

# GEOGRAPHY AND ENVIRONMENT

This section relates to area, climatologic, topographic, hydrologic, noise and other geographic and environmental measurements of Hawaii.

The State consists of eight major islands and 124 minor islands with a total land area of 6,425 square miles and a general coastline of 750 miles. Honolulu is 214 miles from Hilo, 1,367 miles from Kure Atoll (the westernmost end of the State), and 2,397 miles from San Francisco. The highest peak in the State is Mauna Kea, 13,796 feet above sea level; the longest stream is Kaukonahua Stream, Oahu, 33 miles in length; the biggest lake is Halalii, on Niihau, 841 acres; and the highest named waterfall is Kahiwa, Molokai, a 1,750-foot cascade. Various measures of air pollution, such as suspended particulate matter, indicate that Honolulu is one of the cleanest cities in the nation. There is also very little water pollution: 32 out of 35 major Oahu beaches were rated "A" in 1973 (coliform not exceeding 50 per 100 ml.), only three were rated "B" (51-500), and none was rated "C" (501 or more). Climatically, Hawaii is marked by remarkably balmy temperatures and wide variations in rainfall. The all-time temperature range in downtown Honolulu, for example, is from 57° to 88°F. Normal precipitation, however, ranges from 5.7 inches near Kawaihae, South Kohala, to 486 inches atop Waialeale. The longest volcanic eruption in Island history lasted 875 days, the worst earthquake attained 7.5 on the Richter scale, and the highest tsunami wave reached 66 feet. Water withdrawn for use in 1970 averaged 2.7 billion gallons per day, compared with 2.0 billion in 1965 and 1.5 billion in 1960. Among thirty neighborhoods on Oahu, median noise levels ranged from 44.7 decibels (in Pearl City) to 61.5 decibels (in Waikiki).

Important sources of data include the U.S. Geological Survey, National Ocean Survey, National Weather Service, U.S. Bureau of the Census Geography Division, the Division of Water and Land Development of the State Department of Land and Natural Resources, the State Department of Health, and the University of Hawaii Institute of Geophysics. Detailed information is given in *Hawai'i, the Natural Environment*, published by the Department of Planning and Economic Development in 1974. National data are reported in *Statistical Abstract of the United States: 1974*, Section 6.

**Table 64.—GREAT CIRCLE DISTANCES BETWEEN HONOLULU INTERNATIONAL AIRPORT AND SPECIFIED PLACES**

Place	Distance from Honolulu		Place	Distance from Honolulu	
	Statute miles	Kilometers		Statute miles	Kilometers
<b>Hawaiian Islands:</b>			<b>Other Pacific locations, con.:</b>		
Cape Kumukahi, Hawaii <sup>1</sup> .....	236	380	Johnston Island .....	820	1,319
Hilo, Hawaii <sup>2</sup> .....	214	344	Kingman Reef .....	1,073	1,726
Ka Lae (South Cape), Hawaii .....	221	356	Manila, Philippines .....	5,293	8,516
Kailua, Kona, Hawaii .....	168	270	Pago Pago, Amer. Samoa .....	2,606	4,193
Kahului, Maui .....	98	158	Palmyra Island .....	1,101	1,772
Lanai Airport .....	72	116	Papeete, Tahiti .....	2,741	4,410
Molokai Airport .....	54	87	Suva, Fiji .....	3,159	5,083
Lihue, Kauai .....	103	166	Sydney (Port Jackson), Australia ...	5,070	8,158
Puuwai, Niihau .....	152	245	Tokyo, Japan .....	3,847	6,190
Nihoa .....	283	455	Wake Island .....	2,294	3,691
Necker Island .....	520	837	<b>North and South America:</b>		
French Frigate Shoals .....	556	895	Anchorage, Alaska .....	2,781	4,475
Gardner Pinnacles .....	688	1,107	Cape Horn, Chile .....	7,457	11,998
Maro Reef .....	851	1,369	Chicago, Illinois .....	4,179	6,724
Laysan Island .....	936	1,506	Cristobal, Canal Zone .....	5,214	8,389
Lisianski Island .....	1,065	1,714	Los Angeles, California <sup>2</sup> .....	2,557	4,114
Pearl and Hermes Atoll .....	1,208	1,944	Miami, Florida .....	4,856	7,813
Midway Islands .....	1,309	2,106	New York, New York .....	4,959	7,979
Kure Atoll <sup>1</sup> .....	1,367	2,200	Portland, Oregon .....	2,595	4,175
<b>Trust Territory of the Pacific Isl.:</b>			San Diego, California .....	2,610	4,199
Majuro, Marshall Islands .....	2,271	3,654	San Francisco, California <sup>2</sup> .....	2,397	3,857
Kwajalein, Marshall Islands .....	2,443	3,931	Seattle, Washington .....	2,679	4,311
Kolonia, Ponape, E.C.I. ....	3,087	4,967	Vancouver, B.C. ....	2,709	4,359
Saipan, Mariana Islands .....	3,704	5,960	Victoria, B.C. ....	2,668	4,293
Koror, Palau, W.C.I. ....	4,593	7,390	Tijuana, Mexico .....	2,616	4,209
<b>Other Pacific locations:</b>			Washington, D.C. ....	4,829	7,770
Apra Harbor, Guam .....	3,806	6,124	London, England .....	7,226	11,627
Auckland, New Zealand .....	4,393	7,068	Bombay, India .....	8,010	12,888
Hong Kong .....	5,541	8,915	Ghanzi, Botswana <sup>3</sup> .....	12,417	19,979

<sup>1</sup>The great circle distance from Cape Kumukahi to Kure Atoll—the points farthest apart in the Hawaiian Archipelago and State of Hawaii—is 1,523 statute miles (2,451 kilometers). The distance from Kure Atoll to other extreme points in the United States is: West Quoddy Head, Maine, 5,788 miles (9,313 kilometers); Log Point, Elliot Key, Florida, 5,852 miles or 9,416 kilometers (Kure and Log Point are the points farthest apart in the fifty States). Kure is 2,486 miles (4,000 kilometers) from Tokyo, Japan.

<sup>2</sup>Hilo is 2,315 statute miles (3,725 kilometers) from San Francisco and 2,447 miles (3,937 kilometers) from Los Angeles.

<sup>3</sup>Ghanzi, Botswana, is Honolulu's antipode, that is, the point precisely opposite to it on the globe.

Source: U.S. Department of the Interior, Geological Survey, *Elevations and Distances in the United States* (1970), and distance computations prepared for the Department of Planning and Economic Development.

**Table 65.—AREA AND COASTLINE OF COUNTIES, ISLANDS, AND CITIES**

County, island, or city	Total area		Land area <sup>1</sup>		Inland water area <sup>2</sup>		General coastline <sup>3</sup>		Tidal shoreline <sup>4</sup>	
	Sq. mi.	Sq. km.	Sq. mi.	Sq. km.	Sq. mi.	Sq. km.	Statute miles	Km.	Statute miles	Km.
State total .....	6,450	16,707	6,425	16,642	25	65	750	1,207	1,052	1,693
Counties:										
Hawaii .....	4,038.0	10,458	4,037.0	10,456	1.0	3	266	428	313	504
Maui .....	1,161.1	3,007	1,160.3	3,005	0.8	2	} 210	338	343	552
Kalawao .....	13.3	34	13.3	34	—	—				
Honolulu .....	610.9	1,582	595.7	1,543	15.2	39				
Kauai .....	627.1	1,624	619.1	1,603	8.0	21	137	220	162	261
Islands:										
Hawaii .....	4,038.0	10,458	4,037.0	10,456	1.0	3	266	428	313	504
Maui .....	728.8	1,888	728.2	1,886	0.6	2	120	193	149	240
Kahoolawe .....	45.0	117	45.0	117	—	—	29	47	36	58
Molokini .....	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	—	—	...	...	...	...
Lanai .....	139.5	361	139.5	361	—	—	47	76	52	84
Molokai .....	261.1	676	260.9	676	0.2	1	88	142	106	171
Oahu .....	607.7	1,574	592.7	1,535	15.0	39	112	180	209	336
Kauai .....	553.3	1,433	548.7	1,421	4.6	12	90	145	110	177
Niihau .....	73.0	189	69.6	180	3.4	9	45	72	50	80
Lehua .....	0.4	1	0.4	1	—	—	...	...	...	...
Kaula .....	0.4	1	0.4	1	—	—	2	3	2	3
Northwestern Haw'n. I. <sup>6</sup> ...	3.2	8	3.0	8	0.2	1	25	40	25	40
Cities:										
Hilo <sup>7</sup> .....	298.9	774	298.9	774	—	—	...	...	...	...
Honolulu <sup>8</sup> .....	88.7	230	86.6	224	2.1	5	...	...	...	...
On Oahu .....	85.5	221	83.6	217	1.9	5	...	...	...	...

<sup>1</sup>Dry land and land temporarily or partially covered by water, as marshland, swamps, etc.; streams and canals under one-eighth statute mile wide; and lakes, reservoirs, and ponds under 40 acres of area.

<sup>2</sup>Permanent inland water surface, such as lakes, reservoirs, and ponds having 40 acres or more of area; streams, sloughs, estuaries, and canals one-eighth of a statute mile or more in width; deeply indented embayments and sounds, and other coastal waters behind or sheltered by headlands or islands separated by less than 1 nautical mile of water; and islands having less than 40 acres of area.

<sup>3</sup>Figures are lengths of general outline of seacoast. Measurements were made with a unit measure of 30 minutes of latitude on charts as near the scale of 1:1,200,000 as possible. Coastline of bays is included to a point where they narrow to width of unit measure, and includes the distance across at such point. Figures for the four islands of Maui county are not consistent with the published county total.

<sup>4</sup>Figures obtained in 1939-1940 with a recording instrument on the largest-scale charts and maps then available. Shoreline of outer coast, offshore islands, bays, rivers, and creeks is included to the head of tidewater or to a point where tidal waters narrow to a width of 100 feet.

<sup>5</sup>The area of Molokini is 18.6 acres (0.03 square miles or 7.5 hectares).

<sup>6</sup>The Northwestern Hawaiian Islands, from Nihoa to Kure Atoll, but exclusive of the Midway Islands (which are part of the Hawaiian Archipelago but not legally part of the State of Hawaii).

<sup>7</sup>As defined in Hawaii Revised Statutes, Sec. 70-1. As defined for statistical purposes under provisions of Sec. 26-18, Hilo has a land area of 56.1 square miles or 145 square kilometers.

<sup>8</sup>As defined for statistical purposes under HRS, Sec. 26-18. Includes the Northwestern Hawaiian Islands from Nihoa to Kure Atoll, exclusive of the Midway Islands.

Source: Data from Geography Division, U.S. Bureau of the Census, and U.S. Coast and Geodetic Survey, cited in the Hawaii State Department of Planning and Economic Development, *Hawai'i, the Natural Environment* (1974), pp. 9 and 13.

**Table 66.—MAJOR SUMMITS**  
(Elevation of the highest point on each island and other important peaks.)

Island and mountain	Elevation		Island and mountain	Elevation	
	Feet	Meters		Feet	Meters
<b>Hawaii:</b>			<b>Oahu:</b>		
Mauna Kea <sup>1</sup> .....	13,796	4,205	Kaala .....	4,020	1,225
Mauna Loa .....	13,677	4,169	Konahuanui <sup>2</sup> .....	3,150	960
Hualalai .....	8,271	2,521	Tantalus .....	2,013	614
Kohala .....	5,480	1,670	Olomana .....	1,643	501
Kilauea (Uwekahuna) .....	4,090	1,247	Diamond Head .....	760	232
Kilauea (Halemaumau Rim) .....	3,646	1,111	Punchbowl .....	500	152
			Koko Head .....	642	196
<b>Kahoolawe:</b>			<b>Kauai:</b>		
Lua Makika .....	1,477	450	Kawaikini .....	5,243	1,598
			Waialeale .....	5,148	1,569
<b>Maui:</b>			<b>Niihau:</b>		
Haleakala (Red Hill) .....	10,023	3,055	Paniau .....	1,281	390
Haleakala (Kaupo Gap) .....	8,201	2,500			
Puu Kukui .....	5,788	1,764	Kaula .....	550	168
Iao Needle .....	2,250	686	Nihoa .....	910	277
			Necker Island .....	277	84
<b>Lanai:</b>			La Perouse Pinnacle .....	135	41
Lanaihale .....	3,370	1,027	Gardner Pinnacles .....	190	58
			Maro Reef .....	Awash	Awash
<b>Molokai:</b>			Laysan Island .....	35	11
Kamakou .....	4,970	1,515	Lisianski Island .....	20	6
Puu Nana .....	1,381	421	Pearl and Hermes Atoll .....	—	—
			Midway Islands <sup>3</sup> .....	12±	4±
			Kure Atoll .....	20	6
			Kingman Reef <sup>3</sup> .....	3	1
			Palmyra Islands <sup>3</sup> .....	6	2

<sup>1</sup>Includes 19 cones over 11,000 feet, five of them over 13,000.

<sup>2</sup>Two distinct peaks. The lower has an elevation of 3,105 feet.

<sup>3</sup>Not part of the State of Hawaii.

Source: U.S. Geological Survey data cited in the Hawaii State Department of Planning and Economic Development, *Elevations of Major Mountains in Hawaii* (Statistical Report 52, November 7, 1967), as revised.

**Table 67.—MAJOR STREAMS, LAKES, AND WATERFALLS**

Subject	Name	Island	Magnitude
<b>Streams:</b>			
Longest water feature (miles) .....	Kaukonahua Stream .....	Oahu .....	33.0
Second longest water feature (miles) .....	Wailuku River .....	Hawaii .....	32.0
Greatest average discharge (million gal. per day) .....	Wailuku River .....	Hawaii .....	184.0
<b>Lakes:</b>			
Greatest area (acres)—			
Natural, intermittent .....	Halalii Lake .....	Niihau .....	841
Natural, perennial .....	Halulu Lake .....	Niihau .....	182
Man-made .....	Waita Reservoir .....	Kauai .....	422
Longest shoreline (miles) .....	Wahiawa Reservoir .....	Oahu .....	11
Deepest (feet) .....	Wahiawa Reservoir .....	Oahu .....	85
Highest (feet above sea level) .....	Lake Waiau .....	Hawaii .....	13,020
<b>Named waterfalls:</b>			
Greatest sheer drop (feet) .....	Akaka Falls .....	Hawaii .....	442
Greatest cascade (feet) .....	Kahiwa Falls .....	Molokai .....	1,750

Source: Hawaii State Department of Planning and Economic Development, *Hawai'i, the Natural Environment* (1974), pp. 15, 16 and 18.

**Table 68.—VOLCANIC ERUPTIONS: 1790 TO 1974**

(Includes eruptions over 200 days in duration, 15 square miles in area, or 200,000,000 cubic yards in volume; the most recent eruption of record for each volcano; and all eruptions since 1968.)

Volcano and date of outbreak	Duration (days)	Area (square miles)	Volume (cubic yards)
<b>Haleakala:</b>			
c. 1790 .....	(NA)	2.2	35,000,000
<b>Hualalai:</b>			
1800-1801 .....	(NA)	17.7	410,000,000
<b>Mauna Loa:</b>			
1843: Jan. 9 .....	90	20.2	250,000,000
1855: Aug. 11 .....	450	12.2	150,000,000
1859: Jan. 23 .....	300	32.7	600,000,000
1873: Apr. 20 .....	547	(NA)	(NA)
1880: Nov. 1 .....	280	24.0	300,000,000
1887: Jan. 16 .....	10	11.3	300,000,000
1899: July 4 .....	19	16.2	200,000,000
1919: Sept. 29 .....	Short	9.2	350,000,000
1950: June 1 .....	23	35.0	600,000,000
<b>Kilauea:</b>			
1840: May 30 .....	26	6.6	281,000,000
1919: Feb. 7 .....	294	1.6	34,500,000
Dec. 21 .....	221	5.0	62,000,000
1967: Nov. 5 .....	251	0.25	110,000,000
1968: Aug. 22 .....	5	0.01	50,000
Oct. 7 .....	15	0.8	9,000,000
1969: Feb. 22 .....	6	2.3	22,000,000
May 24 .....	875	19.3	240,000,000
1971: Aug. 14 .....	< 1	0.8	13,000,000
Sept. 24 .....	5	1.5	10,000,000
1972: Feb. 4 .....	455	13.5	162,000,000
1973: May 5 .....	< 1	0.05	1,300,000
May 7 .....	187	0.2	3,200,000
Nov. 10 .....	30	0.6	3,900,000
Dec. 12 .....	222	3.1	39,000,000
1974: July 19 .....	3	1.2	13,000,000
Sept. 19 .....	< 1	0.4	14,200,000
Dec. 31 .....	< 1	2.9	19,500,000

NA Not available.

Source: Gordon A. Macdonald and Agatin T. Abbott, *Volcanoes in the Sea* (University of Hawaii Press, 1970), pp. 50, 53, 56-57, and 74-75; D. W. Peterson, R. L. Christianson, W. A. Duffield, R. T. Holcomb, and R. I. Tilling, "Recent Activity of Kilauea Volcano, Hawaii," *Bulletin Volcanologique* (in press); and unpublished data from the U.S. Geological Survey, Hawaiian Volcano Observatory. Correct to December 31, 1974.

**Table 69.—EARTHQUAKES OF MAGNITUDE 5 OR GREATER:  
1957 TO 1975**

Date	Location	Magnitude (Richter Scale)
1957: Aug. 18 .....	E. of Hana, Maui .....	5.6
1961: Sept. 25 .....	Hawaii .....	5.75-6
1962: June 27 .....	Hawaii .....	6.1
June 28 .....	Hawaii .....	5.75
1963: Oct. 23 .....	Hawaii .....	5.4
1964: Oct. 11 .....	W. of S. Kona .....	5.3
Dec. 10 .....	Hawaii .....	5
1969: May 9 .....	Hawaii .....	5
1971: Aug. 1 .....	S.E. of Hawaii .....	4.5-5
1972: Dec. 23 .....	W. of Kona .....	5
1973: Apr. 26 .....	Hawaii .....	6.2
Oct. 9 .....	Hawaii .....	4.8-5
1974: Nov. 30 .....	Hawaii .....	5.5-6

Source: Augustine S. Furumoto, N. Norby Nielsen, and William R. Phillips, *A Study of Past Earthquakes, Isoseismic Zones of Intensity and Recommended Zones for Structural Design for Hawaii* (University of Hawaii, Center for Engineering Research, June 15, 1972), pp. 16-19; Hawaii Institute of Geophysics, records. Correct to April 9, 1975.

**Table 70.—TSUNAMIS WITH RUN-UP OF 2 METERS (6.6 FEET) OR MORE:  
1946 TO 1975  
(Correct to April 9, 1975)**

Date	Maximum height in Hawaii		Deaths in Hawaii	Damage in Hawaii (dollars)
	Meters	Feet		
1946: April 1 .....	17.0	55.8	159	26,000,000
1952: Nov. 4 .....	6.1	20.0	—	1,000,000
1957: March 9 .....	16.0	52.5	—	5,000,000
1960: May 22 .....	10.5	34.5	61	23,000,000
1964: March 27 .....	4.8	15.7	—	67,590

Source: George Pararas-Carayannis, *Catalog of Tsunamis in the Hawaiian Islands* (U.S. Coast and Geodetic Survey, May 1969); Robert C. Schmitt, "Catastrophic Mortality in Hawaii," *The Hawaiian Journal of History*, Vol. III (1969), pp. 66-86; Hawaii Institute of Geophysics, records.

**Table 71.—WATER USE: 1950 TO 1970**  
(In millions of gallons per day, unless otherwise specified.)

Subject	1950	1960	1965	1970
Water withdrawn <sup>1</sup> .....	1,270	1,500	2,000	2,700
Ground water .....	610	600	820	920
Fresh .....	(NA)	580	780	910
Saline .....	(NA)	21	37	13
Surface water .....	660	860	1,200	1,700
Fresh .....	(NA)	600	670	850
Saline .....	(NA)	260	500	860
Reclaimed sewage .....	(NA)		—	66
Withdrawn for irrigation .....	1,120	920	1,160	1,280
Conveyance losses .....	(NA)	100	200	220
Used for hydroelectric power .....	580	(NA)	360	330
Fresh water consumed .....	(NA)	410	580	810
Per capita use (gallons per day) .....	2,500	2,500	2,800	3,500

NA Not available.

<sup>1</sup>Excludes water used for hydroelectric power. Irrigation conveyance losses included in 1965 and 1970, excluded in 1960, and not specified in 1950.

Source: U.S. Geological Survey, *Estimated Use of Water in the United States* for 1950 (Circular 115, May 1951), 1960 (Circular 456, 1961), 1965 (Circular 556, 1968), and 1970 (Circular 676, 1972).



**Table 72.—AVERAGE DAILY WATER CONSUMPTION FROM COUNTY WATERWORKS: 1958 TO 1974**  
(In millions of gallons)

Year	Total	City of Honolulu <sup>1</sup>	Rest of Oahu <sup>2</sup>	Hawaii County <sup>3</sup>	Kauai County <sup>4</sup>	Maui County <sup>5</sup>
1958 .....	(NA)	41.9	11.3	3.17	(NA)	4.63
1959 .....	63.7	39.8	13.0	3.19	2.62	5.11
1960 .....	69.5	41.9	16.0	3.40	2.78	5.49
1961 .....	70.5	41.4	17.4	3.51	2.60	5.61
1962 .....	72.8	41.7	19.4	3.77	2.49	5.45
1963 .....	75.6	43.0	21.4	3.79	2.51	4.90
1964 .....	81.3	44.3	24.0	4.15	2.72	6.15
1965 .....	82.6	45.5	24.0	4.59	2.97	5.57
1966 .....	89.1	48.4	26.1	5.03	3.15	6.42
1967 .....	(NA)	51.0	28.0	(NA)	3.05	6.22
1968 .....	95.3	51.5	29.1	5.38	3.28	6.06
1969 .....	106.2	56.3	33.5	5.94	3.44	7.06
1970 .....	115.5	59.8	37.0	6.67	4.11	7.94
1971 .....	117.9	60.4	37.7	7.16	4.06	8.55
1972 .....	125.1	62.4	40.7	8.02	4.34	9.63
1973 .....	135.6	67.2	44.4	8.99	4.66	10.45
1974 .....	133.6	65.6	43.0	9.32	5.04	10.69

NA Not available.

<sup>1</sup>Amount supplied, 1958; consumption, 1959 and later years. Data refer to calendar years through 1960, the six-month period ended June 30, 1961, and years ended June 30, 1962 and thereafter.

<sup>2</sup>Water sales, 1958; consumption, 1959 and later years. Data refer to calendar years through 1960, the six-month period ended June 30, 1961, and years ended June 30, 1962 and thereafter.

<sup>3</sup>Total water consumption for all years. Data refer to calendar years through 1966 and years ended June 30 thereafter.

<sup>4</sup>Water sales for all years. Data refer to years ended June 30.

<sup>5</sup>Total consumption for all years. Data refer to calendar years through 1965, the six-month period ended June 30, 1966, and years ended June 30, 1967 and thereafter.

Source: Honolulu Board of Water Supply, *Supplement to the Annual Report* for 1963-1974, and records; Hawaii County Department of Water Supply, records; Kauai County Department of Water, records; Maui County Department of Water Supply, records.

**Table 73.—WATER QUALITY DATA FOR OAHU BEACHES: 1950 TO 1973**

Beach	Coliform per 100 milliliters (logarithmic average)					
	1950	1960	1970	1971	1972	1973
Ala Moana Park <sup>1</sup> .....	177.0	11	3	8	12	6
Fort De Russy .....	19.2	7	11	15	17	13
Kuhio Beach .....	4.0	6	25	43	14	20
Hanauma Bay .....	3.9	2	16	7	3	9
Kailua Beach .....	6.4	6	15	14	6	7
Punaluu Park .....	6.3	157	8	74	19	33
Haleiwa Park .....	12.6	81	7	11	12	7
Waianae Park .....	1.7	3	13	32	9	5
Ewa Beach .....	2.4	9	4	6	13	16

<sup>1</sup>Diamond Head side.

Source: *Annual Report, Department of Health, State of Hawaii, Statistical Supplement, 1950-1973.*

**Table 74.—DAILY REFUSE, FOR OAHU: 1970**  
(Excludes agricultural and military refuse.)

Kind of refuse	Tons
Total refuse .....	2,236
Combustible:	
Paper .....	635
Trimings .....	362
Rags .....	23
Wood .....	494
Food .....	51
Plastics and miscellaneous .....	20
Non-combustible:	
Metal .....	127
Glass .....	63
Demolition material .....	461

Source: Metcalf & Eddy, *Solid Waste Management Plan for City and County of Honolulu* (July 1971), p. 61.

**Table 75.—SUSPENDED PARTICULATE MATTER,  
FOR HONOLULU: 1957 TO 1974**

(Sampling conducted from roof of Health Department Building. Annual mean levels over 80 ug/m<sup>3</sup> may affect human health.)

Year	Mean micrograms per cubic meter
1957 .....	47
1958 .....	59
1959 .....	63
1960 .....	47
1961 .....	43
1962 .....	41
1963 .....	42
1964 .....	44
1965 .....	41
1966 .....	35
1967 .....	38
1968 .....	45
1969 .....	43
1970 .....	37
1971 .....	45
1972 .....	41
1973 .....	34
1974 .....	35

Source: Hawaii State Department of Health, *Statistical Report* (annual) and records.

**Table 76.—AIR POLLUTANT EMISSIONS, BY SOURCE AND COUNTY: 1970**  
(In tons per year)

Source or county	Sulphur oxides	Particulates	Carbon monoxide	Hydrocarbons	Nitrogen oxides
Total .....	58,000	51,000	506,000	119,000	74,000
Source:					
Motor vehicles .....	1,000	1,420	413,500	67,900	40,700
Aircraft .....	570	1,390	4,570	3,810	1,250
Vessels .....	1,490	160	400	100	610
Other transportation .....	420	240	3,040	3,460	3,220
Fuel combustion in stationary sources .....	53,000	25,000	1,550	3,200	25,000
Residential, commercial, institutional .....	12,200	490	83	170	3,470
Industrial .....	12,000	910	11	160	3,000
Agricultural .....	2,550	22,800	1,450	2,200	3,900
Steam-electric utilities .....	26,200	1,150	6	700	14,800
Solid waste disposal .....	400	5,800	24,600	8,700	1,900
Industrial process losses .....	1,280	11,800	270	20,200	200
Agricultural field burning .....	(N)	4,860	57,200	11,440	1,140
County:					
City and County of Honolulu .....	50,500	23,800	368,000	86,100	57,800
Hawaii County .....	3,000	15,000	61,000	14,500	7,400
Kauai County .....	1,200	6,600	30,400	7,200	3,400
Maui County .....	3,400	5,600	46,600	10,900	5,400

N Negligible.

Source: Hawaii State Department of Health, Environmental Protection and Health Services Division, records (revised May 1973.)

Table 77.—AEROMETRIC SURVEY DATA FOR SPECIFIED LOCATIONS: 1974

Subject	DOH Bldg. <sup>1</sup>	Kalihi Kai	Pearl City	Barbers Point	Waimanalo	Ala Moana	Kahului, Maui <sup>2</sup>	Kihei, Maui <sup>2</sup>	Hilo, Hawaii	Lihue, Kauai
Minimum:										
Particulate matter <sup>3</sup> .....	16	31	25	19	13	25	16	29	12	13
Sulfur dioxide <sup>3</sup> .....	< 5	< 5	< 5	< 5	—	< 5	< 5	—	< 5	< 5
Nitrogen dioxide <sup>3</sup> .....	< 20	< 20	< 20	< 20	—	< 20	< 20	—	< 20	< 20
Carbon monoxide, 1 hr. <sup>4</sup> .....	0.6	—	—	—	—	—	—	—	—	—
Photochemical oxidants <sup>3</sup> .....	6	—	—	—	—	—	—	—	—	—
Maximum:										
Particulate matter <sup>3</sup> .....	87	155	161	132	74	127	121	561	59	110
Sulfur dioxide <sup>3</sup> .....	44	80	32	14	—	16	179	—	14	< 5
Nitrogen dioxide <sup>3</sup> .....	95	75	95	24	—	95	41	—	23	86
Carbon monoxide, 1 hr. <sup>4</sup> .....	30.5	—	—	—	—	—	—	—	—	—
Photochemical oxidants <sup>3</sup> .....	122	—	—	—	—	—	—	—	—	—
Annual average:										
Particulate matter <sup>3</sup> .....	35	60	58	47	31	63	70	136	26	37
Sulfur dioxide <sup>3</sup> .....	10	5	5	< 5	—	5	30	—	< 5	< 5
Nitrogen dioxide <sup>3</sup> .....	37	37	25	< 20	—	41	< 20	—	< 20	< 20

<sup>1</sup>South Beretania and Punchbowl Streets, Honolulu. Carbon monoxide sampled for only 11 months.

<sup>2</sup>Sampled for 11 months.

<sup>3</sup>Concentration in micrograms per cubic meter.

<sup>4</sup>Concentration in milligrams per cubic meter.

Source: Hawaii State Department of Health. Environmental Protection and Health Services Division, records.

**Table 78.—NOISE LEVELS IN VARIOUS NEIGHBORHOODS ON OAHU: 1974**

[Noise measurements were taken at 578 stations distributed over the populated areas on Oahu, except Waialua, Haleiwa and small communities along the north shoreline. Noise readings were not taken in these areas because previous noise measurements in these communities were similar to noise levels in Waimanalo and Olomana areas. The noise measurement stations were randomly distributed over the communities.

Since one of the objectives of this noise survey was to establish the existing ambient and residual noise levels of each community, the noise readings at each station were taken as far as possible away from all heavily used roads and freeways. Loud identifiable noise from nearby traffic, airplane passing overhead, dogs barking and noise from other sources were also measured. The noise readings at any location were taken on three or more widely separated days. This was done to avoid any abnormal noise conditions. In densely populated areas, the noise survey was conducted between the hours of 4:00 a.m. to 10:00 a.m., 9:00 a.m. to 5:00 p.m. and 4:00 p.m. to 2:00 a.m. In less populated areas west of Pearl City, Wahiawa and Mililani Town, the noise readings were taken during the daytime only.]

Neighborhood	Noise level (in decibels) exceeded—		
	10 percent of time	50 percent of time	90 percent of time
<b>HONOLULU</b>			
Aina Haina .....	53.5	45.0	40.0
Aina Koa .....	61.0	48.4	42.3
Downtown .....	67.0	58.0	50.5
Hawaii Kai .....	57.0	46.5	40.5
Kahala .....	56.7	45.5	42.0
Kaimuki .....	59.0	50.7	44.0
Kalihi .....	58.0	50.2	43.7
Kapahulu .....	55.0	49.7	44.0
Kapalama-Liliha .....	63.8	56.0	46.0
Kuliouou .....	53.5	46.3	40.5
Makiki .....	64.5	55.0	49.5
Manoa .....	58.7	45.3	40.0
Moiliili .....	62.0	55.0	50.0
Niu Valley .....	57.0	46.7	39.5
Nuuanu .....	63.0	50.1	45.4
Palolo .....	58.5	49.4	44.0
Pawaa .....	65.5	60.0	54.0
Waikiki .....	69.0	61.5	54.0
Waialae-Iki .....	60.0	50.5	41.5
Ward to Punchbowl .....	67.5	60.2	57.0
<b>REST OF OAHU</b>			
Aiea-Waimalu .....	57.5	47.3	40.5
Halawa Heights, Foster Village, Salt Lake, Aliamanu .....	57.5	54.5	48.7
Kailua .....	55.5	45.0	37.5
Kaneohe .....	54.0	45.5	40.5
Mililani Town .....	57.5	50.0	45.0
Pearl City .....	53.2	44.7	38.7
Wahiawa .....	62.5	50.5	46.0
Waianae .....	56.5	50.0	45.0
Waimanalo .....	54.5	50.0	44.5
Waipahu .....	59.0	51.0	45.5

Source: Survey conducted by Dr. Iwao Miyake for the Hawaii State Department of Health, and summarized by the Noise and Radiation Branch, Department of Health.

**Table 79.—NOISE COMPLAINTS RECEIVED BY THE HONOLULU POLICE DEPARTMENT: 1973 AND 1974**

Type of noise	1973	1974
All noise complaints .....	9,009	8,741
Loud party, music, singing, TV, radio, etc. ....	4,809	4,081
Loud talking, yelling, crying, etc. ....	909	1,700
Loud vehicle .....	979	604
Loud equipment, construction noises .....	329	231
Noisy animals .....	998	788
Unspecified noises .....	985	1,337

Source: Honolulu Police Department, records.

Table 80.—CLIMATIC DATA FOR SELECTED PLACES

VRE

Island and station	Ground elevation (feet)	Average temperature (°F)		Extreme temperature of record (°F)		Average annual precipitation (inches)	Average annual possible sunshine (percent)
		Coolest month	Warmest month	Lowest	Highest		
Hawaii:							
Hilo Airport .....	27	70.6	75.8	53	94	136.62	38
Haw'n Volcanoes Nat. Park Hdq.	3,971	57.9	63.5	37	85	100.69	—
Kona (Kailua) .....	30	72.1	77.3	54	93	25.22	—
Puako <sup>1</sup> .....	10	73.1	79.8	52	98	9.47	—
Waimea (Kamuela) .....	2,670	62.3	66.8	34	90	40.05	—
Mauna Kea summit <sup>2</sup> .....	13,796	31.1	42.5	11	66	8.08	—
Maui:							
Hana .....	120	71.3	76.8	50	90	70.65	—
Haleakala summit .....	9,960	42.6	50.0	14	73	50.69	—
Kihei <sup>3</sup> .....	90	70.9	78.4	49	98	13.25	—
Kahului Airport .....	48	71.7	79.0	48	95	16.33	70
Lahaina .....	45	71.2	77.7	52	93	14.53	—
Molokai:							
Kaunakakai .....	12					14.08	
Molokai Airport .....	450	70.2	77.6	48	90	29.21	
Lanai:							
Lanai City .....	1,620	65.8	72.8	46	88	38.44	
Oahu:							
Honolulu International Airport ..	7	72.4	79.4	52	92	21.89	69
Honolulu Federal Building <sup>4</sup> .....	12	71.9	78.4	57	88	23.96	65
Waikiki <sup>5</sup> .....	10	71.9	80.6	51	93	28.90	
Manoa (HSPA) .....	500	69.4	75.2			158.41	
Kaneohe MCAS .....	10	72.9	79.1	58	90	43.88	
Kahuku .....	25	70.6	77.8	49	95	41.10	
Wheeler AFB .....	826	68.2	75.5	52	89	39.85	
Waianae .....	20	72.1	79.7	45	96	20.31	
Kauai:							
Kilauea .....	315	68.7	75.6	49	94	68.03	
Kealia .....	9	70.2	78.0	44	93	43.28	
Lihue Airport .....	103	70.7	78.4	50	90	43.00	55
Poipu (Makahuena Pt.) .....	52	72.4	79.4	50	93	36.39	
Kokee (Kanalohuluhulu) .....	3,600	54.9	65.5	31	80	72.25	
Waialeale .....	5,075					486.	
Northwestern Hawaiian Islands:							
Midway .....	10	65.0	78.6	52	89	43.60	

<sup>1</sup>Temperature data are for Mahukona.

<sup>2</sup>Based on incomplete and non-continuous data for 1966-1972.

<sup>3</sup>Temperature data refer to Puunene Airport.

<sup>4</sup>Temperature sensors are 87 feet above the ground.

<sup>5</sup>Located at Honolulu Zoo. Available only from 1965. The rainfall average shown is thought to be above the long-term average.

Source: U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service Pacific Region, data supplied March 13, 1973.



**Table 81.—CLIMATIC DATA FOR THE PERIOD OF RECORD**

Subject	Date	Place	Magnitude
Long-term averages:			
Lowest monthly average minimum temperature (°F.)	February	Mauna Kea summit	23.3
Lowest monthly average daily temp. (°F.)	February	Mauna Kea summit	31.1
Highest monthly average maximum temperature (°F.)	August	Waiawa, Kauai	89.7
Highest monthly average daily temp. (°F.)	August	Puako, Hawaii	80.7
Lowest average annual rainfall (inches)		N. of Kawaihae	5.7
Highest average annual rainfall (inches)		Waialeale	486.
Single events:			
Lowest temperature of record (°F.)	Feb. 11, 1973	Mauna Kea summit	11.
Highest temperature of record (°F.)	April 27, 1931	Pahala, Hawaii	100.
Lowest annual rainfall of record (inches)	1953	Kawaihae, Hawaii	0.2
Highest annual rainfall of record (inches)	1947-1948	Waialeale	624.
Highest wind speed of record (m.p.h.)	Jan. 17-18, 1959	Mauna Loa Obser.	105+

Source: U.S. Department of Commerce, National Weather Service Pacific Region, data supplied March 14, 1973.

**Table 82.—TEMPERATURE AND RAINFALL, FOR SPECIFIED LOCATIONS: 1960 TO 1974**

Year	Average temperature (°F.): Honolulu Federal Bldg.			Extreme temps. (°F.): Honolulu Fed. Bldg.		Annual rainfall (inches)				
	Annual	February	August	Lowest	Highest	Honolulu Fed. Bldg.	Hilo Airport	Holualoa Beach	Lahaina	Koloa
1960	75.6	71.9	79.2	60	86	16.23	146.80	18.08	6.62	72.05
1961	76.1	73.7	79.3	61	87	18.40	119.70	31.05	24.00	67.49
1962	75.6	71.7	78.2	58	85	15.47	71.45	20.60	14.90	70.99
1963	75.5	72.6	78.9	61	86	45.51	124.75	35.42	22.56	70.95
1964	75.8	73.5	78.3	62	85	19.96	166.44	28.42	14.57	94.83
1965	75.2	69.3	78.6	60	87	43.85	127.29	39.79	23.85	89.31
1966	75.7	70.9	78.8	58	86	25.54	124.01	23.14	13.01	58.67
1967	76.0	73.5	79.6	60	87	37.63	154.00	31.10	28.48	86.23
1968	77.0	73.0	80.9	63	88	36.24	134.14	48.86	25.87	84.00
1969	74.8	71.9	78.7	59	86	26.71	173.23	32.89	10.09	72.42
1970	75.5	71.7	78.9	59	85	18.35	153.98	20.78	11.95	64.45
1971	75.4	73.5	78.5	59	85	28.61	140.69	37.61	15.93	75.33
1972	75.0	71.2	78.8	61	88	26.72	98.85	33.22	20.21	66.72
1973	74.8	70.8	78.1	62	85	18.66	107.97	14.85	10.13	66.78
1974	75.9	73.8	79.0	63	86	28.24	117.34	40.49	13.01	86.35

Source: U.S. Department of Commerce, National Weather Service, Pacific Region, records.

**Table 83.—TREES ALONG STREETS OR IN PARKS UNDER THE JURISDICTION OF THE CITY AND COUNTY OF HONOLULU: 1960 TO 1974**

Date	City and County streets and highways <sup>1</sup>		Trees in City and County parks
	Length in miles	Trees	
1960: Apr.-June .....	784.0	19,472	(NA)
1965: June 30 .....	815.54	22,475	(NA)
1970: June 30 .....	933.58	46,290	63,500
1971: June 30 .....	958.13	54,146	64,500
1972: June 30 .....	974.30	61,023	65,000
1973: June 30 .....	987.00	70,497	65,500
1974: June 30 .....	999.80	82,635	65,800

NA Not available.

<sup>1</sup>Excludes Federal, State, and private thoroughfares.

Source: Harland Bartholomew and Associates, *1960 Survey of Oahu Street Trees, City and Co. of Honolulu, State of Hawaii* (Department of Parks and Recreation, 1960), p. 6; Honolulu Department of Recreation, Conservation and Beautification Division, records.

**Table 84.—HAWAII AUDUBON SOCIETY BIRD COUNTS OF THE HONOLULU AREA: 1958 TO 1974**

(Counts are made in late December, in a circle, 15 miles in diameter, centered near Nuuanu Pali.)

Year	Species	Individual birds	Species <sup>1</sup>	Individual birds: annual average, 1970-74
1958 .....	34	7,457	Endemic species:	
1959 .....	34	4,076	Hawaiian Stilt .....	112
1960 .....	34	4,656	Hawaiian Coot .....	69
1961 .....	39	3,954	Amakihi .....	42
1962 .....	39	2,969		
1963 .....	35	7,963	Indigenous species:	
1964 .....	34	10,139	Red-footed Booby .....	1,463
1965 .....	46	11,820+	Great Frigatebird .....	614
1966 .....	51	12,557		
1967 .....	51	22,641	Introduced species:	
1968 .....	49	11,024	Common Mynah .....	2,567
1969 .....	53	13,236	Barred Dove .....	1,468
1970 .....	51	10,454	House Sparrow .....	1,373
1971 .....	50	13,218	Cattle Egret .....	759
1972 .....	52	14,559		
1973 .....	48	9,574	Migratory species:	
1974 .....	44	10,263	Pacific Golden Plover .....	564

<sup>1</sup>Endemic birds averaging more than 40 individuals, indigenous birds more than 200, introduced birds more than 600 and migratory species and stragglers more than 200. Endemic birds are those peculiar to a particular region, in this case Hawaii, and therefore found nowhere else in the world; indigenous birds are those native to a given region, in this case Hawaii, but with a total range of distribution encompassing a much wider area. The classification is that reported in Andrew J. Berger, *Hawaiian Birdlife* (1972).

Source: Hawaii Audubon Society, *The Elepaio* for February 1968-February 1975.