.94	0.338	9.71	8.08	5.20	2.46	4.41	6.89	10.2	3.56	7.21
1948	3.37	0.719	16.7	12.0	9.23	6.70	7.25	5.24	4.74	7.63	19.5
1949	20.9	10.1	6.97	9.69	2.40	0.423	3.25	6.33	4.29	5.70	18.1
1950	8.33	5.78	9.30	19.1	17.5	6.05	7.11	7.76	1.26	0.610	2.76
1951	7.65	12.7	18.6	5.18	2.93	4.11	2.36	12.9	5.49	4.07	17.5
1952	15.8	7.95	22.7	7.84	7.55	5.45	9.15	4.20	5.64	5.79	13.5
1953	1.35	2.00	18.0	4.21	5.68	6.46	2.05	5.13	1.10	11.7	33.6
1954	3.63	2.53	7.37	1.38	4.11	6.06	7.37	15.4	6.44	2.73	21.6
1955	14.4	14.1	8.71	11.9	16.2	5.34	3.17	6.64	4.22	5.20	8.60
1956	5.99	18.7	15.0	11.1	12.9	11.1	4.77	19.1	7.71	3.50	18.1
1957	4.76	10.2	2.35	9.04	10.5	1.69	5.34	19.1	10.2	5.05	7.89
1958	6.36	1.82	3.88	9.73	8.66	6.39	12.0	15.4	8.31	8.24	15.0
1959	2.47	9.27	7.58	7.57	8.30	2.90	2.13	8.08	4.96	3.81	11.9
1960	17.3	11.5	7.41	19.3	11.1	4.37	5.01	6.84	7.66	8.08	12.2
1961	1.08	9.52	11.6	6.29	6.02	3.61	1.60	2.54	3.27	9.00	17.2
1962	3.41	0.443	2.19	3.20	8.88	5.43	3.07	2.84	3.67	2.25	0.916
1963	1.67	0.263	7.76	24.6	17.7	9.25	12.2	8.08	8.56	7.02	4.78
1964	5.38	15.2	22.1	12.1	25.2	7.24	4.58	7.01	7.41	8.02	17.9
1965	3.33	2.23	8.43	11.0	11.4	5.29	4.35	3.00	2.00	12.3	9.71
1966	8.21	6.17	4.66	4.95	3.77	5.71	11.8	8.71	8.58	12.0	9.72
Total	249,758	238,918	344,360	331,795	306,061	180,790	221,670	281,910	212,800	208,906	326,944
Mean	6,938	6,837	9,566	9,217	8,502	5,022	6,156	7,831	5,906	5,646	8,836

Station No. 7012—WAIKAEKA STREAM NEAR HILO

1957											
1958	0.248	0	0	0	0	0	4.80	4.65	0.074	1.08	7.82
1959	0	5.83	0.220	0.451	0	0	0.075	0	0.004	19.7	7.35
1960	19.5	10.3	1.05	19.1	4.24	0	1.30	0.543	1.55	4.02	0
1961	0	2.60	1.72	0.48	0	0	1.06	8.90	18.2	15.9	4.07
1962	0.003	0	0	0	0	0	0.004	0	0.000	0	0.0006
1963	0	0	28.4	4.94	0	0.076	0	0.007	0.002	0.065	0
1964	0.108	12.0	18.7	1.68	49.2	0.960	0	0.015	0.461	0.269	34.3
1965	5.93	0	2.57	4.12	10.2	0	0	0	1.76	1.67	2.21
1966	0.001	0	0.002	0	0	0	6.9	0.653	0.276	9.25	3.69
Total	25,790	10,730	24,262	54,231	68,580	0,960	12,476	44,193	10,975	25,235	89,662
Mean	2,866	3,414	2,696	6,026	7,620	0,096	1,248	4,419	1,098	2,524	8,966

Station No. 7017—WAILUKU RIVER NEAR PUA AKALA

1964	0	0.047	1.16	0	0.53	0	0	0.002	0	0.0006	0.570
1965	0	0	0	0.230	0.230	0	Discontinued				0
Total	0	0.047	1.16	0.230	0.760	0	0	0.002	0	0.0006	0.570
Mean	0	0.024	0.580	0.115	0.380	0	0	0.002	0	0.0008	0.570

Station No. 7017.5—WAILUKU RIVER NEAR HUMUULA

1965		0.078	0.324	5.02	3.86	0.148	0.075	0.082	0.071	0.021	0.467
1966	0.233	0.169	0.195	0.029	0.163	0.103	0.952	0.497	0.369	1.46	1.71
Total	0.233	0.247	0.519	5.049	4.023	0.251	1.027	0.579	0.440	1.481	2.177
Mean	0.233	0.124	0.260	2.525	2.012	0.126	0.514	0.280	0.220	0.741	1.089

Station No. 7030—WAILUKU RIVER AT PUKAMAU NEAR HILO

1923											
1924	10.7	18.4	21.1	78.8	38.8	27.2	26.4			36.3	
1925	30.8	1.60	84.5	70.8	34.1	37.8	24.7	23.5	8.88	68.7	47.5
1926											
1927	56.2	11.9	65.9	50.0	26.0	21.9	19.5	53.0	51.0	17.6	31.5
1928	39.9	18.4	5.27	17.8	23.7	10.8	20.8	9.86	1.33	0.99	63.3
1929											
1930	9.55	22.2	61.3	112	84.9	93.9	67.3	740	254	121	36.3
1931	2.23	49.1	4.69	4.13	1.90	1.97	11.4	59.1	290	79.5	97.9
1932	318	168	36.0	71.5	47.7	26.9	17.6	7.83	6.89	1.86	15.2
1933	241	62.6	49.3	46.8	62.7	18.5	6.92	7.74	6.23	3.90	2.70
1934	449	31.0	2.92	26.8	52.3	36.6	44.4	19.0	93.5	31.0	78.9
1935	123	138	40.9	193	10.7	12.5	67.2	17.1	48.8	20.5	40.2
1936	8.39	1.77	47.0	51.7	36.7	17.8	37.8	123	51.3	64.4	22.2
1937	279	390									
1938		67.0	137	181	62.5	47.6	22.1	43.5	19.3	55.9	170
1939	232	133	201	116	21.3	30.2	69.4	24.1	28.0	23.1	61.2
1940	0.313	1.41	1.03	4.54	Discontinued						
Total	1399,98	1114,38	757.01	1024,37	536.00	390.90	556.21	1252,93	932.63	545.15	670,43
Mean	99,999	74,29	54,07	73,17	35,73	26,06	37,08	89,50	66,62	38,94	51,57

Station No. 7040—WAILUKU RIVER ABOVE HILO BOARDING SCHOOL

1928											
1929	60.7	493	281	188	16.0	28.8	321	118	149	194	280
1930	32.6	68.1	199	326	254	294	219	1,280	642	256	125

AVERAGE DAILY DISCHARGE in Millions of Gallons											
JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.

Station No. 7090—KAPEHU STREAM AT PIIHONUA NEAR HILO

1931	609	179	158	142	207	59.7	24.7	22.0	26.3	15.5	12.4	4.64	122
1934	137	109	7.60	60.8	163	107	150	63.8	163	98.1	215	228	125
1935	277	297	126	390	32.4	40.7	156	45.8	138	47.7	110	141	408
1936	30.5	5.46	154	141	127	45.0	125	354	156	181	65.0	680	175
1937	631	1,040	341	203	201	42.4	253	878	36.9	74.9	221	620	331
1938	350	177	372	468	176	132	56.9	125	55.6	131	292	507	237
1939	543	362	448	309	54.8	86.5	175	72.4	85.3	58.6	165	31.9	137
1940	3.22	5.37	3.55	16.4	16.5	18.6					217	22.9	
1941	24.9	2.85	68.8	47.8	176	462	171	166	513	495	101	250	207
1942	14.0	26.5	651	222	153	67.9	52.6	40.1	152	137	59.4	16.7	133
1943	181	144	82.2	81.0	149	184	323	96.2	51.5	14.6	17.9	52.3	133
1944	39.5	114	39.5	238	204	180	179	57.9	55.5	302	400	188	164
1945	32.3	5.91	450	126	12.4	59.4	55.5	112	67.9	39.4	157	145	104
1946	117	219	411	421	46.5	9.86	104	36.8	21.4	94.9	83.8	671	167
1947	22.6	3.75	232	179	106	16.4	69.7	205	209		138		
1948					177	67.2	122	117	72.3	226	478	596	146
1949	486	210	226	93.9	24.2	14.4	64.9	62.3	31.4	96.3	242	434	166
1950	108	161	197	514	233	52.7	178	67.1	11.3	44.3	49.6	37.6	137
1951	165	991	629	89.9	39.7	60.4	88.7	294	30.8	136	571	69.5	230
1952	401	138	785	89.4	61.5	66.4	154	381	55.8	137	330	174	206
1953	6.28	70.0	500	47.1	114	53.6	2		15.5	17.5	115	62.2	98.3
1954	41.1	74.6	95.0	3	30.8	68.8	79.5	120	39.4	95.2	52.0	23.7	768
1955	287	341	170	342	270	59.5	61.3	95.7	44.4	56.3	208	83.1	167
1956	111	737	226	190	261	186	318	718	54.8	175	374	57.9	264
1957	147	159	238	934	118	11.7	127	765	164	142	132	575	234
1958	49.4	31.3	119	113	199	118	152	99	152	99	116	160	140
1959	46.5	348	77.6	92.8	118	16.3	65.6	190	64.6	56.9	264	392	143
1960	50.3	274	86.7	438	137	56.4	67.0	199	188	141	453	434	214
1961	9.46	382	206	1740	79.8	21.6	45.6	38.4	30.9	344	545	674	209
1962	21.6	4.46	98	67.3	263	39.3	50.0	23.8	17.6	14.6	30.5	89.7	65.7
1963	7.90	0.435	223	1,180	43	251	251	114	103	105	98.6	14.2	233
1964	7.90	0.435	223	1,180	43	251	251	114	103	105	98.6	14.2	233
1965	72.2	27.1	125	266	313	61.3	34.6	128	17.0	14.2	197	336	125
1966	114.0	68	76.9	45.2	75.2	81.5	250	131	96.3	242	234	314	144
Total	6561.56	7805.86	8800.75	8212.60	5985.10	3208.78	4894.80	7907.00	4473.40	4613.44	8377.60	8675.34	6244.45

AVERAGE DAILY DISCHARGE in Millions of Gallons												
JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.

Station No. 7250 — ALAKAHI STREAM NEAR KAMUELA

1964	2.64	7.70	4.25	5.19	9.18	3.96	8.65	4.49	5.53	5.91	5.05	1.83	5.18
1965	1.99	2.37	3.39	2.82	1.59	3.44	3.55	1.57	0.057	1.54	6.38	8.00	3.06
1966	5.2	4.05	2.80	1.89	1.32	7.0	6.12	8.68	4.30	3.69	1.65	6.85	4.48
Total	96.3	14.12	10.44	10.00	12.06	14.30	16.32	14.74	9.887	11.14	13.08	16.68	12.72
Mean	32.77	4.71	3.48	3.33	4.03	4.77	5.44	4.91	3.30	3.71	4.36	5.56	4.24

Station No. 7322 — WAILOA STREAM NEAR WAIPIO

1964													
1965	34.6	34.6	38.5	41.0	87.6	34.8	56.0	49.5	44.7	65.1	58.5	38.5	—
1966	44.1	38.8	36.8	35.2	33.5	57.5	50.9	80.6	61.2	47.5	34.6	65.5	48.9
Total	78.7	73.4	126.1	120.8	152.7	126.2	145.0	158.5	133.0	149.7	144.4	170.9	88.9
Mean	39.35	36.70	42.03	40.3	50.9	42.07	48.33	52.83	44.33	49.90	48.13	66.97	44.5

Station No. 7370 — WAILIKAHAI STREAM NEAR WAIMANU

1939													
1940	1.06	4.45	4.00	12.1	4.92	7.20	13.7	8.30	2.87	4.10	13.7	4.70	—
1941	7.94	1.91	9.80	10.7	14.4	16.5	12.4	12.2	5.82	11.9	5.92	12.1	10.2
1942	2.77	4.33	40.4	18.3	9.01	4.14	3.46	7.19	5.60	3.01	1.96	1.89	8.55
1943	1.74	3.83	7.14	12.7	5.73	6.82	9.66	7.35	3.68	8.17	3.89	5.31	7.33
1944	1.69	1.75	1.13	14.8	7.56	8.96	12.3	6.74	2.58	8.96	5.7	4.97	6.42
1945	1.64	1.22	10.7	3.30	2.06	3.58	1.93	4.09	2.38	3.11	2.80	5.70	3.56
1946	9.53	5.36	10.3	9.54	3.03	4.36	8.50	4.69	3.84	2.25	3.97	13.3	6.57
1947	3.85	1.55	7.10	5.14	8.86	3.12	5.90	5.84	5.26	2.38	8.14	5.18	—
1948	14.3	4.70	14.1	5.72	5.54	3.05	6.58	2.99	4.20	6.28	3.95	7.51	6.02
1949	3.70	1.47	6.75	6.15	4.75	2.43	8.55	8.59	2.70	3.84	11.2	5.84	5.18
1950	2.83	2.79	12.1	18.6	5.21	3.35	11.0	6.18	2.19	2.38	6.74	14.2	7.32
1951	3.64	7.05	2.33	4.36	3.38	3.75	5.78	7.27	3.83	2.89	8.69	4.92	4.80
1952	4.99	7.58	10.1	7.20	7.75	10.2	11.1	7.97	3.26	7.05	7.86	6.29	7.62
1953	0.523	2.38	5.14	4.09	8.87	4.61	9.94	8.19	1.56	2.86	8.10	6.09	5.23
1954	4.15	0.318	6.44	4.31	8.45	7.86	8.43	14.0	1.82	1.70	0.613	19.6	6.55
1955	5.41	13.8	5.96	8.67	10.3	10.1	8.40	5.70	3.20	3.77	5.94	2.40	6.81
1956	4.36	12.1	6.01	7.63	8.33	10.4	5.77	13.3	2.05	7.27	3.47	6.43	7.27
1957	2.33	4.73	2.06	8.44	4.00	2.50	7.73	13.5	3.15	9.12	5.14	18.4	6.79
1958	5.70	2.59	4.54	6.87	8.67	9.14	13.3	17.9	4.82	8.24	4.14	6.21	7.79
1959	6.01	11.4	4.87	8.71	7.65	2.56	4.18	6.73	4.94	2.40	5.71	12.1	6.41
1960	Discontinued												
Total	88.313	95.998	169.990	182.780	143.100	129.080	177.500	185.320	74.510	100.077	116.263	168.860	130.35
Mean	4.416	4.770	8.500	8.704	6.814	6.147	8.452	8.825	3.548	4.766	5.636	8.041	6.52

Station No. 7390 — PUNALULU STREAM NEAR WAIMANU

1939													
1940	0.919	5.22	2.87	8.20	3.22	4.88	10.8	5.88	2.31	3.12	12.9	3.96	—
1941	7.67	1.95	7.31	6.99	13.7	17.5	6.92	7.78	4.38	10.4	5.07	6.46	6.38
1942	2.57	2.62	77.4	12.5	8.29	3.40	2.62	4.51	4.12	2.38	1.75	1.40	10.4
1943	1.27	2.62	5.05	8.26	3.67	4.41	6.57	5.10	2.83	0.840	2.22	3.20	3.68
1944	1.09	1.24	0.888	7.53	4.17	5.49	8.05	4.30	1.79	8.25	3.76	3.35	4.01
1945	1.15	1.07	7.03	2.93	2.36	2.92	1.47	3.15	1.87	2.17	2.15	4.74	2.77
1946	9.81	5.44	7.37	7.42	2.01	2.55	6.01	3.80	3.15	1.77	3.34	10.4	5.27
1947	3.19	1.94	6.77	4.24	6.74	2.50	Discontinued						
1950							8.71	5.02	1.75	1.76	8.16	12.1	—
1951	3.50	5.80	1.80	3.10	2.77	2.99	4.80	5.81	3.40	2.20	7.24	4.34	3.96
1952	4.30	6.63	8.23	6.57	6.99	8.13	Discontinued						
Total	35.469	34.560	125.318	74.580	57.900	58.000	60.930	83.090	29.690	33.780	49.990	54.250	43.36
Mean	3.547	3.456	12.532	6.780	5.264	5.273	6.093	6.309	2.969	3.379	4.999	5.425	5.42

Station No. 7380 — KAIMU STREAM NEAR WAIMANU

1939													
1940	0.694	3.40	2.90	7.97	2.74	4.19	7.60	3.71	1.35	2.30	8.87	2.98	—
1941	6.58	1.84	6.30	7.36	9.79	13.3	8.29	8.95	4.21	10.6	4.32	7.71	7.46
1942	2.27	2.72	37.2	13.3	6.24	3.55	2.04	4.24	3.39	1.73	1.26	1.01	6.55
1943	0.884	2.27	4.62	7.25	3.08	3.53	4.62	4.04	2.21	0.460	1.98	2.35	3.16
1944	0.810	1.00	0.671	7.13	3.89	4.54	8.17	4.22	1.54	5.80	4.77	3.00	3.80
1945	0.814	0.875	6.81	2.33	1.50	2.18	1.13	2.45	1.31	1.67	1.63	3.90	2.23
1946	6.00	2.88	6.17	5.80	1.44	1.85	4.42	3.02	2.47	1.36	2.83	8.92	3.95
1947	2.77	1.59	5.52	3.55	5.31	1.85	3.63	3.37	2.97	2.87	1.54	5.04	3.38
1948	8.21	3.01	8.60	3.95	3.24	1.71	3.94	1.85	2.55	4.35	2.71	4.72	4.09
1949	2.72	1.12	3.98	4.50	3.31	1.54	5.45	3.51	1.70	2.49	7.21	3.75	3.46
1950	1.70	1.65	7.16	10.9	3.17	1.91	6.33	3.38	0.994	1.07	4.65	6.59	4.39
1951	2.04	4.39	1.17	3.12	1.85	2.11	3.88	4.30	2.03	1.42	5.17	2.99	2.73
1952	3.20	5.29	6.14	4.88	4.84	6.31	Discontinued						

AVERAGE DAILY DISCHARGE in Millions of Gallons												
JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.

Total	38,698	32,015	97,241	84,360	53,190	50,130	64,150	61,140	29,944	38,339	50,490	56,610	49,07
Mean	2,977	2,463	7,480	6,026	3,799	3,581	4,935	4,703	2,303	2,949	3,884	4,508	4,09

Station No. 7400 — WAIKALUA STREAM NEAR WAIMANU

1939													
1940	0.264	0.523	0.434	1.16	0.448	0.333	1.01	0.557	0.332	0.320	1.16	0.093	—
1941	1.11	0.608	0.734	0.976	0.925	1.52	1.28	1.46	0.759	1.89	0.975	0.837	1.08
1942	0.666	0.496	10.0	3.08	0.202	0.445	0.315	0.755	0.656	0.413	0.232	0.322	1.54
1943	0.281	0.535	0.950	1.53	0.599	0.458	0.789	0.576	0.415	0.211	0.260	0.431	0.566
1944	0.235	0.195	0.212	0.663	0.532	0.690	1.27	0.745	0.400	1.17	0.709	0.453	0.609
1945	0.259	0.192	0.875	0.671	0.389	0.287	0.150	0.227	0.177	0.261	0.288	1.23	0.418
1946	0.832	0.480	0.743	0.754	0.337	0.272	0.440	0.321	0.283	0.202	0.453	1.72	0.572
1947	0.746	0.520	0.977	0.855	0.791	0.320	0.354	0.350	0.339	0.350	0.324	0.720	0.555
1948	1.20	0.659	1.28	0.924	0.529	0.374	0.475	0.339	0.431	0.682	0.467	0.607	0.665
1949	0.637	0.272	0.650	0.568	0.621	0.288	0.509	0.358	0.277	0.448	0.998	0.687	0.528
1950	0.383	0.271	0.835	1.54	0.630	0.359	0.791	0.588	0.286	0.241	1.10	2.72	0.815
1951	0.517	0.865	0.415	0.261	0.310	0.324	0.314	0.562	0.475	0.282	0.789	0.723	0.484
1952	0.593	1.19	0.817	0.672	0.862	0.909	1.52	Discontinued					
Total	7.673	6.806	18.922	14.117	8.525	6.756	9.757	8.578	5.571	6.640	8.420	11.628	8.434
Mean	0.590	0.524	1.456	1.008	0.609	0.483	0.697	0.660	0.429	0.511	0.648	0.894	0.703

Station No. 7410 — PAOPOA STREAM NEAR WAIMANU

1939				1.31	1.00	1.25	1.69	4.07	2.16	0.781	1.16	4.71	1.83	—
1940	0.428	1.90	1.78	1.63	1.42	1.07	2.24	6.06	1.61	1.06	1.96	1.23	1.87	—
1941	3.58	1.28	2.60	3.10	3.79	5.05	3.71	4.12	1.86	5.27	2.31	3.40	3.36	—
1942	1.44	1.43	17.9	6.71	2.87	1.11	0.853	2.00	1.33	0.748	0.536	0.608	3.15	—
1943	0.467	1.47	2.72	8.11	1.51	1.44	2.38	1.63	0.961	0.284	0.696	1.34	1.93	—
1944	0.412	0.417	0.433	2.77	1.85	2.23	4.27	1.86	0.769	4.76	1.69	1.32	1.91	—
1945	0.480	0.418	3.27	1.50	0.995	0.848	0.374	0.647	0.527	0.906	0.791	5.29	1.36	—
1946	3.08	1.28	2.98	2.35	0.970	0.744	1.85	1.37	0.872	0.460	1.58	6.29	1.96	—
1947	1.71	1.24	5.32	2.40	2.71	0.581	2.51	1.40	1.23	1.31	3.932	2.58	1.72	—
1948	5.25	1.52	5.49	2.80	1.69	0.953	1.94	0.784	1.38	2.50	1.12	1.71	2.27	—
1949	1.49	4.058	2.00	1.97	1.84	0.486	2.32	1.30	0.622	1.31	4.41	2.27	1.72	—
1950	0.880	0.718	3.90	6.38	1.50	0.717	3.24	1.72	0.441	4.084	4.07	9.01	2.77	—
1951	1.15	4.33	0.763	0.832	0.928	0.728	1.51	2.38	1.17	0.691	3.06	2.02	1.61	—
1952	1.66	3.39	3.00	4.07	2.85	2.37	3.87	2.37	0.737	Discontinued				
Total	21.967	19.851	51.546	47.482	25.873	20.283	33.887	30.201	14.290	20.853	27.75	388.98	25.63	—
Mean	1.690	1.527	3.682	3.363	1.848	1.449	2.420	2.157	1.021	1.804	2.137	2.992	2.14	—

	AVERAGE DAILY DISCHARGE in Millions of Gallons												
	JAN.	FEB.	MAR.	APR.	MAY.	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
Station No. 7560 — KOHAKOHU STREAM NEAR KAMUELA													
1956				4.68	5.84	14.2	4.38	13.3	1.36	7.68	3.35	8.85	—
1957	1.31	5.24	1.10	5.28	2.12	1.56	6.70	15.5	2.58	6.44	2.19	18.3	5.73
1958	5.96	2.54	6.67	9.36	12.9	12.6	19.1	29.8	8.09	5.21	4.58	4.34	10.3
1959	20.7	16.9	5.73	7.49	10.7	2.90	3.70	9.59	5.56	0.870	7.51	24.7	9.68
1960	6.63	25.7	5.58	16.0	5.93	4.47	4.08	6.63	4.46	0.956	6.34	2.77	7.49
1961	1.16	12.7	3.41	8.82	1.34	3.99	1.28	1.62	0.179	3.15	12.0	3.53	4.34
1962	0.327	0.933	1.76	1.18	4.28	0.975	2.44	3.39	1.89	0.367	0.578	5.17	1.79
1963	2.15	1.27	4.17	5.16	6.70	2.79	7.64	4.04	4.28	3.36	6.22	0.401	4.03
1964	2.54	10.2	3.49	3.75	11.9	2.54	7.44	5.28	4.77	6.97	7.67	2.75	5.76
1965	2.46	2.09	3.30	3.26	0.902	2.34	2.29	1.07	0.107	1.25	5.88	9.76	2.90
1966	4.28	3.36	2.09	1.07	0.784	7.45	7.45	13.9	5.05	3.80	1.33	14.2	5.43
Total	47.117	80.933	37.300	66.050	63.396	55.815	66.500	104.120	36.326	43.653	59.648	92.771	57.45
Mean	4.712	8.093	3.730	6.005	5.763	5.074	6.045	9.465	3.302	3.968	5.423	8.434	5.75

Station No. 7565 — KEANUOMANO STREAM AT WAIKOA NEAR KAMUELA													
1956													
1957	2.04	19.5	4.00	3.86	23.0	2.96	8.67	5.67	4.51	7.66	9.02	3.33	8.00
1958	2.67	2.09	3.87	3.70	0.522	1.73	1.60	0.674	0	1.04	5.02	11.0	2.83
1959	4.27	3.67	1.98	0.683	0.453	7.33	9.12	13.7	4.62	3.55	0.788	13.0	5.30
1960													
1961													
1962													
1963													
1964													
1965													
1966													
Total	9.88	25.26	9.85	8.24	23.975	12.02	19.39	20.04	9.53	12.55	23.418	27.545	16.13
Mean	3.29	8.42	3.28	2.75	7.992	4.01	6.46	6.68	3.18	4.18	5.885	6.896	5.38

Station No. 7570 — WAIKOLOA STREAM NEAR KAMUELA													
1947													
1948	6.73	4.61	9.88	5.23	4.69	3.00	5.64	3.04	3.92	5.10	4.16	6.08	5.19
1949	4.51	2.21	4.01	5.22	3.93	3.03	7.37	5.49	3.08	3.55	7.79	4.57	4.58
1950	3.04	2.68	7.51	12.6	5.49	3.20	9.61	6.78	2.27	1.88	4.56	11.5	5.95
1951	2.20	4.04	2.71	2.90	2.58	3.23	4.12	5.54	3.02	3.32	4.97	2.91	4.45
1952	4.45	4.47	6.18	6.22	6.04	8.41	8.12	6.25	3.08	4.21	4.82	4.46	5.56
1953	1.38	2.05	3.64	3.30	5.55	4.50	8.40	7.02	2.03	2.55	3.23	4.32	4.19
1954	4.52	1.26	4.70	3.55	5.71	6.86	7.58	11.8	3.13	2.49	1.65	12.3	5.52
1955	4.28	9.03	3.59	6.25	7.97	7.96	5.47	4.78	2.74	2.94	1.36	2.01	4.99
1956	3.48	7.56	3.46	3.40	6.14	7.86	4.05	8.96	2.28	4.01	2.85	4.28	4.88
1957	1.75	3.66	1.89	3.69	2.63	1.97	5.32	9.88	3.43	5.90	3.88	13.2	4.80
1958	4.49	2.57	3.95	5.57	8.56	8.20	14.8	5.14	6.47	3.79	4.38	6.60	6.60
1959	6.90	7.62	3.63	5.38	5.52	2.93	3.11	5.96	4.63	1.99	3.24	10.9	5.31
1960	3.68	11.0	4.40	9.38	5.08	3.54	3.58	5.32	4.41	1.94	4.50	2.88	5.08
1961	1.89	6.33	2.38	6.17	1.95	3.02	1.86	2.20	1.21	2.61	5.83	2.96	3.15
1962	1.32	1.49	2.46	1.91	3.25	1.56	2.93	3.09	2.63	1.22	0.994	3.05	2.16
1963	2.40	1.36	3.37	3.96	5.90	3.91	8.54	4.70	5.10	4.70	3.88	1.61	3.95
1964	2.17	6.10	3.86	3.46	7.84	3.94	5.91	5.05	4.78	6.60	5.44	2.91	4.81
1965	2.40	2.65	3.63	2.53	1.80	2.96	2.49	1.55	0.638	2.44	3.90	5.68	2.71
1966	4.47	3.66	3.02	3.06	1.90	4.72	5.70	8.75	4.87	3.59	2.12	5.68	4.33
Total	65.860	84.350	78.270	93.820	92.500	87.360	113.870	125.370	66.908	70.890	81.264	111.150	87.19
Mean	3.466	4.439	4.119	4.938	4.868	4.368	5.684	6.269	3.345	3.545	4.063	5.558	4.59

Station No. 7580 — WAIKOLOA STREAM AT MARINE DAM NEAR KAMUELA													
1947													
1948	8.85	5.50	12.8	5.92	5.13	2.78	7.01	2.82	4.24	6.13	4.35	7.27	6.08
1949	5.30	1.77	4.35	5.80	4.17	2.76	9.89	6.41	2.94	3.65	10.7	5.41	5.20
1950	2.58	2.39	10.6	17.2	6.66	3.19	13.8	7.96	2.14	1.88	5.56	16.5	7.61
1951	2.50	5.18	3.35	3.14	2.64	3.90	5.45	7.32	3.58	3.90	6.47	3.38	4.23
1952	6.26	6.20	8.33	8.24	8.48	12.9	11.9	6.22	3.16	5.30	6.37	5.40	7.57
1953	0.943	1.75	4.39	3.47	7.69	5.25	11.7	9.67	1.60	2.50	6.20	5.09	5.08
1954	4.87	0.839	5.50	3.92	6.84	8.66	9.73	16.2	2.94	2.07	1.08	16.2	6.65
1955	5.33	12.1	4.08	8.47	10.6	10.3	6.42	5.44	2.48	3.00	3.48	2.55	6.13
1956	4.64	10.9	4.65	4.50	8.22	10.9	5.76	13.6	2.91	5.34	3.73	5.54	6.71
1957	2.01	4.90	2.21	5.58	3.40	2.88	6.52	13.5	4.02	7.69	5.03	30.3	6.45
1958	6.17	7.42	6.99	7.19	11.6	11.9	13.6	20.3	6.38	6.63	4.61	5.58	8.81
1959	8.28	10.3	4.88	7.50	8.13	3.10	3.62	7.58	5.57	2.00	7.24	16.4	7.05
1960	5.04	13.3	5.70	14.4	6.64	4.10	4.28	7.12	5.50	1.98	7.38	3.44	6.39
1961	1.91	8.65	2.74	7.44	2.22	3.56	2.00	2.33	1.06	2.66	7.54	3.61	3.76
1962	1.43	1.84	3.06	2.21	4.23	1.73	3.19	3.44	2.89	1.18	0.913	3.69	2.50
1963	2.72	1.50	4.06	4.09	6.92	4.05	7.75	5.38	5.82	5.84	4.56	1.50	4.61
1964	2.40	8.10	4.79	7.81	3.97	3.99	6.95	5.74	5.13	8.20	6.42	3.14	5.63
1965	2.89	3.11	4.29	2.80	1.93	2.97	2.58	1.61	0.584	2.89	4.52	6.58	3.06
1966	5.54	4.50	3.40	3.42	2.05	5.78	7.25	11.9	5.45	3.83	2.02	7.72	6.25
Total	80.243	106.449	98.870	119.500	116.520	107.050	145.450	161.220	73.604	81.800	98.933	146.190	108.86
Mean	4.223	5.603	5.204	6.289	6.133	5.353	7.273	8.061	3.680	4.090	4.947	7.310	5.73

Station No. 7590 — HAUANI STREAM NEAR KAMUELA													
1956				0.970	0.888	1.47	1.19	0.726	3.52	0.408	1.29	0.598	1.14
1957	0.197	0.879	0.157	0.882	0.405	0.176	1.25	3.42	0.725	1.84	0.868	3.70	1.22
1958	1.12	0.421	0.703	1.06	2.03	2.48	4.32	5.28	1.10	2.34	0.887	0.933	1.91
1959	1.48	2.74	0.991	1.58	1.46	0.425	1.77	0.705	0.144	1.72	0.532	1.47	
1960	0.590	0.434	0.706	2.62	3.13	0.528	0.776	1.15	0.974	0.183	0.097	0.481	1.22
1961	0.096	2.11	0.270	2.49	0.180	0.447	0.094	0.156	0.004	0.105	1.31	0.374	0.622
1962	0.303	0.064	0.322	0.247	0.482	0.110	0.291	0.368	0.280	0.022	0	0.526	0.331
1963	0.484	0.085	0.539	0.727	1.24	0.418	1.38	0.841	0.877	0.879	0.497	0.086	0.975
1964	0.197	1.72	0.507	0.487	2.24	0.486	1.21	0.928	0.799	1.55	1.22	0.068	0.874
1965	0.481	0.441	0.906	0.479	0.135	0.282	0.299	0.074	0	0.557	0.776	1.44	0.491
1966	0.86	0.716	0.555	0.351	1.129	1.09	1.28	0.77	0.969	0.527	1.89	1.79	0.938
Total	5.635	13.516	6.596	11.611	11.081	7.860	12.070	20.277	6.891	9.437	8.872	15.618	9.771
Mean	0.564	1.352	0.600	1.056	1.007	0.696	1.097	1.843	0.626	0.958	0.807	1.420	0.977

Station No. 7592 — RIGHT BRANCH WAIKOA STREAM NEAR HOLUALOA													
					0.241	0.167	0.016	0.057	0.028	0.065	0.012	0.027	—
1960	0.006	0.019	0.888	0.262	0.172	0.334	0.110	0.091	0.057	0.346	0.974	0.030	0.275
1961	0.068	0.005	0.146	0.273	0.474	0.136	0.279	0.311	0.165	0.101	0.018	0.001	0.168
1962	0.469	0.080	0.698	0.586	1.09	0.318	0.329	0.251	0.718	0.025	0.07	0	0.376
1963	0	0.001	0.175	0.330	1.44	0.132	0.075	0.069	0.089	0.308	0.040	0.021	0.282
1964	0.015	0.014	0.192	0.132	0.260	0.600	0.281	0.42	0.576	0.375	0.445	0.01	0.378
1965	0.002	0.026	0.033	0.019	0.223	0.207	0.133	0.089	0.273	0.684	0.249	0.015	0.164
Total	0.560	0.045	2.130	1.012	3.900	2.095	1.133	2.888	2.006	1.634	1.743	0.706	1.821
Mean	0.093	0.024	0.355	0.267	0.557	0.299	0.162	0.327	0.287	0.233	0.249	0.101	0.270

DAILY DISCHARGE in Thousands of Gallons													
ANN.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1955 Ave.	—	3,145	1,981	—	97	167	951	1,019	2,838	2,026	—	1,286	1,351
Total	—	88,064	61,397	—	3,000	5,000	29,494	31,581	85,152	62,808	—	39,873	—
1956 Ave.	95	433	1,740	905	72	—	934	564	1,759	348	1,291	698	803
Total	2,832	12,565	53,949	26,142	2,237	—	28,955	17,489	52,779	10,080	38,717	21,569	—
1957 Ave.	1,084	1,005	1,301	754	833	837	840	726	1,300	—	367	213	842
Total	33,596	28,139	40,329	22,616	28,820	25,100	26,038	22,500	38,990	—	11,003	6,602	—
1958 Ave.	326	—	—	—	—	1,979	1,308	1,193	2,514	862	875	626	1,210
Total	10,113	—	—	—	—	59,379	40,558	36,991	75,426	26,701	26,244	19,413	—
1959 Ave.	1,409	2,301	—	150	99	1,610	1,201	1,781	—	133	244	1,412	1,034
Total	43,694	64,423	—	4,510	3,072	48,304	37,226	55,198	—	5,360	7,334	43,774	—
1960 Ave.	1,561	—	680	—	1,294	1,406	1,471	1,776	739	292	768	1,187	—
Total	48,403	—	21,080	—	40,121	42,193	45,990	56,206	23,220	8,759	23,805	—	—
1961 Ave.	514	623	1,203	1,193	427	961	413	255	—	162	346	1,685	707
Total	15,948	17,452	37,292	35,785	12,813	28,826	12,612	7,910	—	5,033	10,391	52,225	—
1962 Ave.	542	344	664	736	304	540	75	597	119	—	—	873	479
Total	16,800	9,968	20,591	22,094	9,413	16,191	2,353	18,499	3,582	—	—	27,068	—
1963 Ave.	409	184	389	389	448	1,156	483	861	985	504	421	—	566
Total	12,687	5,100	12,060	11,667	13,890	34,969	14,988	26,700	29,539	15,610	12,615	—	—
1964 Ave.	559	—	1,120	449	166	—	1,014	773	530	900	—	553	674
Total	17,322	—	34,713	13,465	5,146	—	31,440	23,955	15,885	27,911	—	17,137	—
1965 Ave.	629	1,019	1,084	2,040	—	—	—	—	—	—	—	—	1,193
Total	19,498	28,541	33,606	61,196	—	—	—	—	—	—	—	—	—
1966 Ave.	—	—	519	—	—	—	587	—	394	387	—	—	467
Total	—	—	16,079	—	—	—	18,105	—	12,206	11,013	—	—	—

KOHALA DITCH

1942 Max.	20,250	20,250	—	—	20,250	—	20,250	20,250	20,250	20,250	20,250	20,250	20,250
Min.	17,103	14,602	—	—	8,967	—	16,191	18,785	19,356	14,690	14,638	14,233	8,967
Ave.	19,682	17,505	20,250	20,250	19,583	20,250	19,745	20,149	20,197	18,496	18,957	17,319	19,365
Total	310,129	490,128	627,750	607,500	607,500	612,098	624,614	605,895	573,452	568,721	536,868	7,071,734	—
1943 Max.	20,250	20,250	20,250	—	—	20,250	—	20,250	20,250	19,639	20,250	20,250	20,250
Min.	13,326	11,805	17,253	—	—	18,682	—	17,200	16,871	11,698	11,273	13,030	11,273
Ave.	17,864	16,871	20,085	20,250	20,250	20,160	20,250	20,005	19,622	14,554	16,123	18,595	18,689
Total	553,786	522,792	622,634	607,500	627,750	604,790	627,750	620,144	588,663	451,161	483,684	576,448	6,887,102
1944 Max.	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250
Min.	12,338	10,916	10,407	13,809	16,540	16,005	902	19,482	13,131	11,099	—	16,233	902
Ave.	16,990	15,323	14,825	19,827	19,748	19,941	18,070	20,225	18,222	17,824	20,250	20,185	16,444
Total	529,794	444,368	459,377	594,623	612,173	595,226	560,175	628,982	546,871	552,582	607,500	625,733	6,752,484
1945 Max.	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250
Min.	12,975	19,712	15,982	16,828	14,472	13,404	12,379	14,889	11,348	11,485	13,843	6,301	6,301
Ave.	16,595	15,466	20,112	20,056	17,729	17,822	16,266	19,077	17,257	14,022	18,836	18,194	17,619
Total	514,436	433,050	623,482	601,671	549,600	534,659	504,230	591,396	517,701	434,672	565,077	564,021	6,434,004
1946 Max.	20,250	20,250	20,250	—	—	20,250	—	20,250	20,250	20,250	20,250	20,250	20,250
Min.	1,803	804	18,146	—	—	15,439	—	17,873	19,280	14,489	18,118	2,094	804
Ave.	16,815	11,399	20,020	20,250	20,250	16,415	20,250	19,967	20,182	17,917	18,356	14,889	18,206
Total	445,898	319,178	700,890	567,000	567,000	644,517	567,000	559,068	705,921	501,998	541,253	554,563	6,673,494
1947 Max.	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250
Min.	3,106	13,592	14,990	19,147	17,367	17,336	18,706	14,351	14,101	16,168	12,772	14,970	3,106
Ave.	16,794	17,261	19,871	20,136	19,840	19,790	20,027	19,371	18,041	19,319	17,714	19,253	18,595
Total	436,631	482,302	695,473	563,794	558,320	692,637	560,744	677,986	505,141	540,920	620,000	598,829	6,931,777
1948 Max.	20,250	20,250	—	—	—	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250
Min.	18,488	18,721	—	—	—	18,151	16,315	14,742	16,578	14,877	18,316	17,017	14,742
Ave.	20,084	20,140	20,250	20,250	20,061	19,118	19,617	19,314	18,844	20,061	20,090	20,250	19,817
Total	642,997	563,923	567,000	567,000	702,121	535,316	698,698	546,798	619,229	702,853	562,520	668,250	7,236,295

Note: Beginning in 1946 monthly discharge adapted to the Kohala Ditch Company report period (more or less than a whole month).

DAILY DISCHARGE in Thousands of Gallons													
	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1949	Max.	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	—	20,250
	Min.	15,777	11,137	12,644	17,991	2,058	15,021	12,639	19,783	16,105	14,573	15,309	11,137
	Ave.	19,445	14,625	18,180	20,020	19,387	18,286	19,501	20,232	18,895	18,500	19,304	20,250
	Total	583,359	408,490	509,948	560,597	943,535	511,454	642,546	566,500	529,089	497,484	597,312	8,895,500
1950	Max.	20,250	20,250	20,250	—	—	—	—	—	20,250	20,250	20,250	20,250
	Min.	17,375	14,888	16,478	—	—	15,505	—	—	16,886	17,073	15,420	16,764
	Ave.	19,651	19,071	19,580	20,250	20,250	19,473	20,250	20,250	20,188	19,220	19,348	20,082
	Total	569,888	533,981	549,230	708,750	526,500	545,254	708,750	567,000	565,265	672,684	541,751	7,232,070
1951	Max.	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250
	Min.	19,100	17,749	15,389	15,519	14,824	15,951	13,667	16,965	16,690	16,863	17,050	20,245
	Ave.	20,206	20,097	19,499	19,688	18,938	19,409	18,245	19,941	18,361	19,664	20,052	20,250
	Total	525,394	502,729	454,975	468,394	530,218	545,449	638,563	556,226	642,623	560,605	561,455	769,495
1952	Max.	—	—	—	—	—	—	—	—	20,250	20,250	—	—
	Min.	—	—	—	—	—	—	—	—	18,813	16,444	—	—
	Ave.	—	—	—	—	—	—	—	—	20,177	19,010	20,250	20,250
	Total	—	—	—	—	—	—	—	—	564,964	532,291	708,750	689,250
1953	Max.	20,250	25,510	20,250	25,510	25,510	25,510	25,510	25,510	20,250	20,250	20,250	25,510
	Min.	18,036	14,456	15,680	16,391	20,250	20,250	20,250	20,250	15,835	14,468	17,096	16,200
	Ave.	19,436	18,083	19,153	19,592	20,250	20,250	20,250	20,250	20,980	17,644	19,750	19,794
	Total	447,034	306,317	470,396	548,583	708,750	708,750	708,750	708,750	524,506	494,024	691,250	8,069,121
1954	Max.	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250	20,250
	Min.	16,362	10,562	—	17,709	16,081	—	—	—	—	—	—	10,562
	Ave.	19,137	11,844	—	19,510	19,655	19,853	20,250	21,808	20,250	20,235	19,389	16,424
	Total	554,985	331,618	537,567	550,329	694,840	567,000	567,000	708,750	566,568	566,615	459,858	262,163
1955	Ave.	16,160	6,058	10,281	20,250	20,208	20,250	20,250	20,250	20,065	20,046	19,374	18,996
	Total	491,968	157,513	287,862	567,000	707,276	567,000	708,750	567,000	561,819	561,819	542,480	6,881,811
1956	Ave.	19,893	19,104	21,234	17,392	20,243	20,230	20,250	20,250	20,250	19,767	20,128	20,187
	Total	505,436	534,064	552,078	608,724	566,802	566,427	708,750	567,000	708,750	553,473	563,577	7,203,031
1957	Ave.	20,118	20,193	19,448	20,116	20,250	19,584	20,058	20,250	20,250	19,025	20,319	19,893
	Total	502,951	565,395	680,975	663,260	567,000	650,437	561,634	567,000	708,750	524,506	563,577	7,203,031

Ground Water

GROUND WATER OCCURRENCE

Ground water on the island of Hawaii can be classified into four general categories: (1) basal water floating on salt water; (2) dike-confined water; (3) water perched on relatively impervious soil or rock formations; and (4) shallow ground water.

Kohala Area. A considerable volume of water discharges into the sea from streams on the wet northeastern slope of Kohala Mountain. Some of the water is derived from overflow of high-level dike compartments, and numerous springs discharge from the interstratified soil beds. Because of the high permeability of the lavas, it is believed that a large volume of fresh basal water is also discharged into the sea.

Toward the northern tip of the island, the more weathered rock retards the mixing of sea water and fresh basal water, and wells sunk in this area have developed water suitable for irrigation. On the lee side of the mountain, the rock is unweathered and rainfall is low; hence, there are no perennial streams, and relatively little basal water moves seaward.

Hamakua and North Hilo Area. On the east



Intake No. 3 at Manowaiopae, Spring No. 50, one of a series supplying Laupahoe town.

and northeast slopes of Mauna Kea, there are many small springs which discharge water perched on ash beds and the dense central cones of aa lava flows. In general, the perching formations are not entirely impervious, and much of the rain water percolates to the basal water table. Basal water is brackish along the coast but is of good quality farther inland.

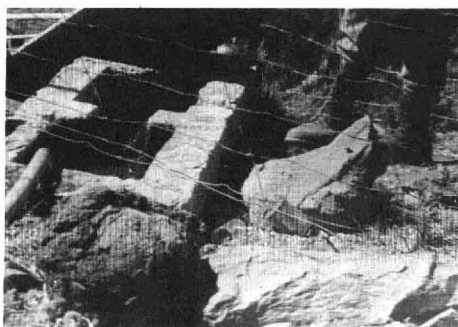
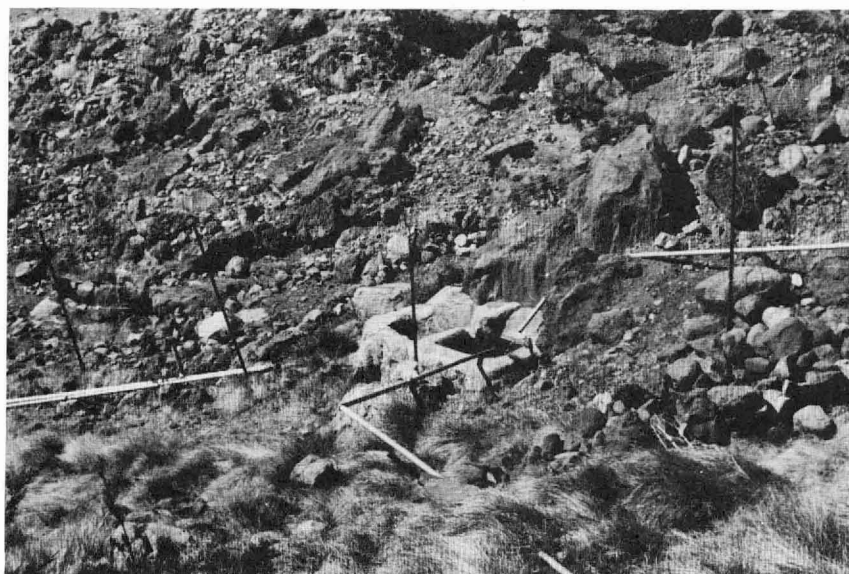
Puna and South Hilo Areas. These areas comprise the eastern slopes of Kilauea and Mauna Loa. Basal water underlies both areas, with the possible exception of the east rift zone of Kilauea, where water may be impounded by dikes at higher levels. Rainfall and recharge are high, and ground water circulation is probably rapid, so that basal water of good quality is abundant. Only a fraction of this abundant supply of basal water is utilized.

Several large and many small basal springs issue along the coast from Hilo to Kalapana. Perched springs occur on the eastern slope of Mauna Loa near its junction with Mauna Kea. The perching member is Pahala ash, which in this area ranges from 9 to 20 or more feet in thickness and is much less permeable than the overlying lavas.

Kau Area. The coast of Kilauea in the Kau District receives little rain and is mostly barren and rocky. In central Kau along the eastern coast of Mauna Loa, considerable basal water discharges into the sea, primarily in the vicinity of Punaluu where Ninole Spring is located. Potable water is difficult to obtain on the arid western coast of Kau. The lavas along the coast northwest of Kalae (South Point) are very permeable, and sea water encroaches inland for a distance. Ground water is perched on volcanic ash beds in central Kau; elsewhere in Kau there is very little perched water because of the low recharge and unfavorable geologic structure.

Kona Area. Because basal water from wells dug or drilled in the lowland areas of Kona is too saline for human consumption, for many years residents had relied on rain catchments for potable water. Deep wells drilled farther inland, however, now produce clear and potable water. The only ground water at high level occurs in pools in lava tubes and in bogs located in pahoehoe depressions. There are no outcrops of relatively fine-grained ash beds in Kona to perch water, as in Kau, and dike-confined water is believed to occur only at great depths.

Hopukani Springs, located high above the saddle in Pohakuloa Gulch on Mauna Kea, comprises spring sources which feed into collection boxes with intake weirs to provide the principal water supply for the military camp and state park facilities in the saddle.



GROUND WATER SOURCES AND RECORDS

The locations of wells, shafts, tunnels, springs, and drilled testholes on the island of Hawaii are shown on Plate 15.

Records of these ground water sources are sparse, are not uniform or consistent, and may not be comparable. Records published in this report are those available, including original data as well as data published elsewhere.

Drilled Testholes. Drilled Testhole Index, pages 141, 144, lists 34 testholes drilled on the island of Hawaii for hydrogeologic exploration. No testhole records have been compiled or published in this report.

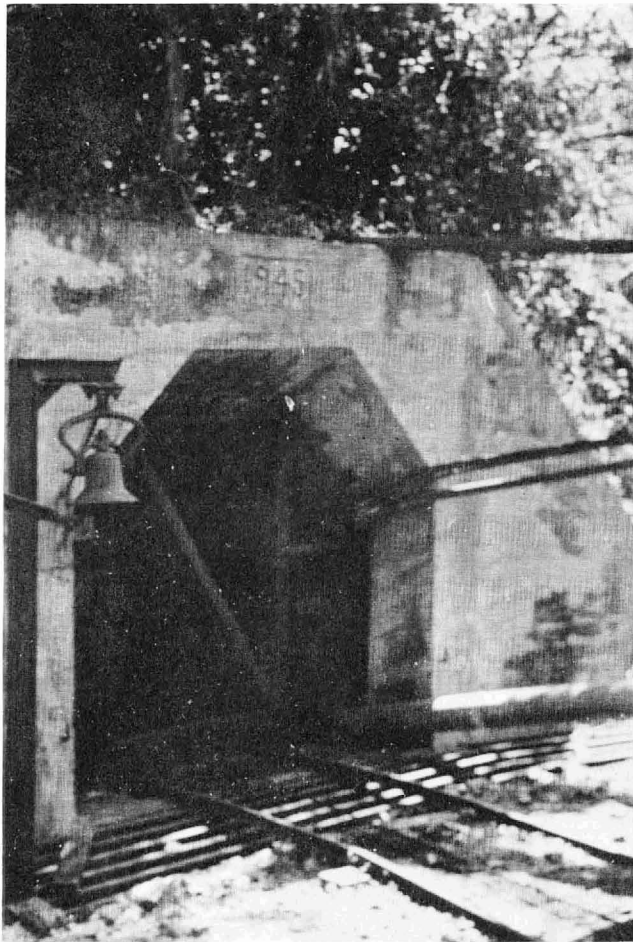
Drilled Wells. Drilled wells on Hawaii totaling 56, including abandoned exploratory wells, are listed in Drilled Well Index, pages 145-147. Such wells generally tap the basal aquifer and are developed primarily for domestic and industrial water supplies. Some brackish wells are used for irrigation purposes.

Two types of drilled well records have been

published in this report: Selected Well Pumpage Records, page 148, and Selected Well Pumping Test Records, pages 149-154. Those limited well pumpage records available are maintained by government agencies, although the wells may be privately owned. Records generally cover the entire year.

Well pumping test data published in this report have been adapted from records submitted by the driller or agency responsible, edited for uniformity to the extent practicable. Only raw data have been reported, without interpretation. Date and time of test, pumping rate, drawdown, chloride content, and temperature have been included in tabular form, together with information on equipment, personnel, and other background details.

Dug Wells and Waterholes. Almost all the shallow dug wells, a large number of them in Kona, tap the basal aquifer in the coastal lowlands about the island. Some dug wells located inland on the mountain slopes develop water perched on ash beds. These dug wells are mostly water holes and ancient Hawaiian wells no longer being utilized.



Shaft No. 5 is the principal source of water for Hamakua Mill Co. and town of Paauilo.

Dug Well and Waterhole Index, including ancient Hawaiian wells, pages 155-157, lists 72 such water sources on the island of Hawaii. Records generally have not been kept for such sources and none are published in this report.

Shafts. Eight of the island's shafts (Maui-type wells) are located on sugar plantations: Nos. 1, 2, 3, and 4 at Kohala Sugar Co. on the northern tip of the island; No. 5 at Hamakua Mill Co. and No. 6 at Kaiwiki Sugar Co.--both on the Hamakua coast; No. 7 at Puna Sugar Co. in Puna; and No. 8 at Hawaiian Agricultural Co. in Kau. No. 9, at Kapoho, is part of the county water system. Shaft Index, page 158, lists all the shafts on the island.

Shafts are dug at an angle to an infiltration tunnel or tunnels which skim the fresh water lens. Records are variously kept of the volume of water pumped, the water level, and chloride content. Some records indicate water use. Selected Shaft Pumpage Records for all plantation company shafts presently in use, including available water level and chloride content data, are

published on pages 159-164. A variety of inconsistent records have been collated and standardized to the extent practicable in order to present a general view of this water source. Original data should be consulted for a more detailed picture of a particular source.

Tunnels. Tunnels have been driven to develop high-level ground water supplies in areas of heavy rainfall where there are perching members or dikes. The windward valleys of North Kohala and the southeast slopes of Mauna Loa in Kau have extensive tunnel development. Tunnels have also been developed, but less extensively, in the vicinity of Paauilo, Ookala, and Papaikou on the Hamakua coast and in the mauka areas southwest of Hilo.

Tunnel Index, pages 155-158, lists 109 tunnels on the island of Hawaii. Most of the tunnels were developed when cane was transported by flumes and not for potable water supplies. The majority have been abandoned and/or integrated into existing water systems which do not record tunnel discharge separately.

Selected Tunnel Discharge Records, pages 169-173, have been published to indicate perched water supplies on the island. Most of the records included are from plantation sources, and some have been published elsewhere. Total monthly and annual discharge data are given.

Springs. Spring Index, pages 174-179, lists 183 sources of spring water on the island of Hawaii.

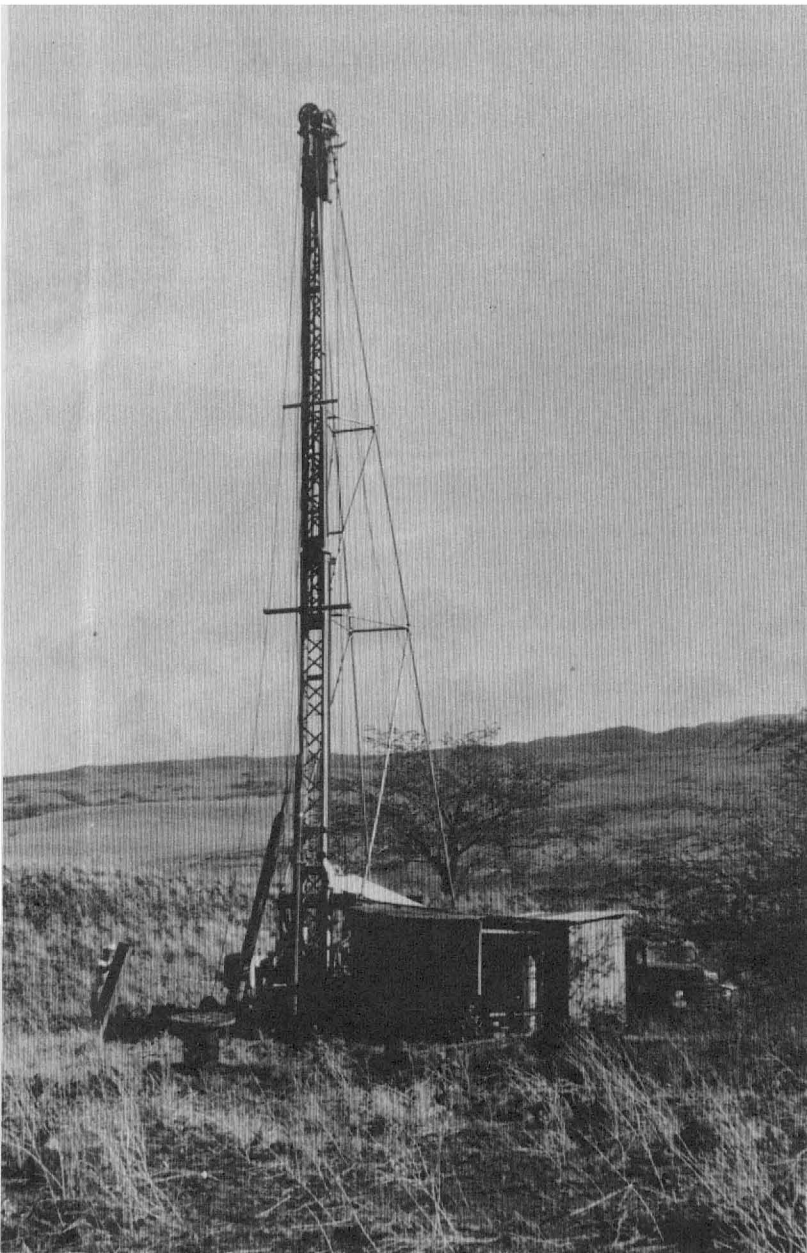
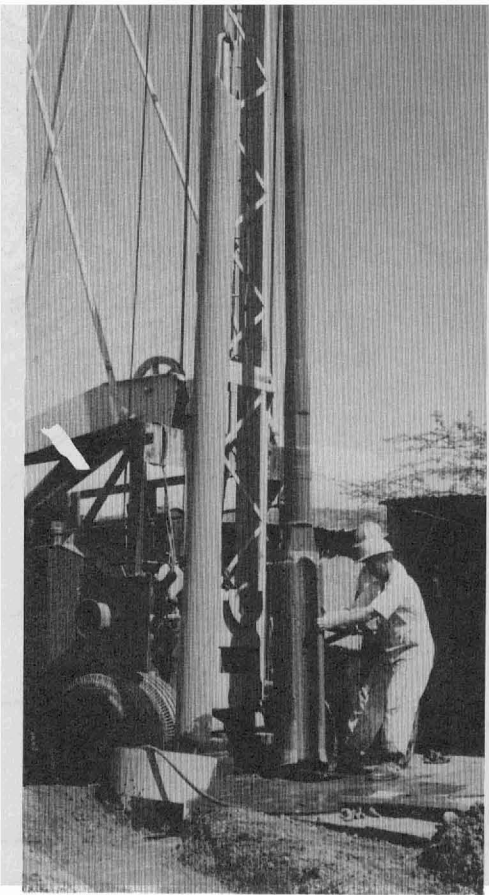
Springs are most prevalent on the windward side of the island, where rainfall is abundant and there are enough perching members and relatively impervious rocks to prevent or retard percolation. In size, these perched springs range from mere seeps of a few gallons daily to high-volume sources discharging close to a half million gallons daily. The larger springs issue in the major windward valleys of Kohala Mountain and on the eastern slope of Mauna Loa near its junction with Mauna Kea. In central Kau, where perched springs yield moderate supplies of ground water, tunnels have developed several spring sources.

Basal springs yield large quantities of water to the sea. Two of the larger ones are those at the Waiakea estuary in Hilo, which discharges about 100 million gallons daily and at Punaluu in central Kau, which discharges about 25 million gallons daily.

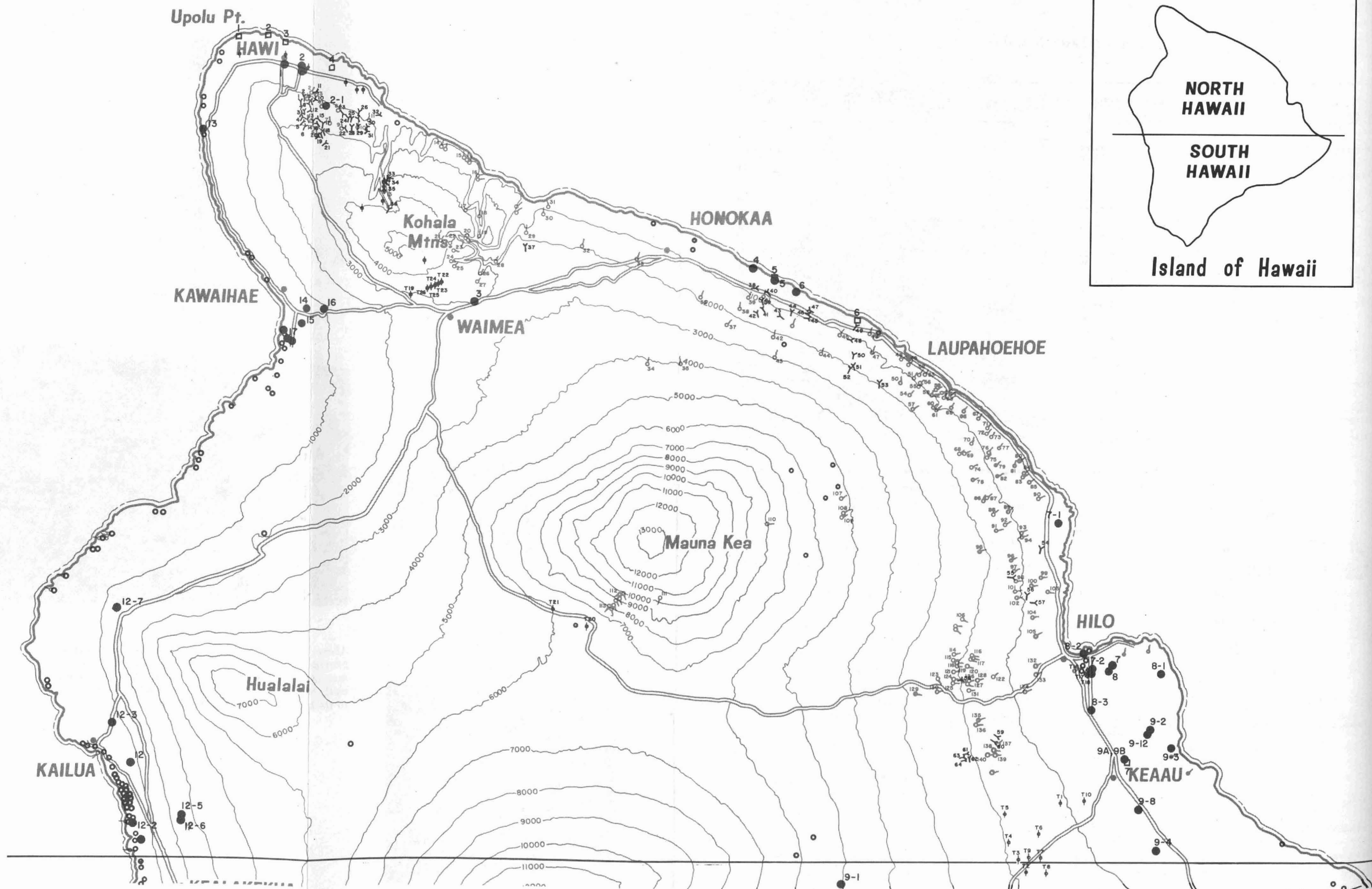
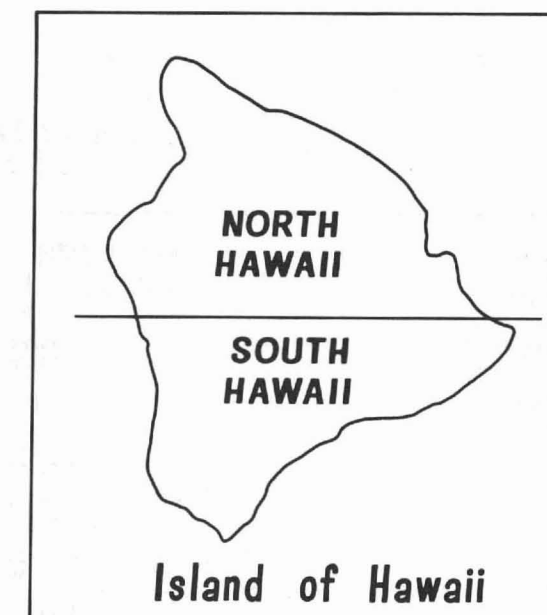
There are few long-term spring records, because reliable sources are usually sealed with an opening and little attention paid to measuring spring flow. Selected Spring Flow Records, page 180, indicate the discharge from springs used for domestic water supplies. Monthly and annual totals are given.

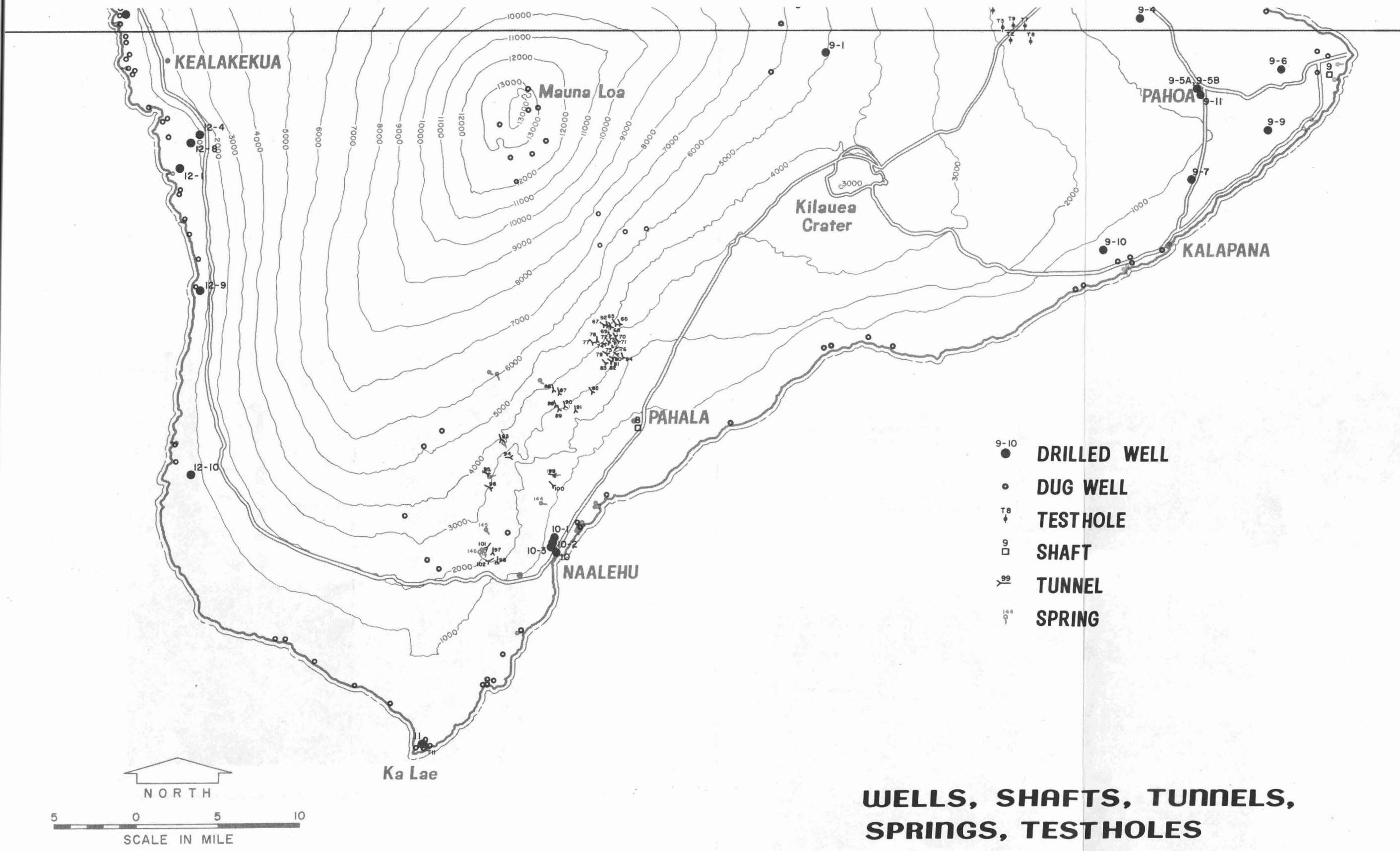
Drilled Testhole Index

USGS No.	Testhole	Owner	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Year Drilled	Depth (ft.)	Diam. (in.)	Static Water Level (ft.)	Chloride Content (ppm)	Water Temp. (°F)	Data Location	Remarks
1	Kurtistown		82	Puna	19 35 55 155 05 40	1125		158					Bull 9	No perched water
2	Mountain View		"	"	19 32 20 155 07 32	1810		58					"	"
3	"		"	"	19 32 55 155 07 50	1835		160					"	"
4	"		"	"	19 33 50 155 08 20	1905		117					"	"
5	"		"	"	19 35 15 155 08 40	1940		155					"	"
6	"		"	"	19 34 10 155 06 35	1445		160					"	"
7	"		"	"	19 33 00 155 06 40	1530		106					"	"
8	"		"	"	19 32 04 155 06 20	1565		150					"	"
9	"		"	"	19 33 02 155 07 20	1685		139					"	"
10	Kurtistown		"	"	19 35 56 155 04 20	815		150					"	"
11	South Point Airport	US Army	83	Kau	18 55 26 155 40 33	51	1941	63.5	6	0	560-655		USGS	Unused
16	Hilo	Hilo Electric Co, Ltd Well 1	82	S Hilo	19 42 42 155 03 54	42	1960	60	6	6	31	68.5	Owner	Abandoned
17	"	Hilo Electric Co, Ltd Well 2	"	"	19 42 42 155 03 54	43	1960	60	6	Above sea level	31	68.5	"	"
18	"	Hilo Electric Co, Ltd Well 3	"	"	"	41	1960	60	6	"	31	68.5	"	"
19	Waiaka Gulch, Waimea	Hawaii State DOWALD Hole A	85	S Kohala	20 03 08 155 41 53	3613	1964	924	5-3	Dry			DOWALD	
20	Pohakuloa, Hamakua	Hawaii State DOWALD	"	Hamakua	19 45 05 155 32 15	6375	1965	1001	10-3	"			"	
22	Kohakohau, Waimea	Hawaii State DOWALD D H 1	"	S Kohala	20 03 30 155 40 48	3910	1964	100	3				"	
23	"	Hawaii State DOWALD D H 2	"	"	20 03 29 155 40 53	3850	1964	100	3				"	
24	"	Hawaii State DOWALD D H 3	"	"	20 03 28 155 40 57	3770	1964	100	3				"	
25	"	Hawaii State DOWALD D H 4	"	"	20 03 28 155 41 01	3790	1964	100 Angled	3				"	
26	"	Hawaii State DOWALD D H 5	"	"	20 03 27 155 41 04	3850	1964	"	3				"	
	Kahua Ranch	Kahua Ranch	"	N Kohala	20 04 28 155 51 29	60	1963	90	2				Owner	Unused
	"	"	81	"	20 07 13 155 45 03	3950	1962	151	14				"	"
#1	Halawa Gulch	Kohala Sugar Co	"	"	20 13 45 155 46 03	170	1964	267	2	6.19-7.39	50-54		"	"
#2	Aamakoa Gulch	"	"	"	20 13 18 155 45 31	171	1964	255	2	6.04-6.81	21-37		"	"
#3	Waikane Gulch	"	"	"	20 13 18 155 45 08	161	1964	265	2	28.9-137.9	25-29		"	"
#4	Union Mill	"	"	"	20 14 22 155 48 23	400	1966	420	6				"	No water

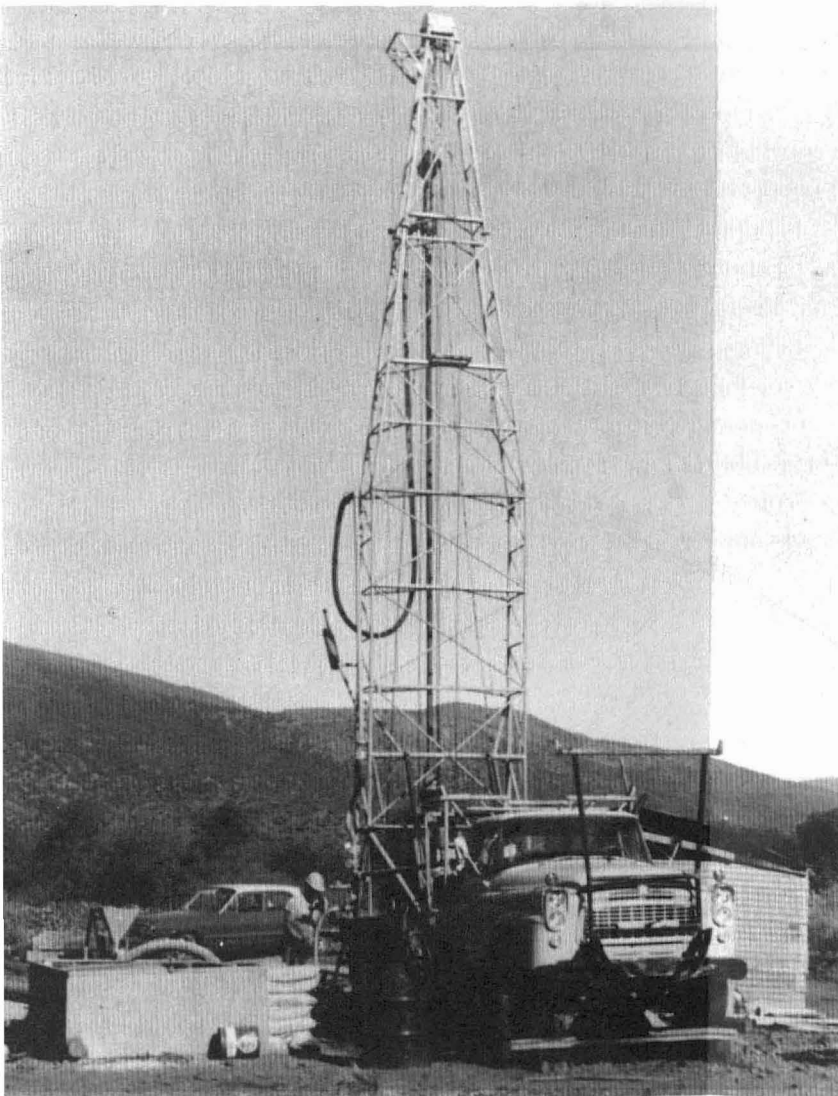


Above: Well No. 14, first of two drilled at Kawaihae, provides brackish water (302 ppm chlorides) for mixing with surface supplies. Left: Drilling second well, No. 15, now used as an observation well due to its high chloride content (504 ppm).



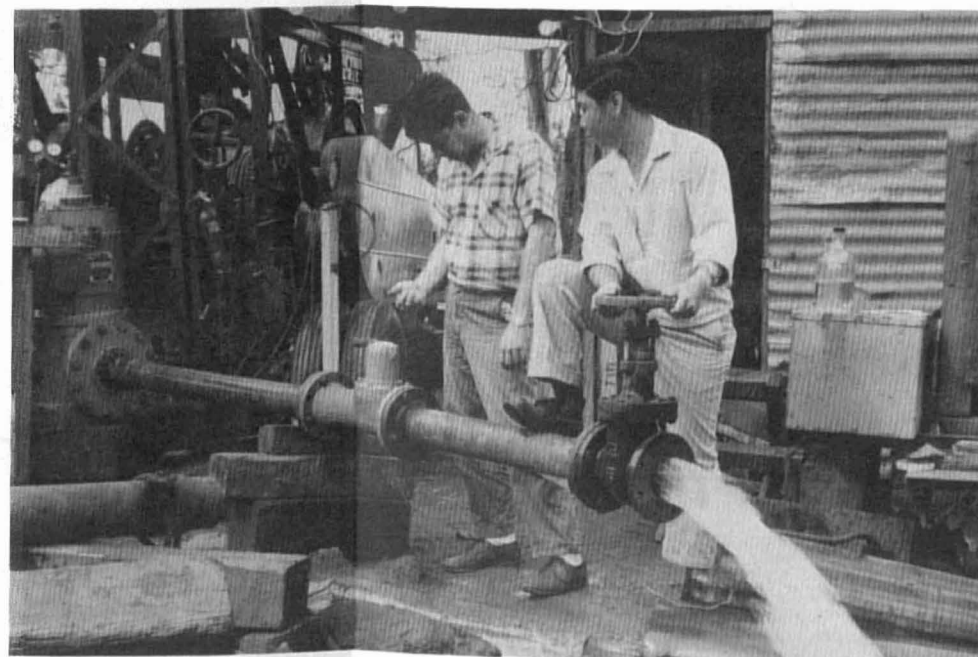


WELLS, SHAFTS, TUNNELS, SPRINGS, TESTHOLES



*Left: Drilling for perched or dike-confined water at Pohaku-
loa, Testhole No. 20.*

*Below: Pumping test at Keei
Well No. 12-4, first of two
drilled wells to supply water
to the South Kona area.*



USGS No.	Testhole	Owner	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Year Drilled	Depth (ft.)	Diam. (in.)	Static Water Level (ft.)	Chloride Content (ppm)	Water Temp. (°F)	Data Location	Remarks
#5	Gusman Gulch	Kohala Sugar Co	81	N Kohala	20 14 25 155 48 19	306	1964	402	2	5.04- 6.25	25-31		Owner	Unused
#6	Upolu	"	"	"	20 15 10 155 52 07	293	1964	360	2	.65- 2.82	312-1550		"	"
#7	Alaala Gulch	"	"	"	20 15 05 155 49 37	362	1965	450	2	3.49- 5.16	21-25		"	"
Honokane #1		Kohala Ditch Co	"	"	20 08 33 155 43 59	965	1964	150	3				"	"
Honokane #2		"	"	"	20 08 25 155 43 58	1031	1964	90	3				"	"
Honokane #3		"	"	"	20 08 23 155 43 58	1050	1964	300	3				"	"
Honokane #4		"	"	"	20 07 40 155 43 53	1196	1964	150	3				"	"



Drilling for high-level water in Kohala Mountains near forest reserve.

Drilled Well Index

USGS No.	Well	Owner	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Year Drilled	Depth (ft.)	Diam. (in.)	Static Water Level (ft.)	Chloride Content (ppm)	Water Temp. (°F)	Use	Data Location	Remarks
1	Hawi	Kohala Sugar Co	81	N Kohala	20 14 34 155 49 30	500	1898	200		Dry			Domes- tic	USGS	
2	Union Mill	"	"	"	20 14 30 155 48 35	400	1898	425	4				Aban- doned	"	Ex indus- trial
2-1	Halaula	"	"	"	20 13 22 155 47 05	3438	1948	505	15	7.8	26		Domes- tic	"	
3	Waimea	US Gov- ernment	"	S Kohala	20 02 05 155 39 42	2855	1944	890	8	Dry			Unused	"	Abandoned 1958
4	Paauiilo	Hamakua Mill Co	"	Hamakua	20 03 55 155 22 52	175	1894		12				Aban- doned	"	Potable; ex livestock
5	Paauiilo Mill	"	"	"	20 03 17 155 21 41	215.6	1894	217.1	12	1.7	179		"	"	Ex domestic & industrial
6	Kukaiaiu	"	"	"	20 02 43 155 20 27	244.7		264.7	12	2.2	213		"	"	"
7	Hilo Airport	County Hawaii BWS	82	S Hilo	19 43 00 155 02 47	59	1944	76	16	4	108		Domes- tic	"	Ex US Navy
7-1	Pepeekeo	Pepeekeo Sugar Co	"	"	19 50 34 155 05 45	304	1946	328	13				Aban- doned	"	Ex domes- tic; aban- doned 1963
7-2	Waiakea	Hilo Electric Co, Ltd	"	"	19 42 42 155 03 54	46.66	1961	201	16	7	25	68	Domes- tic	DOWALD	
8	Hilo Airport	County Hawaii BWS	"	"	19 42 53 155 02 55	71	1944	86	16	5	108		"	USGS	
8-1	King's Landing	Hawn Par- adise Corp	"	"	19 42 35 155 00 04	38.10	1961	58	10	3.37	688		Unused	"	
8-2	Hilo	Hilo Electric Co, Ltd	"	"	19 43 36 155 04 18	9	1961	201	16	7	31	68.5	Indus- trial	Owner	
8-3	Panaewa	County Hawaii BWS	"	"	19 40 36 155 03 54	206.1	1963	306.3	22	13.12	8	68	Domes- tic	DOWALD	
9-A	Olaa Mill	"	"	Puna	19 38 10 155 02 05	220	1921	450	12	17	9	66	"	USGS	
9-B	"	"	"	"	"	220	1921	450	12	17	9	66	"	"	
9-1	Kulani Prison	State Hawaii	"	S Hilo	19 31 34 155 17 54	5080	1947	80	8				Aban- doned		Abandoned 3/9/66
9-2	Keaau Orchard	Royal Hawn Ma- cadamia Nut Co	"	Puna	19 39 37 155 00 43	92	1949	137	8	8.5	60	65	Domes- tic	DOWALD	
9-3	Keaau	W H Ship- man Ltd	"	"	19 38 45 154 59 28	40	1950	60	10	7	117		Aban- doned	Owner	Ex domestic
9-4	Keaau (Orchid Land Estate)	County Hawaii BWS	"	"	19 33 23 155 00 14	426.91	1960	475	12	19	6	73		DOWALD	Test Well #1
9-5A	Pahoa Well 2-A	"	"	"	19 29 33 154 57 00	704.7	1960	754.7	12	17.8	2	72	"	"	Test Well #2
9-5B	Pahoa Well 2-B	"	"	"	"										
9-6	Kapoho	"	"	"	19 30 30 154 52 23	286.75	1960	337.15	12	3.15	338	93	"	"	Test Well #3
9-7	Keauohana	"	"	"	19 24 53 154 57 20	751.75	1961	801.9	12	2.94	82	74	"	"	Test Well #4
9-8	Waipa- hoehoe	"	"	"	19 35 35 155 01 17	310.68	1961	361.48	12	16.18	8	71	"	"	Test Well #5

USGS No.	Well	Owner	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Year Drilled	Depth (ft.)	Diam. (in.)	Static Water Level (ft.)	Chloride Content (ppm)	Water Temp. (°F)	Use	Data Location	Remarks
9-9	Malama-ki	Hawaii State DOWALD	83	Puna	19 27 30 154 53 00	274	1962	316	13	.56	6200	129	Unused	DOWALD	
9-10	Pulama	"	"	"	19 21 15 155 02 15	230	1963	250	12	3.29	295	78.5	"	"	
9-11	Pahoa Well 1	Hawn Beaches & Hawn Parks, Inc	82	"	19 29 25 154 56 47	402	1964	446	8	10.59	16	71		"	
9-12	Keaau Orchard	Royal Hawn Macadamia Nut Co	"	"	19 39 33 155 00 45	94.70	1964	147	12	7.9	192	65	Domes-tic	"	
10	Honuapo Mill	Hutchinson Sugar Co	83	Kau	19 05 30 155 33 00	22	1946	34	3*	25	1870	65	Indus-trial	USGS	
10-1	Honuapo	"	"	"	19 06 17 155 33 01	85	1965	130	14	27	520	65	"	Owner	Well 2
10-2	"	"	"	"	19 06 10 155 33 02	103.25	1965	140	14	27	520	65	"	"	Well 1
10-3	"	"	"	"	19 06 03 155 33 05	89	1965	125	14	27	520	65	"	"	Well 3
11	South Point Airport	US Army	"	"	18 55 26 155 40 33	51	1941	63.5	6	0	560-655		Domes-tic	USGS	Unused
12	Kailua	USGS & Army	84	N Kona	19 38 00 155 58 05	595	1944	615	6	2	520	70	"	"	"
12-1	Honau-nau	Bishop Estate	"	S Kona	19 25 47 155 54 22	175	1956	193	10	176.67	1190		Unused	DOWALD	
12-2	Kahaluu	"	"	N Kona	19 34 49 155 57 52	175	1956	193	6	169.60	1020		"	"	Known as Honaunau
12-3	Kailua	Hawaii State DOWALD	"	"	19 40 02 155 59 07	800	1958	853	16	1.72	3475	70.5	"	"	
12-4	Keei	County Hawaii BWS	"	S Kona	19 27 32 155 53 11	744	1958	780	12	2.17	82-200	67-72.5	Domes-tic	"	
12-5	Kahaluu	"	"	N Kona	19 35 10 155 55 08	833	1959	878	12	4.34	6.8	68.5-73	"	"	
12-6	"	"	"	"	19 35 05 155 55 09	839	1959	881	12	3.95	13-18	69-72	"	"	
12-7	Kaupule-hu	Hualalai Devel Corp	85	"	19 46 03 155 58 42	1400	1960	520	6		370		"	"	Serves hotel
12-8	Keei (Well B)	County Hawaii BWS	84	S Kona	19 27 24 155 53 40	737	1963	774	18	2.3	99	66	"	"	
12-9	Magoon Estate	Magoon Estate Ltd	"	"	19 19 22 155 53 12	205	1965	228	10		1500		Stock		
12-10	Okoe	Hawaii State DOWALD	"	"	19 09 54 155 53 29	650									Not drilled
13	Mahukona	Hawaii R R Co	85	N Kohala	20 11 17 155 54 10	25	1881	800	3	0.5±	Salty		Aban-doned 1940	USGS	Ex indus-trial
14	Kawaihae Well 1	Hawaii State DOWALD	"	S Kohala	20 01 50 155 48 05	580	1961	620	15	3.3	302	81	Domes-tic	DOWALD	
15	Kawaihae Well 2	"	"	"	20 10 00 155 48 33	392.19	"	429.5	15	5.12	504	79	"	"	
16	Kawaihae	"	"	"	20 01 47 155 47 13	982.4	1963	1046	10	5.24	254	97	Unused	"	
17	"	Rockefeller & Maunakea Resort Hotels	"	"	20 00 14 155 49 18	188	1963	218	18	2	365	77	Irri-gation	"	

*9 drilled holes, 3" diameter, 3 holes open, in 15' sq. 20' deep pit extending just below sea level. Holes partly backfilled, reducing yield, which was about 2000 gallons a minute.

Remarks	USGS No.	Well	Owner	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Year Drilled	Depth (ft.)	Diam. (in.)	Static Water Level (ft.)	Chloride Content (ppm)	Water Temp. (°F)	Use	Data Location	Remarks
	21	Pohakuloa	Hawaii State DOWALD	85	Hamakua	19 45 10 155 32 49	6375	1962	144	14	Dry			Abandoned	DOWALD	Abandoned 3/62
		Kanaelehua Steam Unit #5 Wells	Hilo Electric Co, Ltd	82	S Hilo	19 42 28 155 03 52	55	1965	200	20	6	35	68.5	Industrial	Owner	3 wells
		Union Mill #1	Kohala Sugar Co	81	N Kohala	20 14 25 155 48 22	311	1965	411	16	6.17	48-73		Irrigation		Pump inst 1966
		Keauhou	Bishop Estate	84	N Kona	19 33 57 155 57 24	383	1966	418	10	4.5	1400		Golf course irrigation		
		Well #1	Mauna Kea Beach Hotel	85	S Kohala	20 00 09 155 49 03	300					637		Irrigation	Belt Collins	
		Well #3	"	85	"	20 00 34 155 49 38						2220		Air conditioning	"	In hotel basement

Selected Well Pumpage Records

PUMPAGE in Millions of Gallons													
	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
Well No. 2-1 — HALAULA													
1950 Max.	—	—	—	—	—	558	612	576	612	576	504	288	612
Min.	—	—	—	—	—	342	216	144	216	288	288	144	144
Ave.	—	—	—	—	—	452	477	391	382	416	357	224	385
Total	—	—	—	—	—	8,136	15,732	10,944	10,692	14,544	10,008	4,248	74,304
1951 Max.	432	216	360	360	702	936	1,080	1,728	1,728	1,440	684	288	1,728
Min.	144	72	144	36	90	288	792	792	432	360	180	72	36
Ave.	246	168	216	137	410	743	929	1,026	1,033	873	386	184	520
Total	4,680	1,008	3,240	2,052	11,464	20,808	32,508	28,728	35,136	24,444	10,800	918	175,806
1952 Max.	684	324	828	432	504	684	1,332	576	792	720	576	288	1,332
Min.	108	72	36	36	72	72	72	216	72	216	144	36	36
Ave.	242	180	248	278	323	380	396	416	406	560	308	174	326
Total	3,636	540	4,968	6,948	8,064	12,168	9,108	13,716	10,548	15,120	10,764	5,040	100,620
1953 Max.	1,116	720	648	684	756	792	1,044	792	—	—	—	—	1,116
Min.	144	144	216	144	180	72	108	144	—	—	—	—	72
Ave.	538	635	514	399	471	585	612	421	281	465	668	403	499
Total	11,844	17,136	17,991	11,160	16,488	16,380	17,136	13,464	8,424	14,400	20,052	12,492	176,967
1954 Ave.	180	350	402	458	348	154	144	100	88	172	548	645	299
Total	5,580	9,792	12,456	13,752	10,800	4,608	4,464	3,095	2,644	6,328	16,452	10,980	108,951
1955 Ave.	93	51	34	0	0	0	94	49	181	429	342	167	160
Total	2,880	1,440	1,044	0	0	0	2,916	1,530	5,418	13,302	10,260	5,184	52,182
1956 Ave.	46	0	0	0	0	0	11	15	249	91	0	82	82
Total	144	0	0	0	0	0	0	0	324	450	7,704	2,736	11,358
1957 Ave.	0	0	96	167	105	84	300	276	0	0	0	0	172
Total	0	0	3,042	5,022	324	2,520	9,306	8,550	0	0	0	0	28,764
1958 Ave.	0	0	0	0	0	6	20	3	74	179	143	0	71
Total	0	0	0	0	0	180	630	90	2,214	5,544	4,284	0	12,942
1959 Ave.	0	0	0	0	0	23	280	739	611	751	980	509	556
Total	0	0	0	0	0	684	8,676	22,914	18,324	23,292	29,412	15,786	119,088
1960 Ave.	0	16	70	35	123	217	723	768	794	998	832	102	420
Total	0	450	2,160	1,092	3,708	6,498	22,410	23,614	22,014	30,924	24,966	3,150	141,246
1961 Ave.	0	150	476	555	463	628	1,027	996	1,024	12,309	647	380	1,700
Total	0	4,212	14,742	16,650	14,346	18,846	31,842	30,888	30,708	381,574	19,404	11,772	231,984
1962 Ave.	79	252	413	314	349	631	875	856	1,077	905	575	438	564
Total	2,448	7,056	12,816	9,414	10,818	18,936	27,126	26,550	32,310	28,062	17,244	13,590	206,370
1963 Ave.	467	360	433	50	3	40	297	484	788	761	648	448	398
Total	14,490	10,080	13,428	1,494	108	1,188	9,198	14,994	23,652	23,580	19,440	13,878	145,530
1964 Ave.	166	743	117	0	0	0	0	0	0	0	0	0	343
Total	5,220	21,555	3,636	0	0	0	0	0	0	0	0	0	30,411
1965 Ave.	0	0	238	286	418	655	795	911	757	1,069	674	562	637
Total	0	0	7,380	8,568	12,960	19,656	24,660	28,242	22,716	33,138	20,232	17,424	104,076
1966 Ave.	381	163	0	148	398	662	575	280	38	383	549	150	339
Total	11,808	4,554	0	4,446	12,348	19,854	17,820	8,076	1,134	11,867	16,470	4,844	113,621
1967 Ave.	0	57	13	0	75	578	897	774	801	978	803	589	557
Total	0	1,584	414	0	2,340	17,334	27,792	23,994	24,030	30,330	24,064	18,270	170,172

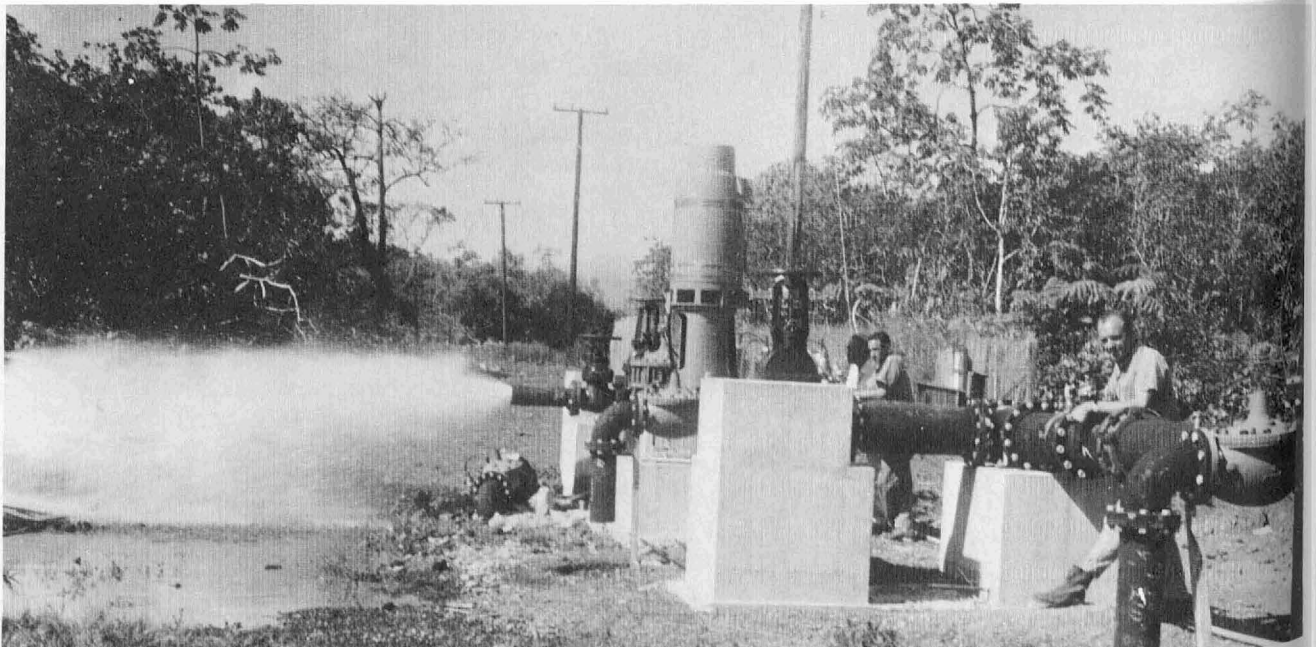


Well No. 12-5—KAHALUU A

COMPOSITE PUMPAGE RECORDS

Well													
	7	7-1	8-3	9-A	9-B	9-5A	9-5B	10	12	12-4	12-5	12-6	
1946	50												
1947	25												
1948		59											828 ^e
1949		75											727 ^e
1950		102											756 ^e
													857 ^e
1951		105											800 ^e
1952		106											840 ^e
1953		1											605
1954		65											521
1955		73											868 ^e
1956		73											700 ^e
1957		73											626 ^e
1958	1	79		49	54								563 ^e
1959	1	75		18	81								740 ^e
1960	1	80		47	47								817 ^e
1961	1	89		58	50								780 ^e
1962	2	30		58	58								792 ^e
1963*	3	2		61	63	18	6						1,040 ^e
1964	1			69	66	9	7						1,163 ^e
1965	1		1 ^e	95	65	10	10						1,290 ^e
1966	3		50	15	117	13	11						1,075 ^e
1967													801 ^e

Note: Pumpage in millions of gallons. e - Estimated. *Discontinued June 1, 1963.



Well No. 8-3—PANAewa (pump efficiency test with booster and deepwell operating).

Selected Well Pumping Test Records

Well No. 8-1 — KING'S LANDING

GENERAL INFORMATION

Contractor: Pacific Drilling Co., Ltd.
Elevation top of casing: 38.10 ft.
Total depth of well: 58 ft.
Casing: Diameter, 10 in.; length, 47 ft. (bottom 16 ft. perforated).

PUMPING TEST DATA

Date of pumping test: January 23, 1961
Static water level: 3.37 ft.
Personnel: S. Kawakami, T. Nakahata, Y. Imada, Nakahata, Kaneshige, Imada & Assoc.; S. Wong, State Division of Hydrography; D. Williams, P. Smith, Pacific Drilling Co., Ltd.

TIME	PUMPING RATE (gpm)	WATER LEVEL Elev. (ft.)	DEPTH (ft.)	DRAW-DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
Top of pump suction screen set at -6.06 ft. elevation.						
9:00 am	0	3.37	34.73	0	—	—
Start pump.	—	—	—	—	—	—
10:00	180	3.05	35.05	0.32	688	—
10:07	Stop pump.	—	—	—	—	—
10:07:30	0	3.37	34.73	0.00	—	—
10:24	Start pump.	—	—	—	—	—
10:50	175	2.91	35.19	0.46	—	—
11:05	175	2.84	35.26	0.53	688	—
11:10	Stop pump.	—	—	—	—	—
11:10:40	0	3.13	34.97	0.24	—	—
11:15	0	3.13	34.97	0.24	—	—
Raise pump and set top of suction screen at -2.06 ft. elevation.						
11:30	0	3.05	35.05	0.32	—	—
11:31	Start pump.	—	—	—	—	—
11:35	158	2.72	35.38	0.65	688	—
12:05 pm	155	2.55	35.55	0.82	—	—
12:30	153	2.45	35.65	0.92	—	—
1:00	152	2.24	35.86	1.13	—	—
1:30	152	2.16	35.94	1.21	680	—
2:00	153	2.00	36.10	1.37	—	—
2:30	152	1.92	36.18	1.45	680	—
2:40	Stop pump.	—	—	—	—	—
2:40:30	0	2.14	35.96	1.23	—	—
2:41:10	0	2.14	35.96	1.23	—	—
2:43	0	2.14	35.96	1.23	—	—
2:44	0	2.14	35.96	1.23	—	—
2:46	0	2.14	35.96	1.23	—	—
Raise pump and set top of suction screen at +1.00 ft. elevation.						
2:51	Start pump.	—	—	—	—	—
2:55	140	1.88	36.22	1.49	664	—
3:05	140	1.87	36.23	1.50	—	—
3:11	Reduce pumping rate by turning discharge valve.	—	—	—	—	—
3:19	91	1.98	36.14	1.41	—	—
3:27	80	1.75	36.17	1.44	680	—
3:30	Reduce pumping rate.	—	—	—	—	—
3:34	70	2.04	36.06	1.33	—	—
3:45	69	2.03	36.07	1.34	—	—
3:46	Reduce pumping rate.	—	—	—	—	—
3:47	47	2.03	36.07	1.34	—	—
3:48	47	2.05	36.05	1.32	—	—
Reduce pumping rate.						
4:00	35	2.09	36.01	1.28	—	—
4:13	35	2.09	36.01	1.28	—	—
4:15	Reduce pumping rate.	—	—	—	—	—
4:17	6	2.09	36.01	1.28	—	—
4:21	—	2.11	35.99	1.26	—	—
4:25	6.5	2.13	35.97	1.24	—	—
4:32	—	2.13	35.97	1.24	660	—
4:33	Raise pump and set top of suction screen at +1.80 ft. elevation.	—	—	—	—	—
4:35	7	2.15	35.95	1.22	—	—
4:38	—	2.15	35.95	1.22	—	—
4:44	7	2.15	35.95	1.22	—	—
4:45	Open discharge valve wider and lower pump to original position - top of suction screen at -6.06 ft. elevation.	—	—	—	—	—
4:50	163	—	—	—	—	—
4:51	—	1.87	—	1.50	—	—
4:52	Stop pump.	—	—	—	—	—
4:52:45	0	2.15	—	1.22	—	—
4:54	0	2.21	—	1.16	—	—
4:55	0	2.21	—	1.16	—	—
4:56	0	2.21	—	1.16	—	—

Well No. 9-4 — KEAAU (ORCHID LAND ESTATE)

GENERAL INFORMATION

Contractor: Ocean View Drilling Co.
Drilling equipment: Walker Neer WS-31 percussion rig.
Drilling date: June 10-August 5, 1960.
Ground elevation above msl: 426.91 ft.
Total depth of well: 475.00 ft.
Size of hole: 11-1/2 in.
Casing: Inner diameter, 8 in.

PUMPING TEST DATA

Date of pumping test: January 13, 1961.
Elevation centerline air gage: 432.34 ft.
Length of airline: 423.43 ft.
Static water level: 19.00 ft.
Drawdown: 0.93 ft. at 340 gpm.
Recovery: Immediate.
Salinity (chlorides): 6-12 ppm.
Water temperature: 72-74°F.

Well No. 9-5A — PAHOA WELL 2-A

GENERAL INFORMATION

Contractor: Maui Drilling Co., Earl Lee.
Drilling equipment: Percussion (cable-tool) Walker-Neer WS-31.
Drilling date: March 28, 1960-June 1, 1960.
Ground elevation: 704.70 ft.
Total depth of well: 754.70 ft.
Size of hole: 11.5 in.
Elevation bottom of well: -50.00 ft.
Casing: Diameter, 8.5 in.; length, 754 ft. (bottom 72 ft. perforated).

PUMPING TEST DATA (Test No. 1)

Date of pumping test: June 27, 1960.
Length of air line: 719.29 ft.
Elevation center air gage: 707.73 ft.
Depth static water level below center air gage: 690.07 ft.
Elevation static water level: 17.56 ft.
Pump: Red Arrow submersible pump.
Pressure gage: Ashcroft 0-30 psi, 0.1 lb. subdivisions.
Pump discharge meter: Trident 4 in. compound meter.
Personnel: William Chun, William Thompson, Mike Victor, Edmund Hoku, Board of Water Supply, George Kramer, E. Kerwin, E. Kerwin, Maui Drilling Co.; Sam Wong, State Division of Hydrography.

TIME	PUMPING RATE (gpm)	WATER LEVEL Elev. (ft.)	DEPTH (ft.)	DRAW-DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
2:20 pm	0	—	—	0	—	—
2:30	Start pump.	—	—	—	—	—
2:33	300	—	—	0.23	6	—
2:43	310	—	—	0.23	—	—
3:00	308	—	—	0.23	—	—
3:30	303	—	—	0.23	6	—
4:00	303	—	—	0.23	—	—
4:30	303	—	—	0.23	5	73
5:00	300	—	—	0.23	—	73
5:30	295	—	—	0.23	—	73
6:00	300	—	—	0.23	—	73
6:30	300	—	—	0.23	—	73
7:00	300	—	—	0.23	—	74
7:30	300	—	—	0.23	6	74
8:00	300	—	—	0.23	—	74
9:00	130	—	—	0.23	—	—
9:05	132	—	—	0.23	—	—
9:07	Stop pump - generator trouble.	—	—	—	—	—

PUMPING TEST DATA (Test No. 2)

Date of pumping test: July 10-14, 1960; August 11-16, 1960.
Duration of pumping test: 165 hrs.
Depth to water level: 686.90 ft.
Length of airline: 719.29 ft.
Elevation centerline air gage: 707.73 ft.
Elevation bottom airline: -11.56 ft.
Airline pressure at start of test: 19.95 psi.
Static water level above msl: 17.80 ft.
Maximum drawdown: 0.462 ft. at 314 gpm.
Rate of recovery: Immediate.
Salinity (chlorides): 2-6 ppm.
Water temperature: 66-74°F.

Well No. 9-6 — KAPOHO

GENERAL INFORMATION

Contractor: Ocean View Drilling Co.
Drilling equipment: Percussion (cable tool) Walker Neer WS 31; Keystone 5D.
Drilling date: September 18, 1960-December 22, 1960.
Ground elevation: 286.75 ft.
Total depth of well: 337.15 ft.
Size of hole: 11-3/4 in.
Elevation bottom of well: -50.40 ft.

PUMPING TEST DATA

Date of pumping test: January 27-30, 1961
Duration of pumping test: 76 hrs.

Depth to water level: 283.60 ft.
Length of airline: 303.02 ft.
Elevation centerline air gage: 290.46 ft.
Elevation bottom airline: -12.56 ft.
Static water level above msl: 3.15 ft.
Maximum drawdown: 1.02 ft. at 317 gpm.
Rate of recovery: Immediate.
Salinity (chlorides): 331-345 ppm.
Water temperature: 92-94°F.

Well No. 9-7 — KEAUOHANA

GENERAL INFORMATION

Contractor: Ocean View Drilling Co.
Drilling equipment: Percussion (cable-tool) Bucyrus-Erie 60-L.
Drilling date: February 8-April 4, 1961.
Ground elevation: 751.75 ft.
Total depth of hole: 801.90 ft.
Size of hole: 12 in.
Elevation bottom of hole: -50.15 ft.
Size of casing: Outer diameter, 8-5/8 in.; inner diameter, 8-1/4 in.; thickness, 3/8 in.
Length of perforated casing: 53.50 ft.
Length of solid casing: 746.51 ft.
Depth of gravel pack from bottom: 780.01 ft.
Size of rock used in gravel pack: #3 crushrock.
Depth of grout from top of gravel pack to top of hole: 20.00 ft.

PUMPING TEST DATA

Date of pumping test: May 23-27, 1961.
Duration of pumping test: 98-1/6 hrs.
Depth to water level: 748.81 ft.
Length of airline: 765.07 ft.
Elevation centerline air gage: 756.92 ft.
Elevation bottom airline: -8.15 ft.
Static water level above msl: 2.94 ft.
Maximum drawdown: 0.46 ft. at 311 gpm.
Rate of recovery: Immediate.
Salinity (chlorides): 72-92 ppm.
Water temperature: 73-75°F.

Well No. 9-8 — WAIKAPAHU

GENERAL INFORMATION

Contractor: Ocean View Drilling Co.
Drilling equipment: Percussion (cable-tool) Keystone 50; Bucyrus-Erie 60-L.
Drilling date: December 27, 1960-May 25, 1961.
Ground elevation: 310.68 ft.
Total depth of well: 361.48 ft.
Size of hole: 11-5/8 in.
Elevation bottom of well: 50.72 ft.

PUMPING TEST DATA

Date of pumping test: August 9-10, 1961.
Duration of pumping test: 24 hrs.
Depth to water level: 294.50 ft.
Length of airline: 302.86 ft.
Elevation centerline air gage: 315.11 ft.
Elevation bottom airline: 12.25 ft.
Static water level above msl: 16.18 ft.
Maximum drawdown: 2.89 ft. at 380 gpm.
Rate of recharge: Immediate.
Salinity (chlorides): 6-10 ppm.
Water temperature: 69-73°F.

Well No. 9-9 — MALAMA-KI

GENERAL INFORMATION

Contractor: Ocean View Drilling Co., Ltd.
Drilling equipment: Bucyrus-Erie 22-W percussion rig.
Drilling date: August 30, 1962 (completion).
Ground elevation: 274 ft. above msl.
Total depth of well: 316 ft.
Size of hole: 13 in.
Casing: Outer diameter, 8-5/8 in.; length, 319 ft. (bottom 48 ft. perforated).

PUMPING TEST DATA

Date of pumping test: September 6-7, 1962.
Static water level above msl: +0.56 to +0.86 ft.
Drawdown: 0.07 ft. at 100 gpm; 0.30 ft. at 380 gpm; 0.76 ft. at 480 gpm.

Salinity (chlorides): 5,400 -7,000 ppm.
 Water temperature: 129°F.
 Personnel: Dan Davis, U.S. Geological Survey;
 Stanley Shin, Sam Wong, State
 Division of Water and Land Dev.

TIME	PUMPING RATE (gpm)	WATER LEVEL Elev. (ft.)	DEPTH (ft.)	DRAW- DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
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September 6, 1962

10:50 am	Start pump.					
10:52	130	—	—	0	7,240	127.50
10:57	—	—	—	0	—	—
	Decrease engine speed.					
11:03	106	—	—	0	5,690	128.25
11:15	56	—	—	0	5,530	129.00

Adjust motor.

11:23	98	—	—	0	5,690	129.50
11:45	106	—	—	—	5,690	129.75
12:00 N	126	—	—	—	5,900	129.50
12:30 pm	101	—	—	—	6,180	129.75
1:00	80	—	—	0	5,370	130.50

Increase engine speed.

1:10	114	—	—	—	—	—
1:30	128	—	—	0	5,690	129.50
2:00	137	—	—	0	5,810	129.50
2:30	120	—	—	0.05	5,780	130.00
3:00	80	—	—	0.05	5,810	130.00

Increase engine speed.

3:15	106	—	—	—	—	—
3:30	101	—	—	—	5,880	129.50
4:00	110	—	—	0.11	6,020	129.50

Increase engine speed.

4:05	350	—	—	0.16	—	—
4:15	360	—	—	0.16	8,830	129.25
5:00	360	—	—	0.18	6,390	129.00
5:20	—	—	—	0.23	—	—
5:30	370	—	—	0.23	6,670	129.00
6:00	380	—	—	0.23	6,670	129.00
7:00	355	—	—	0.23	5,590	129.00
8:00	380	—	—	0.23	6,590	129.00
9:30	335	—	—	0.23	6,750	129.00
10:00	380	—	—	0.23	6,670	129.00
11:00	380	—	—	0.30	6,830	129.00
12:00 M	380	—	—	0.30	6,830	129.00

September 7, 1962

1:00 am	400	—	—	0.42	6,910	128.50
2:00	430	—	—	0.53	7,000	128.75
3:00	450	—	—	0.60	6,910	128.75
4:00	480	—	—	0.65	6,910	128.75
5:00	480	—	—	0.76	6,910	128.50
6:00	430	—	—	0.69	6,830	128.50
7:00	480	—	—	0.65	6,750	128.50
8:00	480	—	—	0.60	6,670	128.50
9:00	480	—	—	0.67	6,590	127.50
10:00	480	—	—	0.30	6,670	127.25

Stop pump.

Recovery test.

10:08:30	0	—	—	0.18	—	—
10:09:00	0	—	—	0.18	—	—
10:09:30	0	—	—	0.18	—	—
10:10:00	0	—	—	0.18	—	—
10:10:30	0	—	—	0.18	—	—
10:11:00	0	—	—	0.18	—	—
10:11:30	0	—	—	0.18	—	—
10:12:00	0	—	—	0.18	—	—
10:12:30	0	—	—	0.18	—	—
10:13:00	0	—	—	0.18	—	—

Well No. 9-10 — PULAMA

GENERAL INFORMATION

Contractor: Samson and Zerbe.
 Drilling equipment: Bucyrus Erie 60-L percussion rig.
 Drilling date: December 6, 1963 (completion).
 Ground elevation: 230 ft., msl.
 Total depth of well: 250 ft.
 Size of hole: 12 in.
 Casing: Outer diameter, 8 5/8 in.; length, 251.4 ft. (bottom 21.7 ft. perforated).
 Pumping test data:
 Date of pumping test: December 3-6, 1963.
 Test pump: Deep-well turbine, 3-4 ratio gear drive, 23-stage bowl assembly, 165 H.P. diesel engine.
 Pressure gage: Ashcroft 0-30 psi.
 Water meter: 4 in. Hersey-Sparling flowmeter.
 Airline length: 243 ft.
 Airline bottom: -12.41 ft., msl.
 Static water level: 3.41 feet, msl, on December 3, 1963.
 Yield: 50 gpm. with no drawdown.
 Chloride content: 293-298 ppm, at 50 gpm.
 Water temperature: 78.5°F.
 Total pumpage: 329,000 gallons.
 Personnel: Sam Wong, Bob Slarot, State Division of Water and Land Dev.; Steve Bowles, U.S. Geological Survey.

TIME	PUMPING RATE (gpm)	WATER LEVEL Elev. (ft.)	DEPTH (ft.)	DRAW- DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
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December 3, 1963

11:15 am	0	—	—	(static)	—	—
11:25	Start pump.					
11:35	50	—	—	0.0	278	79
11:50	49	—	—	0.04	278	79
12:20 pm	49	—	—	0.11	278	79
12:50	48	—	—	0.16	283	79
1:20	48	—	—	0.20	283	79
1:50	48	—	—	0.25	293	79

TIME	PUMPING RATE (gpm)	WATER LEVEL Elev. (ft.)	DEPTH (ft.)	DRAW- DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
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2:20 pm	49	—	—	0.34	288	79
2:50	48	—	—	0.34	288	79
3:20	49	—	—	0.44	288	79
3:50	48	—	—	0.34	283	79
4:20	49	—	—	0.44	288	79
4:50	48	—	—	0.46	288	79
5:20	46	—	—	0.46	288	79

Open discharge valve wider to pump 100 gpm.

5:40	98	—	—	0.34	288	79
6:40	98	—	—	0.46	293	78
7:40	94	—	—	0.46	293	78
8:40	102	—	—	0.46	298	78
9:40	102	—	—	0.57	298	78
10:40	101	—	—	0.76	298	78
11:40	96	—	—	0.85	298	78

December 4, 1963

12:40 am	98	—	—	0.99	298	79
1:40	98	—	—	0.99	298	79
2:40	102	—	—	0.92	303	79
3:40	101	—	—	0.71	303	79
4:40	98	—	—	0.57	298	79
5:40	100	—	—	0.34	303	79
6:40	100	—	—	0.11	303	79
7:40	97	—	—	—	303	79
8:40	100	—	—	—	303	79
9:40	99	—	—	—	307	79
10:40	100	—	—	—	307	79
12:00 N	93	—	—	—	307	79

Adjust discharge valve to pump 50 gpm.

12:05 pm	51	—	—	—	307	79
1:00	50	—	—	—	307	79
2:00	50	—	—	0.11	298	79
3:00	50	—	—	0.30	293	79
4:00	50	—	—	0.42	298	79
5:00	50	—	—	0.39	293	79
6:00	50	—	—	0.39	298	79
7:00	50	—	—	0.37	293	79
8:00	50	—	—	0.37	293	79
9:00	50	—	—	0.44	293	79
10:00	50	—	—	0.48	288	79
11:00	50	—	—	0.57	293	79
12:00 M	48	—	—	0.67	293	79

December 5, 1963

1:00 am	49	—	—	0.80	293	79
2:00	48	—	—	0.83	288	79
3:00	47	—	—	0.80	288	79
4:00	49	—	—	0.71	293	79
5:00	50	—	—	0.55	293	79
6:00	48	—	—	0.34	293	79
7:00	48	—	—	0.14	298	79
8:00	49	—	—	0.00	298	79
9:00	48	—	—	—	298	79
10:00	48	—	—	—	298	79
11:00	48	—	—	—	298	79
12:00 N	49	—	—	—	298	79
1:30 pm	49	—	—	—	298	79
3:00	49	—	—	0.11	298	79
4:30	49	—	—	0.34	293	79
6:00	49	—	—	0.44	298	79
7:30	50	—	—	0.39	293	79
9:00	48	—	—	0.37	293	79
10:30	50	—	—	0.37	298	79
12:00 M	49	—	—	0.44	298	79

December 6, 1963

1:30 am	47	—	—	0.60	283	79
3:00	49	—	—	0.69	293	79
4:30	49	—	—	0.57	293	79
6:00	48	—	—	0.37	298	79
6:55	49	—	—	0.25	298	79

Open discharge valve wider to pump 100 gpm.

7:05	100	—	—	0.25	—	—
7:30	100	—	—	0.16	298	79
8:00	100	—	—	0.07	298	79
8:30	100	—	—	—	298	79
9:00	100	—	—	—	293	79
9:30	100	—	—	—	303	79
9:55	98	—	—	—	307	79

Increase engine speed and adjust discharge valve.

10:05	200	—	—	—	78.5	—
10:20	218	—	—	—	307	78.5
10:35	200	—	—	—	312	78.5
10:55	200	—	—	—	322	78.5

Increase engine speed and adjust discharge valve.

11:10	303	—	—	—	322	78.5
11:30	316	—	—	—	332	78.5
11:55	310	—	—	—	342	78.5

Increase engine speed.

12:10 pm	394	—	—	—	346	78.5
12:20	450	—	—	0.00	346	78.5
12:30	450	—	—	0.02	346	78.5
12:45	448	—	—	0.00	342	78.5
1:00	443	—	—	0.07	346	78.5

Stop pump.

1:02:30	0	—	—	—	—	—
1:03	0	—	—	—	—	—
1:03:30	0	—	—	—	—	—
1:04	0	—	—	—	—	—
1:04:30	0	—	—	—	—	—
1:05	0	—	—	—	—	—
1:06	0	—	—	—	—	—
1:07	0	—	—	—	—	—
1:08	0	—	—	—	—	—
1:09	0	—	—	—	—	—
1:10	0	—	—	—	—	—
1:12	0	—	—	—	—	—
1:15	0	—	—	—	—	—
1:20	0	—	—	—	—	—

Well No. 9-11 — PAHOA WELL 1

GENERAL INFORMATION

Contractor: Ocean View Drilling Co., Ltd.
 Ground elevation: 402 ft., msl.
 Total depth of well: 446 ft.
 Casing: Diameter, 8 in.; length, 446 ft. (bottom 20 ft. perforated).
 Pumping test data:
 Date of pumping test: May 5-7, 1964.
 Length of airline: 421.87 ft.

PUMPING TEST DATA

Date of pumping test: May 5-7, 1964.
 Length of airline: 421.87 ft.

Elevation center air pressure gage: 404.16 ft.
 Depth static water level below center air gage: 393.57 ft. (Elevation static water level: 10.59 ft. Reading based on final recovery of water level at end of test. No reading taken before pumping because of faulty air gage.)
 Pump: Right angle drive Wintroath turbine pump Ser. No. 9885
 Power: Rockford gasoline power take-off Ser. No. 276573, Model PTA-21119.
 Pressure gage: Ashcroft 30 psi gage.
 Pump discharge: Measured with 6-inch Sparling meter.
 Personnel: George Hacker, Hawaiian Parks, Inc.; Ben Sarasin, Reginald Ho, Max Smith, Oliver Smith, Ocean View Drilling Co., Ltd.; Bill Matsubara, Hawaii County Board of Water Supply; Manabu Tagomori, State Division of Water & Land Dev.

TIME

Well No. 9-12—KEAAU ORCHARD

GENERAL INFORMATION

Contractor: Samson and Zerbe.
Date drilled: August 1964.
Ground elevation above msl: 94.70 ft. (pump block).
Total depth of well: 147 ft.
Casing: Inner diameter, 12 in.; length, 112.5 ft. (uncased hole below).

PUMPING TEST DATA (Test No. 1)

Date of pumping test: January 5, 1965
Equipment: Electric-powered Fairbanks-Morse pump; electric sounding probe; orifice plate.
Personnel: T. W. Vorfeld, Samson and Zerbe Drilling Co.; S. P. Bowles, U.S. Geological Survey.

TIME	PUMPING RATE (gpm)	WATER LEVEL Elev. (ft.)	DEPTH (ft.)	DRAW-DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
January 5, 1965						
7:40 am	0	8.12	—	0	—	—
9:40	0	8.15	—	0	—	—
9:49	Start pump to clean well.					
9:53	630	7.99	—	0.16	207	65
9:59	Stop pump.					
10:15	0	8.11	—	0	—	—
10:15:15	Start pump at maximum rate.					
		7.91	—	0.20	—	—
	Reduce rate.					
10:16		7.94	—	0.17	—	—
	Rates varying; adjusting valve.					
10:17		7.99	—	0.12	—	—
10:18:30		7.93	—	0.18	—	—
10:19:30		7.93	—	0.18	—	—
10:20		7.92	—	0.19	—	—
10:20:30		7.93	—	0.18	—	—
10:21	Stop pump.					
10:23		8.11	—	0	—	—
10:25		8.11	—	0	—	—
10:26	Stop pump.					
10:26:30	Adjust rate.					
10:27	"	8.05	—	0.06	—	—
10:27:30	"	8.02	—	0.09	—	—
10:28	297	8.03	—	0.08	202	65
10:28	—	8.02	—	0.09	—	—
10:29	297	8.02	—	0.09	—	—
10:29	297	8.02	—	0.09	187	65
10:29:30	Adjust rate.					
11:00	500	7.99	—	0.12	182	65
11:15	500	7.99	—	0.12	182	65
11:31	500	7.98	—	0.13	—	—
11:31:30	Adjust rate.					
11:35	635	7.89	—	0.22	182*	65
12:00 N	640	7.89	—	0.22	—	—
12:00 pm	640	7.87	—	0.24	107	—
1:00	640	7.81	—	0.30	—	—
1:30	640	7.78	—	0.33	172	—
2:00	643	7.78	—	0.33	—	—
2:30	645	7.78	—	0.33	170	65
3:25	645	7.78	—	0.33	171	65
3:31	Adjust rate.					
3:32	580	7.88**	—	0.23	—	—
3:34	502	7.83**	—	0.28	—	—
3:50	—	7.80**	—	0.31	—	—
3:59	Stop pump.					
4:00	0	7.93**	—	0.18	—	—

*182 ppm as tested by Dept. of Health.

**Final water-level measurements questionable; electric probe not working properly.

PUMPING-SALINITY DATA

Date of sampling: July 15, 1966
Personnel and method: Sampling and salinity by D.A. Davis and W.J. Hull, using Hach drop bottle; pumping was intermittent to waste through pressure storage tank.
Drawdown: Too small to detect with gage on airline.

TIME	SALINITY (ppm)	
	NaCl	Cl
10:22 am	Start pump	
10:24	437	265
10:29	425	255
10:35	400	245
10:39	400	245
10:39	400	245
10:50	437	265
11:00	415	250
11:10	400	245
11:23	400	245
11:34*	400	245

*1-gal. sample taken for complete analysis. (See analytical results by Honolulu BWS.)

WATER LEVEL DATA

Date of observations: August 8-11, 1966
Personnel and method: Measurements by D.A. Davis and W.J. Hull, with wetted tape.
Altitude of top of ring in concrete base: Approximately 94.70 ft., based on spirit leveling by Bowles and Vorfeld, January 5, 1965

TIME	WATER LEVEL	
	Elev. (ft.)	Depth* (ft.)

August 9, 1966

1:00 pm	7.5	87.19
2:35	7.5	87.16
3:35	7.5	87.19

August 10, 1966

8:30 am	6.9	87.84
10:40	7.4	87.29
1:15 pm	7.6	87.14
2:50	7.6	87.07

August 11, 1966

9:15 am	7.2	87.50
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*Below top of steel ring in concrete base.

DEPTH-SALINITY DATA

Date pump pulled: August 8, 1966.
Date of samplings: August 9-18, 1966.
Personnel and method: Lab. determinations titrated by P.M. Okamoto, Royal Hawaiian Macadamia Nut Co.; field determinations by D.A. Davis, using Hach drop bottle.

TIME	DEPTH (ft.)		SALINITY (ppm)			
	Below Ground Surface	Below Water Table	Laboratory NaCl	Cl	Field NaCl	Cl

August 9, 1966

1:23 pm	88	0	100	60	200	120
1:32	98	10	124	75	150	90
1:42	108	20	116	97	150	90
1:47	118	30	248	148	300	180
1:52	123	35	296	178	350	210
2:00	129	41	356	213	400	240
2:07	135	47	304	164	400	240
2:16	139	51	452	274	550	330
2:23	143	55	604	366	650	390
2:30	147*	59	580	350	650	390

August 10, 1966

1:25 pm	88	0	132	80	150	90
1:45	98	10	124	75	150	90
1:50	108	20	140	85	175	106
1:53	111	23	152	92	175	106
2:00	114	26	136	82	175	106
2:05	118	30	272	164	325	197
2:10	123	35	312	189	400	240
2:14	129	41	316	191	375	224
2:19	135	47	332	200	400	240
2:24	139	51	328	198	400	240
2:30	143	55	352	212	400	240
2:36	147*	59	516	312	550	330

August 15, 1966

9:15 am	88	0	128	77	—	—
9:21	98	10	120	73	—	—
9:26	108	20	120	73	—	—
9:32	111	23	116	70	—	—
9:36	114	26	132	80	—	—
9:44	118	30	164	99	—	—
9:51	123	35	188	114	—	—
9:58	129	41	176	112	—	—
10:06	130.5*	42	208	126	—	—

August 18, 1966

11:14 am	88	0	136	82	—	—
11:19	98	10	132	80	—	—
11:31	108	20	128	77	—	—
11:38	111	23	128	77	—	—
11:45	114	26	124	75	—	—
11:52	118	30	172	104	—	—
12:00 N	123	35	192	112	—	—
12:16 pm	128*	40	208	126	—	—

*Bottom of well.

PUMPING TEST DATA (Test No. 2)

Date of pumping test: August 23, 1966
Personnel and method: Drawdown tests conducted by Kenneth Fujiyama, with air line water level checked prior to starting the pump. Pump then started and run for 15 min., and first drawdown and salinity tests taken. Salinity measured by titrating with silver nitrate.

TIME	PUMPING RATE (gpm)	WATER LEVEL Elev. (ft.)	DEPTH (ft.)	DRAW-DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
1:25	—	86.06	—	—	—	—
1:39	—	86.96	—	0	196	—
1:55	—	86.96	—	0	180	—
2:10	—	86.96	—	0	180	—
2:25	—	86.96	—	0	180	—
2:40	—	86.96	—	0	180	—
2:55	—	86.96	—	0	180	—
3:25	—	86.96	—	0	180	—

Well No. 11—SOUTH POINT AIRPORT

PUMPING TEST DATA

Water level: 53.5 ft. below top of well.
Pumping duration: 2 hrs.
Pumping rate: 30 gpm.
Salinity (NaCl): 50 gr. (at start)
60 gr. (at end).

GENERAL INFORMATION

Driller: Mullin.
Date drilled: April 13-May 2, 1941.
Total depth of well: 63.5 ft.
Casing: 6 in.; 21.5 ft.

GENERAL INFORMATION

Date drilled: August 1940-August 1944
Ground elevation: 595 ft., msl.

Total depth of well: 615 ft.
Casing diameter: 6 in.

WATER LEVEL-SALINITY DATA

DATE	WATER LEVEL (ft.)	CHLORIDE CONTENT (ppm)	DATE	WATER LEVEL (ft.)	CHLORIDE CONTENT (ppm)
1944 Aug. 5	—	696	1953 Mar. 15	1.91	429
28	—	517	Aug. 25	1.87	467
1945 Mar. 24	—	463	Dec. 10	—	447
Nov. 19	—	535	1954 Aug. 28	2.1	454
1946 May 16	—	426	Dec. 11	2.39	504
June 14	—	426	1955 June 1	2.29	496
1947 June 14	1.58	436	Sept. 21	2.29	566
Dec. 13	2.41	449	Dec. 14	1.79	550
1948 June 4	1.22	433	1956 June 6	2.79	521
Dec. 17	2.42	445	July 31	—	525
1949 June 24	1.32	408	Oct. 11	1.69	542
Aug. 17	2.52	429	Dec. 13	2.49	492
Dec. 17	2.52	430	1957 Feb. 6	2.19	433
1950 July 9	—	427	Apr. 3	—	433
Nov. 28	2.62	—	May 23	2.59	430
1951 Mar. 23	2.12	411	July 24	2.19	423
Dec. 5	2.52	436	Sept. 25	1.79	402
1952 Feb. 22	2.42	410	1958 May 1	—	408
			July 27	1.89	417
			Dec. 17	1.49	—
				—	533

PUMPING TEST DATA

Date of pumping test: February 26-29, 1948

TIME	PUMPING RATE (gpm)	WATER LEVEL Elev. (ft.)	DEPTH (ft.)	DRAW-DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
February 26, 1948						
8:00 am	—	—	2.02	—	—	—
8:15	Start pump.					
9:00	2.7	—	1.92	—	—	—
9:35	3.3	—	2.02	—	460	—
9:57	Stop pump.					
10:30	Start pump.					
10:35	4.8	—	—	—	450	—
11:05	3.0	—	—	—	455	—
11:45	3.0	—	—	—	450	72
12:05 pm	3.3	—	1.62	—	445	—
1:00	3.3	—	1.77	—	445	72
1:30	3.3	—	1.52	—	445	—
1:45	Increase engine speed.					
1:47	9.4	—	1.62	—	—	—
1:57	8.6	—	—	—	445	—
2:09	Increase engine speed.					
2:13	10.0	—	1.52	—	—	—
2:30	10.0	—	—	—	445	71
3:00	8.6	—	1.62	—	445	—
3:24	Stop pump.					
3:34	Start pump.					
3:55	9.7	—	1.42	—	440	70
4:05	9.4	—	—	—	420	—
4:30	9.4	—	—	—	430	—
5:00	9.7	—	—	—	420	70
5:37	9.4	—	—	—	430	—
5:54	10.0	—	1.62	—	—	—
6:01	10.3	—	1.52	—	435	—
6:03	Stop pump.					

February 27, 1948

7:25 am	—	—	2.02	—	—	—
8:34	Start pump.					
9:15	7.5	—	—	—	465	—
9:20	Increase engine speed.					
9:45	18.7	—	1.87	—	—	—
10:00	18.7	—	—	—	465	—
10:30	18.7	—	—	—	445	—
11:00	18.7	—	—	—	435	—
11:30	18.7	—	—	—	450	—
11:55	18.7	—	—	—	435	—
12:25 pm	18.7	—	—	—	435	—
1:00	18.7	—	—	—	425	—
1:35	18.7	—	—	—	425	—
2:00	18.7	—	—	—	425	—
2:30	18.7	—	1.48	—	425	—
3:00	18.7	—	1.37	—	410	—

TIME	PUMPING RATE (gpm)	WATER LEVEL Elev. (ft.)	DEPTH (ft.)	DRAW-DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
1:30	25	—	—	—	465	—
2:00	25	—	—	—	465	—
2:30	25	—	—	—	470	—
3:00	25	—	1.72	—	465	—
3:30	27.2	—	—	—	470	—
4:00	27.2	—	1.72	—	445	—
4:45	Stop pump.					
4:28	Start pump.					
4:30	27.2	—	—	—	430	—
5:00	27.2	—	1.72	—	440	—
5:30	27.2	—	—	—	440	—
6:00	27.2	—	1.72	—	440	—
6:30	27.2	—	—	—	435	—
7:00	27.2	—	1.72	—	440	69
7:30	27.2	—	—	—	445	—
7:50	Stop pump.					
8:02	Start pump.					
8:05	27.2	—	2.02	—	440	—
8:30	25	—	—	—	445	—
9:00	25	—	1.87	—	435	—
9:30	25	—	—	—	445	—
10:00	25	—	—	—	445	—
10:30	27.2	—	1.72	—	435	—
11:00	27.2	—	—	—	435	—
11:30	27.2	—	—	—	440	—
11:45	27.2	—	1.77	—	—	—
11:49	Stop pump.					
11:53	Start pump.					
12:00 N	27.2	—	—	—	445	—
12:30 pm	27.2	—	—	—	440	—
1:00	27.2	—	—	—	430	—
1:20	27.2	—	1.52	—	—	—
2:00	27.2	—	1.52	—	435	—
3:00	27.2	—	1.32	—	440	—
3:22	Stop pump.					
3:32	Start pump.					
4:00	27.2	—	1.32	—	445	—
5:00	27.2	—	—	—	435	—
6:00	27.2	—	—	—	440	—
7:00	27.2	—	—	—	440	—
8:00	27.2	—	—	—	440	—
8:25	27.2	—	1.82	—	450	—
9:00	27.2	—	1.82	—	450	—
10:00	27.2	—	1.82	—	450	—
10:14	Stop pump.					
10:19	Start pump.					
11:00	27.2	—	1.82	—	440	—
12:00 M	27.2	—	—	—	445	—

Well No. 12-4 — KEEI

GENERAL INFORMATION

Contractor: Samson and Smock, Ltd.
Date of drilling: October 2-December 15, 1958.
Ground elevation: 744 ft., msl.
Total depth of well: 780 ft.
Casing: Outer diameter, 12 in.; length, 769.75 ft.

PUMPING TEST DATA

Date of pumping test: December 17-21, 1958.
Test pump: Byron Jackson 18-L 35 Subette.
Elevation top of casing: 745.95 ft.
Elevation centerline air gage: 746.24 ft.
Length of airline: 753.19 ft.
Static water level: 2.75 ft. (December 17, 1958).
Drawdown: 0.75 ft. at 100 gpm.
Salinity (chlorides): 96 ppm
Personnel: Raymond Chun, Manabu Tagomori, Hawaii Water Authority.

TIME	PUMPING RATE (gpm)	WATER LEVEL Elev. (ft.)	DEPTH (ft.)	DRAW-DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
December 10, 1958						
1:00 pm	—	—	—	—	200	—
1:30	—	—	—	—	200	—
12:00 M	Hole at 770 ft.					
December 11, 1958						
8:00 am	—	—	—	—	200	—
December 16, 1958						
8:30 am	Water sample at surface.	—	—	—	150	—
8:35	Water sample at 1/3 depth.	—	—	—	150	—
8:40	Water sample at 2/3 depth.	—	—	—	150	—
8:45	Water sample at bottom.	—	—	—	200	—
December 17, 1958						
7:45 am	—	2.75	—	—	—	—
10:20	Start pump.				200	—
10:45	Start of pump test. Rate adjusted to 25 gpm.					
10:47	28	2.29	—	—	200	68.5
11:00	27	2.29	—	—	150	71.3
11:15	27	2.29	—	—	150	72.5

TIME	PUMPING RATE (gpm)	WATER LEVEL Elev. (ft.)	DEPTH (ft.)	DRAW-DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
11:45	28	2.29	—	—	125	72.5
12:15 pm	28	2.29	—	—	125	72.5
12:45	28	2.29	—	—	125	72.5
1:15	28	2.29	—	—	150	72.5
1:45	27	2.29	—	—	150	72.5
2:15	27	2.29	—	—	125	72.5
2:45	26	2.29	—	—	100	72.5
2:48	End of 25 gpm test. Rate adjusted to 50 gpm.					
3:05	54	2.06	—	—	150	69.5
3:20	54	1.83	—	—	100	69
3:50	53	2.06	—	—	125	69
4:20	53	2.06	—	—	125	69
4:50	51	2.06	—	—	150	69
5:20	50	2.06	—	—	150	69
5:50	49	2.06	—	—	125	68
6:20	49	2.06	—	—	125	68
6:50	47	1.83	—	—	125	69
7:00	End of 50 gpm test. Rate adjusted to 75 gpm.					
7:15	75	1.71	—	—	125	68
7:30	75	1.83	—	—	125	68
8:00	75	1.83	—	—	125	68
8:30	74	1.83	—	—	125	68
9:00	73	1.83	—	—	125	68
9:30	68	1.83	—	—	125	68
10:00	72	1.71	—	—	100	68
10:30	73	1.83	—	—	125	68
11:00	73	1.83	—	—	125	68
11:03	End of 75 gpm test. Pump wide open.					
11:05	100	1.71	—	—	—	—
11:15	100	1.71	—	—	150	68
11:30	100	1.71	—	—	100	67
December 18, 1958						
12:00 M	100	1.71	—	—	125	67
12:30 am	100	1.71	—	—	125	67
1:00	100	1.71	—	—	125	67
1:30	100	1.71	—	—	125	67
2:00	100	1.71	—	—	125	67
2:30	100	1.71	—	—	125	67
3:00	100	1.71	—	—	125	67
3:30	100	1.71	—	—	96	66
4:00	100	1.71	—	—	100	68
10:52	Stop pump. Starter box trouble.					
10:54	—	2.75	—	—	—	—
Changed to USGS gage for static water level reading.						
11:15	—	2.29	—	—	—	—
11:20	100	1.78	—	—	100	67
12:00 N	99	1.78	—	—	82	67
12:45 pm	100	1.71	—	—	98	68
3:25	Stop pump. Recovery test.					
3:26	—	2.17	—	—	—	—
3:27	—	2.17	—	—	—	—
3:28	—	2.17	—	—	—	—
3:29	—	2.17	—	—	—	—
3:30	Start pump.					
3:32	99	1.60	—	—	—	—
3:45	99	1.60	—	—	—	—
4:00	100	1.60	—	—	96	67
7:00	100	1.48	—	—	100	67
December 19, 1958						
3:00 am	100	1.48	—	—	100	67
8:00	100	1.48	—	—	100	67
11:00	100	1.64	—	—	98	67
7:00	100	1.60	—	—	100	67
December 20, 1958						
3:00 am	100	1.60	—	—	102	67
8:00	100	1.60	—	—	102	67
11:00	100	1.60	—	—	102	67
7:00 pm	100	1.60	—	—	102	67
December 20, 1958						
3:00 am	100	1.60	—	—	102	67
8:00	100	1.60	—	—	102	67
11:00	100	1.60	—	—	102	67
7:00 pm	100	1.60	—	—	102	67
December 21, 1958						
3:00 am	100	1.60	—	—	104	67
8:00	98	1.60	—	—	104	67
Recovery test.						
8:25	—	1.60	—	—	—	—
Stop pump.						
8:25:15	—	2.06	—	—	—	—
8:26	—	2.06	—	—	—	—
8:26:30	—	2.17	—	—	—	—
8:27	—	2.17	—	—	—	—
8:27:30	—	2.17	—	—	—	—
8:28	—	2.17	—	—	—	—
8:28:30	—	2.17	—	—	—	—
8:29	—	2.17	—	—	—	—
8:30	—	2.17	—	—	—	—
Total water pumped during test: 517,070 gallons.						
Total power used during test: 2,930 KWH.						

Comments:

- Chloride content of water improved with pumping from 200 ppm to 100 ppm and steadied off at that salinity.
- Recovery of water level after stopping pump was almost immediate.
- Average drawdown at pumping rate of 100 gpm was 0.57 foot.

Well No. 12-5 — KAHALUU

GENERAL INFORMATION

Contractor: Pacific Drilling Co., Ltd.
Drilling date: May 1959.
Ground elevation: 833 ft., msl.
Total depth of well: 884 ft.
Casing: Diameter, 12 in.; length 871 ft.

PUMPING TEST DATA

Date of pumping test: May 22-23, 1959.
Static water level: 4.04 ft., msl. (May 21, 1959).
Equipment: Berkeley Submersible Pump; U.S. Superauge pressure gage; Trident Crest 4-in. flow meter.

Drawdowns:

0.92-9.01 ft. at 100-360 gpm.

Salinity (chlorides):

4-9 ppm.

Personnel:

Lou H. Herschler, Raymond Chun, James Yoshimoto, Sam Wong, Well Drillers.

TIME	PUMPING RATE (gpm)	WATER LEVEL Elev. (ft.)	Depth (ft.)	DRAW- DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
May 22, 1959						
9:25 am	Start pump.					
9:30	—	—	—	—	8	—
9:35	Electric switch trips; pump stops.					
10:01	Start pump.					
10:30	Air gage not operating; air line plugged up.					
10:40	Stop pump to fix the air line.					
10:54	0	—	—	—	—	—
	Install water meter to measure the discharge.					
11:00	0	—	—	—	—	—
11:10	Start pump.					
11:11	250	—	—	6.93	—	—
11:15	—	—	—	7.39	—	—
11:22	260	—	—	7.39	—	—
11:25	260	—	—	4.62	—	—
11:30	—	—	—	—	8	—
11:39	—	—	—	4.62	—	—
11:40	Regulate discharge valve.					
11:41	285	—	—	5.78	—	—
11:47	—	—	—	6.24	—	—
11:50	280	—	—	6.24	—	—
11:52	280	—	—	6.24	—	—
12:00 N	295	—	—	6.24	—	—
1:45 pm	300	—	—	6.47	—	—
2:01	Stop pump.					
2:02	0	—	—	0	—	—
	Full recovery within a minute.					
2:10	Start pump.					
2:15	350	—	—	8.08	—	—
2:17	Stop pump.					
2:25	Start pump.					
2:28	66	—	—	0.48	—	—
	Regulate discharge valve.					
2:33	100	—	—	1.16	—	—
2:40	200	—	—	3.23	—	—
2:42	250	—	—	4.62	—	—
2:45	Regulate valve to reduce the rate.					
2:47	103	—	—	0.92	—	—
3:03	100	—	—	0.92	—	—
3:15	100	—	—	0.92	7	—
3:30	98	—	—	0.92	—	—
3:48	95	—	—	0.92	—	—
4:00	95	—	—	0.92	—	—
5:00	95	—	—	0.92	—	—
	Open valve wider.					
5:02	200	—	—	3.00	—	—
5:05	—	—	—	—	8	—
5:20	180	—	—	2.77	—	—
5:30	175	—	—	2.54	—	—
5:45	175	—	—	2.54	—	—
6:00	175	—	—	2.54	—	—
6:30	175	—	—	2.31	—	—
6:55	175	—	—	2.54	—	—
	Open valve wider.					
7:00	300	—	—	6.47	—	—
7:15	300	—	—	6.24	—	—
7:30	300	—	—	6.24	—	—
7:45	300	—	—	6.01	—	—
8:00	300	—	—	6.01	—	—
8:30	280	—	—	5.78	—	—
9:00	281	—	—	5.78	—	—
9:02	Valve wide open.					
9:05	360	—	—	8.08	—	—
9:15	360	—	—	8.08	—	—
9:30	360	—	—	8.08	—	—
9:45	360	—	—	8.08	—	—
10:00	367	—	—	8.32	—	—
10:30	360	—	—	8.08	—	—
11:00	360	—	—	8.08	—	—
May 23, 1959						
1:00 am	353	—	—	8.08	—	—
2:00	360	—	—	8.08	—	—
3:00	360	—	—	8.08	—	—
4:00	360	—	—	8.08	—	—
5:00	360	—	—	8.08	—	—
6:00	353	—	—	8.32	—	—
7:00	353	—	—	8.32	—	—
8:00	350	—	—	8.32	8	—
9:00	353	—	—	8.55	—	—
10:10	353	—	—	8.78	—	—
10:35	—	—	—	—	8	—
12:00 N	353	—	—	9.01	—	—
1:45 pm	353	—	—	9.01	8	—

Drawdown: 1.9-10.7 ft. at 100-320 gpm.
Personnel: Raymond Chun, George Morimoto,
Hawaii Water Authority.

TIME	PUMPING RATE (gpm)	WATER LEVEL		DRAW-DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
		Elev. (ft.)	Depth (ft.)			
October 7, 1959						
7:55 am	Static water level - 3.2 ft.					
8:00	Start pump and regulate valve to 100 gpm.					
8:15	100	—	—	1.9	13	71
8:30	100	—	—	1.9	13	71
8:45	100	—	—	1.9	13	71
9:00	100	—	—	1.7	14	71
9:30	100	—	—	1.7	14	71
10:00	100	—	—	1.7	14	72
Regulate valve to 200 gpm.						
10:15	200	—	—	4.7	14	70
10:30	200	—	—	4.4	14	70
10:45	200	—	—	4.4	16	70
11:00	200	—	—	4.4	15	70
11:30	200	—	—	4.4	14	70
Installed 4" Style 2 Neptune Meter in series with Crest Meter.						
12:00 N	200	—	—	4.7	15	70
Regulate valve to 300 gpm.						
12:15 pm	300	—	—	9.5	15	69
12:30	300	—	—	9.5	15	69
12:45	300	—	—	9.5	15	69
1:00	300	—	—	9.5	15	69
1:30	300	—	—	9.5	15	69
2:00	300	—	—	9.5	15	69
Regulate valve wide open.						
2:15	300	—	—	9.5	15	69
2:30	300	—	—	9.5	15	69
2:45	300	—	—	9.5	15	69
3:00	300	—	—	9.5	15	69
3:30	300	—	—	9.5	15	69
4:00	300	—	—	9.5	15	69
5:00	300	—	—	9.5	15	69
7:00	300	—	—	9.7	16	—
October 8, 1959						
8:00 am	305	—	—	9.7	16	69
9:00	Stopped pump to remove 4" Style 2 Neptune Meter.					
Recovery test.						
9:00	—	—	—	9.5	—	—
9:05:10	—	—	—	7.9	—	—
9:05:25	—	—	—	2.1	—	—
9:05:40	—	—	—	0	—	—
9:01	—	—	—	0	—	—
9:01:15	—	—	—	0	—	—
9:01:30	—	—	—	0	—	—
9:10	Start pump.					
9:30	321	—	—	10.2	16	69
1:00 pm	321	—	—	10.2	16	69
5:00	321	—	—	10.4	16	69
October 9, 1959						
8:15 am	321	—	—	10.55	16	69
10:00	321	—	—	10.4	16	69
Shut pump.						
Recovery test.						
10:20	—	—	—	10.4	—	—
10:20:15	—	—	—	8.8	—	—
10:20:30	—	—	—	0	—	—
10:20:45	—	—	—	0	—	—
10:21	—	—	—	0	—	—
10:21:15	—	—	—	0	—	—
10:22	—	—	—	0	—	—
Total amount of water pumped: 902,770 gallons.						
Total amount of electricity used: 4,200 KWH.						
October 13, 1959						
2:52 pm	Start pump.					
3:10	313	—	—	10.2	16	—
October 14, 1959						
4:10 pm	318	—	—	10.2	16	—
October 15, 1959						
3:30 pm	318	—	—	10.2	16	—
October 16, 1959						
9:30 am	318	—	—	10.2	16	—
October 17, 1959						
Pump stopped.						
October 19, 1959						
Start pump.						
4:30 pm	312	—	—	10.4	16	—
5:01	Shut off pressure.					
October 20, 1959						
9:30 am	Water meter not operating; cleaned.					
9:30 pm	Pump stopped.					
5:00	312	—	—	10.4	16	—
October 21, 1959						
2:50 pm	318	—	—	10.4	16	—
October 22, 1959						
8:45 pm	314	—	—	10.4	17	—
October 23, 1959						
10:45 am	315	—	—	10.2	17	—
October 24, 1959						
3:52 pm	315	—	—	10.2	17	—
October 25, 1959						
1:17 pm	316	—	—	10.0	17	—
October 26, 1959						
3:25 pm	320	—	—	10.0	18	—

TIME	PUMPING RATE (gpm)	WATER LEVEL Elev. (ft.)	Depth (ft.)	DRAW-DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
October 27, 1959						
8:45 am	320	—	—	10.4	18	—
October 28, 1959						
8:55 am	317	—	—	10.7	18	69
October 29, 1959						
1:55 pm	316	—	—	10.7	18	69
October 30, 1959						
8:55 am	317	—	—	10.7	18	69
9:45	Shut pump.					
	Total water pumped October 7-30: 6,864,610 gallons.					
	Total electricity used October 7-30: 32,400 KWH.					
Well No. 12-8—KEEI (WELL B)						
GENERAL INFORMATION						
Contractor:		Ocean View Drilling Co., Ltd.				
Drilling equipment:		Bucyrus Erie 60-L drill rig.				
Drilling date:		December 20, 1962-April 25, 1963.				
Ground elevation:		737 ft., msl.				
Total depth of well:		774 ft.				
Size of drilled hole:		18 in.				
Casing:		Inner diameter, 12.25 in.; length, 775 ft. (bottom 40 ft. perforated).				
PUMPING TEST DATA						
Date of pumping test:		May 13-16, 1963.				
Static water level:		2.29 ft. (May 3, 1963).				
Salinity (chlorides):		92-105 ppm.				
Drawdown:		0.2 ft. at 270 gpm.				
Water temperature:		65-66°F				
Personnel:		Daniel Lum, Eugene Souza, Sam Wong, Division of Water and Land Development.				
TIME	PUMPING RATE (gpm)	WATER LEVEL Elev. (ft.)	Depth (ft.)	DRAW-DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
May 13, 1963						
1:15 pm	0	—	—	(static)	—	—
1:25	Start pump.					
1:30	49	—	—	0.12	108	66
1:45	0	—	—	0.12	105	—
1:47	Flow meter not working properly at 50 gpm; increase engine speed.					
1:55	102	—	—	0.12	102	66.5
2:10	105	—	—	0.12	99	66.5
2:25	105	—	—	0.23	98	67
2:40	105	—	—	0.23	98	67
2:55	107	—	—	0.23	97	67
3:30	110	—	—	0.23	95	66
4:00	113	—	—	0.16	94	66.5
4:30	111	—	—	0.23	93	66.5
5:00	113	—	—	0.16	92	66.5
7:00	117	—	—	0.12	92	66
7:30	122	—	—	0.12	92	66
8:00	123	—	—	0.12	93	66
Increase engine speed.						
9:00	198	—	—	—	92	66
10:00	198	—	—	—	92	66
11:00	198	—	—	—	93	66
12:00 M	198	—	—	—	93	65.5
May 14, 1963						
2:00 am	196	—	—	—	94	65.5
4:00	185	—	—	—	92	65.5
4:15	Increase engine speed.					
6:00	191	—	—	0.12	92	65.5
Increase engine speed.						
6:30	300	—	—	0.23	94	65.5
8:45	301	—	—	0.23	92	65.5
7:00	302	—	—	0.23	94	65.5
7:30	Engine sluggish					
7:35	267	—	—	0.23	92	55.5
7:55	296	—	—	0.23	93	65.5
9:00	300	—	—	0.23	93	65
11:00	300	—	—	0.16	94	65
1:00 pm	290	—	—	0.35	95	65
1:12	Stop pump; engine sluggish - clean gas line.					
1:23	Start pump.					
1:40	285	—	—	0.35	94	65
Increase engine speed.						
2:20	320	—	—	0.46	94	65
3:00	325	—	—	0.53	95	65
4:00	300	—	—	0.53	95	65
5:00	290	—	—	0.46	96	65.5
7:00	286	—	—	0.25	97	65.5
9:00	300	—	—	0.23	99	65.5
11:00	270	—	—	0.12	102	66
12:00 M	270	—	—	0.12	100	66
May 15, 1963						
2:00 am	275	—	—	—	103	66
4:00	275	—	—	—	102	66
6:00	274	—	—	0.12	102	66
8:00	274	—	—	0.12	102	66
10:00	277	—	—	0	102	66
12:00 N	200	—	—	0	103	65.5
Engine sluggish; increase speed.						
2:02 pm	270	—	—	0.12	—	—
3:00	281	—	—	0.23	102	65.5
4:00	273	—	—	0.12	103	65.5
5:45	Engine sluggish.					
6:00	257	—	—	0.23	103	66
8:00	257	—	—	0.16	103	65.5
10:00	261	—	—	0.12	104	65.5

TIME	PUMPING RATE (gpm)	WATER LEVEL		DRAW-DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
		Elev. (ft.)	Depth (ft.)			
10:35	Stop pump to change spark plugs.					
10:45	Start pump.					
11:00	202	—	—	—	—	66
12:00 M	201	—	—	—	104	66
May 16, 1963						
2:00 am	260	—	—	—	105	66
4:00	272	—	—	—	105	66
6:00	272	—	—	0.12	104	66
8:00	271	—	—	0.12	104	65.5
10:00	272	—	—	0.12	104	65
11:45	Engine stopped suddenly. Gas line plugged up; clean gas strainer, etc.					
11:56	Start pump.					
12:00 N	270	—	—	0.16	105	65
1:25 pm	268	—	—	0.23	105	65
1:30	Stop pump.					
Well No. 14—KAWAHAE WELL 1						
GENERAL INFORMATION						
Contractor:	Samson and Zerbe, Ltd.					
Drilling equipment:	Bucyrus Erie 28-L drill rig.					
Drilling date:	October 8, 1960-January 26, 1961.					
Ground elevation:	579.37 ft., msl.					
Total depth of well:	620 ft.					
Size of drilled hole:	15 in.					
PUMPING TEST DATA						
Date of pumping test:	February 15-18, 1961.					
Length of airline:	615.83 ft.					
Elevation centerline air gage:	579.37 ft.					
Static water level:	3.27 ft.					
Salinity (chlorides):	298-308 ppm.					
Drawdown:	0 ft. at 50 gpm; 0 ft. at 100 gpm; 0.04-0.07 ft. at 150 gpm; 0.04-0.41 ft. at 180 gpm.					
Water temperature:	81°F.					
Personnel:	Sam Wong, Hawaii Division of Hydrography.					
TIME	PUMPING RATE (gpm)	WATER LEVEL		DRAW-DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
		Elev. (ft.)	Depth (ft.)			
February 15, 1961						
7:49 am	0	—	—	(static)	—	—
7:55	0	—	—	(static)	—	—
8:00	Start pump.					
8:10	52	—	—	—	—	—
8:15	54	—	—	—	302	—
8:20	56	—	—	—	—	82
8:30	57	—	—	—	298	82
8:37	57	—	—	—	—	—
8:45	60	—	—	—	302	82
8:48	Increase engine speed.					
8:53	100	—	—	0	—	82
9:00	100	—	—	—	298	81.5
9:15	100	—	—	—	302	81.5
9:30	102	—	—	—	298	81.5
9:45	102	—	—	—	308	81.5
10:00	103	—	—	—	298	81.5
10:02	Increase engine speed.					
10:05	148	—	—	0.07	302	81
10:10	148	—	—	0.07	—	—
10:20	148	—	—	0.04	308	81
10:35	148	—	—	0.04	308	81
10:50	148	—	—	0.07	308	81
11:05	150	—	—	0	308	81
11:06	Increase engine speed.					
11:09	180	—	—	0.14	308	81
11:25	180	—	—	0.18	302	81
11:40	180	—	—	0.21	302	81
12:00 N	180	—	—	0	302	81
12:00 pm	180	—	—	0.11	302	81
1:30	180	—	—	0.11	308	81
2:00	177	—	—	0.04	308	81
2:30	180	—	—	0.11	302	81
3:00	170	—	—	0.04	308	81
3:30	179	—	—	0.07	305	81
4:00	180	—	—	0.07	302	81
8:00	180	—	—	0.28	302	81
12:00 M	180	—	—	0.34	302	80.5
February 16, 1961						
4:00 am	177	—	—	0.34	298	81
6:00	183	—	—	0.11	298	81
10:00	179	—	—	0	302	81
12:00 N	176	—	—	0.04	308	81
12:10 pm	Short circuit in generator; stop pump.					
12:33	Start pump.					
12:35	176	—	—	—	—	—
1:00	175	—	—	—	—	—
2:00	176	—	—	0	308	81
3:00	175	—	—	0.04	302	81
4:00	174	—	—	0.04	298	81
6:00	179	—	—	0.07	298	81
8:00	174	—	—	0.23	298	81.5
10:00	175	—	—	0.34	298	81.5
12:00 M	176	—	—	0.34	302	81.5
February 17, 1961						
2:00 am	177	—	—	0.34	302	81
4:00	174	—	—	0.34	298	81
6:00	174	—	—	0.41	298	81
7:10	174	—	—	0.41	—	81
8:00	174	—	—	0.39	298	81
10:00	174	—	—	0.16	298	81
12:00 N	172	—	—	0	302	81
2:00 pm	173	—	—	—	298	81

TIME	PUMPING RATE (gpm)	WATER LEVEL Elev. (ft.) Depth (ft.)	DRAW-DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
4:00	172	—	0.04	302	81
6:00	172	—	0.18	298	81
8:00	171	—	0.34	302	81
10:00	171	—	0.28	302	81
12:00 M	173	—	0.34	302	80.5
3:30 am	172	—	0.34	302	81
4:00	173	—	0.34	302	81
7:00	172	—	0.34	302	81
8:00	169	—	0.32	302	81
10:00	176	—	0.23	302	81
11:10	174	—	0.11	302	81
11:11	Stop pump.	—	—	—	—
11:11:30	G	—	—	—	—

Well No. 15 — KAWAHAE WELL 2

GENERAL INFORMATION

Contractor: Samson and Zerbe, Ltd.
 Drilling equipment: Bucyrus Erie 28-L drill rig.
 Drilling date: March 9-June 1, 1961.
 Ground elevation: 392.19 ft., msl.
 Total depth of well: 429.5 ft.
 Size of hole: 15 in.
 Casing: Inner diameter, 10 in.; 428.5 ft. (bottom 40 ft. perforated).

PUMPING TEST DATA

Date of pumping test: June 6-8, 1961.
 Length of airline: 412.60 ft.
 Elevation centerline air gage: 392.19 ft.
 Static water level: 3.3 ft. (electric sounding probe before test); 5.12 ft. (airline after test).
 Salinity (chlorides): 504 ppm.
 Drawdown: 0 ft. at 50, 100, 150, and 180 gpm.
 Water temperature: 79°F.

TIME	PUMPING RATE (gpm)	WATER LEVEL Elev. (ft.) Depth (ft.)	DRAW-DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
June 6, 1961	0	—	—	—	—
8:00 am	Start pump.	—	—	—	—
8:15	52	—	—	504	—
8:30	55	—	—	504	—
8:45	55	—	—	504	—
9:00	56	—	—	504	—
9:05	Increase engine speed.	—	—	—	—
9:15	108	—	—	504	—
9:30	114	—	0.47(?)	496	—
9:45	110	—	0	—	—
10:00	112	—	—	496	—
10:03	Increase engine speed.	—	—	—	—
10:05	152	—	—	—	—
10:15	152	—	0	504	—
10:30	148	—	—	504	—
10:45	147	—	—	—	—
11:00	147	—	0	496	—
11:02	Increase engine speed.	—	—	—	—
11:04	183	—	0	—	—
11:15	182	—	—	496	—
11:30	177	—	0	496	—
11:33	187	Adjust to increase rate.	—	—	—
12:00 N	193	—	—	504	—
12:30 pm	184	—	0	504	—
1:00	183	—	0	504	—
1:30	184	—	0	—	—
2:00	185	—	0	496	—
2:30	184	—	0	—	—
3:00	185	—	0	504	—
3:30	187	—	—	—	—
4:00	189	—	0	504	—
8:00	189	—	0	496	—
10:00	180	—	0	—	—
12:00 M	185	—	0	504	—
June 7, 1961	—	—	—	—	—
2:00 am	184	—	0	—	—
4:00	180	—	0	504	—
6:00	181	—	0	—	—
8:00	180	—	0	496	—
8:25	Install USGS test gage.	—	—	—	—
8:30	184	—	0	—	78.5
10:00	187	—	0	504	79
12:00 N	187	—	—	504	79
2:00	185	—	—	504	79
4:00	187	—	—	504	79

TIME	PUMPING RATE (gpm)	WATER LEVEL Elev. (ft.) Depth (ft.)	DRAW-DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
6:00	188	—	—	504	79
8:00	181	—	0	496	79
10:00	176	—	0	504	79
12:00 M	180	—	—	504	79
June 8, 1961	—	—	—	—	—
2:00 am	179	—	—	504	79
4:00	179	—	—	496	79
6:00	179	—	0	504	79
8:00	184	—	0	504	79
10:00	179	—	—	504	79
11:00	185	—	—	504	79
11:05	Stop pump.	—	—	—	—

Well No. 16 — KAWAHAE

GENERAL INFORMATION

Contractor: Ocean View Drilling Co., Ltd.
 Drilling equipment: Failing 2500 rotary drill rig.
 Drilling date: May 18-June 10, 1963.
 Ground elevation: 982 ft., msl.
 Total depth of well: 1,040 ft.
 Size of hole: 10 in.
 Casing: Inner diameter, 8 1/8 in.; length, 1041 ft. (bottom 43 ft. perforated).

PUMPING TEST DATA

Date of pumping test: June 24-28, 1963.
 Static water level: 4.62 ft. (June 24, 1963).
 Salinity (chlorides): 229-264 ppm.
 Drawdown: 2.8 ft. at 100 gpm; 8.5 ft. at 200 gpm.
 Water temperature: 93-96°F.
 Personnel: Daniel Lum, Linford Chang, Ken Sakuma, Division of Water and Land Development; Jack Roseau, U.S. Geological Survey.

TIME	PUMPING RATE (gpm)	WATER LEVEL Elev. (ft.) Depth (ft.)	DRAW-DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
June 24, 1963	—	—	—	—	—
1:25 pm	0	—	0	—	—
1:34	0	—	0	—	—
1:35	Start pump.	—	—	—	—
1:45	75	—	1.62	229	93
2:00	80	—	1.85	234	98.5
2:15	85	—	1.96	234	98
2:30	90	—	1.96	234	98
2:45	85	—	2.08	234	98
3:00	85	—	2.08	234	98
3:15	90	—	2.08	229	97.5
3:30	90	—	2.19	234	97.5
3:45	90	—	2.19	234	97
4:00	90	—	2.19	234	97
4:30	90	—	2.19	234	96.5
5:00	95	—	2.31	244	97
8:00	95	—	2.42	244	96.5
9:00	100	—	2.54	244	97
10:00	100	—	2.54	244	96.5
11:00	100	—	2.66	244	96.5
12:00 M	100	—	2.66	234	96.5
June 25, 1963	—	—	—	—	—
2:00 am	100	—	2.66	239	96.5
4:00	100	—	2.77	259	96
6:00	100	—	2.77	244	96
8:00	100	—	2.77	239	96.5
10:00	105	—	2.89	244	96
12:00 N	100	—	2.77	254	96.5
2:00 pm	100	—	2.77	244	96.5
4:00	100	—	2.77	244	96.5
7:15	100	—	2.77	244	96.5
8:00	100	—	2.89	254	96
10:00	100	—	2.77	244	96
12:00 M	100	—	2.77	244	97
June 26, 1963	—	—	—	—	—
2:00 am	100	—	2.77	254	96
4:00	100	—	2.77	254	96.5
6:00	95	—	2.77	259	96.5
7:30	Adjust pump.	—	—	—	—
8:00	108	—	3.12	259	96.5
10:00	110	—	3.12	254	96.5
10:05	Adjust pump.	—	—	—	—
10:20	100	—	2.89	—	—
12:00 N	100	—	2.89	254	96.5
2:00 pm	100	—	2.77	254	96.5
Increase pumping rate.	—	—	—	—	—
2:17	200	—	7.62	—	—
2:24	210	—	8.89	254	97
2:35	198	—	7.85	254	97

TIME	PUMPING RATE (gpm)	WATER LEVEL Elev. (ft.) Depth (ft.)	DRAW-DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
Pressure gage fluctuating between 4.40 and 4.80 psi.	—	—	—	—	—
3:00	209	—	8.76	254	96.1
3:30	200	—	8.31	—	97
4:00	200	—	8.54	254	97
6:30	200	—	9.28	259	96.5
8:00	200	—	8.76	254	96
10:00	200	—	8.54	254	96
12:00 M	200	—	8.31	254	97
June 27, 1963	—	—	—	—	—
2:00 am	200	—	8.31	259	96.5
4:00	200	—	8.31	264	96
5:52±	Stop pump due to lack of fuel.	—	—	—	—
6:40	0	—	0	—	—
7:35	Start pump.	—	—	—	—
7:39	—	—	8.54	—	—
7:42	202	—	8.54	259	—
7:42	Stop pump to repair oil line.	—	—	—	—
7:50	—	—	0	—	—
10:25	Start pump.	—	—	—	—
10:26	—	—	8.08	—	—
10:30	100±	—	2.54	—	—
10:31	50±	—	1.62	—	—
10:35	72	—	—	254	96.5
10:50	—	—	1.96	—	—
10:53	77	—	—	—	—
10:57	—	—	—	264	97.5
11:30	70	—	1.73	264	96
11:40	Increase pumping rate.	—	—	—	—
11:45	114	—	3.12	—	—
2:15 pm	110	—	4.04	264	96.5
8:15	120	—	3.69	249	96.5
9:30	120	—	6.70	259	96
12:00 M	120	—	3.81	259	96
June 28, 1963	—	—	—	—	—
6:00 am	120	—	4.04	259	96
8:00	120	—	4.04	264	96
10:00	125	—	4.04	264	96.5
12:00 N	120	—	4.04	264	96.5
12:05	Stop pump.	—	—	—	—

Well No. 17 — KAWAHAE (MAUNA KEA RESORT HOTELS)

GENERAL INFORMATION

Contractor: Ocean View Drilling Co., Ltd.
 Drilling equipment: Bucyrus Erie 22-W drilling.
 Drilling date: January 22-March 28, 1963.
 Ground elevation: 188± ft.
 Total depth of well: 218 ft.
 Size of hole: 16 in.
 Casing: Outer diameter 12.75 in.; length 218 ft. (bottom 40 ft. perforated).

PUMPING TEST DATA

Date of pumping test: April 3-5, 1963.
 Static water level: 2± ft.
 Salinity (chlorides): 365-455 ppm.
 Drawdown: 1.0 ft. at 550 gpm.
 Water temperature: 77-78°F.

TIME	PUMPING RATE (gpm)	WATER LEVEL Elev. (ft.) Depth (ft.)	DRAW-DOWN (ft.)	CHLORIDE CONTENT (ppm)	WATER TEMP. (°F)
April 3, 1963	—	—	—	—	—
8:30 am	Start pump.	—	—	—	—
9:00	550	—	187	1	365
10:00	550	—	187	1	425
11:00	550	—	187	1	445
1:00 pm	550	—	187	1	420
3:30	550	—	187	1	440
6:00	550	—	187	1	410
6:45	550	—	187	1	415
10:00	550	—	187	1	420
12:00	550	—	187	1	420
April 4, 1963	—	—	—	—	—
3:00 am	550	—	187	1	445
6:00	550	—	187	1	455
9:00	550	—	187	1	425
3:15 pm	550	—	187	1	430
6:00	550	—	187	1	455
8:00	550	—	187	1	430
9:00	350	—	187	1	450
11:00	350	—	187	1	440
April 5, 1963	—	—	—	—	—
2:00 pm	350	—	187	1	435

Dug Well and Waterhole Index

INCLUDING ANCIENT HAWAIIAN WELLS

Well	Owner	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Depth (ft.)	Dimension	Chloride Content (ppm)	Use	Remarks
Kauluoa Pt	Magoon Estate (Eaton Magoon, Sr)	84	S Kona	19 19 38 155 53 30	15	30		2720		
Kaawalii Gulch	Laupahoehoe Sugar Co	82	N Hilo	20 00 30 155 15 58	250	25	50'x40'	2598	Industrial	Potable water; abandoned 1930
Kahawailiili Gulch	Paaupau Sugar Co	81	Hamakua	20 05 18 155 26 05	250				Unused	Covered with debris; too brackish to drink
"	"	"	"	20 05 18 155 26 05	260				"	Covered with debris
Hawaiian Cane Products Co		82	S Hilo	19 43 00 155 04 30		9	10' sq		Industrial	Sweet water
Waiakea	Hilo Electric Co	"	"	19 43 43 155 04 15	12	20	"	20000	"	
Hawaiian Cane Products Co		"	"	19 43 10 155 04 26						Sweet, low tide; brackish high tide
Waiakea	Waiakea Mill Co	"	"	19 43 00 155 04 30			10' sq	17	"	Spring
Patton Well		83	Kau	18 58 45 155 36 40				3400		
Kau	Kaalualu Ranch	"	"	18 58 35 155 37 00					Crop	Brackish
Ancient Hawaiian Well		"	"	19 06 50 155 31 50	60					Potable water
Kau Test Well		"	"	19 07 00 155 31 53	110			50		
Unnamed		"	Puna	19 19 15 155 03 25	20				Stock	Brackish
"		"	"	19 20 27 155 01 30	30	30		769	Abandoned	Ex domestic use
Private Well		"	"	19 20 40 155 00 46	30	30	2" pipe	717	Stock	
Ancient Hawaiian Well		"	"	19 20 28 155 00 45	60					Brackish but drinkable
Cave of Refuge		"	"	19 21 05 154 59 08	40				Industrial	Slightly brackish, rises and falls with tide
Old Hawaiian Well	T C White	84	N Kona	19 36 20 155 58 30	30			2435		
"	"	"	"	19 36 20 155 58 20	90			"		
Church Well	Catholic Church	"	"	19 35 05 155 58 00	60			1624		
House Well	Bishop Estate	"	"	19 34 55 155 58 00	60			1200		
Hind Well	"	"	"	19 35 00 155 57 50	130			1175		
Well	T C White	"	"	19 34 10 155 57 37	155			1139		
White Well	Bishop Estate	"	"	19 33 50 155 57 44	95			1007		
Stock Well	William Paris	"	"	19 32 47 155 37 25	120			2255		
"	Walter Ackerman	"	"	19 31 35 155 57 20	70			1849		
"	William Paris	"	"	19 30 47 155 57 17	80			2030		
"	William Roy	"	"	19 32 27 155 57 22	125			2300		
"	Henry Greenwell	"	S Kona	19 30 50 155 57 05	60			2503		

Well	Owner	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Depth (ft.)	Dimension	Chloride Content (ppm)	Use	Remarks
Umi's Well	Maude Greenwell	84	S Kona	19 29 00 155 56 05	10			2977	Stock	
Old McCandless Well	Hawaii Coffee Mill	"	"	19 28 25 155 55 02	90			1263	Industrial	
Well	Captain Cook Coffee Co	"	"	19 28 15 155 55 12	60	20	4' diam	1984	"	Coffee Mill
Stock Well	McCandless Ranch	"	"	19 27 26 155 54 57	130			1488		
Well	Albert Waiau	"	"	19 23 08 155 53 55	125			2435	Stock	
Well	Eaton Magoon	"	"	19 20 58 155 53 11	135			3000	"	
Stock Well	H P Ching	"	N Kona	19 35 32 155 58 05	5			2350		
Joyce Well	Horace Joyce	"	"	19 35 32 155 58 05	75			2368		
Hugo Well	Daniel Hugo	"	"	19 36 00 155 58 13	90			2900		
Hawaiian Well	K Lelewi Estate	"	"	19 36 00 155 58 13	90			4442		
Stock Well	Manual de Guair	"	"	19 36 10 155 58 14	95			2593		
J Pacheco Well	Frank Greenwell	"	"	19 36 15 155 58 26	30			2300		
Old Hawaiian Well	"	"	"	19 36 20 155 58 20	85			2413		
F Silva Well	Frank Silva	"	"	19 36 20 155 58 30	25			1850		
George Carr Well	"	"	"	19 36 25 155 58 28	40			2278		
J Pacheco Well	J Pacheco	"	"	19 36 43 155 58 23	90			1850		
T Yamanaka Well	Kimura, et al	"	"	19 36 40 155 58 15	155			1800		
J Pacheco Well	T Gouveia, et al	"	"	19 36 50 155 58 35	65			3050		
Hind Stock Well	Thomas Gouveia	"	"	19 37 00 155 58 40	60			9500		
A C Amarino Well	J C Pacheco	"	"	19 37 07 155 58 45	63			3250		
Frank Gouveia Well	Manual Gomes	"	"	19 37 48 155 59 00	75			4000		
Manual Gomes Well	Manual Reis	"	"	19 38 23 155 59 17	90			2150		
Court House Well	County Hawaii BWS	"	"	19 38 48 155 59 45	30			2142		
Factors Well	American Factors	"	"	19 38 30 155 59 23	40			7100		
Ancient Hawaiian Well	Bishop Estate	85	"	19 51 08 155 56 33	20			1745	Abandoned	
Hawaiian Well	"	"	"	19 49 47 155 59 43	20			1757	"	
Camp Drews Well	USMC	"	S Kohala	19 59 45 155 49 26	90			558	"	
Honokaa Landing	Honokaa Sugar Co	81	Hamakua	20 06 18 155 28 22	29	31.5	Top 15' x 35', water level 15' sq	161	"	Ex industrial & domestic
Stillman Well	Huehue Ranch	85	N Kona	19 49 17 156 00 07	8			2860	"	
Kaunaoa Well		"	S Kohala	19 59 52 155 49 40	20			Brack-ish		
Waiakailio	Kahua Ranch	"	N Kohala	20 04 38 155 51 12	10			"	Stock	

Well	Owner	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Depth (ft.)	Dimension	Chloride Content (ppm)	Use	Remarks
Honokoa	Kahua Ranch	85	S Kohala	20 03 15 155 51 33	25			Brack- ish	Unused	
Unnamed	"	"	N Kohala	20 04 25 155 51 30	40		10' diam	"	"	
Puako Well #3	Parker Ranch	"	S Kohala	19 58 17 155 49 48	27		5.5' diam	540- 550	Irrigation	
Puako Well #4	"	"	"	19 57 37 155 50 21	36.7	36		590- 640	"	Infiltration tunnel 6'x7' 600' long, NE direction (1961)
Puako Well #6	"	"	"	19 57 28 155 50 12	51.2	55.2	5.5' diam	570- 590	Unused	
Kapaa	Dept of Parks, Hawaii County	"	N Kohala	20 12 23 155 54 17	8	12	4' diam	Brack- ish	Restroom, water lawn	
Coast Guard Station		"	"	20 15 14 155 53 28	8			"		
Bombing Range	Puakea Ranch	"	"	20 14 45 155 53 33	8				Stock	
Haena Well		"	"	20 12 49 155 54 15	10				Abandoned	Dry
Unnamed		"	"	20 10 58 155 54 00	30			4572		¼ mi S of Mahukona
Ancient Hawaiian Well		83	Kau	19 01 20 155 35 10	60					Waikapuna Bay potable water

Shaft Index

USGS No.	Shaft	Owner	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Year Constr.	Length (ft.)	Inclined (degree)	No. of Infiltr. Tunnels	Static Water Level (ft.)	Chloride Content (ppm)	Use	Remarks
1	Waikane	Kohala Sugar Co	81	N Kohala	20 16 00 155 52 10	26	1920	42	Ver- tical	2	0.5	601-1579	Irri- gation	Remodeled 1943
2	Hoea	"	"	"	20 16.00 155 50 25	52	1900	61	"	6	2.0	308-605	"	Steam pumps instal 1900; replaced by electric pumps 193
3	Alaalae	"	"	"	20 15 33 155 49 33	75	1900	84	"	1	2.0		Aban- doned	Ex irrigation
4	Kohala	"	"	"	20 14 50 155 46 50	123	1900	135	"	4	7.0	88-441	Irri- gation	Steam pumps instal 1900; replaced by electric pumps 193
5	Paauiilo	Hamakua Mill Co	"	Hamakua	20 03 22 155 22 00	273	1944	626	26	2	3.4	25-71	Irri- gation; domes- tic; indus- trial	Ex Hamakua Mill tunnel & old Kukais Mill
6	Ookala	Laupahoehoe Sugar Co	82	N Hilo	20 01 05 155 17 15	300	1937	650	30	2	6.0	7-15	Domes- tic; irri- gation	2nd infiltration tunnel driven in 1944; USGS Observa- tion well; ex Kaiwiki Sugar Co
7	Olaa	Puna Sugar Co	"	Puna	19 37 50 155 02 00	220	1936	203	Ver- tical	3	17.0	9	"	USGS Observation well; ex Olaa Sugar Co
8	Pahala	Hawaiian Agricul- tural Co	83	Kau	19 12 40 155 25 40	774	1947	1550	30	0	230	99	Indus- trial; domes- tic	
9	Kapoho	County Hawaii BWS	"	Puna	19 30 17 154 50 21	38	1965	41	Ver- tical	24" cul- vert 50' on each side of shaft	2.6	170-190	Domes- tic	

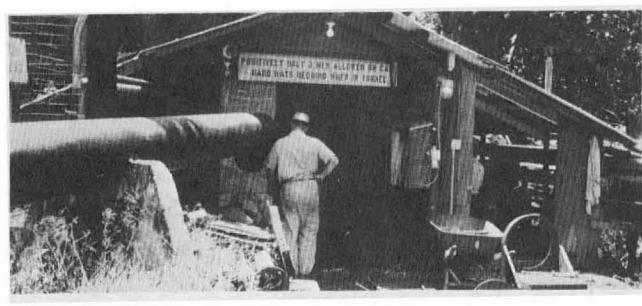
Selected Shaft Pumpage Records

INCLUDING WATER LEVEL AND CHLORIDE CONTENT

PUMPAGE in Millions of Gallons													
	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
Shaft No. 1—WAIKANE													
1942 Max.	—	1,093	—	—	—	—	1,019	—	—	1,019	1,146	—	1,146
Min.	—	892	—	—	—	—	764	—	—	510	1,019	—	510
Ave.	1,229	1,029	—	—	—	—	1,006	1,010	1,019	1,000	1,024	1,019	1,042
Total	20,893	17,492	—	—	—	—	20,125	8,060	19,361	27,004	24,583	17,323	—
1943 Max.	—	—	—	—	—	—	—	—	—	1,019	3,060	—	3,060
Min.	—	—	—	—	—	—	—	—	—	510	764	—	510
Ave.	1,019	1,019	—	—	—	—	1,019	1,019	1,019	2,978	3,060	—	1,516
Total	5,095	15,285	1,019	—	—	—	13,247	18,342	20,389	28,926	83,384	67,320	—
1944 Max.	—	1,019	—	—	—	—	—	—	—	—	—	—	1,019
Min.	—	255	—	—	—	—	—	—	—	1,019	1,019	—	1,019
Ave.	1,019	2,002	—	—	—	—	—	—	—	5,095	22,418	—	3,057
Total	12,228	17,323	—	—	—	—	—	—	—	5,095	22,418	—	3,057
1945 Max.	1,019	3,060	3,060	2,040	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060
Min.	510	1,019	1,784	1,019	1,784	764	1,019	1,813	1,145	510	2,040	1,020	510
Ave.	955	2,380	2,422	1,233	2,422	2,617	2,769	2,769	2,888	2,561	2,601	2,193	2,315
Total	13,375	57,115	4,844	30,636	63,627	49,721	69,226	70,445	66,430	78,395	52,029	46,680	600,894
1946 Max.	3,060	—	—	—	—	—	—	—	—	—	—	—	3,060
Min.	2,040	—	—	—	—	—	—	—	—	—	—	—	315
Ave.	2,193	—	—	—	—	—	—	—	—	—	—	—	2,303
Total	36,720	—	—	—	—	—	—	—	—	—	—	—	254,680
1947 Max.	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060
Min.	510	1,019	1,784	1,019	1,784	764	1,019	1,813	1,145	510	2,040	1,020	510
Ave.	955	2,380	2,422	1,233	2,422	2,617	2,769	2,769	2,888	2,561	2,601	2,193	2,315
Total	13,375	57,115	4,844	30,636	63,627	49,721	69,226	70,445	66,430	78,395	52,029	46,680	600,894
1948 Max.	3,060	—	—	—	—	—	—	—	—	—	—	—	3,060
Min.	2,040	—	—	—	—	—	—	—	—	—	—	—	315
Ave.	2,193	—	—	—	—	—	—	—	—	—	—	—	2,303
Total	36,720	—	—	—	—	—	—	—	—	—	—	—	254,680
1949 Max.	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060
Min.	510	1,019	1,784	1,019	1,784	764	1,019	1,813	1,145	510	2,040	1,020	510
Ave.	955	2,380	2,422	1,233	2,422	2,617	2,769	2,769	2,888	2,561	2,601	2,193	2,315
Total	13,375	57,115	4,844	30,636	63,627	49,721	69,226	70,445	66,430	78,395	52,029	46,680	600,894

PUMPAGE in Millions of Gallons													
	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
Shaft No. 4—KOHALA													
1953 Max.	6,585	6,916	6,829	6,460	6,524	6,585	6,585	7,000	—	—	—	—	7,000
Min.	1,372	499	1,479	776	1,190	2,195	1,554	1,004	—	—	—	—	499
Ave.	5,138	4,473	3,821	3,801	3,839	4,924	3,893	3,179	—	—	—	—	4,109
Total	107,900	111,835	83,293	91,222	84,465	118,181	81,749	76,303	97,936	107,738	145,164	63,021	1,168,870
1954 Max.	—	150,457	11,250	—	—	—	—	—	—	—	—	—	687,872
Total	13,125	—	—	—	—	—	—	—	—	—	—	—	611,771
1955 Max.	4,219	—	—	—	—	—	—	—	—	—	—	—	289,975
Min.	24,453	58,208	161,858	142,102	63,534	234,641	186,980	115,604	140,307	179,125	82,352	17,157	1,406,321
Ave.	40,607	10,979	—	—	—	—	—	—	—	—	—	—	448,372
Total	—	—	—	—	—	—	—	—	—	—	—	—	910,072
1956 Max.	—	—	—	—	—	—	—	—	—	—	—	—	1,682,691
Min.	—	—	—	—	—	—	—	—	—	—	—	—	—
Ave.	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—
1957 Max.	118,755	137,472	133,651	190,500	163,704	137,781	260,677	195,042	212,969	260,859	70,313	168,792	2,146,735
Min.	117,125	209,073	78,438	149,531	101,641	197,031	264,011	165,464	250,432	213,980	140,739	174,620	2,082,085
Ave.	161,328	113,125	185,458	82,219	2,833	130,360	119,265	192,956	236,271	185,323	119,532	116,058	1,825,323
Total	—	—	—	—	—	—	—	—	—	—	—	—	—
1958 Max.	—	—	—	—	—	—	—	—	—	—	—	—	—
Min.	—	—	—	—	—	—	—	—	—	—	—	—	—
Ave.	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—
1959 Max.	—	—	—	—	—	—	—	—	—	—	—	—	—
Min.	—	—	—	—	—	—	—	—	—	—	—	—	—
Ave.	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—

PUMPAGE in Millions of Gallons													
	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
Shaft No. 2—HOEA													
1943 Max.	—	—	—	—	—	—	—	—	—	—	—	—	7,460
Min.	—	—	—	—	—	—	—	—	—	—	—	—	2,495
Ave.	—	—	—	—	—	—	—	—	—	—	—	—	2,495
Total	—	—	—	—	—	—	—	—	—	—	—	—	7,460
1944 Max.	—	—	—	—	—	—	—	—	—	—	—	—	7,460
Min.	—	—	—	—	—	—	—	—	—	—	—	—	2,495
Ave.	—	—	—	—	—	—	—	—	—	—	—	—	2,495
Total	—	—	—	—	—	—	—	—	—	—	—	—	7,460
1945 Max.	—	—	—	—	—	—	—	—	—	—	—	—	7,460
Min.	—	—	—	—	—	—	—	—	—	—	—	—	2,495
Ave.	—	—	—	—	—	—	—	—	—	—	—	—	2,495
Total	—	—	—	—	—	—	—	—	—	—	—	—	7,460
1946 Max.	—	—	—	—	—	—	—	—	—	—	—	—	7,460
Min.	—	—	—	—	—	—	—	—	—	—	—	—	2,495
Ave.	—	—	—	—	—	—	—	—	—	—	—	—	2,495
Total	—	—	—	—	—	—	—	—	—	—	—	—	7,460
1947 Max.	—	—	—	—	—	—	—	—	—	—	—	—	7,460
Min.	—	—	—	—	—	—	—	—	—	—	—	—	2,495
Ave.	—	—	—	—	—	—	—	—	—	—	—	—	2,495
Total	—	—	—	—	—	—	—	—	—	—	—	—	7,460
1948 Max.	—	—	—	—	—	—	—	—	—	—	—	—	7,460
Min.	—	—	—	—	—	—	—	—	—	—	—	—	2,495
Ave.	—	—	—	—	—	—	—	—	—	—	—	—	2,495
Total	—	—	—	—	—	—	—	—	—	—	—	—	7,460
1949 Max.	—	—	—	—	—	—	—	—	—	—	—	—	7,460
Min.	—	—	—	—	—	—	—	—	—	—	—	—	2,495
Ave.	—	—	—	—	—	—	—	—	—	—	—	—	2,495
Total	—	—	—	—	—	—	—	—	—	—	—	—	7,460



Shaft No. 6--OOKALA.

			PUMPAGE		PUMPAGE				
PUMPAGE					Dem.			Indus.	Total
			Shaft No. 5		Shaft No. 6 — OOKALA				
			PAAUILO						
1947	1,666	1945	7	1937	24	24			
1948	c1,571	1946	450	1938	—	—			
1949	453	1947	846	1939	—	—			
1950	556	1948	530	1940	73	73			
1951	1,772	1949	650	1941	67	67			
1952	1,250	1950	788	1942	76	76			
1953	794	1951	671	1943	79	79			
1954	799	1952	774	1944	75	75			
1955	174	1953	860	1945	71	160	231		
1956	e66	1954	951	1946	54	320	374		
1957	e546	1955	741	1947	54	434	488		
1958	—	1956	c1,095	1948	56	384	440		
1959	—	1957	728	1949	61	307	368		
1960	297	1958	728	1950	66	384	450		
1961	286	1959	692	1951	65	390	455		
1962	—	1960	596	1952	71	453	524		
1963	—	1961	466	1953	84	437	521		
1964	220	1962	e662	1954	90	440	530		
1965	177	1963	e504	1955	90	411	501		
1966	154	1964	e744	1956	100	417	517		
1967	124	1965	802	1957	e90	518	608		
		1966	857	1958	e82	473	555		
		1967	822	1959	83	601	684		
				1960	88	460	548		
				1961	88	537	625		
				1962	89	571	660		
				1963	86	542	629		
				1964	89	543	631		

DATE	WATER LEVEL (ft.)	CHLO-RIDES (ppm)	DATE	WATER LEVEL (ft.)	CHLO-RIDES (ppm)	DATE	WATER LEVEL (ft.)	CHLO-RIDES (ppm)	DATE	WATER LEVEL (ft.)	CHLO-RIDES (ppm)	DATE	WATER LEVEL (ft.)	CHLO-RIDES (ppm)	DATE	WATER LEVEL (ft.)	CHLO-RIDES (ppm)
1962 Feb. 4	5.18	26	1954 June 2	5.0	—	1956 May 5	5.5	—	1957 July 1	—	73	1958 Sept. 5	6.2	—	1959 Nov. 5	5.8	—
11	5.49	26	7	5.1	51	8	—	18	5	5.2	—	6	—	56	7	—	49
15	5.66	31	14	5.0	60	10	5.4	—	10	5.2	—	13	—	23	10	6.1	25
25	4.99	18	21	5.1	71	14	—	21	15	5.4	—	15	6.3	—	14	—	—
Mar. 3	5.57	33	28	5.1	64	15	5.4	—	20	5.4	—	20	6.2	—	15	6.1	—
10	5.24	31	July 6	5.2	52	21	—	—	25	5.3	—	25	6.1	—	20	5.9	21
17	5.24	24	12	5.1	62	28	—	23	29	—	55	27	—	93	21	—	—
24	5.49	33	19	—	77	31	5.3	—	31	5.4	—	30	6.0	—	28	—	16
31	4.94	—	26	—	12	June 4	—	22	Aug. 5	5.4	39	Oct. 4	—	75	30	6.0	—
Apr. 7	5.04	—	Aug. 2	—	75	5	5.2	—	10	5.4	—	5	6.3	—	Dec. 5	6.0	21
14	5.35	—	9	—	63	10	5.3	—	12	—	39	10	6.1	—	10	6.0	—
21	5.20	—	16	—	71	11	—	21	15	5.2	—	11	—	115	15	6.0	—
28	5.24	—	19	5.3	70	15	5.4	—	19	—	55	15	6.2	—	20	5.9	—
May 5	5.18	—	23	5.1	59	18	—	21	20	5.3	—	18	—	97	25	6.1	—
12	5.19	—	30	5.3	55	20	5.2	—	25	5.5	—	20	6.3	—	31	6.0	—
19	5.20	—	Sept. 7	5.3	41	25	5.4	19	26	—	36	25	6.4	107	—	—	—
26	5.14	—	13	5.4	57	30	5.5	—	31	5.5	—	31	6.2	—	1960 Jan. 4	—	19
June 2	5.09	—	20	5.5	59	July 2	—	23	Sept. 3	—	30	Nov. 1	—	115	5	5.8	—
9	5.37	—	27	5.4	58	5	5.4	—	5	5.4	—	8	—	113	10	5.8	—
16	5.32	—	Oct. 4	5.3	58	9	—	21	10	5.4	—	10	6.2	—	11	—	19
23	5.35	—	11	5.3	70	10	5.4	—	15	5.4	—	18	6.3	109	18	5.7	22
30	5.35	—	18	5.2	61	15	5.6	—	16	—	39	15	6.2	—	20	—	—
July 7	5.22	—	25	5.2	70	16	—	17	20	5.5	—	20	6.2	—	25	5.7	47
14	5.29	—	Nov. 8	5.3	67	20	5.4	—	23	—	49	25	6.1	—	31	5.8	—
21	5.39	—	15	5.4	88	22	—	23	25	5.5	—	29	—	87	Feb. 2	—	85
28	5.40	—	22	5.5	20	25	5.5	—	30	5.5	18	30	6.3	—	5	5.6	—
Aug. 4	5.02	—	29	5.4	24	31	5.5	—	Oct. 5	5.6	—	Dec. 5	6.2	—	9	—	97
11	5.32	—	Dec. 6	5.3	20	Aug. 5	5.6	—	7	—	24	6	6.3	90	15	5.5	—
18	5.31	—	13	5.2	18	10	5.5	—	10	5.4	—	10	6.3	—	19	5.6	—
25	5.44	—	20	5.3	20	13	—	25	13	—	39	13	—	95	16	—	78
Sept. 1	5.81	—	27	5.2	22	15	5.3	—	15	5.4	—	15	6.2	—	20	5.7	—
8	5.97	—	1955 Jan. 4	5.4	19	20	5.4	24	20	5.8	—	20	6.3	118	23	—	87
15	5.94	—	10	5.4	18	25	5.5	—	25	—	46	25	6.3	—	25	5.6	—
22	6.04	—	17	5.4	18	27	—	25	28	5.6	—	27	—	25	29	5.7	—
29	5.68	—	24	5.3	33	31	5.5	—	31	5.3	—	31	6.5	—	Mar. 1	—	93
Oct. 6	5.69	—	31	5.5	27	Sept. 4	—	23	Nov. 4	—	52	1959 Jan. 3	—	16	8	—	91
13	5.37	—	Feb. 7	5.6	41	5	5.6	—	5	5.4	—	10	6.5	17	10	5.6	—
20	5.42	—	14	5.5	38	10	5.5	23	10	5.6	—	15	6.1	—	15	5.7	98
27	5.24	—	21	5.8	39	15	5.5	24	15	—	12	20	6.1	—	22	—	93
Nov. 3	5.42	—	25	5.7	44	17	—	24	18	—	12	20	6.1	—	25	5.8	—
10	5.30	—	Mar. 7	5.7	31	20	5.4	—	20	5.6	—	24	—	39	29	5.8	70
17	5.46	—	14	5.6	32	24	—	31	25	5.5	24	25	6.1	—	31	5.8	—
24	5.49	—	21	5.7	42	25	5.5	—	30	5.6	—	31	6.1	44	Apr. 4	—	78
Dec. 1	5.51	—	28	5.6	35	Oct. 1	—	43	Dec. 2	—	12	Feb. 5	6.1	—	5	5.8	—
8	5.40	—	Apr. 4	5.7	31	5	5.6	—	9	5.5	—	10	6.1	—	11	—	25
15	5.40	—	11	5.7	32	8	—	25	10	5.4	—	14	—	66	15	6.0	—
22	5.38	—	18	5.7	38	10	5.6	—	15	5.6	—	15	6.3	—	18	—	53
29	5.37	—	25	5.8	31	15	5.6	28	16	—	18	20	5.9	—	20	5.7	—
1953 Jan. 5	5.7	27	May 2	5.7	31	20	5.6	—	20	5.6	—	21	—	42	25	5.8	65
12	5.7	30	9	5.7	31	22	—	24	23	—	15	25	6.2	—	30	5.9	—
19	5.5	31	16	5.7	37	25	5.6	—	25	5.6	—	28	6.2	36	May 2	—	73
26	5.7	31	23	5.6	43	29	—	25	31	5.8	21	Mar. 5	6.2	—	5	5.7	—
Feb. 2	5.5	35	30	5.7	43	31	5.7	—	4	—	15	7	—	41	10	6.0	73
9	5.8	21	June 6	5.5	43	Nov. 5	5.7	47	5	5.7	—	10	6.1	—	15	—	64
16	5.8	18	13	5.5	41	10	5.6	—	11	—	12	14	—	44	17	—	—
23	5.5	18	20	5.5	42	15	5.6	—	15	5.7	—	15	6.3	—	20	6.1	—
Mar. 2	5.5	22	27	5.3	73	19	—	39	18	—	27	20	5.9	—	24	—	64
9	5.4	21	July 5	5.5	37	25	5.6	—	20	5.7	—	21	—	42	26	6.0	—
16	5.3	18	11	5.4	51	28	—	—	25	5.8	—	25	6.2	—	31	6.1	80
23	5.4	22	18	5.6	46	30	5.8	—	28	—	30	31	6.2	—	June 5	6.3	—
30	5.4	39	25	5.6	47	Dec. 3	—	21	31	5.6	—	Apr. 5	6.3	36	10	6.0	—
Apr. 8	5.3	33	Aug. 1	5.7	46	5	5.7	—	Feb. 1	—	18	10	6.1	—	14	—	72
13	5.4	41	8	5.7	49	10	5.7	18	5	6.0	—	12	—	33	15	6.1	—
20	5.3	39	15	5.7	52	15	5.7	—	8	—	18	15	6.1	—	20	6.3	—
27	5.3	38	22	5.7	48	17	—	21	10	5.9	—	15	6.1	—	21	—	75
May 4	5.5	37	29	5.7	58	20	5.7	—	15	6.0	15	20	6.3	—	25	6.2	—
11	5.4	33	Sept. 8	5.7	32	25	5.8	—	20	6.0	—	25	6.3	—	28	—	72
18	5.2	44	12	5.6	32	31	5.8	23	22	—	18	30	6.3	—	30	6.0	—
25	5.2	49	19	5.7	43	1957 Jan. 5	5.7	—	25	5.8	—	May 2	—	19	5	6.2	—
June 1	5.2	49	26	5.5	42	10	5.6	—	28	6.1	—	5	6.3	—	10	6.1	—
8	5.0	47	Oct. 3	5.6	37	15	5.9	—	Mar. 1	—	15	10	6.2	—	12	—	58
15	5.1	49	10	5.5	35	20	5.8	—	5	6.2	—	10	6.2	—	15	5.9	—
22	5.2	46	17	5.6	53	25	5.6	—	8	—	18	15	6.1	—	19	—	28
July 6	5.3	37	24	5.6	20	28	—	44	10	6.2	—	16	—	28	20	6.1	—
13	5.2	49	31	5.7	18	31	5.3	—	15	6.1	15	20	6.2	—	25	6.2	—
20	5.4	47	Nov. 7	5.7	24	Feb. 3	—	42	20	6.0	—	23	—	46	26	—	18
27	5.3	52	14	5.7	20	5	5.4	—	22	—	18	25	6.1	—	31	6.2	—
Aug. 3	5.4	46	21	5.6	19	10	5.5	—	25	6.0	—	30	—	52	Aug. 2	—	33
10	5.3	49	29	5.7	18	11	—	48	31	5.9	—	31	6.2	—	5	5.9	58
17	5.4	45	Dec. 5	5.5	19	15	5.6	—	Apr. 5	5.9	15	6	—	74	10	6.0	—
24	5.4	47	12	5.4	10	18	—	46	10	6.0	15	10	6.0	—	15	6.0	—
31	5.4	47	19	5.5	15	20	5.7	46	12	—	15	15	6.3	97	18	—	68
Sept. 8	5.4	26	27	5.5	12	25	5.7	19	15	5.7	—	20	6.1	79	20	6.0	—
14	5.3	52	1958 Jan. 3	—	—	28	5.4	—	19	—	12	25	6.1	—	23	—	72
21	5.3	21	Mar. 4	—	50	31	5.3	—	20	5.9	—	27	—	61	25	6.1	—
28	5.4	25	5	5.4	—	10	5.4	—	25	5.9	—	30	6.0	—	30	—	61
Oct. 5	5.4	49	10	5.3	—	11	—	57	28	—	18	31	6.1	—	31	6.1	—
12	5.4	49	15	5.6	—	15	5.4	—	30	6.0	—	July 4	—	63	Sept. 5	6.3	—
19	5.4	44	16	—	34	18	—	52	May 3	—	12	5	6.1	—	6	—	53
26	5.4	49	20	5.2	—	20	5.4	—	5	6.0	—	11	—	80	10	6.3	—
Nov. 2	5.3	45	23	—	46	25	5.4	58	1								

DATE	WATER LEVEL (ft.)	CHLORIDES (ppm)	DATE	WATER LEVEL (ft.)	CHLORIDES (ppm)	DATE	WATER LEVEL (ft.)	CHLORIDES (ppm)	DATE	WATER LEVEL (ft.)	CHLORIDES (ppm)	DATE	WATER LEVEL (ft.)	CHLORIDES (ppm)	DATE	WATER LEVEL (ft.)	CHLORIDES (ppm)
1961 Jan. 4	6.0	24	1963 June 4	4.8	119	1965 Jan. 3	5.7	—	1966 Sept. 4	5.2	—	1937 Dec. 3	15.89	—	1940 Apr. 5	—	—
11 5.8	52	10 4.9	124	5 5.7	32	7 10	15.02	—	7 10	15.02	—	12 12	15.89	—	12 12	15.89	—
17 5.3	70	18 4.8	138	10 5.7	97	11 5.1	264	—	11 5.1	264	—	17 15.89	—	—	19 15.89	—	—
24 6.0	50	25 4.9	145	12 —	—	13 —	286	—	13 —	286	—	24 15.89	—	—	26 15.89	—	—
31 5.9	72	July 2	4.6	141	17 5.7	—	25 5.1	288	20 27	—	288	—	31 15.89	—	May 3	—	—
Feb. 7	5.6	9 4.7	133	19 —	126	20 —	—	—	20 —	—	—	1938 Jan. 7	15.94	—	10 15.94	—	—
14 5.6	69	16 4.8	156	24 5.5	97	25 5.1	—	—	25 5.1	—	—	14 15.74	—	—	17 15.74	—	—
21 5.7	40	23 5.0	61	31 5.5	—	Oct. 2	5.1	—	27 —	288	—	21 14.29	—	—	24 14.29	—	—
28 5.8	65	29 5.1	130	Feb. 2	—	9 5.1	—	—	27 —	288	—	28 16.61	—	—	31 16.61	—	—
Mar. 7	5.7	Aug. 6	5.1	135	Feb. 2	—	12 —	308	Oct. 2	5.1	—	Feb. 4	18.28	—	June 7	18.28	—
14 5.7	81	13 5.1	152	9 —	133	7 5.5	—	—	12 —	308	—	11 17.51	—	—	14 17.51	—	—
21 5.8	97	20 5.2	154	14 5.5	—	9 —	133	—	16 5.1	—	—	18 17.97	—	—	21 17.97	—	—
28 5.6	86	27 5.1	145	21 5.4	—	14 5.5	—	—	25 5.1	218	—	25 17.71	—	—	28 17.71	—	—
Apr. 4	6.0	Sept. 4	5.2	160	23 —	126	16 16	—	25 —	291	—	Mar. 4	17.29	—	July 5	17.29	—
11 5.8	88	12 5.0	173	28 5.4	—	158	23 23	—	30 5.1	—	—	11 16.90	—	—	12 16.90	—	—
18 5.5	95	17 5.1	159	Mar. 2	—	143	6 5.1	310	Nov. 1	—	308	18 19.06	—	—	19 19.06	—	—
25 5.5	92	24 5.0	155	6 5.1	—	143	8 —	310	25 19.03	—	—	25 19.03	—	—	26 19.03	—	—
May 2	5.6	Oct. 1	5.0	150	Mar. 2	—	13 5.1	259	Nov. 1	—	308	Apr. 1	16.26	—	Aug. 2	16.26	—
9 5.8	102	8 4.9	148	14 5.6	—	133	13 5.1	259	8 —	310	—	2 16.42	—	—	9 16.42	—	—
16 5.8	101	15 5.0	153	16 —	143	14 5.6	15	21.58	5 13	—	—	11 22.71	—	—	16 22.71	—	—
23 5.7	103	22 5.0	144	21 5.6	—	153	20 5.1	320	15 21.58	—	—	23 23.13	—	—	23 23.13	—	—
30 5.8	96	28 5.3	91	23 —	153	30 —	22 4.8	322	22 20.26	—	—	30 24.14	—	—	30 24.14	—	—
June 6	5.9	Nov. 5	5.2	47	23 23	158	29 —	322	29 19.83	—	—	Sept. 6	15.15	—	Sept. 6	15.15	—
13 5.8	95	11 5.3	24	18 5.4	19	38 —	Dec. 4	5.2	29 —	322	—	May 6	16.38	—	20 16.38	—	—
20 5.7	103	25 5.3	23	25 5.3	23	6 —	12 —	56	Dec. 4	5.2	—	19 16.18	—	—	20 16.18	—	—
27 5.7	101	Dec. 2	5.3	21	11 5.5	128	19 —	36	27 —	32	—	27 17.88	—	—	27 17.88	—	—
July 5	5.8	18 6.0	86	16 9.2	19	13 —	17 17.50	—	19 —	36	—	June 3	17.95	—	Oct. 4	17.95	—
11 5.7	82	23 5.2	—	30 5.2	—	25 5.4	24 17.21	—	27 —	32	—	10 17.74	—	—	16 17.74	—	—
18 6.0	86	Aug. 1	5.6	102	8 5.7	121	7 17.03	—	27 —	32	—	17 17.50	—	—	25 17.50	—	—
25 5.7	93	15 5.7	105	12 5.0	103	14 —	8 16.71	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
Aug. 1	5.6	22 5.7	107	19 5.0	104	21 —	8 16.71	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
8 5.7	121	29 5.7	109	26 5.1	114	28 —	12 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
15 5.7	105	Sept. 5	6.0	97	Feb. 2	5.2	12 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
22 5.7	107	12 5.7	110	28 —	114	2 —	12 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
29 5.7	109	19 5.7	112	28 —	114	2 —	12 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
28 5.8	97	26 5.8	97	28 —	114	2 —	12 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
Oct. 3	5.8	Oct. 3	5.8	115	Feb. 2	5.2	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
17 5.0	22	17 5.0	22	23 5.9	21	11 —	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
23 5.9	21	17 5.0	22	30 5.9	18	16 4.9	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
Nov. 6	5.7	16 16	23 4.9	93	11 —	121	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
13 5.8	16	23 4.9	93	30 5.9	18	16 4.9	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
18 5.6	18	25 —	107	Nov. 6	5.7	16 16	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
27 5.6	15	27 5.6	15	Mar. 1	4.9	—	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
Dec. 4	5.7	17 10	139	3 —	90	10 —	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
11 5.5	16	15 5.0	131	10 —	139	15 —	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
18 5.4	—	22 5.1	—	18 —	139	15 —	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
25 5.5	—	24 5.1	—	20 —	175	25 5.6	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
1962 Jan. 2	5.6	17 10	139	27 —	158	27 —	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
9 5.6	59	22 5.1	—	27 —	158	27 —	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
16 5.6	64	24 —	141	27 —	158	27 —	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
23 5.5	81	29 5.1	—	27 —	158	27 —	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
30 5.8	92	31 —	131	27 —	158	27 —	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
Feb. 6	5.3	98 12	5.1	—	145	8 5.6	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
13 5.4	95	14 —	145	—	145	11 —	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
20 5.5	112	19 5.2	—	—	145	11 —	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
27 5.2	107	21 —	145	—	145	11 —	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
Mar. 6	5.3	88 28	5.1	—	150	18 —	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
13 5.3	85	28 5.1	—	—	150	18 —	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
20 5.1	102	28 —	150	—	150	18 —	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
27 5.3	97	May 3	5.0	—	141	20 —	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
Apr. 3	5.3	102 10	5.4	—	113	21 —	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
10 5.4	113	17 5.2	106	—	139	22 5.6	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
17 5.2	106	24 5.3	99	—	133	22 5.6	26 15.70	—	27 —	32	—	24 17.21	—	—	25 17.50	—	—
24 5.3	99	May 1	5.3	109	24 5.0	63	22 5.6	26 15.70	27 —	32	—	24 17.21	—	—	25 17.50	—	—
May 1	5.3	109 8	5.2	105	26 —	63	22 5.6	26 15.70	27 —	32	—	24 17.21	—	—	25 17.50	—	—
8 5.2	109	22 5.3	109	—	145	9 —	22 5.6	26 15.70	27 —	32	—	24 17.21	—	—	25 17.50	—	—
15 5.2	105	29 5.1	103	—	145	14 5.1	22 5.6	26 15.70	27 —	32	—	24 17.21	—	—	25 17.50	—	—
22 5.3	109	June 2	—	131	16 5.1	145	22 5.6	26 15.70	27 —	32	—	24 17.21	—	—	25 17.50	—	—
29 5.1	103	12 5.2	110	—	145	21 5.3	22 5.6	26 15.70	27 —	32	—	24 17.21	—	—	25 17.50	—	—
June 5	5.2	19 5.1	110	—	145	23 —	22 5.6	26 15.70	27 —	32	—	24 17.21	—	—	25 17.50	—	—
12 5.2	110	26 5.0	105	—	145	30 —	22 5.6	26 15.70	27 —	32	—	24 17.21	—	—	25 17.50	—	—
19 5.1	110	July 3	5.1	109	10 5.2	105	22 5.6	26 15.70	27 —	32	—	24 17.21	—	—	25 17.50	—	—
26 5.0	105	17 5.2	107	—	141	12 5.5	22 5.6	26 15.70	27 —	32	—	24 17.21	—	—	25 17.50	—	—
July 3	5.1	24 5.3	110	—	141	14 —	22 5.6	26 15.70	27 —	32	—	24 17.21	—	—	25 17.50	—	—
10 5.2	105	31 5.2	114	—	141	19 5.5	22 5.6	26 15.70	27 —	32	—	24 17.21	—	—	25 17.50	—	—
17 5.2	107	Aug. 7	5.2	124	14 5.2	125	22 5.6	26 15.70	27 —	32	—	24 17.21	—	—	25 17.50	—	—
24 5.3	110	21 5.2	132	—	150	21 —	22 5.6	26 15.70	27 —	32	—	24 17.21	—	—	25 17.50	—	—
31 5.2	114	28 5.1	132	—	145	24 5.4	22 5.6	26 15.7									

DATE	WATER LEVEL (ft.)	DATE	WATER LEVEL (ft.)	DATE	WATER LEVEL (ft.)	DATE	WATER LEVEL (ft.)	DATE	WATER LEVEL (ft.)	DATE	WATER LEVEL (ft.)
1956 Dec. 1	17.42	1958 Sept. 6	15.92	1960 Apr. 2	16.03	1961 Nov. 4	14.60	1963 July 6	15.19	1965 Mar. 6	14.14
8	16.86	13	16.03	9	15.85	11	14.53	13	15.15	13	14.14
15	16.90	20	15.98	16	15.59	19	14.15	20	14.98	20	14.14
29	16.61	27	15.65	23	15.78	25	14.99	27	14.94	27	13.13
1957 Jan. 5	16.36	Oct. 4	15.65	30	16.03	Dec. 2	15.00	Aug. 3	15.03	Apr. 3	13.13
12	16.19	11	15.55	May 7	16.03	9	15.61	10	15.19	10	14.14
19	16.11	18	15.87	14	16.36	16	16.38	24	14.69	17	14.14
26	13.86	25	15.98	21	16.52	23	16.40	31	14.82	24	14.14
Feb. 2	15.57	Nov. 1	15.82	28	16.16	30	16.40	Sept. 7	14.76	May 8	16.16
9	15.61	8	15.63	June 4	15.69	1962 Jan. 6	17.00	14	14.78	15	15.19
16	15.69	19	16.56	11	16.42	13	16.32	21	14.19	22	15.19
23	15.53	22	16.65	18	16.25	20	16.11	28	14.36	29	15.19
Mar. 2	15.53	29	16.48	25	15.98	27	16.03	Oct. 5	14.36	June 5	15.19
9	15.32	Dec. 6	15.57	July 2	15.52	Feb. 3	15.68	12	14.28	12	15.19
16	15.28	13	15.40	9	15.30	10	15.28	19	14.53	19	15.19
23	15.11	20	15.46	16	14.98	17	15.11	26	14.40	26	14.14
30	14.86	27	15.57	23	14.82	24	14.69	Nov. 2	14.36	July 3	14.14
Apr. 6	14.85	1959 Jan. 3	15.57	30	14.78	Mar. 3	14.50	9	14.28	10	14.14
13	14.69	10	15.34	Aug. 6	14.85	10	14.40	16	14.26	17	14.14
20	14.51	17	15.39	13	14.36	17	14.28	23	13.86	24	14.14
27	14.44	24	14.73	20	14.36	24	14.00	30	13.98	31	14.14
May 4	14.77	31	14.9	27	14.42	31	13.86	Dec. 21	13.22	Aug. 7	14.14
11	14.82	Feb. 7	14.48	Sept. 3	14.42	Apr. 7	13.94	31	13.36	14	14.0
18	15.02	14	14.4	10	14.08	14	13.82	1964 Jan. 11	13.19	21	13.28
25	14.86	21	14.48	17	14.29	21	13.61	18	13.23	28	13.28
June 1	15.15	28	14.53	24	14.52	28	13.44	25	13.32	Sept. 4	13.27
8	15.11	Mar. 7	14.54	Oct. 1	14.74	May 5	13.28	Feb. 1	12.36	11	13.27
15	14.94	14	14.98	8	14.93	12	13.19	8	12.10	18	13.27
22	14.79	21	15.03	15	14.77	26	13.32	15	13.19	25	13.28
29	14.61	28	14.98	22	14.76	June 2	13.28	22	13.44	Oct. 2	13.11
July 6	14.44	Apr. 26	14.58	29	14.79	9	13.28	29	14.53	9	13.28
13	14.27	May 2	14.41	Nov. 5	14.89	16	13.50	Mar. 7	15.11	16	13.28
20	14.36	9	14.53	12	14.77	23	13.44	14	16.53	23	13.23
27	14.11	16	14.61	19	14.82	30	13.44	21	15.86	30	13.23
Aug. 3	14.11	23	14.51	26	14.85	July 14	13.28	28	16.03	Nov. 6	14.37
10	14.28	30	14.44	Dec. 3	15.11	21	13.36	Apr. 4	16.11	20	14.01
17	14.69	June 6	14.48	10	15.44	28	13.40	11	16.03	Dec. 18	14.28
24	14.73	13	14.15	17	15.48	Aug. 11	13.28	18	16.07	Jan. 8	14.19
Sept. 7	17.56	20	14.36	24	15.38	18	13.32	25	15.86	15	14.71
14	17.36	27	14.06	31	15.11	25	12.86	May 2	15.78	22	14.60
21	17.39	July 4	13.34	1961 Jan. 7	14.94	Sept. 1	13.13	9	15.86	29	15.36
28	17.42	11	13.38	14	14.82	6	13.11	16	16.11	Feb. 5	15.17
Oct. 5	16.86	18	13.26	21	14.78	29	12.94	23	16.22	12	14.98
12	16.65	25	13.69	28	14.61	Oct. 6	12.69	30	17.94	19	14.60
19	16.11	Aug. 1	13.96	Feb. 4	14.36	13	12.69	June 6	17.86	26	14.61
26	16.07	8	13.84	11	14.19	20	12.69	13	18.03	Mar. 5	14.97
Nov. 2	15.94	15	13.77	18	14.78	27	12.57	20	17.80	12	14.29
9	15.69	22	13.69	25	15.03	Nov. 3	12.00	27	17.28	19	14.19
16	15.69	29	13.61	Mar. 25	15.23	24	12.28	July 11	16.90	26	14.15
23	15.69	Sept. 5	13.69	Apr. 8	15.11	Dec. 8	12.53	18	16.57	Apr. 2	14.63
30	15.44	12	13.60	15	14.94	15	12.36	25	16.19	9	13.69
Dec. 7	15.69	19	13.60	22	14.92	22	12.36	Aug. 1	15.86	16	13.53
14	16.44	26	13.94	29	14.94	29	12.36	8	15.69	23	13.36
21	16.44	Oct. 3	13.44	May 6	14.61	1963 Jan. 5	12.44	15	15.40	30	13.23
28	16.53	10	13.44	13	14.53	12	12.28	22	15.03	May 7	13.11
1958 Jan. 4	16.86	17	13.68	20	14.53	19	12.28	29	14.92	14	13.23
11	16.89	24	13.52	27	14.33	26	12.19	Sept. 5	14.78	21	12.28
18	16.57	31	16.36	June 3	14.36	Feb. 9	12.11	12	14.73	28	12.94
25	16.36	Nov. 7	17.94	10	14.13	16	12.03	19	14.53	June 4	12.46
Feb. 1	16.11	14	16.52	17	13.61	23	12.11	26	14.57	11	12.90
8	16.28	21	16.20	24	13.59	Mar. 2	12.17	Oct. 3	14.44	18	12.78
15	16.36	28	16.62	July 1	13.61	9	12.15	10	14.44	25	12.68
22	15.86	Dec. 5	15.48	15	14.11	16	12.03	17	14.19	July 2	12.61
Mar. 1	15.36	12	15.44	22	13.86	22	12.07	24	14.26	9	12.57
8	15.26	19	15.60	29	13.78	30	12.36	31	14.50	16	12.53
15	15.11	26	15.77	Aug. 12	13.65	Apr. 20	15.03	Nov. 7	15.13	23	12.62
22	14.86	31	15.90	19	13.69	27	14.65	21	17.44	30	13.28
29	14.78	1960 Jan. 9	15.58	26	13.69	May 4	15.36	Dec. 5	16.46	Aug. 6	13.26
Apr. 5	14.53	16	15.75	Sept. 2	13.69	11	15.19	12	16.32	13	13.36
12	14.36	23	16.85	9	13.61	18	15.15	19	16.28	20	13.53
19	14.11	30	17.73	16	13.56	25	15.61	26	15.69	27	13.40
26	13.94	Feb. 6	17.38	23	13.61	June 1	15.61	1965 Jan. 9	15.64	Sept. 3	13.36
May 3	13.81	13	17.94	30	13.53	8	15.61	18	15.36	10	13.23
10	13.78	20	17.86	Oct. 7	13.21	15	15.57	23	14.86	17	13.44
17	13.86	27	17.61	14	13.23	22	15.53	30	15.54	24	13.61
24	13.90	Mar. 5	17.6	21	13.15	29	15.53	Feb. 6	15.23	Oct. 1	13.52
31	14.13	12	17.36	28	15.11	15	15.11	20	14.57	8	13.57
June 14	14.40	19	16.78	26	16.36	27	14.44	22	14.44	15	13.62
21	14.23	26	16.36	July 12	14.25	19	14.36	22	14.44	22	14.44
28	14.34	19	14.36	26	14.32	Aug. 2	14.94	9	15.46	29	14.79
July 12	14.25	16	15.57	23	15.57	30	15.65	17	15.44	Nov. 5	15.44
19	14.36	24	15.36	Dec. 3	15.78	10	15.53	17	15.44	12	15.61
26	14.32	30	15.65	24	15.36	17	15.44	24	15.36	26	15.67

Tunnel Index

USGS No.	Tunnel	Owner	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Year Constr.	Length (ft.)	Estimated Yield (gpd)	Use	Remarks
1	Kaala	Kohala Sugar Co	81	N Kohala	20 12 45 155 48 40	1025	1934	30			
2	Union	"	"	"	20 12 50 155 48 30	900		180		Domestic	
3	Cowpen (West 1)	"	"	"	20 11 50 155 48 35	1700		700		Exploratory	Ex Hawi Mill
4	Cowpen (West 2)	"	"	"	20 11 40 155 48 35	1740		360		"	"
5	Cowpen (East & West 3)	"	"	"	20 11 45 155 48 30	1740		250		"	"
6	Watt No 1	"	"	"	20 11 35 155 48 25	1750		1230	1,250,000	Domestic	
7	Hapahapai	"	"	"	20 12 20 155 48 25	1350	1935	1076	500,000	Irrigation & domestic	Driven by F Koelling with geologic advice of W O Clark
8	Pahei	"	"	"	20 12 40 155 48 05	1000	1939	395	15,000	Abandoned	
9	Dr Bond	"	"	"	20 12 40 155 48 00	968		712		Irrigation	
10	Bond No 1 (Relief)	"	"	"	20 12 40 155 47 50	978	1937-1939	1038	1,265,000	Irrigation & domestic	
11	Iole, Bond Estate	"	"	"	20 13 10 155 47 45	650		30		Domestic	
12	Bond No 2 (K D Bond)	"	"	"	20 12 15 155 48 05	1450	1934	700	30,000	"	
13	Olding	"	"	"	20 11 50 155 48 00	1600		930	35,000	Abandoned	Ex domestic use; condemned 1950's
14	J D Bond	"	"	"	20 11 50 155 47 50	1500	1935	260			
15	Koelling	"	"	"	20 11 45 155 47 40	1600	1937	255	20,000	Domestic	
16	Watt No 2	"	"	"	20 11 35 155 47 45	1700	1936	1658	250,000	Abandoned	Ex domestic use & irrigation; condemned 1950's
17	Kay	"	"	"	20 11 35 155 47 20	1700		400	250,000	Irrigation & supply reservoir	
18	McGill 1	"	"	"	20 11 05 155 47 30	2000		100		Irrigation	
19	McGill 3	"	"	"	20 11 00 155 47 30	2040	1932	400		"	
20	McGill 2	"	"	"	20 10 55 155 47 35	2060	1932	170		"	
21	Lindsay	"	"	"	20 10 35 155 47 15	2150	1933	300	130,000	Irrigation & domestic	
22	Waipunalau	"	"	"	20 11 25 155 46 10	1600	1934	155	250,000	"	
23	Halawa	"	"	"	20 12 10 155 46 20	1000	1938	380	100,000	Domestic	
24	Paa	"	"	"	20 11 50 155 45 55	1200	1939	25			
25	Puu Mini	"	"	"	20 11 50 155 45 50	1200	1937	246	75,000	Domestic & irrigation	
26	Maulua	"	"	"	20 12 10 155 45 30	750	1939	150	70,000	Domestic	
27	Amiau	"	"	"	20 11 55 155 45 25	1000	1939	30	10,000		
28	Waikani	"	"	"	20 11 25 155 45 45	1500				"	

USGS No.	Tunnel	Owner	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Year Constr.	Length (ft.)	Estimated Yield (gpd)	Use	Remarks
29	Murphy	Kohala Sugar Co	81	N Kohala	20 11 30 155 45 25	1250		300	250,000	Domestic	
30	Opaepilau No. 1	"	"	"	20 11 20 155 44 55	1100	1934	100	30,000		
31	Opaepilau No. 2	"	"	"	20 11 10 155 44 55	1182	1934	132	40,000		
32	Pae	"	"	"	20 12 05 155 44 10	720	1937	25	10,000	Domestic	
33	E Honokane Nui (Upper)	"	"	"	20 08 40 155 43 45	1535	1932	289	200,000	Irrigation	
34	E Honokane Nui (Middle)	"	"	"	20 08 35 155 43 45	1229	1932	546	600,000	"	
35	E Honokane Nui (Lower)	"	"	"	20 08 30 155 43 50	950	1932	254	400,000	"	
36	E Honokane Nui	"	"	"	20 07 00 155 43 40	1900	1941	1200	4,250,000	"	
37	Lalakea Gulch (SE Branch)	"	"	Hamakua	20 05 00 155 36 00	2200		580	0		
38	Manienie Gulch (W side)	Hamakua Mill Co	"	"	20 03 00 155 22 45	700		100	1,500		
39	Paauiilo Stream	"	"	"	20 02 10 155 22 35	1060		50	50	Domestic	Goes dry in dry weather
40	Paauiilo Stream (E Bank)	"	"	"	20 02 45 155 22 15	700		25	100		
41	Kanui Gulch (E Bank)	"	"	"	20 01 55 155 22 35	1350		100	200	Domestic	
42	Paauiilo Gulch (E Bank)	"	"	"	20 01 40 155 22 50	1540		225	0	"	
42A	Paauiilo Gulch	"	"	"	"	1580		100	100		
43	Kawaiili Stream (E Branch)	"	"	"	20 01 35 155 21 30	1500		100	50		Goes dry in dry weather
44	Kainehe Stream (E Branch)	"	"	"	20 01 40 155 20 55	1200		190	50	Domestic	"
45	Puumaile Stream (NW Bank)	"	"	"	20 01 25 155 20 05	1075		35	100	"	
45A	Puumaile Stream (SW Bank)	"	"	"	"	"		30	50	"	
46	Puumaile Stream (NW Bank)	"	"	"	20 01 35 155 20 00	850		40	50		
47	Puumaile Stream (SE Bank)	"	"	"	20 01 45 155 20 00	800		30	300		
48	Kaula Gulch	Laupahoehoe Sugar Co	82	"	20 00 05 155 17 35	1200		15	0	Unused	Ex Kaiwiki Sugar Co
48A	Kaula Gulch (NW Bk 25' N 48)	"	"	"	"	"		30	0	"	"
48B	Kaula Gulch (NW Bk 50' N 48A)	"	"	"	"	"		80	0	"	"
49	Kaula Gulch (NW Bk on rd cut)	"	"	"	20 00 55 155 17 20	640		450	0	"	"
50	Small gulch 0.45 mi SE Kaula Gulch	"	"	N Hilo	19 59 20 155 17 35	1600		400	0	"	"
51	Br Kaawalii Gulch	"	"	"	19 58 40 155 17 40	2000		150	0	"	"
51A	Br Kaawalii Gulch (60' SE No 50)	"	"	"	"	2010		20	0	"	"
52	Kaawalii Gulch (NW Bank)	"	"	"	19 58 35 155 17 45	2000		90	0	"	"
53	Br Kapili Stream	"	"	"	19 57 50 155 16 10	2075		100	100	"	Goes dry in dry weather
54	Br Kawainui Stream	Mauna Kea Sugar Co	"	S Hilo	19 49 05 155 06 40	600		75	60,000	Domestic	
55	Br Kapue Stream	"	"	"	19 47 30 155 08 15	1275		100	50,000	"	

USGS No.	Tunnel	Owner	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Year Constr.	Length (ft.)	Estimated Yield (gpd)	Use	Remarks
56	Pahoehoe Stream (S Bk)	Mauna Kea Sugar Co	82	S Hilo	19 46 40 155 07 30	900		10	7,000	Domestic	
57	Small stream 0.15 mi N Hon- olii Stream	"	"	"	19 46 10 155 06 50	575		25	20,000	"	
58	2.9 mi N, 75 deg W of Kau- mana, hd Olaa Flume	Hawaiian Evangelical Assn	"	"	19 42 10 155 11 15	2000		2000	5,000,000	"	
59	2.65 mi S, 10 deg W Kaumana	Hawaii County BWS	"	"	19 39 10 155 09 10	1550	1890	300	100,000	Industrial & domestic	Ex Waiakea Mill Co
60	3 mi S, 12 deg W Kaumana	"	"	"	19 38 50 155 09 10	1560	1890	170	50,000	"	"
61	4.35 mi S, 33 deg W Kaumana	Puna Sugar Co	"	"	19 38 15 155 10 55	2100	1900	1027	200,000	"	
62	4.3 mi S, 32 deg W Kaumana	"	"	"	19 38 10 155 10 50	2050	"	4860	3,000,000	"	
63	4.5 mi S, 35 deg W Kaumana	"	"	"	19 38 10 155 11 05	2150	"	51	100	Industrial	Goes dry in dry weather
64	4.5 mi S, 35 deg W Kaumana	"	"	"	19 38 05 155 11 00	2150	"	82	100	"	"
65	Makakupu (13)*	Hawaiian Agricultural Co	83	Kau	19 17 30 155 29 50	3700	1929	5798	505,000	Ranch & domestic	
66	Unnamed	"	"	"	19 17 25 155 29 45	3600				Abandoned	
67	Mauka of Ranch (18)	"	"	"	19 17 25 155 30.15	4300		98	0	"	
68	Weda 2 (9)	"	"	"	19 17 20 155 30 05	3750		198		"	
69	Weda 1 (8)	"	"	"	19 17 00 155 30 05	3700		344		"	
70	Weda (7)	"	"	"	19 16 50 155 30 00	3600		1627	149,000	"	Ex domestic use
71	Weda 3 (10)	"	"	"	19 16 40 155 29 55	3400		599	90,000	"	"
72	Heio (5)	"	"	"	19 16 45 155 30 00	3600		1799	214,000	"	"
73	Fault (6)	"	"	"	19 16 40 155 30 05	3500		138	0	"	
74	Noguchi Mauka (4)	"	"	"	19 16 40 155 30 10	3600	1922	1128	86,000	Industrial & domestic	
75	Noguchi 2 (19)	"	"	"	19 16 30 155 30 05	3450	1930	2480	236,000	"	
76	Noguchi 1	"	"	"	19 16 25 155 30 00	3400			689,000	Abandoned	Ex industrial & domestic use
77	Unnamed	"	"	"	19 16 30 155 30 55	4150				"	
78	"	"	"	"	19 16 25 155 30 40	3900				"	
79	Double Arch (11)	"	"	"	19 16 05 155 30 25	3700		1479	595,000	"	
80	Mudflow (Clark) (2)	"	"	"	19 16 10 155 30 00	3500		2611	444,000	"	Ex fluming cane use
81	Mudflow 3 (3)	"	"	"	19 15 55 155 30 05	3500		333		"	
82	Unnamed	"	"	"	19 15 50 155 30 10	3400				"	
83	"	"	"	"	19 15 20 155 30 15	3250				"	
84	Ipuu Ridge (14)	"	"	"	19 15 55 155 29 30	2600		435		"	
85	Alili (15)	Hawaii County BWS	"	"	19 13 50 155 31 10	2900	1930	3839	713,000	Domestic	Ex Hawaiian Agricultural Co till 1962

*(13) Refers to owner's number

USGS No.	Tunnel	Owner	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Year Constr.	Length (ft.)	Estimated Yield (gpd)	Use	Remarks
86	Shirakura (20)	Hawaiian Agricultural Co	83	Kau	19 13 50 155 33 10	3700	1929	1750	297,000	Abandoned	Ex fluming cane use
87	Moaula Gulch (17)	"	"	"	19 13 40 155 33 00	3500		1716	247,000	"	
88	Unnamed	"	"	"	19 13 10 155 33 10	3100				"	
89	Fukuda (12)	"	"	"	19 13 00 155 33 00	3000		1844	203,000	"	
90	Kaumaikiohu (1)	"	"	"	19 13 00 155 32 40	2900	1929	2093	210,000	"	Ex fluming cane use
91	Domestic Supply (16)	"	"	"	19 12 55 155 32 05	2750	1929	2574	345,000	Ranch & domestic	
92	Horita	"	"	"	19 17 20 155 30 10	4150		1500	29,000	Abandoned	Ex ranch and domestic use
93	Plantation Spring	Hutchinson Sugar Co	"	"	19 11 20 155 36 10	3650	1928	3097	199,000	Domestic	
94	Vischer	"	"	"	19 10 25 155 35 40	2150		1340 & 2 Br	0	Abandoned	
95	New Mountain House	"	"	"	19 09 40 155 37 00	3400	1925	7048	1,175,000	Domestic	
96	Old Mountain House	"	"	"	19 08 55 155 36 50	3070	1928	2306		Abandoned	
97	Kahilipali	"	"	"	19 05 25 155 36 45	2250	1922	948	279,000	Domestic	
98	Kobayashi Kapuna	"	"	"	19 05 00 155 36 25	1900				Abandoned	
99	Makanau 1	"	"	"	19 09 30 155 33 15	1750				Ranch & domestic	
100	Makanau 2	"	"	"	19 09 10 155 33 20	1500				"	
101	Haao	"	"	"	19 05 45 155 37 00	2300			25,000	Abandoned	
102	Tanaka	"	"	"	19 05 05 155 36 45	2100	1923	2996	1,000	"	Reported to go dry a month after rains cease
	Kukaiaiu	Hamakua Mill Co	81	Hamakua	20 01 07 155 20 44	1320		175	100,000	Domestic	

Selected Tunnel Discharge Records

DAILY DISCHARGE in Millions of Gallons

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
Tunnel Nos. 61 & 62—WAIKAEA STREAM (MIDDLE FLUME HOUSE)													
1930	—	—	—	—	—	—	—	5.49	4.06	4.21	1.81	3.89	
1931	0.842	1.49	1.41	0.425	0.431	0.20	3.02	5.78	7.42	7.43	8.24	3.14	3.32
1932	10.1	6.67	4.69	7.67	7.00	4.61	4.32	3.13	2.32	0.496	1.45	5.20	4.97
1933	9.03	5.70	6.20	4.20	7.17	3.86	1.95	1.53	1.74	1.27	0.602	0.112	3.62
1934	4.46	6.10	2.18	3.51	10.1	4.91	6.36	5.58	6.32	6.35	10.9	10.3	6.52
1935	14.2	6.91	10.1	14.7	4.22	3.77	6.39	5.78	6.94	3.93	4.78	7.67	7.46
1936	0.997	0.269	6.03	9.45	9.81	4.91	8.58	17.1	9.52	10.6	5.98	15.1	6.20
1937	24.9	21.6	15.7	7.88	13.3	5.31	10.3	17.9	3.80	6.38	11.1	6.37	12.0
1938	12.7	11.2	13.5	15.9	11.2	9.20	6.81	5.66	4.87	5.31	10.0	13.6	9.98
1939	16.8	15.1	18.3	12.0	6.10	5.82	11.0	5.22	5.82	5.83	6.70	4.25	9.55
1940	0.379	0.274	0.330	1.19	2.32	1.57	6.22	13.8	10.7	7.36	9.08	2.19	4.70
1941	1.14	0.082	2.25	4.79	8.59	6.97	9.19	8.69	18.5	20.4	8.05	11.7	8.42
1942	2.46	1.17	31.7	20.6	16.1	6.34	5.14	2.99	8.62	8.39	4.39	0.918	9.11
1943	8.39	7.02	6.48	9.84	7.91	11.2	—	—	—	—	—	—	—

Low flow entirely from Tunnel Nos. 61 & 62; high flow includes surface runoff.

DAILY DISCHARGE in Thousands of Gallons

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
Tunnel No. 65—MAKAKUPU													
1925	Max.	125	—	151	138	700	743	269	269	465	808	390	808
	Min.	73	60	63	111	122	278	216	223	193	629	409	164
	Ave.	97	75	97	113	352	433	235	229	310	713	653	259
	Total	3,000	2,100	3,000	3,400	10,900	13,000	7,300	7,100	9,300	22,100	19,600	7,900
1926	Max.	112	68	89	225	354	759	1,004	1,757	1,184	936	792	1,099
	Min.	79	49	58	69	223	238	505	526	831	490	451	340
	Ave.	100	54	71	143	303	460	661	913	1,003	648	687	555
	Total	3,100	1,500	2,200	4,300	9,400	13,800	20,500	28,300	30,100	20,600	20,300	17,400
1927	Max.	769	288	395	—	1,557	769	413	166	1,164	887	1,446	1,557
	Min.	272	240	240	451	451	469	180	79	140	864	592	550
	Ave.	548	257	332	857	848	640	268	116	610	1,071	920	1,168
	Total	17,000	7,200	10,300	25,700	25,700	19,200	3,800	3,600	24,300	33,300	24,800	36,200
1928	Max.	1,921	323	166	864	792	376	1,377	592	706	642	432	187
	Min.	323	127	106	102	413	305	323	206	456	389	229	102
	Ave.	1,023	207	135	403	655	320	655	281	623	484	350	152
	Total	31,700	6,000	4,200	12,100	20,300	8,600	20,600	8,700	18,700	15,000	10,500	4,700
1929	Max.	151	520	714	831	449	356	370	662	653	733	1,130	1,760
	Min.	112	151	575	700	302	281	196	347	513	481	857	942
	Ave.	139	306	642	713	387	320	268	503	597	568	1,013	1,094
	Total	4,300	8,600	19,900	21,400	12,800	8,600	8,300	15,600	17,900	17,600	30,400	33,600
1930	Max.	393	1,512	1,670	1,498	778	495	—	—	—	—	—	1,670
	Min.	209	372	389	729	554	246	—	—	—	—	—	309
	Ave.	292	995	1,159	1,104	644	343	—	—	—	—	—	756
	Total	9,100	30,800	34,800	34,300	19,300	10,600	—	—	—	—	—	138,900
1931	Max.	233	105	58	85	439	526	821	864	740	950	723	294
	Min.	107	58	43	43	87	302	238	576	432	723	302	138
	Ave.	145	79	50	53	168	426	370	757	550	828	207	347
	Total	4,500	2,200	1,500	1,600	5,200	12,800	11,500	23,500	16,500	25,600	15,800	6,400
1932	Max.	629	936	778	374	474	734	713	317	518	422	590	641
	Min.	130	634	389	216	245	487	327	181	166	245	216	392
	Ave.	285	793	622	276	320	631	518	245	323	347	372	533
	Total	8,600	25,000	19,200	8,300	9,900	18,900	16,000	7,900	10,700	11,100	16,500	159,700
1933	Max.	691	605	994	979	950	1,022	530	217	122	135	330	202
	Min.	360	504	806	576	562	537	223	124	72	141	154	72
	Ave.	520	553	814	827	814	791	372	159	86	99	180	451
	Total	16,100	15,200	25,200	24,800	25,200	23,700	11,500	4,900	2,600	2,900	6,000	5,600
1934	Max.	168	104	213	921	1,207	1,469	762	835	878	804	749	562
	Min.	130	144	153	214	708	789	599	518	576	490	562	353
	Ave.	148	176	186	455	844	1,140	657	668	714	622	628	452
	Total	4,600	4,900	5,800	13,900	26,100	34,200	20,300	20,600	21,400	19,200	18,800	14,000
1935	Max.	347	325	852	878	734	650	472	670	1,008	821	599	—
	Min.	295	281	472	734	598	460	302	395	662	609	487	—
	Ave.	328	302	783	802	680	644	425	481	791	765	546	—
	Total	10,100	8,500	24,200	24,000	21,000	19,300	13,100	14,900	23,700	25,600	16,300	—

Tunnel No. 70—WEDA

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1925	Max.	43	—	101	58	253	—	66	89	253	372	320	66
	Min.	—	22	24	40	101	35	—	66	68	320	79	32
	Ave.	29	25	61	53	148	100	65	81	130	345	180	45
	Total	900	700	1,900	1,600	4,600	3,000	2,000	2,500	3,900	10,700	5,400	1,400
1926	Max.	—	—	—	—	—	—	—	—	—	—	—	—
1927	Max.	180	69	127	510	180	288	69	69	530	395	225	657
	Min.	49	49	69	323	79	91	43	32	59	114	89	59
	Ave.	106	68	116	372	129	143	58	45	253	229	133	361
	Total	3,900	1,900	3,600	11,200	4,000	4,300	1,800	1,400	7,600	7,100	4,000	11,200
1928	Max.	288	49	59	413	240	165	592	209	266	357	180	59
	Min.	24	17	36	40	180	86	79	91	153	69	40	17
	Ave.	123	31	42	193	116	127	210	116	200	229	120	45
	Total	3,800	900	1,300	5,800	6,700	3,800	6,500	3,600	6,000	7,100	3,900	1,400
1929	Max.	102	340	432	635	240	166	102	340	272	323	1,089	340
	Min.	29	114	194	31	79	69	43	140	140	91	140	180
	Ave.	45	175	294	337	145	113	87	223	193	187	500	268
	Total	1,400	4,900	9,100	10,100	4,500	3,400	2,700	6,000	5,800	5,800	15,000	8,900
1930	Max.	—	—	—	—	—	—	—	—	—	—	—	—
	Min.	—	—	—	—	—	—	—	—	—	—	—	—
	Ave.	—	—	—	—	—	—	—	—	—	—	—	—
	Total	—	—	—	—	—	—	—	—	—	—	—	—
1931	Max.	32	17	17	59	59	376	209	288	127	490	153	40
	Min.	24	17	11	32	127	46	59	127	49	114	69	24
	Ave.	30	17	14	39	101	143	105	158	91	253	101	40
	Total	900	500	400	1,200	3,100	4,300	3,300	4,900	2,700	7,800	3,000	1,200
1932	Max.	180	288	240	114	194	166	91	69	166	140	240	288
	Min.	32	166	69	49	79	127	59	49	79	69	69	32
	Ave.	94	210	134	65	138	150	79	59	135	106	147	122
	Total	2,900	6,100	4,200	1,900	4,300	4,500	2,500	1,800	4,100	3,400	4,400	44,700

DAILY DISCHARGE in Thousands of Gallons

		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1933	Max.	225	180	340	240	256	490	79	40	32	69	79	79	490
	Min.	69	140	114	102	114	91	40	32	24	24	59	49	117
	Ave.	135	145	167	210	199	233	56	36	26	35	69	68	114
	Total	4,200	4,100	5,800	6,300	6,200	7,000	1,700	1,100	800	1,100	2,100	2,100	42,300
1934	Max.	65	69	122	256	305	469	357	323	256	153	194	127	469
	Min.	49	59	69	127	140	153	140	140	100	79	102	79	49
	Ave.	59	65	91	187	265	292	232	215	212	121	138	95	163
	Total	1,800	1,800	2,800	5,000	8,200	8,600	7,200	6,700	6,400	3,700	4,100	2,900	59,400
1935	Max.	127	102	323	240	209	357	144	153	272	305	194	—	357
	Min.	59	69	170	166	140	144	89	114	140	127	127	—	59
	Ave.	86	85	248	210	190	225	127	128	177	207	153	—	167
	Total	2,850	2,400	7,700	6,300	5,800	6,700	3,900	4,400	5,300	6,400	4,800	—	56,000

DAILY DISCHARGE in Thousands of Gallons													
	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1926 Max.	72	58	43	130	194	317	360	578	490	360	374	475	576
Min.	65	—	40	50	130	158	259	245	389	245	187	40	—
Ave.	71	50	42	97	171	230	310	390	447	310	327	319	231
Total	2,200	1,400	1,300	2,900	5,700	6,900	9,600	12,100	13,400	9,600	9,800	9,900	84,400
1927 Max.	389	—	202	490	461	360	202	122	749	475	—	446	749
Min.	187	158	144	317	245	245	144	72	79	432	331	382	72
Ave.	268	181	174	367	345	313	171	87	530	448	350	416	303
Total	8,300	4,500	5,400	11,000	10,700	9,400	5,800	2,700	15,900	13,900	10,500	12,900	110,500

Note: Beginning 1928 discharge records combined with Tunnel No. 76.

Tunnel No. 76 — NOGUCHI NO. 1

1925 Max.	454	374	345	432	706	792	598	605	698	1,123	1,224	691	1,224
Min.	403	324	302	396	432	612	576	576	893	792	594	302	—
Ave.	419	364	306	403	618	653	442	448	607	916	940	587	556
Total	13,000	10,200	9,500	12,100	19,100	19,600	13,700	13,900	18,200	28,400	28,200	18,200	204,100
1926 Max.	468	374	—	476	612	821	1,051	1,512	1,224	1,022	979	1,195	1,512
Min.	418	360	338	346	504	554	749	1,109	734	763	619	338	—
Ave.	426	369	355	417	555	620	842	1,039	1,200	887	910	606	705
Total	13,200	10,300	11,000	12,500	17,200	18,600	26,100	32,200	36,000	27,500	27,300	25,000	257,300
1927 Max.	1,138	576	648	1,253	1,440	1,037	677	526	1,195	1,286	893	1,994	1,994
Min.	634	507	533	792	778	706	554	454	884	1,008	734	677	454
Ave.	819	575	580	947	1,018	857	613	481	907	1,161	850	1,129	830
Total	25,400	15,100	18,200	28,400	31,500	25,700	19,000	14,900	27,200	36,000	25,500	35,000	303,000

Note: Beginning 1928 discharge record combined with Tunnel No. 75

Tunnel Nos. 75 & 76 — NOGUCHI NO. 2 & NO. 1

1928	Max.	2,609	854	664	964	1,397	1,152	1,858	1,210	1,476	1,404	1,397	871	2,609	
	Min.	973	613	592	962	1,122	979	929	857	1,159	1,210	1,051	605	562	
	Ave.	1,613	710	636	783	1,348	1,063	1,384	935	1,287	1,303	1,237	758	1,090	
	Total	50,000	20,600	19,700	23,500	41,800	31,900	42,900	29,000	38,600	40,400	37,100	23,500	399,000	
1929	Max.	934	1,354	2,023	2,131	1,368	1,152	1,008	1,728	1,613	1,642	2,765	2,592	2,765	
	Min.	504	605	1,310	1,224	886	828	768	1,066	1,267	1,287	1,613	1,584	504	
	Ave.	555	868	1,619	1,740	1,210	1,020	842	1,348	1,407	1,413	1,937	1,990	1,334	
	Total	17,200	24,300	30,200	32,200	37,500	30,600	26,100	42,900	42,300	43,800	58,100	61,700	486,800	
1930	Max.	—	—	—	—	—	—	1,094	3,024	2,880	2,822	1,613	1,195	3,024	
	Min.	—	—	—	—	—	—	950	1,194	1,131	1,540	1,195	677	677	
	Ave.	—	—	—	—	—	—	1,035	2,163	2,207	2,344	1,411	876	1,689	
	Total	—	—	—	—	—	—	32,000	67,200	69,300	72,700	42,300	27,200	310,700	
1931	Max.	677	468	360	488	897	1,397	1,728	1,788	1,506	2,160	1,391	818	2,160	
	Min.	488	360	288	288	488	864	864	931	1,143	950	1,397	835	521	
	Ave.	553	409	308	337	599	1,092	939	1,532	1,136	1,796	1,145	654	875	
	Total	17,100	11,400	9,600	10,100	18,000	32,900	29,400	47,600	34,100	55,800	34,300	20,200	320,700	
1932	Max.	1,522	2,131	1,872	927	1,286	1,242	1,469	835	1,181	1,166	1,282	1,411	2,131	
	Min.	461	1,584	948	634	733	1,325	819	691	720	749	706	924	461	
	Ave.	727	1,856	1,431	747	955	1,544	1,135	734	958	971	926	1,233	1,106	
	Total	22,500	53,900	44,400	22,400	29,800	46,400	35,200	22,700	28,700	30,000	29,800	38,300	403,200	
1933	Max.	1,368	1,368	1,944	1,944	2,074	2,160	1,152	609	403	475	648	619	2,160	
	Min.	864	1,120	1,221	1,152	1,354	1,181	619	389	374	389	490	576	374	
	Ave.	1,162	1,227	1,577	1,506	1,731	1,892	835	481	395	413	509	593	1,018	
	Total	36,100	34,400	48,900	45,600	53,800	50,800	25,800	14,900	11,800	12,800	18,400	37,400	371,400	
1934	Max.	655	763	1,030	1,526	2,527	3,024	1,621	1,608	1,843	1,734	1,584	1,077	3,024	
	Min.	490	626	605	979	1,287	1,716	1,267	1,066	1,555	1,927	825	490	—	
	Ave.	569	696	786	1,077	1,751	2,480	1,381	1,305	1,659	1,395	1,284	566	1,278	
	Total	17,600	19,400	24,300	32,300	54,300	74,600	42,900	40,500	49,300	38,600	28,600	467,200		
1935	Max.	864	841	1,920	2,045	1,539	1,512	1,109	1,757	1,987	1,958	1,492	—	2,045	
	Min.	720	763	901	1,555	1,325	1,129	864	1,041	1,411	1,411	1,210	—	720	
	Ave.	791	792	1,652	1,768	1,423	1,305	1,035	1,352	1,721	1,669	1,328	—	1,348	
	Total	24,400	22,100	51,300	53,100	44,300	39,200	32,200	42,000	51,700	51,800	39,800	—	451,800	
1936	Max.	—	—	—	—	—	—	—	—	—	—	—	—	—	
1937	Max.	1,570	2,477	1,950	1,958	2,304	1,318	—	—	—	—	—	—	2,477	
	Min.	432	1,584	1,528	1,195	1,325	919	—	—	—	—	—	—	432	
	Ave.	766	2,104	1,788	1,521	1,860	1,126	—	—	—	—	—	—	766	
	Total	23,700	59,100	55,500	45,700	57,700	33,800	—	—	—	—	—	—	275,500	
1938 to 1941	Max.	—	—	—	—	—	—	—	—	—	—	—	—	—	
1942	Max.	—	—	311	314	962	1,210	1,152	968	1,094	2,592	2,030	1,431	995	2,592
	Min.	—	—	230	230	317	605	985	691	705	619	1,382	1,002	835	230
	Ave.	—	—	255	255	582	913	1,066	780	901	1,512	1,535	1,228	891	902
	Total	—	—	7,200	7,900	17,400	28,200	32,000	24,200	27,800	45,500	47,700	36,900	27,600	302,400

Note: Combined discharge.

Tunnel No. 75 — NOGUCHI NO. 2

1957 Ave.	—	—	2,198	1,557	2,447	1,720	1,942	2,463	2,539	2,617	2,537	2,152	2,217
Total	—	—	66,130	46,720	75,860	51,590	60,190	76,340	76,160	81,140	76,100	66,710	678,940
1958 Ave.	1,312	954	2,119	1,569	2,000	972	1,319	1,865	1,785	2,341	2,006	1,496	1,645
Total	40,660	26,700	65,700	47,060	62,010	29,170	40,900	57,800	55,550	72,580	61,900	46,380	602,700
1959 Ave.	2,123	1,893	1,496	1,829	2,031	1,587	1,141	1,953	1,127	1,969	2,328	1,155	1,177
Total	65,800	52,990	46,400	54,860	62,960	46,700	35,370	60,530	39,800	61,040	69,790	35,810	628,070
1960 Ave.	1,255	847	1,450	1,990	1,874	1,523	2,018	2,020	2,530	2,392	1,818	992	1,725
Total	38,910	24,570	44,950	59,710	66,950	45,700	62,510	62,620	75,900	74,180	54,490	30,740	629,340
1961 Ave.	741	969	1,204	1,932	1,771	1,666	1,370	1,352	1,950	1,910	1,916	2,008	1,566
Total	22,970	27,120	37,320	57,970	54,900	49,970	42,470	41,920	56,500	59,200	57,490	62,340	572,070
1962 Ave.	1,360	1,232	1,985	2,293	2,673	2,040	1,719	1,396	1,223	1,631	1,069	749	1,614
Total	42,160	34,490	61,520	68,780	82,850	61,200	53,300	43,280	36,700	50,570	32,080	23,210	990,140
1963 Ave.	1,042	913	2,311	2,372	2,445	2,357	1,594	2,312	2,014	1,633	1,582	1,155	1,811
Total	32,300	25,580	71,650	71,170	75,790	70,710	49,400	71,660	60,410	50,610	47,470	35,800	662,530
1964 Ave.	1,036	827	2,264	2,511	2,232	2,105	1,185	1,089	1,485	1,614	1,109	1,560	1,585
Total	32,110	23,970	70,170	75,330	66,950	63,160	36,730	33,760	44,540	50,020	33,280	48,360	578,380
1965 Ave.	1,727	1,753	1,535	1,475	1,548	2,210	1,554	1,940	1,748	2,216	2,182	1,712	1,808
Total	53,550	49,080	47,600	44,240	47,990	66,300	51,260	60,130	52,440	68,690	57,440	53,080	589,830
1966 Ave.	1,594	1,896	1,517	1,863	1,648	950	1,130	1,512	1,659	1,754	2,108	1,341	1,576
Total	48,470	52,240	47,030	55,890	51,080	28,490	35,030	46,860	49,780	54,270	63,230	41,580	573,930

Note: Discharge includes flow from two streams.

Tunnel No. 79 — DOUBLE ARCH

1925	Max.	56	—	526	193	1,263	428	427	324	2,131	2,304	1,642	151	2,304
	Min.	40	32	40	60	253	158	122	230	203	1,153	193	40	32
	Ave.	45	50	329	130	697	380	213	255	760	1,732	523	61	436
	Total	1,400	1,400	10,200	3,300	21,600	11,400	6,600	7,900	22,800	53,700	15,700	2,500	159,100
1926														
1927	Max.	323	305	524	1,814	605	1,296	259	216	3,168	3,168	864	3,024	3,168
	Min.	180	127	140	657	317	202	58	43	317	374	202	346	43
	Ave.	245	200	426	1,237	532	560	138	152	1,357	1,348	590	1,655	705
	Total	7,600	5,600	13,200	37,100	16,500	16,800	4,300	4,700	40,700	41,600	17,700	51,300	257,300
1928	Max.	576	432	—	2,304	1,354	576	3,168	406	1,152	2,592	1,123	115	3,168
	Min.	72	29	86	216	547	317	202	187	418	432	130	216	81
	Ave.	223	124	116	1,057	290	520	913	448	880	1,065	470	81	561
	Total	6,920	3,960	3,600	31,700	13,500	13,500	28,300	13,900	25,400	33,000	14,100	2,500	63,600

DAILY DISCHARGE in Thousands of Gallons														
	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.	
1934	Max.	237	272	592	1,083	1,901	2,310	1,274	1,247	1,247	1,115	1,414	662	2,310
	Min.	166	194	274	451	724	680	657	357	701	530	662	320	166
	Ave.	192	238	454	651	1,093	1,616	973	772	936	825	1,007	504	769
	Total	6,000	6,700	14,000	18,400	33,900	48,500	30,100	23,900	28,000	25,600	30,300	15,600	280,500
1935	Max.	469	449	1,564	1,705	816	1,414	550	1,302	1,797	1,921	704	—	1,921
	Min.	256	225	546	635	472	432	288	323	701	651	469	—	225
	Ave.	334	302	1,260	1,089	624	689	405	936	1,246	1,276	576	—	813
	Total	10,300	8,500	39,100	32,700	19,300	27,000	12,500	29,000	37,400	39,600	17,200	—	272,600
1936 to 1941	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1942	Max.	—	92	96	393	962	1,166	870	1,414	2,592	1,646	924	1,813	2,592
	Min.	—	59	40	96	340	769	346	563	490	657	469	413	40
	Ave.	—	68	66	258	662	930	544	1,170	1,509	1,171	714	802	716
	Total	—	1,900	2,000	7,800	29,500	27,200	16,800	36,500	45,300	36,300	21,400	24,800	240,500
1943	Max.	2,592	482	962	769	1,765	1,655	1,705	1,152	1,119	1,765	441	262	2,592
	Min.	514	197	180	400	490	530	544	300	635	480	265	153	180
	Ave.	1,433	317	678	622	1,342	952	1,250	871	887	1,045	346	209	821
	Total	44,400	8,900	8,900	18,600	41,800	28,500	38,800	27,000	26,600	32,400	10,400	6,500	301,500
1944	Max.	154	840	1,166	724	2,448	1,644	1,358	1,223	962	867	806	—	2,448
	Min.	111	91	634	382	305	965	530	340	361	413	504	—	91
	Ave.	135	174	971	666	1,153	1,395	928	599	677	828	841	—	135
	Total	4,200	5,100	30,100	17,000	35,700	41,800	28,600	18,600	20,300	19,400	19,200	—	239,900
Tunnel No. 86 — SHIRAKURA														
1929	Max.	—	—	—	—	395	256	323	680	572	550	613	550	680
	Min.	—	—	—	—	225	79	166	225	168	256	288	166	79
	Ave.	—	—	—	—	274	150	287	455	350	445	440	352	244
	Total	—	—	—	—	8,500	4,500	8,900	14,100	10,500	13,900	13,300	10,900	84,400
1930	Max.	—	—	—	—	—	—	—	510	962	832	510	288	63
	Min.	—	—	—	—	—	—	—	166	340	75	96	32	32
	Ave.	—	—	—	—	—	—	—	328	770	550	112	164	43
	Total	—	—	—	—	—	—	—	10,000	17,600	16,500	9,700	4,900	60,000
1931	Max.	69	209	96	395	370	451	769	746	816	694	124	71	816
	Min.	24	17	24	49	49	32	143	253	153	127	73	17	17
	Ave.	36	40	52	207	180	184	563	556	621	315	99	35	241
	Total	1,100	1,100	1,600	6,200	5,800	5,500	17,400	17,200	18,300	9,800	3,000	1,100	87,900
1932	Max.	816	792	240	288	799	840	451	194	490	225	657	724	840
	Min.	17	114	69	49	187	240	153	96	59	49	17	49	40
	Ave.	366	452	130	127	488	472	255	174	281	122	258	183	276
	Total	11,300	13,100	4,000	4,000	15,100	14,100	7,900	5,400	8,400	3,800	7,700	5,700	100,500
1933	Max.	769	619	762	657	613	572	59	323	194	194	127	26	792
	Min.	40	100	91	91	60	24	24	69	32	26	12	12	12
	Ave.	314	225	410	348	341	236	39	153	137	99	73	20	283
	Total	9,800	6,300	12,700	10,400	10,500	7,100	1,200	4,800	4,100	3,100	2,200	600	72,800
1934	Max.	240	206	469	701	693	724	613	510	432	482	330	194	724
	Min.	12	32	114	127	140	340	180	232	166	166	207	35	120
	Ave.	96	122	284	262	477	474	376	344	291	300	360	80	290
	Total	3,000	3,400	8,600	7,900	14,800	14,200	11,600	10,900	8,700	9,300	10,800	2,900	106,000
1935	Max.	395	305	657	701	406	469	469	724	816	769	240	—	816
	Min.	89	69	194	225	49	265	194	194	127	127	114	—	49
	Ave.	163	186	353	416	190	377	386	523	400	334	166	—	319
	Total	5,700	5,200	10,400	12,400	5,900	11,300	11,800	16,200	12,000	10,300	5,800	—	106,800
Tunnel No. 87 — MOAUULA GULCH														
1929	Max.	—	—	—	—	560	451	305	572	432	305	413	413	572
	Min.	—	—	—	—	180	127	140	209	194	256	256	209	127
	Ave.	—	—	—	—	300	268	217	332	316	253	310	327	295
	Total	—	—	—	—	6,000	8,300	6,500	10,300	9,800	7,600	9,800	10,300	78,200
1930	Max.	—	—	—	—	—	—	—	323	432	357	272	240	147
	Min.	—	—	—	—	—	—	—	166	203	256	143	140	78
	Ave.	—	—	—	—	—	—	—	249	298	324	223	183	102
	Total	—	—	—	—	—	—	—	7,700	9,300	9,700	6,000	5,500	42,300
1931	Max.	75	58	160	357	298	357	413	413	451	348	220	196	451
	Min.	59	40	49	180	127	127	153	213	213	220	156	79	40
	Ave.	69	49	76	226	222	213	344	323	336	282	181	111	204
	Total	2,100	1,400	2,400	8,600	6,900	6,400	10,600	10,300	10,100	8,800	5,400	3,400	74,600
1932	Max.	510	510	288	209	376	351	256	209	240	194	3,7	395	510
	Min.	79	140	127	127	209	216	168	157	140	114	114	140	79
	Ave.	281	334	180	174	288	266	207	196	196	150	233	213	226
	Total	8,700	9,700	5,600	5,200	8,800	8,000	6,400	6,100	5,900	4,700	7,000	6,700	82,900
1933	Max.	550	422	530	490	471	395	140	240	209	240	194	94	550
	Min.	150	140	134	127	153	141	102	91	163	140	97	79	79
	Ave.	287	223	304	262	287	377	243	122	167	161	153	69	210
	Total	8,900	6,300	9,400	8,500	8,900	7,000	3,300	5,500	5,600	5,000	4,600	2,800	76,900
1934	Max.	272	240	357	510	521	550	490	432	376	356	395	256	550
	Min.	69	127	194	184	180	209	240	272	256	209	240	127	69
	Ave.	151	192	274	246	379	363	327	325	314	255	302	174	275
	Total	4,700	5,400	8,500	7,400	11,700	10,900	10,100	10,100	9,400	7,900	9,100	5,400	100,600
1935	Max.	256	225	623	965	312	451	323	469	550	613	259	—	613
	Min.	127	114	209	225	180	288	256	256	194	261	194	—	114
	Ave.	171	190	262	305	233	354	311	379	359	357	235	—	207
	Total	5,300	5,300	8,100	9,200	7,200	10,600	9,700	11,700	10,800	10,700	7,100	—	95,700
Tunnel No. 89 — FUKUDA														
1925	Max.	49	—	269	207	288	320	138	238	547	806	320	68	808
	Min.	45	42	49	58	193	151	89	144	171	207	89	22	42
	Ave.	39	43	155	200	242	227	145	161	317	380	175	45	170
	Total	1,200	1,200	4,800	3,000	7,400	6,800	4,500	5,000	9,500	12,100	5,200	1,400	63,200
1926	Max.	—	—	—	—	—	—	—	—	—	—	—	—	—
1927	Max.	127	127	180	376	238	272	114	395	510	323	240	398	986
	Min.	69	79	79	194	127	166	49	49	272	168	102	102	49
	Ave.	110	107	138	277	187	216	117	158	373	246	177	590	821
	Total	6,400	3,900	4,200	8,300	5,800	6,600	2,400	9,900	11,200	7,600	5,300	18,300	20,700
1928	Max.	153	225	114	724	376	576	395	680	323	256	272	91	724
	Min.	59	91	49	91	240	127	225	127	194	127	102	59	49
	Ave.	165	145	71	320	294	357	323	355	267	194	163	71	227
	Total	5,100	4,200	2,200	9,600	9,100	10,700	10,000	11,100	8,000	6,000	4,900	2,200	83,000
1929	Max.	209	305	746	635	395	272	635	635	357	305	572	776	746
	Min.	69	272											

DAILY DISCHARGE in Thousands of Gallons														
		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
1928	Max.	256	140	127	194	225	256	272	209	209	—	180	153	256
	Min.	140	140	114	127	194	194	209	194	180	166	153	153	114
	Ave.	194	140	123	150	203	223	229	203	200	181	177	153	182
	Total	6,000	4,000	3,800	4,500	6,300	6,700	7,100	6,500	6,000	5,000	5,300	5,100	66,700
1929	Max.	—	—	—	—	—	—	166	166	166	166	180	180	180
	Min.	—	—	—	—	—	—	140	166	166	166	180	180	140
	Ave.	136	136	155	166	166	166	161	166	166	166	180	180	162
	Total	4,226	3,794	4,797	4,968	5,134	4,968	4,978	5,134	4,968	5,134	5,400	5,580	59,081
1930	Max.	180	180	180	180	194	194	194	225	225	225	166	140	225
	Min.	180	180	153	180	180	194	194	194	225	180	153	140	140
	Ave.	180	180	174	180	192	194	194	204	225	213	164	140	187
	Total	5,580	5,040	5,388	5,400	5,954	5,820	6,026	6,309	6,739	6,596	4,928	4,330	68,110
1931	Max.	140	140	127	140	140	140	166	194	194	225	194	166	225
	Min.	140	127	114	140	140	140	140	166	180	194	180	127	114
	Ave.	140	134	117	140	140	140	162	190	192	213	192	141	158
	Total	4,330	3,756	3,630	4,190	4,330	4,190	5,017	5,897	5,767	6,616	5,764	4,385	58,872
1932	Max.	—	153	153	153	153	153	153	140	153	140	140	140	153
	Min.	—	153	153	140	153	153	140	140	140	127	127	140	127
	Ave.	—	153	153	150	153	153	144	140	145	130	136	140	145
	Total	—	4,427	4,732	4,488	4,732	4,579	4,473	4,330	4,352	4,045	4,093	4,330	—
1933	Max.	140	140	140	153	153	153	153	153	140	140	127	114	153
	Min.	140	140	140	140	153	153	153	140	140	127	114	91	91
	Ave.	140	140	140	142	153	153	153	152	140	134	120	101	139
	Total	4,330	3,911	4,330	4,255	4,743	4,579	4,743	4,698	4,200	4,152	3,596	3,144	50,681
1934	Max.	102	102	102	102	102	140	194	153	153	155	166	153	194
	Min.	91	102	102	102	102	153	153	153	153	153	153	153	91
	Ave.	97	102	102	102	118	168	153	153	153	154	155	153	134
	Total	2,997	2,856	3,162	3,000	3,670	5,041	4,743	4,743	4,590	4,782	4,649	4,743	49,036
1935	Max.	153	140	127	140	140	140	140	140	140	140	140	140	153
	Min.	140	127	127	127	140	140	140	140	140	140	114	114	114
	Ave.	152	136	127	133	140	140	140	140	140	140	137	132	136
	Total	4,098	3,797	3,937	3,989	4,340	4,200	4,340	4,340	4,200	4,340	4,096	4,093	50,380
1936	Max.	114	114	114	114	114	114	140	140	140	140	140	140	140
	Min.	114	114	114	114	114	114	114	140	140	140	102	91	91
	Ave.	114	114	114	114	114	114	129	140	140	140	123	104	122
	Total	3,534	3,306	3,534	3,420	3,534	3,420	3,989	4,340	4,200	4,340	3,687	3,218	44,522
1937	Max.	140	140	140	140	153	153	140	153	153	153	153	127	153
	Min.	102	140	140	127	140	127	140	153	153	153	127	127	102
	Ave.	120	140	140	132	152	144	135	150	153	153	133	127	140
	Total	3,705	3,920	4,340	3,960	4,711	4,317	4,197	4,659	4,590	4,743	3,979	3,937	51,100
1938	Max.	127	153	140	140	153	153	—	—	—	—	—	—	153
	Min.	127	140	140	140	140	153	—	—	—	—	—	—	127
	Ave.	127	148	140	140	145	153	153	153	153	153	153	153	148
	Total	3,937	4,154	4,340	4,200	4,498	4,590	4,743	4,743	4,590	4,743	4,590	4,743	53,869

Tunnel No. 95 — NEW MOUNTAIN HOUSE

1924 Max.	—	—	—	—	—	—	—	—	—	—	—	—	—
Min.	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	4,13	145	232	667	916	810	671	774	717	1,300	690	368	642
1925 Max.	287	215	485	785	1,263	1,857	1,231	1,220	1,735	1,705	1,385	490	1,857
Min.	207	193	193	377	785	906	546	588	670	550	490	256	193
Ave.	248	214	365	433	1,052	1,337	774	781	1,007	977	760	381	694
Total	7,700	6,000	11,300	13,000	32,600	40,100	24,000	24,200	30,200	30,300	22,800	11,200	253,400
1926 Max.	372	372	390	372	785	855	1,800	2,808	2,785	1,642	1,066	1,354	2,808
Min.	233	238	253	253	409	505	723	1,051	1,011	662	518	432	223
Ave.	281	293	310	323	590	663	1,087	1,781	1,677	1,058	723	600	893,200
Total	8,700	8,200	9,600	10,000	18,300	19,900	33,700	55,200	50,300	32,800	21,700	24,800	293,200
1927 Max.	1,185	611	825	1,403	1,824	4,113	611	1,228	2,464	1,726	1,165	3,149	4,113
Min.	513	380	362	752	901	645	481	449	1,228	1,143	449	481	362
Ave.	729	500	497	967	1,328	1,727	548	913	1,853	1,477	810	2,045	1,119
Total	22,600	14,000	15,400	29,000	41,100	51,800	17,000	28,300	55,600	45,800	24,300	63,400	408,300
1928 Max.	—	—	—	—	—	1,822	1,584	2,742	2,229	2,282	1,539	718	2,282
Min.	—	—	—	—	—	752	901	1,447	1,102	1,102	752	611	611
Ave.	—	—	—	—	—	1,377	1,197	1,806	1,473	1,565	1,050	628	1,299
Total	—	—	—	—	—	41,300	37,100	56,000	44,200	48,500	31,500	19,400	278,000
1929 Max.	—	—	—	—	—	—	1,725	2,023	1,920	1,920	—	2,546	2,546
Min.	—	—	—	—	—	—	937	1,448	1,099	1,312	—	827	827
Ave.	611	1,069	1,693	1,721	1,876	1,477	1,260	1,736	1,457	1,550	1,518	1,270	1,394
Total	18,936	29,922	52,163	51,641	42,656	44,322	39,073	53,803	45,695	48,061	45,540	39,370	509,182

DAILY DISCHARGE in Thousands of Gallons														
	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	AN.	
1930	Max.	827	575	827	1,446	1,777	2,381	2,381	3,115	2,715	2,824	982	717	3,115
	Min.	543	511	446	750	1,099	1,312	1,328	1,273	1,226	982	717	478	1,312
	Ave.	714	537	595	1,165	1,424	2,020	1,534	2,384	2,221	1,780	771	576	1,780
	Total	22,136	15,028	18,431	34,959	44,159	60,569	47,539	79,314	66,036	55,168	23,142	17,966	479,110
1931	Max.	478	388	330	1,273	1,273	1,357	2,656	2,715	2,656	1,228	1,021	2,656	2,656
	Min.	330	304	252	788	788	788	1,312	1,099	1,312	717	511	1,312	1,312
	Ave.	407	360	286	897	999	1,066	1,839	2,191	1,949	931	679	1,066	1,066
	Total	12,623	10,079	8,927	30,922	30,984	31,965	57,023	67,932	44,719	63,475	27,924	21,061	397,410
1932	Max.	2,126	2,126	1,777	1,162	3,089	3,496	1,529	1,241	1,881	1,045	1,659	2,110	3,496
	Min.	1,478	1,228	750	652	971	1,489	1,045	971	652	685	824	971	1,489
	Ave.	1,111	1,682	1,183	883	1,610	2,141	1,236	1,160	1,432	804	1,196	1,424	1,610
	Total	34,452	48,781	36,688	26,479	49,918	64,241	38,323	35,963	42,958	24,919	35,880	44,153	483,487
1933	Max.	1,446	1,572	1,572	1,881	2,831	2,110	1,162	1,084	1,123	1,084	512	248	2,831
	Min.	824	1,282	789	720	1,241	933	789	720	1,045	933	524	399	933
	Ave.	1,291	1,402	1,311	1,017	2,016	1,582	990	905	1,070	1,012	633	426	1,582
	Total	40,018	39,266	40,651	30,522	62,495	47,445	30,699	29,086	32,102	31,965	24,987	15,219	420,810
1934	Max.	825	825	611	611	1,824	2,254	2,282	1,539	1,776	1,539	1,776	1,270	4,254
	Min.	369	544	544	513	611	1,680	1,539	979	1,315	1,185	1,270	611	1,539
	Ave.	536	635	562	571	1,163	2,979	2,007	1,223	1,474	1,270	1,679	883	1,223
	Total	16,629	17,767	17,437	17,139	36,062	89,361	62,215	37,905	44,214	39,385	47,383	27,366	454,840
1935	Max.	1,358	979	1,185	1,680	1,680	2,177	2,177	3,149	3,149	1,776	1,143	979	3,149
	Min.	577	513	513	1,020	1,102	1,102	1,270	1,447	1,447	1,102	788	611	1,102
	Ave.	682	645	544	1,020	1,102	1,102	1,270	1,447	1,447	1,102	788	611	1,102
	Total	27,944	17,937	30,750	40,316	40,337	50,740	55,261	72,192	67,951	46,423	29,231	25,236	503,771
1936	Max.	611	979	1,228	1,143	901	1,539	6,450	5,021	2,023	2,177	1,176	645	6,450
	Min.	481	481	481	752	716	752	611	2,282	1,633	1,539	716	333	2,282
	Ave.	529	687	723	859	785	1,158	1,189	2,936	1,819	1,914	1,614	465	1,189
	Total	16,396	19,932	22,735	25,776	24,327	34,731	56,382	91,020	54,559	59,327	34,924	14,409	428,518
1937	Max.	2,125	2,464	1,824	1,217	3,776	1,873	1,680	2,854	2,573	2,177	1,315	1,102	3,776
	Min.	333	1,020	752	788	1,447	901	863	1,102	901	1,358	611	513	1,447
	Ave.	878	1,885	1,241	3,324	2,257	1,509	1,240	2,048	1,932	1,788	904	619	1,885
	Total	27,919	52,770	39,485	39,705	69,965	45,278	37,322	65,462	67,951	55,368	27,131	19,191	533,048
1938	Max.	1,102	3,776	1,102	1,228	2,388	2,388	3,716	3,604	2,178	1,583	2,178	937	3,716
	Min.	645	645	544	1,020	1,102	1,403	1,228	1,583	1,583	988	333	544	1,403
	Ave.	784	2,222	788	1,150	1,311	1,899	2,488	2,069	931	1,367	1,318	961	1,899
	Total	24,313	62,202	24,432	34,504	40,860	56,961	69,686	64,133	57,381	42,383	39,541	17,380	533,766
1939	Max.	1,312	2,824	3,115	2,022	1,628	2,546	2,546	4,126	1,784	2,173	1,273	827	4,126
	Min.	544	1,312	1,182	1,147	678	646	1,312	1,059	1,098	827	827	576	1,312
	Ave.	932	1,970	2,100	1,618	1,085	1,573	1,795	1,522	1,418	1,025	1,081	678	1,618
	Total	28,899	55,147	65,111	46,525	33,631	47,179	55,650	47,180	42,529	32,093	32,419	20,942	509,965
1940	Max.	542	361	226	440	749	2,022	2,022	3,716	3,115	2,229	2,136	1,770	3,716
	Min.	361	226	226	440	717	788	937	1,021	1,143	1,098	749	383	937
	Ave.	461	277	330	549	1,272	1,421	1,268	2,389	2,081	1,782	1,256	900	1,268
	Total	14,287	8,034	10,236	18,467	39,420	42,921	39,902	70,967	65,426	55,256	37,665	31,103	439,294
1941	Max.	367	305	788	962	2,261	2,126	1,680						2,261
	Min.	277	226	226	717	788	788	927						788
	Ave.	308	443	323	804	1,855	1,236	1,294						1,855
	Total	9,546	6,792	10,016	24,136	57,299	37,085	40,106						57,299

[illegible]

Spring Index

USGS No.	Spring	Owner	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Estimated Yield (gpd)	Use	Remarks
1	County Spring	Kohala Sugar Co	81	N Kohala	20 13 00 155 48 25	900	10,000	Domestic	
2	Kohala Seminary	"	"	"	20 13 25 155 47 45	625	Dry		
3	Iole Springs	"	"	"	20 13 20 155 47 35	650	50,000	Irrigation	
4	Maulili Spring	"	"	"	20 12 35 155 47 15	1030	20,000	"	
5	Olding Spring	"	"	"	20 11 55 155 48 00	1600	25,000	"	
6	Waipuhi Spring	"	"	"	20 11 10 155 47 40	2000	20,000	Domestic & cattle	
7	Halawa Gulch, W branch	"	"	"	20 12 00 155 46 55	1200	150,000	Irrigation	
8	Halawa Gulch, E branch	"	"	"	20 12 30 155 46 25	850	7,200	"	
9	Waipunalau Gulch	"	"	"	20 11 30 155 45 10	1600	45,000	"	
10	Murphy Spring	"	"	"	20 11 35 155 45 25	1250	25,000	Domestic	
11	Mau Spring	"	"	"	20 11 55 155 44 45	900	Dry		
12A	E Honokane Nui Canyon below Kohala Ditch	"	"	"	20 08 40 155 43 50	900	1,250,000	"	
12B	E wall of E branch Honokane Nui Canyon below Kohala Ditch	"	"	"	20 08 40 155 43 50	950	650,000	"	
13	"	Bishop Estate	"	"	20 08 10 155 43 45	1400	500,000		
14	Apua Springs	State of Hawaii	"	Hamakua	20 10 35 155 40 30	150	40,000		
15	Laupoepoe Spring	Elizabeth K Booth	"	"	20 09 55 155 39 25	150	75,000		
16	Keawewai Spring	State of Hawaii	"	"	20 08 45 155 38 35	400	40,000	Irrigation	
17	Waihilau Spring	"	"	"	20 07 10 155 39 10	425	12,000,000	"	
18	W bank of Waimanu Stream	"	"	"	20 06 55 155 38 35	175	500,000		
19	Waimanu Spring	"	"	"	20 06 00 155 38 30	425	5,000,000	"	
20	N branch of Kawainui Stream	"	"	"	20 05 50 155 39 15	3000	5,000,000		
21	Plunge pool, Ulu Falls, Kawainui Stream	Bishop Museum	"	"	20 05 35 155 40 30	2250	6,000,000	"	
22	Northern Upper Kawainui Stream	"	"	"	20 05 25 155 40 10	3550	500,000	"	
23	Southern Upper Kawainui Stream	"	"	"	20 05 10 155 39 55	"	"	"	
24	Plunge pool head of Alakahi Canyon	"	"	"	20 04 25 155 40 10	1475	1,000,000		
25	Spring in S bank, 50' above Alakahi Stream	"	"	"	20 04 20 155 40 05	1425	3,000,000		
26	Pool 25' above Koiawe Stream in W wall	"	"	"	20 03 50 155 38 25	1200	200,000		

USGS No.	Spring	Owner	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Estimated Yield (gpd)	Use	Remarks
27	In falls at head Koiawe Canyon	Bishop Museum	81	Hamakua	20 03 30 155 38 40	1650	2,000,000		
28	E wall at Waimea Canyon just below intake of ditch	"	"	"	20 04 10 155 37 30	850	1,000,000		
29	Pool at foot of Hiilawe Falls	"	"	"	20 06 10 155 35 50	300	8,000,000		
30	Kukuihaele	Honokaa Sugar Co	"	"	20 07 10 155 34 50	900	250,000	Domestic	
31	Waiuliu	County Hawaii BWS	"	"	20 07 30 155 34 40	600	250,000	"	Ex Honokaa Sugar Co
32	Kapulena Stream	State of Hawaii	"	"	20 05 25 155 32 40	1650	250		
33	Ahualoa Stream	Honokaa Sugar Co	"	"	19 59 15 155 29 30	1450	1,000	Domestic	
34	Waikomakapo Spring	Richard Smart	"	"	19 59 15 155 29 00	4275	1,000		Goes dry in dry weather
35	Palikua Spring	State of Hawaii	"	"	19 59 15 155 27 05	3850	10,000		"
36	Kalopa Gulch	Paauihau Sugar Co	"	"	20 02 45 155 25 55	1800	500		
37	W fork of Manienie Gulch	State of Hawaii	"	"	20 01 15 155 24 30	2250	500	Abandoned	
38	Gulch W of Manienie Gulch	Hamakua Mill Co	"	"	20 02 05 155 23 50	1510	50	"	
39	"	"	"	"	20 02 30 155 22 05	1050	50	"	Goes dry in dry weather
40	Sea cliff 0.4 mi NW Manienie Gulch	"	"	"	20 03 55 155 22 45	15	5,000	"	"
41	Paauihau Gulch	"	"	"	20 02 30 155 22 05	730	10,000	Domestic	
41A	"	"	"	"	"	700	100	Abandoned	
41B	"	"	"	"	"	675	100	"	
42	Branch of Kawaiili Stream	"	"	"	20 00 30 155 21 50	2025	100	"	Goes dry in dry weather
43	Kalapahapuu Stream	"	"	"	19 59 30 155 21 45	3075	40,000	"	"
44	Keehia Stream	Laupahoehoe Sugar Co	"	"	19 59 45 155 19 10	2000	250		"
45	Kupapaulua Stream	"	"	"	20 00 35 155 18 10	1100	1,000	Domestic	
46	Kaahaoha Stream	"	82	N Hilo	20 00 45 155 16 20	450	4,000		"
47	Kaawalii Spring	"	"	"	19 59 45 155 16 20	380	150,000	Abandoned	Ex Kaiwiki Sugar Co
48	Sea cliff just W of Kilau Stream	State of Hawaii	"	"	19 59 35 155 14 40	330	20,000		
49	Laupahoehoe Spring	Laupahoehoe Sugar Co	"	"	19 59 20 155 14 20	320	50,000	Domestic	Several springs close together
50	Manowaiopae Stream	State of Hawaii	"	"	19 58 20 155 14 20	1100	100,000	"	
51	Kihalani Stream	Mrs Cook	"	"	19 58 35 155 14 00	700	20,000	"	Ex K R N Bradley
52	"	"	"	"	19 58 45 155 13 45	500	40,000	"	"
53	Sea cliff just W of Kaiwilahilahi Stream	Laupahoehoe Sugar Co	"	"	19 58 50 155 13 15	150	100,000	Abandoned	
54	Kaiwilahilahi Stream	Alexander Cameron	"	"	19 57 45 155 14 10	1200	20,000	Domestic	
55	Kaiwilahilahi Gulch	State of Hawaii	"	"	19 58 10 155 13 45	750	15,000		
56	"	Laupahoehoe Sugar Co	"	"	19 58 20 155 13 40	700	40,000	Domestic	

USGS No.	Spring	Station	Owner	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Estimated Yield (gpd)	Use	Remarks
57	Pahale Stream		State of Hawaii	82	N Hilo	19 57 00 155 14 00	1575	1,000	Abandoned	Goes dry in dry weather
58	Kapehu Stream		Laupahoehoe Sugar Co	"	"	19 57 40 155 12 50	750	3,500	Domestic	
59	"		"	"	"	19 57 55 155 12 50	525	25,000	"	
60	Paeohe Stream		"	"	"	19 57 05 155 12 55	1100	2,500	"	
61	Stream S of Paeohe Stream		"	"	"	19 57 00 155 12 40	1000	40,000		
62	Weloka Stream, N Fork		"	"	"	19 57 50 155 12 15	400	8,000		
63	Weloka Stream, S Fork		"	"	"	19 57 40 155 12 15	400	5,000	Domestic	
64	Sea cliff at Weloka Stream; railroad cut		"	"	"	19 57 55 155 12 10	200	5,000	Unused	
65	Huliilii Stream		"	"	"	19 57 05 155 11 55	650	18,000	Domestic	
66	Poupou Stream		"	"	"	19 56 50 155 11 00	350	5,000	"	
67	SW Ninole Village 0.1 mile		Pepeekeo Sugar Co	"	"	19 56 30 155 10 20	300	100,000	"	
68	Nanue Gulch, N side		"	"	"	19 54 35 155 11 20	1500	25,000	"	
69	Nanue Gulch, S side		"	"	"	19 54 40 155 11 15	1450	5,000	"	Goes dry in dry weather
69A	Nanue Gulch, N side		"	"	"	"	"	10,000	"	"
70	Waiehu Stream, N of Nanue Stream		"	"	"	19 55 10 155 10 45	1050	8,000	"	
71	Waiehu Stream		"	"	"	19 55 55 155 09 55	300	12,000	"	
72	Nanue Gulch, N side		"	"	"	19 55 45 155 09 50	450	10,000	"	
73	Opea Gulch, N side		"	"	"	19 55 25 155 09 40	450	15,000	"	
73A	Opea Gulch, 300' farther NE		"	"	"	"	450	15,000	"	
74	Branch Umauma Stream		Bishop Estate	"	"	19 53 50 155 10 50	1150	10,000	"	
75	Peleau Stream		Pepeekeo Sugar Co	"	"	19 54 25 155 09 50	960	2,000	"	
76	"		"	"	"	19 54 35 155 09 45	880	30,000	"	
77	Lujan Spring		"	"	"	19 54 55 155 09 15	600	20,000	"	
78	Kamaee Stream		"	"	"	19 53 15 155 10 35	1300	35,000	"	
79	Hanapueo Stream		"	"	"	19 54 00 155 09 20	775	12,000	"	
80	Hiway cut, N side Hakalau Gulch		"	"	"	19 54 20 155 08 00	200	5,000	Industrial	
81	Hakalau Gulch, S side		"	"	S Hilo	19 54 00 155 08 15	270	35,000	Domestic	
82	Waawaa Stream		"	"	"	19 53 25 155 09 15	800	5,000	"	
82A	"		"	"	"	"	775	3,000	"	
83	0.25 mi W Hakalau School		"	"	"	19 53 25 155 07 55	325	60,000	"	
84	Duhrsen Spring		"	"	"	19 53 35 155 07 50	250	20,000	"	
85	Kolekole Gulch, N W side		"	"	"	19 53 00 155 07 25	150	10,000	Industrial	
86	Hakalau Iki Spring		"	"	"	19 52 10 155 10 00	1300	46,000	Domestic	

USGS No.	Spring	Owner	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Estimated Yield (gpd)	Use	Remarks
87	Hakalau Iki Spring	Pepeekeo Sugar Co	82	S Hilo	19 52 15 155 09 55	1250	500	Domestic	
88	Akaka Spring	"	"	"	19 51 25 155 09 30	1250	140,000	"	
89	Branch Paheehee Stream	"	"	"	19 51 35 155 08 45	1000	100,000	"	
90	Honomu Gulch, NW side	"	"	"	19 52 10 155 07 00	300	1,000	Industrial	
91	Branch Honomu Stream	"	"	"	19 50 30 155 09 20	1500	100,000	Domestic	
92	Honomu Stream	"	"	"	19 50 50 155 08 55	1200	5,000	Industrial	
93	Luiiz Spring	"	"	"	19 50 20 155 08 00	950	200,000	Domestic	
94	Branch Alia Stream	"	"	"	19 50 15 155 07 55	950	400,000	"	
95	Branch Kawainui Stream	Mauna Kea Sugar Co	"	"	19 49 25 155 10 10	2050	2,000		
96	"	"	"	"	19 49 00 155 08 25	1330	15,000	Domestic	
97	Kalaoa Stream	"	"	"	19 48 20 155 08 05	1250	300,000	"	
98	Kaieie Stream	"	"	"	19 47 55 155 08 15	1250	300,000	"	
99	Branch Kaieie Stream	"	"	"	19 48 05 155 06 45	550	17,000	"	
100	Branch Pahoehe Stream	"	"	"	19 47 40 155 07 20	750	50,000	"	
101	Branch Kapue Stream	"	"	"	19 47 20 155 08 15	1225	45,000	Industrial & domestic	
102	Kapue Gulch, N side	"	"	"	19 47 10 155 08 10	1050	10,000	Industrial	
103	Small stream N Kapue Stream	"	"	"	19 47 20 155 06 20	425	25,000	Industrial & domestic	
104	Honolii Gulch, N side	"	"	"	19 46 10 155 07 05	600	10,000	Domestic	
105	Branch Maili Stream	"	"	"	19 45 00 155 06 55	700	20,000		
106	"	"	"	"	19 46 00 155 11 00	2350	500		
107	Waiokaumalo Stream at Spring Water Camp	Pepeekeo Sugar Co	"	"	19 52 15 155 18 00	5100	15,000		
108	Nauhi Spring	"	"	"	19 51 30 155 17 50	5150	15,000		
109	Nauhi Stream, S Branch	"	"	"	19 51 20 155 18 00	5250	200,000		
110	Kanakaleonui Spring	Richard Smart	"	"	19 51 20 155 22 15	8000	5,000		Goes dry in dry weather
111	Waikahalulu Gulch	State of Hawaii	"	Hamakua	19 47 10 155 28 10	11000	2,000		
112	Waihu Spring	"	85	"	19 47 15 155 30 15	10390	39,000	Domestic	Several small springs and seeps
112A	"	"	"	"	"	10140	1,500	"	Low water flow; discharge increases greatly in wet weather
112B	"	"	"	"	"	10090	1,500	"	"
112C	"	"	"	"	"	9990	2,000	"	"
112D	"	"	"	"	"	9825	2,500	"	"
112E	"	"	"	"	"	9575	2,500	"	"
112F	"	"	"	"	"	10500	1,500	"	"
113	Small gulch W Pohakuloa Gulch	"	"	"	19 46 40 155 30 50	8935	1,500	"	"
114	Kapehu Spring	"	82	S Hilo	19 43 55 155 11 15	2150	2,000,000	"	

USGS No.	Spring	Owner	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Estimated Yield (gpd)	Use	Remarks
115	Kalamana Stream, Trib Wailuku River	State of Hawaii	82	S Hilo	19 43 35 155 11 35	2160	500,000		
116	Trib Wailuku River	"	"	"	19 44 00 155 10 30	1800	100,000		
117	Trib Wailuku River 0.2 mi S Spring 116	"	"	"	19 44 00 155 10 36	1800	100,000		
118	N Fork Kahena Stream	"	"	"	19 43 40 155 11 15	1990	300,000		Goes dry in dry weather
119	S Fork Kahena Stream	"	"	"	19 43 35 155 11 20	1990	300,000		"
120	Kahena Stream	"	"	"	19 43 30 155 10 50	1880	400,000		"
121	Kalohewa Stream N bank	"	"	"	19 43 15 155 11 35	2100	1,000,000	Domestic	
122	Kahoama Gulch	"	"	"	19 43 00 155 09 15	1200	400,000		Ex Mauna Kea Sugar Co
123	Wailuku River	"	"	"	19 42 45 155 12 25	2400	500,000		
124	"	"	"	"	19 42 50 155 11 35	2000	250,000		
125	Wailuku River at Poakana Falls	"	"	"	19 42 40 155 11 35	1975	500,000		
126	Trib Wailuku River	"	"	"	19 42 45 155 10 40	1700	1,000,000		Decreases greatly or dries up completely during drought
127	"	"	"	"	19 42 35 155 10 45	1750	2,500,000	Domestic	"
128	"	"	"	"	19 42 40 155 10 15	1570	1,500,000	"	"
129	Kipuka, S Hilo-Humuula Road	"	"	"	19 42 05 155 13 40	2725	15,000		
130	Kipuka, N Hilo-Humuula Road	"	"	"	19 42 15 155 12 25	2370	500,000		Several springs close together
131	Kahoama Stream	"	"	"	19 42 15 155 10 40	1700	1,000,000	Domestic	Decreases greatly or dries up completely during drought
131K	Kahoama Stream, 50' N Spring 131	Mauna Kea Sugar Co	"	"	"	"	2,500,000		
132	Wailuku River at Rainbow Falls	"	"	"	19 43 30 155 06 55	375	100,000		
133	Kaumana Spring	County Hawaii BWS	"	"	19 43 05 155 06 55	400	1,500,000	Domestic	
134	Trib Waipahoehoe Stream	Mauna Kea Sugar Co	"	"	19 42 15 155 07 30	725	100,000		
135	S edge of 1881 lava flow	"	"	"	19 40 40 155 10 10	1775	10,000		
136	"	"	"	"	19 40 30 155 10 15	1825	50,000		
137	Upper Waiakea Homesteads	State of Hawaii	"	"	19 39 10 155 09 00	1500	20,000		
138	"	"	"	"	19 39 05 155 09 15	1600	25,000	Domestic	Low water flow. Discharge increases greatly during wet weather
139	"	"	"	"	19 38 50 155 09 20	1620	40,000	"	"
140	"	"	"	"	19 38 50 155 09 35	1675	15,000	"	"
141	Plantation Spring	"	83	Kau	19 11 20 155 36 10	3650	See remarks	"	Included with discharge of tunnel 93
142	Mountain House Spring	County Hawaii BWS	"	"	19 09 35 155 36 50	3400	"	Industrial	Included with discharge of tunnel 95
143	Makanau Ridge	Hutchinson Sugar Co	"	"	19 09 35 155 33 10	1750	"	Ranch	Included with discharge of tunnel 99; dry 1958
144	W of Hilea	"	"	"	19 08 15 155 33 50	1550			
145	Portuguese Spring	State of Hawaii	"	"	19 06 45 155 36 50	2650	250,000	Domestic	

USGS No.	Spring	Owner	Hyd. Area	District	Latitude Longitude	Elev. (ft.)	Estimated Yield (gpd)	Use	Remarks
146	Haa0 (Waiohinu) Springs	Hutchinson Sugar Co	83	Kau	19 05 35 155 37 20	2300	600,000	Domestic	Turned over to BWS
	Ninole Springs		"	"	19 08 00 155 30 45	40	25,000,000		
	Kawaa Springs		"	"	19 06 55 155 31 40	40	10,000,000	Industrial	
	Wailepua Spring	Mauna Kea Sugar Co	82	S Hilo	19 45 32 155 11 22	2415		"	Wainaku Factory water
	Water Hole	Kala Pilipo	84	S Kona	19 11 20 155 54 25	80			Chloride content 3653 ppm
	Honaunau Spring		"	"	19 25 30 155 54 38	40	350,000	Ranch & domestic	
	Nawawa Cave		"	N Kona	19 31 10 155 57 15	60	54,000		Brackish water
	Kahoe Cave		"	"	19 33 25 155 57 40	60	54,000		"
	Waikapuna Bay		83	Kau	19 01 20 155 35 10	60			
	Old Spring	A K Magoon	84	N Kona	19 47 07 156 02 15	20			
	Cave Spring	Bishop Estate	85	"	19 47 50 156 01 40	20			
	Kaupulehu Water Hole	"	"	"	19 49 48 155 59 30	25		Ranch & domestic	Brackish water
	Kaupulehu Pool	"	"	"	19 50 10 155 59 00	15		"	"
	Kaupulehu Water Hole	"	"	"	19 50 00 155 59 00	30		"	"
	Kaupulehu Springs	"	"	"	19 49 55 155 59 10	30	70,000	"	"
	Fishpond	C K Nahale	84	"	19 35 00 155 58 10	Sea Level			
	Hopukani Springs		85	Hamakua	19 47 15 155 30 17	10420			
	Unnamed		"	"	19 46 35 155 30 56	8640			
	Liloe Spring		"	"	19 46 41 155 30 50	8921			
	Deisham	Pepeekeo Sugar Co	82	N Hilo			Small	Domestic	Hakalau
	Machado	"	"	"			"	"	"
	Jerry	"	"	"			"	"	"
	Kiilae Acre Springs	L L Mc-Candless Estate	84	S Kona	19 23 02 155 54 03	30			
	Waiakea-Uka Springs		82	S Hilo	19 38 54 155 09 13	1590			
	Kukaiau	Hamakua Mill	81	Hamakua	20 01 07 155 20 44	1320	250,000	Domestic	

Selected Spring Flow Records

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN.
Spring No. 112—WAIHU SPRING													
1958	—	—	—	—	—	25.25	60.00	153.00	62.00	36.00	31.50	30.50	56.89
1959	100.00	117.00	127.00	96.00	38.00	38.00	24.50	67.50	42.50	38.50	34.50	39.50	61.92
1960	29.10	33.00	36.40	34.40	34.40	31.50	29.51	26.25	23.65	21.00	24.05	16.05	28.44
1961	18.16	17.00	14.58	14.75	17.22	15.57	13.01	12.04	9.60	12.64	40.45	26.18	17.60
1962	46.82	25.86	—	28.33	28.00	28.00	22.00	17.50	14.67	16.00	—	14.00	24.12
1963	42.00	—	—	—	126.67	98.00	86.67	87.00	71.67	57.00	—	35.50	75.56
1964	27.00	—	30.20	30.00	—	—	—	13.00	18.50	36.50	111.00	99.00	45.65
1965	78.00	—	—	—	—	—	—	—	—	—	—	—	—
Ave.	48.73	48.22	52.54	32.70	48.86	39.39	39.28	53.76	34.66	31.09	52.30	37.25	—

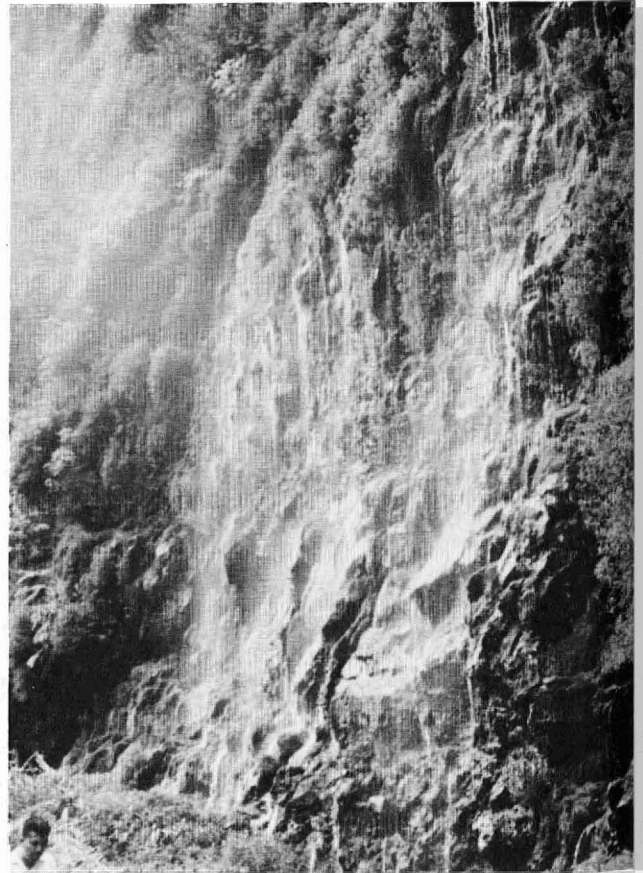
Note: Average discharge in thousand gallons daily.

Spring No. 133—KAUMANA SPRING													
1930	—	—	—	—	—	a2.772	2.656	3.208	3.132	2.922	2.534	2.215	2.778
1931	1.629	0.673	1.560	0.735	1.088	0.190	0.797	1.965	2.245	2.585	2.529	2.088	1.507
1932	2.014	1.961	1.777	—	1.252	2.159	2.414	1.977	1.145	1.136	0.503	2.081	1.673
1933	2.461	2.656	2.535	2.501	2.853	2.239	2.040	1.085	0.865	0.904	0.160	0.058	1.713
1934	1.010	1.346	1.358	1.512	2.204	2.180	1.740	1.535	1.488	1.549	1.595	1.888	1.616
1935	1.822	1.671	1.920	1.976	2.004	1.213	1.117	1.304	1.223	1.712	1.795	2.009	1.647
1936	1.534	1.122	1.701	2.442	1.983	2.084	2.139	2.056	2.154	1.596	1.758	1.783	1.863
1937	1.508	1.516	1.597	1.599	1.695	1.753	1.704	1.719	1.729	1.716	1.723	1.669	1.661
1938	1.634	1.638	1.646	1.391	1.369	1.668	1.721	1.747	1.725	1.676	1.676	a1.448	1.611
1939	1.745	1.748	1.764	1.807	1.896	1.493	0.954	1.279	1.308	0.431	0.025	0.025	1.206
1940	0.217	0.333	0.431	0.037	0.058	0.106	0.462	1.697	0.643	0.55	0.345	0.933	0.445
1941	0.917	0.082	0.241	0.681	0.296	0.119	0.451	0.470	0.466	0.463	1.340	1.607	0.394
1942	1.003	0.562	1.371	0.908	0.643	0.524	0.464	1.076	1.447	2.348	2.110	1.392	1.154
1943	2.706	3.250	3.049	3.017	3.182	3.314	3.411	3.304	2.621	2.790	2.346	2.709	2.973
Ave.	1.569	1.428	1.611	1.558	1.577	1.558	1.578	1.744	1.585	1.563	1.460	1.562	1.567

Note: Average discharge in million gallons daily. a - Record incomplete.

Spring No. 146—WAIHOHINU													
1930	—	—	10.109	13.321	11.913	12.080	12.630	15.687	17.217	15.605	9.325	5.247	12.313
1931	4.110	2.632	2.900	4.337	7.677	9.311	10.128	12.269	12.541	16.127	7.379	5.409	7.902
1932	9.442	14.475	12.413	4.287	3.849	9.036	6.313	5.180	10.486	7.572	9.652	14.668	8.948
1933	11.745	13.320	9.723	5.629	12.437	11.393	5.573	6.633	5.450	4.366	8.161	4.669	8.258
1934	5.692	6.800	3.701	3.930	6.180	12.697	9.454	5.355	5.784	6.854	8.387	7.372	8.867
1935	5.391	3.715	6.049	9.676	7.203	8.654	6.126	12.418	12.595	11.111	6.148	6.820	6.286
1936	5.561	8.843	4.435	5.748	3.962	4.278	4.356	10.482	8.178	14.431	9.543	3.303	6.927
1937	4.096	15.330	10.364	8.096	10.505	6.526	4.929	13.163	9.329	6.932	7.241	3.879	8.611
1938	7.616	13.763	6.347	5.388	9.965	11.516	10.668	11.310	8.071	7.004	—	—	9.165
Ave.	6.703	8.860	7.560	6.731	8.188	9.521	7.797	10.277	9.958	10.334	8.355	6.296	—

Note: Average discharge in million gallons daily.



Spring No. 28—WAIMA VALLEY



Spring No. 49—LAUPAHOEHOE (PALI)



Spring-fed stream flow in Waima Valley, Honokaa.

Water Quality

SAMPLING SITES AND RECORDS

Water quality is usually determined by physical, chemical, and bacterial analysis of samples. The Department of Health is the state agency responsible for collecting and analyzing water samples for potability and pollution control.

As the state pollution control agency, the Department enforces and administers water quality standards relating to all waters within the state as well as coastal waters, as contained in Chapter 37-A, H.R.S., effective in February 1968. This new function is not reflected in this report.

Samples for potability tests have been collected from various water supply and distribution systems at random locations on the island of Hawaii. Plate 16 shows the location of all 61 water quality sampling sites listed in Water Quality Sampling Site Index, pages 183-185. Except at a few locations, water quality samples are not collected on a regular frequency.

All readily available records on physical and chemical characteristics of water samples collected on the island of Hawaii are presented in Selected Water Quality Records, pages 186-188. Bacterial analysis data are not included.

WATER QUALITY CHARACTERISTICS

Surface water on the island of Hawaii is characterized by low concentrations of dissolved solids (salts and mineral constituents) averaging about 64 ppm, and minimal hardness, averaging about 29 ppm. Ground water, by contrast, has considerably higher concentrations of dissolved solids and greater hardness, averaging about 125 and 112 ppm, respectively. Hardness is caused principally by calcium and magnesium compounds, and somewhat by sulfate. The relatively high silica content of ground water on the island is associated with the lava rocks comprising the principal aquifers.

Surface water on Hawaii is not uniformly characterized as any one particular chemical type or class. Either sodium or calcium may be the predominant cation, and bicarbonate, sulfate, or chloride the principal anion. The presence of carbonate and bicarbonate, reported as ppm calcium carbonate, may cause odor and color. Chloride affects taste, and a large amount will

cause corrosion. Most of the chloride content of high-level ground water supplies on the island is probably due to the effect of salt spray carried in moisture-laden tradewinds. Chloride occurring in basal ground water is infiltrated from sea water underlying the fresh water lens.

Acid and alkali balance is expressed as pH. Surface water on Hawaii tends to be somewhat acid because of its exposure to the soil and decomposed organic matter. Ground water from the basal aquifer tends to be alkaline because of its proximity to sea water.

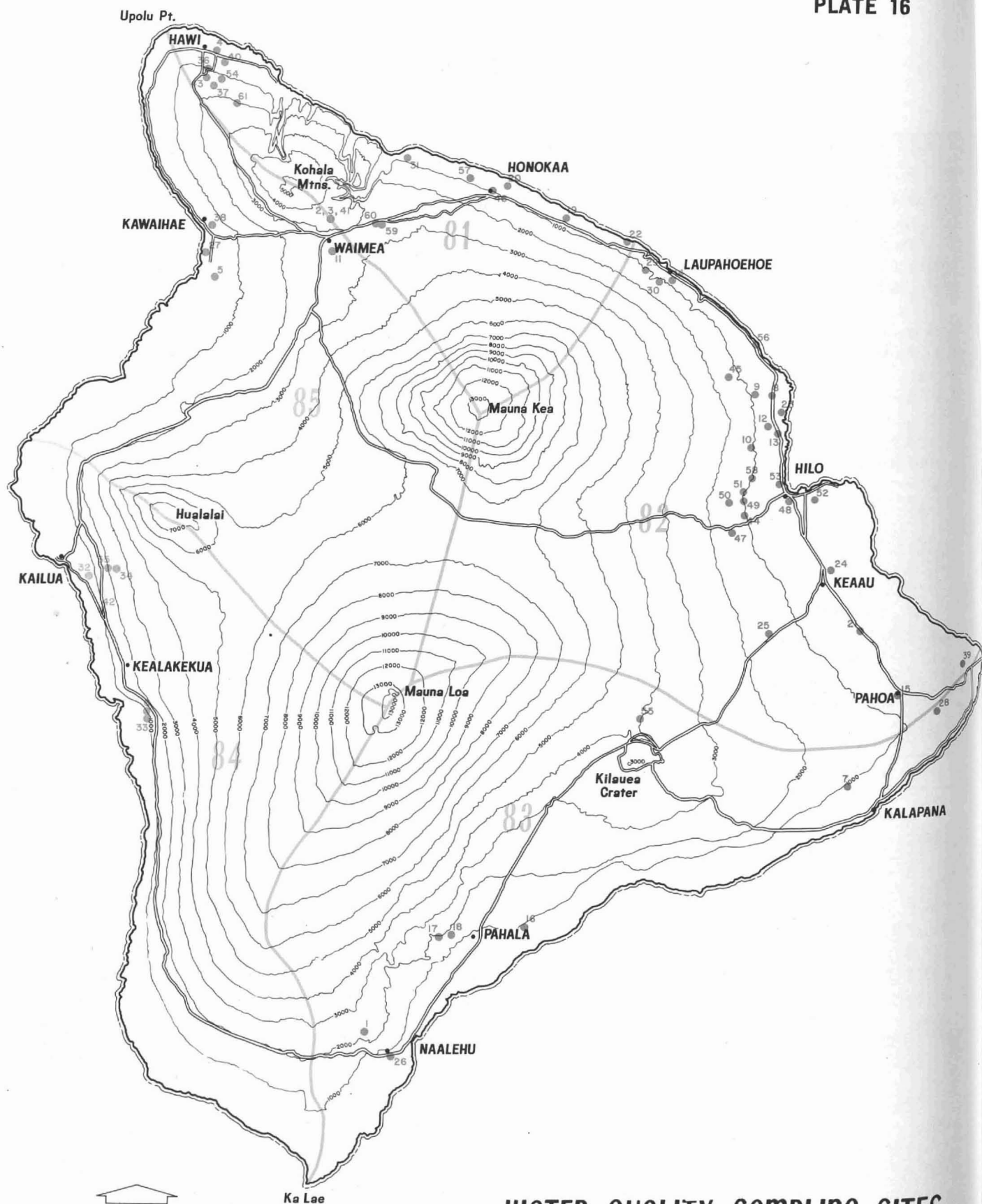
Taste, color, and turbidity are qualities of significance primarily for domestic water supplies. Color and turbidity are objectionable from an aesthetic standpoint. Limits recommended by the U.S. Public Health Service for drinking water supplies are 5 units for turbidity, 15 units for color, and threshold odor number 3.

Where other more suitable supplies are available, the U.S.P.H.S. recommends that chemical substances should not be present in drinking water in excess of the following concentrations (in ppm).

Arsenic	0.01
Chlorides	250
Copper	1
Iron	0.3
Manganese	0.05
Nitrates	45
Phenols	0.001
Sulfate	250
Total Solids	500
Zinc	5

Common characteristics of surface water originating in forested or heavily vegetated watershed areas are turbidity and yellowish brown color. The color bodies in the water are organic in nature, derived from humic and fannic acids in decomposing fern and other flora of the watershed. Studies of the stream waters of Kohala Mountain show that color values reach upwards of 300 units, typical values lying in the 50-100 unit range.

Public water supplies on Hawaii, from both ground and surface sources, contain chemical substances in amounts which are generally well below the recommended limits. However, basal ground water sources in the coastal areas, such as the wells and shafts, are susceptible to contamination from salt water intrusion.



WATER QUALITY SAMPLING SITES

Water Quality Sampling Site Index

Site No.	Location	Hyd. Area	District	Latitude Longitude	Record Years
1	Waiohinu, Naalehu - Haao Spring	83	Kau	19 05 35 155 37 37	1945, 1956
2	Waimea - Waikoloa Intake	85	S Kohala	20 02 47 155 40 00	1944, 1951, 1954, 1955
3	" Kawaihae	"	"	20 02 47 155 40 00	1947, 1962
4	Union Mill	81	N Kohala	20 14 30 155 48 35	1956
5	Lalamilo Irrigation System	84	S Kohala	19 59 40 155 40 20	1964
6	South Kona - Keei Well 12-4	"	S Kona	19 27 32 155 53 11	1958, 1960, 1966
7	Pulama, Puna - Well No 9-10	82	Puna	19 21 15 155 02 15	1963
8	Pepeekeo - Well No 1	"	S Hilo	19 50 34 155 05 45	1948, 1956
9	" Maukaloa Spring	"	"	19 50 18 155 08 00	1949
10	Pauka, Honolii, Pahoehe - Pahoehe Spring	"	"	19 47 40 155 07 20	1953, 1954, 1956
11	Parker Ranch Well No 3	85	S Kohala	19 58 17 155 49 48	1960
11A	" Well No 4	"	"	" "	1960
12	Papaikou - Mahaula Spring & Stream	82	S Hilo	19 47 20 155 06 20	1948
13	" Kaieie Stream	"	"	19 47 50 155 08 45	1956
14	Papaaloa - Spring	"	N Hilo	19 58 35 155 14 00	1956
15	Pahoa School Well	"	Puna	19 29 25 154 55 47	1960
16	Pahala - Well No 1	83	Kau	19 12 40 155 25 40	1947, 1954, 1955
17	" Moaula Tunnels	"	"	19 13 40 155 33 00	1956
18	" Alili Tunnel	"	"	19 13 50 155 31 10	1956
19	Paauilo - Shaft	82	Hamakua	20 03 22 155 22 00	1948, 1954, 1955
20	Paauhau - Lower Hamakua Ditch	81	"	20 06 37 155 26 45	1956
21	Orchid Estates Well	82	Puna	19 33 23 155 00 14	1961
22	Ookala Shaft	"	Hamakua	20 01 05 155 17 15	1948, 1954, 1955
23	Onomea - Pahoehe Springs	"	S Hilo	19 47 40 155 07 20	1949
24	Olaa Village Well	83	Puna	19 37 50 155 02 00	1948
25	Olaa, Mt View - Well	"	"	19 32 40 155 07 20	1942, 1954-1956
26	Naalehu	"	Kau	19 04 03 155 35 30	1955, 1961
27	Mauna Kea Beach Hotel	85	S Kohala	20 00 14 155 49 18	1965
28	Malama Ki Exploratory Well	83	Puna	19 27 30 154 53 00	1962

Site No.	Location	Hyd. Area	District	Latitude Longitude	Record Years
29	Laupahoehoe Tunnel	82	S Hilo	19 59 20 155 17 35	1956
30	Laupahoehoe - Manowaiopae Spring	"	"	19 58 20 155 14 20	1965
31	Kukuihaele - Waiulili	81	Hamakua	20 07 05 155 35 10	1966
32	Kona - Well No 12	84	N Kona	19 38 00 155 58 05	1949, 1954-1956, 1958
33	" Well No 12-8	"	S Kona	19 27 24 155 53 40	1963
34	" Waiaha Stream	"	N Kona	19 33 12 155 55 40	1954, 1955, 1963, 1966
35	" Inlet to steel tank	"	"	19 38 10 155 57 05	1956
36	Kokoiki - Kohala Ditch (Raw)	81	N Kohala	20 11 50 155 50 25	1945, 1956
37	Kohala - Halaula Well	"	"	20 13 22 155 47 05	1956
38	Kawaihae Experimental Test Well	85	S Kohala	20 01 47 155 47 13	1961, 1963
39	Kapoho Well	83	Puna	19 30 17 154 50 21	1961
40	Kapaau - Kohala Ditch	81	N Kohala	20 12 55 155 48 10	1945, 1948, 1954, 1955
41	Kamuela	85	S Kohala	20 02 41 155 40 00	1948
42	Kahaluu Well	84	N Kona	19 35 10 155 58 03	1959, 1966
43	Keauhuhu - Kehena Ditch	81	N Kohala	20 18 50 155 50 25	1945, 1954, 1955
44	Hilo - Kaumana Spring	82	S Hilo	19 48 05 155 06 55	1945, 1949, 1950, 1952-1956, 1960, 1966
45	Honomu - Akaka Falls Spring	"	"	19 51 25 155 09 30	1949, 1956
46	Honokaa - Hamakua Ditch	"	Hamakua	20 05 10 155 28 35	1948, 1966
47	Hilo - Waiakea Springs	"	S Hilo	19 38 54 155 09 11	1953-1956, 1960, 1966
48	" Waiakea Lab	"	"	" "	1948
49	" Piihonua	"	"	19 43 25 155 07 07	1945, 1950-1953, 1955, 1956, 1960, 1963-1965
50	" Lyman Springs	"	"	19 42 06 155 10 11	1952-1956, 1960, 1966
51	" Kaohuna, Pukamaui, Lauole Streams	"	"	19 42 50 155 09 20	1949, 1960
52	" Airport Well	"	"	19 43 00 155 02 47	1946-1948, 1953-1956, 1960
53	Hilo Sugar Co Mill Camp	"	"	19 44 30 155 05 35	1955
54	Hawi - Bonds Spring	81	N Kohala	20 12 20 155 48 30	1945, 1956
55	Hawaii National Park (Rain)	83	Puna	19 26 25 155 16 50	1961
56	Hakalau	82	N Hilo	19 52 50 155 08 45	1956
57	Haina Village - Lower Hanakua Ditch	81	Hamakua	20 05 11 155 28 35	1955
58	Amauulu Camp 1 - Pukihae Stream	82	S Hilo	19 44 05 155 06 35	1948
59	Ahualoa, Honokaa - Puu Pulehu Reservoir	81	Hamakua	20 02 30 155 36 00	1954-1956, 1959
60	Puu Pulehu	"	"	20 02 30 155 36 00	1951, 1955, 1956

Site No.	Location	Hyd. Area	District	Latitude Longitude	Record Years
61	Lindsay Tunnel	"	N Kohala	20 10 35 155 47 15	1955
62	Keaau - Well No 9-2	82	Puna	19 39 43 155 00 40	1966
63	Keaauhana Well - Well No 9-7	83	"	19 24 58 154 57 18	1961
64	Waipahoehoe Well - Well No 9-8	82	"	19 35 32 155 01 02	1961
65	Hawaiian Beaches, Pahoa - Well No 9-11	"	"	19 31 13 154 55 58	1964
66	Keaau Orchard - Well No 9-12	"	"	19 39 04 155 00 45	1966
67	Kona Village Well #1 - Well No 12-7	85	N Kona	19 48 22 155 55 27	1960, 1961, 1965
68	Mauna Kea Beach Hotel - Well No 17	"	S Kohala	20 00 20 155 49 19	1964

Selected Water Quality Records

	Site No. 1				Site No. 2				Site No. 3		Site No. 4		Site No. 5		Site No. 6		Site No. 7		Site No. 8		Site No. 9		Site No. 10		
	1945	1956	1961	1964	1951	1954	1955	1964	1962	1956	1964	1958	1966	1963	1948	1956	1949	1953							
pH 25°C	6.75	6.7	—	—	—	—	—	—	—	—	5.95	—	—	—	—	—	—	—	—	—	—	—	—	pH 25°C	
pH 30°C	—	0	9.2	5.9	6.8	7.0	6.1	6.8	4.76	6.5	—	9.4	7.42	7.45	6.9	6.2	—	—	—	—	—	—	6.5	pH 30°C	
Color	0	0	0	tea	125.0	120.0	80.0	100.0	25.0	120.0	110.0	0	0	0	0	0	0	0	0	0	0	0	0	Color	
Odor	0	0	0	0	0	0	0	0	0	0	sweet	0	0	0	0	0	0	0	0	0	0	0	0	Odor	
Turbidity	0	0	0	nil	0	40.0	10.0	0	5.0	90.0	2.0	0	0	0	2.0	0	0	0	0	0	0	0	0	Turbidity	
Nitrites	0	0	0	0	0	0	0	0	0.001	0	0.001	0.1	0.01	0.001	0	0	0	0	0	0	0	0	0	Nitrites	
Nitrates	0.04	0.3	0	0.18	0	0.1	0	0.62	0.44	0	1.33	0.4	4.6	0.32	0.89	5.6	0.3	0.4	0.3	0.4	0.3	0.4	0.4	Nitrates	
Hydroxide Alkalinity	0	0	6.0	0	0	0	0	0	0	0	0	56.0	0	0.0	0	0	0	0	0	0	0	0	0	Hydroxide Alkalinity	
Bicarbonate Alkalinity	24.0	17.0	62.0	21.0	8.0	7.0	10.0	19.0	12.0	20.0	12.0	8.0	48	44.0	48	52.0	53.0	34.0	34.0	34.0	34.0	34.0	34.0	Bicarbonate Alkalinity	
Total Alkalinity	—	17.0	68.0	—	8.0	7.0	10.0	—	12.0	20.0	12.0	64.0	48	44.0	48	52.0	53.0	34.0	34.0	34.0	34.0	34.0	34.0	Total Alkalinity	
Total Hardness	34.4	28.6	64.0	3.1	30.7	11.3	11.5	14.0	21.5	24.3	8.4	89.4	55.1	145.0	48.58	65.5	45.2	64.6	64.6	64.6	64.6	64.6	64.6	Total Hardness	
Total Solids	120.0	68.0	120.0	54.5	32.0	78.0	58.0	60.0	102.0	120.0	62.0	316.0	320.0	38.0	116.0	83.0	86.0	86.0	86.0	86.0	86.0	86.0	86.0	Total Solids	
Loss on Ignition	38.0	16.0	26.0	41.0	6.0	30.0	16.0	26.0	30.0	40.0	20.0	48.0	40.0	148.0	16.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	Loss on Ignition	
Silica	25.2	14.8	23.2	2.6	4.0	2.0	1.2	8.0	10.0	14.4	3.2	24.4	31.0	72.4	27.4	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	Silica	
Iron and Aluminum	—	0.4	0.3	—	0.4	1.6	0.4	—	4.4	6.0	—	0.8	—	—	—	0.4	0.4	0.6	0.4	0.4	0.6	0.4	0.4	Iron and Aluminum	
Iron	0.1	0.1	0.1	2.0	0.4	0.3	0.2	1.43	1.5	1.0	—	0.1	—	—	—	0.18	0.1	0.3	0.1	0.1	0.3	0.1	0.1	Iron	
Aluminum	1.7	0.3	0.3	2.6	0.0	1.3	0.2	1.37	2.9	5.0	0.05	0.7	0.05	0.05	0.22	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	Aluminum	
Calcium	7.01	5.8	17.2	1.0	10.0	4.0	3.1	2.1	5.06	4.4	2.5	21.6	14.8	15.9	8.86	9.4	7.3	16.9	16.9	16.9	16.9	16.9	16.9	Calcium	
Magnesium	2.94	3.4	5.0	0.8	1.4	0.3	0.9	0.5	2.14	3.9	0.5	8.5	11.9	31.2	6.43	9.0	6.2	5.4	5.4	5.4	5.4	5.4	5.4	Magnesium	
Sulfate	10.19	8.1	17.4	2.3	4.3	19.7	17.3	0.1	9.4	4.8	0.8	30.3	19.0	65.1	6.98	7.4	8.2	13.8	13.8	13.8	13.8	13.8	13.8	Sulfate	
Sodium and Potash	7.9	9.6	3.9	27.0	0.2	1.6	3.8	12.3	9.9	17.2	5.0	54.5	66.1	178.5	7.32	9.6	11.5	4.6	4.6	4.6	4.6	4.6	4.6	Sodium and Potash	
Chlorides	9.5	8.0	4.0	6.0	6.0	6.0	4.0	19.0	20.0	6.0	6.0	90.0	93.0	345.0	13.0	8.0	6.0	7.0	7.0	7.0	7.0	7.0	7.0	Chlorides	
Arsenic	—	*0.01	*0.01	—	0	*0.01	*0.01	0	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	Arsenic	
Fluoride	—	0.1	0.1	—	0	0	0	0.6	0.05	0.1	0.05	0.2	0.22	0.1	0.15	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Fluoride	
Manganese	—	*0.1	*0.1	—	0	0	0	0	0.05	0.1	0.05	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	Manganese	
Lead	—	*0.025	*0.025	—	0	*0.01	*0.01	neg.	0.01	0.025	0.01	0.025	0.01	0.025	0.01	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	Lead	
Copper	—	*0.1	*0.1	—	0	*0.01	*0.01	neg.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Copper	
Zinc	—	*0.025	*0.025	—	0	*0.01	*0.01	neg.	0.1	0.1	0.025	0.1	0.025	0.13	0.1	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	Zinc	
Selenium	—	*0.05	*0.05	—	0	*0.01	*0.01	neg.	0.02	0.05	0.005	0.05	0.01	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	Selenium	
Phenols	—	*0.005	*0.005	—	0	*0.01	*0.01	neg.	0.05	0.005	0.0015	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	Phenols	

	Site No. 10		Site No. 12		Site No. 13		Site No. 14		Site No. 15		Site No. 16		Site No. 17		Site No. 18		Site No. 19		Site No. 20		Site No. 21		Site No. 22		
	1954	1956	1948	1956	1956	1960	1947	1954	1955	1956	1956	1948	1954	1955	1956	1961	1948	1954							
pH 25°C	6.7	6.4	—	6.4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	pH 25°C	
pH 30°C	—	—	—	—	6.8	7.1	8.1	7.9	8.1	7.1	6.4	7.7	7.4	7.8	6.0	7.6	7.0	7.9	7.0	7.0	7.0	7.0	7.9	pH 30°C	
Color	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Color	
Odor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Odor	
Turbidity	0	5.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Turbidity	
Nitrites	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Nitrites	
Nitrates	0.3	0.6	0.35	5.6	0.6	0.1	0.69	0.8	0.5	0.2	0.2	0.82	0.4	0.2	0.4	0.1	0.62	0.1	0.1	0.62	0.1	0.1	0.1	Nitrates	
Hydroxide Alkalinity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18.0	0	0	0	0	0	0	0	Hydroxide Alkalinity	
Bicarbonate Alkalinity	42.0	39.0	25.0	61.0	54.0	42.0	38.0	25.0	30.0	29.0	20.0	50.0	38.0	27.0	21.0	41.0	40.0	30.0	30.0	30.0	30.0	30.0	30.0	Bicarbonate Alkalinity	
Total Alkalinity	42.0	39.0	25.0	61.0	54.0	42.0	38.0	25.0	30.0	29.0	20.0	50.0	38.0	27.0	21.0	41.0	40.0	30.0	30.0	30.0	30.0	30.0	30.0	Total Alkalinity	
Total Hardness	67.5	46.4	34.21	80.0	52.0	79.8	33.8	52.5	49.7	39.0	22.6	82.11	211.9	89.5	25.8	34.7	43.78	137.5	137.5	137.5	137.5	137.5	137.5	Total Hardness	
Total Solids	112.0	84.0	70.0	98.0	88.0	154.0	98.0	130.0	118.0	52.0	54.0	460.0	512.0	178.0	52.0	112.0	212	338	338	338	338	338	338	Total Solids	
Loss on Ignition	28.0	14.0	26.0	6.0	4.0	52.0	15.0	28.0	20.0	6.0	20.0	126.0	136.0	10.0	10.0	20.0	69	114	114	114	114	114	114	Loss on Ignition	
Silica	4.8	0.4	17.0	12.8	22.0	30.4	42.6	34.4	36.8	11.0	1.2	39.2	12.0	32.8	64.0	10.8	34.8	24.4	24.4	24.4	24.4	24.4	24.4	Silica	
Iron and Aluminum	0.4	0.4	6.2	0.4	0.4	0.4	—	0.4	0.4	0.4	0.4	1.6	1.2	0.4	1.2	0.3	0.4	1.2	1.2	1.2	1.2	1.2	1.2	Iron and Aluminum	
Iron	0.1	0.1	0.14	0.1	0.1	0.1	0.14	0.1	0.1	0.1	0.1	0.1	0.14	0.1	0.1	0.2	0.1	0.14	0.2	0.1	0.14	0.2	0.2	Iron	
Aluminum	0.3	0.3	8.06	0.3	0.3	0.3	0.46	0.3	0.3	0.3	0.3	1.46	1.1	0.3	1.0	0.2	0.26	1.0	1.0	1.0	1.0	1.0	1.0	Aluminum	
Calcium	19.2	9.0	5.97	10.5	11.4	4.7	7.6	13.0	13.5	7.1	3.5	23.16	49.8	22.0	10.2	6.2	5.86	34.0	34.0	34.0	34.0	34.0	34.0	Calcium	
Magnesium	4.6	5.8	2.23	12.7	5.8	16.3	3.2	4.8	3.8	5.2	3.3	4.28	20.9	8.3	3.6	4.3	6.29	12.6	12.6	12.6	12.6	12.6	12.6	Magnesium	
Sulfate	26.3	17.4	4.19	4.8	21.7	21.0	10.9	17.3	22.4	18.3	7.1	25.84	37.2	18.1	10.8	4.9	7.89	31.3	31.3	31.3	31.3	31.3	31.3	Sulfate	
Sodium and Potash	2.5	4.7	0.00	4.4	4.8	15.3	23.7	5.0	1.3	6.5	49.92	62.9	25.1	3.8	7.5	43.22	22	22	22	22	22	22	22	Sodium and Potash	
Chlorides	6.0	7.0	5.0	6.0	5.0	6.0	7.0	4.0	2.0	4.0	2.0	1.80	177.0	48.0	6.0	12.0	54	85	85	85	85	85	85	Chlorides	
Arsenic	*0.01	*0.01	0	*0.01	0.01	0.01	0	0.01	0.01	0.01	0.01	0.01	0	0.01	0.01	0.01	0	0.01	0.01	0.01	0.01	0.01	0.01	Arsenic	
Fluoride	0	*0.1	0.1	0.1	0.1	0.1	0.01	0.20	0.2	0.1	0	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Fluoride	
Manganese	0	*0.1	0	*0.1	0.1	0.1	0	0	0.1	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	Manganese	
Lead	*0.01	*0.025	neg.	*0.025	0.025	0.025	neg.	0.01	0.01	0.025	0.025	neg.	0.01	0.01	0.025	0.025	neg.	0.01	0.01	0.025	0.025	0.025	0.025	0.025	Lead
Copper	*0.01	*0.1	neg.	*0.1	0.1	0.1	neg.	0.01	0.01	0.1	0.1	neg.	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	Copper
Zinc	*0.1	*0.1	neg.	*0.025	0.025	0.025	neg.	0.01	0.01	0.025	0.025	neg.	0.01	0.01	0.025	0.025									

Note: Units in ppm for nitrites through phenols. Alkalinity and hardness expressed in terms of CaCO₃. Asterisk indicates less than designated figure. Site No. 6 for 1960: pH 30°C, 6.6; chlorides, 100.0. Site No. 11, chlorides for 1960: Parker Ranch No. 3, 550.0; Parker Ranch No. 4, 610.0.

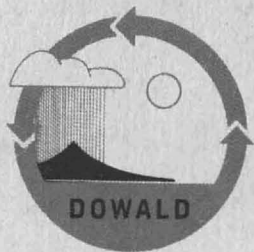
	Site No. 32		Site No. 33		Site No. 34		Site No. 35		Site No. 36		Site No. 37		Site No. 38		Site No. 39		Site No. 40				
	1958	1963	1954	1955	1963	1966	1956	1945	1956	1949	1956	1961	1963	1961	1945	1948	1954	1955			
pH 25°C	—	—	6.5	6.7	5.58	—	7.45	—	7.45	—	—	—	—	—	7.2	—	6.7	—	pH 25°C		
pH 30°C	7.1	7.0	—	—	—	—	—	7.3	—	7.2	—	8	7.7	7.3	7.2	—	—	—	pH 30°C		
Color	0	0	70.0	80.0	70.0	lt. yel. tint	80	28.0	80.0	0	0	0	0	5	0	45.0	40.0	120.0	0	Color	
Odor	0	1.0	musty	0	0	0	0	0	0	0	0	0	0	chem. hyd.	0	0	0	0	0	Odor	
Turbidity	0	3	20.0	80.0	5.0	5	40	28.0	20.0	0	5	10	1	0	20.0	0	30.0	5.0	0	Turbidity	
Nitrites	0	0.002	0	0	*0.01	0.01	0	0	0	0	0	0	0	0.001	0	0	0	0	0	Nitrites	
Nitrates	0.8	1.09	0.1	0	0.25	0.1	0.3	0.22	0.8	0.87	1.2	0	2.88	0.1	0.11	0.09	0.1	0	0	Nitrates	
Hydroxide Alkalinity	0	0	0	0	—	0	0	0	0.8	0	0	0	0	0	0	0	0	0	14.0	Hydroxide Alkalinity	
Bicarbonate Alkalinity	36	40	3.0	10.0	12.0	14	15	34.0	19.0	37.0	40	78	89	50	26.5	33.0	15.0	15.0	15.0	Bicarbonate Alkalinity	
Total Alkalinity	36	40	3.0	10.0	12.0	14	15	—	19.0	—	40	78	89	50	—	—	15.0	29.0	29.0	Total Alkalinity	
Total Hardness	189	55.7	21.3	23.9	10.0	8.5	17.4	69.1	15.6	46.51	49.5	250	214	106.4	45.2	33.12	20.1	42.2	42.2	Total Hardness	
Total Solids	1180	320	50.0	84.0	36.0	60	52	164.0	90.0	128.00	142	1200	796	740.0	97.0	79.0	98.0	112.0	112.0	Total Solids	
Loss on Ignition	272	60	8.0	32.0	18.0	20	16	62.0	40.0	17.00	30	212	240	60.0	47.0	26.0	36.0	48.0	48.0	Loss on Ignition	
Silica	25.6	48.8	2.4	0.4	6.5	7	2.8	46.4	17.6	42.2	28.4	30	89.2	70.5	23.2	26.2	13.6	11.2	11.2	Silica	
Iron and Aluminum	0.8	—	4.4	2.8	—	—	0.4	—	0.4	1.4	0.4	—	—	0.3	—	2.4	4.0	0.4	0.4	Iron and Aluminum	
Iron	0.2	0.07	3.5	1.5	0.6	—	0.1	2.14	0.1	0.07	0.1	—	—	0.2	1.79	0.22	0.6	0.1	0.1	Iron	
Aluminum	0.8	0.05	0.9	1.3	0.06	0.17	0.3	10.66	0.3	1.33	0.3	—	0.05	0.1	5.41	2.18	3.4	0.3	0.3	Aluminum	
Calcium	14.9	7.6	4.4	5.5	2.5	4.2	14.7	7.15	4.9	8.02	4.9	53.6	31.5	14.1	5.86	6.29	5.6	11.8	11.8	Calcium	
Magnesium	37.3	8.92	2.4	2.4	0.9	1.6	3.9	3.89	0.6	5.46	8.9	27.8	32.8	17.1	2.76	2.58	1.5	3.1	3.1	Magnesium	
Sulfate	76.4	23.5	5.9	5.4	1.6	1	4.4	3.78	4.5	9.62	12.5	90.8	54	65.4	4.19	2.62	2.4	10.5	10.5	Sulfate	
Sodium and Potash	236.0	70	4.5	4.6	2.5	8.4	0.7	3.15	3.1	14.55	12.6	0	149.5	163.5	2.68	7.73	1.1	8.2	8.2	Sodium and Potash	
Chlorides	440	106	10.0	4.0	3.5	0	3.0	9.5	6.0	22.0	26.0	550	250	331.0	10.5	10.0	5.0	17.0	17.0	Chlorides	
Arsenic	0.01	0.01	*0.01	*0.01	0.002	0.01	0.01	0	*0.01	0	0.01	—	0.01	0.01	0	0	*0.01	*0.01	*0.01	Arsenic	
Fluoride	0.2	0.3	0.1	0	0.05	0.08	0.1	0	0.2	0.1	0.1	—	0.2	0.1	—	0	0.1	0.2	0.2	Fluoride	
Manganese	0.1	0.05	0	0	0.05	0.05	0.1	—	0.1	0	0.1	0.1	0.05	0.1	—	0	0	0	0	Manganese	
Lead	0.025	0.012	*0.01	*0.01	0.009	0.01	0.025	—	*0.025	neg.	0.025	—	0.01	0.025	—	neg.	*0.01	*0.01	*0.01	Lead	
Copper	0.1	0.1	*0.01	*0.01	*0.1	0.1	0.1	—	*0.1	neg.	0.1	—	0.13	0.1	—	neg.	*0.01	*0.01	*0.01	Copper	
Zinc	0.14	0.1	0.1	1.2	*0.1	0.2	0.11	—	*0.025	neg.	0.025	—	0.1	0.025	—	neg.	*0.01	*0.01	*0.01	Zinc	
Selenium	0.005	0.005	*0.01	*0.01	*0.01	0.01	0.05	—	*0.05	neg.	0.05	—	0.01	0.05	—	neg.	*0.01	*0.01	*0.01	Selenium	
Phenols	0.005	0.005	*0.01	*0.01	*0.001	0.001	0.005	—	*0.005	neg.	0.005	—	0.001	0.005	—	neg.	*0.01	*0.01	*0.01	Phenols	

	Site No. 41		Site No. 42		Site No. 43		Site No. 44		Site No. 45											
	1948	1959	1966	1945	1954	1955	1945	1949	1950	1951		1952	1953	1955	1956	1960	1966	1949	1956	
pH 25°C	—	—	—	5.7	6.2	—	—	—	—	—	—	—	—	—	6.7	—	—	—	pH 25°C	
pH 30°C	—	7.1	7.27	—	—	7.8	6.55	—	—	6.0	6.4	6.6	6.2	6.8	—	7.1	—	6.3	pH 30°C	
Color	100.0	0	0	150.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Color
Odor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Odor
Turbidity	0	5.0	0	20.0	0	5.0	0	0	0	0	0	0	0	0	20.0	0	0	0	0	Turbidity
Nitrites	0.39	0	0.01	0	0	0	0	0	0	0.3	0	0	0	0	0	0	0.01	0.3	0.8	Nitrites
Nitrates	—	1.6	4.2	0.18	0.1	0	0	0.27	0.1	0.3	0.6	0.4	0.4	1.6	0	2.2	0	0	0	Nitrates
Hydroxide Alkalinity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Hydroxide Alkalinity
Bicarbonate Alkalinity	14.0	45.0	10	15.5	28.0	34.0	25	28	29	20	25.0	24.0	23.0	23.8	31.0	32	44	47	47	Bicarbonate Alkalinity
Total Alkalinity	—	45.0	10	—	28.0	34.0	25	28	29	20	25.0	24.0	23.0	23.8	31.0	32	44	47	47	Total Alkalinity
Total Hardness	15.17	41.5	29.7	44.4	34.3	35.8	13.3	34.74	11.9	32.6	33.2	47.5	43.5	29.0	29.2	23.3	43.3	45.2	45.2	Total Hardness
Total Solids	54.0	104.0	140	93.0	92.0	90.0	91	68	70	66	64.0	40.0	42.0	74.0	80.0	80	74	82	82	Total Solids
Loss on Ignition	30.0	12.0	40	63.0	8.0	24.0	28	21	18	36	16.0	8.0	0.4	28.0	16.0	20	13	10	10	Loss on Ignition
Silica	7.0	31.6	39	8.0	12.0	11.2	18	21.4	23	18.6	10.6	4.4	6.0	15.6	1.6	22	22	2.4	2.4	Silica
Iron and Aluminum	3.0	0.4	—	—	0.4	2.0	1.9	2.8	0.2	0.8	0.4	0.4	0.4	4.4	0.4	—	2.0	0.4	0.4	Iron and Aluminum
Iron	0.89	0.1	—	3.43	0.1	0.2	0.15	0.14	0.1	0.1	0.3	0.1	0.1	0.1	0.1	—	0.1	0.1	0.1	Iron
Aluminum	2.11	0.3	0.05	7.77	0.3	1.8	1.75	2.66	0.1	0.7	0.1	0.3	0.3	4.3	0.3	0.05	1.5	0.3	0.3	Aluminum
Calcium	2.00	6.9	8.5	3.72	10.7	10.2	7.72	7.29	6.3	8.0	0.1	13.2	10.0	5.3	5.9	10.6	8.6	8.1	8.1	Calcium
Magnesium	0.57	5.8	6.3	1.44	1.8	2.4	2.1	2.01	1.6	3.0	10.0	3.5	4.4	3.8	4.8	4.6	3.9	6.0	6.0	Magnesium
Sulfate	1.32	16.6	7	3.62	11.8	10.9	11.47	4.52	1.9	17.6	2.0	13.1	6.7	1.5	9.3	1.0	7.3	7.9	7.9	Sulfate
Sodium and Potash	4.67	20.4	22.5	2.75	3.1	8.8	7.83	3.73	8.0	6.8	6.9	8.8	6.1	6.6	2.1	8.0	9.0	8.7	8.7	Sodium and Potash
Chlorides	7.0	6.0	7	9.3	11.0	9.0	7.0	7.0	3.0	7.9	5.0	6.0	5.0	6.0	7.0	8.0	7.0	7.0	7.0	Chlorides
Arsenic	0	*0.01	0.01	0	0.01	*0.01	0	0	0	0	0	*0.01	*0.01	*0.01	*0.01	0.01	0	0.01	0.01	Arsenic
Fluoride	0	0	0.1	0.28	—	0.1	0.1	—	0.1	0.1	0.08	0.1	0	*0.1	0	0.06	0.1	0.1	0.1	Fluoride
Manganese	0	—	0.05	—	0	0	—	0	0	0	0	0	0	*0.1	0.1	0.05	0	0.1	0.1	Manganese
Lead	neg.	*0.025	0.01	—	*0.01	*0.01	—	neg.	neg.	neg.	0	*0.01	*0.01	*0.01	*0.025	0.01	neg.	0.025	0.025	Lead
Copper	neg.	*0.1	0.1	—	*0.01	*0.01	—	neg.	neg.	neg.	0	*0.01	*0.01	*0.1	*0.1	0.01	neg.	0.10	0.10	Copper
Zinc	neg.	*0.025	0.1	—	*0.01	0.1	—	neg.	neg.	neg.	0	0.05	*0.01	*0.1	*0.025	0.14	neg.	0.05	0.05	Zinc
Selenium	neg.	*0.05	0.01	—	*0.01	*0.01	—	neg.	neg.	neg.	0	*0.01	*0.01	*0.05	*0.04	0.01	neg.	0.05	0.05	Selenium
Phenols	neg.	*0.005	0.001	—	*0.01	*0.01	—	neg.	neg.	neg.										

	Site No. 49				Site No. 50				Site No. 51				Site No. 52						
	1964	1965	1966	1952	1953	1954	1955	1956	1960	1966	1949	1960	1946	1947	1948	1953	1954		1955
pH 25°C	—	—	—	—	—	—	6.9	6.6	7.5	7.35	—	—	7.4	7.9	—	7.4	7.4	7.1	pH 25°C
pH 30°C	6.70	6.35	7.33	6.7	7.0	7.1	—	—	—	—	7.1	—	—	—	—	—	—	—	pH 30°C
Color	35	20	yel. tint	0	0	5.0	0	5.0	0	0	0	0	0	0	0	0	0	0	Color
Odor	0	0	musty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Odor
Turbidity	3	2	100+	0	0	20.0	0	5.0	0	2	0	5	0	0	0	0	0	0	Turbidity
Nitrites	0.001	0.001	0.01	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	Nitrites
Nitrates	0.3	0.62	0.3	0.3	0	0	0.5	0.2	0	0.5	0.18	0.1	1.33	0.62	0.62	0.1	0	0.3	Nitrates
Hydroxide Alkalinity	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	Hydroxide Alkalinity
Bicarbonate Alkalinity	20	16	20	15.0	13.0	14.0	12.0	13.0	21.0	20	17	14	34	30	33.0	28.0	26.0	10.0	Bicarbonate Alkalinity
Total Alkalinity	20	16	20	15.0	13.0	14.0	12.0	13.0	21.0	20	17	14	34	32	—	28.0	26.0	10.0	Total Alkalinity
Total Hardness	10.3	10.3	10.6	19.6	18.5	17.9	21.2	26.1	21.2	10.6	18	23.9	98.2	87	84.93	158.4	167.6	20.0	Total Hardness
Total Solids	38	40	60	36.0	74.0	48.0	50.0	40.0	42.0	60	50	48	484	434	436.0	44.0	488.0	44.0	Total Solids
Loss on Ignition	16	24	20	26.0	28.0	12.0	16.0	10.0	6.0	20	17	10	133	80	107.0	100.0	31.2	4.0	Loss on Ignition
Silica	11.6	11.1	14	12.0	8.4	7.6	6.4	8.0	11.2	12	15	6.4	33.0	33.8	32.4	28.4	23.2	8.4	Silica
Iron and Aluminum	—	—	—	0.4	1.2	1.6	0.4	0.4	0.4	—	2.6	0.4	0.6	—	2.0	0.4	3.2	0.4	Iron and Aluminum
Iron	—	—	—	0.1	0.1	0.3	0.1	0.1	0.1	—	0.14	0.1	0.04	0.07	0.14	0.1	0.1	0.1	Iron
Aluminum	0.05	0.05	0.05	0.3	1.1	1.3	0.3	0.3	0.3	0.05	2.16	0.3	0.56	0.33	1.86	0.3	3.1	0.3	Aluminum
Calcium	3.15	2.32	4.2	7.0	5.3	5.6	5.5	3.3	3.5	2.1	3.72	1.7	11.6	10.2	10.29	38.5	39.9	4.2	Calcium
Magnesium	0.60	1.1	2.2	6.5	1.3	0.9	1.8	4.3	2.9	2.4	0.52	3.5	16.4	14.6	13.0	14.9	16.3	1.9	Magnesium
Sulfate	0.5	2.7	1	5.8	6.9	2.6	8.2	2.9	12.2	1	3.21	10.2	26.6	27.0	28.2	32.1	46.1	13.5	Sulfate
Sodium and Potash	4	5	5.7	3.9	4.7	3.1	4.7	3.8	1.1	6.4	4.56	1.1	107	113.6	93.56	80.5	75.5	2.8	Sodium and Potash
Chlorides	5	5	5	2.0	7.0	2.0	4.0	2.0	3.0	4	4.9	4.0	210	194	184.0	180.0	186.0	2.0	Chlorides
Arsenic	0.01	0.01	0.01	0	*0.01	*0.01	*0.01	*0.01	*0.01	0.01	0	0.01	0	0	0	*0.01	*0.01	*0.01	Arsenic
Fluoride	0.1	0.2	0.14	0.14	0.2	0.1	0.1	0.2	0	0.08	0.1	0	0.4	0.1	0.1	0.2	0.1	0.3	Fluoride
Manganese	0.05	0.05	0.05	0	0	0	0	*0.1	*0.1	0.05	0	0.1	0	0	0	0	0	0	Manganese
Lead	0.025	0.01	0.01	0	*0.01	*0.01	*0.1	*0.025	*0.025	0.01	neg.	0.025	—	neg.	neg.	*0.01	*0.01	*0.01	Lead
Copper	0.1	0.1	0.1	0	*0.01	*0.01	*0.1	*0.1	*0.1	0.1	neg.	0.1	0	neg.	neg.	*0.01	*0.01	*0.01	Copper
Zinc	0.1	0.1	0.1	0	*0.01	*0.01	*0.2	*0.1	*0.025	0.1	neg.	0.35	0	neg.	neg.	*0.01	0.4	*0.01	Zinc
Selenium	0.01	0.01	0.01	0	*0.01	*0.01	*0.01	*0.05	*0.05	0.01	neg.	0.05	0	neg.	neg.	*0.01	*0.01	*0.01	Selenium
Phenols	0.001	0.002	0.001	0	*0.01	*0.01	*0.01	*0.005	*0.005	0.001	neg.	0.005	—	neg.	neg.	*0.01	*0.01	*0.01	Phenols

	Site No. 52		Site No. 53		Site No. 54		Site No. 55		Site No. 56		Site No. 57		Site No. 58		Site No. 59		Site No. 60		Site No. 61		Site No. 62		
	1956	1960	1955	1945	1958	1961	1956	1955	1948	1954	1955	1956	1959	1951	1955	1956	1955	1956	1955	1956	1956	1956	
pH 25°C	7.3	6.7	—	—	—	—	—	—	—	5.6	6.0	5.6	6.8	6.8	6.0	5.6	—	—	7.8	—	7.73	—	pH 25°C
pH 30°C	—	—	7.0	6.75	6.5	7.2	6.9	6.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	pH 30°C
Color	0	0	10	0	0	0	0	60	0	100.0	70	100	5	125.0	70.0	100.0	0	0	0	0	0	0	Color
Odor	0	0	0	0	0	0	0	0	0	III M	0	III M	0	0	0	0	0	0	0	0	0	0	Odor
Turbidity	0	0	5	0	5	0	5	0	40.0	40	40	40	0	40.0	40.0	40.0	5.0	0	0	0	0	0	Turbidity
Nitrites	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*0.01	0	Nitrites
Nitrates	0.1	0.1	0.5	0.44	0.1	0	0.4	0.2	0.09	0.4	0	0.4	0	0	0	0.4	0	0.4	0	0	2.6	0	Nitrates
Hydroxide Alkalinity	0	0	0	0	0	0	0	0	0	0	0	0	0	—	0	0	0	0	0	0	0	0	Hydroxide Alkalinity
Bicarbonate Alkalinity	26.0	28.0	19.0	36	41.0	17	45	15	21	9.0	7	9.0	12	—	7.0	9.0	34.0	43.0	34.0	48.0	48.0	48.0	Bicarbonate Alkalinity
Total Alkalinity	26.0	28.0	19.0	36	41.0	17	45	15	21	9.0	7	9.0	12	—	7.0	9.0	34.0	43.0	34.0	48.0	48.0	48.0	Total Alkalinity
Total Hardness	57.0	59.1	37.1	33.9	38.2	10.6	59.1	26.9	21.02	8.6	15	8.6	17.2	30.7	15.0	8.6	35.8	46.8	35.8	46.8	46.8	46.8	Total Hardness
Total Solids	290.0	286.1	56	109	106	30	130	46	38.0	52	38.0	90	32.0	52.0	38.0	90.0	90.0	180.0	90.0	180.0	180.0	180.0	Total Solids
Loss on Ignition	32.0	84.0	20	29	16	10	20	20	19	16.0	20	16	36	6.0	20.0	16.0	24.0	40.0	24.0	40.0	40.0	40.0	Loss on Ignition
Silica	31.6	8.4	4.4	22	32	4.4	6.4	0.4	11.60	0.4	0.4	0.4	22.8	4.0	0.4	0.4	11.2	22.0	—	—	—	—	Silica
Iron and Aluminum	2.4	0.4	0.4	2.8	0.4	0.2	0.4	3.2	3.60	0.8	2.4	0.8	0.8	0.4	2.4	0.8	2.0	—	—	—	—	—	Iron and Aluminum
Iron	0.1	0.1	0.2	0.43	0.1	0.1	0.1	0.3	0.14	0.2	0.4	0.2	0.2	0.4	0.4	0.2	0.2	—	—	—	—	—	Iron
Aluminum	2.3	0.3	0.2	2.37	0.3	0.1	0.4	2.9	3.46	0.6	2.0	0.6	0.6	0	2.0	0.6	1.8	—	—	—	—	—	Aluminum
Calcium	6.6	8.2	9.8	5.00	5.9	1.8	8.6	6.1	3.86	1.8	4.0	1.8	3.6	10.0	4.0	1.8	10.2	12.7	—	—	—	—	Calcium
Magnesium	9.9	11.5	3.0	3.32	5.6	2.2	8.4	2.8	1.53	1.0	1.2	1.0	1.9	1.4	1.2	1.0	2.4	10.1	—	—	—	—	Magnesium
Sulfate	30.5	7.6	7.1	7.15	12.8	6.7	4.4	13.2	2.79	5.6	11.9	5.6	12	4.3	11.9	5.6	10.9	10.0	—	—	—	—	Sulfate
Sodium and Potash	58.2	62.5	2.2	12.82	15.7	1.6	5.4	4.7	2.64	2.8	4.2	2.8	6.3	0.2	4.2	2.8	8.8	25 & 6.8	—	—	—	—	Sodium and Potash
Chlorides	120.0	108.0	4.0	13.3	14.0	2.0	7.0	4.0	5	6.0	4.0	5	19	6.0	4.0	6.0	9.0	60.0	—	—	—	—	Chlorides
Arsenic	*0.01	*0.01	0.01	0	0.01	0.01	0.01	0.01	0	*0.01	0.01	0.01	0.01	0	*0.01	*0.01	*0.01	*0.01	—	—	—	—	Arsenic
Fluoride	*0.1	0	0.1	—	0.2	0.1	0.1	0.1	0.1	0.2	0	0.2	0.1	0	0	0.2	0.1	0.06	—	—	—	—	Fluoride
Manganese	*0.1	*0.1	0	—	0.1	0.1	0.1	0	0	*0.1	0	0.1	0.1	0	0	*0.1	0	*0.05	—	—	—	—	Manganese
Lead	*0.1	*0.025	0.1	—	0.025	0.025	0.025	0.01	neg.	*0.025	0.01	0.025	0.025	neg.	*0.01	*0.025	*0.01	*0.01	—	—	—	—	Lead
Copper	*0.1	*0.1	0.1	—	0.1	0.1	0.10	0.01	neg.	*0.1	0.01	0.1	0.1	neg.	*0.01	*0.1	*0.01	*0.01	—	—	—	—	Copper
Zinc	*0.1	*0.02	0.25	—	0.075	0.60	0.025	0.01	neg.	*0.025	0.01	0.025	0.025	neg.	*0.01	*0.025	0.1	0.1	—	—	—	—	Zinc
Selenium	*0.5	*0.025	0.01	—	0.05	0.05	0.05	0.01	neg.	*0.05	0.01	0.05	0.05	neg.	*0.01	*0.05	*0.01	*0.01	—	—	—	—	Selenium
Phenols	*0.005	*0.005	0.01	—	0.005	0.005	0.005	0.01	neg.	*0.005	0.01	0.005	0.005	neg.	*0.01	*0.005	*0.01	*0.001	—	—	—	—	Phenols

	Site No. 63	Site No. 64	Site No. 65	Site No. 66	Site No. 67		Site No. 68	
	1961	1961	1964	1966	1960	1961	1965	1964
pH 25°C	7.9	—	7.68	6.3	—	7.2	7.33	8.05
pH 30°C	—	7.1	—	—	7.7	—	—	—
Color	0	0	0	3	20.0	0	0	15.0
Odor	0	0	0	—	—	0	0	—
Turbidity	0	0	2	8	—	0	4.0	20.0
Nitrites	0.0	0.0	*0.001	—	—	0.0	0.002	*0.001
Nitrates	0.0	0.0	0.22	2.5	0.0	0.0	8.31	2.33
Hydroxide Alkalinity	0.0	0.0	0.00	—	213.0	0.0	0.00	0.00
Bicarbonate Alkalinity	43.0	58.0	38.0	—	213.0	209.0	360.00	87.0
Total Alkalinity	43.0	58.0	38.0	32	—	109.0	360.0	61.0
Total Hardness	71.5	41.0	24.0	112.0	334.5	368.0	384.0	231.0
Total Solids	222.0	140.0	123.0	504.0	1186.0	1180.0	1092.0	1054.0
Loss on Ignition	12.0	56.0	38.0	—	178.0	132.0	96.0	33.0
Silica	44.0	46.5	58.8	33	—	15.6	80.0	30
Iron and Aluminum	0.3	0.3	—	—	—	0.3	—	0.2
Iron	0.1	0.1	—	—	—	0.1	—	43.3
Aluminum	0.2	0.2	—	—	—	0.2	—	56.2
Calcium	16.2	5.3	4.20	11.4	41.2	21.4	27.0	100.0
Magnesium	7.5	6.7	4.83	—	55.5	75.1	77.0	460.0
Sulfate	18.4	10.9	6.7	34.5	—	88.6	60.0	—
Sodium and Potash	49.2	7.6	16 & 2	126 & 7	—	153.0	250 & 12	—
Chlorides	72.0	6.0	16.0	230.0	370.0	390.0	370.0	250
Arsenic	*0.01	*0.01	*0.01	—	—	*0.1	*0.1	*0.01
Fluoride	0.1	0.1	0.2	—	—	0.1	0.1	0.2
Manganese	*0.1	*0.1	*0.05	20.3	—	*0.1	*0.05	*0.05
Lead	*0.025	*0.025	*0.01	—	—	*0.025	*0.01	*0.01
Copper	*0.1	*0.1	*0.1	—	—	*0.1	*0.1	—
Zinc	*0.025	0.025	*0.1	—	—	*0.025	4.0	*0.1
Selenium	*0.05	*0.05	*0.01	—	—	*0.05	*0.01	*0.01
Phenols	*0.005	*0.005	*0.001	—	—	*0.005	*0.001	*0.001



Ka wai oia ke ola o ka aina.

Water is the life of the land.