WATER RESOURCES OF THE PALAU ISLANDS

By Otto van der Brug

U.S. GEOLOGICAL SURVEY

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CONVERSION TABLE

The following table may be used to convert measurements in the inch-pound system to the International System of Units (SI).

Multiply	By		To obtain
	Length		
inch (in)	25.4	----	millimeter (mm)
foot (ft)	0.3048	----	meter (m)
mile (mi)	1.609	----	kilometer (km)
	Area		
acre	4,047	----	square meter (m^2)
square foot (ft^2)	0.0929	----	square meter (m^2)
square mile (mi^2)	2.590	----	square kilometer (km^2)
	Volume		
acre-foot (acre-ft)	1,233	----	cubic meter (m^3)
cubic foot (ft^3)	0.02832	----	cubic meter (m^3)
gallon (gal)	3.785	----	liter (L)
million gallons (Mgal)	3,785	----	cubic meter (m^3)
	Volume Per Unit Time (includes Flow)		
cubic foot per second (ft^3/s)	0.02832	----	cubic meter per second (m^3/s)
gallon per minute (gal/min)	0.06309	----	liter per second (L/s)
gallon per day (gal/d)	90.85	----	liter per second (L/s)
million gallons per day (Mgal/d)	0.04381	----	cubic meter per second (m^3/s)
	Miscellaneous		
cubic foot per second per square mile [$(ft^3/s)/mi^2$].	0.01093	----	cubic meter per second per square kilometer [$(m^3/s)/km^2$].
micromho per centimeter at 25° Celsius (µmho/cm at 25°C).	1.000	------	microsiemens per centimeter at 25° Celsius (µS/cm at 25°C).

DEFINITION OF TERMS

Water Resources

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

Control designates a feature downstream from the gage that determines the stage-discharge relation at the gage. This feature may be a natural constriction of the channel, an artificial structure, or a uniform cross section over a long reach of the channel.

Cubic foot per second (ft^3/s) is the rate of discharge representing a volume of one cubic foot passing a given point during one second and is equivalent to 7.48 gallons per second or 448.8 gallons per minute.

Cubic feet per second-day (ft^3/s-d) is the volume of water represented by a flow of one cubic foot per second for 24 hours. It is equivalent to 86,400 cubic feet, 1.9835 acre-feet, or 646,317 gallons.

Discharge is the volume of water that passes a given point within a given period of time.

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

Instantaneous discharge is the discharge at a particular instant of time. If this discharge is reported instead of the daily mean, the heading of the discharge column in the table is "Discharge."

Dissolved is that material in a representative water sample which passes through a 0.45-µm membrane filter.

Drainage area of a stream at a specific location is that area, measured in a horizontal plane, enclosed by a topographic divide from which direct surface runoff from precipitation normally drains by gravity into the stream above the specified point.

Gage height is the water-surface elevation referred to some arbitrary gage datum.

Gaging station is a particular site on a stream where systematic observations of hydrologic data are obtained.

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

Micrograms per liter (µg/L) is a unit expressing the concentration of chemical constituents in solution as mass (micrograms) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter.

Milligrams per liter (mg/L) is a unit expressing the concentration of chemical constituents in solution as mass (milligrams) of solute per unit volume (liter) of water.

Partial-record station is a particular site where limited streamflow and/or water-quality data are collected systematically over a period of years for use in hydrologic analyses.

Recurrence interval is the average interval of time within which an event will be equaled or exceeded once.

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

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

Specific conductance is a measure of the ability of water to conduct an electrical current. It is expressed in micromhos per centimeter at 25°C. Specific conductance is related to the type and concentration of ions in solution and can be used for approximating the dissolved-solids content of the water. Commonly, the concentration of dissolved solids (in milligrams per liter) is about 65 percent of the specific conductance (in micromhos). This relation is not constant from stream to stream, and it may vary in the same source with changes in the composition of the water.

Stage is the water-surface altitude referred to some arbitrary gage datum (gage height).

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

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

Geology

Alluvium: Soil, sand, gravel, or similar material deposited by running water.

Andesite: A volcanic rock of fine-grained texture, consisting chiefly of plagioclase feldspar and ferromagnesium materials, without olivine.

Basalt: Dark-colored, fine-grained igneous dike or flow rock of relatively high specific gravity, composed primarily of plagioclase feldspar, pyroxene, with or without olivine.

Breccia: A rock consisting of consolidated angular rock fragments larger than sand grains.

Detrital: Any loose material that results directly from rock disintegration.

Dike: A tabular body of igneous rock that cuts across the structure of adjacent rocks or cuts massive rocks.

Tuff: Indurated pyroclastic rocks of grain generally finer than 4 mm (equivalent to volcanic ash or dust).

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By Otto van der Brug

ABSTRACT

The Palau Islands are a group of 350 islands, ranging in size from a few hundred square feet to the 153-square-mile island of Babelthuap. Babelthuap is the second largest island in the western Pacific and comprises more than 80 percent of the total land area of the Palau Islands. Most of the islands are uninhabited limestone ridges covered with dense vegetation. These islands have no freshwater resources and are not included in this report.

The island of Koror with an area of 3.6 square miles is the administrative, commercial, and population center of Palau and has an annual average rainfall of 148 inches. Short-term rainfall records at other locations in the islands indicate little variation in annual rainfall throughout the Palau Islands. Runoff-to-rainfall ratios for streams on Babelthuap show that about 70 percent of the rain falling on the island runs off to the ocean. The uniformity of rainfall and basin characteristics is shown by an excellent correlation between mean annual rainfall on Koror and streamflow on Babelthuap and by the close correlations between discharge at gaging stations and partial-record sites.

Surface water quality is generally good as shown by 55 chemical analyses of water from 18 sources. The dissolved-solids concentration of the water samples did not exceed 66 milligrams per liter.

This report summarizes in one volume hydrologic data collected in a 14-year period of study and provides interpretations of the data that can be used by planners and public works officials as a basis for making decisions on the development and management of the islands' water resources.

INTRODUCTION

Cooperation

In 1968, the U.S. Geological Survey and the Trust Territory of the Pacific Islands began a joint-funding agreement to systematically collect water-resources data in most of the principal islands of the Trust Territory. Under the program, the Trust Territory agreed to provide labor, equipment, services, and funds in amounts to be matched on an equal-value basis by the Geological Survey. The Survey assumed responsibility for supervision of the work and the compilation, analyses, and publication of the data. The program began on Palau in 1969 with the construction of three gaging stations on Babelthuap and the establishment of several low-flow, partial-record stations. This program was expanded gradually in subsequent years.

Since 1981, the work has continued under an agreement between the new Republic of Palau and the Geological Survey.

Purpose and Scope

Since 1968, the U.S. Geological Survey has systematically collected water-resources information on the major islands in the Trust Territory of the Pacific Islands.

Initially, only records of discharge and stage of the major streams were collected, but the program was gradually expanded to include rainfall records, ground-water information, and chemical analyses.

The purpose of this report is to summarize in one volume all available water-resources information for the Palau Islands and to provide results of analyses of the information needed for planning, development, and management of the resources. To explore the potential for surface-water development, the continuous record of gaging stations is used for flow-duration tables and curves and for statistical analyses. Low-flow measurements are used to estimate the dry weather flow of ungaged basins. Runoff-rainfall comparisons are made, and chemical analyses of surface water are interpreted.

Geographic Setting

The Palau Islands form a chain nearly 100 miles long between latitude $6^{\circ}53'$ and $8^{\circ}12'$ North and longitude $134^{\circ}07'$ and $134^{\circ}39'$ East. The group lies about 1,000 statute miles southeast of Manila, 2,000 miles south of Tokyo and 4,600 miles west of Honolulu (fig. 1). The islands number about 350 and range in size from very small islets to Babelthuap, one of the largest islands in the western Pacific. Except for two small atolls in the north and Angaur and small reef islands in the south, all islands are enclosed within a 65-mile long reef (fig. 2).

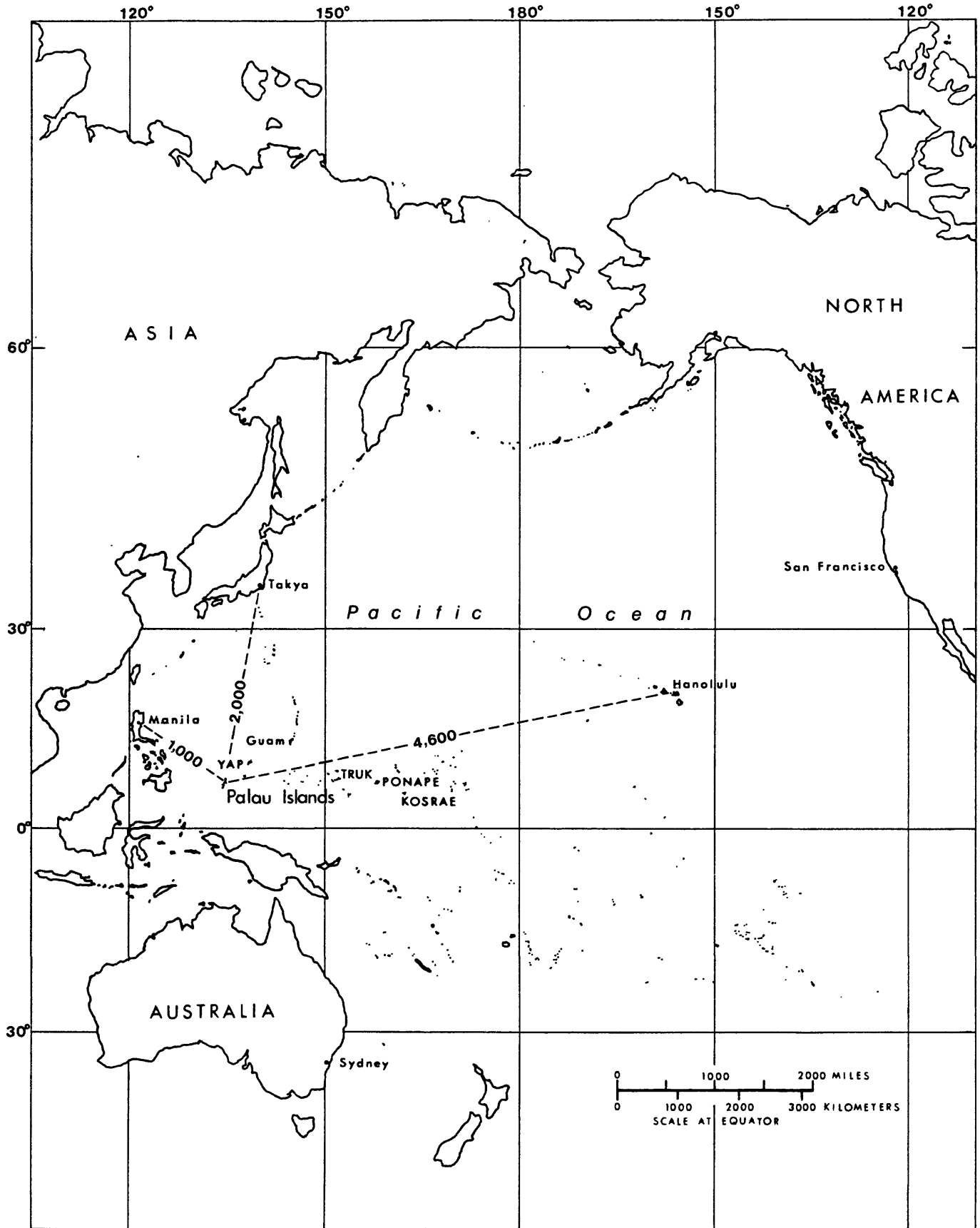
The large island of Babelthuap near the northern end of the chain, has an area of 153 mi^2 (square miles), more than 80 percent of the total land area of the Palau Islands. Directly south of Babelthuap, connected by a large bridge across a narrow channel, lies Koror, the administrative, commercial, and population center of Palau, with an area of 3.6 mi^2. Connected by causeways to Koror are the smaller islands of Ngerekebesang (0.9 mi^2) and Malakal (0.3 mi^2).

The remaining inhabited islands are farther south: Peleliu, 4.5 mi^2, still within the Palau reef, and Angaur, 3.2 mi^2, well known for its phosphate.

Between Babelthuap and Peleliu lie several hundred uninhabited limestone islands ranging in area from mere dots in the lagoon to Ngeruktabel, which has an area of 7.2 mi^2 and is the second largest island of Palau. These are called the "rock islands."

The height of the islands is low to moderate, with the highest point on Babelthuap, almost 800 feet. The northern group of Babelthuap, Koror, Ngerekebesang, and Malakal, forms a dissected volcanic plateau, presumably part of a formerly much higher land area. The "rock islands" are coralline limestone ridges covered by dense tropical growth. The northwest parts of Peleliu and Angaur are similar to the limestone ridges of the "rock islands" with much of the area of the two islands consisting of low plains of reef limestone and beach and lagoon deposits.

Fringing most of the volcanic islands are dense mangrove swamps, especially around Babelthuap where 80 percent of the coastline is bounded by mangrove thickets, covering approximately 13 mi^2.



Note: All distances are in statute miles (one statute mile is 0.868 nautical mile).

Figure 1. Location of the Palau Islands.

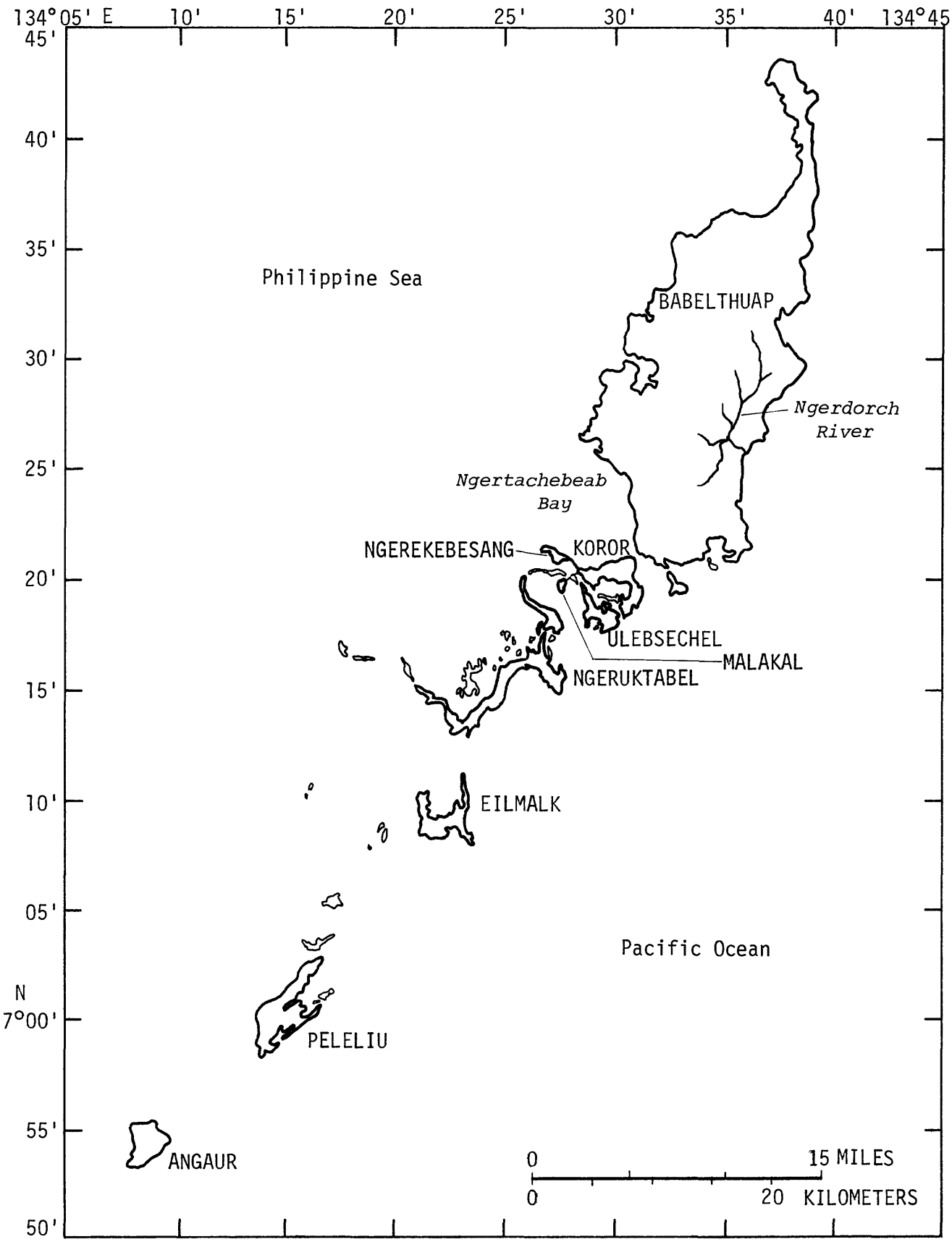


Figure 2. Palau Islands.

Streams are found only on the volcanic islands. Except for those on Babelthuap, they are small and dry part of the year. Many large streams flow on Babelthuap. The largest is the Ngerdorch River, draining almost 18 mi^2 of the eastern part of the Island.

The climate of the Palau Islands is warm and moist and varies little, the mean temperature is 27.6°C and the humidity averages 84 percent. The average rainfall is 148 inches per year. Winds are normally moderate with northeast trade winds prevailing from December to April, which are the drier months of the year.

Historical Development

The Palau Islands were discovered in 1543 by the Spanish explorer, Ruiz Lopez de Villalobos, who called the Islands Arrecifes (reef islands). The islands were rediscovered in 1710 by the Spaniard, De Padilla, after some Palau Islanders drifted to the Philippines in 1708 (Friis, 1967).

Prior to 1880, the Palau Islands were subject to little outside control and were considered to be within Spain's sphere of influence. Following a dispute between Germany and Spain in 1885 over possession of the islands, Pope Leo XIII settled the dispute in favor of Spain the following year.

In 1899, Spain sold all of the Caroline and Mariana Islands to Germany for 25 million pesetas. Guam was not included because it had been ceded by Spain to the United States in 1898. The Palau Islands became a German protectorate administered by the Governor of German New Guinea.

After the outbreak of World War I, the Japanese Navy took possession of the islands and in 1920 Japan received a mandate from the League of Nations to administer the islands. They built a town on Koror with a Japanese civilian population of more than 10,000, many times that of the native population of the island. They built roads and encouraged agriculture on Babelthuap. They mined bauxite from 1938 to 1942 near Ngermetengel, north of Ngeremeduu Bay, and from 1940 to 1944, in Ngerdmau in north Babelthuap. (See fig. 7.)

After Japan withdrew from the League of Nations in 1935, it annexed the islands as part of its empire. After 1938, the islands became a closed military area and the principal Japanese military base in the south Pacific.

In September 1944 during World War II, American Forces attacked Peleliu and Angaur. Resistance, especially on Peleliu, was fierce; securing the island took 2 months at a cost of nearly 11,000 Japanese lives and more than 1,000 American lives. From newly constructed American airfields on Peleliu and Angaur, developments on the remaining Japanese-held islands of Babelthuap, Koror, Malakal, and Ngerekebesang were destroyed (U.S. Army Chief of Engineers, 1956).

The Japanese were repatriated after World War II, and in 1947 the United States became the administrator of the Palau Islands, which were a part of the Trust Territory of the Pacific Islands, for the United Nations. In 1951, the Department of the Interior took over the responsibilities from the U.S. Navy. The islands remained under American Administration until their independence as the Republic of Palau.

Population

European explorers in the 18th century estimated the population of Palau to be 40,000. Although there is no way to confirm this, abandoned agricultural terraces indicate that the population was much larger than the present 12,000 (U.S. Army Chief of Engineers, 1956). Through diseases introduced by the Europeans, the population declined until the 20th century when most of the diseases were brought under control.

Prof. Dr. A. Krämer (1917-29) reported many abandoned villages and estimated the population of Palau at 3,000 when he visited the islands in 1907 on board the ship evacuating most of the people of the Southwest Islands to Palau after the 1906 typhoon.

Under the Japanese Administration many Japanese settled on the islands, as shown by the following population data (U.S. Army Chief of Engineers, 1956):

	Local	Foreign	Total
1920	5,605	756	6,361
1930	5,794	2,307	8,101
1935	6,022	6,776	12,798
1938	6,377	15,667	22,044
1943	6,233	27,442	33,675

The population data for 1920-38 are for the Palau District. The District consists of the Palau Islands and the Southwest Islands, small coral islands of which Sonsorol, Puluana, Merir, and Tobi are inhabited. In 1947, the population of these four islands was 292 (U.S. Army Chief of Engineers, 1956).

The population data do not include Japanese military forces. The Japanese 14th Division alone numbered about 25,000 men on Palau in 1943, most of them stationed on Babelthuap (U.S. Army Chief of Engineers, 1956).

Population data gathered during the American Administration were transmitted annually to the United Nations in reports on the administration of the Trust Territory of the Pacific Islands. In 1955, the population of the Palau District was reported as 7,656 and in 1967, as 11,232, including 225 people on the Southwest Islands (U.S. Department of State, 1954-55 and 1966-67). The 1980 U.S. census population for the Palau District was 12,116, including 153 people on the Southwest Islands (U.S. Department of Commerce, 1982).

In 1943, about 600 people, less than 10 percent of the local population, resided on Koror compared to 60 percent on Babelthuap. After World War II, the population of Koror increased rapidly with most of the increase representing migration from other Palau Islands. In 1957, the population was 3,409 on Koror, about 400 on Ngerekebesang, and 15 on Malakal (Cooper, 1959). By 1967, the population of these three islands had reached 5,667 (Hawaii Architects and Engineers, 1980) and in 1983, about 9,000 or 75 percent of the population was living on Koror.

Previous Investigations

Numerous German scientists studied the islands beginning in 1861 and published several geologic reports. During the Japanese Administration, some geologic, petrographic, and geomorphologic studies were made. Many detailed studies of coral reefs and the geology of the islands were made by Risaburo Tayama between 1934 and 1952. A list of these studies can be found in "Military Geology of Palau Islands, Caroline Islands" (U.S. Army Chief of Engineers, 1956).

After World War II, Americans surveyed phosphate, bauxite, and other mineral deposits. In 1949, a team of geologists made a reconnaissance-type investigation of the effects of phosphate mining on the ground-water resources of Angaur, and from 1951 to 1953, the U.S. Geological Survey made further studies of the effects of mining (Arnow, 1961).

Few water-resources data were collected prior to the start of the cooperative program between the Trust Territory Government and the U.S. Geological Survey in 1968.

Acknowledgments

Throughout the years, the cooperation from the Headquarters staff of Trust Territory Government on Saipan and from administrative officials in Palau has been invaluable.

Special acknowledgment is made to Koichi L. Wong, who has been involved in all phases of the work since the inception of the program; to Louis F. Irving, who acted as liaison with Headquarters on Saipan; and to the Palau Directors of Public Works, David E. Shay and Marcelino Melarei. Much of the construction of the gaging stations and practically all fieldwork throughout the life of the program was done by Florentin Yangilmau of Ngerekebesang.

GEOLOGY

The Palau Islands can be classified as follows: volcanic, high limestone, low platform, and reef and (or) atoll. A few islands--namely Koror, Peleliu, and Angaur--are combinations of more than one type.

With the exception of two atolls in the north (Kayangel and Ngaruangl) and Angaur in the south, all islands are enclosed within the Palau reef, which is partly barrier and partly fringing. The barrier reef is well developed on the west side where it averages 1-1/2 miles in width and is about 65 miles in length. Within the lagoon, the depth of the water ranges from a few feet to about 110 feet in Ngertachebeab Bay, southwest of Babelthuap, and 130 feet in Kossol passage at the north end of Babelthuap.

The volcanic islands of Babelthuap, Koror, Malakal, and Ngerekebesang form a dissected volcanic plateau, presumably part of a much higher land mass at one time (fig. 3). They have rolling uplands with rugged areas of sharp ridges and cliffs, flat alluvial areas, and irregular coastlines bounded by dense mangrove swamps.

The only perennial streams in the Palau Islands are found on Babelthuap. The largest is the Ngerdorch River with a drainage area of almost 18 mi^2. Lake Ngerdok, at the upper end of the North Fork Ngerdorch River, is the largest lake in the islands, with a length of 2,400 feet, and a width of 600 feet at the widest part. This lake is up to 9 feet deep and contains a volume of approximately 15 Mgal (million gallons).

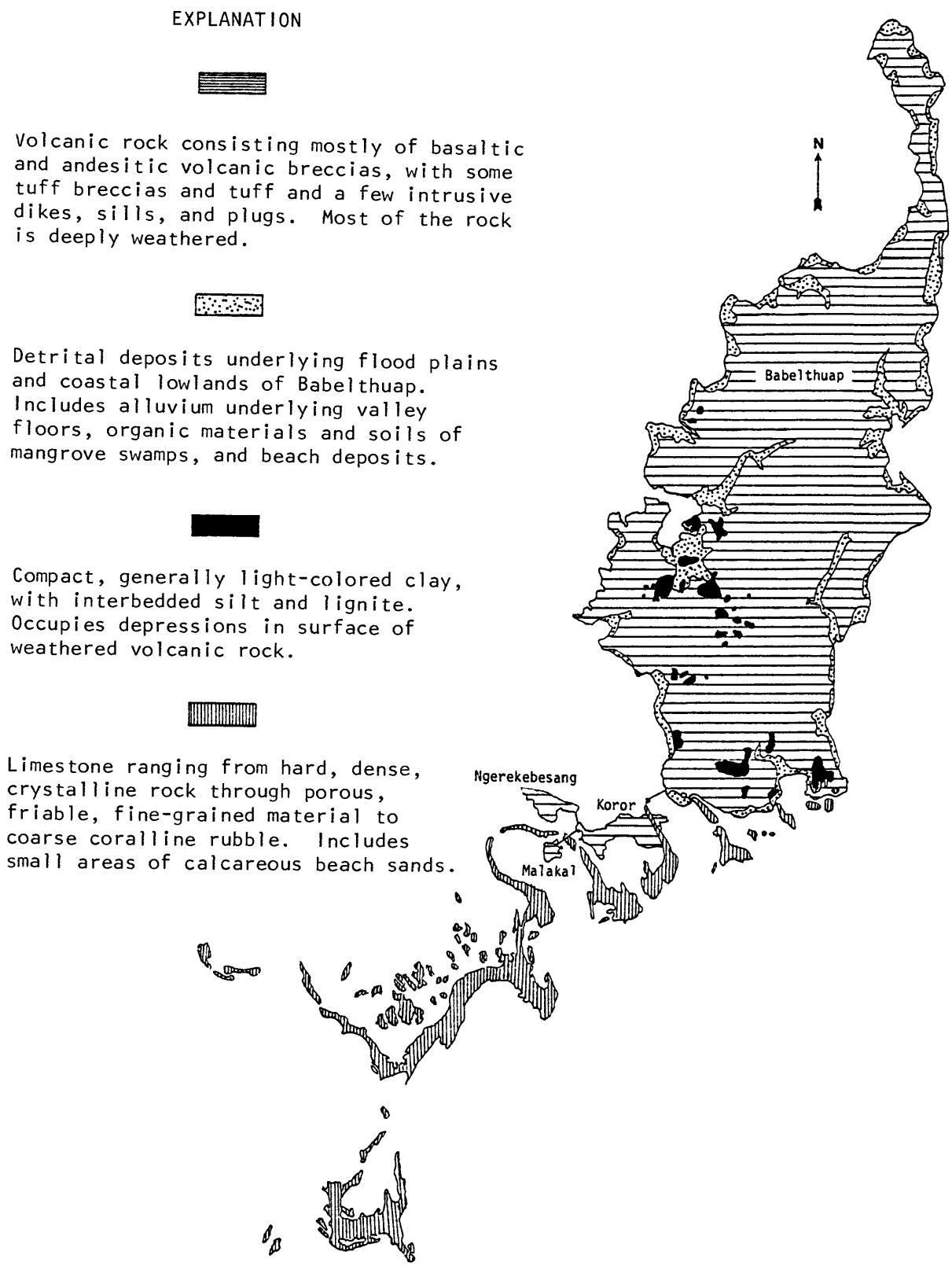


Figure 3. Map showing distribution of rock types in Babelthuap and adjacent islands.

Between Babelthuap and Peleliu, there are more than 300 high-limestone islands, the "rock islands", ranging in size from large rocks to 7.2 mi^2 Ngeruktabel. Many of these islands are irregular in shape. Ngeruktabel, for instance, while only 7.2 mi^2 in size has a shoreline of 57 miles. The islands are undercut at sea level with an overhang from 2 to 20 feet. Limestone ridges also cover the eastern part of Koror and the northern parts of Peleliu and Angaur.

The island of Koror is composed of volcanic and limestone ridges, whereas Peleliu and Angaur are composed of high limestone ridges, low plains of reef limestones, and beach deposits (figs. 4 and 5).

Outside the Palau reef, two atolls lie north of Babelthuap and some small reef islands are located on the reef near Peleliu.

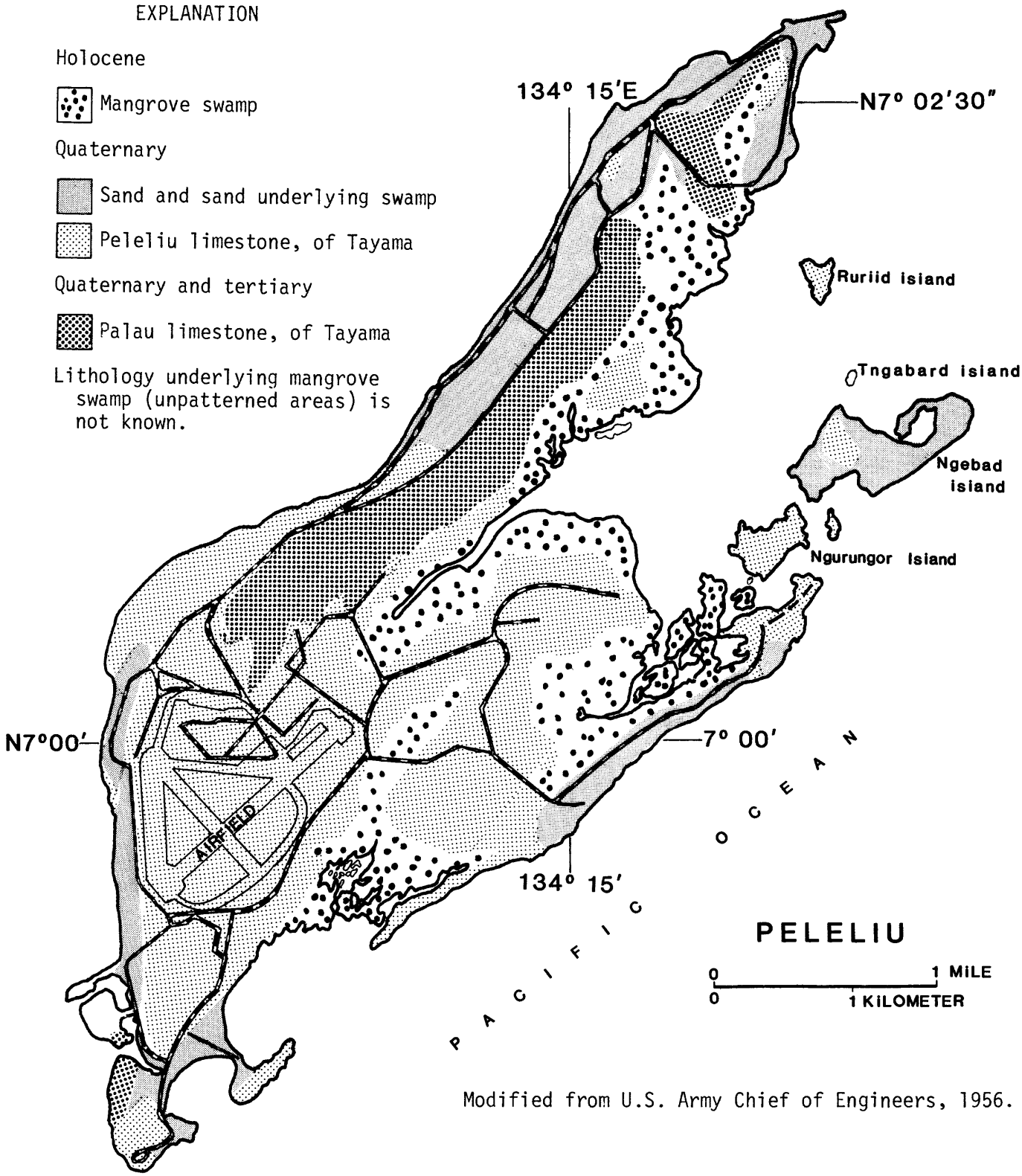
CLIMATE

General

The Palau Islands are only 7° north of the Equator in a large expanse of ocean; thus, the climate is uniformly warm and moist throughout the year. The relative humidity is high and averages 84 percent. It is highest during the early morning hours in the summer months.

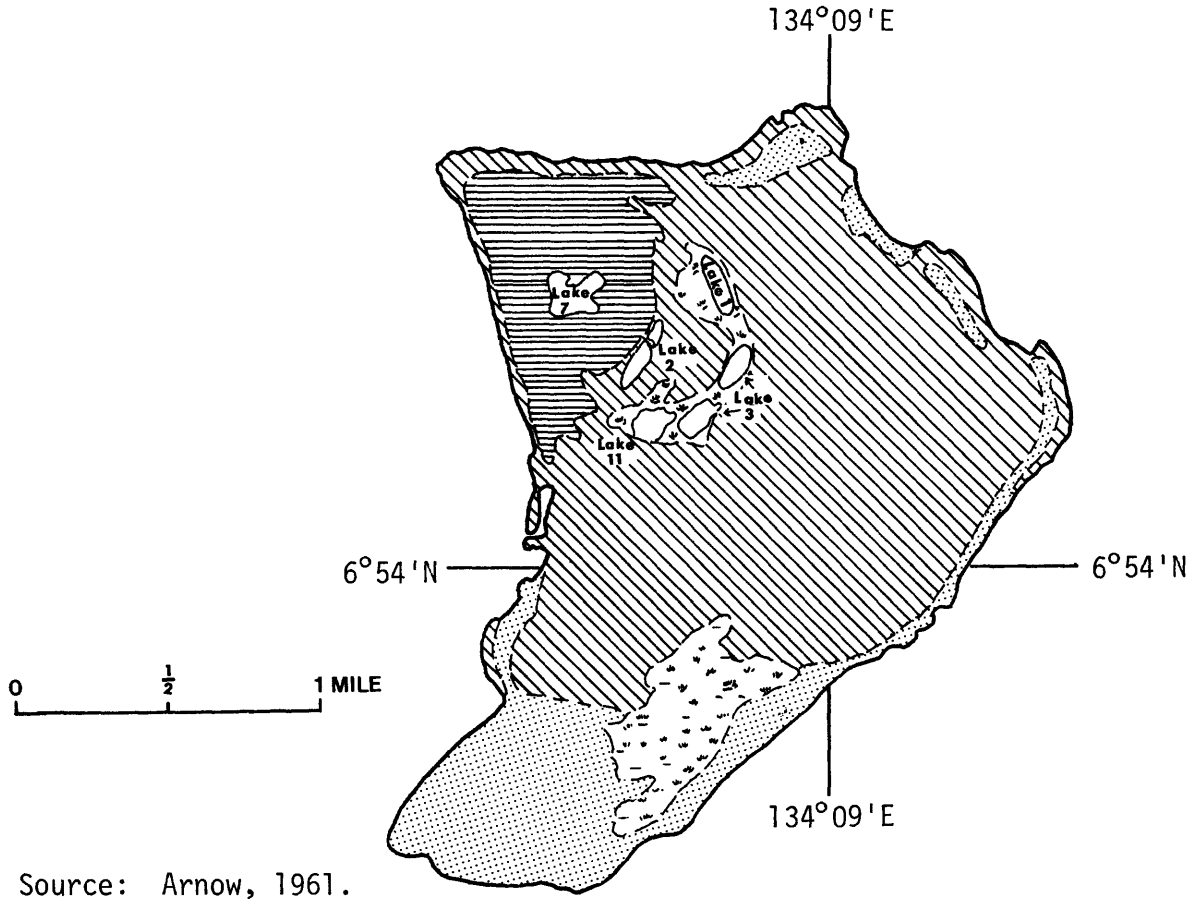
Winds average 7.3 miles per hour and are generally light to moderate during December through April, when northeast trade winds prevail. From July to October, winds vary and heavy rainfall may occur when the intertropical Convergence Zone is located near Palau. Typhoons normally stay north of the Palau Islands. Typhoons caused extensive damage in 1862 and again in 1866, but little information about these events is available. In the fall of 1906, the Southwest Islands especially Puluana and Merir, were devastated by a typhoon (Krämer, 1917-29). To prevent famine, the Germans evacuated most of the inhabitants to Ngerekebesang, where many have remained.

Other storms during the period of the German Administration occurred on May 17-18, 1909, when 13-1/2 inches of rain were recorded, and on November 26, 1912, when much damage was inflicted upon Melekeok, Ngeremlengui and the northern tip of Babelthuap (Krämer, 1917-29).



Modified from U.S. Army Chief of Engineers, 1956.

Figure 4. Geologic map of Peleliu.



Source: Arnow, 1961.

EXPLANATION

	Swamp deposits, largely organic muck	Holocene
	Calcareous sand and coralline boulders and rubble of present and older beaches	
	Coralline rubble and coralline limestone, composed of unsorted or poorly sorted fragments, sand, and fine material	Holocene and Pleistocene
	Coralline limestone, composed of unsorted or poorly sorted fragments, sand, and fine material, generally indurated	Pleistocene and Pliocene
	Geologic contact, approximately located	

Figure 5. Geologic map of Angaur.

The worst storm to strike Palau during the Japanese Administration occurred in May 1927 when 80 percent of the houses were damaged. On Peleliu all five villages were destroyed (Great Britain Naval Intelligence Division, 1945). During the last two decades, the strongest winds (73 mph) were recorded in March 1967 when typhoon Sally moved westward across Koror and southern Babelthuap causing three deaths and 50 injured. The 60-mile-per-hour winds of typhoon Marie destroyed crops and damaged structures on April 8, 1976.

The average rainfall is 148 inches per year on Koror, where records of rainfall are available for most years since 1905 from German, Japanese, and U.S. Government sources.

All locations where rainfall data have been collected are listed in table 1.

Rainfall

German records of rainfall are available for Malakal (1901-03), Koror (1905-12), and Angaur (1909-11). They were published in millimeters in the annual publication "Mitt(h)eilungen von Forschungreisenden und Gelehrten aus den deutschen Schutzgebieten, 1902-13," and for 1902-11 in "Strategic Bulletins of Oceania", No. 7 (Institute of Human Relations, 1943). (See table 20, in the Hydrologic Data section.)

The Japanese collected rainfall data on Koror during 1924-41 (table 21) and at a number of other locations for shorter periods (table 22). The locations and periods of record were listed in the annual reports for 1924-26 and 1927-34 of the (Japanese) Meterological Observatory of the South Seas Government (Bryan, 1946).

After World War II, records of rainfall have been published by the National Weather Service for Koror (since 1947), Ngesang, Babelthuap (1955-79), and Angaur (1955-77). A few monthly totals during 1952-55 are available at Aimeliik, Babelthuap. For Ngesang and Angaur many monthly and annual totals were not reported (tables 23-26).

The only location for which long-term rainfall data are available is on Koror, where almost 60 years of data have been collected. Table 2 gives the means and extremes for these years and shows that February, March, and April are the driest months of the year and that July is the wettest month.

Table 1. Rain gages in the Palau Islands

Period of record	Location	Latitude north	Longitude east	Altitude (ft)	Remarks	Frequency of reading	Diameter raincan (in)
German records:							
1901-03	Malakal	7°20'	134°27'	--	--	Daily	--
1905-12	Koror	7°20'	134°29'	--	--	do.	--
1909-11	Angaur	6°54'	134°08'	--	--	do.	--
Japanese records:							
1924-41	Koror	7°20'	134°29'	94	--	--	--
1924-34	Angaur	6°54'	134°08'	--	--	--	--
1924-34	Babelthuap	7°31'	134°30'	--	At Ngermetengel (Almongui)	--	--
1924-34	Babelthuap	7°37'	134°39'	--	At Chelap (Galap)	--	--
1924-34	Babelthuap	7°30'	134°38'	--	At Melekeok	--	--
1932-34	Peleliu	7°01'	134°13'	--	--	--	--
Records published by National Weather Service:							
1947-83	Koror	7°20'	134°29'	94	U.S. Navy to May 1951, National Weather Service from July 1951.	Hourly	8
1955-77	Angaur	6°55'	139°09'	15	At U.S. Coast Guard Loran station.	Daily	8
1955-79	Babelthuap	7°37'	134°39'	10	At Bethania Mission School at Ngesang.	do.	8
1952-55	Babelthuap	7°27'	134°31'	200	At Aimeliik	do.	8
Records collected by U.S. Geological Survey:							
1972-78	Koror	7°20'35"	134°29'14"	210	At filter plant	Monthly	6
1972-78	Malakal	7°19'59"	134°27'01"	5	At power plant	do.	6
1972-77	Peleliu	6°59'58"	138°14'16"	13	At well 5	do.	6
1972-77	Babelthuap	7°22'20"	134°31'38"	20	At Ngerimel (Gihmel) River	do.	6
1972-78	Babelthuap	7°26'20"	134°34'29"	40	At South Fork Ngerdorch (Ngardok) River.	do.	6
1972-78	Babelthuap	7°36'04"	134°35'02"	25	At Diongradid (Adeiddo) River	do.	6
1978-83	Babelthuap	7°36'08"	134°35'03"	100	do.	Continuous	8
1978-83	Babelthuap	7°22'53"	134°33'06"	80	At Airai	do.	8

Table 2. Means and extremes of rainfall on Koror

Means, maximums, and minimums, in inches, for 57-58 years during 1905-1982 at same location on Koror.

No record available for 1913-23, 1942-46, and parts of 1905, 1947, 1949, and 1951.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Mean	11.60	8.21	7.98	9.21	13.49	14.18	17.43	14.82	13.15	13.31	11.60	12.90	147.88
Percent	7.8	5.6	5.4	6.2	9.1	9.6	11.8	10.0	8.9	9.1	7.8	8.7	100
Maximum	28.13	22.46	21.98	27.69	27.46	29.17	34.82	30.03	23.54	28.74	27.86	21.65	184.99
Year	1974	1978	1972	1979	1954	1981	1962	1936	1939	1931	1937	1910	1974
Minimum	2.11	[1/] 1.24	[1/] 2.46	1.65	4.88	5.91	4.14	5.58	5.28	2.52	3.82	3.62	108.32
Year	1973	1973	1955	1948	1907	1976	1964	1930	1911	1907	1911	1935	1911
24-hour maximum.[2/]	13.86	8.42	8.46	16.95	8.21	6.38	8.27	8.18	8.47	6.18	5.17	6.61	--
Year	1974	1980	1909	1979	1958	1981	1981	1962	1949	1957	1967	1910	--

[1/] Minimum in 1983 was less: February, 0.64 inches; March, 1.71 inches.

[2/] For 1905-12, 1948-81.

The U.S. Geological Survey has made cumulative rainfall readings at several locations since 1972 (tables 27, 29, 31-34). Most records are not complete due to vandalism and other mishaps. Those which might be in error by more than 10 percent are not published in this report. Although cumulative readings might be low due to some evaporation between visits, table 3 shows little variation for most years between totals from cumulative and from daily readings and between rainfall on the various islands of Palau.

During 1978, two recording rain gages were constructed on Babelthuap, one near the gaging station on Diongradid River and the other in Airai near the Edeng River gaging station (fig. 6). The rain gages record rainfall continuously and rainfall intensities can be obtained from the charts. The daily rainfall totals have not been published previously, and are tabulated in the Hydrologic Data section (tables 28 and 30).

The location of rainfall-collection sites on Babelthuap, Koror, Malakal, and Ngerekebesang are shown in figures 7 and 8.

Air Temperatures

Air temperatures on Koror during 1945-81 (U.S. National Oceanic and Atmospheric Adm., 1981) are listed in table 4. The difference between the long-term mean for the coolest and the warmest month, is only 0.8°C. Mean annual temperatures for the period vary by less than 1°C. U.S. National Weather Service data were published in degrees Fahrenheit and have been converted to degrees Celsius. Readings of air temperatures have been made during measurements of stream discharge and are published in conjunction with water temperatures in the Hydrologic Data Section (tables 66-83).

Evaporation

No evaporation data are available for the Palau Islands. However, the U.S. National Weather Service publishes evaporation data for Guam and Yap, and it is reasonable to assume evaporation on Palau is of the same order of magnitude as evaporation on Guam and Yap. These values are provided in table 5.

Table 3. Annual rainfall totals, in inches, 1973-82

[NWS, National Weather Service; USGS, U.S. Geological Survey.
Annual totals in parentheses are from cumulative monthly readings]

Calendar year	Koror (NWS)	Angaur (NWS)	Babelthuap				Koror Filter Plant (USGS)	Malakal Power Plant (USGS)	Peleliu well 5 (USGS)
			Diongradid River (USGS)	Ngerimel River (USGS)	Airai (USGS)	S. F. Ngerdorch River (USGS)			
1973	123	--	(127)	(121)	--	(115)	--	--	(118)
1974	185	185	(158)	(174)	--	--	--	--	(152)
1975	154	--	(158)	(173)	--	(141)	(137)	(148)	(141)
1976	126	--	--	(133)	--	(100)	--	--	--
1977	119	--	(118)	(124)	--	(91)	(115)	(100)	--
1978	165	--	--	--	--	--	--	--	--
1979	160	--	152	--	--	--	--	--	--
1980	169	--	--	--	149	--	--	--	--
1981	153	--	158	--	154	--	--	--	--
1982	137	--	126	--	135	--	--	--	--

Figure 6. Recording rain gage at Airai, Babelthuap, January 1980.

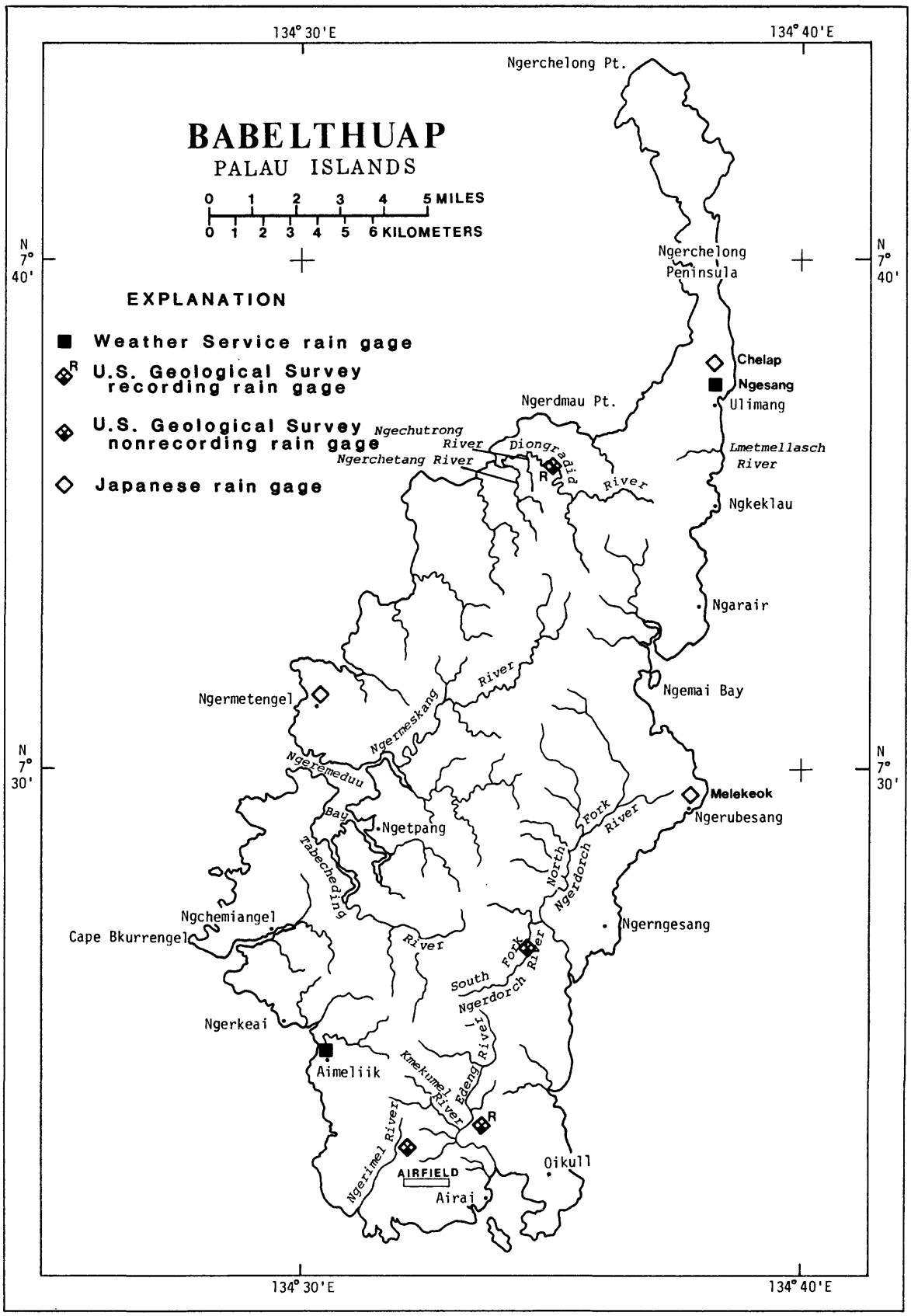


Figure 7. Location of rain gages on Babelthuap.

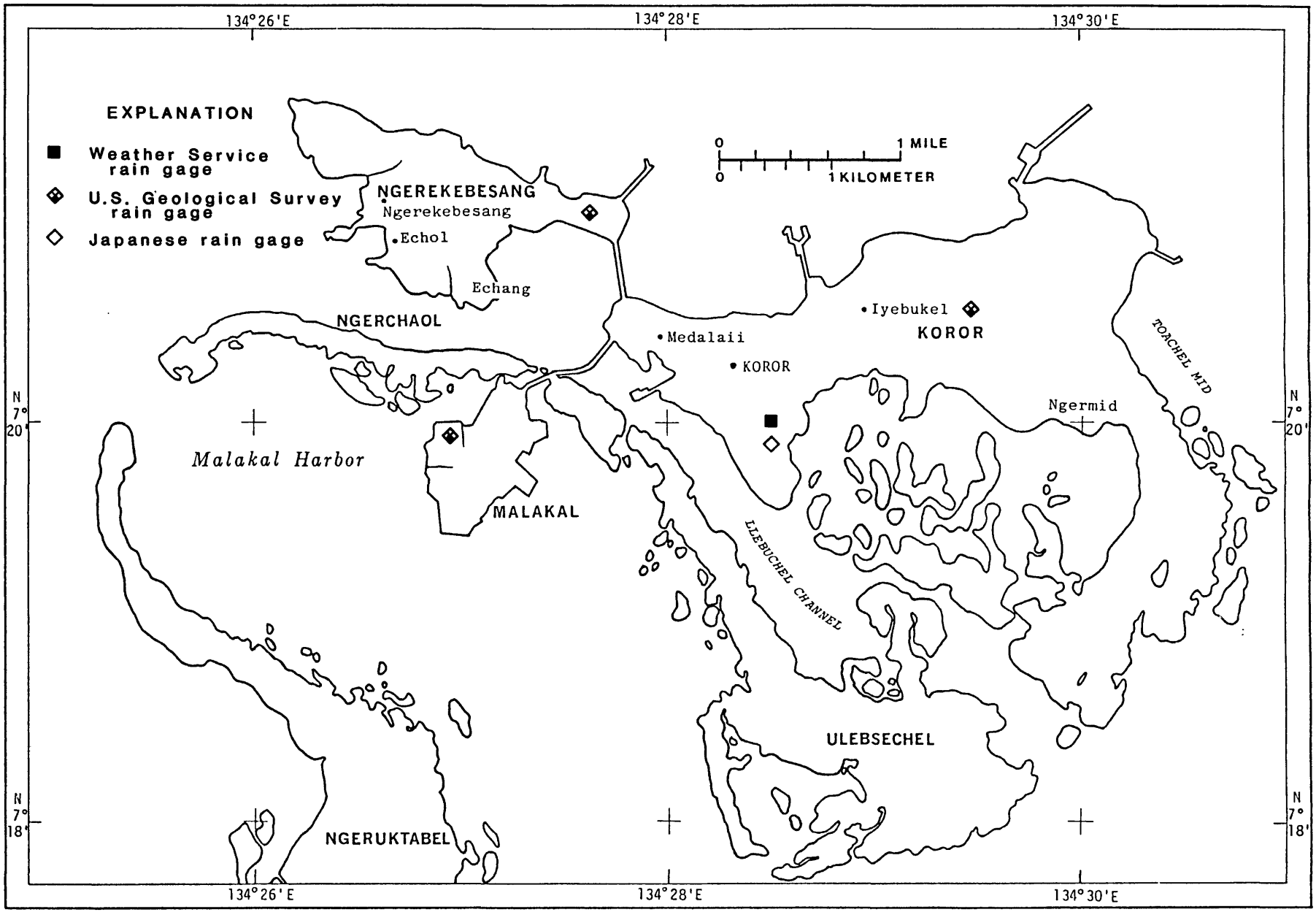


Figure 8. Location of rain gages on Koror, Malakal, and Ngerekebesang.

Table 4. Monthly and annual mean air temperatures, in degrees Celsius, on Koror

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1948	27.2	27.2	27.4	28.3	27.6	27.3	27.4	27.6	27.6	27.4	27.9	27.1	27.5
1949	27.1	27.1	27.1	--	26.8	27.6	26.9	27.2	27.4	27.4	27.3	26.6	--
1950	27.6	26.4	26.2	26.5	27.3	27.2	27.3	26.9	27.1	27.2	27.2	27.0	26.9
1951	27.1	27.4	27.5	--	--	--	27.6	27.3	27.3	27.9	27.7	27.6	--
1952	27.1	27.1	27.2	27.6	27.8	27.5	27.3	27.0	27.1	27.6	27.9	27.4	27.4
1953	27.3	27.2	27.2	28.0	28.1	27.4	27.6	27.5	27.3	28.1	27.8	27.4	27.6
1954	27.3	27.6	27.6	27.9	27.6	27.6	27.1	27.3	27.6	27.4	27.4	27.2	27.4
1955	26.6	26.9	27.2	27.7	27.4	27.1	27.2	27.2	27.6	27.4	27.6	27.4	27.3
1956	26.5	27.3	27.4	27.3	27.4	27.5	27.1	27.2	27.2	27.3	27.3	27.1	27.2
1957	27.3	27.2	27.6	27.4	27.9	27.6	27.2	27.3	27.7	27.9	27.9	27.6	27.6
1958	27.6	27.4	27.5	27.8	28.3	28.3	27.8	27.7	27.4	28.2	27.4	27.7	27.8
1959	27.0	26.8	27.2	27.6	27.7	27.7	27.0	27.2	27.6	27.5	27.7	27.4	27.3
1960	26.9	27.0	27.4	27.7	27.8	27.5	27.8	27.8	27.7	27.9	28.0	27.7	27.6
1961	26.9	27.3	27.5	27.8	27.6	26.9	27.2	27.2	27.4	27.0	27.6	27.1	27.3
1962	26.8	26.9	27.0	27.8	27.6	27.7	27.1	27.3	27.2	28.1	28.2	27.4	27.4
1963	27.1	27.1	27.3	28.0	27.8	27.7	27.3	27.2	27.7	27.7	27.7	27.6	27.5
1964	27.1	26.5	27.4	27.6	27.8	27.5	27.8	26.9	27.8	27.5	27.2	27.2	27.4
1965	27.2	26.7	26.7	27.4	27.4	27.0	26.0	27.2	27.4	27.7	27.9	27.2	27.2
1966	26.4	26.7	27.2	27.7	27.8	27.6	27.3	27.6	28.1	27.8	27.8	27.6	27.4
1967	26.7	27.4	27.3	28.0	28.1	27.8	27.3	27.0	28.1	27.6	27.8	27.2	27.5
1968	27.2	26.7	27.4	27.9	28.2	28.4	27.8	27.7	27.8	28.1	28.1	27.3	27.7
1969	27.1	27.3	27.6	28.0	28.2	28.1	27.1	27.7	27.4	27.9	27.8	27.7	27.7
1970	27.5	27.7	27.8	28.1	28.0	28.0	27.8	27.8	27.9	27.9	28.0	27.6	27.8
1971	27.4	27.4	27.8	28.3	27.9	27.3	27.1	27.5	27.8	27.2	27.8	27.8	27.6
1972	27.1	26.9	27.2	27.7	28.2	27.6	27.9	27.6	27.7	28.1	27.9	27.7	27.6
1973	27.3	27.6	27.7	27.9	28.2	28.2	27.7	28.1	27.9	27.7	27.9	27.7	27.6
1974	27.2	27.6	27.3	27.6	28.2	27.7	27.4	27.8	27.9	27.8	27.8	27.6	27.7
1975	27.1	27.4	27.6	27.8	27.9	27.3	27.1	27.6	27.6	27.7	27.9	27.2	27.5
1976	27.7	27.2	27.4	27.6	28.1	27.8	27.8	27.1	27.7	28.0	28.2	27.6	27.7
1977	27.5	27.3	27.7	28.1	28.3	28.1	27.3	27.3	27.9	28.2	28.3	28.1	27.8
1978	27.4	26.7	27.8	27.7	28.1	27.7	27.9	27.1	27.2	27.4	27.6	27.7	27.6
1979	27.4	27.4	27.3	27.4	28.0	27.2	27.3	27.5	27.8	27.8	27.9	26.9	27.6
1980	27.1	26.8	27.4	27.7	28.1	27.7	27.3	27.2	27.6	27.9	28.3	27.3	27.6
1981	27.3	26.9	27.3	27.8	28.1	27.2	27.3	27.6	27.6	27.3	28.1	27.8	27.5
Mean	27.1	27.1	27.4	27.8	27.9	27.6	27.4	27.4	27.6	27.7	27.8	27.5	27.6
Daily:													
Maximum	30.4	30.4	30.8	31.2	31.3	31.0	30.7	30.6	30.9	31.1	31.3	30.8	30.9
Minimum	23.9	23.9	24.0	24.3	24.5	24.2	24.1	24.2	24.3	24.4	24.3	24.2	24.2

Table 5. Monthly and annual evaporation data for Guam and Yap

[Source: U.S. National Oceanic and Atmospheric Administration, 1956-72, 1973-82]

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Evaporation data for Guam (in inches) (1956 to May 1958 at Fena Lake, August 1958 to present at Weather Service Station)													
1956	6.83	6.54	8.24	9.13	8.82	7.81	5.74	5.86	4.49	5.01	5.26	5.92	79.65
1957	6.18	5.99	7.32	8.42	8.71	9.10	7.41	7.76	6.52	5.57	7.28	7.22	87.48
1958	7.48	6.08	7.65	9.34	9.49	--	--						--
								5.48	5.61	6.08	4.64	5.30	--
1959	5.63	6.66	7.60	7.58	9.03	7.96	6.98	5.31	4.52	5.12	4.59	4.89	75.87
1960	4.86	6.26	7.05	8.05	7.17	6.54	5.41	4.71	4.38	4.30	5.03	5.16	68.92
1961	4.27	5.73	6.27	7.00	6.87	5.57	5.08	4.67	4.44	4.63	5.07	4.96	64.56
1962	6.15	4.94	7.81	6.17	7.00	5.20	4.99	4.91	4.28	5.00	4.45	5.26	66.16
1963	4.73	4.31	6.44	6.57	6.21	5.37	5.09	5.82	4.29	5.26	5.11	--	--
1964	5.91	6.39	7.01	6.99	6.76	7.47	6.18	4.75	4.58	4.73	5.95	6.50	73.22
1965	5.35	6.31	8.58	--	--	--	7.35	6.75	4.59	5.56	5.81	5.88	--
1966	7.07	6.55	7.78	9.17	8.88	7.37	7.21	4.71	4.76	5.36	5.39	5.92	80.17
1967	5.18	5.32	5.32	6.07	7.00	5.43	5.06	4.71	4.64	4.60	5.72	5.67	64.72
1968	5.89	6.31	8.50	7.57	7.58	5.89	5.77	4.95	4.49	5.53	4.32	5.35	72.15
1969	5.57	--	8.46	8.96	8.04	8.06	5.74	5.67	4.90	4.55	5.09	5.78	--
1970	4.68	5.90	7.93	8.98	8.06	7.30	6.27	4.28	4.86	4.62	5.80	6.02	74.70
1971	4.61	6.21	6.41	6.65	8.77	6.03	5.38	5.91	5.78	5.74	5.59	7.31	74.39
1972	6.55	6.65	5.75	7.85	8.06	7.26	5.66	5.00	5.87	5.55	4.71	5.67	74.58
1973	5.94	5.46	7.47	8.46	8.14	6.49	5.46	4.79	5.64	5.33	6.26	5.29	74.73
1974	5.81	6.62	6.90	8.27	7.21	5.88	--	5.09	5.61	6.28	5.73	6.93	--
1975	6.13	6.80	8.08	8.35	9.01	9.29	6.18	5.69	6.14	5.70	6.73	6.39	84.49
1976	6.27	5.58	7.22	7.62	7.37	7.65	6.59	6.33	5.47	7.36	6.43	6.56	80.45
1977	6.64	6.49	8.20	9.03	8.48	7.89	7.83	6.99	5.24	5.53	6.27	6.90	85.49
1978	7.30	6.10	9.46	7.72	8.85	6.55	5.90	6.10	5.33	6.32	5.46	5.95	81.04
1979	7.26	6.68	7.76	9.50	10.33	8.44	6.44	6.34	5.26	5.16	5.93	6.36	85.46
1980	7.73	6.43	7.85	7.93	8.05	6.91	6.33	4.84	5.14	5.98	7.10	6.20	80.49
1981	5.54	7.22	8.94	8.13	6.80	7.14	6.78	6.55	7.38	7.01	6.66	5.35	83.30
1982	--	6.20	7.64	8.28	8.06	6.90	5.89	6.28	6.60	5.27	6.08	6.31	--
Mean	5.98	6.14	7.54	7.99	8.03	7.02	6.11	5.56	5.22	5.45	5.65	5.96	76.76
Evaporation data for Yap (in inches)													
1978	--	--	--	--	--	--	5.58	6.70	5.15	5.33	5.06	7.23	--
1979	6.52	6.74	7.49	8.21	7.41	5.90	5.55	6.33	6.15	8.60	6.11	6.11	81.12
1980	5.41	6.16	6.96	6.87	6.32	5.97	6.25	5.96	4.78	6.54	5.24	5.55	72.01
1981	3.99	5.56	7.48	7.69	8.41	4.36	5.31	6.65	7.01	5.56	4.91	5.35	72.28
1982	6.58	5.60	7.12	7.56	5.58	5.70	6.82	7.75	5.70	5.88	5.76	6.37	76.42
Mean	5.62	6.02	7.26	7.58	6.93	5.48	5.90	6.68	5.76	6.38	5.42	6.12	75.46

Totals of monthly means: Guam 76.65, Yap 75.15 inches.

WATER RESOURCES

General

Water-resources data have been collected by the U.S. Geological Survey on the Palau Islands since 1969 and consist of surface-water data and data on the quality of surface water. Surface-water data consist of daily discharges from continuous-record stream-gaging stations, systematic measurements of discharge at partial-record stations, and measurements of discharge at miscellaneous sites. Water-quality data include water temperature readings and results of chemical analyses from samples collected at all stream-gaging stations, partial-record sites, and some miscellaneous sites.

For most of 1970-77, ground-water levels were recorded continuously on Well 5, Peleliu, and at the Page Communication well, Ngerekebesang. The records are available at the Guam Subdistrict Office.

Since 1979, water samples have been collected annually or biannually for chemical analyses at 18 surface-water sites. These analyses are listed in tables 55-64 in the Hydrologic Data section.

Surface Water

The systematic collection of surface-water data on Palau by the U.S. Geological Survey began in 1969 with the establishment of three gaging stations on Babelthuap. In the 2 years following, two additional gaging stations were installed on Babelthuap and several low-flow partial-record sites were established on Babelthuap, Malakal, and Ngerekebesang (figs. 9 and 10).

Of the five gaging stations on Babelthuap, one was located on the Ngerimel River, below the diversion for the domestic water supply of Koror, to gage unused flow, and one each in the northern, southern, western, and eastern part of Babelthuap to record natural stream runoff (table 6, fig. 11).

In 1978, the gaging station on Ngerimel River was discontinued as sufficient information had been collected, and the station was relocated on Kmekumel River, which was under consideration by the Public Works Department as an additional source of water for Koror (fig. 12). The low-flow partial-record station, located at the mouth of Kmekumel River, was then discontinued.

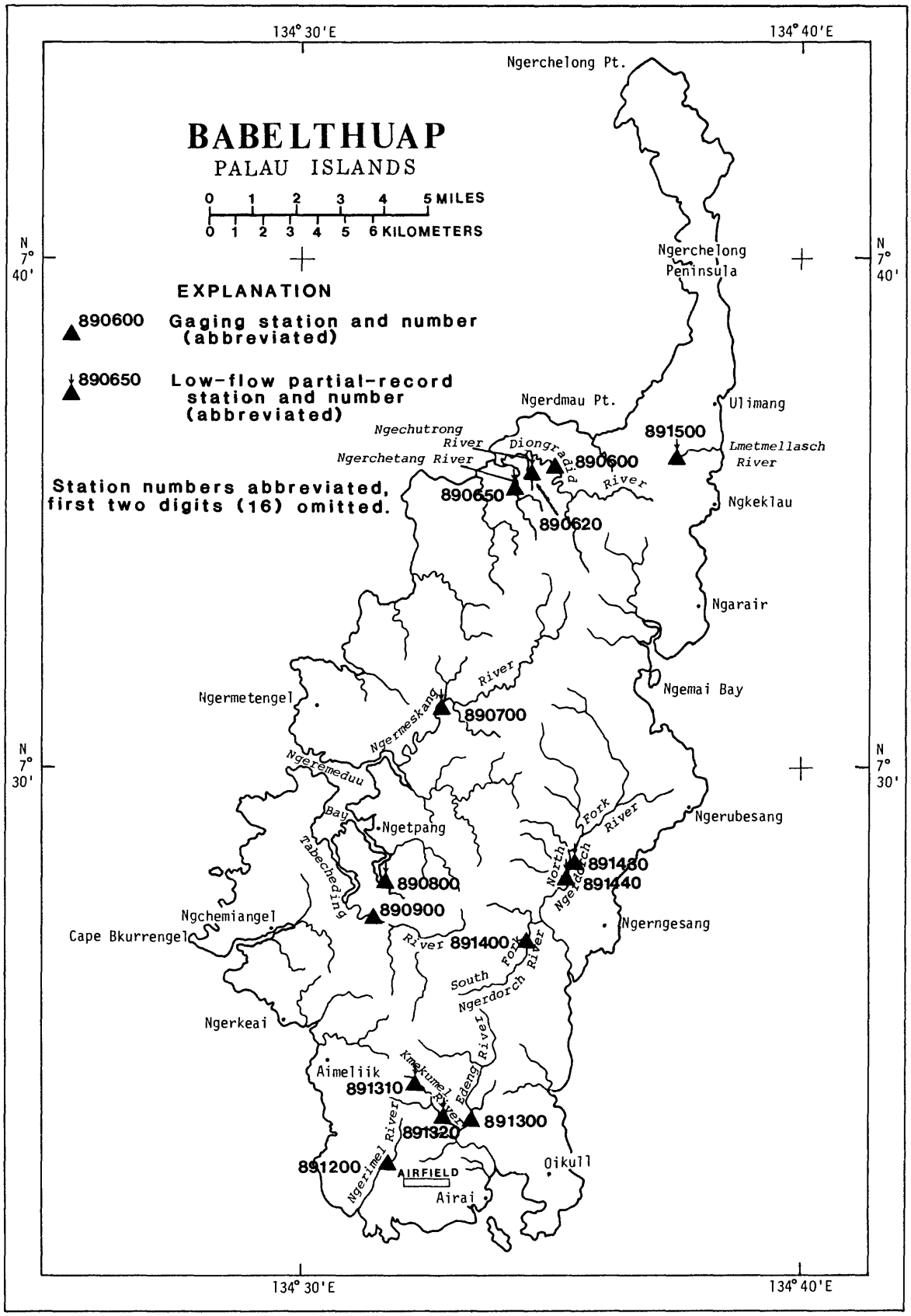


Figure 9. Location of gaging and partial-record stations on Babelthuap.

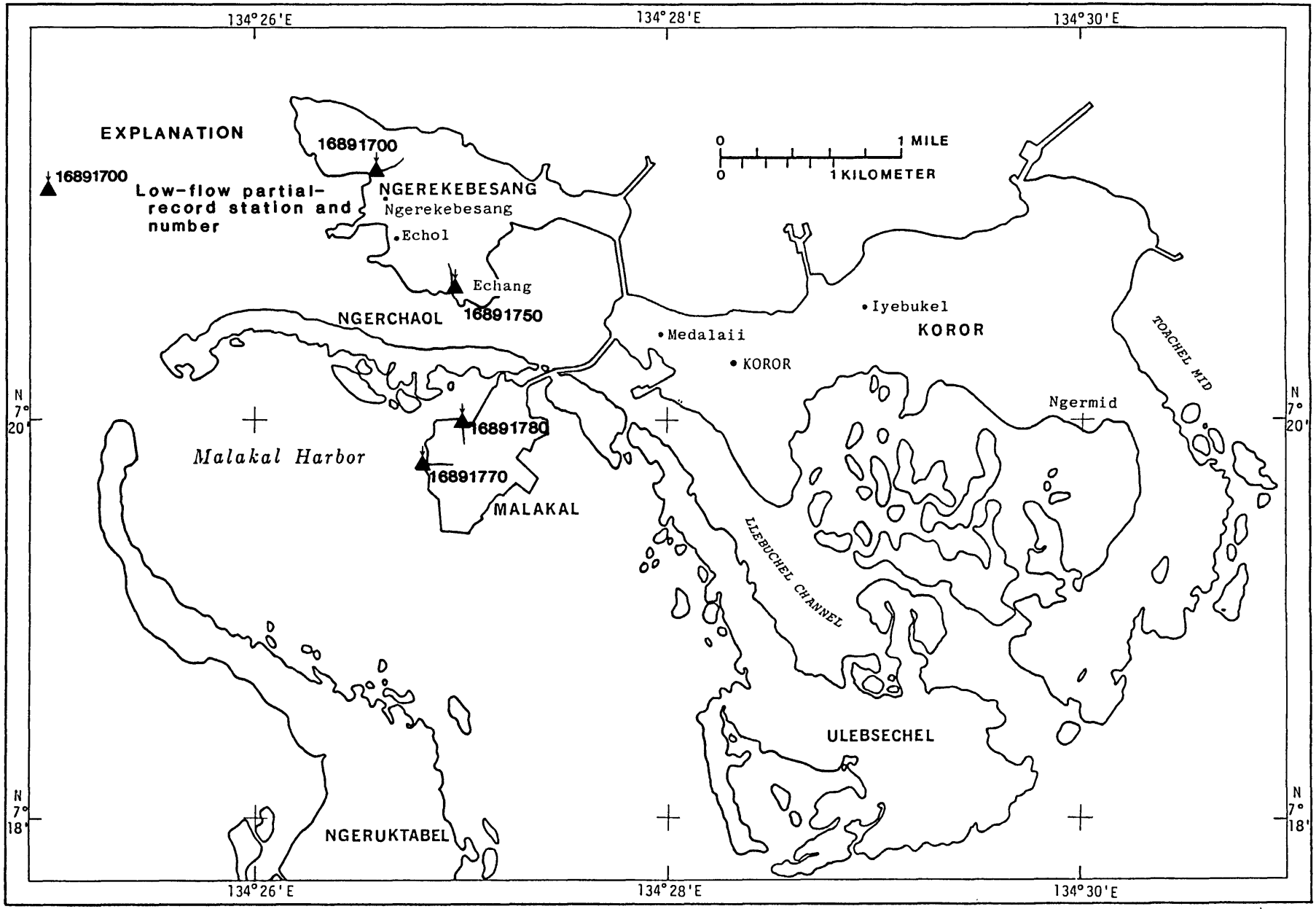


Figure 10. Location of partial-record stations on Malakal and Ngerekebesang.

Table 6. Summary of continuous-record stations on Babelthuap

[Names and locations are based on the 1981 U.S. Geological Survey topographic maps, scale 1:10,000. Names in parentheses are those used in Geological Survey publication prior to 1981]

Station No.	Station name	Drainage area (mi^2)	Location			Period of record
			Latitude north	Longitude east	Altitude (ft)	
16890600	Diongradid (Adeiddo) River.	4.45	7°36'04"	134°35'02"	15	Oct. 1969 to Sept. 1982.
16890900	Tabecheding (Tabagaten) River.	6.07	7°27'03"	134°31'29"	20	Oct. 1970 to Sept. 1982.
16891200	Ngerimel (Ghimel) River.	.77	7°22'18"	134°31'37"	15	Oct. 1969 to Apr. 1978.
16891300	Edeng (Gaden) River.	4.26	7°23'00"	134°33'07"	7	Oct. 1969 to Sept. 1982.
16891310	Kmekumel (Kumekumeyel) River.[1/]	1.44	7°23'14"	134°32'42"	96	Sept. 1978 to Sept. 1982.
16891400	South Fork Ngerdorch (Ngardok) River.	2.44	7°26'20"	134°34'28"	25	Mar. 1971 to Sept. 1982.

[1/] Low-flow partial-record station at mouth, 1970-78.

Figure 11. Gaging station on Diongradid River, Babelthuap, January 1980.

Figure 12. Gaging station on Kmekumel River, Babelthuap.

Data collected at gaging stations consist of continuous records of stage and periodic measurements of discharge. Records of stage are obtained from a water-stage recorder that produces a continuous graph of stream fluctuations. Measurements of discharge are made with a current meter (fig. 13).

From records of stage and discharge measurements, stage-discharge relationship curves are derived. These curves are used to prepare rating tables which give the discharge for any stage. Application of the daily mean stage to the rating table provides the daily mean discharge from which the monthly and yearly mean discharges are computed.

Tables with monthly and annual totals, annual maximums, minimums, and means are presented in the Hydrologic Data section. Peak discharges, their times of occurrence, and corresponding stage are listed for all peaks above a selected base discharge (tables 35-40). The base discharge is selected so that an average of about three peaks a year can be presented. Time is expressed in 24-hour local standard time.

Partial-record stations are sites where discharge measurements are made on a systematic basis over a period of years, usually during a period of base flow when streamflow is primarily from ground-water storage. When these measurements are correlated with the simultaneous discharge of a nearby station for which continuous record is available, the low-flow potential of the stream can be estimated. Discharge measurements made at sites not included in the partial-record program are called measurements at miscellaneous sites.

All records are published in the inch-pound system of units of length, area, and volume. The data are published by water year, the year beginning on October 1 and ending on September 30. The water year is designated by the calendar year in which most of the water year falls.

The spelling of names, the drainage areas and locations for most stations have been revised from those published in "Water Resources Data for Hawaii and other Pacific Areas", 1968 to 1980. The original information had been based on 1954 U.S. Army Map Service series W 856 maps with a scale of 1:25,000 and 10-meter contours (International spheroid). The revised names and figures were based on the 1981 USGS preliminary maps with 1:10,000 scale and 5-meter contours (Clarke spheroid of 1866).

Figure 13. Streamflow measurement at Edeng River, Babelthuap.

When making a discharge measurement, the number of revolutions of a current meter is timed to obtain the velocity of the water at up to 25 sections along a cross section of the stream (Buchanan and Somers, 1969).

The annual mean discharge and the average discharge per square mile for major streams on Babelthuap are listed in table 7. The discharges per square mile are similar which indicates similarity in geology, vegetation, and rainfall within the four basins. The mean monthly discharge and percentage of annual discharge for each month showing differences in yield during dry and wet months are listed in table 8.

The correlation between the drainage areas of four Babelthuap gaging stations and the corresponding mean annual discharges for the period 1972-81 is shown in figure 14. The regression equation is $Q = 8.1\ A^{0.98}$ with A the drainage area and Q the discharge (standard error is 11 percent and correlation coefficient is 0.99). Roughly, this represents an average discharge of 8 ft^3/s (cubic feet per second) for each square mile. This means that each square mile on Babelthuap will yield approximately 8 ft^3/s or 5.2 Mgal/d (million gallons per day). Based on this, the yield from any drainage area on Babelthuap can be estimated.

To augment data collected at continuous-record stations, eight low-flow partial-record stations were established on Babelthuap. To collect low-flow information on Malakal and Ngerekebesang, a large number of discharge measurements were made at two stations on each island. The drainage areas, locations, and period of record of all partial-record stations are summarized in table 9.

Streamflow Characteristics

Runoff/rainfall comparison

The runoff to rainfall ratio for four gaging stations on Babelthuap with record for the period 1972-81, shows that about 70 percent of the rain falling on the island runs off to the ocean (table 10). For a year with an average rainfall of 148 inches, this amounts to 275 billion gallons. The runoff from the Babelthuap streams was compared to the Koror rainfall as no complete rainfall record for the period is available for Babelthuap. Comparison of available rainfall records for Babelthuap (tables 24, 27-31) with those for Koror (table 25) show no significant differences in rainfall totals during periods when rainfall data were available for both islands.

Table 7. Annual mean discharge and discharge per square mile, in cubic feet per second, of gaged basins on the island of Babelthuap

Station number - Station name --- Drainage area --	16890600 Diongradid River 4.45 mi^2		16890900 Tabecheding River 6.07 mi^2		16891300 Edeng River 4.26 mi^2		16891400 South Fork Ngerdorch River 2.44 mi^2	
Water year	Discharge	Rank	Discharge	Rank	Discharge	Rank	Discharge	Rank
1970	28.0	11	--	--	22.1	12	--	--
1971	33.8	6	48.5	7	36.9	4	--	--
1972	39.7	2	55.1	4	38.5	3	22.3	4
1973	25.4	13	29.1	12	18.3	13	11.5	11
1974	37.9	4	58.8	1	41.7	2	23.9	2
1975	40.0	1	57.4	3	42.3	1	24.6	1
1976	31.5	8	48.4	9	33.9	8	20.1	6
1977	28.3	10	42.6	11	26.5	11	15.5	9
1978	31.2	9	43.7	10	29.4	9	15.1	10
1979	35.8	5	52.3	5	36.2	6	22.2	5
1980	32.4	7	51.3	6	29.4	10	20.1	7
1981	38.6	3	57.8	2	36.7	5	23.9	3
1982	28.0	12	48.7	8	34.3	7	19.5	8
Mean 1970-82 ---	33.1		--		32.8		--	
Mean 1971-82 ---	33.6		49.5		33.7		--	
Mean 1972-82 ---	33.5		49.6		33.4		19.9	
Discharge per square mile:								
1970-82	7.4		--		7.7		--	
1971-82	7.5		8.2		7.9		--	
1972-82	7.5		8.2		7.8		8.2	

Table 8. Average monthly mean discharge in cubic feet per second and in percentage of total mean monthly flow

	Years of record		Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
Diongradid River	13	Mean	42.7	30.5	33.6	30.4	30.3	20.4	22.6	20.8	37.1	56.5	38.7	32.9	33.1
		Percent	10.8	7.7	8.5	7.7	7.6	5.1	5.7	5.2	9.4	14.2	9.8	8.3	--
Tabecheding River	12	Mean	65.4	47.5	57.8	43.2	38.9	24.2	36.3	37.8	66.5	69.7	60.7	44.8	49.5
		Percent	11.0	8.0	9.7	7.3	6.6	4.1	6.1	6.4	11.2	11.8	10.2	7.6	--
Edeng River	13	Mean	42.8	32.1	35.6	33.1	27.1	17.6	25.3	24.3	37.7	48.0	40.9	28.0	32.8
		Percent	10.9	8.2	9.1	8.4	6.9	4.5	6.5	6.2	9.6	12.2	10.4	7.1	--
Ngerimel River[1/]	6	Mean	5.2	3.4	3.2	3.7	2.0	1.2	1.3	1.4	3.1	5.3	4.9	2.7	3.1
		Percent	14.0	9.2	8.6	9.9	5.3	3.1	3.4	3.8	8.2	14.1	13.1	7.3	--
South Fork Ngerdorch River.	11-12	Mean	26.7	16.4	22.7	19.7	17.4	9.3	17.2	15.3	24.7	28.1	24.6	16.7	19.9
		Percent	11.2	6.9	9.5	8.2	7.3	3.9	7.2	6.4	10.3	11.8	10.3	7.0	--

[1/] Ngerimel River station was located downstream from the reservoir.

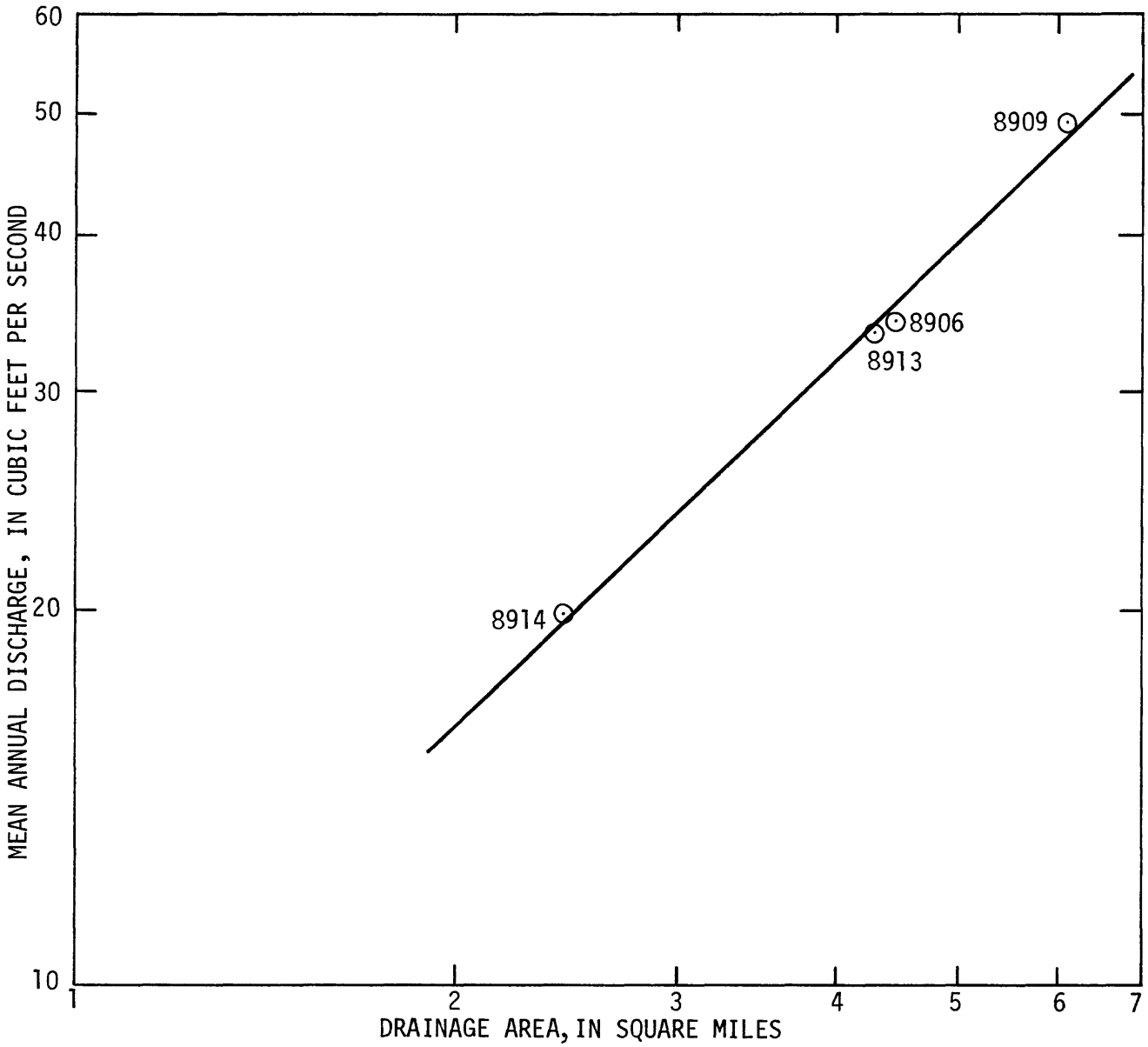


Figure 14. Correlation between mean annual discharge and drainage area.

Table 9. Summary of low-flow partial-record stations

[Names and locations are based on the 1981 U.S. Geological Survey topographic maps, scale 1:10,000. Names in parentheses are those used in Geological Survey publication prior to 1981]

Station No.	Station name	Drainage area (mi^2)	Location			Period of record
			Latitude north	Longitude east	Altitude (ft)	water years)
16890620	Ngechutrong River, Babelthuap.	0.25	7°36'11"	134°34'50"	15	1974-82
16890650	Ngerchetang (Galkatan) River, Babelthuap.	1.51	7°35'48"	134°34'13"	10	1974-77, 1980-82.
16890700	Ngermeskang (Almiokan) River, Babelthuap.	7.14	7°31'16"	134°33'16"	10	1973-82
16890800	Ngetpang (Ngatpang) River, Babelthuap.	.34	7°27'45"	134°31'38"	15	Do.
16891320	[1/] Kmekumel (Kumekumeyel) River at mouth, Babelthuap.	1.59	7°23'04"	134°33'01"	5	1970-78, 1980.
16891430	North Fork Ngerdorch (Ngardok) River, Babelthuap.	9.70	7°27'51"	134°35'12"	13	1975-83
16891440	North Fork Ngerdorch (Ngardok) tributary, Babelthuap.	1.78	7°27'51"	134°35'10"	12	Do.
16891500	Lmetmellasch River (Geligal Marsh outlet), Babelthuap.	.32	7°36'12"	134°37'36"	100	1971-75, 1977, 1980-82.
16891700	Unnamed west coast stream, Ngerekebesang (Arakabesan).	.02	7°21'17"	134°26'32"	10	1970-79
16891750	Unnamed south coast stream, Ngerekebesang (Arakabesan).	.02	7°20'42"	134°26'54"	25	Do.
16891770	Unnamed west coast stream, Malakal.	.01	7°19'48"	134°26'49"	80	1971-78
16891780	Unnamed north coast stream, Malakal.	.02	7°19'53"	134°27'01"	50	1971-80

[1/] Continuous-record station at altitude 96 ft since 1978.

Table 10. Runoff to rainfall ratio for gaging stations on Babelthuap

Station number ------		16890600		16890900		16891300		16891400	
Station name --------		Diongradid (Adeiddo) River		Tabecheding (Tabagaten) River		Edeng (Gaden) River		South Fork Ngerdorch (Ngardok) River	
Drainage area -------		4.45 mi^2		6.07 mi^2		4.26 mi^2		2.44 mi^2	
		Runoff		Runoff		Runoff		Runoff	
Calendar year	Koror rainfall (inches)	(Inches)	Percent of rainfall	(Inches)	Percent of rainfall	(Inches)	Percent of rainfall	(Inches)	Percent of rainfall
1970	114.55	90.60	79.1	--	--	89.54	78.2	--	--
1971	159.33	112.56	70.6	102.42	64.3	111.20	69.8	--	--
1972	150.12	107.37	71.5	110.69	73.7	108.34	72.2	111.26	74.1
1973	123.42	90.90	73.7	86.99	70.5	79.66	64.5	87.90	71.2
1974	184.99	118.96	64.3	138.65	74.9	146.89	79.4	142.97	77.3
1975	154.23	121.40	78.7	120.98	78.4	121.40	78.7	120.22	78.3
1976	125.55	72.90	58.1	89.90	71.6	90.81	72.3	95.69	76.2
1977	119.44	87.54	73.3	93.25	78.1	80.93	67.8	80.11	67.1
1978	164.75	104.63	63.5	112.48	68.3	111.52	67.7	106.81	64.8
1979	160.08	106.46	66.5	114.94	71.8	105.79	66.1	119.05	74.4
1980	169.07	100.36	59.4	115.39	68.2	95.59	56.5	107.37	63.5
1981	152.85	117.13	76.6	130.15	85.1	117.26	76.7	139.08	91.0
1970-81									
Mean ---	148.20	102.57	69.2	--	--	104.91	70.8	--	--
1971-81									
Mean ---	151.26	103.66	68.6	110.53	73.1	106.31	70.3	--	--
1972-81									
Mean ---	150.45	102.76	68.3	111.34	74.0	105.82	70.3	111.05	73.8
1972-80									
Mean runoff									
$[(ft^3/s)/mi^2]/yr$ -----		7.6		8.1		7.7		8.2	

The mass curves of mean monthly discharges for Diongradid River in northern Babelthuap and Edeng River in southern Babelthuap are shown with the mass curve of monthly rainfall for Koror in figure 15. For better comparison between the discharge and rainfall curves, 70 percent of the rainfall was plotted. This 70 percent is the mean of the average runoff/rainfall percentages for Diongradid and Edeng Rivers for 1970-81. The correlation between rainfall on Koror and streamflow on Babelthuap is apparent.

The regression equation between rainfall on Koror and the average annual discharge on Babelthuap (1972-81) is $Q = 0.81\ R^{0.97}$, where Q is the average annual discharge on Babelthuap in inches and R the annual rainfall on Koror in inches. The standard error is 20 percent and the correlation coefficient is 0.87.

The average discharge on Babelthuap is the average of the mean annual discharges for four gaging stations: Diongradid River (northern Babelthuap), Tabecheding River (western Babelthuap), South Fork Ngerdorch River (eastern Babelthuap), and Edeng River (southern Babelthaup).

The equation can be used to estimate the average discharge in inches on Babelthuap for years for which rainfall data on Koror are available (1905-12, 1924-41, 1947-82). The average discharge can be used to estimate the yield of ungaged streams. Discharge in inches can be converted to cubic feet per second ($ft^3/s = \frac{in \times mi^2}{13.574}$).

Flow-duration curves

A flow-duration curve is a cumulative frequency curve showing the percentage of time within the total period of record that a specified daily discharge was equaled or exceeded. It delineates flow characteristics of a stream throughout the range of discharge without regard to the sequence of occurrence. The general shape of such a curve is influenced by many factors, such as basin slope and cover, ground-water discharge, precipitation, and stream diversion.

The curve is plotted from a flow-duration table which tabulates the distribution of daily discharges by different class limits in increasing order of magnitude. Discharge, in cubic feet per second, is plotted on the ordinate and percentage of time, equaled or exceeded, is plotted on the abscissa.

For reliable comparisons of the curves for different streams, data covering the same period should be used, in order to avoid including an extremely dry or wet year in one set and not in the other.

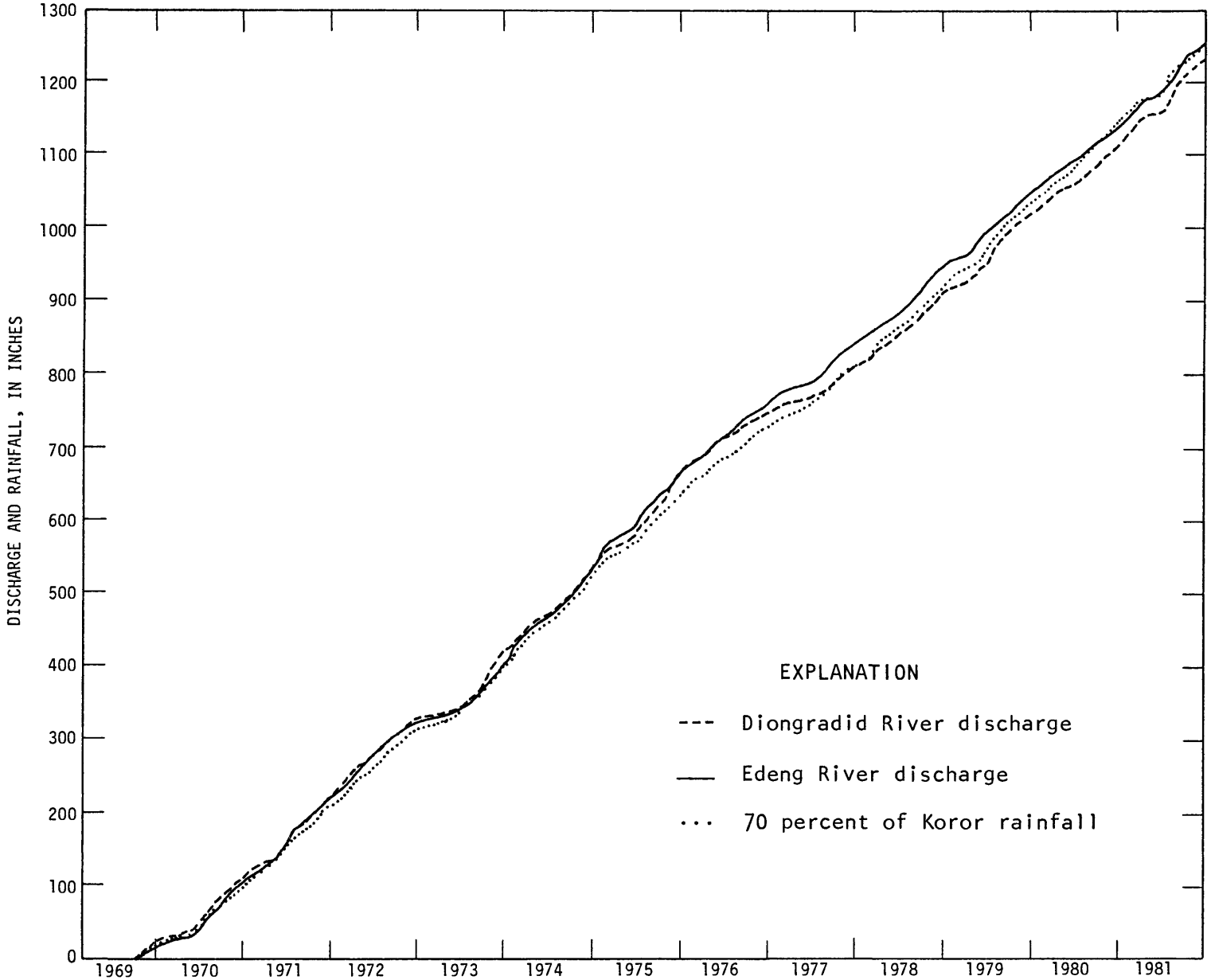


Figure 15. Mass curves of mean monthly discharges of Diongradid and Edeng Rivers, Babelthuap, and Koror rainfall.

Flow-duration curves are used to determine the percentage of time that a certain amount of water was available during the period of record. This information is essential for the planning of stream diversions for water supply or for assessing hydroelectric potential.

The flow-duration curves for four streams on Babelthuap are shown in figure 16.

Although the periods of record used are not identical, mean annual rainfall for the periods is about the same and the flow-duration curves should be comparable (table 11).

Table 11. Summary of streams used for flow-duration curves

Station No.	Stream name	Drainage area (mi^2)	Years of record	Mean annual rainfall for period of record (in)
16890600	Diongradid River	4.45	11	148
16890900	Tabecheding River	6.07	10	151
16891300	Edeng River	4.26	11	148
16891400	South Fork Ngerdorch River.	2.44	9	150

The unusual drop shown by the curve for station 16890900 below 10 ft^3/s was caused by the very dry period January to March 1973. Very likely, ground water contribution to streamflow drops off sharply in the Tabecheding River basin owing to the presence of impermeable clay in large areas of the drainage basin.

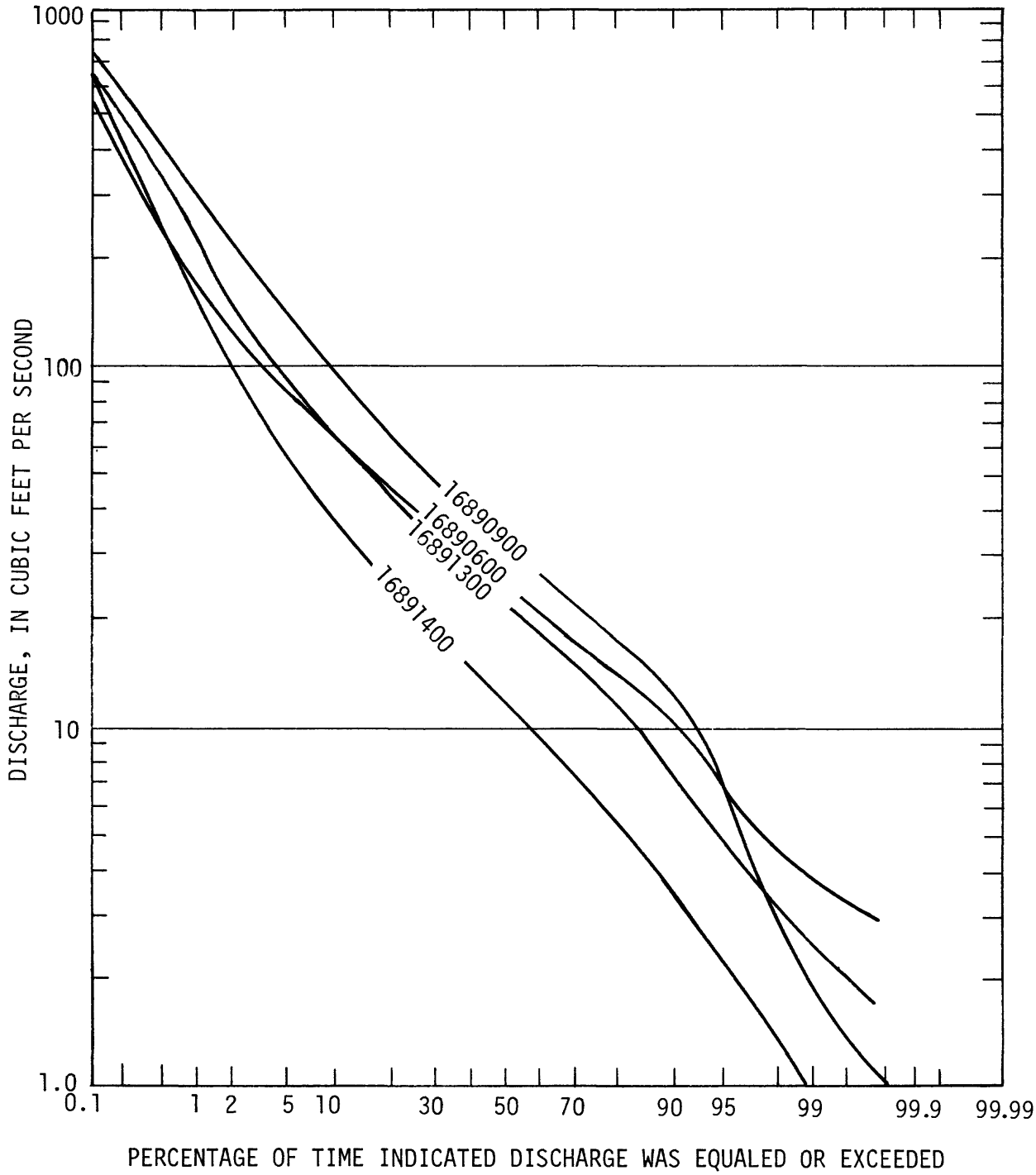


Figure 16. Duration curves for four gaging station on Babelthuap.

Low-flow frequency curves

Low-flow frequency curves show the lowest mean discharge for certain periods of consecutive days and their estimated recurrence interval. Figures 17-20 show the low-flow frequency curves for a number of consecutive days, ranging from 1 to 120, for four Babelthuap gaging stations.

No curves were drawn for Ngerimel River gaging station because the station is located downstream from the reservoir. Curves were not drawn for Kmekumel River because the period of record is too short.

The 1-day curve represents the daily discharge of the stream. The curves for longer periods show the mean discharge for those periods.

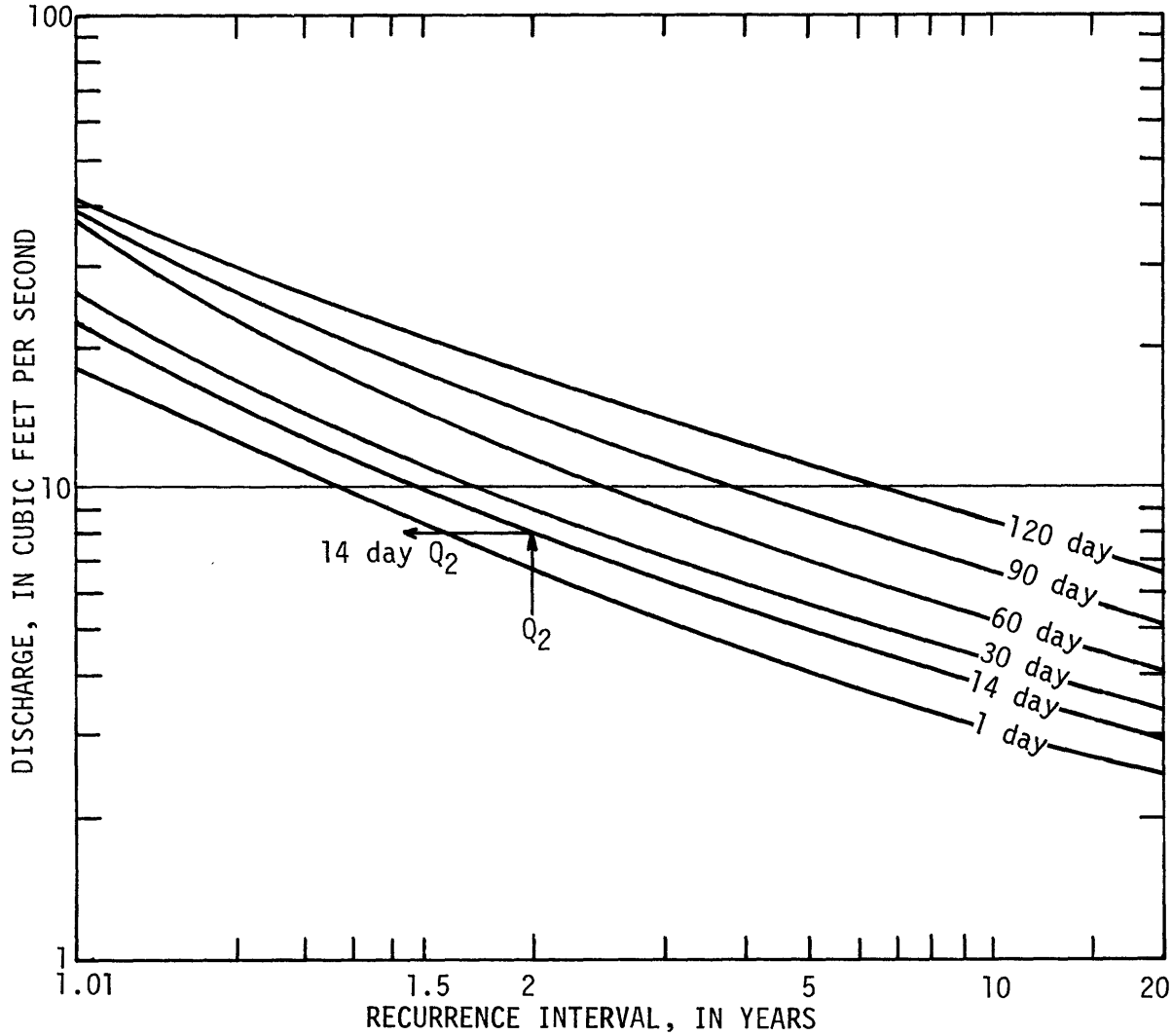
High-flow frequency curves

High-flow frequency curves show the maximum mean discharge for certain periods of consecutive days and the likelihood of its occurrence. They can also be used to show the frequency of instantaneous annual peak discharge.

Figures 21-24 show the high-flow frequency curves for 1, 3, 7, 15, and 30 consecutive days for the four Babelthuap continuous-record stations.

Figure 25 shows the magnitude and frequency of annual and instantaneous peak flows for three Babelthuap continuous-record stations having at least 10 years of complete records.

High-flow frequency curves provide information needed to determine the size of reservoirs. Frequency curves for annual peak flows are needed to size and design storm-drainage systems, culverts and bridge openings.



Q_2 is mean flow with a two-year recurrence interval.

Figure 17. Low-flow frequency curves for Diongradid River, Babelthuap, for the indicated number of consecutive days.

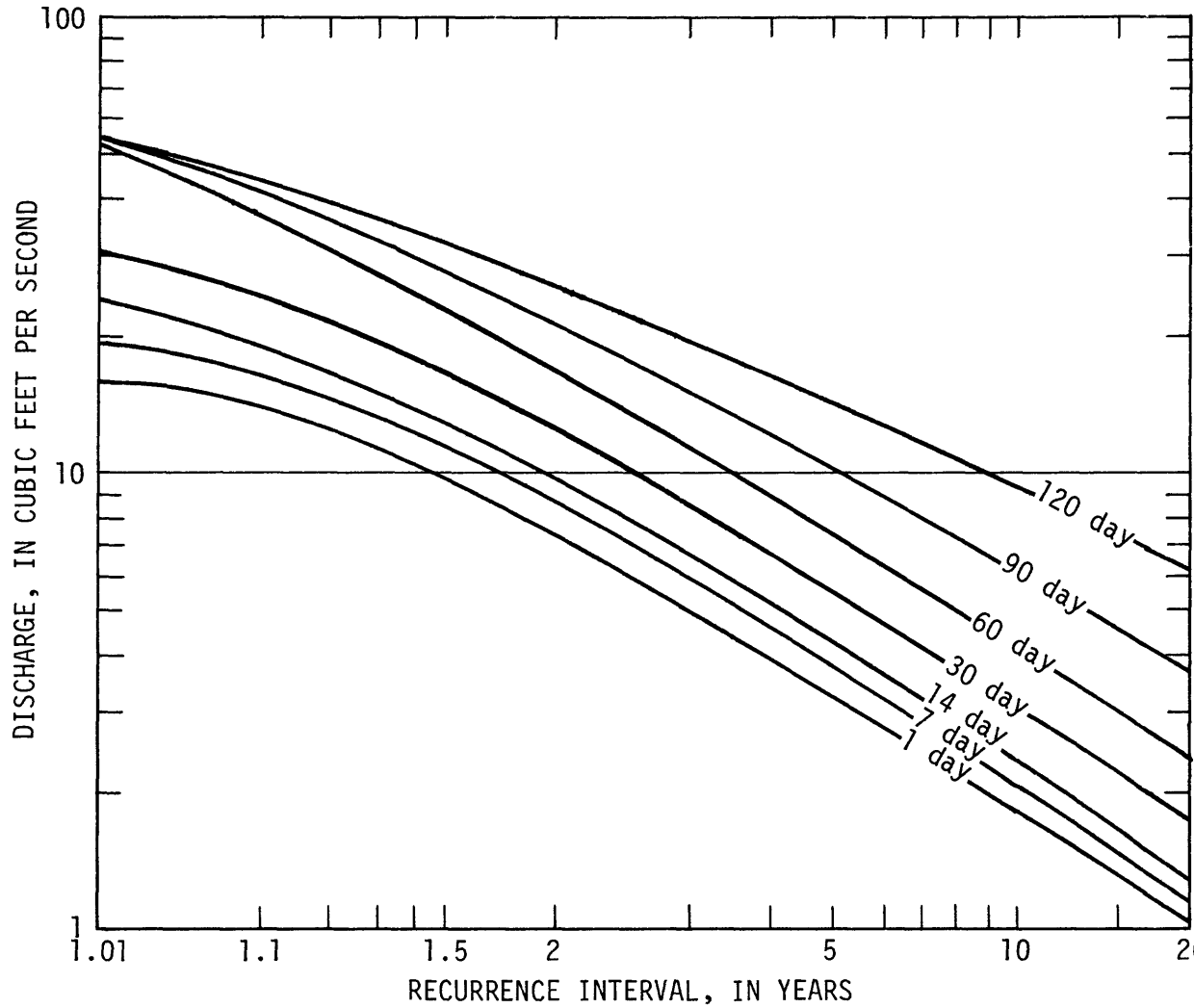


Figure 18. Low-flow frequency curves for Tabecheding River, Babelthuap, for the indicated number of consecutive days.

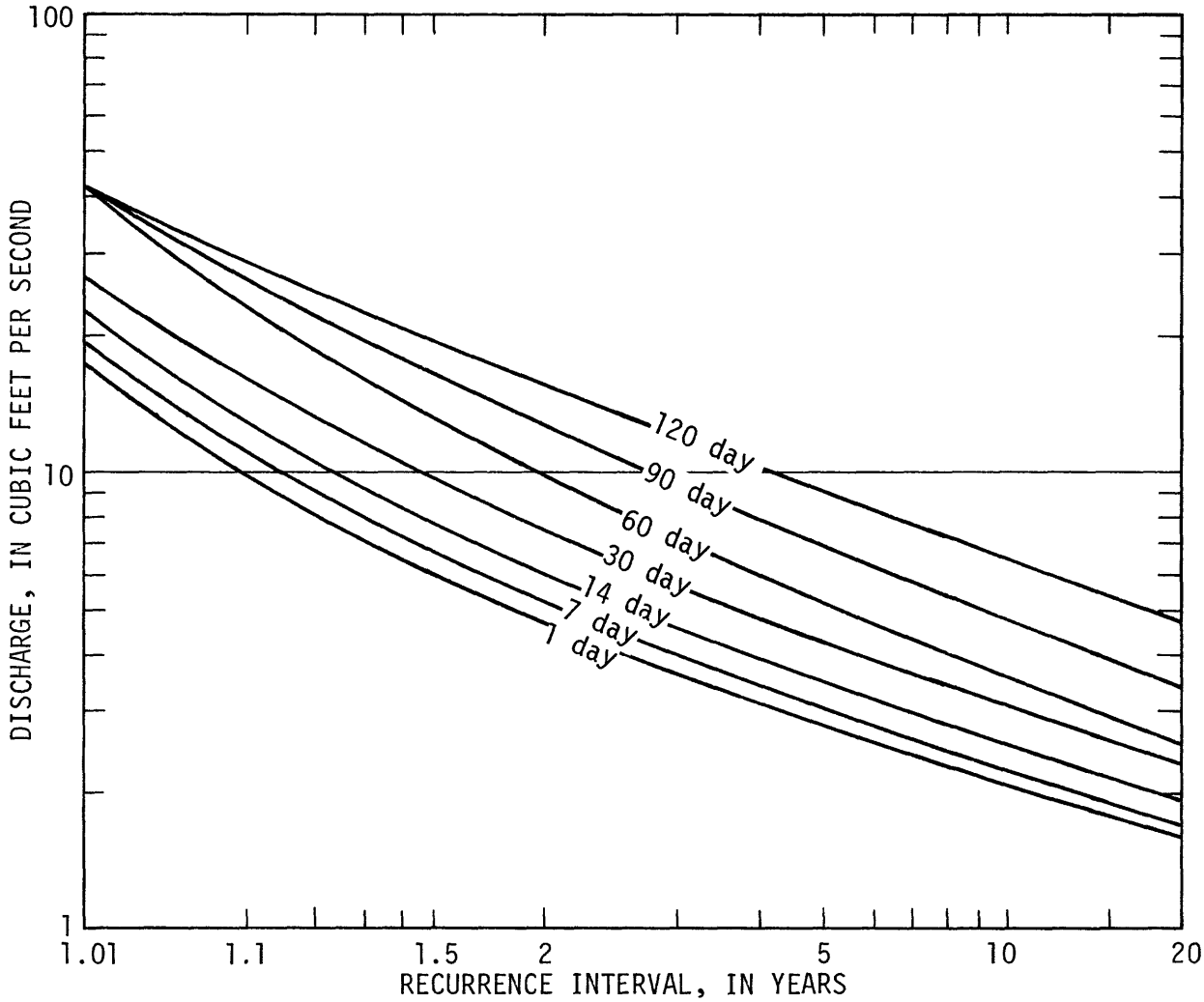


Figure 19. Low-flow frequency curves for Edeng River, Babelthuap, for for the indicated number of consecutive days.

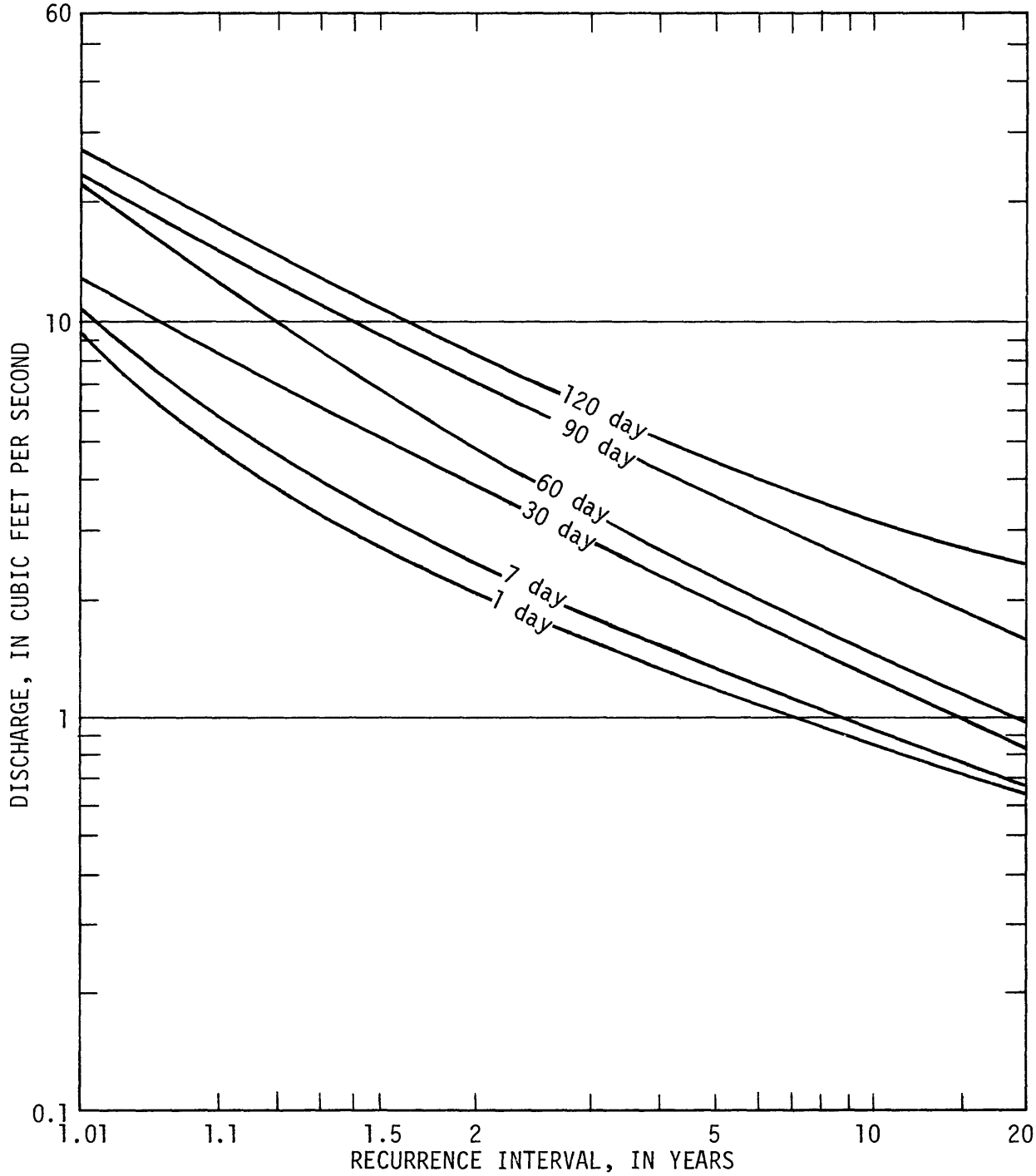


Figure 20. Low-flow frequency curves for South Fork Ngerdorch River, Babelthuap, for the indicated number of consecutive days.

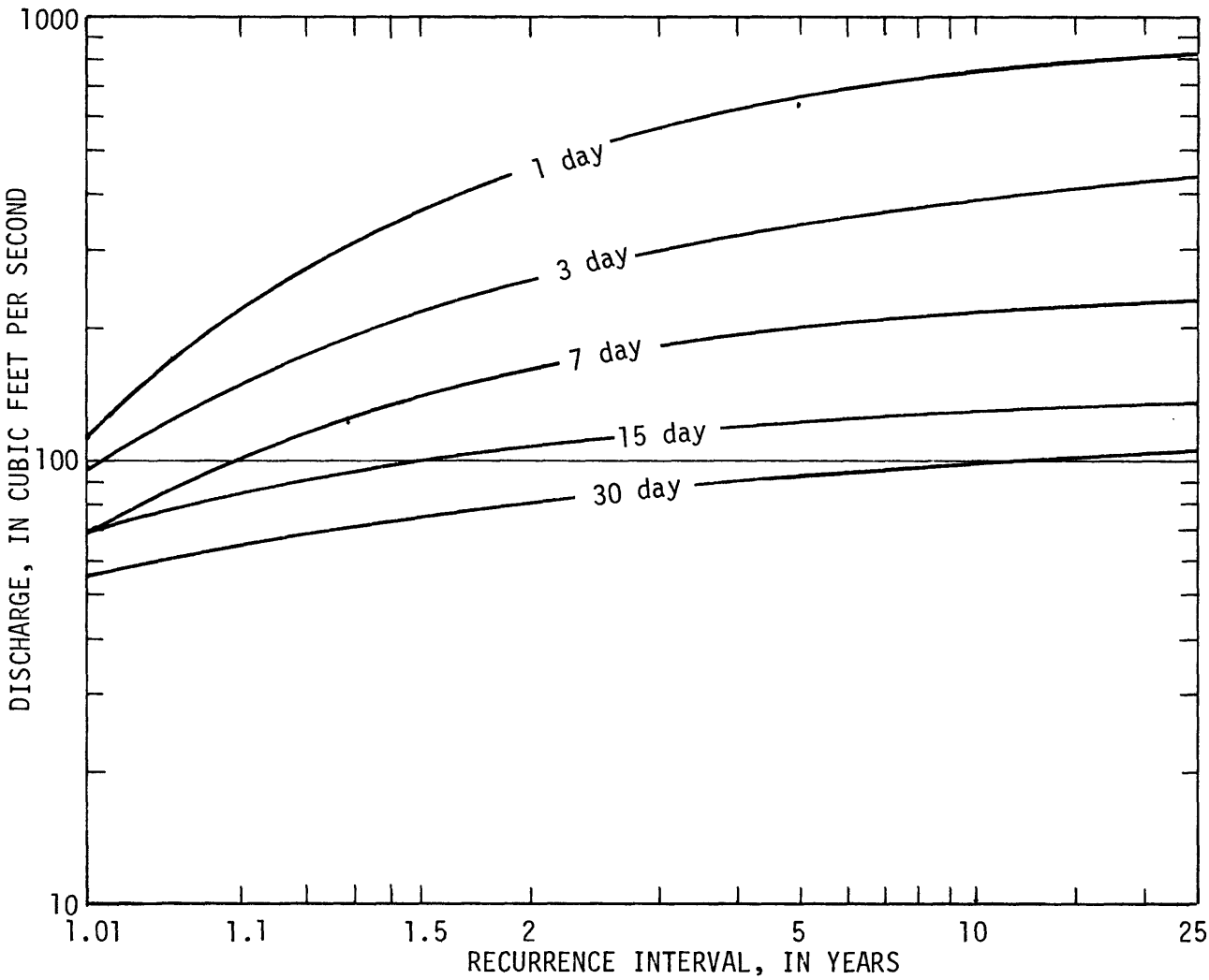


Figure 21. High-flow frequency curves for Diongradid River, Babelthuap, for the indicated number of consecutive days.

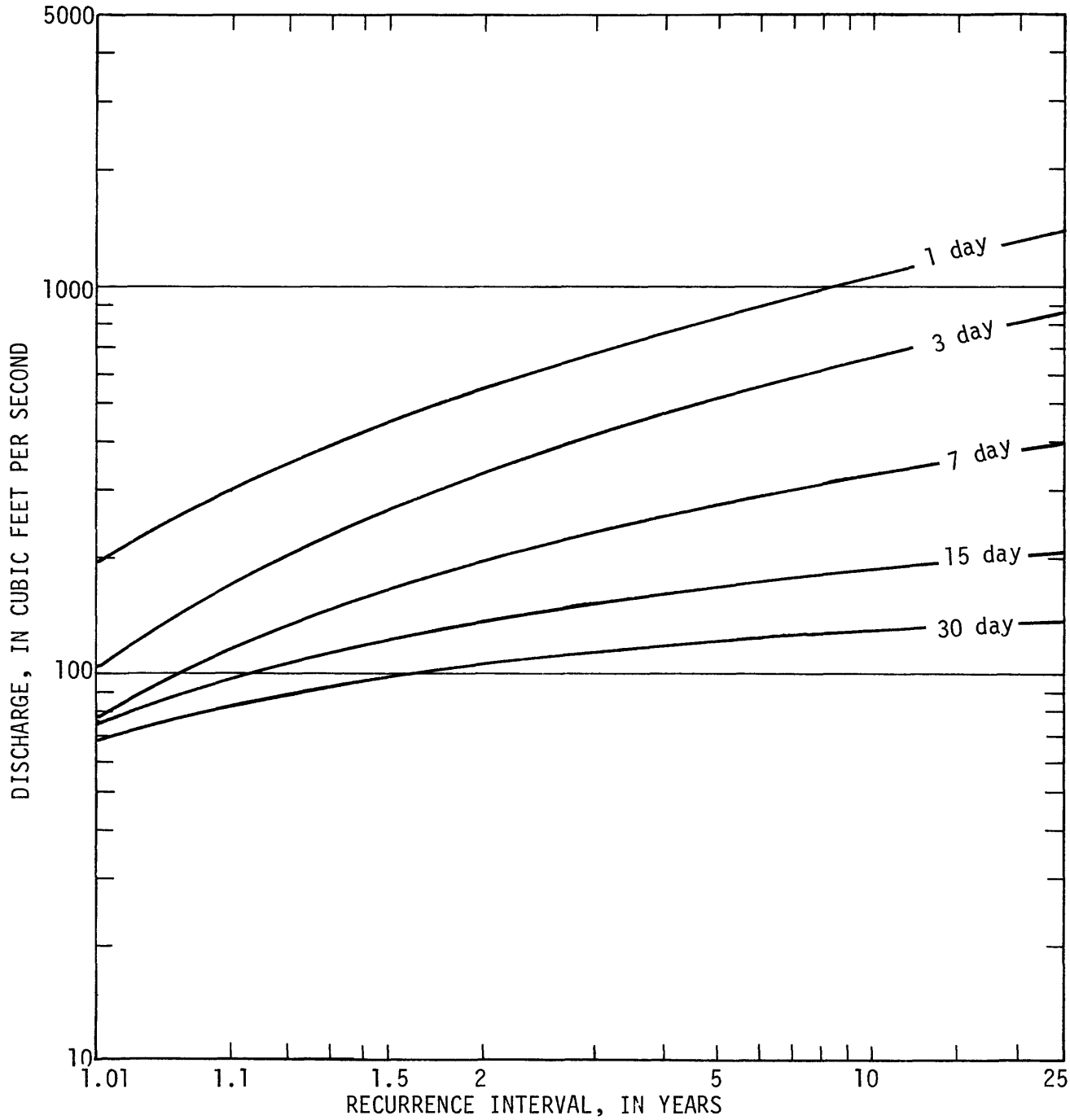


Figure 22. High-flow frequency curves for Tabecheding River, Babelthuap, for the indicated number of consecutive days.

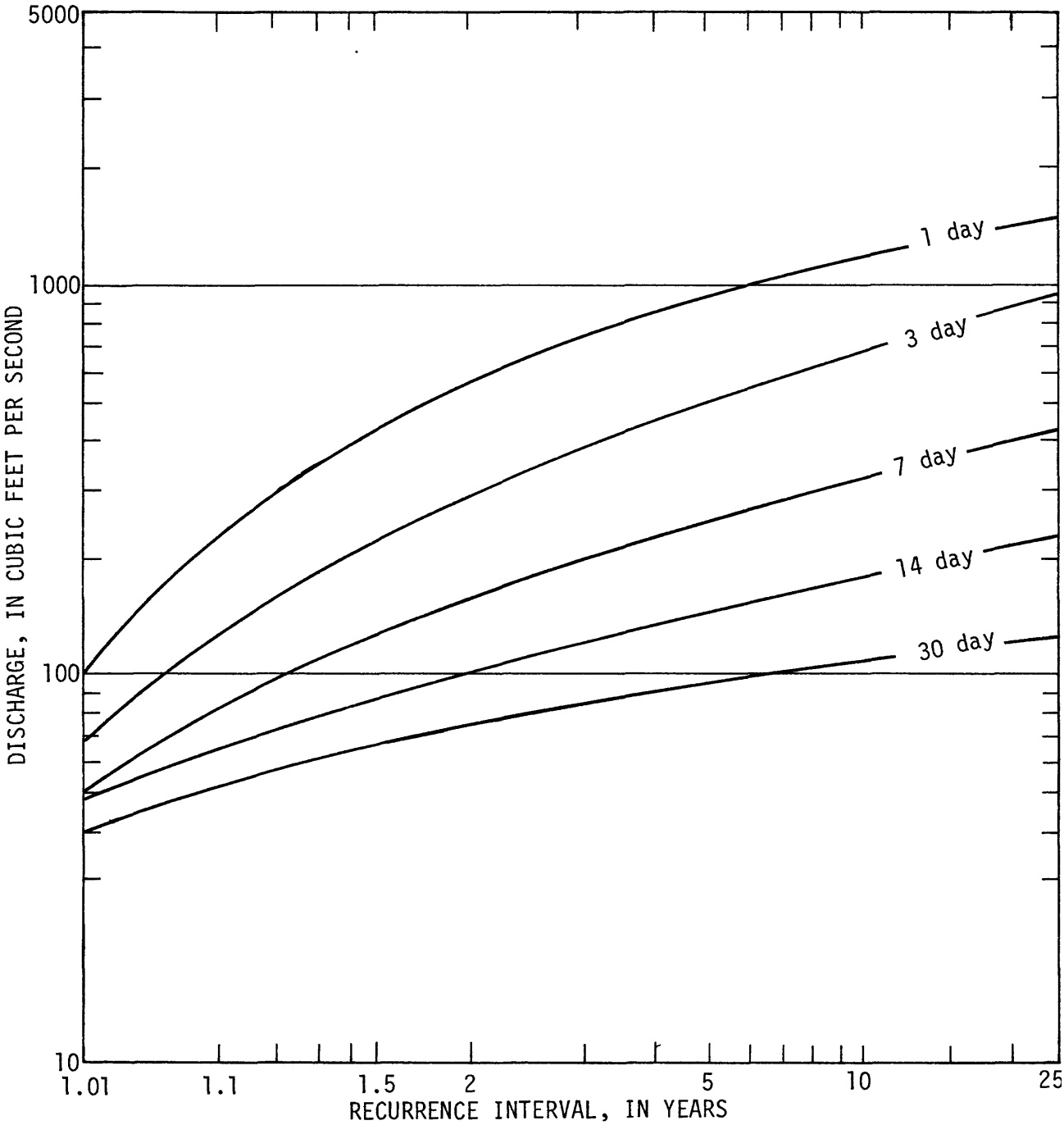


Figure 23. High-flow frequency curves for Edeng River, Babelthuap, for the indicated number of consecutive days.

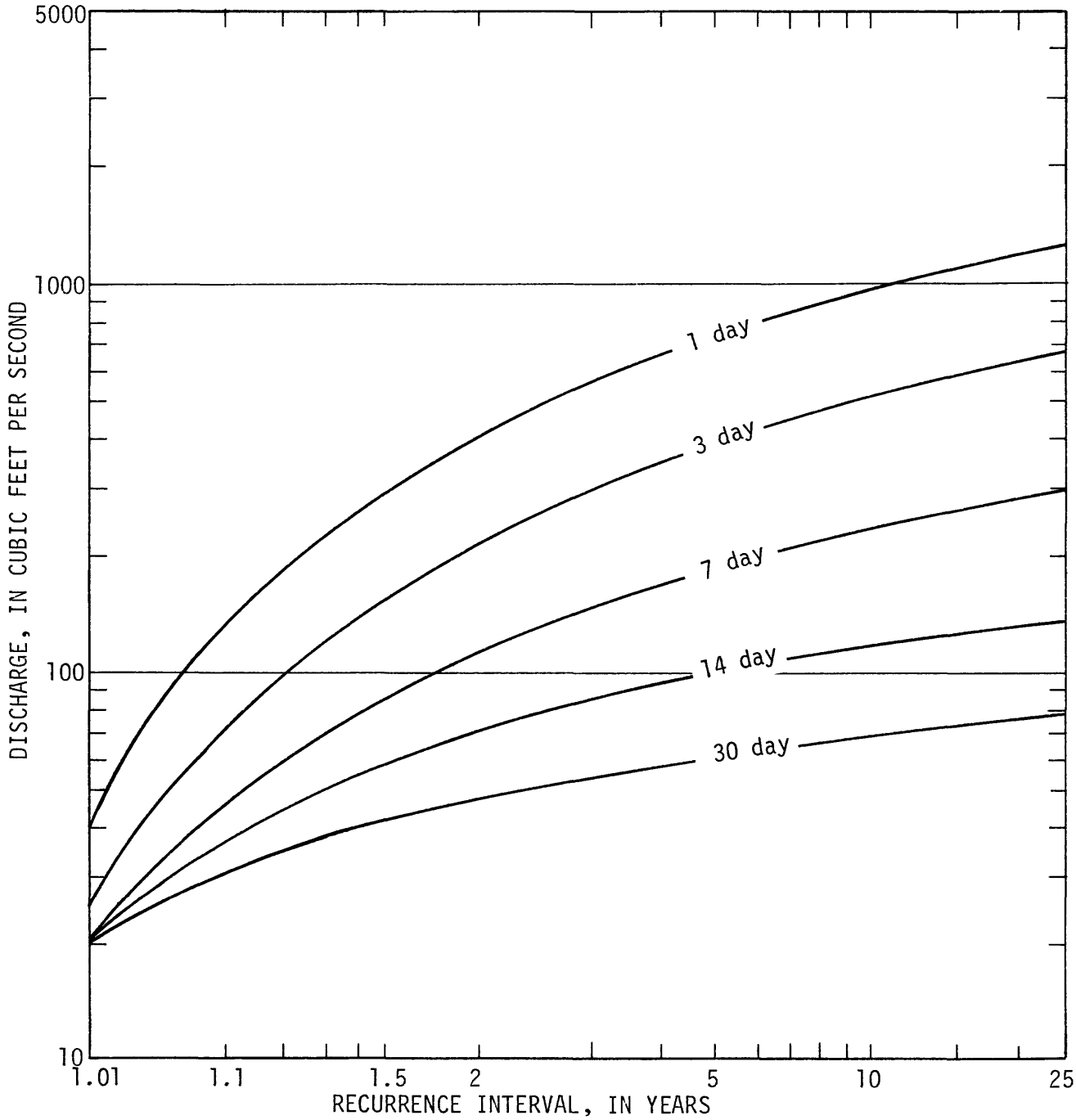


Figure 24. High-flow frequency curves for South Fork Ngerdorch River, Babelthuap, for the indicated number of consecutive days.

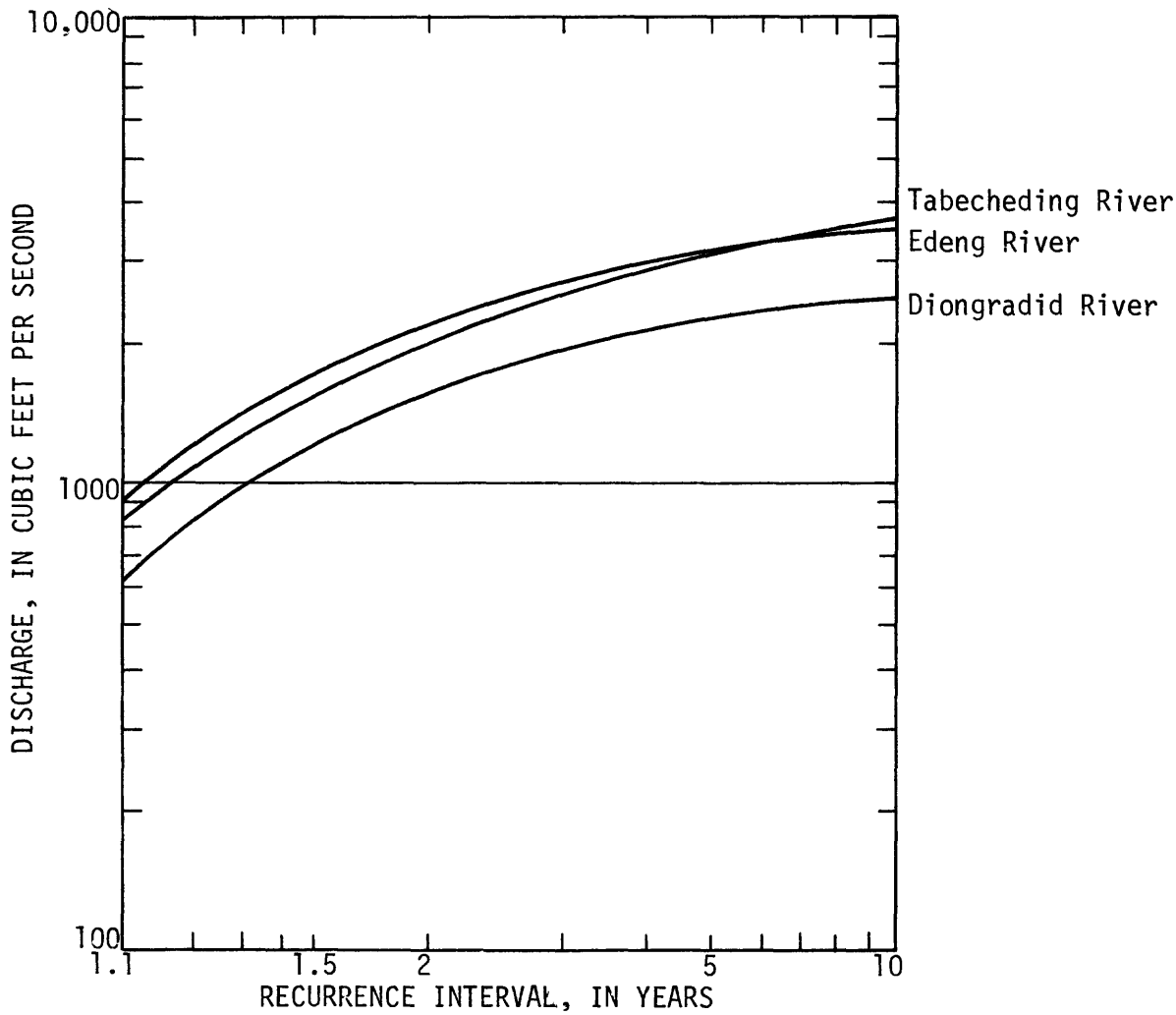


Figure 25. Frequency curves for three Babelthuap rivers, showing magnitude and frequency of annual instantaneous peak flows.

Correlations between partial-record and continuous-record stations

Low-flow characteristics at partial-record stations can be estimated by correlating the discharge measurements at the partial-record station with concurrent discharges at continuous record stations. Discharge measurements made at all partial-record stations on Babelthuap were correlated with the instantaneous discharge at nearby continuous-record stations. Where two gaging stations were located nearly equidistant, correlations were made with each one, and the choice of the regression line used was based on the best combination of the highest correlation coefficient. Close correlations were found for all stations on Babelthuap as shown by table 12 and figures 26-33. These relations can be used to obtain reliable estimates of low flow at the partial-record stations. For example, from figure 26 the 14-day Q_2 low flow (lowest mean discharge for 14 days which can occur once every two years) for Ngechutrong River can be estimated from the 14-day Q_2 low flow of the corresponding continuous-record station (fig. 17).

No correlations were made for the partial-record stations on Ngerekebesang and Malakal because of the minimal discharge of the small streams and the absence of gaging stations on the islands.

Water Quality

General

Stations and sites from which the U.S. Geological Survey collected and analyzed water samples are listed on table 13, and those on the island of Babelthuap shown on fig. 34. The results of these analyses, can be found in tables 55-65 in the Hydrologic Data section.

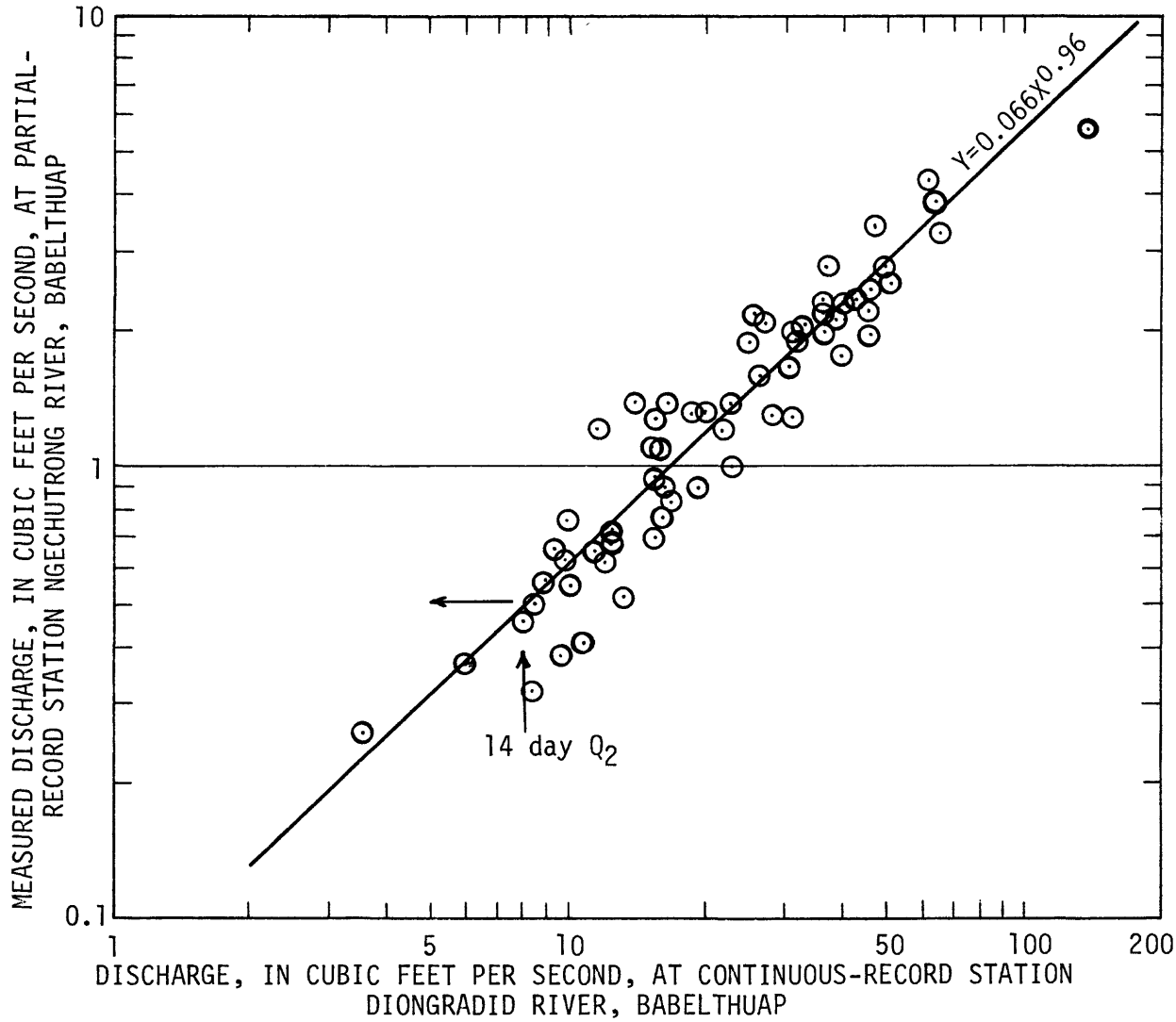
All water samples collected by the Geological Survey (fig. 35) were analyzed in the Geological Survey Central Laboratory in Denver, Colorado. Discharge, water temperature, specific conductance, pH, and dissolved oxygen were determined at the site.

Water temperatures were obtained when discharge measurements were made and are listed in the Hydrologic Data section (tables 66-83).

Table 12. Correlation between discharge at low-flow partial-record and continuous-record stations

[X, discharge for continuous-record station; Y, discharge for partial-record station.]

Partial-record station	Drainage area (mi^2)	Continuous-record station	Drainage area (mi^2)	Number of observations	Correlation coefficient	Regression equation
Ngechutrong River	0.25	Diongradid River	4.45	67	0.95	$Y = 0.066\ X^{0.96}$
Ngerchetang River	1.51	do.	4.45	31	.89	$Y = 0.32\ X^{1.06}$
Ngermeskang River	7.14	do.	4.45	54	.93	$Y = 1.63\ X^{0.99}$
Ngetpang River	.34	South Fork Ngerdorch River.	2.44	52	.96	$Y = 0.16\ X^{0.91}$
Kmekumel River	1.59	Edeng River	4.26	59	.96	$Y = 0.33\ X^{1.04}$
North Fork Ngerdorch River.	9.70	South Fork Ngerdorch River.	2.44	39	.95	$Y = 4.16\ X^{1.04}$
North Fork Ngerdorch River tributary.	1.78	South Fork Ngerdorch River.	2.44	37	.90	$Y = 1.19\ X^{0.78}$
Lmetmellasch River	.32	Diongradid River	4.45	21	.98	$Y = 0.026\ X^{1.21}$



Arrows show how discharge at partial-record station is obtained from discharge at continuous-record station. Q_2 is the mean flow with a 2-year recurrence interval.

Figure 26. Correlation between discharges of Ngechutrong and Diongradid Rivers.

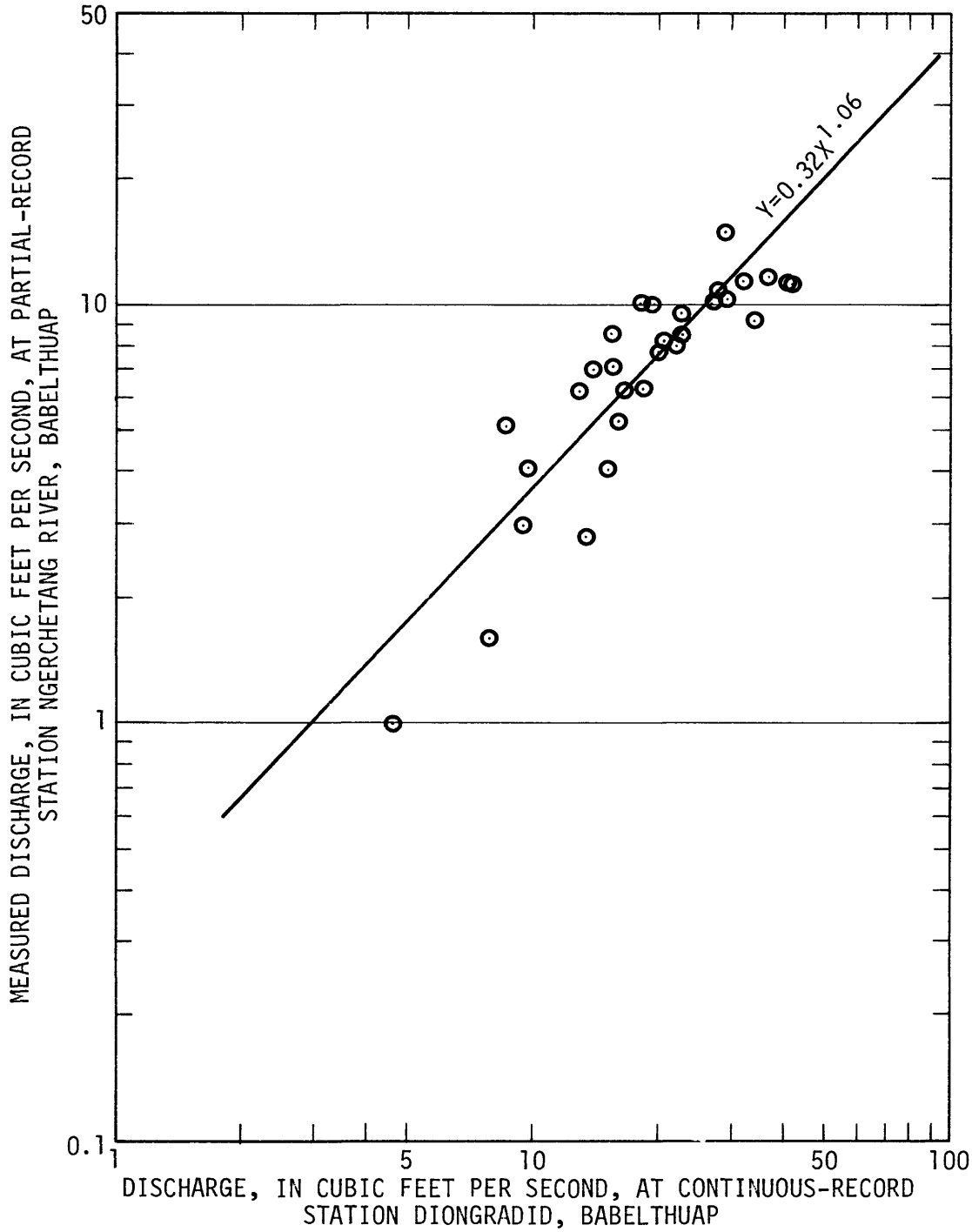


Figure 27. Correlation between discharges of Ngerchetang and Diongradid Rivers.

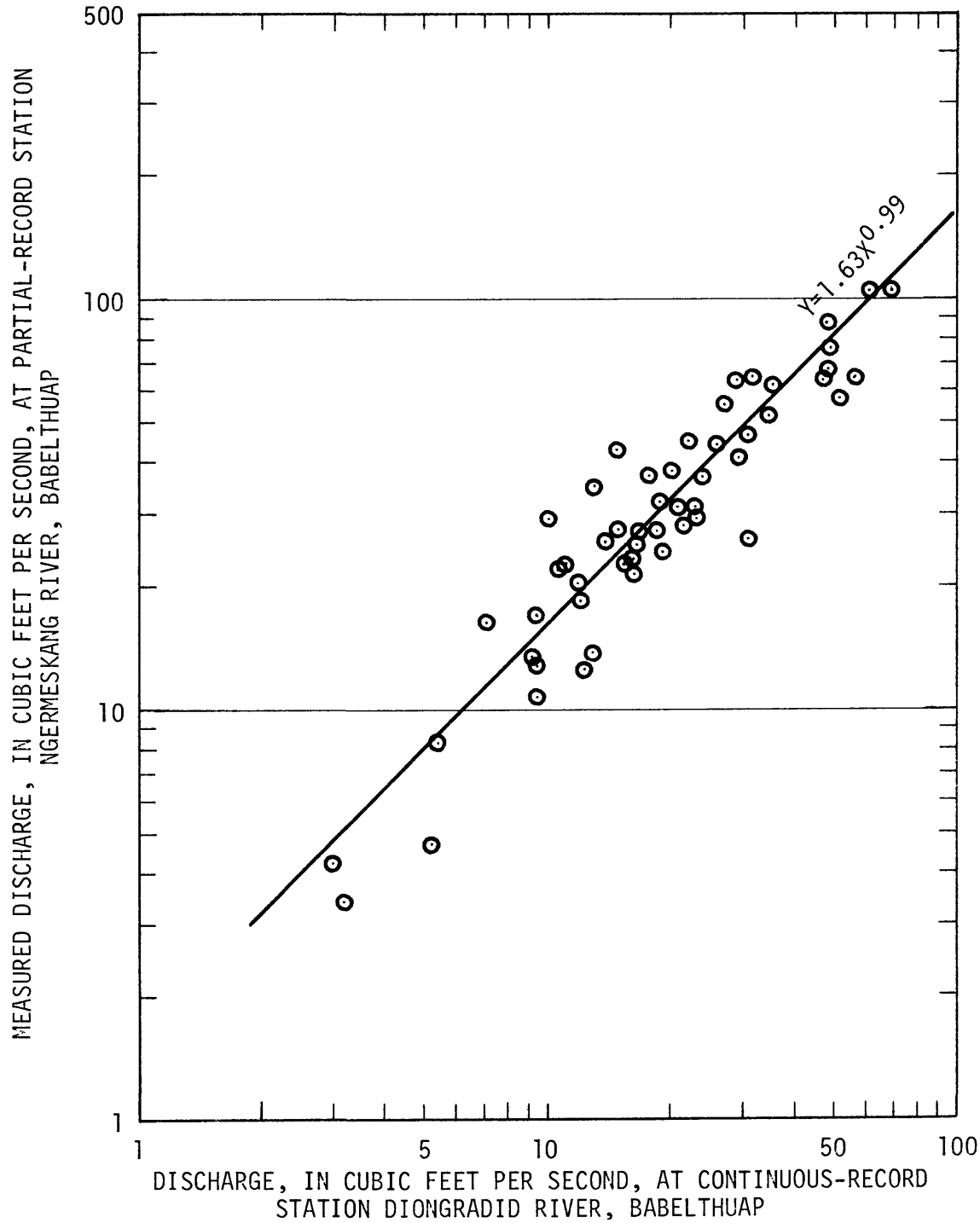


Figure 28. Correlation between discharges of Ngermeskang and Diongradid Rivers.

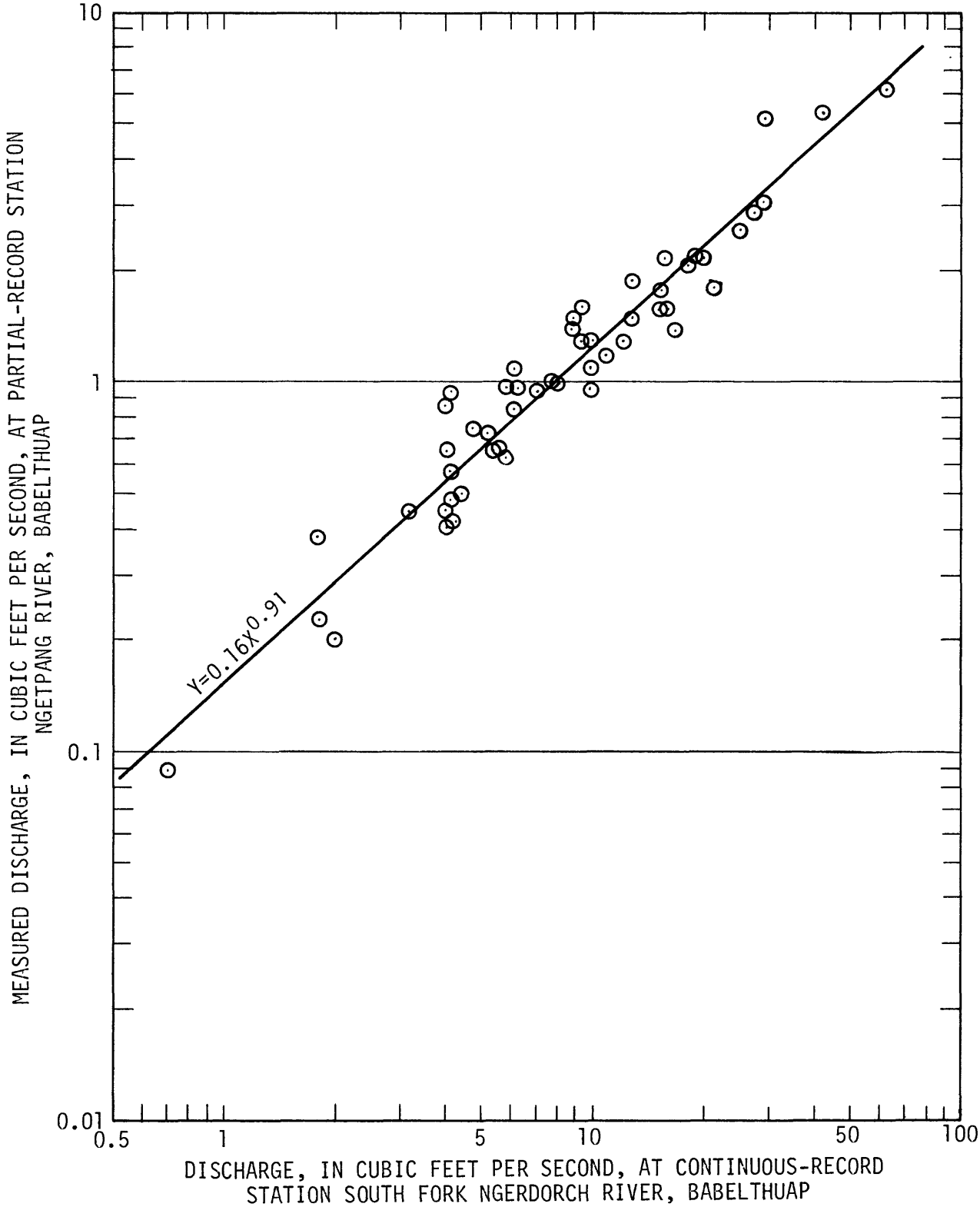


Figure 29. Correlation between discharges of Ngetpang and South Fork Ngerdorch Rivers.

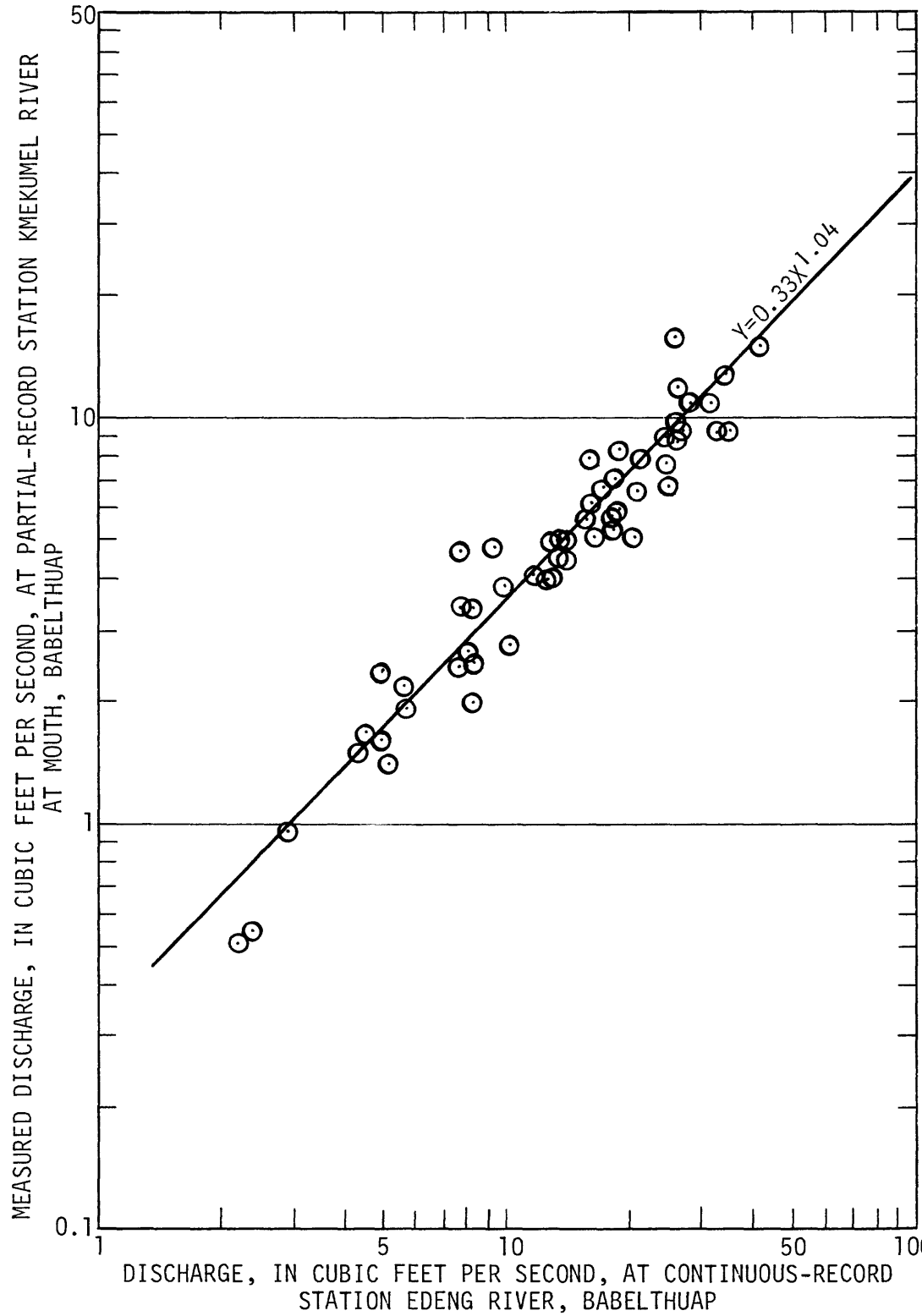


Figure 30. Correlation between discharges of Kmekumel River at mouth and Edeng River.

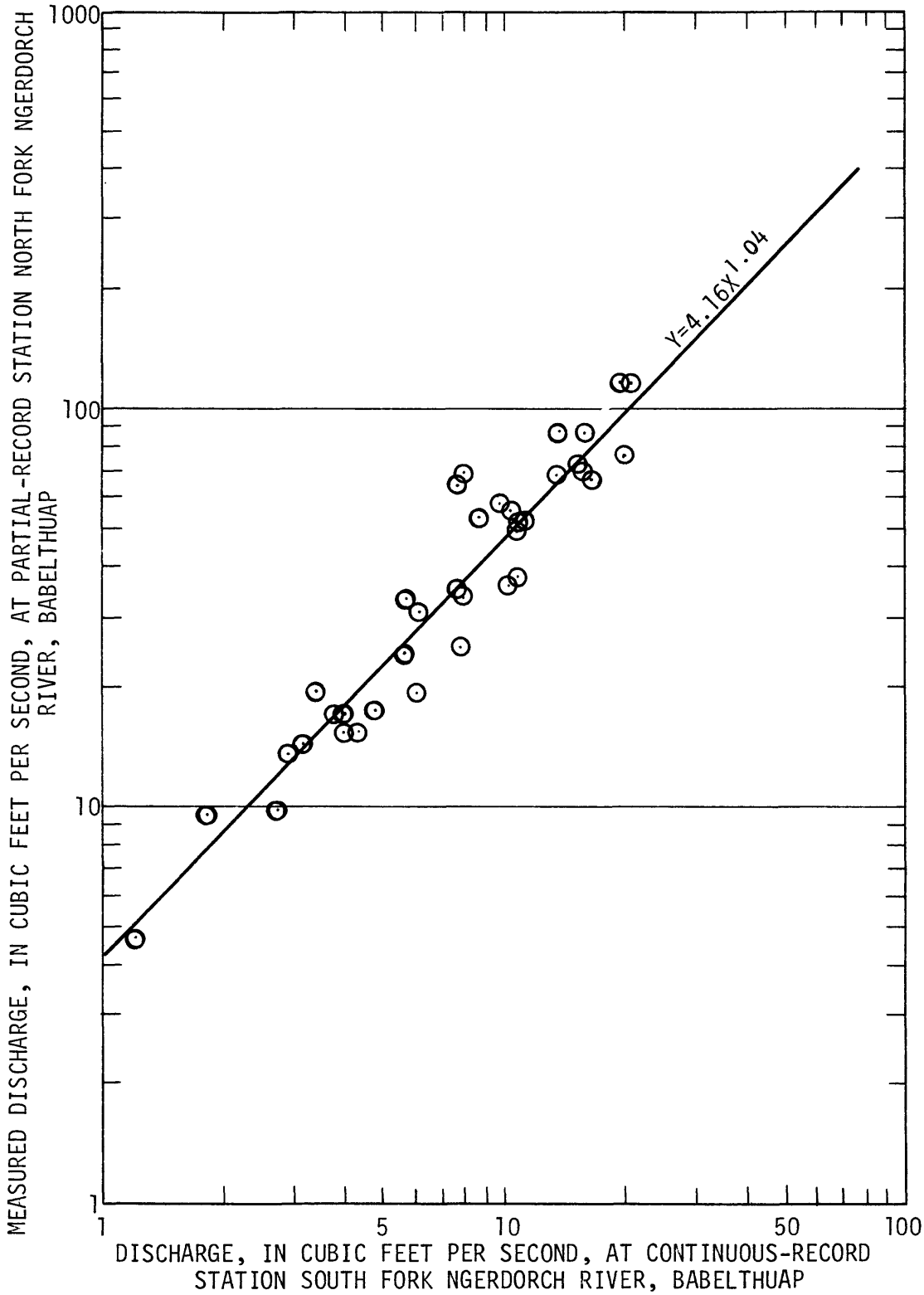


Figure 31. Correlation between discharges of North Fork and South Fork Ngerdorch Rivers.

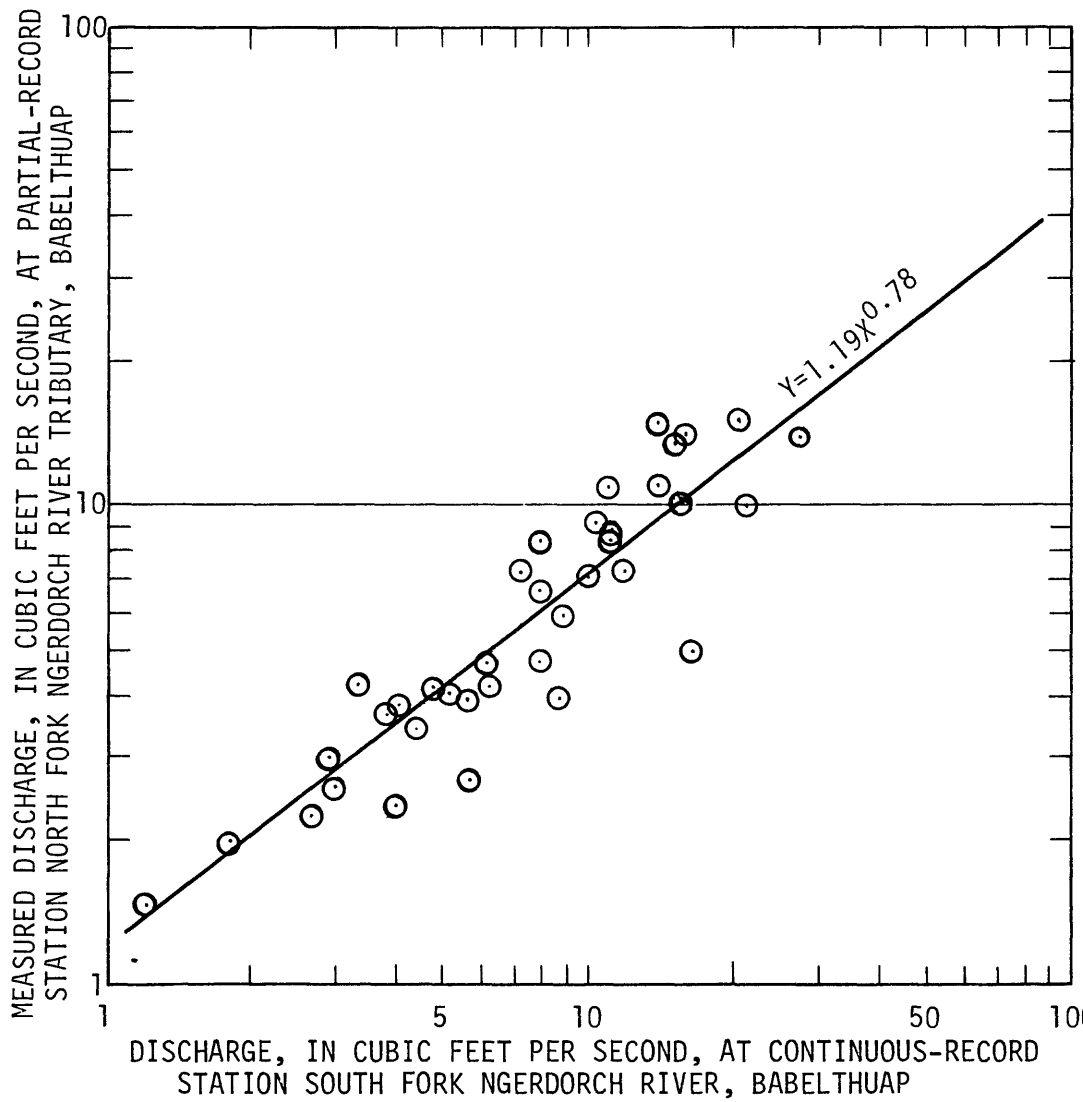


Figure 32. Correlation between discharges of North Fork Ngerdorch River tributary and South Fork Ngerdorch River.

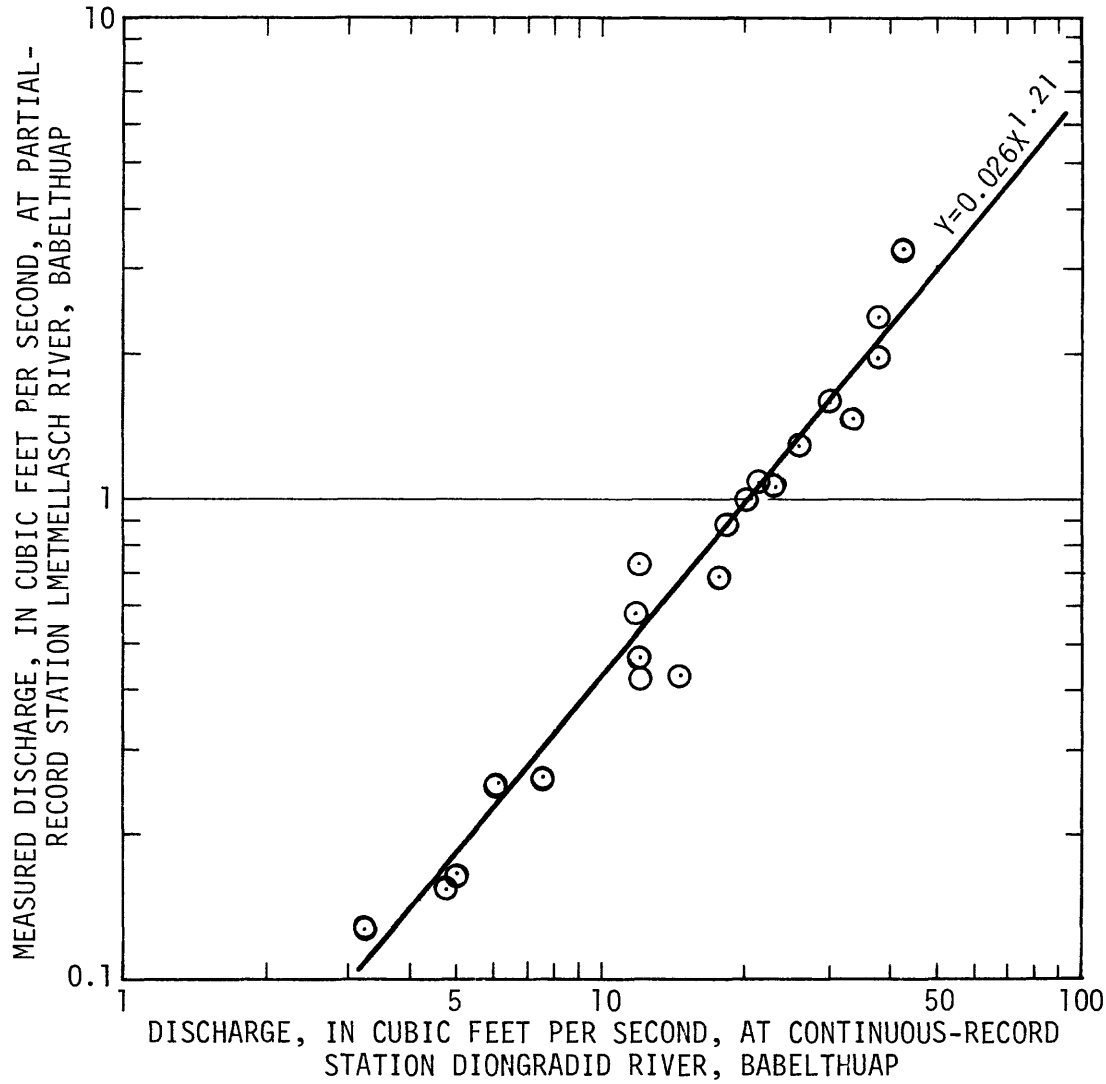


Figure 33. Correlation between discharges of Lmetmellasch River and Diongradid River.

Table 13. Summary of chemical analyses of surface water (U.S. Geological Survey)

Station No.	Station name	Date sample collected				
	Babelthuap					
16890600	Diongradid (Adeiddo) River	4-11-79	1-29-80	9-25-80	7-8-81	9-23-82
16890620	Ngechutrong River	--	do.	do.	do.	Do.
16890650	Ngerchetang (Galkatan) River	--	do.	do.	do.	--
16890700	Ngermeskang (Almiokan) River	--	1-25-80	--	7-11-81	--
16890800	Ngetpang (Ngatpang) River	--	1-24-80	--	7-6-81	9-21-82
16890900	Tabecheding (Tabagaten) River	4-12-79	do.	9-27-80	do.	Do.
16891190	Ngerimel (Gihmel) Reservoir	--	1-27-80	9-23-80	--	9-20-82
16891200	Ngerimel (Gihmel) River	4-15-79	--	--	7-12-81	--
16891300	Edeng (Gaden) River	4-13-79	1-22-80	9-23-80	7-4-81	9-20-82
16891310	Kmekumel (Kumekumeyel) River	4-14-79	do.	do.	do.	Do.
16891400	South Fork Ngerdorch (Ngardok) River.	--	1-23-80	9-24-80	7-5-81	9-22-82
16891430	North Fork Ngerdorch (Ngardok) River.	--	do.	do.	do.	Do.
16891480	Ngkeklau village reservoir	--	--	--	7-9-81	--
16891500	Lmetmellasch River (Geligal Marsh outlet).	9-15-71	--	--	do.	--
	Ngerekebesang (Arakabesan)					
16891700	Unnamed west coast stream	--	1-24-80	--	--	9-24-82
16891750	Unnamed south coast stream	--	--	--	7-12-81	Do.
	Malakal					
16891780	Unnamed north coast stream	--	--	9-22-80	--	--
	Koror					
16891800	Elodesachel (Almigu) Spring	--	--	--	7-12-81	9-24-82

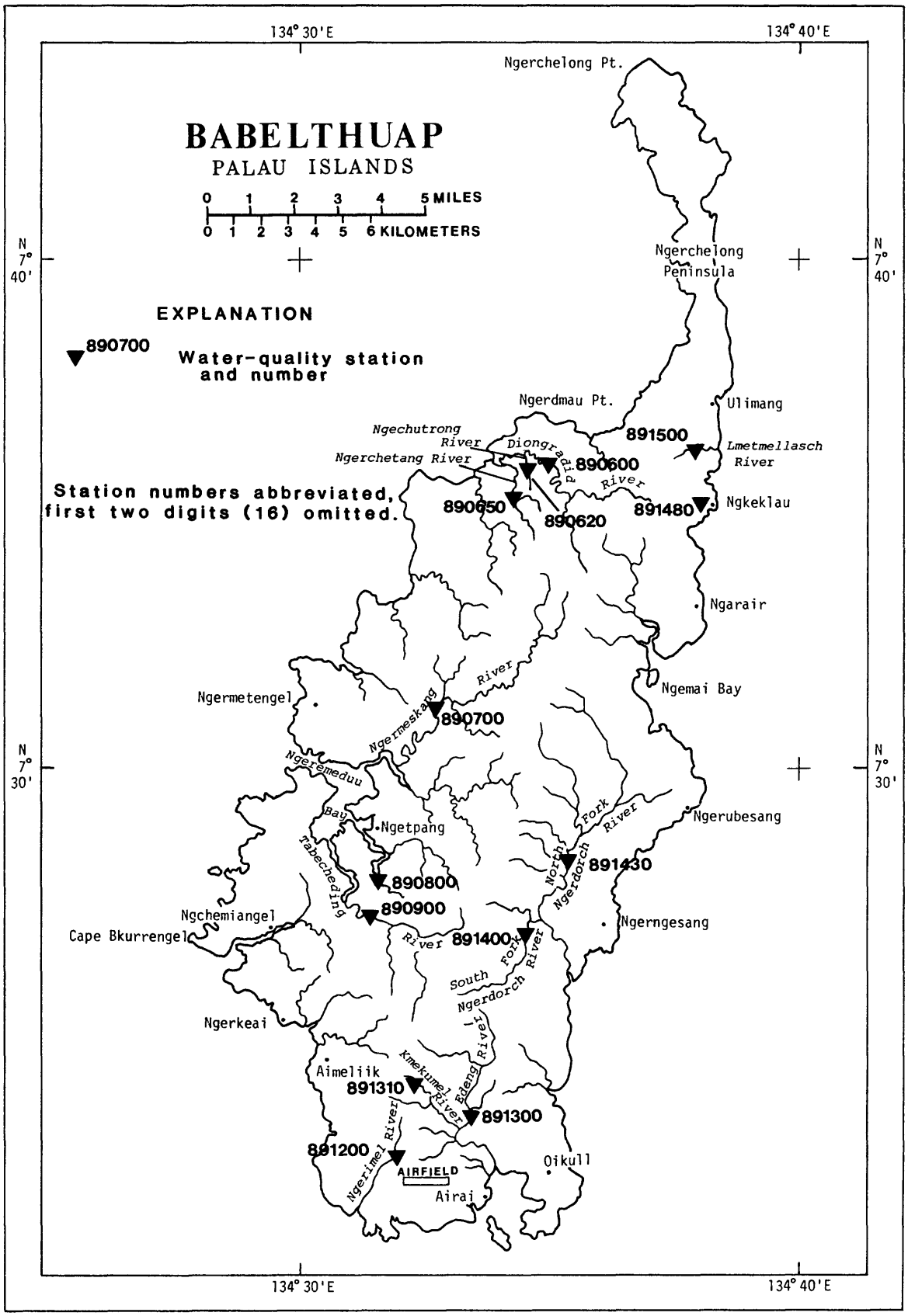


Figure 34. Location of water-quality stations on Babelthuap.

Figure 35. Water sampling for chemical analysis, Tabecheding River, Babelthuap, January 1980.

Surface-water quality

Water-quality data were collected by the U.S. Geological Survey to determine the baseline chemical and physical characteristics of surface water. Toxic chemicals and bacteriological determinations were not part of this basic inventory.

The quality of the surface water is excellent. The water is uniformly soft and the concentrations of all chemicals are well within the maximum permissible level recommended for domestic use by the World Health Organization, 1971. (Table 14).

The dissolved-solids concentration of stream water ranged from 17 mg/L (milligram per liter) to 66 mg/L (the maximum permissible level by World Health Organization standards is 1,500 mg/L). Silica is the dominant constituent and constitutes 32-44 percent of the dissolved solids. The silica concentration of the samples ranged from 6.2 to 25 mg/L. This range of concentration is characteristic of rainwater flowing over tropical volcanic terrain. Other constituents in decreasing order of concentration were: alkalinity, chloride, sodium, calcium, magnesium, sulfate, potassium, nitrite plus nitrate nitrogen, and fluoride.

The iron concentration of surface water ranged from 20-350 µg/L (microgram per liter) with a mean of 134 µg/L. Iron is a minor element in water but can cause undesirable effects when the concentration exceeds 300 µg/L. It can cause problems with taste, discoloration, turbidity, and growth of iron bacteria. The World Health Organization recommends a desirable level of 100 µg/L and a maximum permissible level of 1,000 µg/L (World Health Organization, 1971).

Runoff from tropical storms is usually flashy and can cause turbidity problems in streamwater and coastal waters. However, storm duration generally is short and streams revert to base flow with clear water within a short time. Physical quality data in terms of specific conductance, pH, temperature and turbidity are included in the chemical analyses as an integral part of the baseline information.

Specific conductance is expressed in micromho per centimeter at 25°C. It is a measure of the ability of water to transmit electrical current and is used as an indicator of the amount of dissolved solids in water; for example, the more dissolved solids, the greater the conductance. The specific conductance of streamwater on Palau did not exceed 92 µmho.

Table 14. World Health Organization drinking-water standards

[Trust Territory standards are based on World Health Organization, 1971, standards. NTU, nephelometric turbidity unit; mg/L, milligram per liter; µg/L, microgram per liter]

Constituent	Unit	World Health Organization	
		Highest desirable	Maximum permissible
pH	--	7.0-8.5	6.5-9.2
Turbidity	NTU	5	25
Hardness as $CaCO_3$	mg/L	100	500
Calcium, dissolved (Ca)	mg/L	75	200
Magnesium, dissolved (Mg)	mg/L	30	150
Sulfate, dissolved (SO_4)	mg/L	200	400
Chloride, dissolved (Cl)	mg/L	200	600
Fluoride, dissolved (F)	mg/L	1/	1/
Solids, total dissolved	mg/L	500	1,500
Iron, dissolved (Fe)	µg/L	100	1,000
Manganese, dissolved (Mn)	µg/L	50	500

1/ 1.4-2.4 mg/L, depending on ambient temperature.

A measure of acidity or basicity is pH. In natural water, pH is a function of chemical and biological processes. For streams on Babelthuap, pH values ranged from 6.5 to 7.9 and are within the recommended range for public water supply (World Health Organization, 1971).

Stream temperatures do not vary much on Palau. They fluctuate somewhat with ambient conditions and are normally highest in mid-afternoon. Temperature is an important consideration because of its effect on chemical reactions and biological activities.

The turbidity of the stream samples analyzed did not exceed 6.6 NTU (Nephelometric Turbidity Unit). The values do not reflect high-flow conditions.

Ground-water quality

Chemical analyses of a water sample taken from Page Communication well, Arakabesan, in 1967; from Well 5, Peleliu, taken in 1971; and from Van Camp well, Malakal, in 1982, indicate the water is from limestone aquifers (tables 53 and 65). The dissolved solids concentrations of the water are below 250 mg/L, and within the recommended criteria for drinking water supply. Hardness of water can be classified as follows (Durfor and Becker, 1962):

Class	Hardness as $CaCO_3$
Soft	Less than 60 mg/L
Moderately hard	60-120 mg/L
Hard	120-180 mg/L
Very hard	More than 180 mg/L

The water from Page Communication well and Van Camp well are thus classified as moderately hard, and water from Well 5, Peleliu, as very hard.

Ground Water

The water-bearing volcanic rocks of Koror, Malakal, Ngerekebesang, and Babelthuap are weathered to a red or brown-red laterite, usually to a few tens of feet below the land surface. The water absorbed by the laterite seeps down to the unweathered volcanic rock, which is almost impermeable (Piper, 1946-47). This ground water appears as small springs or seeps where the mantle is cut by stream channels. The springs sustain the perennial flow of the rivers. Because of the slow rate of flow through the laterite and the small storage capacity, only a limited amount of water can be recovered from shallow wells. No deep wells have been drilled in the volcanic rock.

Of all the Palau Islands, only Peleliu and Angaur have the porosity of the soil and the size necessary to maintain a freshwater lens from which a substantial amount of ground water can be obtained.

Babelthuap

During the Japanese Administration of the islands, water from two rivers on Babelthuap was used for water supply. In northern Babelthuap, where the Japanese mined bauxite from 1940 to 1944, water from the Diongradid River was diverted from two concrete dams, located about 2 miles upstream from the present Geological Survey gaging station, to a storage reservoir near a bauxite washing area. The capacity of this reservoir was estimated by Piper (1946-47) at 750,000 gallons, and in a report by the Geological Survey (1948), as 500,000 gallons. Water was piped from the reservoir for 1 mile to the Ngerdmau pier. All that remained after bombing by American Forces was one of the diversion dams.

On the Ngerimel River in southern Babelthuap, the Japanese constructed a dam to divert water for use on Koror. In a report by the U.S. Army Chief of Engineers (1956), the dam was reported to have been 15 feet high, impounding 10 Mgal. Piper, 1946-47, mentions a 30-foot high dam with 35-Mgal capacity. Cooper, 1959, reported the dam to have been 20 feet high, 140 feet long, with a 10-Mgal capacity, whereas Austin, Smith and Associates (1967), calculated a capacity of 14 Mgal.

The dam was constructed across the river on an outcrop of rock by pouring concrete onto the rock without anchoring. This permitted leakage at the interface of dam and rock and there is evidence the dam was later reinforced by concrete and by earthfill on the downstream side of the right bank (Cooper, 1959).

During World War II, the dam was destroyed by American bombing. After the American occupation, water for Koror initially came only from Elodesachel Spring on Koror, but after a 1948 dry spell reduced the yield of the spring to a trickle, the U.S. Navy tried to repair the dam in 1949 by pouring concrete between the remaining sections of the old dam, but almost half of the streamflow continued to leak under the dam (Cooper, 1959).

In 1969, a new dam designed to hold about 28 Mgal (figs. 36, 37), was constructed across the Ngerimel River at the site of the Japanese dam. From this reservoir, water now flows through a 12-inch pipe to the Airai pump station and treatment plant, which replaced the Koror filter plant.

Figure 36. Ngerimel River reservoir, Babelthuap, December 1971.

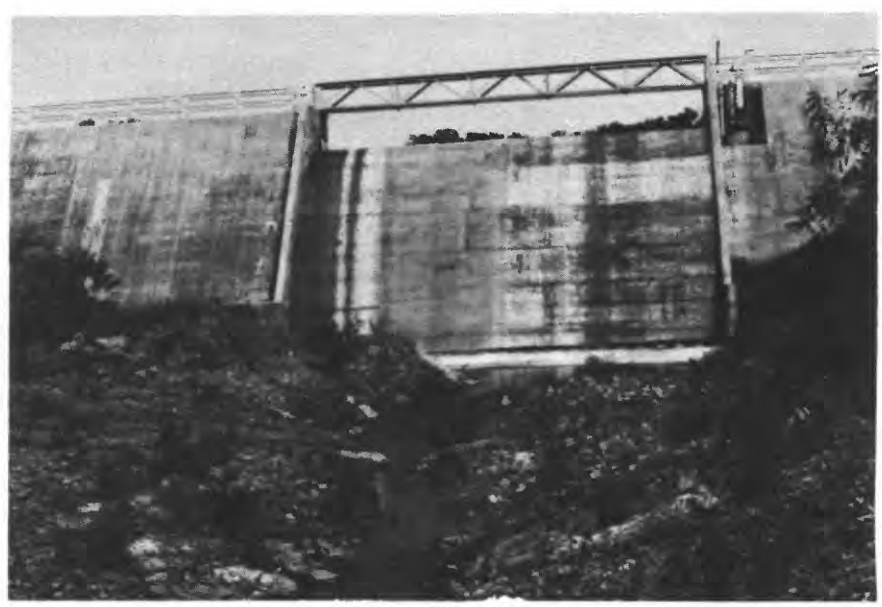


Figure 37. Ngerimel River reservoir spillway, December 1971.

Koror

The only water source of significance on Koror is Elodesachel Spring, also called "Almigu Spring" or "Japanese Cave". This spring is the drainage of a swamp in a 15-acre depression in the limestone ridges on the northern end of Koror. Most of the water from the swamp filters slowly through the limestone to underlying impervious volcanic rock and to a cave, a distance of about 300 yards (U.S. Army Chief of Engineers, 1946). In 1948, dye placed at the swamp outlet by Geological Survey personnel took 3 hours to appear at the cave and observations showed that the flow in the cave increases about 4 hours after a heavy rain (Cooper, 1959).

During the Japanese Administration, a low weir was built at the spring outlet in the cave and the water was pumped to a small reservoir about 300 feet to the west on a ridge for use on Koror, Malakal, and Arakabesan. During the early days of the American Administration, a concrete dam was built across the mouth of the cave forming a small reservoir of about 10,000 gallons.

Water produced from the cave ranged from about 5,000 gal/d (gallon per day) during the dry season to 50,000 gal/d during the wet season. A discharge measurement made on April 15, 1948 showed a yield of 18,000 gallons for the day (Cooper, 1959). Because the water remains in contact with the limestone only for a short time, the water is relatively soft. For chemical analyses of the spring water, see tables 54 (1949) and 65 (1981-82).

Koror Central Water System

During the Japanese administration, water for Koror was supplied by a combination of water from Elodesachel (Almigu) Spring and surface water from Ngerimel River on Babelthuap. Water was taken at the Ngerimel River dam and pumped across Toachel Mid (the channel between Babelthuap and Koror) to Elodesachel Spring. The water was combined with that of Elodesachel Spring, and pumped to the Koror filter plant. The filtered water was stored in a 200,000 gallon covered concrete reservoir for distribution on Koror, Malakal, and Ngerekebesang.

Until 1980, essentially the Japanese designed system was used to supply water to Koror (fig. 38).

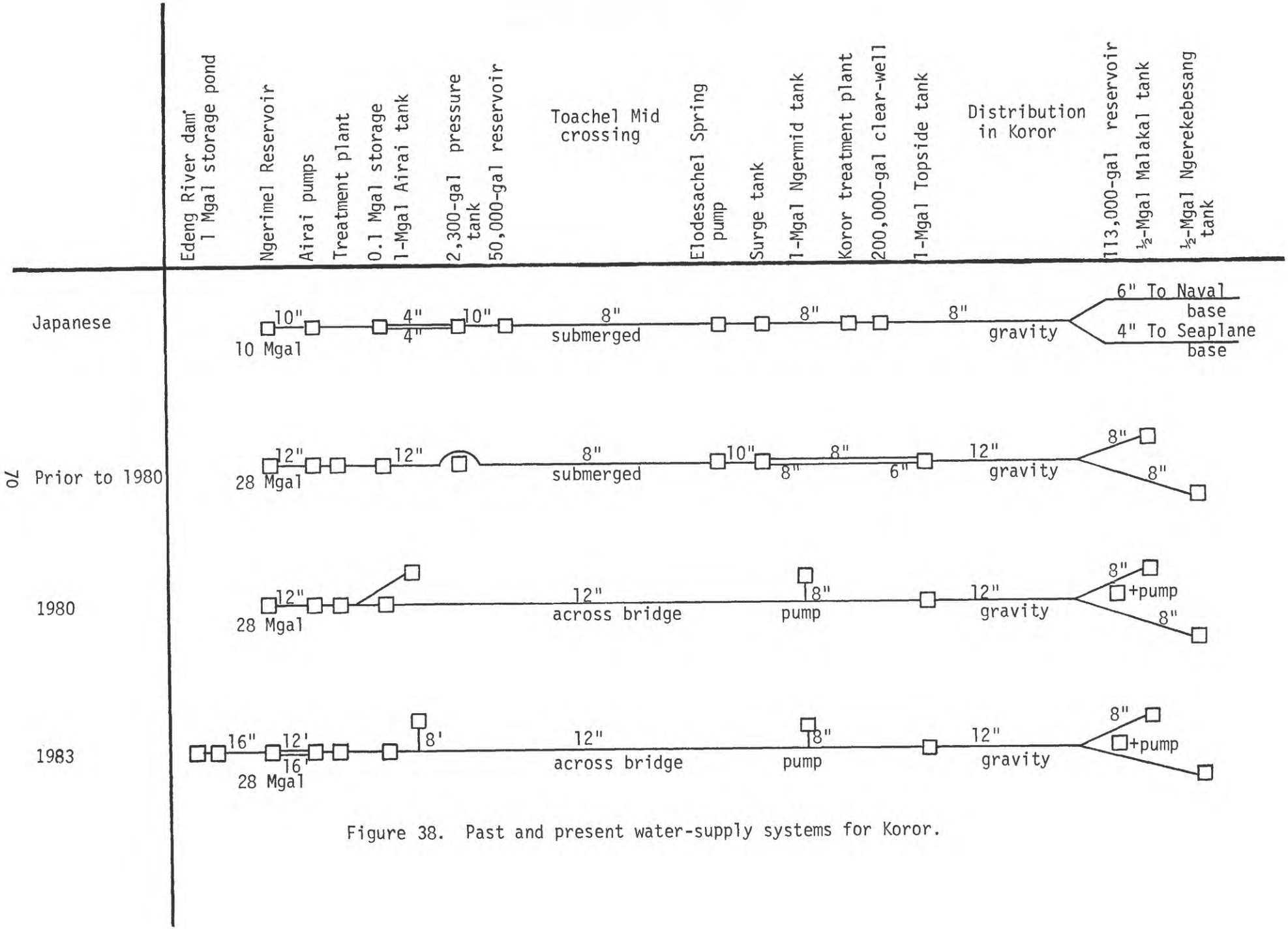


Figure 38. Past and present water-supply systems for Koror.

Since then, a 12-inch pipe has been installed which runs from a 100,000-gallon-capacity clear-water reservoir at the Airai treatment plant on Babelthuap across the new channel bridge to two 1-Mgal tanks on Koror and to 500,000-gallon tanks on Ngerekebesang and Malakal (fig. 39). From the Airai clear-water reservoir, water is also pumped through an 8-inch line to a 1-Mgal steel tank near the airport.

Water consumption from the Koror central water system, averaged only 2.3 Mgal/month in 1956-58, (Cooper, 1959, monthly totals of metered consumption) and less than half of the people on Koror, Malakal, and Ngerekebesang received water from the system. By December of 1966, consumption had risen to 8.9 Mgal/month (Austin, Smith, 1967).

At the inlet to the Koror treatment plant, a 90-degree V-notch weir provided the only measuring device in the system. The Geological Survey collected twice daily readings from the weir from 1971 until 1974, when part of the flow started to bypass the weir. Table 15 shows monthly production figures for February and March 1971 and from June 1971 to March 1974. The average monthly production during the latter period was 18.2 Mgal (28.1 ft^3/s).

In 1980, water production was about 30 Mgal per month which should have been sufficient to satisfy the demand. However, water was supplied only during the hours of greatest demand because of leaks in the distribution system. The central water system served a population of about 9,500 in 1980 and this population was projected to increase to 12,000 by 1985 or to 13,430 with the anticipated inclusion of Airai Village that year (Hawaii Architects and Engineers, 1980). Since May 1983, water is pumped from the Edeng River through a 16-inch pipe to the treatment plant or the Ngerimel Reservoir. This has increased the total capacity of the system to 66 Mgal/month.

A chemical analysis of water from the Koror treatment plant in 1976 is given in table 53 and analyses of Ngerimel River water for 1979-81 are listed in table 57 in the Hydrologic Data section.

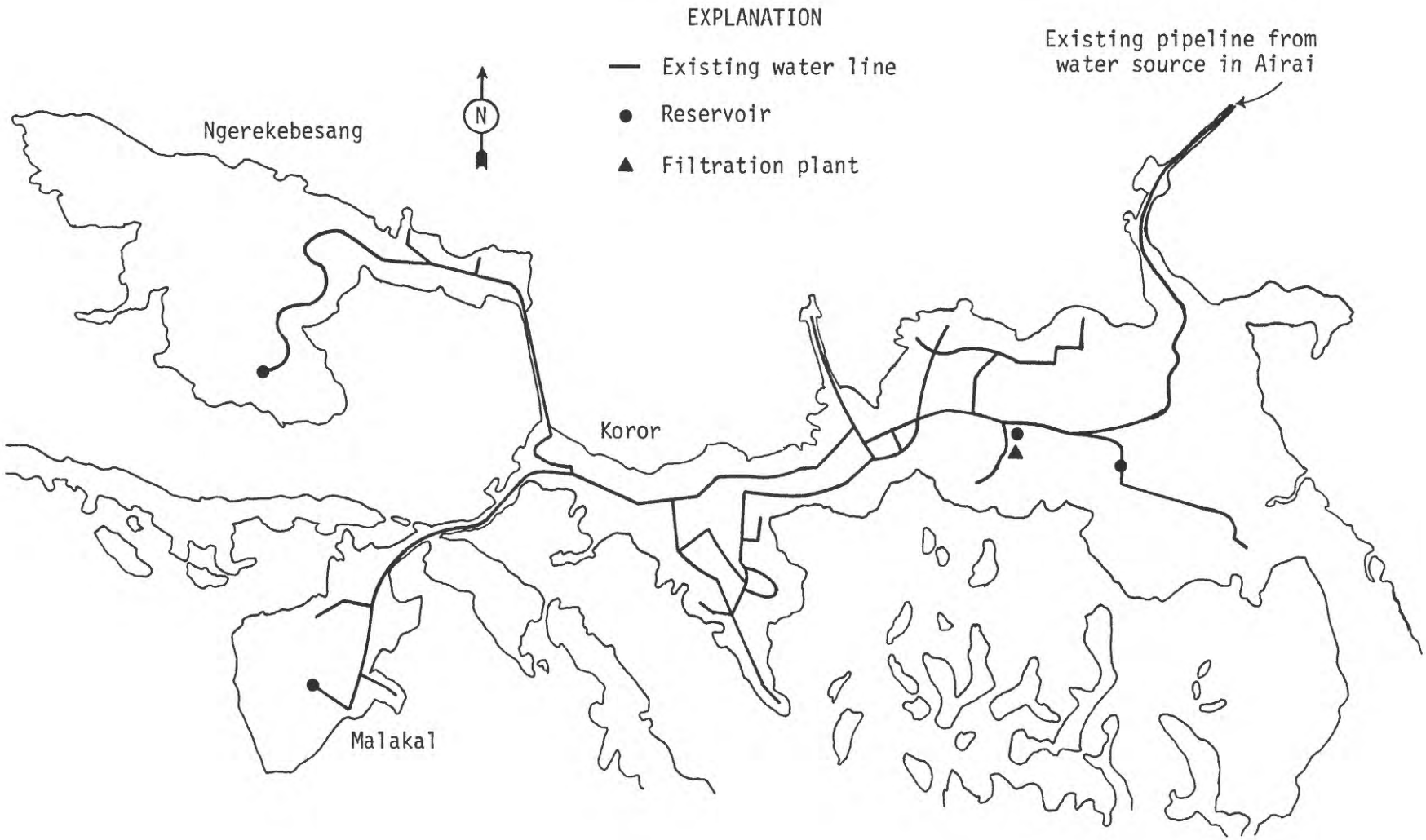


Figure 39. Koror central water-distribution system.

Table 15. Monthly and annual inflow, in cubic feet per second, into the Koror filter plant

Year	Calendar year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Water year
1971														
Total			20.03	22.54	--	--	28.15	26.13	21.61	22.84				--
												25.08	22.81	24.53
Mean			.72	.73	--	--	.94	.85	.70	.76	.81	.76	.79	--
Max.			.77	.90	--	--	1.1	1.0	.90	1.0	1.0	1.0	.94	--
Min.			.66	.63	--	--	.66	.60	.33	.37	.36	.66	.55	--
1972														
Total		27.31	25.63	29.78	29.74	30.45	29.94	30.70	30.76	29.82				336.55
		356.14										30.94	29.90	31.17
Mean	.97	.88	.88	.96	.99	.98	1.00	.99	.99	.99	1.00	1.00	1.00	.92
Max.	1.4	1.0	1.0	1.0	1.4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.4
Min.	.55	.66	.55	.77	.71	.74	.97	.97	.97	.97	.97	.90	.97	.36
1973														
Total		30.31	19.79	7.85	26.37	30.40	29.84	30.90	29.41	31.1				327.98
		335.15										34.10	32.82	32.26
Mean	.92	.98	.71	.25	.88	.98	.99	1.00	.95	1.00	1.10	1.09	1.04	.90
Max.	1.2	1.0	.97	.58	1.1	1.1	1.0	1.0	1.0	1.1	1.2	1.1	1.1	1.1
Min.	0	.84	.23	0	.36	.77	.87	.90	.84	1.0	.90	.92	.96	0
1974														
Total	--	31.60	28.20	31.9										
Mean	--	1.02	1.01	1.03										
Max.	--	1.1	1.1	1.2										
Min.	--	.10	.55	1.0										

June 1971 to March 1974 (34 months): total, 954.14 ft^3/s; average, 28.1 (ft^3/s)/month.

Malakal

On Malakal, the Japanese collected surface runoff from the exposed rock on the hillside on the southeast side of the island. The water was stored in a 115,000-gallon concrete reservoir. A Fujita Salvage Co. meter indicates that during the dry months in 1957-58, about 100,000 gallons per month were used by the company from this source. The water is now used only during emergencies and is then chlorinated, but not filtered, before it enters the main waterline (fig. 40).

On the north side of the island behind the present powerplant, the Japanese built a large covered concrete reservoir with four compartments with a storage capacity of 250,000 gallons. The source for this reservoir was runoff from the exposed rock hillside and the water was fed to the reservoir through a 100-foot-long concrete channel. In the Hydrologic Data section, results of 77 discharge measurements made during 1971-80 at the source (station 16891780) are given in table 52, chemical analyses of a water sample taken September 22, 1980, in table 64, and water temperatures in table 83. The source went dry only during the very dry years 1973 and 1977. Water from the reservoir was used for nearby housing and would have been used at a planned Japanese shipyard had the war not intervened. At present, the water is used by the power plant for cooling.

On the south side of the island, Van Camp Sea Food Co. constructed a 10-foot concrete dam across a small unnamed stream for use in a tuna-processing plant (fig. 40). This storage facility is no longer used; instead water is pumped from an old Japanese well to a large, new storage tank to supply the plant.

For their Naval Base on Malakal, the Japanese brought in water through a 6-inch pipe from the Koror treatment plant. At present, a 500,000-gallon steel tank receives water through an 8-inch pipe from the Koror distribution system for local distribution (fig. 41).

A large number of discharge measurements have been made on a small stream on the west side of the island. Results of these discharge measurements are listed in table 51 and water temperatures can be found in table 82 in the Hydrologic Data section. Water from the stream has never been used.

Figure 40. Van Camp Sea Food Co. dam, south Malakal, January 1980.

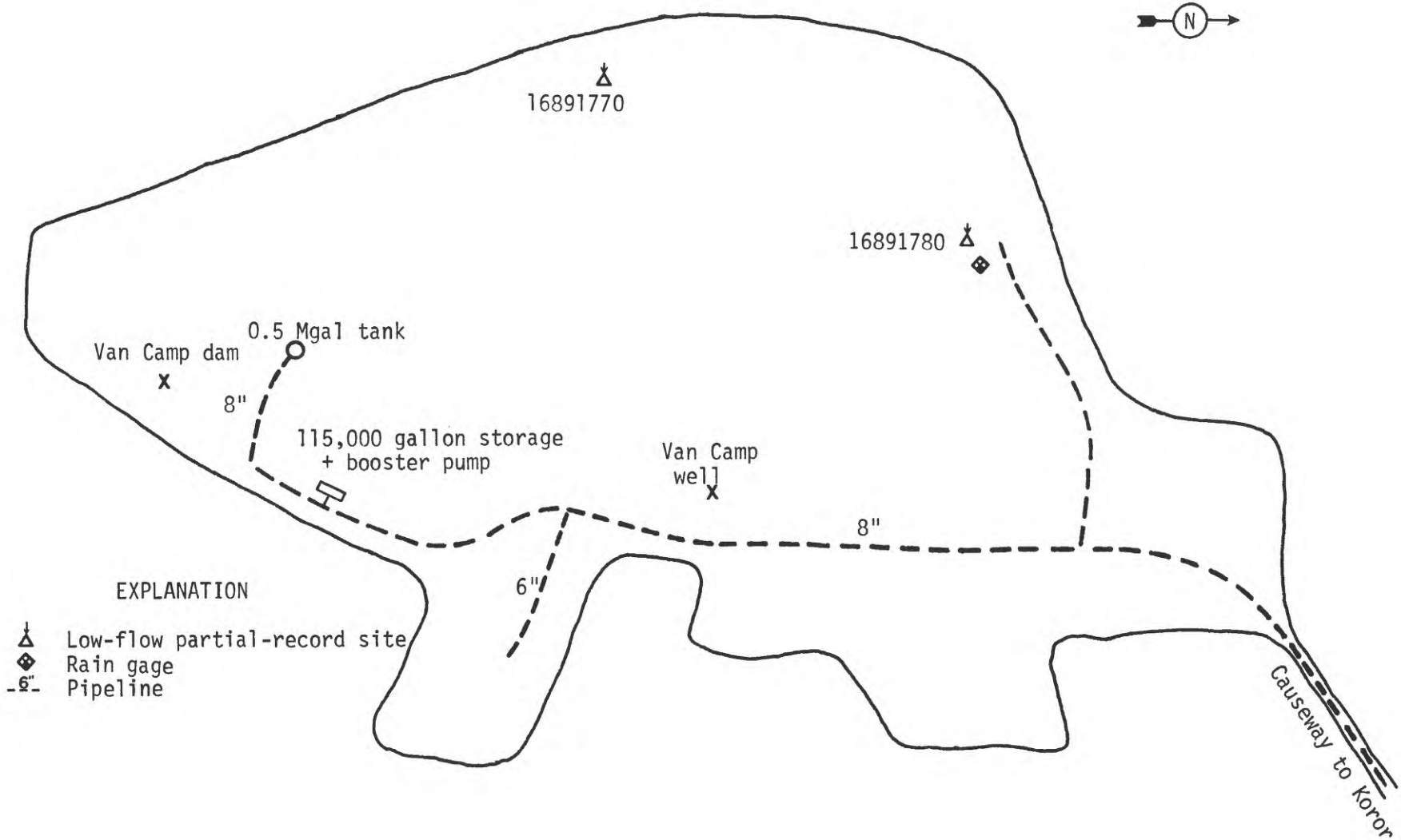


Figure 41. Water supply of Malakal.

Ngerekebesang

On Ngerekebesang the Japanese constructed a 12-foot-high concrete and stone dam (fig. 42) across a very small stream on the west side of the island to supply water for a seaplane base. Its reservoir has a capacity of about 15,000 gallons and is not used at present, but could supply water to a hotel under construction at the mouth of the valley.

The results of 85 discharge measurements made at this stream during 1971-79 (station 16891700) can be found in table 49, chemical analyses of water samples taken on January 24, 1980 and September 24, 1982 in table 64, and water temperatures in table 80 in the Hydrologic Data section.

To provide water for the Page Communication Station in eastern Ngerekebesang, a 6 x 6 x 13-foot well was dug and capped with concrete. This well produced 5,000 gal/d in 1967 (Austin, Smith, 1967). Nearby, a similar well was dug as a courtesy to the land owner. Both wells are no longer in use. (See table 53 for a chemical analysis (1967) of water from the Page Communication Station well.) The well strata were described by Cooper (1959) as a 4-foot top layer of fill, 2 feet of mangrove mud, and 3 feet of clay underlain by 4 feet of weathered breccia resting on impervious volcanic breccia. The water source is the weathered breccia and is slightly artesian.

A spring in southern Ngerekebesang is used to supply water for Echang village where people from the Southwest Islands reside. Results of 93 discharge measurements during 1971-79 (station 16891750) can be found in table 50, chemical analyses of water samples taken in 1981-82 in table 64, and water temperatures in table 81.

A 500,000-gallon storage tank is filled by gravity flow through an 8-inch pipe from the Koror distribution system to supply water to most of the people on the island (fig. 43).

Figure 42. Empty reservoir, west Ngerekebesang, January 1980.

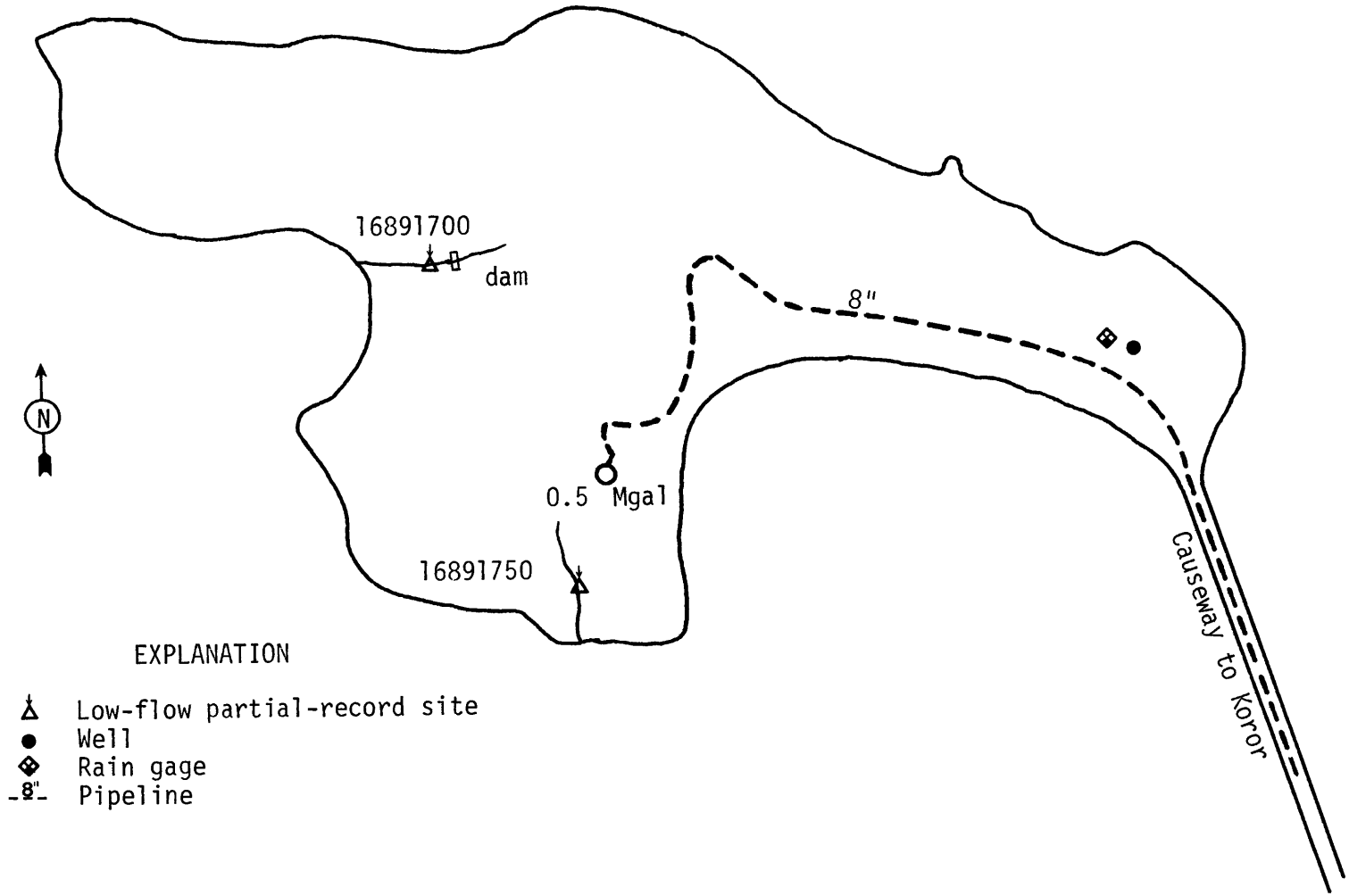


Figure 43. Water supply of Ngerekebesang.

Peleliu

The island of Peleliu consists of two dissimilar areas--high ridges in the northwest, with the remainder of the island a low plain of coralline rubble and calcareous sand. In the low plain section and in sandy areas near the shore, ground water was obtained from a thin freshwater lens by digging shallow wells.

Forty-two wells were dug in 1945 to supply water to 15,000 American troops stationed on Peleliu. Most of the wells were located within 300 yards of the shore and half of these drew brackish water. After 1945, additional wells were dug and in 1948, 43 wells were counted (table 16), of which 19 had been dug in 1945. With the exception of wells 5 and 6 at the old airfield, the wells were not used by the local population because they were either brackish or contained trash (fig. 44). A pump test on well 6 in 1948 showed a drawdown of 3-1/2 feet when pumped for 45 minutes at a rate of 60 gal/min (gallon per minute), with a recovery time of 30 minutes. No allowance was made for tidal fluctuation in this test (U.S. Geological Survey, 1948 and 1950).

During much of the period August 25, 1971 to April 20, 1978, continuous records of ground-water levels were obtained for well 5, which was not in use during that period. Water levels in this well, located near the center of the island, followed the tides closely.

In 1980, a new system utilizing a rain catchment area of six acres at the northeast end of the airfield runway was constructed. Runoff from the catchment is stored in a 2.6-Mgal reservoir lined and covered with synthetic rubber. Water is pumped from the reservoir to an old 60,000-gallon tank, a nearby 10,000-gallon tank, and to three new 10,000-gallon tanks at the village on the north end of the island (fig. 45).

Table 16. List of dug wells on Peleliu in 1948

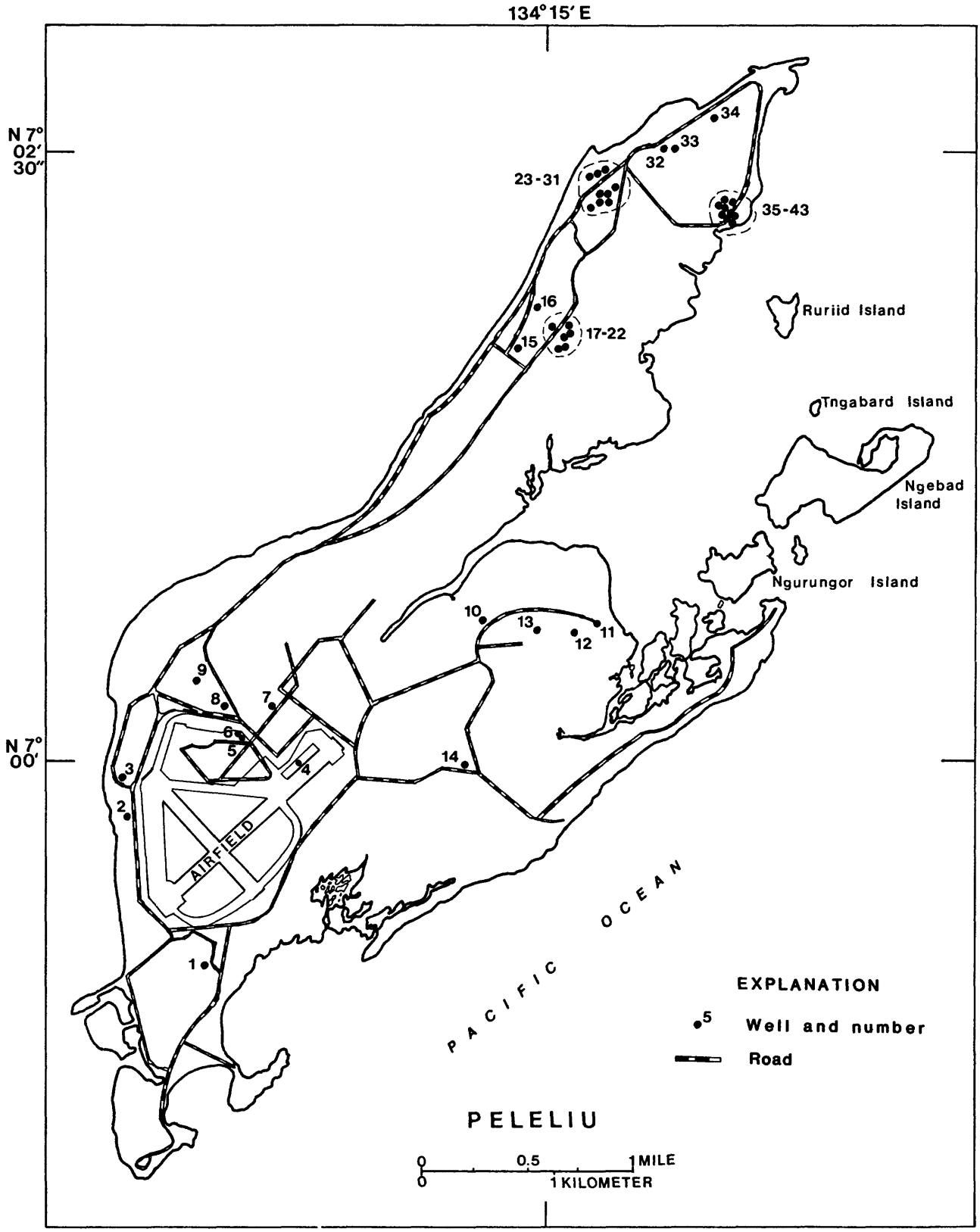
[Source: U.S. Army Chief of Engineers, 1956.
Altitudes were determined by hand level and are approximate]

Well No.	Curb altitude above mean high tide (ft)	Horizontal dimensions (ft)	Depth of well (ft)	Remarks
1	18.0	5.0 diameter	18.7	
2	11.6	5.5 by 4.0	13.3	
3	5.5	0.5 diameter	19.7	Iron pipe.
4	10.5	20.0 diameter	11.0	Uncovered water hole.
5*	8.5	4.6 square	12.0	
6	8.0	5.0 diameter	13.5	
7	14.6	0.5 diameter	21.2	Iron pipe.
8	17.0	5.0 square	16.3	
9	19.0	5.0 diameter	22.0	
10	10.2	20.0 diameter	11.5	Uncovered water hole.
11	8.3	5.0 diameter	11.0	
12	5.5	do.	6.1	
13	8.0	6.5 diameter	8.5	
14	8.2	1.8 diameter	10.1	
15	1.5	2.3 square	5.2	Swamp water.
16	1.5	4.0 by 5.5	5.8	Do.
17*	8.0	2.9 diameter	9.3	
18*	9.6	3.0 diameter	12.1	
19*	8.5	2.2 diameter	10.6	
20*	7.3	2.0 diameter	8.4	
21*	6.5	1.9 diameter	7.0	
22*	5.8	2.0 diameter	7.6	
23*	3.1	4.0 square	5.0	
24*	6.0	3.0 square	7.0	
25*	3.0	3.5 by 3.8	6.0	
26*	5.3	3.0 square	8.3	
27*	4.7	3.5 by 2.8	7.2	
28*	5.5	5.0 by 3.0	7.8	
29*	4.2	3.0 square	6.7	
30*	4.8	do.	8.1	
31*	4.0	3.0 square	7.2	
32	6.5	2.6 diameter	9.6	
33	6.8	2.8 diameter	9.4	
34*	6.6	3.0 diameter	8.9	
35*	3.0	7.2 by 8.0	6.1	

Table 16. List of dug wells on Peleliu in 1948--Continued

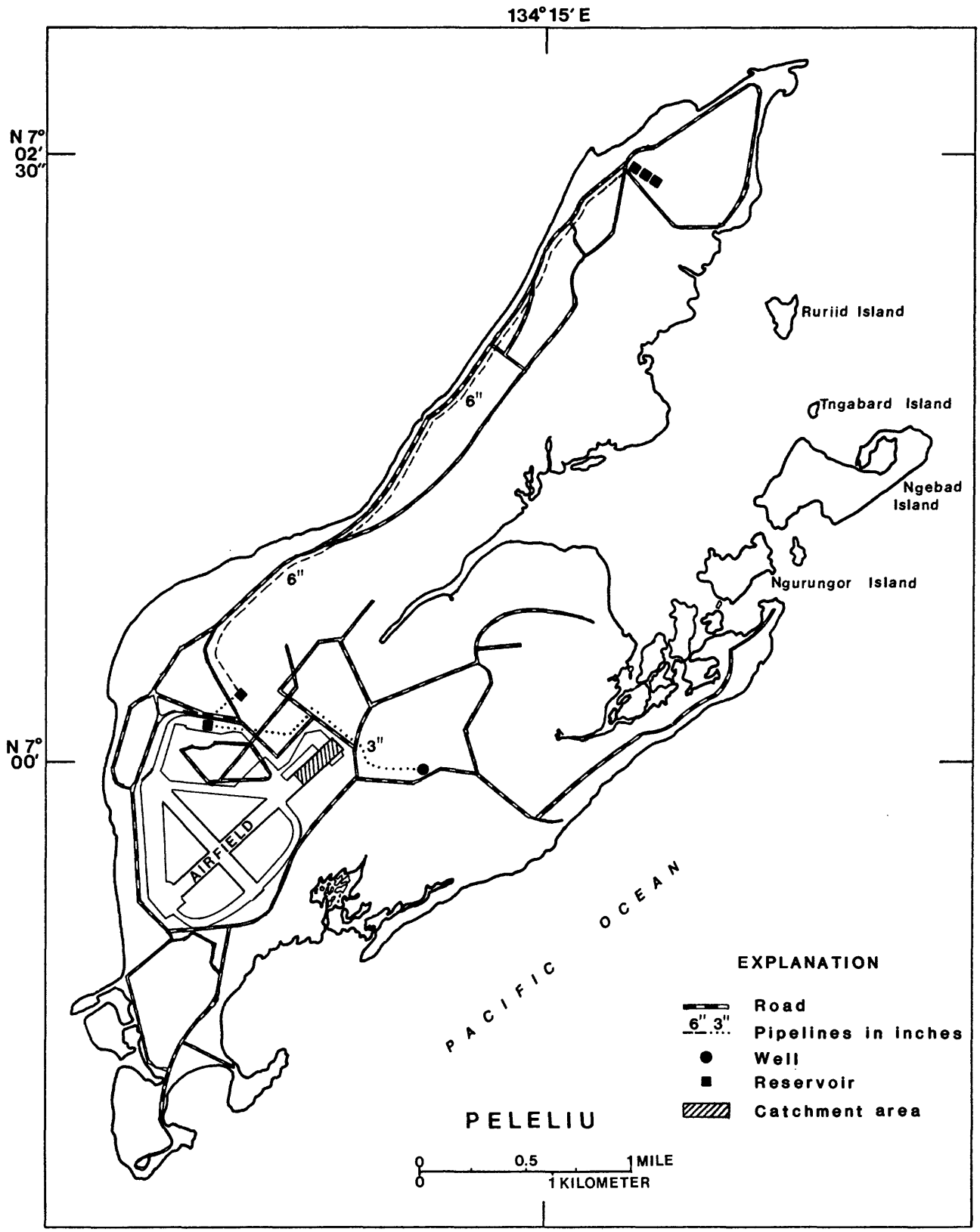
Well No.	Curb altitude above mean high tide (ft)	Horizontal dimensions (ft)	Depth of well (ft)	Remarks
36*	3.1	2.0 diameter	4.8	
37*	2.5	3.0 square	4.4	
38*	2.3	3.5 square	4.6	
39*	3.0	3.0 square	4.0	
40*	2.8	3.0 by 4.0	4.8	
41*	2.2	2.5 by 2.9	4.3	
42*	2.5	3.0 by 2.6	4.9	
43*	2.5	2.7 by 2.3	5.0	

* Wells in use in 1948.



Modified from U.S. Army Chief of Engineers, 1956.

Figure 44. Location of wells on Peleliu in 1948.



Modified from U.S. Army Chief of Engineers, 1956.

Figure 45. Water-supply system of Peleliu, 1980.

Angaur

The Island of Angaur, originally an atoll, has three distinct sections: high limestone ridges in the northwestern one-third of the island, a limestone platform, and calcareous sand at the southern end of the island. The land was uplifted intermittently with at least one downward movement. These upheavals occurred between static periods when a seaward growth of coral developed (U.S. Geological Survey, 1950). The island is 3.2 mi^2 in size, with the highest point at 154 feet. A large swamp of 124 acres is located in the southeast. Many lakes and ponds, created by early phosphate mining, were scattered over most of the island until the Trust Territory Administration became concerned about the encroachment of saline water. Mining operations had removed phosphate deposits which formed a protective seal over the highly permeable limestone. After 1950, the Phosphate Mining Co. was required to fill the lakes with limestone quarried outside the mining area and to backfill each excavation immediately after mining was completed. After the lakes were filled, chloride concentration of wells in the area dropped considerably (Arnow, 1961).

Because rainwater passes rapidly into the porous ground, there are no streams on the island and water can be obtained only from wells and from collected rainwater. Before the lakes had been filled, the water was brackish when tested and showed the effect of the tides. No potable water could be recovered from lakes or ponds. In "Military Geology of the Palau Islands," (U.S. Army Chief of Engineers, 1956), water samples collected in February 1950 from most lakes, ponds and wells on the island are listed; these samples were analyzed for chloride, sulphate, calcium, total solids, and pH.

Before World War II, the mining operation used water from wells 1 and 2 near the phosphate-drying kiln. After the American occupation of the island, when more than 10,000 men were stationed on Angaur, the water was drawn from nine wells (wells 1 to 9), much of it from well 3 (Arnow, 1961). In 1947, after the troops had left, only wells 1 and 3 remained in production producing 150,000 gal/d, mostly from well 1.

Cleaves L. Rogers made a detailed study of the water supply in March and April 1948 and found all wells to be in good condition (table 17).

Table 17. List of wells on Angaur in 1948-49

[Source: U.S. Army Chief of Engineers, 1956]

Well No.	Size[1/] (ft)	Depth (ft)	Curb altitude (ft)	Tidal changes in water level		Mean altitude surface (ft)	Chlorides in parts per million	
				Range (ft)	Amplitude (ft)		1949	1948
1	4.6d	24	22.62	0.87-1.40	0.53	1.13	140	286
2	3.5s	21	21.50	.94-1.38	.44	1.13	44	
3	4.2d	11	9.99	.49-1.31	.82	.90	31	104
4	1.8d	10	9.14	.92-1.64	.72	1.28	74	57
5	4.9s	9	8.99	1.31-1.99	.68	1.65	14	104
6	7.3d	16	16.42	1.12-1.77	.65	1.42	67	197
7	4.5s	18	16.92	.26-1.72	1.46	.73	514	1,108
8	3.4d	12	12.02	.37-1.92	1.55	1.14	203	
9	4.5d	20[1/]	19.5[1/]					

Note:

[1/] Measured by C. L. Rogers, February 1948. d refers to the diameter of a circular well s to one dimension of a square well.

[2/] Data for chloride in 1948 collected by Rogers from Phosphate Development Co.

All other data compiled from information collected in December 1949 by Wentworth Survey Board from Phosphate Development Co. As Rogers' data were partly based on hand leveling, they are omitted where they are duplicated by 1949 data, which were based upon instrumental leveling.

Altitudes are referred to mean sea level established July 1950 based upon continuous records of an automatically recording tide gage located in the small boat basin on the west side of the island.

After 1949, 16 test holes and wells 11, 12, 14-22, were dug for use as observation wells. Figure 46 shows the locations and table 18 the chemical analyses of water from some of the wells. Well 13 was dug in 1951 to supply cooling water at the power plant for the mining operation camp. Since 1953, water from well 6 has been used to augment the rain catchment at the U.S. Coast Guard station.

Monthly pumpage of wells 1 and 2 averaged about 3 Mgal between 1950 and 1954 and of well 3, about 500,000 gallons. After phosphate mining ended in 1955, pumping virtually ceased, except at wells 3 and 6. Because of the high mineral content, the water from well 3 was used only for cooking and washing by the village residents (Arnow, 1961).

APPLICATION OF DATA TO FUTURE WATER DEVELOPMENT

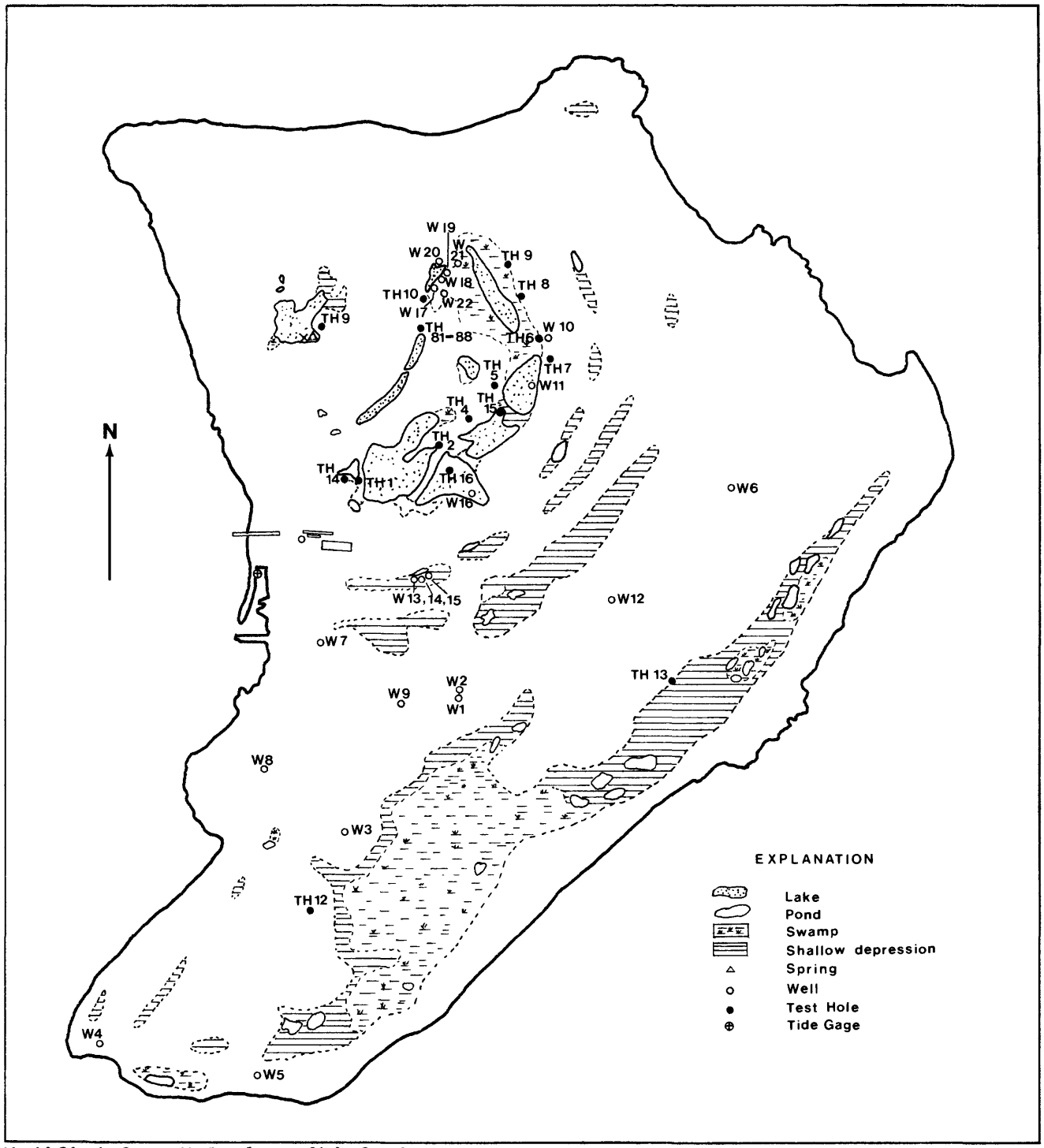
Reservoirs

Population growth and higher per-capita water consumption will continue to increase the demand for potable water on Koror.

The water production in 1980 was about 1 Mgal/d and was doubled in 1983, which may be sufficient to fill the demand until 1990.

As the Ngerimel Reservoir has a capacity of only 28 Mgal, most of the water for Koror has to come from run-of-the-river flow. Fortunately, there normally is plentiful water on southern Babelthuap. The average discharge of the Edeng River has been 21 Mgal/d (1970-82), the lowest known discharge 0.8 Mgal/d (April 1983).

Figures 47 and 48 show the mass curves of mean monthly discharges for Diongradid, Edeng and Tabecheding Rivers as well as the draft rates, which would be available if sufficient storage facilities were constructed. No evaporation losses were considered. Although such a demand for domestic water cannot be foreseen outside southern Babelthuap, local industrial development, such as a petrochemical plant once under consideration for the Ngerdmau area, could require substantial amounts of water. No study has been made for possible water-impounding sites outside of southern Babelthuap.



Modified from U.S. Army Chief of Engineers, 1956.

Figure 46. Location of wells and test holes on Angaur in 1951.

Table 18. Chemical analyses of ground water from Angaur

Source: Arnow, 1961.

[Analyzed by U.S. Geological Survey.
Dissolved constituents given in parts per million]

Source of water	Date of collection	Silica	Iron	Calcium	Magnesium	Sodium	Potassium	Bicarbonate	Carbonate	Sulfate	Chloride	Fluoride	Nitrate	Dissolved solids	Total	Hardness as calcium carbonate: Carbonate	Hardness as calcium carbonate: Noncarbonate	Specific conductance[1/]
Well 1	7-3-51	--	--	92	--	--	--	--	--	--	142	0.2	--	--	507	270	--	896
1	5-21-53	3.6	0.05	85	13	62	2.9	260	0	19	120	.2	1.4	455	266	214	52	810
3	2-2-51	2.7	.02	90	7.9	14	1.8	286	--	14	24	.1	4.8	300	257	235	22	570
3	5-21-53	4.9	.05	92	12	38	1.7	294	0	12	70	.2	2.0	373	279	241	38	687
4	4-7-52	--	.05	53	9.2	--	--	248	14	7.8	38	--	--	282	170	170	0	533
4	5-21-53	2.4	--	--	--	9.7	2.5	204	0	2.3	42	.2	1.5	--	--	--	--	487
6	4-7-52	--	.05	77	18	--	--	130	20	47	260	--	--	632	266	139	127	1,140
6	5-21-53	1.6	.05	46	11	70	3.0	124	0	24	126	.2	4.1	360	160	102	58	670
10	2-2-51	1.3	.04	132	127	974	35	324	--	246	1,810	.0	1.7	3,490	852	266	586	6,150
10	5-22-53	1.4	.07	135	149	1,300	41	292	0	304	2,280	.2	3.8	4,330	950	240	710	7,350
13	4-7-52	--	.08	117	92	--	--	218	12	209	1,450	--	--	2,870	670	198	472	4,910
15	do.	--	.06	54	37	--	--	150	31	55	570	--	--	1,160	288	175	113	2,100
Test hole 8	do.	--	.20	54	43	--	--	270	12	10	680	--	--	1,340	312	241	71	2,470
10	7-3-51	--	--	30	--	--	--	--	--	--	260	.4	--	575	164	--	--	1,090
13:																		
Water table	4-7-52	--	.11	70	26	--	--	319	0	34	420	--	--	940	282	262	20	1,793
20 ft below water table	do.	--	.70	99	121	--	--	180	12	244	1,680	--	--	3,380	742	167	575	5,580
Test hole 16:																		
Water table	do.	--	.36	205	342	--	--	110	10	713	5,690	--	--	10,800	1,920	110	1,810	16,200
38 ft below water table	do.	--	.35	287	617	--	--	260	0	1,210	9,520	--	--	17,700	3,250	210	3,040	25,100
Lake 1	2-2-51	2.8	.04	52	71	607	38	162	22	109	1,120	.4	.8	2,080	422	133	289	3,820
1	5-22-53	5.1	.08	43	62	534	19	102	10	94	950	.6	2.7	1,830	362	100	262	3,230
7	2-2-51	.7	.10	289	953	7,400	269	112	14	1,960	13,700	.6	--	24,600	4,640	90	4,550	36,200

[1/] Micromhos at 25° C.

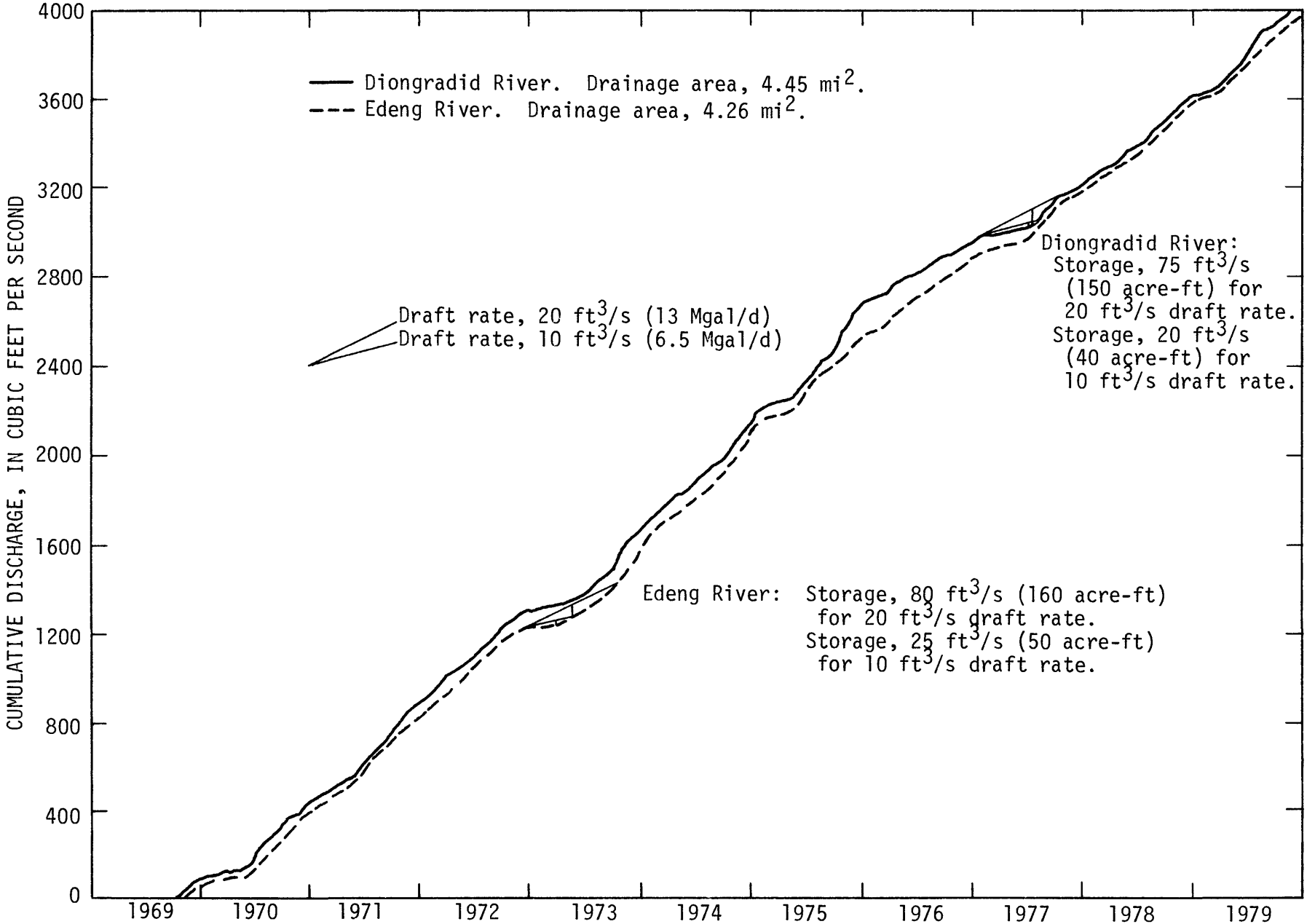


Figure 47. Mass curves of mean monthly discharge of Diongradid and Edeng Rivers, Babelthuap, 1969-79.

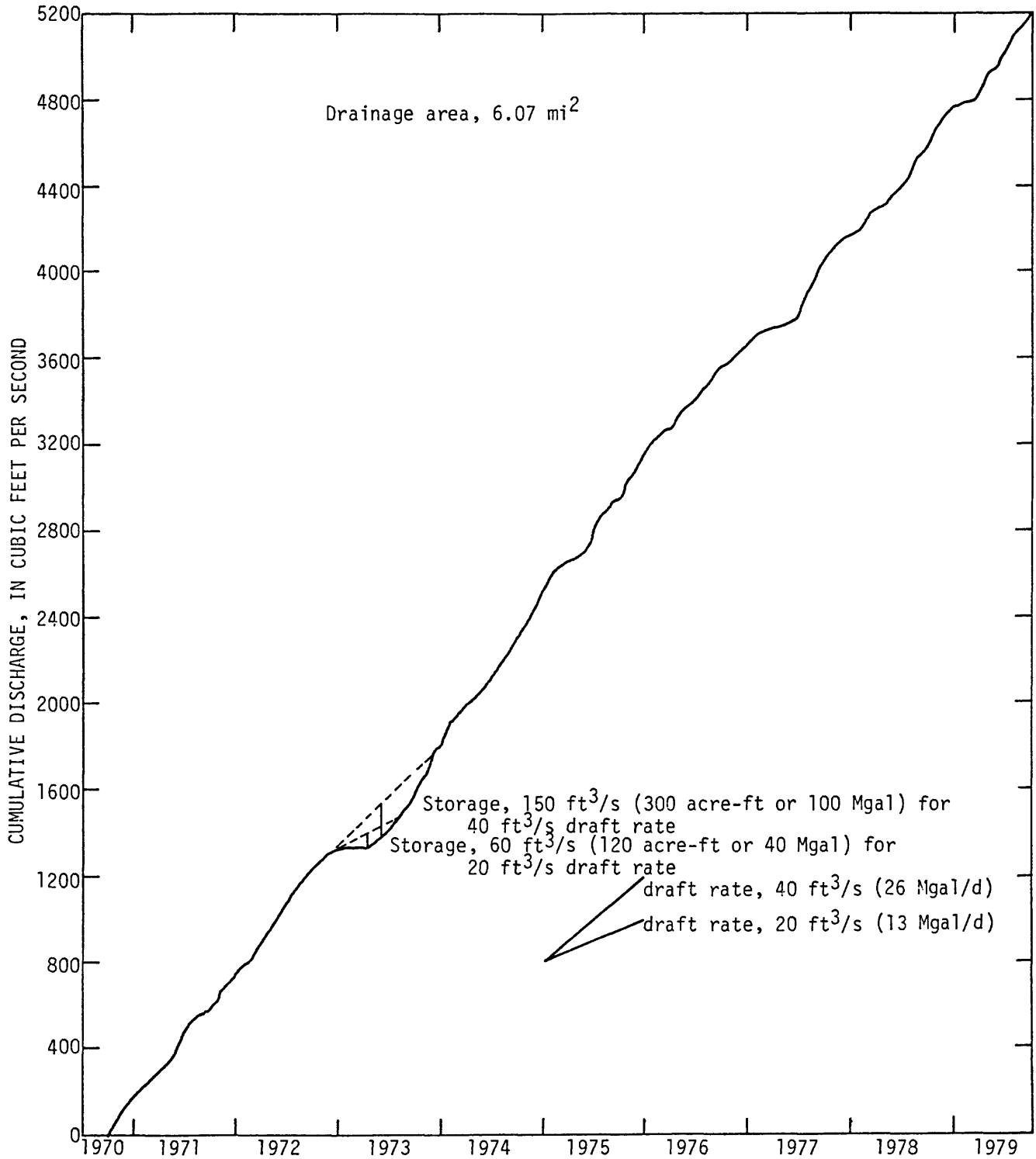


Figure 48. Mass curve of mean monthly discharge of Tabecheding River, Babelthuap, 1970-79.

Mass curves are used for storage analysis. Any desired draft rate can be represented by a straight line of appropriate slope drawn for the most critical period. The needed storage is indicated by the maximum vertical distance between the draft rate slope and the mass curve.

Rain Catchments

Because the Koror water-distribution system cannot easily be extended beyond southern Babelthuap, the population of the rest of the Palau Islands will remain dependent upon traditional ways of obtaining water. For human consumption, rainwater is usually preferred. Streamflow or well water is used for washing and bathing, where available. During the Japanese Administration, construction of cisterns to store rainwater was encouraged, but most of these have fallen into disrepair.

Table 19 shows the amount of rainfall needed to produce a certain number of gallons from various catchment sizes. Figure 49 shows the cumulative rainfall for the driest period in the last 32 years of continuous record, whereas figure 50 shows the cumulative rainfall for the dry months of a year with average rainfall (1976). For both years, the draft rates from 100-ft^2 and 200-ft^2 catchments are indicated, assuming 100 percent recovery.

These figures show that if storage capacity is doubled, the draft rate for the dry periods during 1973 and 1976 would increase by only approximately 50 percent.

Table 19. Rain, in inches, needed to produce a number of gallons from various catchment sizes

	Size catchment (ft^2)				
	100	200	300	n	
1 in rain	14,400	28,800	43,200	144n	in^3.
Do.	62	125	187	$\frac{n \times 7.48}{12}$	gallons.
100 gallons	1.6	.8	.54	$\frac{160}{n}$	inches rain.
200 gallons	3.2	1.6	1.1	$\frac{321}{n}$	Do.
300 gallons	4.8	2.4	1.6	$\frac{481}{n}$	Do.
p gallons	$\frac{p}{62}$	$\frac{p}{125}$	$\frac{p}{187}$	$\frac{12p}{7.48\ n}$	Do.

1 ft^3 = 7.48 gallons.

1 in^3 = 0.00433 gallons.

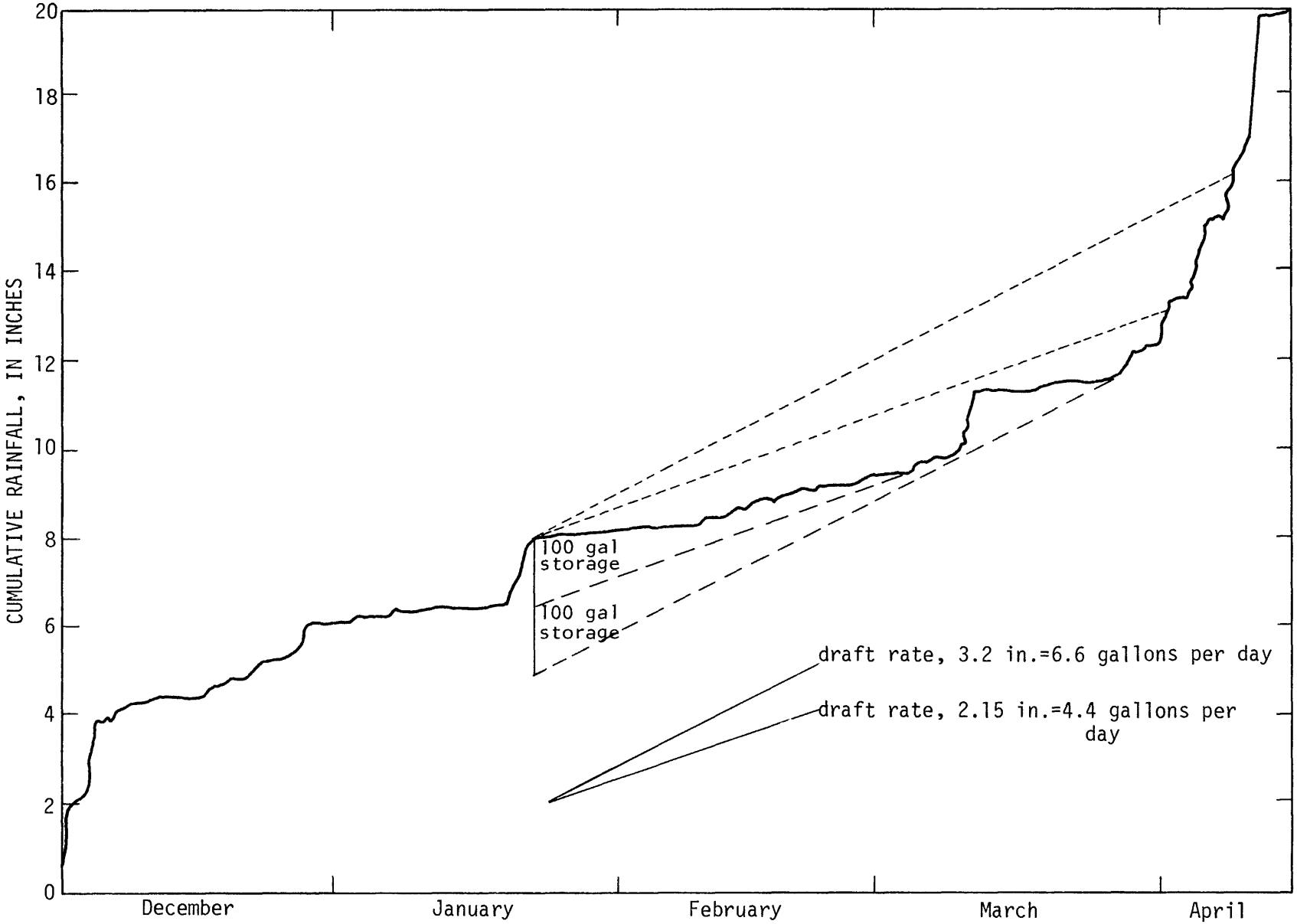


Figure 49. Mass curve of rainfall on Koror, December 2, 1972 to April 14, 1973.

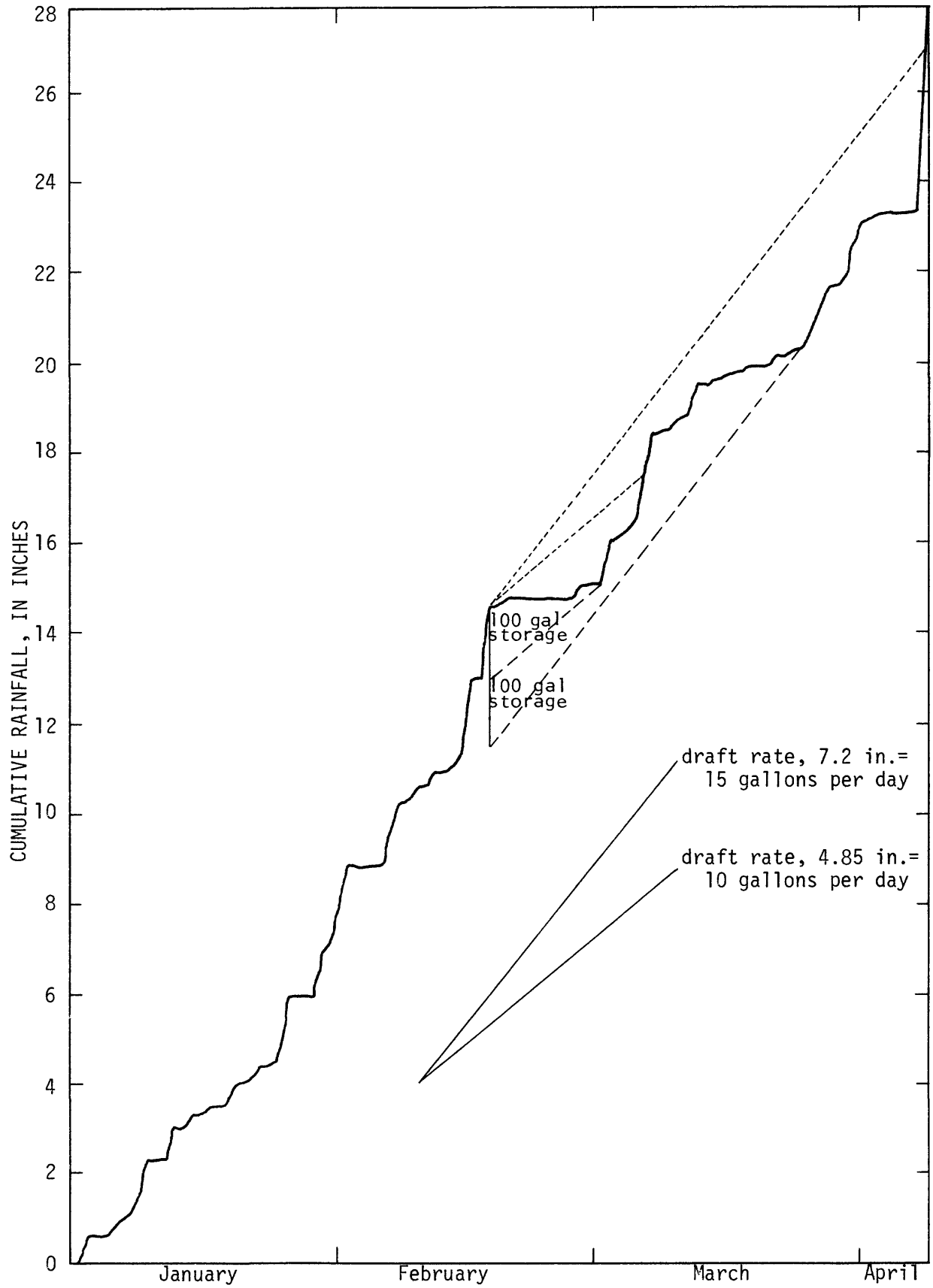


Figure 50. Mass curve of rainfall on Koror, January 1 to April 7, 1976.

SUMMARY

The Palau Islands consist of almost 350 islands with one of these, Babelthuap, accounting for 80 percent of the total land area of 190 mi^2. The islands generally fall into four groups: the volcanic-island group of Babelthuap, Koror, Ngerekebesang and Malakal; the numerous coralline limestone islands between Babelthuap and Peleliu; the islands of Peleliu and Angaur, a combination of coralline limestone ridges and low plains of reef limestone; and the two atolls north of Babelthuap plus some small reef islands near Peleliu.

Although rainfall is quite uniform throughout the islands (148 inches annually), surface-water runoff occurs only on the volcanic islands. Because of their small size, Koror, Ngerekebesang and Malakal have only minimal surface water; Babelthuap on the other hand, has many rivers. Southern Babelthuap provides all the water for the central water system serving nearly 10,000 people of Koror, Ngerekebesang, and Malakal.

The coralline limestone islands are the so-called "rock islands" and are uninhabited. The islands of Peleliu and Angaur rely on ground-water wells and rain catchments for their water supply. The wells, dug in the plains of reef limestone, produce only limited amounts of fair-quality but very hard water. Rainwater is the only source of water for the inhabitants of the two atolls.

The quality of the stream water on the volcanic islands is good as shown by 55 chemical analyses of water from 18 sources, most of them on Babelthuap. The water is uniformly soft, and low in dissolved solids. With proper management of existing systems and timely development of additional sources for the central water system, there need not be a shortage of water on the Palau Islands.

HYDROLOGIC DATA

Rainfall Records

Streamflow records

Water-Quality Records

Water and Air Temperatures and Instantaneous Discharge

Rainfall Records

Table 20. German rainfall records

Monthly and annual rainfall totals, in inches, for 1901-12.

Sources: "Mitteilungen von Forschungreisenden und Gelehrten aus den deutschen Schutzgebieten", 1902-13; and "Strategic Bulletins of Oceania" no. 7, publication of Institute of Human Relations, 1943.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
						Station on Malakal							
1901	--	--	2.76	5.54	15.78	9.75	29.78	9.74	9.53	9.23	8.28	11.82	--
1902	14.80	14.96	6.73	8.03	18.19	17.24	6.85	5.75	3.74	8.15	3.50	5.79	113.73
1903	1.10	1.65	1.54	12.76	10.08	7.52	17.17	3.19	5.51	9.45	14.29	10.43	94.69
						Station moved to Koror							
1905	--	--	2.72	1.93	12.17	8.85	29.29	13.62	11.02	19.57	12.32	15.24	--
1906	7.68	8.23	3.15	6.18	22.52	11.10	26.14	15.47	14.92	7.64	10.83	15.98	149.84
1907	12.32	6.34	6.77	1.85	4.88	13.23	13.39	24.61	8.54	2.52	11.85	15.39	121.69
1908	15.98	9.88	12.52	8.11	11.65	16.02	15.04	18.62	18.15	4.92	7.72	14.80	153.41
1909	12.44	4.65	20.79	10.28	14.72	8.82	14.41	8.98	15.08	13.27	19.80	19.80	163.04
1910	7.24	12.28	12.05	2.80	10.98	17.28	10.12	9.92	7.44	11.61	22.05	21.65	145.42
1911	3.66	4.45	4.17	12.32	8.39	12.60	16.54	8.98	5.28	12.95	3.82	15.16	108.32
1912	5.73	2.47	2.49	13.14	10.16	9.28	22.58	17.20	8.29	5.16	24.00	6.97	127.47
						Station on Angaur							
1909	--	--	--	--	--	--	--	--	--	--	17.28	14.33	--
1910	8.43	13.66	12.76	5.75	4.96	12.05	9.45	7.80	4.29	4.92	14.13	11.14	109.34
1911	--	--	--	--	4.13	10.67	16.89	8.58	--	--	--	--	--

Table 21. Japanese rainfall records on Koror

Monthly and annual rainfall totals, in inches, for 1924-41.

Location: Lat 7°20' N., long 134°29' E., at altitude 104 feet, at present Weather Service station.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1924	6.06	5.16	5.71	10.00	18.62	13.35	23.27	7.91	13.38	16.10	18.78	14.92	153.26
1925	13.54	7.75	9.57	3.70	17.48	15.24	18.66	11.58	9.17	16.69	7.72	7.80	138.90
1926	21.73	4.09	3.98	3.78	9.76	12.44	16.77	23.70	16.54	13.35	12.32	11.58	150.04
1927	15.39	5.71	8.31	11.12	25.94	13.50	32.80	17.24	11.50	16.54	4.61	11.73	174.39
1928	10.91	16.46	7.60	6.48	14.49	15.63	24.29	18.03	12.12	8.94	5.20	19.57	159.72
1929	26.65	10.28	5.51	12.60	17.36	9.65	28.98	13.82	14.80	20.39	10.59	17.52	180.15
1930	8.19	17.13	6.06	6.14	12.48	9.80	17.20	5.58	20.75	6.54	7.80	15.04	132.71
1931	8.86	7.24	3.90	5.18	9.80	10.20	12.44	17.52	13.03	28.74	10.75	9.61	137.27
1932	31.38	13.35	10.12	6.77	18.27	9.45	14.41	11.42	21.10	9.37	23.78	13.98	183.40
1933	10.83	4.21	7.13	3.54	15.24	14.53	18.31	9.61	18.45	18.27	10.67	6.93	137.72
1934	15.28	11.06	9.69	12.91	9.25	14.17	10.71	17.91	23.45	7.72	16.06	11.46	159.67
1935	24.88	7.36	9.17	11.54	9.21	9.06	21.14	9.84	12.40	10.79	6.10	3.62	135.11
1936	8.42	[1/]2.45	4.49	22.65	17.73	16.41	29.76	30.03	6.05	11.00	4.63	7.01	160.63
1937	6.39	4.56	3.24	11.37	8.38	15.16	18.42	18.24	10.15	18.68	27.86	8.40	150.85
1938	7.18	3.46	8.94	19.47	15.90	6.46	7.26	7.04	12.55	13.35	15.48	12.71	129.80
1939	7.77	15.96	9.37	9.12	12.39	13.66	8.95	14.06	23.54	10.45	18.87	12.97	157.11
1940	15.60	11.28	6.15	5.72	12.28	14.11	18.78	19.72	7.82	12.83	8.28	7.71	140.28
1941	7.67	6.70	7.19	1.81	13.44	12.60	16.31	11.82	10.74	7.63	11.15	9.17	116.23
Mean	13.71	8.56	7.01	9.11	14.33	12.52	18.80	14.73	14.31	13.74	12.26	11.21	150.29
Percent	9.1	5.7	4.7	6.1	9.5	8.3	12.5	9.8	9.5	9.1	8.2	7.5	100

[1/] Published incorrectly as 24.49 in U.S. Army Chief of Engineers, 1956; Cooper, 1959; and Austin, Smith and Associates, 1967. (Annual total for 1936 in the three publications showed the decimal point error for February 1936, made during conversion from millimeters to inches.)

Table 22. Miscellaneous Japanese rainfall records outside Koror

Monthly and annual rainfall means, maximums, and minimums, in inches, for 1924-35.

Source: U.S. Army Chief of Engineers, 1956 (years not identified); years identified by Bryan, 1946.

Station	Number of years	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
						Monthly and annual means								
Angaur	1924-35	12.1	7.3	6.5	8.1	13.7	12.2	15.6	10.5	10.9	11.2	8.5	10.4	127.0
Peleliu	1932-34	15.1	5.4	6.2	7.7	15.2	11.2	15.5	15.8	15.5	10.7	11.9	11.2	141.4
Melekeok	1924-34	13.2	7.7	6.0	6.6	12.0	11.9	18.0	14.3	14.0	13.7	11.8	12.8	142.0
Ngermetengel (Almongui)	1924-34	14.1	8.9	7.6	7.4	15.3	14.9	20.6	14.9	17.5	17.4	13.5	15.6	167.7
Chelap (Galap)	1924-34	15.5	8.9	6.3	7.4	14.0	13.7	16.6	13.8	14.0	13.1	11.2	14.0	148.5
						Monthly and annual maximums								
Angaur	11-12	20.8	13.7	11.1	15.9	26.7	20.0	19.9	29.1	22.8	21.1	15.9	19.4	173.3
Peleliu	3	22.6	6.4	9.1	9.9	19.0	14.9	19.1	27.0	20.9	16.9	15.7	12.4	154.1
Melekeok	8-9	25.4	18.2	10.9	12.0	16.5	19.7	28.2	22.1	24.5	26.9	24.2	18.4	161.6
Ngermetengel	10-11	31.5	22.4	12.5	13.5	28.3	21.8	33.2	22.7	32.4	32.5	25.2	24.9	209.6
Chelap	9-10	27.7	16.3	13.5	14.3	22.9	27.4	27.0	26.4	22.8	23.3	20.8	24.0	180.5
						Monthly and annual minimums								
Angaur	11-12	5.3	3.0	2.0	0.8	5.4	7.4	11.2	5.0	4.8	2.8	6.0	5.6	78.4
Peleliu	3	10.5	4.2	3.4	6.3	11.8	5.8	10.9	9.5	12.4	6.5	9.9	8.7	133.4
Melekeok	8-9	4.2	2.4	1.9	1.5	7.8	7.6	11.0	2.8	6.7	3.2	4.5	5.9	117.3
Ngermetengel	8-9	4.5	2.4	2.4	1.1	9.4	10.4	12.8	5.2	10.8	5.7	4.7	7.4	145.6
Chelap	9-10	3.7	4.1	2.9	1.9	6.9	6.1	11.5	6.9	6.8	2.1	6.3	6.0	126.4
						Daily maximums								
Angaur	3-4	8.9	4.1	2.3	4.1	3.2	3.4	3.4	2.9	3.5	2.4	4.8	3.1	8.9
Peleliu	3	3.3	2.1	2.6	2.8	4.1	3.2	3.1	3.8	5.6	1.8	3.6	4.1	5.6
Melekeok	3	2.7	1.8	3.0	3.0	3.1	3.1	3.4	4.3	4.2	2.4	10.5	2.6	10.5
Chelap	3	8.2	3.8	2.4	3.4	2.2	2.3	3.9	4.6	3.5	3.5	5.4	2.0	8.2

Table 23. National Weather Service rainfall records at Ngesang, Babelthuap

Monthly and annual rainfall totals, in inches, for 1955-79.

Source: U.S. National Oceanic and Atmospheric Administration, 1956-72, 1973-79.

Location: Bethania Seminary, lat 7°38' N., long 136°39' E., at altitude 10 feet.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1955	--	--	--	--	--	--	10.92	10.59	10.33	10.38	11.68	8.36	--
1956	16.87	8.36	8.67	12.24	14.96	12.02	11.89	20.88	22.43	16.81	12.82	16.00	173.95
1957	e4.54	2.23	5.61	13.65	8.08	10.45	12.06	16.57	12.21	12.32	5.76	6.78	e110.26
1958	7.08	--	--	4.30	9.24	5.51	14.30	13.90	16.64	13.11	22.43	14.03	--
1959	5.50	2.63	10.62	10.24	13.89	5.79	17.99	13.70	9.62	13.82	12.76	9.72	126.28
1960	15.44	5.92	.80	10.14	4.35	11.13	--	16.83	11.60	12.49	8.53	8.57	--
1961	15.77	4.26	1.50	2.87	17.26	13.06	12.58	--	12.69	16.28	3.41	11.09	--
1962	27.41	6.31	8.67	7.86	e19.52	14.61	25.66	12.72	12.55	13.21	12.00	8.39	e168.91
1963	19.91	8.93	4.65	1.98	11.59	15.05	13.31	e15.74	10.84	15.16	6.78	11.30	e135.24
1964	7.79	14.72	8.76	13.60	13.88	15.93	20.50	18.76	9.35	10.90	13.45	10.21	157.85
1965	6.84	10.94	9.49	1.44	9.83	16.43	19.23	9.94	6.82	3.89	3.66	6.36	104.87
1966	9.25	1.49	3.83	10.79	8.43	--	14.92	10.88	9.65	19.12	9.13	15.86	--
1967	17.19	5.81	4.98	3.03	12.27	17.84	10.91	18.71	9.15	14.87	10.26	--	--
1968	7.67	14.56	6.10	6.50	7.20	6.65	12.34	17.28	12.35	12.80	10.26	11.74	125.45
1969	4.14	1.84	5.06	7.39	--	31.00	24.50	--	--	10.87	5.82	16.33	--
1970	e13.85	e3.12	3.47	3.49	4.70	13.86	24.12	14.76	6.82	7.81	2.52	e10.93	e109.45
1971	e7.28	10.11	6.57	7.58	e7.77	e10.25	e4.30	--	7.91	24.49	9.48	e9.66	--
1972	5.76	13.79	*	(21.14)	9.93	--	9.85	15.65	14.39	7.34	9.01	10.09	--
1973	3.63	.48	1.13	11.52	--	--	--	--	7.42	17.63	14.88	--	
1974	12.26	8.00	--	12.47	--	--	e12.49	5.27	4.82	--	12.27	11.82	--
1975	14.21	2.68	4.66	--	--	--	--	--	--	--	--	--	--
1976	8.33	8.89	6.24	13.42	*	*	(16.85)	12.50	9.24	7.99	--	--	--
1977	--	3.49	--	4.33	--	--	--	--	--	--	--	12.11	--
1978	16.41	--	--	--	--	--	--	--	--	15.47	--	--	--
1979	7.71	--	8.01	--	--	--	--	--	--	12.35	--	--	--
Mean	11.08	6.60	5.73	7.94	11.31	13.31	15.10	14.39	10.84	13.14	9.85	11.02	1/ 134.69
Percent	8.5	5.1	4.4	6.1	8.7	10.2	11.6	11.0	8.3	10.1	7.6	8.4	100

e Partly estimated.

* Amount included in following total.

1/ Mean annual rainfall at Koror for same years, 145.92 inches.
Total of monthly means, 130.31 inches.

Table 24. National Weather Service rainfall records at Aimeliik, Babelthuap

Monthly rainfall totals, in inches, for part of 1952-55.

Source: U.S. National Oceanic and Atmospheric Administration, 1952-55.

Location: Lat 7°27' N., long 134°31' E., at altitude 200 feet.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1952	--	--	--	--	--	--	--	--	--	13.90	8.76	8.56
1953	--	--	--	--	--	--	--	--	16.64	--	--	12.39
1954	4.79	2.85	--	--	--	--	--	15.14	--	--	14.52	8.88
1955	19.76	13.84	2.65	6.84	19.67	24.17	16.42	14.11	--	--	--	--

Table 25. National Weather Service rainfall records on Koror

Monthly and annual rainfall totals, in inches, for 1947-83.
Source: U.S. National Oceanic and Atmospheric Administration, 1981, 1982-83; collected by U.S. Navy July 1, 1947 to May 31, 1951 and by Weather Service since July 1, 1951.
Location: Lat 7°20' N., long 134°29' E., at altitude 94 feet.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1947	--	--	--	--	--	--	14.00	15.42	7.88	1/ 9.37	1/ 22.28	1/ 17.01	--
1948	8.61	7.15	5.25	1.65	21.05	18.98	16.10	16.53	9.83	14.99	9.02	18.89	148.05
1949	9.49	11.35	10.35	--	22.28	9.59	15.48	11.15	18.93	12.85	8.76	13.26	--
1950	6.05	6.31	17.41	16.94	9.54	12.55	10.85	16.67	13.92	10.24	15.47	11.42	147.37
1951	11.19	6.58	5.26	--	--	--	9.51	12.51	8.58	6.77	10.74	13.98	--
1952	6.14	6.66	10.37	15.38	16.66	12.49	17.72	24.66	14.92	14.21	9.51	13.55	162.27
1953	10.86	4.07	14.66	5.23	13.99	19.17	18.68	16.97	15.18	9.75	13.19	17.45	159.20
1954	4.94	3.04	9.74	7.51	27.46	15.57	15.64	13.48	14.64	12.15	11.25	12.30	147.72
1955	19.39	15.14	2.46	6.47	13.29	17.81	8.68	8.92	10.87	14.27	8.58	7.51	133.39
1956	24.45	5.50	8.80	15.63	22.78	15.71	12.84	18.95	14.00	11.98	12.88	15.63	179.15
1957	4.74	2.42	6.72	16.42	9.68	12.60	16.69	21.57	16.12	19.22	4.70	7.62	138.50
1958	8.42	2.69	2.93	8.09	17.18	9.73	15.74	20.27	18.11	9.95	22.06	12.62	147.79
1959	6.28	3.49	10.82	12.96	13.09	12.26	22.53	14.88	13.12	16.64	15.41	10.41	151.89
1960	15.16	10.20	3.75	11.66	11.45	14.16	13.41	11.36	20.79	15.04	10.12	14.11	151.21
1961	15.79	10.13	6.25	6.72	20.14	22.67	13.68	17.37	11.61	18.55	7.81	13.23	163.95
1962	16.78	9.38	7.65	6.84	18.30	8.59	34.82	19.45	20.79	9.09	6.84	14.04	172.57
1963	18.63	8.79	8.41	3.39	12.01	13.99	11.19	14.24	14.01	10.23	6.73	13.40	135.02
1964	7.27	16.10	6.98	7.46	18.32	12.12	4.14	15.73	7.06	10.19	13.75	11.45	130.57
1965	6.40	13.03	14.60	7.11	9.78	19.85	30.57	16.76	12.98	9.68	6.16	12.67	159.59
1966	8.23	3.31	10.02	15.27	9.08	10.44	23.68	9.69	7.20	16.66	11.76	14.93	140.27
1967	18.86	3.74	7.20	4.63	9.91	17.19	12.20	17.11	6.75	17.06	11.79	12.23	138.67
1968	8.02	15.54	8.59	7.56	9.51	7.01	16.43	11.00	12.25	11.46	8.15	15.93	131.47
1969	6.14	2.93	5.11	6.83	11.72	16.79	28.21	12.39	14.00	9.81	9.06	6.32	129.31
1970	6.23	5.78	4.83	3.21	8.25	12.38	12.61	15.77	8.51	12.99	9.17	14.82	114.55
1971	13.54	10.68	11.09	8.32	16.31	19.61	14.49	10.40	13.98	19.59	10.26	11.06	159.33
1972	10.78	10.83	21.98	7.08	9.49	20.68	11.15	15.88	14.90	9.85	9.96	7.54	150.12
1973	2.11	1.24	2.95	11.29	10.16	13.78	12.79	11.35	12.18	19.14	16.56	9.87	123.42
1974	28.13	7.98	13.75	10.86	8.10	9.72	21.16	13.73	14.80	22.47	15.73	18.54	184.99
1975	17.29	2.82	6.69	10.00	9.01	16.24	22.86	8.28	17.24	11.52	11.18	21.10	154.23
1976	7.80	7.27	8.05	20.09	8.66	5.91	8.08	16.64	7.72	12.49	6.30	16.54	125.55
1977	5.18	5.30	3.60	4.48	11.36	11.15	20.72	19.20	12.65	10.63	7.38	7.79	119.44
1978	10.34	22.46	6.02	8.98	12.52	16.04	9.13	20.36	10.85	20.06	17.66	10.33	164.75
1979	6.98	6.47	7.96	27.69	11.26	22.84	17.79	11.69	12.29	11.97	11.57	11.57	160.08
1980	8.72	16.01	5.53	18.80	10.02	19.50	12.40	15.26	13.60	17.11	12.17	19.95	169.07
1981	11.32	15.00	4.49	3.00	9.66	29.17	21.14	6.89	16.70	14.30	11.37	9.81	152.85
1982	5.79	6.81	9.90	9.45	19.12	22.41	19.40	10.94	1.04	8.82	9.92	13.71	137.31
1983	3.44	.64	1.71	3.12	5.73	18.48							
1948, 1950, 1952-82:													
Mean	10.76	8.13	8.32	9.91	13.30	15.43	16.59	14.98	12.87	13.70	11.02	12.98	147.99
Percent	7.3	5.5	5.6	6.7	9.0	10.4	11.2	10.1	8.7	9.3	7.4	8.8	100

1/ From: Cooper, 1959.

Table 26. National Weather Service rainfall records on Angaur

Monthly and annual rainfall totals, in inches, for 1955-77.
Source: U.S. National Oceanic and Atmospheric Administration, 1956-72, 1973-77; collected by U.S. Coast Guard.
Location: USCG Loran Station, lat 6°55' N., long 134°09' E., at altitude 15 feet.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1955	--	--	--	--	--	--	--	12.60	8.56	14.00	8.03	7.83	--
1956	24.85	2.92	6.18	14.77	17.54	9.59	10.00	23.10	11.70	16.32	17.36	15.99	170.32
1957	3.54	2.40	16.24	15.09	10.57	10.44	24.76	17.82	13.24	13.28	7.24	8.10	142.72
1958	3.76	4.67	1.48	4.24	8.57	10.50	10.94	10.35	10.48	8.23	12.66	9.90	95.78
1959	3.29	2.57	8.24	4.32	13.82	12.28	25.25	18.19	8.74	11.68	10.01	5.95	124.34
1960	11.47	11.38	2.31	7.07	8.03	9.58	7.54	9.60	14.46	13.97	11.41	16.83	123.65
1961	28.79	7.58	4.63	6.10	15.48	16.34	13.29	13.76	6.85	8.92	4.56	15.80	142.10
1962	20.50	7.81	9.71	11.98	13.20	7.86	21.51	10.67	11.05	10.59	9.40	8.28	142.56
1963	8.88	8.67	8.51	3.15	8.16	5.47	--	17.24	10.32	5.26	2.34	6.00	99.40
1964	4.86	9.00	6.04	7.72	16.21	9.84	5.66	16.56	11.24	19.84	25.00	8.93	140.90
1965	6.87	6.62	9.44	8.08	10.70	17.59	18.06	8.92	14.03	7.35	11.40	11.18	130.24
1966	8.82	3.80	5.18	10.91	9.56	12.85	21.33	8.68	6.22	13.72	7.03	6.94	115.04
1967	13.95	4.74	5.53	3.87	2.80	13.11	6.76	18.71	2.50	11.59	10.41	8.98	102.95
1968	8.51	12.57	8.54	5.11	10.56	14.67	15.85	.45	11.06	7.65	2.75	7.34	105.06
1969	e7.85	e7.71	8.98	8.60	2.81	8.38	22.73	9.73	13.03	4.76	6.77	6.52	e107.87
1970	4.44	3.93	1.57	2.41	9.41	9.57	11.87	10.52	18.89	14.64	12.68	10.58	110.51
1971	11.66	6.92	8.54	6.55	15.55	--	14.64	14.69	--	--	--	--	--
1972	13.65	7.90	8.80	5.00	10.70	--	10.33	15.98	7.02	8.48	8.06	5.21	--
1973	1.61	--	4.12	15.03	14.28	15.22	18.51	9.25	20.87	25.34	31.89	30.01	--
1974	39.50	9.01	9.89	10.92	15.19	14.29	18.00	11.76	6.38	23.49	12.10	15.00	185.53
1975	18.54	--	4.26	--	9.82	16.27	22.27	16.11	15.33	9.69	9.90	14.45	--
1976	--	--	8.52	21.66	2.37	10.28	7.79	15.06	6.53	6.86	8.18	12.43	--
1977	6.27	7.09	7.63	4.65	8.98	11.29	18.32	9.92	--	7.39	10.56	--	--
1956-77:													
Mean	10.69	6.42	6.84	7.56	10.49	11.20	15.40	12.93	10.77	11.36	9.94	9.95	1/ 127.44
Percent	8.7	5.2	5.5	6.1	8.5	9.1	12.5	10.5	8.7	9.2	8.0	8.0	100

e Partly estimated.

1/ Mean rainfall at Koror for same years, 148.09 inches.

Total of monthly means, 123.55 inches.

Rain Gage at Diongradid (Adeiddo) River, Babelthuap
[U.S. Geological Survey]

Location: Lat 7°36'08" N., long 134°35'03" E., on low hill 400 ft north of Diongradid (Adeiddo) River gaging station and 0.9 mi southeast of Ngetbong village school.

Period of record: June 1972 to June 1983.

Gage: June 1972 to February 1978: Six-inch diameter steel can, monthly cumulative readings (table 27).

May 1978 to June 1983: Water-stage recorder and 8-inch diameter rain can; continuous record (table 28).

Altitude of gage: June 1972 to February 1978, 30 ft; since May 1978, 100 ft (from topographic map).

Summary of monthly and annual rainfall, in inches

Year	Jan.	Feb.	Mar.	Apr.	May	June
1978	--	--	--	--	14.36	6.87
1979	5.35	3.42	13.75	19.37	*	(35.54)
1980	--	--	--	e 8.71	--	e12.54
1981	16.03	16.94	3.77	2.35	12.62	23.40
1982	5.41	11.75	*	(18.5)	14.67	*
1983	2.74	.76	.74	4.54	1.52	13.43

Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1978	14.33	--	--	13.18	--	e9.93	--
1979	26.54	10.50	9.18	9.08	9.29	10.16	152.18
1980	e16.12	9.85	15.95	11.45	5.23	24.28	--
1981	1/ 18.84	1/ 21.65	13.11	8.73	9.31	11.06	157.81
1982	(32.22)	11.87	3.67	e10.61	e7.5	e9.27	125.47

* Included in following total.
e Partly estimated.
1/ Rainfall for July 28-31 (about 7.0 inches) included in August 1981 total.

Table 27. Cumulative rainfall readings, in inches, at Diongradid River, Babelthuap

Period	Rainfall	Period	Rainfall
1972			
May 26 to June 23	11.8	Sept. 30 to Oct. 21	8.3
June 23 to July 24	14.4	Oct. 21 to Nov. 21	7.3
July 24 to Aug. 7	4.4	Nov. 21 to Dec. 6	8.5
Aug. 7 to Sept. 30	25.8	Dec. 6-28	1.1
1973			
Dec. 28 to Jan. 25	2.2	July 6-17	5.4
(Jan. 1-25	1.8)	July 17 to Aug. 12	8.1
Jan. 25 to Feb. 20	0	Aug. 12-28	7.3
Feb. 20 to Mar. 11	0	Aug. 28 to Sept. 27	16.0
Mar. 11-29	1.3	Sept. 27 to Oct. 12	14.5
Mar. 29 to Apr. 26	12.3	Oct. 12 to Nov. 2	5.6
Apr. 26 to May 22	8.5	Nov. 2-23	14.5
May 22 to June 13	8.5	Nov. 23 to Dec. 13	4.0
June 13 to July 6	14.5	(Dec. 13-31	5.0)
Total 1973: 127.3 inches			
1974			
Dec. 13 to Jan. 24	21.6	June 12 to July 3	8.3
(Jan. 1-24	18.6)	July 3 to Aug. 1	12.0
Jan. 24 to Feb. 28	12.5	Aug. 1-28	12.9
Feb. 28 to Apr. 10	15.1	Aug. 28 to Sept. 26	8.2
Apr. 10 to May 1	11.8	Sept. 26 to Nov. 7	25.1
May 1-21	2.3	Nov. 7 to Jan. 7	24.8
May 21 to June 12	9.0	(Jan. 1-7	1.0)
Total 1974: 157.6 inches			
1975			
(Jan. 1-7	1.0)	June 12 to July 14	17.6
Jan. 7 to Feb. 4	14.9	July 14 to Aug. 12	12.5
Feb. 4-18	.8	Aug. 12 to Sept. 16	13.0
Feb. 18 to Mar. 7	3.5	Sept. 16 to Oct. 2	12.9
Mar. 7-30	5.0	Oct. 2 to Nov. 6	21.1
Mar. 30 to Apr. 29	11.4	Nov. 6 to Dec. 12	13.6
Apr. 29 to May 21	10.5	Dec. 12 to Jan. 8	10.8
May 21 to June 12	11.1	(Jan. 1-8	1.5)
Total 1975: 158.2 inches			

Table 27. Cumulative rainfall readings, in inches, at Diongradid River, Babelthuap--Continued

Period	Rainfall	Period	Rainfall
		1976	
Jan. 8-31	6.9	June 2-30	7.9
Jan. 31 to Feb. 24	7.4	June 30 to Aug. 10	17.3
Feb. 24 to Mar. 23	2.2	Aug. 10 to Sept. 1	4.4
Mar. 23 to Apr. 14	17.2	Oct. 8 to Nov. 10	6.4
Apr. 14 to June 2	4.7	Dec. 3 to Jan. 12	15.3
		1977	
(Jan. 1-12	3.0)	July 8-29	17.0
Jan. 12 to Feb. 16	3.1	July 29 to Sept. 14	20.6
Feb. 16 to Mar. 17	2.2	Sept. 14 to Oct. 18	17.6
Mar. 17 to Apr. 19	2.5	Oct. 18 to Nov. 25	6.9
Apr. 19 to May 26	10.8	Nov. 25 to Jan. 12	11.7
May 26 to July 8	24.8	(Jan. 1-12	4.0)
		Total 1977: 118.2 inches	

Note: Data in parentheses estimated on basis of Koror rainfall.

Table 28. Daily rainfall, in inches, at Diongradid River, Babelthuap

1978

Day	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0.18	1.46	0	--	0.08	0.14	*
2	0	0	.13	.10	--	.10	.42	*
3	.01	.28	.23	2.18	--	.37	.02	*
4	.07	1.40	.49	.04	--	.06	1.07	2.4
5	.25	0	.97	.70	--	3.52	1.09	.29
6	.30	.91	.14	.71	--	1.26	0	.01
7	.23	.24	0	.30	--	1.88	.01	.59
8	.14	.26	0	.86	--	1.52	.24	.60
9	2.21	.31	.08	.74	--	.25	.36	.25
10	1.78	.43	.42	.14	--	0	.16	.79
11	.54	.34	0	.13	--	.02	.24	3.02
12	1.30	0	.06	.04	--	1.07	0	.38
13	.17	0	.60	--	--	.90	.30	.01
14	.08	0	0	--	--	.04	.37	.14
15	.95	0	.40	--	--	0	0	0
16	3.06	2.27	0	--	--	0	.36	0
17	0	0	.31	--	--	.06	.02	0
18	1.22	0	.02	--	--	.19	1.92	.05
19	.05	0	.58	--	--	.10	.01	.02
20	.07	0	0	--	--	.13	0	.04
21	.01	0	0	--	1.63	0	0	0
22	0	0	.55	--	.20	.84	--	0
23	0	0	.06	--	.38	.05	--	0
24	0	0	0	--	0	0	--	.18
25	0	0	1.16	--	1.14	.12	--	.42
26	0	0	.60	--	0	0	--	.11
27	.37	0	1.18	--	1.01	.28	--	.08
28	.68	0	.80	--	0	.13	--	.37
29	.37	0	1.75	--	.11	.20	--	.11
30	.01	.25	.98	--	.72	.01	--	.05
31	.49		1.36	--		0		.02
Total	14.36	6.87	14.33	--	--	13.18	--	9.93

Rainfall for December 1-4 estimated on basis of Airai rainfall.

Table 28. Daily rainfall, in inches, at Diongradid River, Babelthuap--Continued

1979

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.04	0	0.28	0	0.13	*	*	0.01	0.28	2.78	0	0
2	0	0	3.02	0	0	*	*	1.19	0	.96	.06	0
3	0	.04	1.32	.07	0	*	*	0	.17	0	.10	0
4	0	.04	6.25	3.72	.34	*	*	0	0	0	.67	.01
5	0	.01	.07	0	.48	*	*	.24	0	0	0	0
6	0	.02	0	0	.01	*	*	0	.82	0	1.68	0
7	0	.01	0	0	.01	*	*	0	.90	0	2.42	0
8	0	.65	1.00	0	.41	*	*	0	.01	1.61	.06	0
9	0	.23	.56	0	.28	*	*	0	0	.06	.56	0
10	0	.70	.20	0	.13	10.36	17.46	1.13	0	.86	0	0
11	0	0	0	4.01	.13	.98	.14	.70	.16	.01	0	0
12	0	0	0	6.60	2.23	.82	.02	0	.02	.40	.38	0
13	0	0	0	3.20	2.23	.18	.10	0	.01	.42	0	0
14	1.15	0	0	.03	.72	1.85	.11	.01	.32	.78	0	0
15	.31	0	0	.46	.06	.50	.17	.04	.55	.17	0	0
16	0	0	.01	.17	.07	2.08	.05	1.56	.48	.01	0	0
17	.01	*	0	.11	0	.34	.30	2.33	.26	0	.04	1.94
18	0	*	0	0	0	.01	.02	.18	0	0	.34	.90
19	0	*	0	.10	.81	.66	0	.11	1.36	.01	.08	1.12
20	.12	.16	.01	.22	*	.83	.30	0	0	.01	0	1.06
21	.16	0	.01	.01	*	.89	.76	.50	0	.01	0	.97
22	.35	0	.64	0	*	.66	3.67	.16	.19	0	0	0
23	.43	0	.04	0	*	.11	.07	0	2.02	.79	0	.98
24	0	0	.06	0	*	0	1.64	0	.23	.06	0	1.52
25	.04	0	0	.11	*	1.60	.16	.08	.14	0	0	.02
26	1.73	0	0	.01	*	.72	.02	1.61	.25	0	.70	.05
27	.20	.66	.01	0	*	2.34	.84	.02	0	0	2.20	0
28	.77	.90	.10	0	*	.53	.43	0	0	0	0	0
29	.04		.06	.08	*	2.04	.17	0	1.00	.14	0	0
30	0		.11	.47	*	*	.11	.25	.01	0	0	.94
31	0		0		*		0	.38		0		.65
Total	5.35	3.42	13.75	19.37	*	(35.54)	26.54	10.50	9.18	9.08	9.29	10.16

* Included in following amount.
Rainfall for June 30 (about 0.6 inches) included in July total.
Total rainfall for 1979: 152.18 inches.

Table 28. Daily rainfall, in inches, at Diongradid River, Babelthuap--Continued

1980

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.13	--	--	0	--	*	0.02	1.08	1.14	0.96	0.16	0.05
2	.01	--	--	.64	--	*	2.40	.34	.84	.47	0	.11
3	.02	--	--	.05	--	*	3.73	.07	.22	.01	0	1.37
4	0	--	--	.71	--	0.20	.22	0	1.36	0	0	.32
5	.04	--	--	0	--	0	.16	.38	1.37	0	.01	1.72
6	--	--	--	.13	--	0	.47	.19	2.16	.05	.48	.42
7	--	--	--	.48	--	.13	.72	.17	.29	0	0	1.75
8	--	--	--	.14	--	.64	.01	.24	.01	0	.18	0
9	--	--	--	0	--	.30	0	.01	.02	.02	.06	.12
10	--	--	--	0	--	1.12	0	.37	.01	0	.37	0
11	--	--	--	.19	--	1.01	*	.25	.01	0	.16	.07
12	--	--	--	.04	--	1.79	*	.02	.02	.01	.19	0
13	--	--	--	0	--	.02	*	1.61	.02	.20	.23	2.10
14	--	--	--	0	--	0	*	.54	.02	.12	.01	1.44
15	--	--	--	0	--	.01	*	.07	.02	.48	0	.01
16	--	--	--	1.08	--	.24	*	0	0	.17	.52	.17
17	--	--	--	.46	--	.01	4.2	.82	.02	1.38	.08	.07
18	--	--	--	.16	--	.37	.22	.14	*	.13	.02	.29
19	--	--	--	*	--	.16	.41	0	*	.01	.01	.08
20	--	--	--	*	--	.54	.01	0	*	.55	.01	1.70
21	--	--	0.07	*	--	1.94	.02	.04	*	0	.22	0
22	--	--	.17	*	--	.60	2.59	.06	*	.30	.50	1.61
23	--	--	.36	*	--	.83	.04	.08	*	1.30	.10	1.88
24	--	--	.18	*	--	.24	.23	.05	*	.19	0	.73
25	--	--	0	*	--	.13	.08	.04	4.94	.01	.84	.06
26	--	--	0	*	--	.07	.18	1.62	1.36	4.14	.31	.29
27	--	--	.42	*	--	.17	.25	0	.71	.30	.31	5.04
28	--	--	0	4.43	--	.22	.04	.32	.02	.05	.14	.13
29	--	--	.02	0	--	.14	.10	.14	.49	.23	.02	.04
30	--		0	.20	--	1.66	.02	.49	.90	0	.30	.29
31	--		0		--		0	.71		.37		2.42
Total	--	--	--	8.71	--	12.54	16.12	9.85	15.95	11.45	5.23	24.28

* Included in following amount.
Rainfall for Apr. 30, 31, June 1-4, and July 11-17 estimated on basis of Airai rainfall.

Table 28. Daily rainfall, in inches, at Diongradid River, Babelthuap--Continued

1981

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.13	0	0	0	0	0.02	1.37	*	0	*	0.19	2.27
2	.24	0	.43	0	.83	.14	3.05	*	0	0.13	.16	.26
3	.85	1.82	.06	0	0	.95	0	*	.30	.14	.05	.08
4	.60	0	.01	0	.50	.84	.40	*	.01	0	.85	0
5	.23	2.30	0	0	.89	2.18	1.44	*	0	.07	.50	.16
6	.01	.96	.26	0	0	2.29	.01	*	0	.89	.18	0
7	.36	0	.07	.48	0	0	.02	*	.11	.62	0	.58
8	.24	.25	.06	.25	0	0	.05	*	.36	.18	0	.02
9	.24	.02	.44	0	.54	.83	.31	*	.08	.06	0	.98
10	*	.02	.07	0	1.03	*	.77	*	0	.38	.08	1.73
11	*	4.10	0	.26	0	*	.29	*	0	.28	.04	.53
12	*	4.88	.68	.40	0	*	2.11	*	0	.07	.06	.11
13	*	1.44	.50	0	2.58	*	.66	*	.67	.73	0	.18
14	*	0	.01	0	.41	*	.53	*	.68	.09	.12	2.75
15	5.57	.02	0	0	.20	*	.01	*	.14	.92	.01	.01
16	.20	0	0	0	.13	*	.42	*	1.04	*	0	0
17	.30	.10	0	.50	.19	*	.57	*	.92	*	.46	.06
18	.24	0	0	0	.90	12.80	1.16	*	.13	*	.01	.01
19	.24	.01	0	0	.66	.08	.53	*	.18	*	1.62	0
20	0	.12	0	0	.28	.42	0	17.15	1.32	*	.01	.20
21	.48	0	0	0	.31	.01	0	0	*	*	.74	.24
22	.36	.48	.06	0	.38	.02	.16	.12	*	1.48	0	.06
23	3.84	0	0	0	.05	.56	.10	0	*	*	0	.66
24	.46	.40	0	0	.01	0	.11	0	*	*	.29	.08
25	.22	0	.36	0	.04	.44	.73	0	*	.88	0	0
26	0	.02	.04	0	.42	.02	.73	.31	*	.92	.55	.05
27	1.22	0	0	0	.73	0	3.31	1.61	*	0	.01	.01
28	0	0	.07	.46	1.32	.53	*	.02	6.92	.28	3.26	.01
29	0		.48	0	0	1.26	*	2.35	.24	.13	.08	.01
30	0		.17	0	.05	.01	*	.01	.01	0	.04	.01
31	0		0		.17		*	.08		.49		0
Total	16.03	16.94	3.77	2.35	12.62	23.40	1/ 18.84	1/ 21.65	13.11	8.74	9.31	11.06

* Included in following total.

1/ Rainfall for July 28-31 (about 7.0 inches) included in August total.

Total rainfall for 1981: 157.82 inches.

Table 28. Daily rainfall, in inches, at Diongradid River, Babelthuap--Continued

1982

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.06	0	0	*	0.70	2.23	*	0	0	3.13	--	*
2	.37	0	0	*	.61	0	*	0	0	.58	--	*
3	.04	0	0	*	.48	0	*	0	.41	1.92	--	*
4	.90	.06	*	*	.01	.06	*	.13	.07	1.78	--	*
5	.36	0	*	*	0	.72	*	.07	.90	1.24	--	*
6	.07	.02	*	*	0	.65	*	.34	.01	.10	--	1.3
7	0	1.40	*	*	.44	.17	*	.02	0	0	--	.86
8	0	.71	*	*	.20	1.03	*	.19	0	0	--	.19
9	0	.02	*	*	.34	.74	*	.30	0	0	--	.04
10	0	1.54	*	*	.26	.61	*	.07	0	.26	--	.42
11	0	0	*	*	0	*	*	.04	0	.45	--	.61
12	0	0	*	*	2.04	*	*	.01	0	.14	--	.89
13	0	.19	*	*	.02	*	*	.56	0	.11	--	.89
14	.07	1.15	*	*	.19	.8	*	.77	0	0	--	0
15	.01	.17	*	*	0	*	*	1.91	0	0	--	.14
16	.08	.07	*	*	.94	*	24.1	.37	0	0	--	0
17	.05	0	*	*	4.43	*	.01	.08	0	0	--	0
18	.08	0	*	*	1.36	*	0	.06	0	0	--	.23
19	.11	.05	*	*	.01	*	.25	.22	0	0	--	0
20	.11	3.52	*	*	0	*	.80	.03	0	0	--	0
21	.24	.06	*	15.6	0	*	.04	.43	0	*	--	.01
22	.04	.04	*	.01	.04	*	0	.01	1.57	*	--	.07
23	.44	.07	*	2.28	.02	*	.01	0	0	*	--	.31
24	2.04	.47	*	.01	.42	*	0	0	0	*	--	.18
25	.26	.02	*	.11	.06	*	0	.01	0	*	--	.68
26	.08	1.33	*	0	.28	*	0	0	0	*	--	1.80
27	0	.86	*	0	.12	*	0	0	0	*	--	.53
28	0	0	*	.46	.52	*	0	1.39	0	*	--	.01
29	0		*	.01	0	*	0	4.36	0	*	--	.11
30	0		*	0	.26	*	0	.50	.71	*	--	0
31	0		*		.92		0	0		.90		0
Total	5.41	11.75	*	(18.5)	14.67	*	(32.22)	11.87	3.67	10.61	(7.5)	9.27

* Included in following total.
Totals for Oct. 21-31, November, and Dec. 1-6 estimated on basis of recorded rainfall at Koror and Airai.
Total rainfall for 1982: 125.47 inches.

Table 28. Daily rainfall, in inches, at Diongradid River, Babelthuap--Continued

1983

Day	Jan.	Feb.	Mar.	Apr.	May	June
1	0.22	0	0	0	0	0.08
2	.41	.19	0	0	0	0
3	.05	0	0	0	0	0
4	0	0	0	0	0	0
5	.05	0	0	0	.13	.56
6	1.00	0	0	0	0	.30
7	.10	0	0	0	0	1.22
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	.04	0	0	0	0
11	.07	0	0	0	.02	.07
12	.06	0	0	0	.06	.50
13	.36	0	0	0	.25	.90
14	.04	.06	0	0	0	1.24
15	0	0	.06	0	0	1.26
16	.25	.18	0	0	0	.02
17	.05	0	.11	.06	.19	1.80
18	.08	0	0	.12	0	.60
19	0	0	0	.36	0	*
20	0	0	0	0	0	*
21	0	0	.34	0	0	*
22	0	.02	0	0	0	*
23	0	0	.23	0	0	*
24	0	0	0	.06	.29	*
25	0	0	0	0	.06	*
26	0	.17	0	0	0	*
27	0	.10	0	0	0	*
28	0	0	0	.52	0	*
29	0		0	1.78	0	*
30	0		0	1.64	.52	4.88
31	0		0		0	
Total	2.74	0.76	0.74	4.54	1.52	13.43

Table 29. Cumulative rainfall readings, in inches, at Ngerimel River, Babelthuap

[Lat 7°22'20" N., long 134°31'38" E., 100 ft downstream from dam and 300 ft upstream from old gaging station site; altitude, 20 ft (from topographic map)]

Period	Rainfall	Period	Rainfall
1972			
July 22 to Aug. 22	7.5	Oct. 19 to Nov. 10	2.7
Aug. 22 to Sept. 25	16.5	Nov. 10 to Dec. 8	10.6
Sept. 25 to Oct. 19	16.4	Dec. 8 to Jan. 22	1.1
1973			
(Jan. 1-21	.8)	June 29 to July 27	9.8
Jan. 22 to Feb. 13	.1	July 27 to Aug. 23	12.7
Feb. 13 to Mar. 8	.7	Aug. 23 to Sept. 15	7.0
Mar. 8-27	1.1	Sept. 15 to Oct. 10	17.4
Mar. 27 to Apr. 19	13.1	(Oct. 10-31	7.2)
Apr. 19 to May 15	9.1	Oct. 31 to Nov. 19	13.2
May 15 to June 7	10.5	Nov. 19 to Dec. 18	4.0
June 7-29	7.2	(Dec. 18-31	7.0)
Total 1973: 120.9 inches			
1974			
Dec. 18 to Jan. 25	25.4	June 18 to July 16	13.2
(Jan. 1-25	18.4)	July 16 to Aug. 12	23.2
Jan. 25 to Mar. 1	8.9	Aug. 12 to Sept. 24	10.1
Mar. 1 to Apr. 11	16.8	Sept. 24 to Oct. 23	21.0
Apr. 11 to May 6	6.6	Oct. 23 to Nov. 29	22.2
May 6-30	7.2	Nov. 29 to Dec. 28	13.8
May 30 to June 18	4.6	(Dec. 29-31	8.0)
Total 1974: 174.0 inches			
1975			
Dec. 28 to Feb. 3	27.8	July 24 to Aug. 8	7.8
(Jan. 1 to Feb. 3	19.8)	Aug. 8-16	3.8
Feb. 3 to Mar. 11	3.0	Aug. 16 to Sept. 14	12.6
Mar. 11 to Apr. 17	8.8	Sept. 14 to Oct. 9	15.3
Apr. 17 to May 15	13.7	Oct. 9 to Nov. 17	16.0
May 15 to June 17	22.5	Nov. 17 to Dec. 15	19.7
June 17 to July 24	19.7	(Dec. 15-31	10.0)
Total 1975: 172.7 inches			

Table 29. Cumulative rainfall readings, in inches, at Ngerimel River, Babelthuap--Continued

Period	Rainfall	Period	Rainfall
		1976	
(Jan. 1-12	2.3)	June 16 to July 29	10.8
Jan. 13-30	4.3	July 29 to Aug. 24	17.0
Jan. 30 to Feb. 1	1.4	Aug. 24 to Sept. 28	8.1
Feb. 1-20	7.2	Sept. 28 to Oct. 29	12.2
Feb. 20 to Mar. 19	5.2	Oct. 29 to Dec. 9	18.0
Mar. 19 to Apr. 9	21.9	Dec. 9 to Jan. 10	15.5
Apr. 9 to May 17	9.5	(Dec. 9-31	10.5)
May 17 to June 16	8.1		
		Total 1976: 136.5 inches	
		1977	
(Jan. 1-9	5.0)	Aug. 3 to Sept. 6	19.0
Jan. 10 to Feb. 10	5.5	Sept. 6 to Oct. 11	12.7
Feb. 10 to Mar. 9	3.8	Oct. 11 to Nov. 1	11.2
Mar. 9 to Apr. 14	5.9	Nov. 1 to Dec. 5	11.4
Apr. 14 to May 19	11.6	Dec. 5 to Jan. 11	6.5
May 19 to June 6	5.2	(Dec. 5-31	3.5)
June 6 to Aug. 3	29.7		
		Total 1977: 124.5 inches	

Note: Data in parentheses estimated on basis of rainfall for Koror.

Rain Gage at Airai, Babelthuap
[U.S. Geological Survey]

Location: Lat 7°22'53" N., long 134°33'06" E., on low hill next to small reservoir, 0.25 mi southeast of confluence of Edeng and Kmekumel Rivers, and 0.6 mi north of Palau Mission Academy.

Period of record: October 24, 1978 to June 1983.

Gage: Water-stage recorder and 8-inch diameter rain can; continuous record (table 30). Altitude of gage is 80 ft (from topographic map).

Summary of monthly and annual rainfall, in inches

Year	Jan.	Feb.	Mar.	Apr.	May	June
1978	--	--	--	--	--	--
1979	6.39	3.39	10.51	22.68	12.64	17.93
1980	e 8.10	14.51	7.09	13.58	10.02	16.41
1981	11.92	16.23	3.76	2.04	13.64	22.94
1982	6.96	8.55	6.59	12.49	*	(33.93)
1983	2.57	.18	.81	3.19	3.43	12.66

Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1978	--	--	--	--	7.69	9.97	--
1979	1/ 17.47	--	--	--	--	--	--
1980	12.75	2/ 12.24	2/ 14.48	3/ 14.89	3/ 6.66	18.69	149.42
1981	18.35	8.98	15.84	12.43	12.80	15.50	154.43
1982	17.14	14.91	4.83	10.50	7.11	11.63	134.64

e Partly estimated.
* Included in following total.
1/ Rainfall for Aug. 1-6 (about 1.0 inch) included in August 1979 total.
2/ Rainfall for Aug. 30, 31 (about 1.0 inch) included in September 1980 total.
3/ Rainfall for Nov. 1-4 (about 0.2 inch) included in October 1980 total.

Table 30. Daily rainfall, in inches, at Airai, Babelthuap

1978

Day	Oct.	Nov.	Dec.
1	--	0.41	0
2	--	.04	2.08
3	--	.25	.31
4	--	.83	0
5	--	.78	.34
6	--	.34	.06
7	--	0	.04
8	--	1.03	.32
9	--	.12	.23
10	--	.12	.82
11	--	.08	4.33
12	--	.22	.10
13	--	.10	.08
14	--	.07	.04
15	--	.01	.04
16	--	0	0
17	--	0	0
18	--	.53	0
19	--	.30	0
20	--	.16	0
21	--	.37	.01
22	--	.11	.14
23	--	.11	.12
24	1.12	.47	.32
25	.08	.05	.20
26	.79	0	.06
27	.24	.11	.02
28	.62	.12	.16
29	1.52	.53	.13
30	.12	.43	.02
31	.10		0
Total	--	7.69	9.97

Table 30. Daily rainfall, in inches, at Airai, Babelthuap--Continued

1979

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.-Dec.[1/]
1	0.14	0.12	3.18	0.12	0.14	0.59	3.42	
2	.05	0	2.63	0	.01	.02	.12	
3	0	0	1.03	0	0	.01	.01	
4	0	.04	1.90	2.59	0	.59	.67	
5	.13	0	.02	.06	1.45	.19	.40	
6	.23	.34	0	0	.04	.02	.25	
7	0	.05	0	0	0	.12	.06	
8	.54	.26	.52	0	0	2.15	0	
9	.14	.28	.52	0	.58	1.03	0	
10	.01	.52	.19	0	.16	.26	3.34	
11	0	0	.02	1.74	.11	.91	.08	
12	0	0	0	7.02	1.13	.61	.06	
13	0	0	.01	9.19	2.96	.06	0	
14	.72	0	.05	.01	1.15	.06	.77	
15	.17	0	.04	.01	.04	.82	.07	
16	0	0	0	.12	.20	1.45	.18	
17	0	0	0	.44	.02	.05	0	
18	0	0	0	.05	0	.49	0	
19	0	.55	0	0	0	.53	0	
20	.01	.05	0	.29	0	.26	*	
21	.18	.07	0	.08	.12	.91	*	
22	.62	0	0	0	.66	.19	*	
23	.80	0	.30	0	.07	.13	*	
24	.01	0	0	0	.68	.60	*	
25	0	0	.01	.05	.49	.05	*	
26	1.55	0	0	.18	.44	.16	*	
27	.35	.91	0	0	.46	2.59	*	
28	.68	.20	.12	0	.95	1.49	*	
29	.06		.13	.01	.01	.39	*	
30	0		0	.72	.06	.60	*	
31	0		.04		.65		[2/]7.0	
Total	6.39	3.39	10.51	22.68	12.58	17.93	[2/]16.43	

* Included in following total.

[1/] No record available.

[2/] Rainfall for Aug. 20-31 estimated on basis of Koror rainfall and total of July 20 to Aug. 6 (8.04 inches).

Total rainfall for January to July 1979: 89.41 inches.

Table 30. Daily rainfall, in inches, at Airai, Babelthuap--Continued

1980

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	*	*	0.01	0	0.52	0.05	0	0.16	*	1.55	*	*
2	*	*	.04	1.80	.07	0	3.30	.07	*	.56	*	*
3	*	*	.20	.16	.04	0	1.26	0	*	.06	*	*
4	*	*	0	1.52	.13	.16	.28	*	*	0	12.26	*
5	*	*	0	.16	.44	.04	.05	.22	3.98	.41	*	*
6	*	*	.46	.25	.60	.71	.16	2.27	.60	.05	*	3.47
7	*	*	.01	.29	3.82	.24	.42	.50	*	0	*	*
8	*	*	.12	.50	0	.86	.02	.42	*	*	*	*
9	*	*	0	.34	.10	.18	0	.34	*	*	*	*
10	*	*	.13	.18	.20	1.01	.42	.06	*	*	*	*
11	*	*	1.27	.46	.30	.02	1.91	.20	*	*	*	*
12	*	*	.08	0	.04	.91	.30	.07	.29	*	*	1.38
13	*	4.93	.84	0	0	0	0	3.23	0	*	*	2.22
14	*	.01	.01	0	.02	0	.17	.94	0	*	*	1.21
15	*	.01	.02	.28	.01	.91	.38	.12	0	*	*	0
16	*	.48	.04	.22	.08	.43	.05	.07	0	*	*	.19
17	*	7.49	0	2.30	1.02	.01	1.36	.55	.02	*	*	0
18	*	.07	.96	.22	1.33	.12	.68	.20	.92	*	*	0
19	*	.56	1.03	.01	0	.86	.05	.07	.22	*	*	0
20	*	.01	1.38	0	.02	*	.20	.18	1.55	*	*	0
21	*	0	.07	0	.43	*	1.00	.14	.06	*	*	0
22	[1]/ 5.60	0	0	.01	.02	*	.04	.31	1.90	*	*	0
23	0	.01	0	2.14	0		0	.30	0	*	*	.10
24	.22	.19	0	.02	0	4.67	.02	.07	.85	*	*	.04
25	.01	0	.12	0	.06	.05	.19	.02	1.26	*	*	.06
26	.22	.30	0	.32	.22	.01	.10	.90	1.22	*	*	.67
27	.52	.06	.28	2.18	0	.92	0	0	.52	*	*	2.17
28	.02	.35	0	0	.20	1.67	.07	.67	0	*	*	.22
29	1.51	.04	.01	0	.06	2.48	.01	.16	.38	*	*	.54
30	0		.01	.22	.11	.10	0	*	.71	*	6.66	.44
31	0		0		.18		.31	*		*		5.98
Total	8.10	14.51	7.09	13.58	10.02	16.41	12.75	[2]/ 12.24	[2]/ 14.48	[3]/ 14.89	[3]/ 6.66	18.69

* Included in following total.

[1]/ Total from National Weather Service rain gage on Koror.

[2]/ Rainfall for Aug. 30, 31 (about 1.0 inch) included in September total.

[3]/ Rainfall for Nov. 1-4 (about 0.2 inch) included in October total.

Total rainfall for 1980: 149.42 inches.

Table 30. Daily rainfall, in inches, at Airai, Babelthuap--Continued

1981

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	*	0.11	0.08	0	0.04	0.29	0.10	1.61	0	0	0.04	0.24
2	*	.96	1.06	0	.12	.34	1.68	.52	1.84	.14	0	1.45
3	*	.44	.12	0	.18	.02	.72	*	.11	1.80	.01	.61
4	*	.53	*	0	1.43	.71	.59	*	0	.05	.32	.08
5	*	1.16	*	0	.18	.60	1.34	*	0	0	.06	.17
6	*	.52	*	0	.06	.02	.20	*	0	.35	.17	0
7	*	.20	*	0	0	0	.02	*	.23	2.17	.06	0
8	4.27	.13	*	.02	0	0	.16	*	.06	.17	.29	.47
9	1.27	.43	*	.02	0	3.12	.12	*	.01	.06	1.70	.36
10	1.32	.01	*	0	0	1.08	.40	*	1.14	.05	.05	3.00
11	.02	3.50	*	.29	0	.85	.05	*	0	.04	.02	*
12	0	4.98	*	.91	.01	3.07	1.56	5.24	.22	.08	0	*
13	.01	1.66	.80	.01	2.53	.14	0	.04	.13	.46	0	*
14	*	.02	0	0	.26	2.00	0	.04	1.00	.02	.79	*
15	*	0	0	0	.46	.49	0	.01	1.10	.36	.17	*
16	*	0	0	0	.48	1.39	0	0	1.07	1.92	0	7.05
17	*	.60	0	0	1.46	.72	.36	.01	.89	1.46	1.01	.02
18	*	0	.01	.22	.34	.07	0	0	.02	.73	.10	0
19	*	0	0	0	.29	.52	.10	0	.20	.10	.13	0
20	*	0	0	0	.78	.86	0	.67	.05	0	.31	1.50
21	*	0	0	0	.55	.31	0	.02	.52	0	3.13	.08
22	*	.49	.01	.01	.29	0	0	0	1.03	0	.10	0
23	*	.04	0	0	.37	.77	0	0	.02	.29	.13	.35
24	*	.32	0	.56	.05	.02	1.08	0	.13	0	.52	.05
25	*	0	.14	0	0	0	.26	0	0	.68	1.25	0
26	*	0	.11	0	.07	1.16	.01	.06	.24	.11	.05	.01
27	4.37	.08	.07	0	.61	.02	2.03	.06	3.86	.07	0	0
28	.30	.05	0	0	1.90	1.09	5.84	.01	1.28	0	1.44	0
29	.36		1.18	0	.61	.96	.32	.11	.05	.01	.94	.06
30	0		.18	0	.25	2.32	.88	0	.64	.01	.01	0
31	0		0		.32		.53	.58		1.30		0
Total	11.92	16.23	3.76	2.04	13.64	22.94	18.35	8.98	15.84	12.43	12.80	15.50

* Included in following total.
Total rainfall for 1981: 154.43 inches.

Table 30. Daily rainfall, in inches, at Airai, Babelthuap--Continued

1982

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0.43	*	1.57	0	0	2.59	0	0
2	.07	0	0	0	.30	*	.64	0	.05	1.81	.19	0
3	.02	0	.02	.11	1.28	*	.14	0	.31	2.88	.58	0
4	1.06	0	0	0	0	*	2.63	0	.71	.83	.01	0
5	1.31	.05	.72	0	0	*	.02	0	.61	.06	.55	0
6	.25	0	1.00	0	0	*	.12	0	0	.01	.07	.60
7	0	1.18	.61	2.15	0	*	.67	0	0	0	.48	.02
8	0	1.09	.35	0	.05	*	2.64	.34	0	0	0	.34
9	0	.16	.82	.01	.37	*	.04	5.63	0	0	0	.04
10	0	.59	.29	0	.06	*	.73	.04	0	.31	.22	.30
11	0	.12	0	.07	*	*	3.58	.17	0	.53	.50	.22
12	0	0	.11	0	*	*	1.86	.01	0	.52	1.00	.83
13	0	.05	.06	.14	2.24	*	.40	.59	0	.07	.01	1.94
14	.65	.98	.41	.34	*	*	.10	.12	0	0	.05	.73
15	0	.84	.54	.42	*	*	0	.54	0	0	.01	.34
16	.58	.07	.10	1.13	*	*	.64	.11	0	0	0	.01
17	.01	0	0	2.10	*	*	.08	.07	0	0	.01	0
18	.05	0	.10	2.87	*	*	0	.06	0	0	.19	0
19	1.03	1.16	.41	.17	*	*	.25	.46	0	0	0	0
20	.67	.82	.90	.01	*	*	.90	.16	0	0	.01	0
21	.06	.10	.06	.10	*	*	.05	.02	0	0	.14	.13
22	.01	0	0	.10	*	*	.08	.26	0	0	.08	0
23	.42	.10	.01	1.93	*	*	0	0	0	0	.04	.06
24	.68	.34	0	.06	*	*	0	0	0	0	.40	.23
25	.08	0	0	.41	*	*	0	0	0	.16	.01	.34
26	0	.26	.07	0	*	*	0	0	.55	.01	.04	.66
27	0	.64	0	.05	*	*	0	.38	.49	.38	1.68	4.49
28	0	0	0	.31	*	*	0	2.53	1.55	0	.54	.22
29	0		0	.01	*	*	0	3.22	0	.34	.30	.12
30	.01		0	0	*	29.2	0	.20	.56	0	0	.01
31	0		.01		*		0	0		0		0
Total	6.96	8.55	6.59	12.49	*	(33.93)	17.14	14.91	4.83	10.50	7.11	11.63

* Including in following total.

Total rainfall for 1982: 134.64 inches.

Table 30. Daily rainfall, in inches, at Airai, Babelthuap--Continued

1983

Day	Jan.	Feb.	Mar.	Apr.	May	June
1	0.50	0	0	0	0	*
2	.41	.06	0	0	0	*
3	.02	.02	0	0	0	*
4	0	0	0	0	0	*
5	0	0	0	0	0	*
6	.37	0	.13	0	0	*
7	.24	0	0	0	0	*
8	0	0	0	.01	0	*
9	0	*	0	0	0	*
10	0	*	0	0	0	*
11	.12	*	0	0	0	*
12	.20	*	0	0	0	*
13	.04	*	0	0	.36	*
14	.16	*	0	0	0	*
15	.08	*	0	0	0	*
16	0	*	0	0	.85	*
17	.12	*	0	0	1.38	*
18	.01	*	.07	0	.04	*
19	.01	*	0	.07	0	*
20	0	*	0	.25	0	*
21	0	*	.24	0	0	*
22	0	*	0	.04	.01	*
23	0	*	.37	0	.07	*
24	0	.10	0	.20	0	*
25	0	0	0	0	0	*
26	0	0	0	0	.02	*
27	.14	0	0	0	0	*
28	.04	0	0	.34	.10	11.0
29	0		0	.83	0	.34
30	.01		0	1.45	1/ .60	1.32
31	.10		0		1/ 0	
Total	2.57	0.18	0.81	3.19	3.43	12.66

* Included in following total.

1/ Estimated on basis of rainfall at Diongradid River and Koror.

Table 31. Cumulative rainfall readings, in inches, at South Fork Ngerdorch River, Babelthuap

[Lat 7°26'20" N., long 134°34'29" E., at South Fork Ngerdorch River gaging station; altitude, 40 ft (from topographic map)]

Period	Rainfall	Period	Rainfall
1972			
May 6-24	8.5	Oct. 1-22	4.7
May 24 to June 22	13.3	Oct. 22 to Nov. 22	5.0
June 22 to July 27	16.1	Nov. 22 to Dec. 7	9.7
July 27 to Aug. 18	7.1	Dec. 7 to Jan. 4	1.5
Aug. 18 to Oct. 1	25.5		
1973			
(Jan. 1-4	.4)	July 3 to Aug. 1	7.8
Jan. 4-29	.8	Aug. 1-27	12.7
Jan. 29 to Feb. 23	0	Aug. 27 to Sept. 7	10.3
Feb. 23 to Mar. 12	.2	Sept. 7 to Oct. 11	18.5
Mar. 12-30	1.0	Oct. 11 to Nov. 1	5.2
Mar. 30 to Apr. 27	12.2	Nov. 1-21	14.8
Apr. 27 to May 23	7.5	Nov. 21 to Dec. 14	1.8
May 23 to June 15	6.5	Dec. 14 to Jan. 23	24.5
June 15 to July 3	7.9	(Dec. 14-31	7.0)
Total 1973: 114.6 inches			
1974			
Jan. 23 to Feb. 27	5.4	June 13 to July 8	12.6
Feb. 27 to Apr. 9	12.8	Aug. 9-29	6.9
Apr. 9-29	6.7	Sept. 26 to Oct. 30	11.9
Apr. 29 to May 17	7.3	Oct. 30 to Nov. 20	11.0
May 17 to June 13	7.5	Nov. 20 to Jan. 6	23.5
1975			
(Jan. 1-6	1.0)	July 16 to Aug. 19	15.5
Jan. 6 to Feb. 5	20.8	Aug. 19 to Sept. 18	4.0
Feb. 5 to Mar. 5	.5	Sept. 18 to Oct. 3	6.6
Mar. 5 to Apr. 1	4.7	Oct. 3 to Nov. 1	11.2
Apr. 1 to May 1	7.9	Nov. 1 to Dec. 11	18.6
May 1-20	2.5	Dec. 11 to Jan. 10	14.9
May 20 to June 18	17.5	(Jan. 1-10	2.0)
June 18 to July 16	17.7		
Total 1975: 141.4 inches			

Table 31. Cumulative rainfall readings, in inches, at South Fork Ngerdorch River, Babelthuap--Continued

Period	Rainfall	Period	Rainfall
		1976	
(Jan. 1-10 ----------	2.0)	Aug. 4 to Sept. 7 ------	.5
Jan. 10 to Feb. 26 ----	6.6	Sept. 7 to Oct. 13 -----	4.7
Feb. 26 to Mar. 24 ----	2.9	Oct. 13 to Nov. 9 ------	6.0
Mar. 24 to Apr. 17 ----	19.2	Nov. 9 to Dec. 10 ------	9.1
Apr. 17 to June 3 -----	4.5	Dec. 10 to Jan. 13 -----	13.5
June to July 1 --------	15.6	(Jan. 1-13 ----------	3.0)
July 1 to Aug. 4 ------	17.9		
		Total 1976: 99.5 inches	
		1977	
(Jan. 1-13 ----------	3.0)	July 14 to Aug. 18 -----	22.7
Jan. 13 to Feb. 17 ----	2.8	Aug. 18 to Sept. 16 ----	10.0
Feb. 17 to Mar. 22 ----	1.8	Sept. 16 to Oct. 20 ----	6.8
Mar. 22 to Apr. 21 ----	1.1	Oct. 20 to Dec. 1 ------	6.8
Apr. 21 to May 24 -----	9.4	Dec. 1 to Jan. 16 ------	7.9
May 24 to July 14 -----	22.8	(Jan. 1-16 ----------	4.0)
		Total 1977: 91.1 inches	
		1978	
Jan. 16 to Mar. 1 -----	20.2	July 14 to Aug. 31 -----	20.3
Mar. 1 to Apr. 14 -----	4.8	Aug. 31 to Sept. 27 ----	9.2
Apr. 14 to May 24 -----	16.0	Sept. 27 to Nov. 3 -----	10.0
May 24 to July 14 -----	14.0	Nov. 3 to Dec. 21 ------	12.0

Note: Data in parentheses estimated on basis of Koror rainfall.

Table 32. Cumulative rainfall readings, in inches, at filter plant, Koror

[Lat 7°20'35" N., long 134°29'14" E., at filter plant, Koror; altitude, 210 ft (from topographic map)]

Period	Rainfall	Period	Rainfall
1972			
Apr. 27 to May 30	8.4	Oct. 10-24	2.0
May 30 to June 26	16.4	Oct. 24 to Nov. 30	8.9
June 26 to Aug. 2	15.5	Nov. 30 to Dec. 15	5.0
Aug. 2-25	4.9	Dec. 15-31	0
Aug. 25 to Oct. 10	11.2		
1973			
Jan. 1-5	0	May 30 to June 20	9.7
Jan. 5-30	1.0	June 20 to July 30	14.9
Jan. 30 to Feb. 27	.3	July 30 to Aug. 17	3.1
Feb. 27 to Mar. 14	1.0	Aug. 17 to Sept. 6	10.2
Mar. 14 to Apr. 14	1.7	Sept. 6 to Oct. 1	11.2
Apr. 4 to May 8	12.3	Oct. 1-26	16.7
May 8-30	5.7	Oct. 26 to Nov. 14	9.8
1974			
Dec. 21 to Jan. 27	24.9	June 28 to July 18	9.0
Jan. 27 to Mar. 1	8.3	July 18 to Aug. 2	5.2
Mar. 1 to Apr. 9	13.9	Aug. 2 to Sept. 5	10.7
Apr. 9 to May 13	4.5	Sept. 5 to Oct. 1	10.7
May 13-20	4.6	Oct. 1-31	19.7
May 30 to June 28	4.3		
1975			
Dec. 29 to Jan. 28	29.1	July 7-23	5.8
Jan. 28 to Feb. 18	.2	July 23 to Aug. 26	14.1
Feb. 18 to Mar. 12	.5	Aug. 26 to Oct. 8	16.5
Mar. 12 to Apr. 18	.5	Oct. 8 to Nov. 28	14.2
Apr. 18 to May 29	14.4	Nov. 28 to Dec. 29	18.9
May 29 to July 7	22.5		

Total Dec. 29, 1974 to Dec. 29, 1975: 136.7 inches

Table 32. Cumulative rainfall readings, in inches, at filter plant, Koror--Continued

Period	Rainfall	Period	Rainfall
		1976	
Dec. 29 to Feb. 5 -----	7.5	June 4 to July 22 ------	14.1
Mar. 11 to Apr. 12 ----	22.1	July 22 to Aug. 17 -----	12.4
Apr. 12 to June 4 -----	10.5		
		1977	
(Jan. 1-12 ----------	3.0)	June 14 to Aug. 17 -----	30.0
Jan. 12-28 ----------	18.5	Aug. 17 to Oct. 4 ------	17.5
Jan. 28 to Feb. 23 ----	4.8	Oct. 4 to Nov. 17 ------	10.2
Feb. 23 to Apr. 6 -----	3.8	Nov. 17 to Jan. 6 ------	10.7
Apr. 6 to May 20 ------	8.8	(Jan. 1-6 ----------	2.0)
May 20 to June 14 -----	9.7		
		Total 1977: 115.0 inches	

Note: Data in parentheses estimated on basis of Koror rainfall.

Table 33. Cumulative rainfall readings, in inches, at power plant, Malakal

[Lat 7°19'50" N., long 134°27'01" E., at power plant, Malakal; altitude, 5 ft (from topographic map)]

Period	Rainfall	Period	Rainfall
1972			
Apr. 27 to May 30	6.4	Oct. 10-26	4.0
May 30 to June 26	15.0	Oct. 26 to Nov. 30	9.8
June 26 to Aug. 2	15.4	Nov. 30 to Dec. 12	7.2
Aug. 2-25	9.3	Dec. 12 to Jan. 3	.5
Aug. 25 to Oct. 10	17.6		
1973			
Jan. 3 to Feb. 5	.9	June 20 to July 13	8.3
Feb. 5-27	.2	July 13 to Aug. 16	6.3
Feb. 27 to Mar. 14	1.2	Aug. 16 to Sept. 6	8.0
Mar. 14 to Apr. 4	1.4	Sept. 6 to Oct. 5	19.2
Apr. 4 to May 8	12.3	Oct. 5-26	8.0
May 8-30	5.0	Oct. 26 to Nov. 15	11.4
May 30 to June 20	7.4		
1974			
Dec. 21 to Jan. 27	25.6	July 19 to Aug. 2	5.7
Jan. 27 to Mar. 2	5.6	Aug. 2 to Sept. 5	9.9
Mar. 2 to Apr. 9	12.3	Sept. 5 to Oct. 1	9.9
Apr. 9 to May 8	4.0	Oct. 1-31	21.1
May 8 to June 28	7.6	Oct. 31 to Nov. 28	16.7
June 28 to July 19	14.0		
1975			
Dec. 29 to Jan. 28	29.5	July 7-23	5.2
Jan. 28 to Feb. 18	1.6	July 23 to Aug. 26	15.2
Feb. 18 to Mar. 13	.7	Aug. 26 to Oct. 8	19.5
Mar. 13 to Apr. 18	1.8	Oct. 8 to Nov. 28	16.7
Apr. 18 to May 29	14.8	Nov. 28 to Dec. 29	19.5
May 29 to July 7	23.0		

Total Dec. 29, 1974 to Dec. 29, 1975: 147.5 inches

Table 33. Cumulative rainfall readings, in inches, at power plant, Malakal--Continued

Period	Rainfall	Period	Rainfall
		1976	
Dec. 29 to Feb. 6 -----	8.0	June 4 to July 22 ------	12.7
Mar. 11 to Apr. 12 ----	21.5	July 22 to Aug. 17 -----	14.5
Apr. 12 to June 4 -----	7.3	Aug. 17 to Sept. 16 ----	12.0
		1977	
(Jan. 1-11 ----------	3.0)	June 15 to Aug. 12 -----	25.0
Jan. 11-28 ----------	12.4	Aug. 17 to Oct. 4 ------	16.2
Jan. 28 to Feb. 23 ----	5.6	Oct. 4 to Nov. 18 ------	9.2
Feb. 23 to Apr. 6 -----	4.0	Nov. 18 to Jan. 6 ------	12.4
Apr. 6 to May 20 ------	5.0	(Jan. 1-6 ----------	2.0)
May 20 to June 14 -----	8.7		
		Total 1977: 99.5 inches	

Note: Data in parentheses estimated on basis of Koror rainfall.

Table 34. Cumulative rainfall readings, in inches, at Well 5, Peleliu

[Lat 6°59'58" N., long 138°14'16" E., at north end of old airfield; altitude, 13.1 ft (from stadia survey)]

Period	Rainfall	Period	Rainfall
1972			
Nov. 2-24	6.6	Nov. 24 to Dec. 14	5.0
1973			
Dec. 14 to Jan. 16	2.5	May 24 to June 19	6.8
(Jan. 1-16	.3)	June 19 to July 21	14.5
Jan. 16 to Feb. 9	1.0	July 21 to Aug. 8	7.2
(Feb. 9-26	.3)	Aug. 8 to Sept. 25	11.2
Feb. 26 to Mar. 13	.6	Sept. 25 to Oct. 15	14.2
(Mar. 13 to Apr. 14	8.0)	Oct. 14 to Nov. 6	6.0
Apr. 14 to May 3	10.2	Nov. 6 to Dec. 12	17.2
May 3-24	10.8	(Dec. 12-31	9.5)
Total 1973: 117.8 inches			
1974			
Dec. 12 to Jan. 22	22.1	July 10-27	9.5
(Jan. 1-22	12.6)	July 10 to Aug. 21	14.9
Jan. 22 to Feb. 26	7.0	Aug. 21 to Sept. 17	6.0
Feb. 26 to Apr. 8	9.3	Sept. 17 to Oct. 22	16.0
Apr. 8-25	8.1	Oct. 22 to Nov. 21	20.2
Apr. 25 to May 16	2.2	Nov. 21 to Dec. 23	9.5
May 16 to June 11	13.6	(Dec. 23-31	10.0)
June 11 to July 10	13.5		
Total 1974: 152.4 inches			
1975			
Dec. 23 to Jan. 30	21.2	July 15 to Sept. 8	12.4
(Jan. 1-30	17.0)	Sept. 8 to Oct. 1	7.8
Jan. 30 to Mar. 4	3.2	Oct. 1 to Nov. 3	18.1
Mar. 4-31	8.8	Nov. 3 to Dec. 3	9.6
Mar. 31 to May 16	10.1	Dec. 3 to Jan. 7	16.8
May 16 to June 16	19.2	(Jan. 1-7	1.5)
June 16 to July 15	19.5		
Total 1975: 141.0 inches			

Table 34. Cumulative rainfall readings, in inches, at Well 5, Peleliu--Continued

Period	Rainfall	Period	Rainfall
	1976		
Jan. 7 to Feb. 25 -----	16.6	Feb. 25 to Mar. 22 -----	3.2
	1977		
Jan. 6 to Feb. 2 ------	7.6	Mar. 2 to Apr. 1 -------	4.7
Feb. 2 to Mar. 2 ------	.8	Apr. 1 to May 4 --------	3.6

Note: Data in parentheses estimated on basis of Koror rainfall.

Gaging stations

Table 35. Streamflow records for Diongradid River, Babelthuap (16890600)
(Formerly published as Adeiddo River, Babelthuap)

Location: Lat 7°36'04" N., long 134°35'02" E., on right bank, 0.3 mi upstream from left-bank tributary (Ngechutrong River), 0.9 mi southeast of Ngetbong village school, and 2.3 mi upstream from confluence with Ngerchetang River.

Drainage area: 4.45 mi^2.

Period of record: October 1969 to September 1982.

Gage: Water-stage recorder. Altitude of gage is 15 ft (from topographic map).

Average discharge: 13 years, 33.1 ft^3/s (23,980 acre-ft/yr).

Remarks: Records good to fair. No diversion above station. Continuous record of rainfall has been obtained near station since May 1978.

Extremes for period of record: Maximum discharge, 2,310 ft^3/s Jan. 22, 1975 (gage height, 15.44 ft), from rating curve extended above 410 ft^3/s on basis of field estimate at gage height 15.44 ft; minimum, 2.7 ft^3/s Mar. 24, 25, 31, Apr. 1, 1973, and Apr. 28, 29, 1977.

A. Discharge measurements, in cubic feet per second, made outside the period of continuous discharge record ending September 1982

Date	Discharge	Date	Discharge
Oct. 20, 1982	16	July 2, 1983	51
Dec. 6, 1982	7.8	July 29, 1983	45
Feb. 3, 1983	7.0	Aug. 23, 1983	52
Mar. 10, 1983	4.2	Oct. 4, 1983	41
Apr. 18, 1983	2.4		

Table 35. Streamflow records for Diongradid River, Babelthuap--Continued

B. Annual maximum discharge (*) and peak discharges above base (600 ft^3/s)

[Discharge in cubic feet per second, gage height in feet]

Date	Time	Discharge	Gage height
Oct 31, 1969	1100	1,200	9.85
July 12, 1970	1100	*1,700	12.80
Dec. 12, 1970	0600	736	7.98
Dec. 28, 1970	1200	905	8.82
June 23, 1971	1030	708	7.84
July 7, 1971	2300	* 995	9.18
Oct. 8, 1971	1800	678	7.69
Oct. 22, 1971	2100	652	7.56
Mar. 15, 1972	0700	1,730	12.93
Aug. 28, 1972	1800	1,010	9.24
Sept. 29, 1972	0530	*1,730	12.96
Dec. 2, 1972	0230	1,520	11.90
Sept. 16, 1973	0200	*2,290	15.35
Oct. 3, 1973	2200	*1,070	9.49
Jan 16, 1974	1730	1,020	9.27
Feb. 8, 1974	2300	850	8.45
Aug. 4, 1974	2200	636	7.38
Nov. 10, 1974	0630	1,380	11.21
Jan. 22, 1975	1730	*2,310	15.44
June 12, 1975	2300	1,160	10.09
Aug. 13, 1975	1300	1,070	9.64
Oct. 17, 1975	1000	665	7.57
Nov. 27, 1975	0600	1,840	13.49
Dec. 20, 1975	1700	772	8.15
Jan. 12, 1976	1000	688	7.70
Feb. 1, 1976	1300	814	8.37
Apr. 7, 1976	2330	*1,950	14.00
July 4, 1977	1100	*2,060	14.43
July 27, 1977	0500	834	8.47
Aug. 18, 1978	1030	* 500	6.72
Mar. 4, 1979	0300	*1,890	13.73
Apr. 12, 1979	2200	1,840	13.50
June 29, 1979	1830	1,030	9.47
July 22, 1979	1330	738	7.97

Table 35. Streamflow records for Diongradid River, Babelthuap--Continued

B. Annual maximum discharge (*) and peak discharges above base (600 ft^3/s)--Continued

Date	Time	Discharge	Gage height
Nov. 7, 1979	1200	763	8.10
Jan. 29, 1980	0630	834	8.47
Feb. 17, 1980	1330	795	8.27
July 3, 1980	0530	*1,660	12.62
July 22, 1980	1100	842	8.51
Sept. 25, 1980	0300	663	7.56
Oct. 26, 1980	1800	884	8.72
Dec. 27, 1980	2100	1,450	11.47
Jan. 15, 1981	0100	*1,710	12.78
Jan. 23, 1981	1430	1,180	10.13
Feb. 12, 1981	1630	1,370	11.11
Feb. 13, 1981	0430	962	9.05
July 28, 1981	0930	1,420	11.32
June 21, 1982	1630	* 561	6.98

C. Annual minimum discharge in cubic feet per second

Water year	Date	Discharge
1970	May 16, 1970	4.1
1971	Apr. 17, 1971	7.7
1972	Aug. 15-17, 20-22, 1972	10
1973	Mar. 24, 25, 31, Apr. 1, 1973	2.7
1974	Sept. 13, 1974	12
1975	Apr. 17, 18, 1975	5.8
1976	June 8, 9, 1976	7.5
1977	Apr. 28, 29, 1977	2.7
1978	Apr. 1, 2, 1978	10
1979	Feb. 24-26, 1979	5.9
1980	Apr. 14, 1980	7.8
1981	May 1, 2, 1981	4.8
1982	Apr. 14, 1982	1/ 6.0

1/ Estimate of minimum daily discharge.

Table 35. Streamflow records for Diongradid River, Babelthuap--Continued

D. Monthly and annual discharges in cubic feet per second

Year		Calendar year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Water year
1969	Total	--										1,045	909	651	
	Mean	--										33.7	30.3	21.0	
	Max.	--										163	64	50	
	Min.	--										20	19	14	
1970	Total		657	500	343.0	227.6	317.3	734	2,454	1,375	1,009				10,221.9
		10,836.9										1,234	618	1,368	
	Mean	29.7	21.2	17.9	11.1	7.59	10.2	24.5	79.2	44.4	33.6	39.8	20.6	44.1	28.0
	Max.	519	40	55	19	12	21	58	519	89	63	76	42	139	519
	Min.	4.3	15	13	8.7	5.2	4.3	14	33	27	20	24	14	26	4.3
1971	Total		872	768	690	397.7	885	1,677	1,882	1,021	914				12,326.7
		13,485.7										2,255	1,133	991	
	Mean	36.9	28.1	27.4	22.3	13.3	28.5	55.9	60.7	32.9	30.5	72.7	37.8	32.0	33.8
	Max.	237	70	149	68	32	78	237	199	75	52	158	62	150	237
	Min.	8.3	17	14	13	8.3	12	28	24	21	22	33	21	13	8.3
1972	Total		902	1,051	2,095	723	750	742	1,561	917	1,410				14,530
		12,886										1,273	495	967	
	Mean	35.2	29.1	36.2	67.6	24.1	24.2	24.7	50.4	29.6	47.0	41.1	16.5	31.2	39.7
	Max.	395	100	90	331	79	129	105	116	187	395	84	34	251	395
	Min.	10	19	15	33	12	12	12	18	10	20	19	11	12	10
1973	Total		299.7	163.4	118.9	229.8	437.9	695	1,426	963	2,197				9,265.7
		10,879.7										2,265	1,374	710	
	Mean	29.8	9.67	5.84	3.84	7.66	14.1	23.2	46.0	31.1	73.2	73.1	45.8	22.9	25.4
	Max.	626	17	7.2	5.6	17	33	34	115	66	626	297	100	77	626
	Min.	2.7	7.2	5.0	2.7	3.2	9.2	16	25	18	31	25	19	14	2.7
1974	Total		1,504	951	937	1,309	741	819	1,284	1,398	530				13,822
		14,227										1,022	2,347	1,385	
	Mean	39.0	48.5	34.0	30.2	43.6	23.9	27.3	41.4	45.1	17.7	33.0	78.2	44.7	37.9
	Max.	248	198	117	66	165	44	53	73	118	36	90	248	98	297
	Min.	13	19	17	15	17	16	16	24	20	13	15	32	29	13
1975	Total		2,218	576	348.1	453.1	669	2,014	1,437	1,472	670				14,611.2
		14,528.2										1,838	1,271	1,562	
	Mean	39.8	71.5	20.6	11.2	15.1	21.6	67.1	46.4	47.5	22.3	59.3	42.4	50.4	40.0
	Max.	716	716	36	34	106	43	166	94	170	67	135	319	150	716
	Min.	5.9	30	12	8.4	5.9	13	22	23	24	15	31	17	32	5.9

Table 35. Streamflow records for Diongradid River, Babelthuap--Continued

D. Monthly and annual discharges in cubic feet per second--Continued

Year		Calendar year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Water year
1976	Total	8,733.3	892	603	332.9	1,733.7	418	397.7	865	967	636	459	393	1,036	11,516.3
	Mean	23.9	28.8	20.8	10.7	57.8	13.5	13.3	27.9	31.2	21.2	14.8	13.1	33.4	31.5
	Max.	611	119	110	19	611	24	27	92	75	51	19	24	101	611
	Min.	7.8	16	12	8.2	8.2	10	7.8	14	19	15	12	10	18	7.8
1977	Total	10,476.7	810	310.3	220.4	123.6	359.5	519.9	3,152	1,716	1,231	1,089	529	416	10,330.7
	Mean	28.7	26.1	11.1	7.11	4.12	11.6	17.3	102	55.4	41.0	35.1	17.6	13.4	28.3
	Max.	413	51	17	15	8.9	50	33	413	120	103	94	33	20	413
	Min.	2.9	12	8.6	4.6	2.9	3.0	9.9	17	35	23	22	13	11	2.9
1978	Total	12,505	495	1,563	656	559	1,301	977	743	1,777	1,265	1,703	691	775	11,370.0
	Mean	34.3	16.0	55.8	21.2	18.6	42.0	32.6	24.0	57.3	42.2	54.9	23.0	25.0	31.2
	Max.	175	30	175	40	75	159	58	43	125	97	155	55	78	175
	Min.	10	11	16	13	10	12	24	12	23	19	19	16	17	10
1979	Total	12,744.0	384.7	223.0	857.3	1,927	692	1,932	2,247	969	652	1,299	863	698	13,053.0
	Mean	34.9	12.4	7.96	27.7	64.2	22.3	64.4	72.5	31.2	21.7	41.9	28.8	22.5	35.8
	Max.	604	24	13	300	604	68	288	204	68	50	125	117	41	604
	Min.	6.1	9.0	6.1	7.3	10	13	22	30	20	15	19	15	14	6.1
1980	Total	12,039.9	963	1,593	495.7	431.2	535	801	1,803	977	1,387	971	477	1,606	11,845.9
	Mean	32.9	31.3	54.9	16.0	14.4	17.3	26.7	58.2	31.5	46.2	31.4	15.9	51.8	32.4
	Max.	405	229	295	27	67	39	59	405	82	110	140	23	234	405
	Min.	8.0	16	28	9.7	8.0	13	12	22	20	20	16	10	11	8.0
1981	Total	13,896.3	1,682	2,329	431.0	205.1	326.2	1,416	2,520	1,534	592	749	819	1,293	14,089.3
	Mean	38.1	54.2	83.2	13.9	6.84	10.5	47.2	81.3	49.5	19.7	24.2	27.3	41.7	38.6
	Max.	663	218	382	24	9.7	28	162	663	142	64	38	79	155	663
	Min.	4.8	34	24	9.0	5.0	4.8	10	27	19	12	18	15	21	4.8
1982	Total		520.4	489.2	652	496.0	929.5	1,774	1,360	500.0	338.0				9,920.1
	Mean		16.8	17.5	21.0	16.5	30.0	59.1	43.9	16.1	11.3				27.2
	Max.		34	67	80	100	139	161	110	63	19				161
	Min.		9.8	8.5	11	6.0	9.0	22	16	9.0	8.0				6.0

Table 36. Streamflow records for Tabecheding River, Babelthuap (16890900)
(Formerly published as Tabagaten River, Babelthuap)

Location: Lat 7°27'03" N., long 134°31'29" E., on left bank 0.2 mi downstream from waterfall, 1.5 mi upstream from boat landing, and 1.6 mi east of forestry station.

Drainage area: 6.07 mi^2.

Period of record: October 1970 to September 1982.

Gage: Water-stage recorder. Altitude of gage is 20 ft (from topographic map).

Average discharge: 12 years, 49.5 ft^3/s (35,840 acre-ft/yr).

Remarks: Records fair. No diversion above station.

Extremes for period of record: Maximum discharge, 3,580 ft^3/s Dec. 23, 1973 (gage height, 8.79 ft), from rating curve extended above 290 ft^3/s; minimum, 0.80 ft^3/s Mar. 23, 24, 1973.

A. Discharge measurements, in cubic feet per second, made outside the period of record ending September 1982

Date	Discharge	Date	Discharge
July 16, 1969	77	Aug. 14, 1970	124
Sept. 26, 1969	32	Sept. 11, 1970	34
Nov. 6, 1969	27	Sept. 26, 1970	65
Dec. 23, 1969	32	Oct. 21, 1982	14
Jan. 15, 1970	21	Dec. 10, 1982	19
Mar. 24, 1970	8.5	Jan. 19, 1983	14
Apr. 14, 1970	7.7	Mar. 24, 1983	3.4
Apr. 28, 1970	3.8	Apr. 19, 1983	.57
May 25, 1970	8.4	July 26, 1983	37
June 18, 1970	54	Sept. 7, 1983	22
July 15, 1970	124	Oct. 11, 1983	51
July 29, 1970	51		

Table 36. Streamflow records for Tabecheding River, Babelthuap--Continued

B. Annual maximum discharge (*) and peak discharges above base (700 ft^3/s)

[Discharge in cubic feet per second, gage height in feet]

Date	Time	Discharge	Gage height
Nov. 9, 1970	1300	719	5.63
Feb. 13, 1971	0900	* 900	6.20
June 23, 1971	--	unknown	--
Dec. 28, 1971	1930	1,160	6.53
Jan. 1, 1972	1030	1,330	6.81
May 1, 1972	0300	1,880	7.48
June 24, 1972	1200	752	5.59
July 2, 1972	1300	794	5.71
Aug. 24, 1972	1900	*1,980	7.58
Sept. 29, 1972	0500	1,800	7.40
Dec. 2, 1972	0130	*1,420	6.95
Oct. 3, 1973	2300	1,480	7.02
Nov. 10, 1973	1530	772	5.65
Dec. 23, 1973	0900	*3,580	8.79
Jan. 8, 1974	1000	1,020	6.25
Jan. 16, 1974	1830	1,580	7.15
Jan. 17, 1974	1800	2,580	8.09
Aug. 4, 1974	a/2000	unknown	--
Oct. 6, 1974	2100	713	5.48
Nov. 7, 1974	2000	1,250	6.69
Dec. 2, 1974	2330	955	6.11
Dec. 5, 1974	0300	1,040	6.27
Dec. 13, 1974	1800	3,000	8.40
Dec. 29, 1974	2300	1,160	6.51
Jan. 22, 1975	1400	*3,090	8.46
May 27, 1975	1530	826	5.79
June 14, 1975	a/0400	a/1,000	--
Nov. 27, 1975	a/0300	a/ 800	--
Dec. 20, 1975	1700	1,270	6.71
Apr. 8, 1976	0100	*1,680	7.27
Aug. 1, 1976	1500	938	6.07
Dec. 28, 1976	a/1100	a/1,500	--
July 4, 1977	a/1100	a/*2,000	--
July 8, 1977	1530	1,040	6.29
July 14, 1977	2330	716	5.49
Aug. 3, 1977	0900	970	6.14
Aug. 15, 1977	0600	965	6.13

Table 36. Streamflow records for Tabecheding River, Babelthuap--Continued

B. Annual maximum discharge (*) and peak discharges above base (700 ft^3/s)--Continued

Date	Time	Discharge	Gage height
Feb. 4, 1978 ----------	1730	1,020	6.25
June 4, 1978 ----------	0730	772	5.65
Aug. 3, 1978 ----------	0600	* 1,180	6.56
Aug. 6, 1978 ----------	1730	870	5.90
Oct. 7, 1978 ----------	2200	975	6.15
Apr. 13, 1979 ---------	0430	2,810	8.25
July 22, 1979 ---------	1500	1,040	6.27
Sept. 23, 1979 --------	0100	* 3,090	8.47
Oct. 14, 1979 ---------	1530	1,100	6.45
Nov. 8, 1979 ----------	0030	975	6.19
Dec. 23, 1979 ---------	2030	1,100	6.44
Feb. 17, 1980 ---------	1100	* 2,120	7.70
Apr. 17, 1980 ---------	1900	1,140	6.49
Aug. 13, 1980 ---------	2330	970	6.14
Oct. 26, 1980 ---------	1930	1,120	6.44
Jan. 15, 1981 ---------	0330	918	6.02
Feb. 13, 1981 ---------	0200	1,280	6.73
July 2, 1981 ----------	0500	1,130	6.46
July 28, 1981 ---------	0800	1,920	7.52
Aug. 5, 1981 ----------	1730	* 1,930	7.53
Oct. 7, 1981 ----------	0200	1,300	6.74
Nov. 28, 1981 ---------	1630	1,010	6.10
Dec. 14, 1981 ---------	0330	* 3,210	8.57
May 18, 1982 ----------	0500	1,080	6.28
July 12, 1982 ---------	0600	1,310	6.75

a/ About.

Table 36. Streamflow records for Tabecheding River, Babelthuap--Continued

C. Annual minimum discharge in cubic feet per second

Water year	Date	Discharge
1971 ------	Apr. 18, 1971	10
1972 ------	Aug. 15-17, 1972	9.4
1973 ------	Mar. 23, 24, 1973	.80
1974 ------	Dec. 18, 1973	10
1975 ------	Apr. 17, 1975	a/5.0
1976 ------	Apr. 4-6, 1976	10
1977 ------	Apr. 29, 1977	2.3
1978 ------	Apr. 3, 1978	8.8
1979 ------	Apr. 4, 1979	5.8
1980 ------	Mar. 31, Apr. 1, 1980	8.5
1981 ------	May 1, 2, 1981	3.4
1982 ------	Apr. 14, 15, 1982	6.9

a/ About.

Table 36. Streamflow records for Tabecheding River, Babelthuap--Continued

D. Monthly and annual discharges in cubic feet per second

Year		Calendar year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Water year
1970	Total	--										2,090	1,971	1,899	
	Mean	--										67.4	65.7	61.3	
	Max.	--										165	272	125	
	Min.	--										35	27	31	
1971	Total	16,721	944	1,113	944	1,069	1,497	2,752	1,981	879	571	2,328	1,371	1,272	17,710
	Mean	45.8	30.5	39.8	30.5	35.6	48.3	91.7	63.9	28.4	19.0	75.1	45.7	41.0	48.5
	Max.	300	162	264	191	150	181	300	200	67	37	206	90	222	300
	Min.	11	15	14	14	11	22	42	20	18	11	22	29	15	11
1972	Total	18,132	1,310	1,207	2,205	1,449	1,664	1,922	2,220	1,343	1,883	1,205	620	1,104	20,174
	Mean	49.5	42.3	41.6	71.1	48.3	53.7	64.1	71.6	43.3	62.8	38.9	20.7	35.6	55.1
	Max.	531	266	110	209	211	454	192	288	264	531	108	71	338	531
	Min.	10	18	16	27	14	17	28	13	10	13	14	11	11	10
1973	Total	14,194.20	206.7	74.8	49.60	490.1	719	1,252	1,494	1,318	2,090	2,780	2,304	1,416	10,623.20
	Mean	38.9	6.67	2.67	1.60	16.3	23.2	41.7	48.2	42.5	69.7	89.7	76.8	45.7	29.1
	Max.	615	12	4.0	3.7	86	46	103	177	155	163	446	382	615	338
	Min.	.80	4.0	2.0	.80	1.5	11	22	20	15	31	22	17	11	.80
1974	Total	22,641.0	3,724	884	1,471	1,373	1,009	1,454	1,767	2,159	1,111	2,339	2,353	2,997	21,452
	Mean	62.0	120	31.6	47.5	45.8	32.5	48.5	57.0	69.6	37.0	75.5	78.4	96.7	58.8
	Max.	799	799	109	160	95	106	126	150	400	164	203	220	486	799
	Min.	12	27	18	15	22	17	26	30	24	12	29	26	28	11
1975	Total	19,763.7	2,778	524.0	295.2	635.5	1,007	2,987	2,441	1,742	850	1,665	1,725	3,114	20,948.7
	Mean	54.1	89.6	18.7	9.52	21.2	32.5	99.6	78.7	56.2	28.3	53.7	57.5	100	57.4
	Max.	815	815	46	25	180	157	250	250	200	175	200	500	385	815
	Min.	5.3	31	9.2	6.3	5.3	15	31	35	20	12	30	15	37	5.3
1976	Total	14,712.0	1,074	867	621	2,222	836	957	1,484	2,417	738	1,022	658	1,816	17,720
	Mean	40.2	34.6	29.9	20.0	74.1	27.0	31.9	47.9	78.0	24.6	33.0	21.9	58.6	48.4
	Max.	729	114	128	91	729	84	103	171	205	68	98	50	300	729
	Min.	11	20	13	11	11	12	12	20	26	13	15	14	18	11

Table 36. Streamflow records for Tabecheding River, Babelthuap--Continued

D. Monthly and annual discharges in cubic feet per second--Continued

Year		Calendar year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Water year
1977	Total		1,328	418.0	266.9	148.4	656.2	1,081	3,267	3,185	1,716				15,562.5
		15,222.5										1,589	858	709	
	Mean	41.7	42.8	14.9	8.61	4.95	21.2	36.0	105	103	57.2	51.3	28.6	22.9	42.6
	Max.	339	200	27	58	16	79	108	300	339	173	135	73	36	339
	Min.	2.4	15	7.0	4.2	2.4	2.9	16	33	33	19	25	14	14	2.4
1978	Total		691	2,422	646	609.7	1,463	1,382	867	3,098	1,617				15,951.7
		18,375.7										3,027	1,389	1,164	
	Mean	50.3	22.3	86.5	20.8	20.3	47.2	46.1	28.0	99.9	53.9	97.6	46.3	37.5	43.7
	Max.	458	70	458	42	93	154	148	62	289	154	446	135	199	458
	Min.	9.7	11	24	11	9.7	10	22	16	22	28	36	23	15	9.7
1979	Total		508.9	303.9	796.7	2,896.7	874	2,306	2,552	1,338	1,942				19,098.2
		18,754.2										2,601	1,479	1,156	
	Mean	51.4	16.4	10.9	25.7	96.6	28.2	76.9	82.3	43.2	64.7	83.9	49.3	37.3	52.3
	Max.	1,280	68	27	158	1,280	102	254	305	90	513	293	182	169	1,280
	Min.	6.5	9.4	7.3	7.9	6.5	15	30	31	23	16	24	18	13	6.5
1980	Total		747	1,949	584.4	1,416.1	1,496	1,599	2,029	1,835	1,876				18,767.5
		18,888.5										1,912	1,013	2,432	
	Mean	51.6	24.1	67.2	18.9	47.2	48.3	53.3	65.5	59.2	62.5	61.7	33.8	78.4	51.3
	Max.	636	46	636	79	265	205	185	294	256	170	329	66	208	636
	Min.	9.1	15	17	9.4	9.1	22	17	22	18	20	20	21	25	9.1
1981	Total		1,964	2,378	413.0	164.3	899.8	3,359	3,425	1,941	1,201				21,102.1
		21,253.1										1,767	1,343	2,398	
	Mean	58.2	63.3	84.9	13.3	5.48	29.0	112	110	62.6	40.0	57.0	44.8	77.4	57.8
	Max.	684	243	502	27	15	108	299	654	326	178	453	159	684	654
	Min.	3.4	32	20	7.3	3.6	3.4	29	25	14	10	22	21	18	3.4
1982	Total		804	1,050	727	595.7	1,938	2,874	2,408	1,352	522.8				17,779.5
	Mean		25.9	37.5	23.5	19.9	62.5	95.8	77.7	43.6	17.4				48.7
	Max.		78	123	85	146	495	426	436	239	39				684
	Min.		14	12	12	7.1	12	31	16	12	8.7				7.1

Table 37. Streamflow records for Ngerimel River, Babelthuap (16891200)
(Formerly published as Gihmel River, Babelthuap)

Location: Lat 7°22'18" N., long 134°31'37" E., on right bank 400 ft downstream from dam and 0.7 mi north northwest of new airport terminal.

Drainage area: 0.77 mi^2.

Period of record: October 1969 to April 1978 (discontinued).

Gage: Water-stage recorder. Altitude of gage is 15 ft (from topographic map).

Average discharge: 8 yrs, 3.18 ft^3/s (2,300 acre-ft/yr).

Remarks: Records fair. A 12-inch pipeline diverts an average of 1 Mgal/d from above the dam, 400 ft upstream from the gage, for domestic consumption on Koror.

Extremes for period of record: Maximum discharge, 534 ft^3/s Jan. 22, 1975 (gage height, 7.34 ft), from rating curve extended above 52 ft^3/s; no flow for many days during 1973-74.

A. Discharge measurements, in cubic feet per second, made prior to beginning of continuous discharge record

Date	Discharge
Mar. 27, 1968	2.8
May 17, 1968	6.3
Aug. 8, 1968	6.9
Oct. 10, 1968	1.6
Dec. 12, 1968	.54
Apr. 22, 1969	.18
July 1, 1969	3.5
Sept. 29, 1969	5.1

Table 37. Streamflow records for Ngerimel River, Babelthuap--Continued

B. Annual maximum discharge (*) and peak discharges above base (150 ft^3/s)

[Discharge in cubic feet per second, gage height in feet]

Date	Time	Discharge	Gage height
July 12, 1970	0800	* 135	4.88
Feb. 14, 1971	a/1100	195	5.40
Mar. 6, 1971	0600	* 267	5.92
May 28, 1971	a/1500	189	5.35
Mar. 27, 1972	0600	175	5.23
May 1, 1972	0130	* 331	6.32
Aug. 22, 1973	0930	* 270	5.65
Jan. 8, 1974	1000	237	5.40
Jan. 16, 1974	1100	* 421	6.68
Aug. 4, 1974	1930	413	6.67
Oct. 7, 1974	1030	171	4.68
Dec. 29, 1974	2330	188	5.00
Jan. 22, 1975	1300	* 534	7.34
Dec. 10, 1975	0530	220	5.27
Apr. 8, 1976	0200	* 267	5.63
Dec. 28, 1976	1200	182	5.01
July 4, 1977	1130	* 373	6.38
Aug. 3, 1977	0800	252	5.54
Mar. 2, 1978	1000	*+137	4.63

a/ About.

\+ For period October 1977 to April 1978.

Table 37. Streamflow records for Ngerimel River, Babelthuap--Continued

C. Annual minimum discharge in cubic feet per second

Water year	Date	Discharge
1970 ------	Apr. 10, 12, 13, 1970	0.01
1971 ------	Several days in April, May	a/.10
1972 ------	Dec. 16, 1971	.07
1973 ------	Many days during February, March, April 1973	0
1974 ------	Several days in December 1973	0
1975 ------	Many days in March, April 1975	.01
1976 ------	Apr. 24-26, 1976	.02
1977 ------	Many days March to June, 1977	.01
1978b/ ----	Mar. 10-12, Apr. 11-14, 1978	.06

a/ About.

b/ For period October 1977 to April 1978.

Table 37. Streamflow records for Ngerimel River, Babelthuap--Continued

D. Monthly and annual discharges in cubic feet per second

Year		Calendar year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Water year
1969	Total	--										111.8	44.04	34.69	
	Mean	--										3.61	1.47	1.12	
	Max.	--										5.3	3.1	3.4	
	Min.	--										1.4	.39	.47	
1970	Total	940.65	43.69	35.38	11.08	9.05	9.23	29.94	156.8	93.4	120.4	142.68	145.4	143.6	699.50
	Mean	2.58	1.41	1.26	.36	.30	.30	1.00	5.06	3.01	4.01	4.60	4.85	4.63	1.92
	Max.	14	2.7	3.5	.92	.56	.83	5.0	14	8.6	11	8.2	11	8.5	14
	Min.	.03	.39	.26	.03	.03	.03	.20	2.5	1.6	1.4	.70	1.7	2.4	.03
1971	Total	1,059.75	66.20	59.64	58.66	12.10	138.90	212.3	171.8	34.20	23.40	165.7	74.90	41.95	1,208.88
	Mean	2.90	2.14	2.13	1.89	.40	4.48	7.08	5.54	1.10	.78	5.35	2.50	1.35	3.31
	Max.	50	9.1	20	17	1.2	50	19	14	3.4	5.7	11	7.2	11	50
	Min.	.10	.82	.40	.15	.10	.15	3.5	1.7	.20	.15	.18	.40	.15	.10
1972	Total	982.15	72.20	90.2	127.5	54.8	85.47	109.7	101.09	56.64	111.12	120.7	9.01	43.72	1,091.27
	Mean	2.68	2.33	3.11	4.11	1.83	2.76	3.66	3.26	1.83	3.70	3.89	.30	1.41	2.98
	Max.	27	5.4	5.4	16	5.3	22	7.4	11	.87	17	27	.50	27	22
	Min.	.10	.40	1.6	1.6	1.1	.60	1.0	.66	.40	.60	.32	.15	.10	.15
1973	Total	894.09	2.10	.04	0	1.46	6.29	62.91	71.40	149.16	93.3	274.7	214.16	18.57	560.09
	Mean	2.45	.068	.001	0	.049	.20	2.10	2.30	4.81	3.11	8.86	7.14	.60	1.53
	Max.	46	.10	.01	0	.38	2.8	6.6	9.1	43	7.8	46	46	8.3	43
	Min.	0	.02	0	0	0	.01	.72	.56	.36	1.4	1.2	.24	0	0
1974	Total	1,686.89	421.40	27.10	96.99	39.18	12.41	17.76	110.2	172.66	45.49	360.6	228.3	154.8	1,450.62
	Mean	4.62	13.6	.97	3.13	1.31	.40	.59	3.55	5.57	1.52	11.6	7.61	4.99	3.97
	Max.	135	135	5.2	23	4.2	1.8	2.1	12	46	8.1	41	33	48	135
	Min.	.04	.66	.20	.24	.40	.06	.04	1.6	.96	.44	2.0	1.0	1.1	0

Table 37. Streamflow records for Ngerimel River, Babelthuap--Continued

D. Monthly and annual discharges in cubic feet per second--Continued

Year		Calendar year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Water year
1975	Total		287.2	18.04	1.68	11.14	79.79	267.8	245.2	121.76	107.99				1,884.30
		1,712.26										136.99	151.17	283.5	
	Mean	4.69	9.26	.64	.054	.37	2.57	8.93	7.91	3.93	3.60	4.42	5.04	9.15	5.16
	Max.	102	102	4.8	.29	3.6	11	29	31	23	23	22	41	34	102
	Min.	.01	1.5	.02	.01	.02	.04	1.3	1.7	.40	.10	.32	.74	1.6	.01
1976	Total		31.61	31.45	4.27	200.62	19.67	32.18	78.60	189.3	51.06				1,210.42
		845.75										43.25	19.69	144.05	
	Mean	2.31	1.02	1.08	.14	6.69	.63	1.07	2.54	6.11	1.70	1.40	.66	4.65	3.31
	Max.	87	6.5	12	2.0	87	4.5	5.8	18	20	8.0	18	7.7	40	87
	Min.	.02	.06	.04	.04	.02	.03	.12	.21	1.6	.06	.06	.07	.20	.02
1977	Total		103.29	1.43	.82	.52	.96	.65	372.84	398.3	105.03				1,190.83
		1,152.60										104.81	37.34	26.61	
	Mean	3.16	3.33	.051	.026	.017	.031	.022	12.0	12.8	3.50	3.38	1.24	.86	3.26
	Max.	57	30	.12	.09	.09	.25	.12	57	55	18	14	10	5.5	57
	Min.	.01	.05	.03	.01	.01	.01	.01	.84	1.7	.07	.52	.07	.09	.01
1978	Total		9.35	241.57	21.21	11.80									--
		--													
	Mean	--	.30	8.63	.68	.39									--
	Max.	--	3.1	59	6.2	2.6									--
	Min.	--	.09	.77	.06	.06									--

Table 38. Streamflow records for Edeng River, Babelthuap (16891300)
(Formerly published as Gaden River, Babelthuap)

Location: Lat 7°23'00" N., long 134°33'07" E., on left bank 1,000 ft upstream from confluence with Kmekumel River, 0.7 mi north of Palau Mission Academy, and 2.1 mi northeast of new airport terminal.

Drainage area: 4.26 mi^2.

Period of record: October 1969 to December 1982 (Station discontinued July 31, 1983).

Gage: Water-stage recorder. Altitude of zero of gage is 2.0 ft (from stadia survey). Prior to Dec. 9, 1974, at site 300 ft downstream at datum 0.30 ft lower.

Average discharge: 13 years, 32.8 ft^3/s (23,760 acre-ft/yr).

Remarks: Records good to fair. Small amount of water is pumped at times since 1976 from site 300 ft upstream from station for irrigation 0.5 mi downstream. Continuous record of rainfall is obtained near station at Airai since November 1978.

Extremes for period of record: Maximum discharge, 1,850 ft^3/s Apr. 13, 1979 (gage height, 18.2 ft), from rating curve extended above 118 ft^3/s on basis of measurement at gage height 13.0 ft; minimum, 1.6 ft^3/s Mar. 23, 24, 1973.

A. Discharge measurements, in cubic feet per second, made outside the period of record ending December 1982

Date	Discharge
Sept. 25, 1969	29
Jan. 11, 1983	12
Feb. 24, 1983	3.4
Mar. 29, 1983	1.6
Apr. 1, 1983	1.6
Apr. 8, 1983	1.3
Apr. 27, 1983	1.6
June 29, 1983	4.7
July 4, 1983	16
July 11, 1983	26

Table 38. Streamflow records for Edeng River, Babelthuap--Continued

B. Annual maximum discharge (*) and peak discharges above base (800 ft^3/s)

[Discharge in cubic feet per second, gage height in feet]

Date	Time	Discharge	Gage height
July 12, 1970 ----------	1200	* 805	10.74
Feb. 14, 1971 ----------	1100	1,000	12.26
Mar. 6, 1971 ----------	0730	822	10.88
May 28, 1971 ----------	1500	*1,270	14.05
Dec. 28, 1971 ----------	2000	824	10.90
May 1, 1972 ----------	0230	*1,520	15.70
Aug. 24, 1972 ----------	2000	1,380	14.79
Sept. 29, 1972 ---------	0430	1,120	13.03
Dec. 2, 1972 ----------	0230	* 626	9.16
Jan. 8, 1974 ----------	0800	*1,550	15.87
Jan. 16, 1974 ----------	1100	1,500	15.56
Aug. 4, 1974 ----------	2030	1,540	15.81
(Station moved 300 feet upstream)			
Dec. 13, 1974 ----------	1800	1,030	12.73
Dec. 29, 1974 ----------	2400	909	11.88
Jan. 22, 1975 ----------	a/1400	*1,710	1/17.24
July 15, 1975 ----------	1130	848	11.40
Dec. 9, 1975 ----------	0530	878	11.64
Apr. 8, 1976 ----------	a/0200	*1,450	+15.56
Aug. 1, 1976 ----------	1500	866	11.55
Dec. 28, 1976 ----------	1200	a/1,000	--
July 4, 1977 ----------	1230	*1,050	12.87
Aug. 22, 1978 ----------	0330	* 973	12.35
Oct. 7, 1978 ----------	2100	1,070	13.03
Dec. 2, 1978 ----------	0930	963	12.28
Dec. 11, 1978 ----------	1330	1,090	13.15
Mar. 2, 1979 ----------	0130	929	12.03
Apr. 13, 1979 ----------	1200	*1,850	18.2
July 1, 1979 ----------	2000	908	11.87
Sept. 23, 1979 ---------	0700	859	11.49

Table 38. Streamflow records for Edeng River, Babelthuap--Continued

B. Annual maximum discharge (*) and peak discharges above base (800 ft^3/s)--Continued

Date	Time	Discharge	Gage height
Oct. 14, 1979 ----------	1530	824	11.20
Nov. 9, 1979 ----------	1430	800	11.00
Dec. 23, 1979 ----------	2100	904	11.84
Feb. 17, 1980 ----------	1200	*1,390	15.15
Aug. 13, 1980 ----------	2400	930	12.04
Dec. 31, 1980 ----------	0400	1,180	13.75
Feb. 13, 1981 ----------	0100	1,010	12.58
July 2, 1981 ----------	0400	1,010	12.57
July 28, 1981 ----------	0700	*1,300	14.55
Dec. 14, 1981 ----------	0230	*1,450	+15.52
May 18, 1982 ----------	0400	801	10.92
Aug. 9, 1982 ----------	1800	1,130	13.43

1/ At old site, 17.44 ft.
a/ About.
+ From floodmarks.

C. Annual minimum discharge in cubic feet per second

Water year	Date	Discharge
1970 ------	May 15, 1970	4.3
1971 ------	Apr. 17, 18, 1971	5.8
1972 ------	Many days in December 1971 and August 1972.	11
1973 ------	Mar. 23, 24, 1973	1.6
1974 ------	Dec. 18, 1973	9.3
1975 ------	Apr. 15-17, 1975	2.0
1976 ------	June 8, 9, 1976	3.6
1977 ------	Apr. 28, 1977	3.1
1978 ------	Apr. 2, 3, 1978	7.2
1979 ------	Feb. 25, 26, 1979	4.6
1980 ------	Apr. 1, 14, 1980	9.0
1981 ------	Apr. 27, 1981	3.5
1982 ------	Apr. 14, 1982	6.6

Table 38. Streamflow records for Edeng River, Babelthuap--Continued

D. Monthly and annual discharges in cubic feet per second

Year		Calendar year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Water year
1969	Total	--										767	650	610	
	Mean	--										24.7	21.7	19.7	
	Max.	--										84	42	59	
	Min.	--										11	13	12	
1970	Total		482.3	435.2	236.1	157.5	202.9	543.5	1,815	1,089	1,076				8,064.5
		10,251.5										1,633	1,331	1,250	
	Mean	28.1	15.6	15.5	7.62	5.25	6.55	18.1	58.5	35.1	35.9	52.7	44.4	40.3	22.1
	Max.	330	38	47	16	13	29	54	330	129	97	103	139	78	330
	Min.	4.4	9.6	9.6	5.5	4.4	4.4	5.8	24	16	15	30	20	23	4.4
1971	Total		587	922.9	735	492.2	1,512	2,187	1,830	541	441.9				13,463.0
		12,728.0										1,680	1,018	781	
	Mean	34.9	18.9	33.0	23.7	16.4	48.8	72.9	59.0	17.5	14.7	54.2	33.9	25.2	36.9
	Max.	457	73	272	207	65	457	250	189	35	44	144	105	146	457
	Min.	6.1	10	8.6	11	6.1	16	37	18	11	7.7	17	15	11	6.1
1972	Total		981	965	1,359	942	1,433	1,020	1,312	1,107	1,495				14,093
		12,457.0										882	410	551.0	
	Mean	34.0	31.6	33.3	43.8	31.4	46.2	34.0	42.3	35.7	49.8	28.5	13.7	17.8	38.5
	Max.	520	114	74	130	150	520	97	188	234	398	68	26	161	520
	Min.	6.3	17	14	20	15	12	16	13	12	12	12	10	6.3	11
1973	Total		164.7	75.5	69.4	273.7	395.5	849	928	974.7	1,121				6,694.5
		9,140.0										1,947	1,693	648.5	
	Mean	25.0	5.31	2.70	2.24	9.12	12.8	28.3	29.9	31.4	37.4	62.8	56.4	20.9	18.3
	Max.	307	8.2	3.3	3.6	43	38	88	133	145	108	265	307	127	161
	Min.	1.8	2.9	2.2	1.8	2.2	6.1	15	14	9.5	22	17	14	9.5	1.8
1974	Total		3,709	575	1,211	832	705	634	1,159	1,478	621				15,212.5
		16,838.0										1,834	1,870	2,210	
	Mean	46.1	120	20.5	39.1	27.7	22.7	21.1	37.4	47.7	20.7	59.2	62.3	71.3	41.7
	Max.	1,090	1,090	64	191	50	51	40	99	369	102	174	200	352	1,090
	Min.	11	17	12	11	16	15	14	21	18	11	25	20	20	9.5
1975	Total		2,499	437.1	226.2	331.2	602.8	1,771	1,944	1,036	663.0				15,424.3
		13,905.3										1,099	1,351	1,945	
	Mean	38.1	80.6	15.6	7.30	11.0	19.4	59.0	62.7	33.4	22.1	35.5	45.0	62.7	42.3
	Max.	900	900	40	39	95	140	232	246	127	98	133	392	281	900
	Min.	2.0	21	6.3	3.0	2.0	6.9	15	24	11	8.2	16	16	28	2.0

Table 38. Streamflow records for Edeng River, Babelthuap--Continued

D. Monthly and annual discharges in cubic feet per second--Continued

Year		Calendar year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Water year
1976	Total	10,419.5	619	550.9	388.2	2,558.7	353.1	676.6	851	1,493	507.2	728.6	389.2	1,304	12,392.7
	Mean	28.5	20.0	19.0	12.5	85.3	11.4	22.6	27.5	48.2	16.9	23.5	13.0	42.1	33.9
	Max.	1,020	55	95	29	1,020	30	93	92	236	40	93	23	263	1,020
	Min.	4.1	12	9.9	6.6	7.4	5.4	4.1	16	18	9.0	9.6	9.4	15	4.1
1977	Total	9,286.5	1,084	281.9	191.7	145.1	365.6	526.2	1,822	1,852	973	809	677	559	9,663.3
	Mean	25.4	35.0	10.1	6.18	4.84	11.8	17.5	58.8	59.7	32.4	26.1	22.6	18.0	26.5
	Max.	324	177	19	28	13	35	74	324	190	80	70	60	34	324
	Min.	3.2	10	6.1	4.2	3.2	4.2	8.3	15	22	15	18	12	10	3.2
1978	Total	12,772.7	445.3	1,605	457.1	448.9	1,033.4	898	512	2,423	877	2,282	806	985	10,744.7
	Mean	35.0	14.4	57.3	14.7	15.0	33.3	29.9	16.5	78.2	29.2	73.6	26.9	31.8	29.4
	Max.	380	41	350	31	57	126	71	28	380	72	372	71	234	380
	Min.	7.8	8.3	15	8.9	7.8	9.4	16	10	12	16	25	17	11	7.8
1979	Total	12,133.1	349.6	189.3	718.0	2,206.2	666	1,340	1,653	978	1,058	1,299	884	792	13,231.1
	Mean	33.2	11.3	6.76	23.2	73.5	21.5	14.7	53.3	31.5	35.3	41.9	29.5	25.5	36.2
	Max.	1,000	30	10	228	1,000	54	107	185	56	295	162	129	133	1,000
	Min.	4.7	7.0	4.7	6.6	5.8	13	20	21	19	14	18	14	11	4.7
1980	Total	10,981.2	516	1,273	499	699.2	818	769	1,298	1,036	869	1,261	703	1,240	10,752.2
	Mean	30.0	16.6	43.9	16.1	23.3	26.4	25.6	41.9	33.4	29.0	40.7	23.4	40.0	29.4
	Max.	462	38	462	64	89	118	93	145	170	54	194	61	254	462
	Min.	9.6	11	11	10	9.6	13	11	17	16	16	15	14	14	9.6
1981	Total	13,452.1	1,357	1,749	363.2	155.2	416.2	1,802	2,379	1,284	678.5	1,027	745	1,496	13,388.1
	Mean	36.9	43.8	62.5	11.7	5.17	13.4	60.1	76.7	41.4	22.6	33.1	24.8	48.3	36.7
	Max.	513	144	365	28	12	46	206	513	131	107	175	97	334	513
	Min.	3.6	18	17	6.8	3.8	3.6	14	18	12	8.3	14	12	15	3.6
1982	Total	11,096.9	549	877.6	668	611.6	1,283	1,673	1,838	1,206.0	541.5	797.9	337.4	713.9	12,515.7
	Mean	30.4	17.7	31.3	21.5	20.4	41.4	55.8	59.3	38.9	18.1	25.7	11.2	23.0	34.3
	Max.	323	47	136	67	156	323	228	260	264	44	111	41	243	334
	Min.	6.1	10	9.8	11	7.0	12	20	14	9.5	9.2	8.1	6.1	7.3	7.0

Table 39. Streamflow records for Kmekumel River, Babelthuap (16891310)
(Formerly published at Kumekumeyel River, Babelthuap)

Location: Lat $7^{\circ}23'14''$ N., long $134^{\circ}32'42''$ E., on right bank 0.5 mi upstream from confluence with Edeng River and 1.1 mi north of Palau Mission Academy.

Drainage area: 1.44 mi^2.

Period of record: September 1978 to December 1982. Low-flow partial-record station operated "at mouth", 1970-78.

Gage: Water-stage recorder. Altitude of zero of gage is 96.44 ft (from stadia survey).

Remarks: Records good. No diversion above gage.

Extremes for period of record: Maximum discharge, 1,560 ft^3/s Apr. 13, 1978 (gage height, 10.53 ft), from rating curve extended above 106 ft^3/s on basis of slope-area measurement at gage height 10.53 ft; minimum, 0.78 ft^3/s Apr. 27 to May 3, 1981.

A. Discharge measurements, in cubic feet per second, made outside the period of record ending December 1982

Date	Discharge	Date	Discharge
May 17, 1977 ----	2.4	Sept. 19, 1977 --	2.8
May 18, 1977 ----	1.9	Oct. 14, 1977 ---	7.0
May 19, 1977 ----	6.3	Oct. 17, 1977 ---	9.2
May 25, 1977 ----	1.5	Oct. 21, 1977 ---	8.5
May 27, 1977 ----	1.8	Nov. 8, 1977 ----	8.3
May 31, 1977 ----	2.2	Aug. 15, 1978 ---	13
June 6, 1977 ----	2.3	Jan. 12, 1983 ---	3.7
June 13, 1977 ---	4.5	Feb. 24, 1983 ---	.57
June 17, 1977 ---	6.1	Mar. 29, 1983 ---	.35
June 24, 1977 ---	4.3	Apr. 14, 1983 ---	.22
July 1, 1977 ----	8.4	July 3, 1983 ----	5.1
July 11, 1977 ---	10	Aug. 1, 1983 ----	8.4
July 15, 1977 ---	28	Sept. 1, 1983 ---	4.1
Sept. 6, 1977 ---	9.4	Oct. 5, 1983 ----	12

Table 39. Streamflow records for Kmekumel River, Babelthuap--Continued

B. Annual maximum discharge (*) and peak discharges above base (450 ft^3/s)

[Discharge in cubic feet per second, gage height in feet]

Date	Time	Discharge	Gage height
Oct. 7, 1978	2000	a/600	--
Dec. 2, 1978	1000	a/550	--
Dec. 11, 1978	1400	a/600	--
Mar. 2, 1979	0200	468	6.4
Apr. 13, 1979	1200	*1,560	10.53
Sept. 23, 1979	a/0800	a/500	--
Oct. 14, 1979	1430	559	6.87
Feb. 17, 1980	1100	*840	8.15
Aug. 13, 1980	2300	595	7.05
Dec. 31, 1980	0330	*1,020	8.82
Feb. 13, 1981	0200	473	6.43
July 2, 1981	0300	481	6.47
July 28, 1981	0400	799	7.98
Dec. 14, 1981	0230	a/750	--
May 17, 1982	2000	457	6.34
July 12, 1982	0430	473	6.43
Aug. 9, 1982	1600	*772	7.86

a/ About.

C. Annual minimum discharge in cubic feet per second

Water year	Date	Discharge
1979	Feb. 26, 1979	1.1
1980	Mar. 31, Apr. 1, 1980	2.1
1981	Apr. 27 to May 3, 1981	.78
1982	Apr. 13-15, 1982	1.5
1983	Apr. 15-17, 1983	.17

Table 39. Streamflow records for Kmekumel River, Babelthuap--Continued

D. Monthly and annual discharges in cubic feet per second

Year		Calendar year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Water year
1978	Total										289.4				--
		--										673.6	228.0	359.5	
	Mean	--									9.6	21.7	7.6	11.6	--
	Max.	--									22	82	17	86	--
	Min.	--									5.0	6.0	4.1	3.7	--
1979	Total		104.6	47.1	199.6	682.4	177.9	448.3	489.3	254.1	288.9				3,953.3
		3,622.3										364.5	328.8	236.8	
	Mean	9.92	3.37	1.68	6.44	22.7	5.74	14.9	15.8	8.20	9.63	11.8	11.0	7.64	10.8
	Max.	397	9.6	2.8	59	397	24	34	49	20	100	48	51	37	397
	Min.	1.2	1.6	1.2	1.5	1.3	3.0	4.3	5.8	4.1	3.0	4.8	3.7	2.8	1.2
1980	Total		148.1	414.1	125.6	214.1	250.6	282.1	425.7	310.5	307.7				3,408.6
		3,368.9										361.6	166.2	362.6	
	Mean	9.20	4.78	14.3	4.05	7.14	8.08	9.40	13.7	10.0	10.3	11.7	5.54	11.7	9.31
	Max.	163	12	163	20	36	36	40	59	42	36	61	19	86	163
	Min.	2.2	3.2	2.7	2.2	2.2	3.5	2.7	3.9	3.4	3.9	4.1	3.7	3.2	2.2
1981	Total		395.3	466.9	94.3	34.60	98.54	469.9	638.0	308.9	230.6				3,627.44
		3,651.34										341.4	172.6	400.3	
	Mean	10.0	12.8	16.7	3.04	1.15	3.18	15.7	20.6	9.96	7.69	11.0	5.75	12.9	9.94
	Max.	186	48	100	7.2	2.8	15	64	186	29	31	60	26	90	186
	Min.	.78	4.4	4.1	1.6	.78	.78	2.8	4.1	2.7	1.8	3.7	2.4	3.5	.78
1982	Total		149.7	243.4	170.9	167.7	375.7	472.4	536.9	326.3	138.4				3,495.7
		3,076.8										205.4	80.4	209.6	
	Mean	8.43	4.83	8.69	5.51	5.59	12.1	15.7	17.3	10.5	4.61	6.63	2.68	6.76	9.58
	Max.	98	16	50	18	40	87	64	98	62	13	30	10	70	98
	Min.	1.3	2.4	2.2	2.8	1.6	3.2	5.2	3.7	2.7	2.2	1.8	1.3	1.8	1.6

Table 40. Streamflow records for South Fork Ngerdorch River, Babelthuap (16891400)

(Formerly published as South Fork Ngardok River, Babelthuap)

Location: Lat 7°26'19" N., long 134°34'28" E., on right bank 0.3 mi upstream from left-bank tributary, 1.3 mi west of Rrai village, and 1.5 mi upstream from confluence with North Fork Ngerdorch River.

Drainage area: 2.44 mi^2.

Period of record: March 1971 to September 1982.

Gage: Water-stage recorder. Altitude of gage is 25 ft (from topographic map).

Average discharge: 11 years, 19.9 ft^3/s (14,420 acre-ft/yr).

Remarks: Records good. No diversion above station.

Extremes for period of record: Maximum discharge, 5,750 ft^3/s Dec. 13, 1974 (gage height, 9.19 ft), from rating curve extended above 65 ft^3/s on basis of field estimate at gage height 7.57 ft; minimum, 0.55 ft^3/s Mar. 9, 1973.

A. Discharge measurements, in cubic feet per second, made outside the period of record ending September 1982

Date	Discharge
Feb. 25, 1971	7.2
Oct. 22, 1982	5.7
Dec. 16, 1982	9.3
Feb. 14, 1983	1.6
Mar. 25, 1983	1.2
May 5, 1983	1.3
July 5, 1983	17
July 27, 1983	14
Sept. 8, 1983	6.6
Oct. 6, 1983	27

Table 40. Streamflow records for South Fork Ngerdorch River, Babelthuap--Continued

B. Annual maximum discharge (*) and peak discharges above base (800 ft^3/s)

[Discharge in cubic feet per second, gage height in feet]

Date	Time	Discharge	Gage height
July 7, 1971	2130	800	4.04
July 27, 1971	0830	* 958	4.33
May 1, 1972	0200	*3,270	7.10
Aug. 24, 1972	1930	3,140	6.98
Sept. 2, 1972	1400	2,110	5.93
Sept. 29, 1972	0400	1,560	5.24
Dec. 2, 1972	0200	946	4.31
Sept. 30, 1973	1500	*1,460	5.10
Oct. 3, 1973	2330	1,050	4.48
Dec. 23, 1973	0830	*3,040	6.89
Jan. 8, 1974	1100	2,000	5.80
Jan. 16, 1974	1830	2,050	5.86
Jan. 17, 1974	1830	1,510	5.17
Aug. 4, 1974	2000	2,960	6.82
Sept. 24, 1974	2400	1,150	4.65
Oct. 6, 1974	2000	2,100	5.92
Dec. 2, 1974	2200	1,020	4.44
Dec. 13, 1974	1700	*5,750	9.19
Dec. 29, 1974	2200	1,330	4.91
Jan. 22, 1975	1300	3,800	7.57
May 27, 1975	1530	958	4.33
June 14, 1975	0330	1,080	4.53
Dec. 20, 1975	1900	1,130	4.62
Apr. 7, 1976	2300	*2,460	6.32
July 14, 1976	0830	820	4.08
Aug. 1, 1976	1730	2,240	6.08
Dec. 28, 1976	1100	*1,860	5.62
Jan. 8, 1977	1630	952	4.32
July 4, 1977	1130	1,420	5.05
July 8, 1977	1430	1,640	5.35
July 14, 1977	2230	928	4.28
Aug. 3, 1978	0530	* 840	4.13

Table 40. Streamflow records for South Fork Ngerdorch River, Babelthuap--Continued

B. Annual maximum discharge (*) and peak discharges above base (800 ft^3/s)--Continued

Date	Time	Discharge	Gage height
Oct. 7, 1978	2130	1,130	4.62
Mar. 2, 1979	0200	910	4.25
Mar. 4, 1979	0500	1,360	4.95
Apr. 13, 1979	1200	*3,470	7.28
July 1, 1979	1930	810	4.06
Oct. 14, 1979	1500	1,660	5.38
Nov. 9, 1979	1330	982	4.37
Dec. 23, 1979	2000	2,020	5.83
Feb. 17, 1980	1030	*2,160	5.99
July 22, 1980	1030	904	4.24
Aug. 13, 1980	2300	1,320	4.90
Oct. 26, 1980	1900	1,340	4.93
Dec. 13, 1980	2230	1,110	4.58
Jan. 15, 1981	0330	928	4.28
Feb. 11, 1981	2030	1,040	4.47
Feb. 13, 1981	0130	1,320	4.90
July 2, 1981	a/0500	a/ 900	--
July 12, 1981	0700	1,840	5.60
July 28, 1981	0800	*2,160	5.99
Aug. 5, 1981	1700	2,100	5.92
Nov. 9, 1981	1300	1,390	5.00
Nov. 28, 1981	1600	1,280	4.84
Dec. 10, 1981	0630	1,500	5.15
Dec. 14, 1981	0230	*2,610	6.47
May 18, 1982	0230	1,070	4.64
Aug. 9, 1982	1730	1,900	5.73
Aug. 28, 1982	0930	978	4.48
Aug. 29, 1982	0530	835	4.23

a/ About.

Table 40. Streamflow records for South Fork Ngerdorch River, Babelthuap--Continued

C. Annual minimum discharge in cubic feet per second

Water year	Date	Discharge
1971[a]/ ----	Apr. 16-18, 1971	2.4
1972 ------	Dec. 12, 1971, Aug. 16, 1972	[b]/5.2
1973 ------	Mar. 9, 1973	.55
1974 ------	Mar. 3, 1974	4.3
1975 ------	Apr. 15-18, 1975	1.5
1976 ------	June 8, 9, 1976	1.8
1977 ------	Apr. 26-29, 1977	1.0
1978 ------	Apr. 1, 2, 1978	2.6
1979 ------	Feb. 17-19, 24-26, 1979	2.0
1980 ------	June 6-8, 1980	2.6
1981 ------	May 1, 2, 1981	1.2
1982 ------	Apr. 14, 1982	3.0

a/ March to September 1971.

b/ May have been less during Dec. 14-25, 1971.

Table 40. Streamflow records for South Fork Ngerdorch River, Babelthuap--Continued

D. Monthly and annual discharges in cubic feet per second

Year		Calendar year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Water year
1971	Total				336.2	415.5	746	1,301	930.6	382.5	271.6	989.9	545.8	434.1	
	Mean				10.8	13.9	24.1	43.4	30.0	12.3	9.05	31.9	18.2	14.0	
	Max.				55	70	80	150	86	39	26	90	42	80	
	Min.				5.6	2.7	10	19	9.0	7.2	5.1	9.9	7.7	5.7	
1972	Total	7,304.2	480.8	566.6	775	569.1	766.2	713	736.8	602.7	974.0	497.7	229.3	393.0	8,154.0
	Mean	20.0	115.5	19.5	25.0	19.0	24.7	23.8	23.8	19.4	32.5	16.1	7.64	12.7	22.3
	Max.	298	60	47	76	99	298	79	88	96	277	39	18	95	298
	Min.	3.8	7.7	7.7	11	7.2	6.2	11	6.2	5.2	6.2	7.2	3.8	4.3	5.2
1973	Total	5,769.59	98.4	39.85	29.39	200.95	243.3	436.7	622.0	546.9	861	1,189.2	891.9	610.0	4,198.49
	Mean	15.8	3.17	1.42	.95	6.70	7.85	14.6	20.1	17.6	28.7	38.4	29.7	19.7	11.5
	Max.	270	5.7	2.1	2.1	31	15	30	86	61	92	232	142	270	95
	Min.	.70	1.8	.85	.70	.85	3.8	8.4	7.7	5.7	14	7.2	7.2	5.7	.70
1974	Total	9,393.8	1,953.2	315.5	594.2	498.9	596.7	372.6	618	756.2	327.5	973	913	1,475	8,723.9
	Mean	25.7	63.0	11.3	19.2	16.6	19.2	12.4	19.9	24.4	10.9	31.4	30.4	47.6	23.9
	Max.	610	610	35	66	34	62	25	44	123	62	136	94	497	610
	Min.	4.8	9.2	5.7	5.2	7.7	9.9	7.7	11	7.7	4.8	12	10	10	4.8
1975	Total	7,924.4	1,602	212.3	119.7	238.2	308.5	1,104.0	1,078	670.8	282.4	697.8	497.7	1,113	8,976.9
	Mean	21.7	51.7	7.58	3.86	7.94	9.95	36.8	34.8	21.6	9.41	22.5	16.6	35.9	24.6
	Max.	769	769	22	15	80	94	148	127	112	86	97	150	233	769
	Min.	1.5	12	3.6	2.3	1.5	3.6	8.7	12	5.2	3.6	9.9	4.0	14	1.5
1976	Total	6,313.2	367.4	275.2	220.6	1,431.4	184.9	521.1	662.9	1,107.9	264.7	437.8	171.9	667.4	7,344.6
	Mean	17.2	11.9	9.49	7.12	47.7	5.96	17.4	21.4	35.7	8.82	14.1	5.73	21.5	20.1
	Max.	633	44	41	26	633	18	59	120	191	21	42	12	183	633
	Min.	2.0	6.8	4.4	3.6	4.4	2.9	2.0	8.0	8.7	4.8	4.4	3.6	6.2	2.0

Table 40. Streamflow records for South Fork Ngerdorch River, Babelthuap--Continued

D. Monthly and annual discharges in cubic feet per second--Continued

Year		Calendar year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Water year
1977	Total		520.8	120.8	84.7	64.6	215.4	347.9	1,348.1	1,120	545.2				5,644.6
		5,270.0										346.4	291.0	265.1	
	Mean	14.4	16.8	4.31	2.73	2.15	6.95	11.6	43.5	36.1	18.2	11.2	9.70	8.55	15.5
	Max.	180	118	9.6	22	4.8	26	36	164	180	64	39	37	21	183
	Min.	1.2	4.4	2.0	1.5	1.2	1.5	4.4	7.4	13	6.8	6.2	4.4	4.4	1.2
1978	Total		216.2	1,010.8	202.3	225.3	634.0	413.8	237.8	1,137.5	514.0				5,494.2
		7,015.9										1,494	546.9	383.3	
	Mean	19.2	6.97	36.1	6.53	7.51	20.5	13.8	7.67	36.7	17.1	48.2	18.2	12.4	15.1
	Max.	306	25	306	16	32	75	41	15	107	73	277	50	88	306
	Min.	2.9	3.6	7.4	3.2	2.9	4.4	5.7	4.8	4.8	7.4	12	9.9	4.4	2.9
1979	Total		149.3	85.6	379.2	1,642.6	420.6	890	961	473.8	676.5				8,102.8
		7,818.0										1,122.3	472.8	544.3	
	Mean	21.4	4.82	3.06	12.2	54.8	13.6	29.7	31.0	15.3	22.6	36.2	15.8	17.6	22.2
	Max.	923	16	4.8	119	923	40	84	125	30	180	239	94	184	923
	Min.	2.0	2.9	2.0	2.3	2.3	4.0	12	10	7.5	6.0	9.3	5.7	4.0	2.0
1980	Total		272.8	967.2	250.9	534.6	440.0	478.5	797.9	812.3	673.2				7,366.8
		7,061.5										722.1	306.4	805.6	
	Mean	19.3	8.80	33.4	8.09	17.8	14.2	16.0	25.7	26.2	22.4	23.3	10.2	26.0	20.1
	Max.	463	20	463	40	109	70	61	113	140	57	167	23	86	463
	Min.	4.0	5.2	4.8	4.4	4.0	4.4	2.9	9.9	8.7	9.3	5.7	5.7	6.2	2.9
1981	Total		745	1,361.4	180.9	78.3	375.3	1,378	1,566.1	828.7	369.4				8,717.2
		9,116.3										609.3	561.0	1,062.9	
	Mean	25.0	24.0	48.6	5.84	2.61	12.1	45.9	50.5	26.7	12.3	19.7	18.7	34.3	23.9
	Max.	438	139	349	22	7.4	56	134	438	201	81	146	90	290	438
	Min.	1.5	11	7.4	3.2	1.5	1.5	16	9.3	4.4	3.2	7.4	6.8	8.0	1.5
1982	Total		295.7	451.9	301.0	270.6	743.9	939.0	888.6	741.0	249.2				7,114.1
	Mean		9.54	16.1	9.71	9.02	24.0	31.3	28.7	23.9	8.31				19.5
	Max.		26	79	40	76	232	190	138	189	25				290
	Min.		4.5	4.0	4.7	3.2	4.7	9.0	6.1	4.4	3.5				3.2

Low-flow partial-record stations

Table 41. Discharge measurements, in cubic feet per second, at Ngechutrong River, Babelthuap (16890620)

Location: Lat 7°36'11" N., long 134°34'50" E., at trail crossing 300 ft upstream from Diongradid River and 0.7 mi southeast of Ngetbong village school. Altitude is 15 ft (from topographic map).

Drainage area: 0.25 mi^2.

Period of record: 1974-82 (water years).

Table 41. Discharge measurements, in cubic feet per second, on Ngechutrong River, Babelthuap--Continued

Date	Discharge	Date	Discharge
Aug. 1, 1974	1.8	Feb. 27, 1978	2.1
Aug. 28, 1974	1.9	Apr. 25, 1978	.67
Sept. 26, 1974	5.8	June 27, 1978	1.3
Nov. 7, 1974	3.9	Sept. 20, 1978	2.8
Jan. 7, 1975	2.4	Oct. 26, 1978	1.4
Feb. 18, 1975	.94	Jan. 9, 1979	.70
Mar. 7, 1975	.62	Feb. 20, 1979	.46
Mar. 30, 1975	.56	Mar. 20, 1979	1.1
Apr. 29, 1975	1.4	Apr. 11, 1979	3.4
May 21, 1975	2.9	May 2, 1979	1.4
June 12, 1975	2.6	June 11, 1979	2.2
July 14, 1975	2.0	Aug. 9, 1979	1.6
Aug. 12, 1975	2.3	Sept. 10, 1979	1.1
Sept. 16, 1975	1.3	Oct. 5, 1979	3.4
Oct. 2, 1975	3.3	Dec. 4, 1979	.73
Nov. 6, 1975	2.0	Jan. 10, 1980	1.3
Dec. 12, 1975	1.9	Mar. 20, 1980	.83
Jan. 8, 1976	2.0	Apr. 28, 1980	1.1
Jan. 31, 1976	.93	June 5, 1980	.62
Feb. 24, 1976	.72	Aug. 25, 1980	1.2
Mar. 23, 1976	.50	Sept. 25, 1980	2.8
Apr. 14, 1976	2.0	Oct. 9, 1980	2.1
June 2, 1976	3.9	Nov. 7, 1980	1.4
June 30, 1976	.52	Jan. 15, 1981	4.3
Aug. 10, 1976	2.2	Feb. 5, 1981	2.3
Sept. 1, 1976	.90	May 13, 1981	.32
Nov. 10, 1976	.41	July 8, 1981	2.3
Jan. 12, 1977	1.7	Aug. 20, 1981	1.0
Feb. 16, 1977	.56	Oct. 14, 1981	1.3
Mar. 17, 1977	.37	Nov. 13, 1981	.94
Apr. 19, 1977	.26	Dec. 15, 1981	3.3
July 29, 1977	5.7	Jan. 27, 1982	1.2
Sept. 14, 1977	2.0	Apr. 21, 1982	.70
Oct. 18, 1977	2.5	June 14, 1982	1.3
Nov. 25, 1977	.71	July 16, 1982	2.2
Jan. 12, 1978	.78	Sept. 23, 1982	.76

Table 42. Discharge measurements, in cubic feet per second, at Ngerchetang River, Babelthuap (16890650)
(Formerly published as Galkatan River, Babelthuap)

Location: Lat 7°35'48" N., long 134°34'13" E., 0.7 mi south of Ngetbong village school and 0.9 mi upstream from Diongradid River. Altitude is 10 ft (from topographic map).

Drainage area: 1.51 mi^2.

Period of record: 1974-77, 1980-82 (water years).

Date	Discharge	Date	Discharge
Aug. 1, 1974	12	Mar. 30, 1977	1.0
Aug. 31, 1974	7.8	June 9, 1977	2.8
Sept. 26, 1974	8.6	Sept. 30, 1977	15
Jan. 7, 1975	12	Jan. 29, 1980	67
Feb. 18, 1975	7.2	Feb. 29, 1980	11
Mar. 7, 1975	3.0	Apr. 2, 1980	10
Mar. 30, 1975	5.2	May 7, 1980	11
Apr. 29, 1975	7.1	June 17, 1980	8.6
May 22, 1975	9.8	July 22, 1980	62
July 20, 1975	11	Sept. 25, 1980	27
Aug. 27, 1975	11	Oct. 15, 1980	8.0
Sept. 19, 1975	6.3	Nov. 18, 1980	6.2
Oct. 2, 1975	12	June 3, 1981	4.8
Nov. 11, 1975	10	July 8, 1981	14
Jan. 8, 1976	9.3	Oct. 14, 1981	10
Jan. 31, 1976	5.4	Nov. 24, 1981	8.0
Feb. 24, 1976	4.1	Jan. 12, 1982	10
Mar. 25, 1976	1.6		
June 2, 1975	4.1		
Aug. 10, 1976	12		
Sept. 1, 1976	6.3		

Table 43. Discharge measurements, in cubic feet per second, at Ngermeskang River, Babelthuap (16890700)
(Formerly published as Almiokan River, Babelthuap)

Location: Lat 7°31'16" N., long 134°33'16" E., 0.5 mi upstream from unnamed left-bank tributary, 2.0 mi east of Imeong village, and 5.8 mi upstream from mouth. Altitude is 10 ft (from topographic map).

Drainage area: 7.14 mi^2.

Period of record: 1973-82 (water years).

Date	Discharge	Date	Discharge
Feb. 28, 1973	4.7	Aug. 19, 1977	75
Mar. 17, 1973	3.4	Sept. 30, 1977	41
Apr. 21, 1973	16	Nov. 15, 1977	28
May 11, 1973	22	Dec. 22, 1977	18
June 1, 1973	43	Jan. 26, 1978	12
June 23, 1973	56	May 3, 1978	23
July 16, 1973	57	Oct. 16, 1978	67
Aug. 11, 1973	45	Nov. 16, 1978	25
Sept. 5, 1973	128	Jan. 19, 1979	13
Oct. 17, 1973	64	Mar. 2, 1979	63
Nov. 7, 1973	24	Mar. 30, 1979	14
Dec. 17, 1973	22	July 26, 1979	104
Mar. 2, 1974	23	Aug. 23, 1979	57
Apr. 12, 1974	37	Sept. 18, 1979	27
May 9, 1974	37	Oct. 8, 1979	72
June 14, 1974	29	Jan. 4, 1980	38
Aug. 14, 1974	63	Jan. 17, 1980	32
Sept. 28, 1974	25	Jan. 25, 1980	23
Nov. 23, 1974	88	Feb. 28, 1980	46
Feb. 10, 1975	26	Apr. 1, 1980	17
Mar. 8, 1975	11	May 6, 1980	83
Apr. 2, 1975	14	July 21, 1980	31
June 19, 1975	102	Oct. 16, 1980	28
July 19, 1975	27	Nov. 17, 1980	25
Sept. 17, 1975	22	Dec. 20, 1980	106
Jan. 13, 1976	62	Feb. 18, 1981	68
Aug. 12, 1976	64	July 11, 1981	52
Sept. 21, 1976	27	Aug. 28, 1981	44
Oct. 14, 1976	34	Oct. 15, 1981	69
Nov. 19, 1976	20	Nov. 19, 1981	25
Jan. 18, 1977	31	Jan. 11, 1982	19
Mar. 1, 1977	11	Feb. 4, 1982	10
Mar. 23, 1977	8.3	Apr. 8, 1982	8.9
Apr. 29, 1977	4.3	Aug. 11, 1982	15
June 2, 1977	30		

Table 44. Discharge measurements, in cubic feet per second, at Ngetpang River, Babelthuap (16890800)

(Formerly published as Ngatpang River, Babelthuap)

Location: Lat 7°27'45" N., long 134°31'38" E., 0.2 mi upstream from unnamed right-bank tributary, 1.1 mi east of forestry station, and 2.5 mi upstream from mouth. Altitude is 15 ft (from topographic map).

Drainage area: 0.34 mi^2.

Period of record: 1973-82 (water years).

Date	Discharge	Date	Discharge
Mar. 17, 1973	0.09	Sept. 20, 1977	0.67
Apr. 21, 1973	.98	Nov. 15, 1977	1.7
May 11, 1973	.74	Dec. 22, 1977	.66
June 1, 1973	5.9	Jan. 26, 1978	.40
June 23, 1973	1.5	May 3, 1978	.45
July 16, 1973	1.2	Oct. 16, 1978	1.8
Aug. 11, 1973	1.3	Nov. 16, 1978	1.3
Sept. 5, 1973	5.3	Mar. 2, 1979	1.2
Oct. 17, 1973	1.9	Mar. 30, 1979	.42
Nov. 7, 1973	1.3	July 26, 1979	2.6
Dec. 17, 1973	.63	Sept. 7, 1979	1.1
Jan. 26, 1974	1.6	Oct. 4, 1979	3.8
Mar. 2, 1974	.66	Jan. 15, 1980	.62
Apr. 12, 1974	1.5	Jan. 24, 1980	1.2
May 9, 1974	1.1	Feb. 21, 1980	2.2
June 15, 1974	1.3	Mar. 18, 1980	.49
Aug. 14, 1974	2.2	Apr. 25, 1980	2.8
Sept. 28, 1974	24	June 3, 1980	.76
Nov. 23, 1974	2.1	July 2, 1980	6.4
Feb. 10, 1975	1.0	Aug. 29, 1980	7.0
Mar. 8, 1975	.45	Oct. 10, 1980	1.6
Apr. 2, 1975	.67	Nov. 10, 1980	2.0
June 19, 1975	5.4	Feb. 26, 1981	1.4
July 19, 1975	1.6	May 7, 1981	.50
Sept. 17, 1975	.87	July 6, 1981	7.4
Jan. 12, 1976	1.8	Sept. 10, 1981	1.0
July 15, 1976	2.9	Oct. 15, 1981	2.2
Aug. 12, 1976	6.5	Nov. 12, 1981	1.4
Sept. 21, 1976	.79	Jan. 26, 1982	.95
Oct. 14, 1976	.49	Apr. 8, 1982	.58
Nov. 19, 1976	1.1	June 10, 1982	2.3
Jan. 18, 1977	.96	July 15, 1982	3.1
Mar. 1, 1977	.20	Aug. 24, 1982	.85
Mar. 23, 1977	.38	Sept. 21, 1982	.48
June 2, 1977	.98		

Table 45. Discharge measurements, in cubic feet per second, at Kmekumel River at mouth, Babelthuap (16891320)
(Formerly published as Kumekumeyel River at mouth, Babelthuap)

Location: Lat 7°23'04" N., long 134°33'01" E., 100 ft upstream from confluence with Edeng River and 0.8 mi north of Palau Mission Academy. Altitude is 5 ft (from topographic map).

Drainage area: 1.59 mi^2.

Period of record: 1970-78, 1980 (water years).

Date	Discharge	Date	Discharge
Apr. 15, 1970	1.6	Apr. 20, 1973	16
Apr. 29, 1970	1.8	May 15, 1973	3.4
May 18, 1970	1.5	June 7, 1973	6.9
June 10, 1970	3.4	June 29, 1973	7.2
July 1, 1970	9.3	July 27, 1973	7.2
July 23, 1970	8.8	Sept. 15, 1973	7.7
Aug. 19, 1970	12	Oct. 10, 1973	15
Sept. 8, 1970	7.6	Oct. 31, 1973	6.7
Oct. 21, 1970	13	May 3, 1974	6.8
Nov. 7, 1970	9.4	June 19, 1974	4.1
Jan. 6, 1971	6.2	Sept. 24, 1974	5.0
Jan. 26, 1971	5.0	Nov. 29, 1974	6.4
Mar. 1, 1971	4.6	Mar. 13, 1975	2.4
Mar. 22, 1971	5.0	Apr. 17, 1975	2.4
Apr. 13, 1971	2.5	May 15, 1975	4.8
Aug. 4, 1971	6.0	July 24, 1975	8.9
Sept. 10, 1971	2.8	Aug. 8, 1975	11
Sept. 23, 1971	2.0	Oct. 21, 1975	9.7
Dec. 11, 1971	4.0	Nov. 17, 1975	6.5
Apr. 5, 1972	9.3	Mar. 19, 1976	2.5
Apr. 27, 1972	5.2	May 20, 1976	4.7
May 22, 1972	8.0	July 29, 1976	5.4
June 19, 1972	5.7	Aug. 24, 1976	8.9
July 21, 1972	6.0	Sept. 29, 1976	3.8
Sept. 25, 1972	4.5	Oct. 29, 1976	5.9
Oct. 19, 1972	7.9	Mar. 9, 1977	2.2
Nov. 10, 1972	4.1	Apr. 14, 1977	1.7
Dec. 8, 1972	5.7	June 10, 1977	7.0
Dec. 26, 1972	2.7	Jan. 11, 1978	5.1
Jan. 23, 1973	1.4	Feb. 9, 1978	11
Feb. 13, 1973	.97	June 20, 1978	8.4
Mar. 8, 1973	.52	Jan. 22, 1980	4.9
Mar. 28, 1973	.55		

Table 46. Discharge measurements, in cubic feet per second, at North Fork Ngerdorch River, Babelthuap (16891430)
(Formerly published as North Fork Ngerdorch River, Babelthuap)

Location: Lat 7°27'51" N., long 134°35'12" E., 500 ft upstream from right-bank tributary, 1.4 mi upstream from confluence with South Fork Ngerdorch River, and 1.5 mi west of Ngchesar village. Altitude is 13 ft (from topographic map).

Drainage area: 9.70 mi^2.

Period of record: 1975-83 (water years).

Date	Discharge	Date	Discharge
Aug. 19, 1975	87	Jan. 3, 1980	56
Jan. 15, 1976	53	Jan. 23, 1980	24
July 19, 1976	67	Feb. 27, 1980	55
Aug. 11, 1976	114	Mar. 27, 1980	19
Sept. 17, 1976	24	June 13, 1980	76
Nov. 23, 1976	17	July 18, 1980	37
Jan. 20, 1977	35	Sept. 24, 1980	60
Feb. 24, 1977	13	Oct. 8, 1980	51
Mar. 24, 1977	9.4	Nov. 13, 1980	33
Apr. 27, 1977	4.7	Jan. 13, 1981	69
June 7, 1977	34	Feb. 10, 1981	67
Sept. 29, 1977	65	Mar. 18, 1981	15
Nov. 11, 1977	69	May 22, 1981	25
Dec. 21, 1977	31	Aug. 17, 1981	49
Jan. 30, 1978	17	Sept. 16, 1981	38
Nov. 17, 1978	74	Oct. 9, 1981	75
Jan. 17, 1979	19	Nov. 16, 1981	35
Feb. 23, 1979	9.7	Feb. 2, 1982	15
Mar. 29, 1979	14	Apr. 9, 1982	17
Apr. 23, 1979	52	Aug. 12, 1982	21
Aug. 22, 1979	87	Sept. 22, 1982	15
Oct. 7, 1979	114	July 5, 1983	79

Table 47. Discharge measurements, in cubic feet per second, at North Fork Ngerdorch River tributary, Babelthuap (16891440)
(Formerly published as North Fork Ngardok River tributary, Babelthuap)

Location: Lat 7°27'51" N., long 134°35'10" E., 50 ft upstream from North Fork Ngerdorch River and 1.5 mi west of Ngchesar village. Altitude is 12 ft (from topographic map).

Drainage area: 1.78 mi^2.

Period of record: 1975-83 (water years).

Date	Discharge	Date	Discharge
Aug. 19, 1975	15	Jan. 3, 1980	7.2
Jan. 15, 1976	8.5	Jan. 18, 1980	16
July 19, 1976	5.0	Jan. 23, 1980	5.1
Aug. 11, 1976	14	Feb. 27, 1980	9.2
Sept. 17, 1976	2.7	Mar. 27, 1980	4.2
Nov. 23, 1976	2.4	June 16, 1980	8.9
Jan. 20, 1977	6.0	July 18, 1980	8.6
Feb. 24, 1977	3.0	Sept. 24, 1980	14
Mar. 24, 1977	2.0	Oct. 8, 1980	11
Apr. 27, 1977	1.5	Nov. 13, 1980	6.7
June 7, 1977	4.0	Jan. 13, 1981	14
Sept. 29, 1977	7.4	Feb. 10, 1981	11
Nov. 11, 1977	8.5	Mar. 18, 1981	3.4
Dec. 21, 1977	4.8	May 22, 1981	4.7
Jan. 30, 1978	4.2	Sept. 16, 1981	7.3
Nov. 17, 1978	14	Oct. 9, 1981	15
Jan. 17, 1979	4.3	Nov. 16, 1981	7.9
Feb. 23, 1979	2.3	Feb. 2, 1982	3.9
Mar. 29, 1979	2.6	Apr. 9, 1982	3.7
Apr. 23, 1979	4.0	Aug. 12, 1982	4.9
Aug. 22, 1979	10	July 5, 1983	12
Oct. 7, 1979	10		

Table 48. Discharge measurements, in cubic feet per second, at Lmetmellasch River, Babelthuap (16891500)
(Formerly published as Geligal Marsh outlet, Babelthuap)

Location: Lat 7°36'12" N., long 134°37'36" E., 0.5 mi upstream from mouth and 1.1 mi northwest of Ngkeklau Community Center. Altitude is 100 ft (from topographic map).

Drainage area: 0.32 mi^2.

Period of record: 1971-75, 1977, 1980-82 (water years).

Date	Discharge	Date	Discharge
Sept. 15, 1971	1.1	Apr. 5, 1977	0.16
Nov. 8, 1971	3.4	June 8, 1977	.16
May 4, 1972	1.5	Mar. 6, 1980	1.1
Dec. 5, 1972	2.0	Apr. 8, 1980	.58
Feb. 7, 1973	.26	June 19, 1980	.90
Mar. 1, 1973	.17	July 25, 1980	1.6
Apr. 3, 1973	.13	Oct. 14, 1980	1.0
May 2, 1973	.17	Nov. 21, 1980	.73
June 5, 1973	.70	June 4, 1981	.42
Sept. 30, 1974	.43	July 9, 1981	2.4
Mar. 18, 1975	.48	Nov. 25, 1981	1.3
Apr. 4, 1975	.27		

Table 49. Discharge measurements, in cubic feet per second, at unnamed west coast stream, Ngerekebesang (16891700)
(Formerly published as unnamed west coast stream, Arakabesan)

Location: Lat 7°21'17" N., long 134°26'32" E., 50 ft downstream from reservoir, 200 ft upstream from mouth, and 0.25 mi northwest of Ngerekebesang Village Community Center. Altitude is 10 ft (from topographic map).

Drainage area: 0.02 mi^2.

Period of record: 1970-79, 1982 (water years).

Date	Discharge	Date	Discharge
Apr. 15, 1970	0.01	Oct. 23, 1973	0.08
Oct. 26, 1970	.07	Nov. 8, 1973	.08
Nov. 13, 1970	.10	Dec. 19, 1973	.16
Dec. 4, 1970	.09	Jan. 23, 1974	.29
Dec. 21, 1970	.10	Feb. 26, 1974	.06
Jan. 7, 1971	.09	Apr. 11, 1974	.06
Jan. 28, 1971	.08	May 7, 1974	.06
Mar. 3, 1971	.05	May 29, 1974	.06
Mar. 27, 1971	.06	June 28, 1974	.07
Apr. 12, 1971	.04	July 17, 1974	.11
May 4, 1971	.05	Aug. 2, 1974	.09
June 22, 1971	.18	Oct. 1, 1974	.03
July 13, 1971	.32	Oct. 31, 1974	.13
Aug. 12, 1971	.05	Jan. 28, 1975	.12
Sept. 9, 1971	.04	Mar. 12, 1975	.48
Sept. 30, 1971	.09	Apr. 18, 1975	.05
Oct. 18, 1971	.22	May 29, 1975	.11
Oct. 27, 1971	.17	July 1, 1975	.20
Nov. 18, 1971	.12	July 23, 1975	.14
Jan. 31, 1972	.08	Aug. 26, 1975	.09
Mar. 17, 1972	.22	Oct. 8, 1975	.20
Apr. 6, 1972	.13	Nov. 28, 1975	.08
May 3, 1972	.09	Dec. 29, 1975	.11
May 30, 1972	.11	Feb. 6, 1976	.04
June 29, 1972	.29	Mar. 10, 1976	.03
Aug. 1, 1972	.08	June 4, 1976	.02
Aug. 24, 1972	.17	July 20, 1976	.01
Oct. 4, 1972	.09	Aug. 18, 1976	.03
Oct. 25, 1972	.08	Sept. 15, 1976	.04
Nov. 28, 1972	.10	Jan. 25, 1977	.03
Dec. 11, 1972	.07	Feb. 23, 1977	.05
Jan. 3, 1973	.06	Apr. 6, 1977	.01
Feb. 5, 1973	.01	May 20, 1977	.01
Mar. 2, 1973	.02	June 14, 1977	.01
Mar. 14, 1973	.02	Aug. 17, 1977	.12
Apr. 4, 1973	.01	Oct. 4, 1977	.12

Table 49. Discharge measurements, in cubic feet per second, at unnamed west coast stream, Ngerekebesang (16891700)--Continued

Date	Discharge	Date	Discharge
May 7, 1973	0.03	Nov. 17, 1977	0.02
May 29, 1973	.05	Jan. 6, 1978	.01
June 21, 1973	.04	Feb. 10, 1978	.02
July 13, 1973	.06	May 11, 1978	.06
Aug. 10, 1973	.05	Sept. 28, 1978	.09
Aug. 30, 1973	.05	Dec. 15, 1978	.14
Oct. 3, 1973	.29	Sept. 24, 1982	.03

Table 50. Discharge measurements, in cubic feet per second, at unnamed south coast stream, Ngerekebesang
(Formerly published as unnamed south coast stream, Arakabesan)

Location: Lat 7°20'42" N., long 134°26'54" E., at Echang village, 200 ft upstream from mouth and 0.5 mi southeast of Ngerekebesang Village Community Center. Altitude is 25 ft (from topographic map).

Drainage area: 0.02 mi^2.

Period of record: 1970-79, 1981-82 (water years).

Date	Discharge	Date	Discharge
Apr. 15, 1970	0.02	Aug. 10, 1973	0.06
May 5, 1970	.02	Aug. 30, 1973	.05
May 14, 1970	.04	Sept. 28, 1973	.11
June 9, 1970	.04	Oct. 23, 1973	.12
June 29, 1970	.09	Nov. 8, 1973	.10
July 24, 1970	.08	Dec. 19, 1973	.11
Aug. 20, 1970	.10	Jan. 27, 1974	.26
Sept. 10, 1970	.10	Feb. 27, 1974	.06
Sept. 30, 1970	.12	Apr. 11, 1974	.13
Oct. 22, 1970	.13	May 7, 1974	.07
Nov. 13, 1970	.09	May 29, 1974	.08
Dec. 4, 1970	.11	June 28, 1974	.09
Dec. 21, 1970	.12	July 17, 1974	.12
Jan. 7, 1971	.11	Aug. 2, 1974	.17
Jan. 28, 1971	.09	Sept. 5, 1974	.05
Mar. 3, 1971	.07	Oct. 1, 1974	.04
Mar. 26, 1971	.07	Oct. 31, 1974	.16

Table 50. Discharge measurements, in cubic feet per second, on unnamed south coast stream, Ngerekebesang--Continued

Date	Discharge	Date	Discharge
Apr. 12, 1971	0.05	Jan. 28, 1975	0.18
May 4, 1971	.05	Apr. 18, 1975	.02
June 22, 1971	.18	May 29, 1975	.05
July 13, 1971	.31	July 1, 1975	.13
Aug. 12, 1971	.06	July 23, 1975	.12
Sept. 9, 1971	.07	Aug. 26, 1975	.06
Sept. 30, 1971	.12	Oct. 8, 1975	.18
Oct. 18, 1971	.19	Nov. 28, 1975	.05
Oct. 27, 1971	.17	Dec. 29, 1975	.15
Nov. 18, 1971	.14	Feb. 4, 1976	.09
Jan. 31, 1972	.08	Mar. 10, 1976	.06
Mar. 17, 1972	.18	June 4, 1976	.03
Apr. 6, 1972	.11	July 20, 1976	.03
May 3, 1972	.07	Aug. 18, 1976	.06
May 30, 1972	.11	Sept. 15, 1976	.08
June 29, 1972	.29	Jan. 11, 1977	.05
Aug. 1, 1972	.06	Feb. 23, 1977	.03
Aug. 29, 1972	.09	Apr. 6, 1977	.02
Oct. 4, 1972	.07	May 20, 1977	.01
Oct. 25, 1972	.09	June 14, 1977	.01
Nov. 28, 1972	.08	Aug. 17, 1977	.15
Dec. 11, 1972	.09	Oct. 4, 1977	.15
Jan. 3, 1973	.08	Nov. 17, 1977	.04
Feb. 5, 1973	.03	Jan. 6, 1978	.02
Mar. 2, 1973	.02	Feb. 10, 1978	.07
Mar. 14, 1973	.02	May 11, 1978	.04
Apr. 4, 1973	.03	Sept. 28, 1978	.05
May 7, 1973	.03	Dec. 15, 1978	.13
May 29, 1973	.08	June 12, 1981	.16
July 21, 1973	.06	Sept. 24, 1982	.02
Mar. 12, 1975	.03		

Table 51. Discharge measurements, in cubic feet per second, at unnamed west coast stream, Malakal (16891770)

Location: Lat 7°19'48" N., long 134°26'49" E., 200 ft upstream from mouth and 1.5 mi northwest of Kaltiookal Peak. Altitude is 80 ft (from topographic map).

Drainage area: 0.01 mi^2.

Period of record: 1971-78 (water years).

Date	Discharge	Date	Discharge
Oct. 8, 1970	0.01	Sept. 6, 1973	0.02
Oct. 27, 1970	.02	Oct. 3, 1973	.18
Nov. 12, 1970	.01	Oct. 26, 1973	.03
Dec. 7, 1970	.01	Nov. 15, 1973	.04
Dec. 23, 1970	.02	Mar. 2, 1974	.01
Jan. 11, 1971	.06	Mar. 5, 1974	.02
Jan. 29, 1971	.02	Apr. 9, 1974	.01
Feb. 19, 1971	.02	May 8, 1974	.02
Mar. 27, 1971	.01	July 19, 1974	.04
May 10, 1971	.03	Aug. 2, 1974	.01
June 28, 1971	.02	Oct. 1, 1974	.01
July 14, 1971	.04	Oct. 31, 1974	.02
Sept. 28, 1971	.03	Jan. 28, 1975	.02
Oct. 15, 1971	.01	May 29, 1975	.02
Oct. 28, 1971	.03	July 7, 1975	.03
Nov. 19, 1971	.02	July 23, 1975	.01
Jan. 31, 1972	.01	Aug. 26, 1975	.004
Mar. 16, 1972	.06	Oct. 8, 1975	.01
Apr. 7, 1972	.01	Nov. 28, 1975	.004
June 29, 1972	.03	Dec. 29, 1975	.02
Aug. 2, 1972	.01	Feb. 6, 1975	.002
Aug. 30, 1972	.06	June 4, 1975	e/.01
Oct. 5, 1972	.01	Aug. 17, 1975	.01
Oct. 26, 1972	.004	Sept. 16, 1976	.004
Nov. 30, 1972	.004	Apr. 6, 1977	0
Dec. 12, 1972	.01	May 20, 1977	0
Jan. 3, 1973	0	Aug. 17, 1977	.03
Mar. 14, 1973	0	Oct. 4, 1977	.04
Apr. 4, 1973	0	Nov. 18, 1977	e/.01
June 21, 1973	.01	Jan. 6, 1978	e/.01
July 13, 1973	.02	Feb. 17, 1978	.04
Aug. 16, 1973	.01	Sept. 29, 1978	.01

e/ Estimated.

Table 52. Discharge measurements, in cubic feet per second, at unnamed north coast stream, Malakal (16891780)

Location: Lat 7°19'53" N., long 134°27'01" E., 5 ft upstream from steep concrete channel and 0.2 mi northeast of Kaltiookal Peak. Altitude is 50 ft (from topographic map).

Drainage area: 0.02 mi^2.

Period of record: 1971-80 (water years).

Date	Discharge	Date	Discharge
Oct. 6, 1970	0.02	Mar. 5, 1974	0.02
Oct. 27, 1970	.02	Apr. 9, 1974	.02
Nov. 12, 1970	.01	May 8, 1974	.01
Dec. 7, 1970	.02	May 31, 1974	.01
Dec. 23, 1970	.02	June 28, 1974	.01
Jan. 11, 1971	.14	July 19, 1974	.07
Jan. 29, 1971	.02	Aug. 2, 1974	.02
Feb. 19, 1971	.04	Sept. 5, 1974	.02
Mar. 25, 1971	.02	Oct. 1, 1974	.02
Apr. 14, 1971	.01	Oct. 31, 1974	.04
May 10, 1971	.08	Jan. 28, 1975	.04
June 28, 1971	.04	Mar. 13, 1975	.01
July 14, 1971	.08	May 29, 1975	.04
Sept. 28, 1971	.04	July 7, 1975	.09
Oct. 15, 1971	.05	July 23, 1975	.03
Oct. 28, 1971	.05	Aug. 26, 1975	.007
Nov. 19, 1971	.02	Oct. 8, 1975	.05
Jan. 31, 1972	.01	Nov. 28, 1975	.02
Mar. 16, 1972	.06	Dec. 29, 1975	.03
Apr. 7, 1972	.02	Feb. 6, 1976	.01
May 31, 1972	.01	Mar. 10, 1976	.01
June 29, 1972	.06	June 4, 1976	e/.01
Aug. 2, 1972	.01	July 22, 1976	.01
Aug. 30, 1972	.09	Aug. 17, 1976	.08
Oct. 5, 1972	.02	Sept. 16, 1976	.02
Oct. 26, 1972	.01	Jan. 25, 1977	.02
Nov. 30, 1972	.01	Feb. 23, 1977	.05
Dec. 12, 1972	.01	Apr. 6, 1977	0
Jan. 3, 1973	0	May 20, 1977	0
Feb. 27, 1973	0	Aug. 17, 1977	.05
Mar. 14, 1973	0	Oct. 4, 1977	.02
Apr. 4, 1973	0	Nov. 18, 1977	e/.01
June 21, 1973	.01	Jan. 6, 1978	.01
July 13, 1973	.02	Feb. 17, 1978	.06
Aug. 16, 1973	.01	May 12, 1978	.03
Sept. 6, 1973	.03	Sept. 29, 1978	.04
Oct. 3, 1973	.13	Dec. 15, 1978	.02
Oct. 26, 1973	.03	Jan. 21, 1980	.02
Nov. 15, 1973	.06		

e/ Estimated.

Table 53. Chemical analyses of water from Koror treatment plant and from Page Communication well

[Source of data: Austin, Smith and Associates, 1967. Unit concentrations are not given, presumed reported in parts per million. °C, degrees Celsius; µmho, micromho per centimeter at 25°C]

Sample source Date collected	Koror treatment plant 4-28-67	Page Communication well, Ngerekebesang 4-28-67
Temperature (°C)	25.5	25.5
pH	7.14	6.41
Conductivity (µmho)	132	319
Chlorine (Cl_2)	0	0
Phenol-alkalinity ($CaCO_3$)	0	0
Methol-alkalinity ($CaCO_3$)	62	130
Calcium hardness	37	119
Fluoride (F)	0	.025
Total solids	108	206
Total dissolved solids	100	203
Chloride (Cl)	4	10
Total hardness	49	156
Iron (Fe)	1.57	.02
Calcium (Ca)	14.8	47.6
Magnesium (Mg)	2.88	8.88
Nitrate (NO_3)	.192	.72
Sulfate (SO_4)	.08	.75
Bicarbonate (HCO_3)	69.24	158.6
Silica (SiO_2)	11.29	.9

Table 54. Chemical analysis of water from Elodesachel Spring, Koror

[Source of data: U.S. Army Chief of Engineers, 1956. Sample taken April 18, 1949. Analyzed by Pacific Islands Engineers Laboratory]

Constituents	Parts per million	Additional determinations	Parts per million
Silica as SiO_2	13.4	Alkalinity:	
Iron as Fe	.3	Phenolphthalein	0
Aluminum as Al	0	Methyl orange	75
Calcium as Ca	20.6	Calcium, as $CaCO_3$	51.5
Magnesium as Mg	3.0	Magnesium, as $MgCO_3$	12.3
Chloride as Cl	9	Total hardness	63.8
Sulfate as SO_4	6	Free chlorine	0
Bicarbonate as HCO_3	91.5	Free CO_2	8
Phosphate as PO_4	0	Total dissolved solids	144
Combined metallic oxides as R_2O_3	6.2	pH	1/

1/ pH reported as 7.4.

For analyses of water samples collected June 12, 1981 and September 24, 1982 by the U.S. Geological Survey, see table 65.

Parts per million is numerically equivalent to milligrams per liter.

Table 55. Chemical analyses of water from Diongradid (Adeiddo) River, Babelthuap

[U.S. Geological Survey]

Constituents		4-11-79	1-29-80	9-25-80	7-8-81	9-23-82
Time		1100	1155	1430	1026	1200
Discharge, instantaneous	ft^3/s	17	350	44	42	9.8
Specific conductance	µmho	57	24	38	45	54
pH	--	7.1	7.1	6.8	7.6	7.1
Temperature, water	°C	25.0	25.5	26.0	25.3	25.0
Turbidity	NTU	--	--	4.6	--	--
Oxygen, dissolved	mg/L	8.0	--	7.6	8.0	--
Hardness as $CaCO_3$	mg/L	19	9	16	16	22
Noncarbonate hardness	mg/L	6	1	4	1	0
Calcium, dissolved (Ca)	mg/L	3.7	2.0	4.0	3.2	4.5
Magnesium, dissolved (Mg)	mg/L	2.4	1.0	1.5	2.0	2.6
Sodium, dissolved (Na)	mg/L	3.3	2.1	2.3	3.5	3.4
Percent sodium	percent	27	33	23	31	25
Sodium adsorption ratio	--	.3	.3	.2	.4	.4
Potassium, dissolved (K)	mg/L	.3	.3	.3	.3	.2
Alkalinity, total as $CaCO_3$	mg/L	13	8	12	15	28
Sulfate, dissolved (SO_4)	mg/L	1.3	1.1	.6	< 1.0	< 5
Chloride, dissolved (Cl)	mg/L	4.6	2.9	3.9	4.6	4.3
Fluoride, dissolved (F)	mg/L	.1	0	0	0	< .1
Silica, dissolved (SiO_2)	mg/L	17	6.8	9.6	15	17
Solids, dissolved, sum of constituents	mg/L	41	22	29	39	--
Solids, dissolved, ton per acre foot	ton/ac-ft	.06	.03	.04	--	--
Nitrite plus nitrate, dissolved as N	mg/L	.04	.12	.01	.06	< .1
Iron, dissolved (Fe)	µg/L	50	90	100	140	120
Manganese, dissolved (Mn)	µg/L	5	9	10	5	6

Table 56. Chemical analyses of water from Ngechutrong and Ngerchetang Rivers, Babelthuap

[U.S. Geological Survey]

Constituents		Ngechutrong River				Ngerchetang (Galkatan) River		
Time		1-29-80 1230	9-25-80 1530	7-8-81 1241	9-23-82 1230	1-29-80 1025	9-25-80 1000	7-8-81 1436
Discharge, instantaneous	ft^3/s	10	2.9	2.3	.76	65	27	14
Specific conductance	µmho	21	32	30	30	26	35	42
pH	--	6.7	6.7	6.9	6.6	6.7	6.5	7.0
Temperature, water	°C	26.0	26.0	27.2	26.5	25.5	26.0	26.8
Turbidity	NTU	--	1.9	--	--	--	--	--
Oxygen, dissolved	mg/L	--	7.2	8.0	--	--	7.3	7.1
Hardness as $CaCO_3$	mg/L	6	7	8	10	8	9	14
Noncarbonate hardness	mg/L	0	--	1	0	0		1
Calcium, dissolved (Ca)	mg/L	1.4	1.5	1.8	2.1	1.7	1.8	2.6
Magnesium, dissolved (Mg)	mg/L	.7	.9	.9	1.1	.9	1.1	1.7
Sodium, dissolved (Na)	mg/L	2.2	2.2	2.9	2.4	2.2	2.1	3.4
Percent sodium	percent	42	39	43	34	37	33	35
Sodium adsorption ratio	--	.4	.4	.4	.4	.3	.3	.4
Potassium, dissolved (K)	mg/L	.2	.1	.2	.2	.3	.2	.2
Alkalinity, total as $CaCO_3$	mg/L	6	--	7	10	8		13
Sulfate, dissolved (SO_4)	mg/L	.7	.8	1.0	< 5	.5	1.4	1.0
Chloride, dissolved (Cl)	mg/L	3.6	3.0	4.6	3.8	3.3	4.1	4.2
Fluoride, dissolved (F)	mg/L	0	0	0	< .1	0	0	0
Silica, dissolved (SiO_2)	mg/L	6.3	9.4	10	10	7.1	8.9	14
Solids, dissolved, sum of constituents	mg/L	19	--	--	--	21	20	--
Solids, dissolved, ton per acre foot	ton/ac-ft	.03	--	--	--	.03	.03	--
Nitrite plus nitrate, dissolved as N	mg/L	.01	--	.07	< .1	.01	.01	0
Iron, dissolved (Fe)	µg/L	50	150	60	100	100	70	90
Manganese, dissolved (Mn)	µg/L	20	20	6	16	10	10	8

Table 57. Chemical analyses of water from Ngermeskang and Ngetpang Rivers, Babelthuap

[U.S. Geological Survey]

Constituents		Ngermeskang (Almiokan) River		Ngetpang (Ngatpang) River		
		1-25-80	7-11-81	1-24-80	7-6-81	9-21-82
Time		1030	1155	1205	1400	1300
Discharge, instantaneous	ft^3/s	23	52	1.2	7.4	.48
Specific conductance	µmho	67	52	64	39	71
pH	--	7.2	7.4	7.2	6.8	6.9
Temperature, water	°C	25.5	25.5	25.0	26.0	25.5
Oxygen, dissolved	mg/L	6.8	7.6	7.2	8.1	--
Hardness as $CaCO_3$	mg/L	24	20	22	12	27
Noncarbonate hardness	mg/L	0	5	0	0	0
Calcium, dissolved (Ca)	mg/L	4.3	3.6	4.4	2.1	5.6
Magnesium, dissolved (Mg)	mg/L	3.2	2.6	2.6	1.6	3.1
Sodium, dissolved (Na)	mg/L	4.3	3.3	5.1	3.1	5.5
Percent sodium	percent	28	26	33	35	31
Sodium adsorption ratio	--	.4	.3	.5	.4	.5
Potassium, dissolved (K)	mg/L	.2	.3	.4	.3	.4
Alkalinity, total as $CaCO_3$	mg/L	25	15	33	12	36
Sulfate, dissolved (SO_4)	mg/L	.4	< 1.0	1.0	1.0	< 5
Chloride, dissolved (Cl)	mg/L	4.7	3.7	4.7	3.2	4.6
Fluoride, dissolved (F)	mg/L	0	0	0	0	< .1
Silica, dissolved (SiO_2)	mg/L	20	18	24	17	27
Solids, dissolved, sum of constituents	mg/L	56	--	58	37	--
Solids, dissolved, ton per acre foot	ton/ac-ft	.08	--	.08	--	--
Nitrite plus nitrate, dissolved as N	mg/L	.01	.06	.01	.08	< .1
Iron, dissolved (Fe)	µg/L	240	130	260	70	230
Manganese, dissolved (Mn)	µg/L	10	6	20	6	13

Table 58. Chemical analyses of water from Tabecheding (Tabagaten) River, Babelthuap

[U.S. Geological Survey]

Constituents		4-12-79	1-24-80	9-27-80	7-6-81	9-21-82
Time		1130	1010	1000	1100	1100
Discharge, instantaneous	ft^3/s	94	30	127	121	11
Specific conductance	µmho	45	68	45	42	72
pH	--	7.1	7.4	7.1	7.6	7.6
Temperature, water	°C	25.0	25.0	--	24.7	25.5
Turbidity	NTU	--	--	6.6	--	--
Oxygen, dissolved	mg/L	8.0	8.0	8.2	7.6	--
Hardness as $CaCO_3$	mg/L	14	24	14	13	28
Noncarbonate hardness	mg/L	2	0	0	0	0
Calcium, dissolved (Ca)	mg/L	2.4	4.3	2.2	2.1	4.8
Magnesium, dissolved (Mg)	mg/L	1.6	3.3	2.0	2.0	3.8
Sodium, dissolved (Na)	mg/L	3.0	4.1	2.9	3.2	4.9
Percent sodium	percent	31	27	31	32	28
Sodium adsorption ratio	--	.4	.4	.3	.4	.5
Potassium, dissolved (K)	mg/L	.4	.3	.3	.2	.3
Alkalinity, total as $CaCO_3$	mg/L	12	27	14	13	30
Sulfate, dissolved (SO_4)	mg/L	2.1	.3	3.8	< 1.0	< 5
Chloride, dissolved (Cl)	mg/L	2.4	4.3	3.7	3.1	3.8
Fluoride, dissolved (F)	mg/L	0	0	0	0	< .1
Silica, dissolved (SiO_2)	mg/L	13	22	14	14	25
Solids, dissolved, sum of constituents	mg/L	34	55	37	--	--
Solids, dissolved, ton per acre foot	ton/ac-ft	.05	.07	.05	--	--
Nitrite plus nitrate, dissolved as N	mg/L	0	.01	0	.07	< .1
Iron, dissolved (Fe)	µg/L	80	190	90	60	170
Manganese, dissolved (Mn)	µg/L	6	7	7	5	5

Table 59. Chemical analyses of water from Ngerimel (Gihmel) Reservoir and Ngerimel (Gihmel) River, Babelthuap

[U.S. Geological Survey]

Constituents		Ngerimel Reservoir			Ngerimel River (16891200)	
		1-27-80	9-23-80	9-20-82	4-15-79	7-12-81
Time		0905	1500	1500	1100	1350
Discharge, instantaneous	ft^3/s	--	--	--	12	5.2
Specific conductance	µmho	76	65	65	46	55
pH	--	7.4	7.0	7.6	7.1	7.8
Temperature, water	°C	29.5	30.0	31.5	26.0	29.8
Turbidity	NTU	--	6.2	--	--	--
Oxygen, dissolved	mg/L	7.4	6.9	--	8.0	7.2
Hardness as $CaCO_3$	mg/L	28	22	28	13	21
Noncarbonate hardness	mg/L	0	1	0	2	0
Calcium, dissolved (Ca)	mg/L	5.8	4.8	6.4	3.0	4.8
Magnesium, dissolved (Mg)	mg/L	3.2	2.5	2.9	1.3	2.2
Sodium, dissolved (Na)	mg/L	4.2	3.7	4.0	3.1	4.0
Percent sodium	percent	25	26	23	34	29
Sodium adsorption ratio	--	.3	.3	.4	.4	.4
Potassium, dissolved (K)	mg/L	.3	.6	.4	.3	.4
Alkalinity, total as $CaCO_3$	mg/L	29	21	34	11	21
Sulfate, dissolved (SO_4)	mg/L	.3	--	< 5	1.7	< 1.0
Chloride, dissolved (Cl)	mg/L	4.9	4.8	4.5	4.5	4.3
Fluoride, dissolved (F)	mg/L	0	0	< .1	0	0
Silica, dissolved (SiO_2)	mg/L	21	17	20	11	17
Solids, dissolved, sum of constituents	mg/L	58	52	--	32	--
Solids, dissolved, ton per acre foot	ton/ac-ft	.08	.07	--	.04	--
Nitrite plus nitrate, dissolved as N	mg/L	.16	0	< .1	0	.07
Iron, dissolved (Fe)	µg/L	260	300	220	--	120
Manganese, dissolved (Mn)	µg/L	3.2	40	2	1.3	30

Table 60. Chemical analyses of water from Edeng (Gaden) River, Babelthuap

[U.S. Geological Survey]

Constituents		4-13-79	1-22-80	9-23-80	7-4-81	9-20-82
Time		1130	1335	1100	1415	1200
Discharge, instantaneous	ft^3/s	2,000	13	29	90	10
Specific conductance	µmho	25	79	59	47	82
pH	--	6.6	7.9	7.0	7.0	7.4
Temperature, water	°C	25.0	25.5	26.5	25.9	25.0
Turbidity	NTU	--	--	4.1	--	--
Oxygen, dissolved	mg/L	8.2	7.0	7.4	7.4	--
Hardness as $CaCO_3$	mg/L	6	30	21	16	34
Noncarbonate hardness	mg/L	4	0	1	0	0
Calcium, dissolved (Ca)	mg/L	1.4	5.8	4.1	3.2	6.9
Magnesium, dissolved (Mg)	mg/L	.7	3.8	2.5	2.0	4.0
Sodium, dissolved (Na)	mg/L	2.0	3.5	3.0	3.5	4.6
Percent sodium	percent	39	20	24	31	23
Sodium adsorption ratio	--	.3	.3	.3	.4	.4
Potassium, dissolved (K)	mg/L	.3	.2	.3	.3	.2
Alkalinity, total as $CaCO_3$	mg/L	2	34	20	16	40
Sulfate, dissolved (SO_4)	mg/L	2.1	.2	5.2	< 1.0	< 5
Chloride, dissolved (Cl)	mg/L	3.3	5.1	4.0	3.5	4.2
Fluoride, dissolved (F)	mg/L	0	0	0	0	< .1
Silica, dissolved (SiO_2)	mg/L	6.2	21	15	15	24
Solids, dissolved, sum of constituents	mg/L	17	60	46	--	--
Solids, dissolved, ton per acre foot	ton/ac-ft	.02	.08	.06	--	--
Nitrite plus nitrate, dissolved as N	mg/L	.01	.03	.01	.06	< .1
Iron, dissolved (Fe)	µg/L	20	150	110	100	150
Manganese, dissolved (Mn)	µg/L	5	5	7	5	5

Note: Analysis by Hawaii Architects and Engineers in March 1980 (time, day of month, and discharge not given): pH, 6.9; turbidity, 1.8 NTU; hardness as $CaCO_3$, 29 mg/L; alkalinity, 30 mg/L; chloride, 4.0 mg/L.

Table 61. Chemical analyses of water from Kmekumel (Kumekumeyel) River, Babelthuap

[U.S. Geological Survey]

Constituents		4-14-79	1-22-80	9-23-80	7-4-81	9-20-82
Time		1030	0950	1330	1046	1400
Discharge, instantaneous	ft^3/s	47	3.7	9.9	22	3.2
Specific conductance	µmho	39	82	70	60	92
pH	--	7.0	7.5	7.4	7.2	7.6
Temperature, water	°C	26.0	25.0	26.0	25.0	26.0
Turbidity	NTU	--	--	5.1	--	--
Oxygen, dissolved	mg/L	8.0	8.0	8.2	8.1	--
Hardness as $CaCO_3$	mg/L	11	34	26	24	41
Noncarbonate hardness	mg/L	5	0	2	2	1
Calcium, dissolved (Ca)	mg/L	2.1	7.2	6.1	5.7	9.2
Magnesium, dissolved (Mg)	mg/L	1.3	4.0	2.6	2.4	4.3
Sodium, dissolved (Na)	mg/L	2.7	4.0	3.2	3.7	4.5
Percent sodium	percent	35	20	21	25	19
Sodium adsorption ratio	--	.4	.3	.3	.3	.3
Potassium, dissolved (K)	mg/L	.2	.3	.3	.2	.2
Alkalinity, total as $CaCO_3$	mg/L	6	34	24	22	40
Sulfate, dissolved (SO_4)	mg/L	1.3	.6	4.9	1.0	< 5
Chloride, dissolved (Cl)	mg/L	3.8	4.4	4.6	3.8	4.2
Fluoride, dissolved (F)	mg/L	0	0	0	0	< .1
Silica, dissolved (SiO_2)	mg/L	12	25	17	17	27
Solids, dissolved, sum of constituents	mg/L	27	66	53	--	--
Solids, dissolved, ton per acre foot	ton/ac-ft	.04	.09	.07	--	--
Nitrite plus nitrate, dissolved as N	mg/L	0	.01	0	.06	< .1
Iron, dissolved (Fe)	µg/L	20	200	80	90	170
Manganese, dissolved (Mn)	µg/L	8	10	10	10	4

Table 62. Chemical analyses of water from South Fork Ngerdorch (Ngardok) River, Babelthuap

[U.S. Geological Survey]

Constituents		1-23-80	9-24-80	7-5-81	9-22-82
Time		1100	1100	1145	1115
Discharge, instantaneous	ft^3/s	5.8	13	180	4.3
Specific conductance	µmho	61	45	38	59
pH	--	7.3	7.4	7.3	7.6
Temperature, water	°C	25.0	26.0	24.9	25.5
Turbidity	NTU	--	1.5	--	--
Oxygen, dissolved	mg/L	7.8	8.1	8.6	--
Hardness as $CaCO_3$	mg/L	23	15	10	24
Noncarbonate hardness	mg/L	0	0	0	0
Calcium, dissolved (Ca)	mg/L	4.6	2.7	1.8	4.6
Magnesium, dissolved (Mg)	mg/L	2.9	2.0	1.4	3.0
Sodium, dissolved (Na)	mg/L	3.1	2.9	2.9	4.1
Percent sodium	percent	22	29	37	27
Sodium adsorption ratio	--	.3	.3	.4	.4
Potassium, dissolved (K)	mg/L	.2	.1	.2	.4
Alkalinity, total as $CaCO_3$	mg/L	23	15	11	30
Sulfate, dissolved (SO_4)	mg/L	.3	3.1	1.0	< 5
Chloride, dissolved (Cl)	mg/L	4.2	3.8	2.8	4.0
Fluoride, dissolved (F)	mg/L	0	0	0	< .1
Silica, dissolved (SiO_2)	mg/L	18	15	11	21
Solids, dissolved, sum of constituents	mg/L	47	39	28	--
Solids, dissolved, ton per acre foot	ton/ac-ft	.06	.05	--	--
Nitrite plus nitrate, dissolved as N	mg/L	.01	.01	.11	< .1
Iron, dissolved (Fe)	µg/L	190	120	80	200
Manganese, dissolved (Mn)	µg/L	6	6	5	4

Table 63. Chemical analyses of water from North Fork Ngerdorch and Lmetmellasch Rivers, Babelthuap

[U.S. Geological Survey]

Constituents		North Fork Ngerdorch (Ngardok) River				Lmetmellasch River (Geligal Marsh outlet)	
Time		1-23-80 1310	9-24-80 1530	7-5-81 1500	9-22-82 1400	9-15-71 1500	7-9-81 1310
Discharge, instantaneous	ft^3/s	24	60	1/	15	1.1	2.4
Specific conductance	µmho	57	51	32	58	88	70
pH	--	7.4	7.0	6.5	7.1	6.9	8.2
Temperature, water	°C	26.0	26.0	24.7	26.0	--	26.4
Turbidity	NTU	--	3.4	--	--	--	--
Oxygen, dissolved	mg/L	8.0	7.2	7.8	--	--	7.8
Hardness as $CaCO_3$	mg/L	21	16	9	27	32	25
Noncarbonate hardness	mg/L	0	0	0	0	0	2
Calcium, dissolved (Ca)	mg/L	3.8	2.8	1.6	6.0	6.1	5.0
Magnesium, dissolved (Mg)	mg/L	2.8	2.2	1.3	3.0	4.0	3.1
Sodium, dissolved (Na)	mg/L	4.4	4.8	2.9	4.0	6.0	5.3
Percent sodium	percent	31	16	39	24	--	31
Sodium adsorption ratio	--	.4	.5	.4	.4	--	.5
Potassium, dissolved (K)	mg/L	.1	.1	.2	.2	.3	.3
Alkalinity, total as $CaCO_3$	mg/L	23	21	9	32	33	23
Sulfate, dissolved (SO_4)	mg/L	.2	3.1	--	< 5	.4	1.0
Chloride, dissolved (Cl)	mg/L	4.4	4.0	3.0	3.7	4.5	5.5
Fluoride, dissolved (F)	mg/L	0	0	0	< .1	.1	0
Silica, dissolved (SiO_2)	mg/L	17	14	10	17	22	22
Solids, dissolved, sum of constituents	mg/L	47	44	27	--	67	57
Solids, dissolved, ton per acre foot	ton/ac-ft	.06	.06	--	--	--	--
Nitrite plus nitrate, dissolved as N	mg/L		--	.11	< .1	--	.08
Iron, dissolved (Fe)	µg/L	350	160	130	230	100	150
Manganese, dissolved (Mn)	µg/L	20	20	10	15	--	6

Table 64. Chemical analyses of water from miscellaneous surface-water sources

[U.S. Geological Survey]

Constituents		168914801/	168917002/		168917503/		168917804/
Time		7-9-81 1020	1-24-80 1545	9-24-82 1100	7-12-81 1110	9-24-82 1200	9-22-80 1600
Discharge, instantaneous	ft^3/s	--	.03	.03	.16	.02	.002
Specific conductance	µmho	121	66	78	40	45	65
pH	--	7.2	7.0	6.5	7.4	7.0	6.9
Temperature, water	°C	--	25.0	27.5	26.5	27.5	27.0
Oxygen, dissolved	mg/L	--	--	--	7.4	--	7.2
Hardness as $CaCO_3$	mg/L	44	20	24	10	14	20
Noncarbonate hardness	mg/L	0	1	0	0	0	0
Calcium, dissolved (Ca)	mg/L	10	4.4	5.3	2.3	3.0	4.5
Magnesium, dissolved (Mg)	mg/L	4.7	2.2	2.7	1.1	1.5	2.2
Sodium, dissolved (Na)	mg/L	7.0	5.9	6.7	4.3	4.2	5.0
Percent sodium	percent	25	39	37	47	40	34
Sodium adsorption ratio	--	.5	.6	.7	.6	.5	.5
Potassium, dissolved (K)	mg/L	.3	.3	.2	.2	.1	.4
Alkalinity, total as $CaCO_3$	mg/L	44	19	30	13	20	21
Sulfate, dissolved (SO_4)	mg/L	1.0	2.9	< 5	2.0	< 5	.2
Chloride, dissolved (Cl)	mg/L	6.6	8.6	9.3	5.2	5.1	8.7
Fluoride, dissolved (F)	mg/L	0	0	< .1	0	< .1	0
Silica, dissolved (SiO_2)	mg/L	38	21	28	17	20	19
Solids, dissolved, sum of constituents	mg/L	95	57	--	41	--	53
Nitrite plus nitrate, dissolved as N	mg/L	.21	.18	.14	.15	< .1	0
Iron, dissolved (Fe)	µg/L	90	150	96	100	100	60
Manganese, dissolved (Mn)	µg/L	4	8	1	9	5	50

1/ Ngkeklau village reservoir, Babelthuap, lat 7°35'31" N., long 134°38'08" E., at altitude 15 ft (from topographic map).

2/ Unnamed west coast stream, Ngerekebesang.

3/ Unnamed south coast stream, Ngerekebesang.

4/ Unnamed north coast stream, Malakal.

Table 65. Chemical analyses of spring and well water

[U.S. Geological Survey]

Constituents		Van Camp Well Malakal[1/]	Elodesachel Spring, Koror[2/]		Well 5, Peleliu
Time		9-24-82 1400	7-12-81 1455	9-24-82 0830	6-10-71 0845
Discharge, instantaneous	ft^3/s	--	--	--	--
Specific conductance	µmho	176	104	168	498
pH	--	6.2	8.1	8.0	7.4
Temperature, water	°C	29.0	26.5	25.5	25.8
Oxygen, dissolved	mg/L	--	6.4	--	--
Hardness as $CaCO_3$	mg/L	75	41	80	209
Noncarbonate hardness	mg/L	0	0	0	19
Calcium, dissolved (Ca)	mg/L	21	12	25	75
Magnesium, dissolved (Mg)	mg/L	5.4	2.8	4.3	5.4
Sodium, dissolved (Na)	mg/L	12	4.3	5.3	22
Percent sodium	percent	26	18	13	--
Sodium adsorption ratio	--	.6	.3	.3	--
Potassium, dissolved (K)	mg/L	.3	.2	.3	.8
Alkalinity, total as $CaCO_3$	mg/L	80	42	81	190
Sulfate, dissolved (SO_4)	mg/L	< 5	2.0	< 5	6.0
Chloride, dissolved (Cl)	mg/L	9.9	4.7	5.9	43
Fluoride, dissolved (F)	mg/L	< .1	0	< .1	0.1
Silica, dissolved (SiO_2)	mg/L	29	18	22	2.0
Solids, dissolved, sum of constituents	mg/L	--	69	123	248
Nitrite plus nitrate, dissolved as N	mg/L	< .1	.20	.19	.21
Iron, dissolved (Fe)	µg/L	130	310	130	310
Manganese, dissolved (Mn)	µg/L	190	10	5	10

1/ Lat 7°19'52" N., long 134°27'09" E. Well pumping during sampling.

2/ Lat 7°20'47" N., long 134°29'57" E., at altitude 30 ft (from topographic map). Spring is also called Almigu Spring or Japanese Cave.

Table 66. Water and air temperatures and instantaneous discharges at Diongradid River, Babelthuap

[Temperatures read to units until December 1973, to half units thereafter]

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Apr. 16, 1970	1120	8.7	25	--
Apr. 30, 1970	1235	6.6	26	--
May 13, 1970	1140	6.9	26	--
June 16, 1970	1230	16	25	--
July 11, 1970	1145	67	25	--
July 28, 1970	1245	50	24	--
Aug. 13, 1970	1215	33	24	--
Sept. 1, 1970	1130	38	25	--
Sept. 25, 1970	1225	35	25	--
Oct. 20, 1970	1555	39	25	--
Nov. 5, 1970	1145	23	25	--
Nov. 30, 1970	1545	14	25	--
Dec. 16, 1970	1345	57	25	--
Jan. 5, 1971	1240	28	25	--
Feb. 22, 1971	1240	22	25	--
Mar. 16, 1971	1150	20	25	--
Apr. 5, 1971	1300	12	25	--
Apr. 30, 1971	1140	20	24	--
May 21, 1971	1520	22	25	--
July 1, 1971	1240	79	24	--
Aug. 2, 1971	1200	20	25	--
Aug. 30, 1971	1225	30	24	--
Oct. 5, 1971	1435	35	25	--
Oct. 23, 1971	1115	77	25	--
Nov. 12, 1971	1430	34	25	--
Nov. 25, 1971	1135	24	25	--
Feb. 3, 1972	1525	22	24	--
Feb. 29, 1972	1445	50	25	--
Mar. 31, 1972	1250	41	25	--
May 6, 1972	1500	26	25	--
May 26, 1972	1235	15	25	--
June 23, 1972	1147	16	25	--
July 24, 1972	1207	22	25	--
Aug. 17, 1972	1140	24	25	--
Sept. 30, 1972	1205	81	24	--
Oct. 21, 1972	1130	29	24	--
Nov. 21, 1972	1215	14	25	--
Dec. 6, 1972	1340	35	25	--

Table 66. Water and air temperatures and instantaneous discharges at Diongradid River, Babelthuap--Continued

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Dec. 28, 1972	1215	15	25	--
Jan. 25, 1973	1145	8.7	24	--
Feb. 20, 1973	1510	5.2	25	--
Mar. 11, 1973	1345	3.8	25	--
Mar. 29, 1973	1440	4.6	26	--
Apr. 26, 1973	1530	9.0	26	--
May 22, 1973	1355	12	25	--
June 13, 1973	1450	18	25	--
Aug. 28, 1973	1225	43	26	--
Sept. 27, 1973	1110	34	25	--
Nov. 23, 1973	1200	49	26	--
Dec. 13, 1973	1310	20	25	--
Jan. 24, 1974	1215	44	25.5	--
Feb. 28, 1974	1310	17	26.0	--
Apr. 10, 1974	1150	19	25.5	--
May 1, 1974	1450	61	25.5	--
July 3, 1974	1150	61	24.5	--
Aug. 1, 1974	1130	41	25.0	29.0
Nov. 7, 1974	1330	72	25.0	26.0
Feb. 4, 1975	1455	28	25.5	28.0
Feb. 18, 1975	1315	15	24.5	28.5
Mar. 7, 1975	1155	9.5	25.0	29.0
Mar. 30, 1975	0915	9.4	25.0	28.0
Apr. 29, 1975	1115	14	25.5	28.5
May 21, 1975	1215	27	25.0	27.0
July 14, 1975	1145	45	25.0	27.0
Aug. 12, 1975	1200	36	25.0	25.5
Sept. 16, 1975	1340	14	25.0	27.0
Oct. 2, 1975	1125	35	25.0	29.0
Nov. 6, 1975	1235	36	25.5	29.0
Dec. 12, 1975	1310	32	25.0	28.0
Feb. 24, 1976	1215	13	24.0	28.0
Mar. 23, 1976	1210	8.2	25.0	27.0
June 2, 1976	0935	9.4	25.5	28.0
June 30, 1976	1250	14	25.0	27.5
Jan. 12, 1977	1150	29	24.5	27.5
Feb. 16, 1977	1015	11	25.0	28.0
Mar. 17, 1977	1250	6.9	25.5	--
Apr. 19, 1977	1135	3.6	26.0	29.0
July 7, 1977	1225	111	26.5	28.5
Sept. 14, 1977	1220	32	26.5	30.0
Feb. 27, 1978	1220	31	26.0	29.0
June 27, 1978	1120	32	25.5	28.0

Table 66. Water and air temperatures and instantaneous discharges at Diongradid River, Babelthuap--Continued

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Aug. 30, 1978 ----------	1315	32	22.0	24.0
Jan. 9, 1979 ----------	1330	12	25.5	27.0
Feb. 20, 1979 ----------	1420	7.6	26.0	27.5
Mar. 20, 1979 ----------	1245	15	25.0	29.0
Apr. 11, 1979 ----------	1210	28	25.0	--
June 11, 1979 ----------	1335	25	26.5	29.0
July 10, 1979 ----------	1320	69	26.0	27.0
Aug. 9, 1979 ----------	1210	30	26.0	28.5
Sept. 10, 1979 ---------	1230	17	25.5	29.0
Oct. 5, 1979 ----------	1235	51	26.5	29.5
Nov. 8, 1979 ----------	1210	39	26.0	29.0
Dec. 4, 1979 ----------	1140	19	25.5	28.0
Jan. 29, 1980 ----------	1200	410	25.5	--
Feb. 26, 1980 ----------	1430	32	26.0	28.0
Mar. 20, 1980 ----------	1255	18	25.0	--
Apr. 28, 1980 ----------	1330	23	25.0	27.0
June 5, 1980 ----------	1335	13	25.5	28.0
July 17, 1980 ----------	1425	28	25.5	26.0
Aug. 25, 1980 ----------	1200	25	25.5	28.0
Sept. 25, 1980 ---------	1430	44	26.0	27.5
Oct. 9, 1980 ----------	1235	27	25.0	28.0
Nov. 7, 1980 ----------	1245	23	25.5	27.5

Table 67. Water and air temperatures and instantaneous discharges at Ngechutrong River, Babelthuap

[Temperatures read to half units]

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Aug. 1, 1974	1240	1.8	26.0	29.0
Aug. 28, 1974	1340	1.9	25.5	26.5
Sept. 26, 1974	1440	5.8	25.5	27.0
Nov. 7, 1974	1445	3.9	26.0	27.0
Feb. 18, 1975	1355	.94	26.0	28.5
Mar. 7, 1975	1245	.62	26.0	28.5
Mar. 30, 1975	1005	.56	25.0	28.0
Apr. 29, 1975	1145	1.4	26.5	28.0
May 21, 1975	1315	2.9	26.0	27.0
July 14, 1975	1220	2.0	26.0	27.0
Aug. 12, 1975	1245	2.3	25.0	25.5
Sept. 16, 1975	1425	1.3	26.0	27.0
Oct. 2, 1975	1210	3.3	26.0	29.0
Nov. 6, 1975	1310	2.0	26.5	29.0
Feb. 24, 1976	1300	.72	25.0	28.0
Mar. 23, 1976	1315	.50	25.5	28.0
June 2, 1976	1025	.39	26.0	28.0
June 30, 1976	1320	.52	26.0	27.5
Jan. 12, 1977	1245	1.7	26.0	28.0
Feb. 16, 1977	1115	.56	25.5	28.0
Mar. 17, 1977	1355	.37	26.0	28.0
Apr. 19, 1977	1120	.26	26.0	29.0
Sept. 14, 1977	1220	2.0	27.5	30.0
Oct. 18, 1977	1310	2.5	27.5	28.5
Feb. 27, 1978	1215	2.1	27.0	30.0
June 27, 1978	1310	1.3	26.5	28.0
Feb. 20, 1979	1505	.46	26.5	27.5
Mar. 20, 1979	1340	1.1	27.0	28.0
Apr. 11, 1979	1505	3.4	26.0	26.0
June 11, 1979	1430	2.2	27.5	29.0
Aug. 9, 1979	1315	1.6	27.5	29.0
Sept. 10, 1979	1315	1.1	27.0	29.0
Oct. 5, 1979	1405	3.4	27.5	29.5
Dec. 4, 1979	1230	.73	26.0	28.0
Mar. 20, 1980	1355	.83	26.0	27.0
Apr. 28, 1980	1415	1.1	27.0	28.0
June 5, 1980	1410	.62	26.0	28.0
Aug. 25, 1980	1240	1.2	25.0	28.0
Sept. 25, 1980	1530	2.8	26.0	27.0
Oct. 9, 1980	1325	2.1	26.0	28.0
Nov. 7, 1980	1330	1.4	26.0	27.5

Table 68. Water and air temperatures and instantaneous discharges at Ngerchetang River, Babelthuap

[Temperatures read to half units]

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Aug. 31, 1974 ----------	1040	7.8	25.0	28.5
Sept. 26, 1974 ---------	1005	8.6	25.0	27.0
Feb. 18, 1975 ----------	1250	7.2	25.0	28.0
Mar. 7, 1975 ----------	1500	3.0	25.0	28.0
Mar. 30, 1975 ----------	1250	5.2	25.5	28.0
Apr. 29, 1975 ----------	1450	7.1	25.5	27.0
May 22, 1975 ----------	1130	9.8	26.0	27.5
July 20, 1975 ----------	1135	11	25.0	27.0
Aug. 27, 1975 ----------	1030	11	25.0	26.0
Sept. 19, 1975 ---------	1105	6.3	25.0	27.0
Oct. 2, 1975 ----------	1400	12	26.0	27.5
Nov. 11, 1975 ----------	1205	10	25.5	28.5
Feb. 24, 1976 ----------	1445	4.1	25.0	28.0
Mar. 25, 1976 ----------	1140	1.6	25.5	27.5
June 2, 1976 ----------	1245	4.1	26.0	27.0
Mar. 30, 1977 ----------	1155	1.0	25.0	27.5
June 9, 1977 ----------	1055	2.8	26.0	27.5
Sept. 30, 1977 ---------	1335	15	27.0	28.0
Jan. 29, 1980 ----------	1030	67	25.5	--
Feb. 29, 1980 ----------	1140	11	25.0	27.0
Apr. 2, 1980 ----------	1105	10	25.5	27.0
June 17, 1980 ----------	1150	8.6	25.5	28.5
July 22, 1980 ----------	1310	62	25.0	--
Sept. 25, 1980 ---------	1000	27	26.0	26.5
Oct. 15, 1980 ----------	1040	8.0	25.5	27.0
Nov. 18, 1980 ----------	1245	6.2	25.5	28.0

Table 69. Water and air temperatures and instantaneous discharges at Ngermeskang River, Babelthuap

[Temperatures read to units until June 1973, to half units thereafter]

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Mar. 17, 1973	1130	3.4	24	--
Apr. 21, 1973	1240	16	25	--
May 11, 1973	1245	22	25	--
June 1, 1973	1005	43	25	--
June 23, 1973	1300	56	25	--
Sept. 5, 1973	1245	128	26.0	--
Oct. 17, 1973	1210	64	25.0	--
Nov. 7, 1973	1200	24	25.0	--
Dec. 17, 1973	1040	22	25.5	--
Apr. 12, 1974	1005	37	25.0	--
May 9, 1974	1230	37	25.0	--
Aug. 14, 1974	1150	63	25.0	28.5
Sept. 28, 1974	1045	25	24.0	27.0
Feb. 10, 1975	1315	26	24.0	28.0
Mar. 8, 1975	1235	11	24.5	27.5
Apr. 2, 1975	1240	14	25.5	27.5
June 19, 1975	1450	102	25.5	27.0
Sept. 17, 1975	1320	22	24.5	27.0
Jan. 13, 1976	1100	62	24.5	26.5
Jan. 18, 1977	1410	31	24.0	26.0
Mar. 1, 1977	1310	11	25.0	27.0
Mar. 23, 1977	1305	8.3	25.5	28.0
Aug. 19, 1977	1335	75	25.0	28.0
Sept. 30, 1977	0955	41	25.0	27.5
Nov. 15, 1977	1005	28	25.5	27.5
Jan. 26, 1978	1250	12	26.0	28.0
Nov. 16, 1978	0905	25	25.0	26.5
Jan. 19, 1979	1050	13	26.5	28.0
Mar. 2, 1979	1225	63	26.0	27.0
Mar. 30, 1979	1140	14	26.5	28.0
June 26, 1979	1000	104	25.0	26.0
Aug. 23, 1979	0810	57	25.5	26.0
Sept. 18, 1979	0835	27	25.0	27.0
Oct. 8, 1979	0955	72	26.0	27.0
Jan. 17, 1980	0900	32	25.0	26.0
Jan. 25, 1980	1115	23	25.5	26.0
Feb. 28, 1980	1050	46	25.0	27.0
Apr. 1, 1980	1015	17	25.5	27.0
May 6, 1980	1045	83	26.0	27.0
July 21, 1980	1100	31	25.0	26.0
Oct. 16, 1980	1205	28	25.5	27.5
Nov. 17, 1980	1225	25	25.5	28.0
Dec. 20, 1980	1035	106	25.0	26.0

Table 70. Water and air temperatures and instantaneous discharges at Ngetpang River, Babelthuap

[Temperatures read to units until December 1973, to half units thereafter]

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Mar. 17, 1973	1250	0.09	24	--
Apr. 21, 1973	1040	.98	25	--
May 11, 1973	1005	.74	25	--
June 1, 1973	1220	5.9	25	--
June 23, 1973	1105	1.5	25	--
Sept. 5, 1973	1025	5.3	25	--
Oct. 17, 1973	0945	1.9	25	--
Nov. 7, 1973	1430	1.3	25	--
Dec. 17, 1973	1315	.63	26	--
Jan. 26, 1974	0915	1.6	25.0	--
Mar. 2, 1974	1005	.66	25.0	--
Apr. 12, 1974	1225	1.5	25.5	--
May 9, 1974	1015	1.1	24.5	--
Aug. 14, 1974	1510	2.2	25.5	28.5
Sept. 28, 1974	1310	24	25.5	27.0
Feb. 10, 1975	0955	1.0	23.5	27.5
Mar. 8, 1975	0955	.45	24.0	27.5
Apr. 2, 1975	0925	.67	25.0	27.5
June 19, 1975	1120	5.4	25.5	27.0
July 19, 1975	1000	1.6	24.5	27.5
Sept. 17, 1975	1025	.87	24.5	26.5
Jan. 12, 1976	1420	1.8	24.5	26.5
July 15, 1976	1300	2.9	25.5	28.5
Jan. 18, 1977	1050	.96	23.5	26.0
Mar. 1, 1977	1015	.20	24.0	27.0
Mar. 23, 1977	1035	.38	24.0	26.0
Sept. 20, 1977	1110	.67	26.5	28.5
Nov. 15, 1977	1300	1.7	25.5	27.5
Jan. 26, 1978	1025	.40	25.5	27.0
Nov. 16, 1978	1130	1.3	25.0	28.0
Mar. 2, 1979	1515	1.2	25.0	26.0
Mar. 30, 1979	1425	.42	26.5	28.5
July 26, 1979	1250	2.6	25.5	26.5
Sept. 7, 1979	1040	1.1	25.5	26.5
Oct. 4, 1979	1045	3.8	26.5	29.0
Jan. 15, 1980	1250	.62	25.0	27.5
Jan. 24, 1980	1220	1.2	25.0	27.0
Feb. 21, 1980	1350	2.2	25.0	28.0
Mar. 18, 1980	1230	.49	24.5	26.5
Apr. 25, 1980	1415	2.8	25.0	27.0
June 3, 1980	1410	.76	26.0	28.0
July 2, 1980	1305	6.4	25.0	24.5
Aug. 29, 1980	1050	7.0	25.0	26.0

Table 71. Water and air temperatures and instantaneous discharges at Tabecheding River, Babelthuap

[Temperatures read to units until June 1973, to half units thereafter]

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Apr. 28, 1970	1305	3.8	27	
May 25, 1970	1455	8.4	26	
June 18, 1970	1245	54	25	
July 15, 1970	1155	124	25	
July 29, 1970	1325	51	25	
Aug. 14, 1970	1350	124	25	
Sept. 11, 1970	1040	34	25	
Sept. 26, 1970	1130	65	25	
Oct. 7, 1970	1205	50	25	
Oct. 20, 1970	1115	58	25	
Nov. 5, 1970	1525	26	25	
Nov. 30, 1970	1115	48	25	
Dec. 16, 1970	1720	95	25	
Jan. 5, 1971	1655	27	25	
Jan. 25, 1971	1610	18	25	
Feb. 22, 1971	1615	22	25	
Mar. 12, 1971	1145	25	25	
Apr. 16, 1971	1040	11	25	
May 27, 1971	1040	23	25	
July 1, 1971	1630	69	24	
Aug. 30, 1971	1605	29	24	
Sept. 1, 1971	0935	13	24	
Oct. 5, 1971	1030	43	24	
Oct. 21, 1971	1035	54	25	
Nov. 12, 1971	1100	35	25	
Nov. 25, 1971	1500	31	25	
Feb. 3, 1972	1105	29	24	
Feb. 29, 1972	1015	44	25	
Apr. 18, 1972	1000	18	25	
May 6, 1972	1105	37	25	
May 26, 1972	0815	16	24	
June 23, 1972	1625	28	25	
July 24, 1972	1630	16	26	
Aug. 17, 1972	1445	24	25	
Oct. 21, 1972	1540	22	25	
Nov. 11, 1972	1420	13	25	
Dec. 6, 1972	0845	40	24	
Dec. 27, 1972	1130	17	25	
Jan. 27, 1973	1125	3.9	24	
Feb. 20, 1973	1055	2.7	25	
Mar. 11, 1973	0955	1.3	25	

Table 71. Water and air temperatures and instantaneous discharges at Tabecheding River, Babelthuap--Continued

Date	Time	Streamflow, instantaneous (ft^3/s)	Water temperature (^oC)	Air temperature (^oC)
Apr. 26, 1973	1155	16	26	--
May 22, 1973	1030	14	25	--
June 13, 1973	1045	34	25.0	--
Aug. 28, 1973	0845	48	25.5	--
Sept. 27, 1973	0815	30	25.0	--
Oct. 13, 1973	1005	41	25.5	--
Nov. 2, 1973	0955	20	25.5	--
Nov. 23, 1973	0815	48	25.0	--
Dec. 13, 1973	0955	13	24.0	--
Jan. 24, 1974	0900	51	25.5	--
Feb. 28, 1974	1000	20	26.0	--
Apr. 10, 1974	0830	31	25.0	--
May 1, 1974	1735	33	25.5	--
July 9, 1974	1100	36	25.0	--
Aug. 30, 1974	0820	24	24.5	26.0
Sept. 27, 1974	1440	34	25.0	28.0
Oct. 29, 1974	1035	62	25.0	28.0
Feb. 9, 1975	0915	21	24.5	26.0
Mar. 6, 1975	1025	7.5	25.5	27.5
Mar. 29, 1975	1045	6.2	25.5	28.0
Apr. 24, 1975	1100	36	25.0	29.0
July 17, 1975	1125	56	25.0	29.0
Aug. 13, 1975	1130	74	25.0	29.0
Aug. 18, 1975	1130	51	25.0	25.5
Sept. 10, 1975	1410	19	25.5	29.0
Sept. 20, 1975	1150	12	26.0	--
Oct. 6, 1975	1035	68	25.5	28.0
Oct. 29, 1975	1210	30	25.0	28.0
Dec. 2, 1975	1200	54	25.5	28.0
Jan. 31, 1976	1025	20	25.0	27.0
Mar. 5, 1976	1040	31	25.0	26.5
Mar. 25, 1976	1450	11	25.0	29.0
Apr. 13, 1976	1025	43	25.0	28.0
May 21, 1976	1115	21	26.0	--
June 21, 1976	1255	42	25.0	28.0
Jan. 6, 1977	1225	98	25.0	27.0
Feb. 15, 1977	1335	19	25.0	26.5
Mar. 10, 1977	1125	5.6	24.5	27.5
Sept. 15, 1977	1050	26	26.0	29.0
Oct. 13, 1977	1030	45	26.0	27.5
Nov. 17, 1977	1055	19	25.5	28.5
Dec. 8, 1977	1225	25	26.0	27.5

Table 71. Water and air temperatures and instantaneous discharges at Tabecheding River, Babelthuap--Continued

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Jan. 18, 1978 ----------	1205	18	26.5	27.0
Feb. 22, 1978 ----------	1005	39	26.0	27.0
Aug. 30, 1978 ----------	1045	38	22.0	24.0
Dec. 5, 1978 ----------	1120	23	25.0	27.5
Jan. 8, 1979 ----------	1435	19	25.0	25.5
Feb. 9, 1979 ----------	1135	14	25.0	28.5
Mar. 22, 1979 ----------	1300	11	25.5	28.0
Apr. 12, 1979 ----------	1140	94	25.0	26.0
May 8, 1979 ----------	1155	14	26.0	28.0
June 15, 1979 ----------	1050	58	26.0	27.0
July 11, 1979 ----------	1045	93	26.0	27.0
Aug. 10, 1979 ----------	0910	27	26.0	26.0
Sept. 7, 1979 ----------	0830	27	25.0	25.0
Oct. 4, 1979 ----------	0840	93	26.0	28.0
Nov. 6, 1979 ----------	1020	76	25.5	27.0
Jan. 15, 1980 ----------	1025	17	25.0	27.5
Jan. 24, 1980 ----------	1040	32	25.0	27.0
Feb. 21, 1980 ----------	1120	53	25.0	28.0
Mar. 18, 1980 ----------	1020	12	24.5	25.5
Apr. 25, 1980 ----------	1105	57	25.0	27.0
June 3, 1980 ----------	1055	17	25.0	28.5
Aug. 21, 1980 ----------	1055	35	25.0	27.0
Sept. 27, 1980 ----------	1000	130	25.5	26.5
Oct. 10, 1980 ----------	1255	29	25.0	29.0
Nov. 10, 1980 ----------	1105	25	25.5	27.5

Table 72. Water and air temperatures and instantaneous discharges at Ngerimel River, Babelthuap

[Temperatures read to units until June 1973, to half units thereafter]

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Mar. 27, 1968 ----------	1200	2.8	26	
Apr. 15, 1970 ----------	1230	.06	28	
May 18, 1970 ----------	1355	.03	29	
June 15, 1970 ----------	1025	.18	27	
July 8, 1970 ----------	1305	5.8	28	
July 23, 1970 ----------	1040	2.9	29	
Aug. 6, 1970 ----------	1405	1.6	30	
Sept. 8, 1970 ----------	1050	2.0	29	
Sept. 29, 1970 ----------	1300	5.0	29	
Oct. 21, 1970 ----------	1455	1.1	28	
Nov. 7, 1970 ----------	1425	2.0	29	
Dec. 3, 1970 ----------	1030	4.0	27	
Dec. 17, 1970 ----------	1350	5.3	28	
Jan. 6, 1971 ----------	1450	2.8	28	
Jan. 26, 1971 ----------	1515	.89	28	
Mar. 2, 1971 ----------	1230	.26	29	
Mar. 24, 1971 ----------	1155	.14	29	
Apr. 13, 1971 ----------	1505	.18	31	
July 6, 1971 ----------	1405	3.0	30	
Sept. 23, 1971 ----------	1350	.37	30	
Oct. 12, 1971 ----------	1400	3.1	30	
Oct. 26, 1971 ----------	1430	5.0	28	
Dec. 11, 1971 ----------	1255	.53	28	
Feb. 1, 1972 ----------	1740	6.3	28	
Mar. 1, 1972 ----------	1310	2.4	29	
Apr. 5, 1972 ----------	1520	1.7	29	
Apr. 27, 1972 ----------	1040	1.2	29	
May 22, 1972 ----------	1025	.86	25	
June 19, 1972 ----------	1405	1.0	29	
Aug. 22, 1972 ----------	1400	.43	24	
Sept. 25, 1972 ----------	1415	.56	30	
Oct. 19, 1972 ----------	1230	1.6	29	
Nov. 10, 1972 ----------	1445	.13	29	
Dec. 8, 1972 ----------	1035	.86	28	
Dec. 26, 1972 ----------	1010	.08	28	
Jan. 23, 1973 ----------	0900	.03	25	
Apr. 20, 1973 ----------	0905	.03	26	
May 15, 1973 ----------	0955	.02	28	
June 7, 1973 ----------	1250	1.4	29	
June 29, 1973 ----------	1000	.98	29	
Aug. 23, 1973 ----------	1005	8.7	28	

Table 72. Water and air temperatures and instantaneous discharges at Ngerimel River, Babelthuap--Continued

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Oct. 31, 1973	1005	1.5	29	--
Nov. 19, 1973	1125	6.1	28.0	--
Jan. 25, 1974	1315	3.9	29.0	--
Mar. 1, 1974	1310	.19	32.0	--
Apr. 11, 1974	1045	.55	29.5	--
May 3, 1974	1345	.29	35.0	--
July 16, 1974	1530	3.6	29.0	--
Aug. 12, 1974	1420	5.8	26.0	28.5
Sept. 24, 1974	1230	.42	29.5	28.5
Oct. 23, 1974	1200	2.3	29.0	29.5
Feb. 3, 1975	1650	1.6	29.0	29.0
Mar. 11, 1975	1400	.06	27.0	28.0
Apr. 17, 1975	0840	.06	26.0	28.5
June 17, 1975	1405	8.2	28.0	--
July 24, 1975	1355	1.8	31.0	29.0
Aug. 8, 1975	1345	2.4	28.0	28.0
Aug. 16, 1975	1325	2.6	27.0	29.0
Sept. 14, 1975	1135	4.1	29.0	28.0
Oct. 9, 1975	1220	4.4	28.0	28.0
Feb. 20, 1976	1455	.34	32.0	28.5
May 17, 1976	1355	.77	29.0	--
Jan. 10, 1977	1330	6.0	27.0	27.0
Feb. 10, 1977	1325	.05	27.0	28.0
Mar. 9, 1977	1405	.04	28.5	28.0
Sept. 6, 1977	1530	4.3	28.0	--
Oct. 11, 1977	1540	3.4	29.0	29.0
Nov. 1, 1977	1445	.48	31.5	28.0

Table 73. Water and air temperatures and instantaneous discharges at Edeng River, Babelthuap

[Temperatures read to units until June 1973, to half units thereafter]

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Apr. 15, 1970	1445	4.7	26	
May 18, 1970	1040	4.9	25	
June 10, 1970	1255	9.2	25	
July 1, 1970	1310	36	25	
July 23, 1970	1410	27	25	
Aug. 19, 1970	1210	25	24	
Sept. 8, 1970	1355	21	25	
Oct. 1, 1970	1405	33	25	
Oct. 6, 1970	1100	59	25	
Oct. 21, 1970	1045	36	25	
Nov. 7, 1970	1045	29	25	
Dec. 3, 1970	1330	44	25	
Dec. 17, 1970	1150	42	25	
Jan. 6, 1971	1105	18	25	
Jan. 26, 1971	1130	13	24	
Mar. 1, 1971	1140	15	24	
Mar. 22, 1971	1105	14	25	
Apr. 13, 1971	1115	7.6	25	
June 17, 1971	1130	38	25	
July 6, 1971	1130	30	25	
Aug. 4, 1971	1055	19	24	
Sept. 10, 1971	1255	10	24	
Sept. 23, 1971	1050	7.8	24	
Oct. 12, 1971	1120	39	25	
Oct. 26, 1971	1125	61	24	
Nov. 16, 1971	1205	24	25	
Jan. 10, 1972	1110	25	24	
Feb. 1, 1972	1445	60	25	
Mar. 1, 1972	1045	29	25	
Apr. 5, 1972	1115	32	25	
Apr. 27, 1972	1300	23	25	
May 22, 1972	1300	15	24	
June 19, 1972	1050	18	25	
July 21, 1972	1205	17	25	
Aug. 22, 1972	1020	22	24	
Sept. 15, 1972	1115	15	25	
Oct. 19, 1972	1025	21	24	
Nov. 10, 1972	1135	12	25	
Dec. 8, 1972	1330	14	25	
Dec. 26, 1972	1335	7.8	25	
Jan. 23, 1973	1140	4.9	24	

Table 73. Water and air temperatures and instantaneous discharges at Edeng River, Babelthuap--Continued

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Feb. 13, 1973	1200	2.8	25	--
Mar. 8, 1973	1345	2.2	26	--
Mar. 28, 1973	1205	2.6	26	--
Apr. 20, 1973	1205	21	25	--
May 15, 1973	1210	7.4	25	--
June 7, 1973	1005	19	25	--
Aug. 23, 1973	1230	41	25.0	--
Sept. 15, 1973	1240	25	25.5	--
Oct. 10, 1973	1055	42	25.5	--
Oct. 31, 1973	1200	18	25.5	--
Nov. 19, 1973	1345	55	25.5	--
Dec. 18, 1973	1450	9.3	25.0	--
Jan. 25, 1974	1055	33	25.5	--
Mar. 1, 1974	1055	12	26.0	--
Apr. 16, 1974	1115	23	25.5	--
May 3, 1974	1105	24	25.0	--
June 19, 1974	1100	15	25.0	--
July 16, 1974	1340	31	25.0	--
July 31, 1974	1500	20	26.0	29.0
Aug. 16, 1974	1055	27	25.0	29.0
Sept. 24, 1974	1510	14	25.0	28.0
Oct. 23, 1974	1510	24	25.5	29.0
Feb. 6, 1975	1420	20	25.5	27.0
Mar. 13, 1975	1040	7.0	25.0	27.5
Apr. 17, 1975	1050	4.0	25.0	28.5
May 15, 1975	1300	8.7	26.0	29.5
June 3, 1975	1515	14	26.0	28.5
June 26, 1975	1605	42	26.0	28.0
July 24, 1975	1105	24	25.0	29.0
Aug. 8, 1975	1105	28	25.0	28.0
Aug. 16, 1975	1220	29	25.0	29.0
Sept. 22, 1975	1155	16	25.0	27.5
Oct. 9, 1975	1035	30	25.5	28.0
Oct. 21, 1975	1100	27	25.0	28.0
Nov. 17, 1975	1305	27	24.5	27.5
Jan. 12, 1976	1430	118	24.5	26.5
Feb. 19, 1976	1545	15	25.5	28.0
Mar. 19, 1976	1315	8.0	25.0	27.0
Apr. 9, 1976	1215	97	25.0	28.0
May 20, 1976	1235	11	26.0	29.0
June 16, 1976	1345	18	25.5	28.5
July 29, 1976	1040	18	25.0	28.0
Jan. 10, 1977	1120	53	25.0	26.0

Table 73. Water and air temperatures and instantaneous discharges at Edeng River, Babelthuap--Continued

Date	Time	Streamflow, instantaneous (ft^3/s)	Water temperature (^oC)	Air temperature (^oC)
Feb. 10, 1977	1040	9.3	24.5	27.5
Mar. 9, 1977	1150	5.8	25.0	28.0
Apr. 14, 1977	1055	4.5	26.0	28.0
June 10, 1977	1115	31	25.5	28.0
Sept. 2, 1977	1210	43	26.0	28.0
Oct. 11, 1977	1400	24	26.5	29.0
Nov. 1, 1977	1250	18	26.0	28.5
Jan. 11, 1978	1140	16	26.0	28.0
Feb. 9, 1978	1045	32	25.0	28.5
June 20, 1978	1220	20	26.0	28.0
July 26, 1978	1145	11	25.0	28.0
Nov. 8, 1978	1130	23	25.0	27.0
Dec. 1, 1978	1055	17	25.0	27.0
Jan. 11, 1979	1115	8.8	24.5	28.0
Feb. 1, 1979	1115	9.0	26.0	28.5
Mar. 8, 1979	1340	16	26.0	29.0
May 4, 1979	1510	13	27.5	29.5
June 5, 1979	1300	27	26.0	29.0
June 29, 1979	1200	60	26.0	27.5
Aug. 6, 1979	1520	23	27.0	29.0
Sept. 5, 1979	1305	16	26.5	30.0
Oct. 31, 1979	1200	19	25.0	28.0
Nov. 29, 1979	1120	20	25.5	27.0
Jan. 22, 1980	1340	13	25.5	27.0
Feb. 13, 1980	1055	26	25.0	27.0
Mar. 17, 1980	1110	10	24.5	27.0
Apr. 15, 1980	1020	9.1	26.0	28.0
Aug. 5, 1980	1455	50	25.0	27.0
Sept. 12, 1980	1235	22	25.5	28.0
Sept. 23, 1980	1100	29	26.5	28.0
Sept. 26, 1980	1500	63	26.0	27.5
Oct. 7, 1980	1115	22	25.0	28.0
Nov. 3, 1980	1140	30	25.5	28.5

Table 74. Water and air temperatures and instantaneous discharges at Kmekumel River, Babelthuap

[Temperatures read to half units]

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
June 6, 1977	1220	2.3	25.0	28.0
June 13, 1977	1405	4.5	26.0	27.0
June 17, 1977	1030	6.1	26.0	28.0
June 24, 1977	1020	4.3	26.0	28.0
Sept. 6, 1977	1400	9.4	25.0	28.0
Sept. 19, 1977	1430	2.8	26.5	28.0
Oct. 14, 1977	1010	7.0	26.0	28.0
Nov. 8, 1977	1110	8.3	26.0	28.0
Aug. 15, 1978	1210	13	25.0	28.0
Nov. 9, 1978	1310	9.7	26.0	28.0
Dec. 6, 1978	1225	5.1	26.0	28.0
Jan. 12, 1979	1320	1.6	25.5	27.0
Feb. 5, 1979	1125	2.0	25.5	29.0
Mar. 13, 1979	1135	3.5	25.5	29.0
May 14, 1979	1240	6.6	26.0	28.0
June 13, 1979	1235	13	26.0	27.5
July 27, 1979	1355	12	25.5	26.5
Aug. 29, 1979	1400	6.7	25.5	26.5
Sept. 24, 1979	1235	17	26.0	28.5
Oct. 9, 1979	1615	6.9	26.0	27.0
Nov. 21, 1979	1020	7.8	26.0	28.0
Jan. 22, 1980	1010	3.7	25.0	27.0
Feb. 13, 1980	1325	8.1	25.0	27.0
Mar. 17, 1980	1335	2.6	25.0	28.0
Apr. 15, 1980	1245	2.3	26.0	28.0
May 14, 1980	1425	5.5	26.0	28.0
June 25, 1980	1220	7.4	26.0	28.0
Aug. 6, 1980	1200	3.4	26.0	28.0
Sept. 18, 1980	1105	3.5	25.0	28.0
Sept. 23, 1980	1330	9.9	26.0	28.0
Sept. 26, 1980	1130	7.8	26.0	27.0
Oct. 7, 1980	1330	6.2	26.0	28.0
Nov. 3, 1980	1350	7.0	26.0	--

Table 75. Water and air temperatures and instantaneous discharges at Kmekumel River at mouth, Babelthuap

[Temperatures read to units until March 1975, to half units thereafter]

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
May 18, 1970	1105	1.5	25	--
June 10, 1970	1330	3.4	25	--
July 1, 1970	1415	9.3	25	--
July 23, 1970	1505	8.8	25	--
Sept. 8, 1970	1425	7.6	25	--
Oct. 21, 1970	1155	13	25	--
Nov. 7, 1970	1120	9.4	25	--
Jan. 6, 1971	1230	5.0	25	--
Mar. 22, 1971	1205	5.0	25	--
Apr. 13, 1971	1150	2.5	25	--
Aug. 4, 1971	1150	6.0	25	--
Sept. 10, 1971	1305	2.8	26	--
Sept. 23, 1971	1130	2.0	25	--
Apr. 5, 1972	1155	9.3	25	--
Apr. 27, 1972	1335	5.2	25	--
May 22, 1972	1335	8.0	25	--
June 19, 1972	1125	5.7	25	--
July 21, 1972	1240	6.0	26	--
Sept. 25, 1972	1150	4.5	26	--
Oct. 19, 1972	1100	7.9	25	--
Nov. 10, 1972	1210	4.1	26	--
Dec. 8, 1972	1410	5.7	26	--
Dec. 26, 1972	1415	2.7	26	--
Jan. 23, 1973	1210	1.4	24	--
Feb. 13, 1973	1235	.97	25	--
Mar. 8, 1973	1405	.52	26	--
Mar. 28, 1973	1255	.55	26	--
Apr. 20, 1973	1240	16	25	--
May 15, 1973	1240	3.4	26	--
June 7, 1973	1035	6.9	25	--
Sept. 15, 1973	1310	7.7	26	--
Oct. 10, 1973	1135	15	26	--
Oct. 31, 1973	1240	6.7	26	--
May 3, 1974	1155	6.7	26	--
June 19, 1974	1215	4.1	26	--
Sept. 24, 1974	--	5.0	25	--
Mar. 13, 1975	1120	2.4	25	27
Apr. 17, 1975	1145	2.4	26.5	28.5
May 15, 1975	1010	4.8	26.0	28.5
July 24, 1975	1200	9.0	26.0	29.0
Aug. 8, 1975	1205	11	25.5	28.0

Table 75. Water and air temperatures and instantaneous discharges at Kmekumel River at mouth, Babelthuap--Continued

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Oct. 21, 1975	1215	9.7	26.0	28.0
Nov. 17, 1975	1400	6.5	25.0	26.5
Mar. 19, 1976	1340	2.5	26.0	27.0
May 20, 1976	1335	4.7	27.0	--
July 29, 1976	1140	5.4	25.5	28.0
Mar. 9, 1977	1230	2.2	26.0	28.0
Apr. 14, 1977	1135	1.7	26.0	28.0
June 10, 1977	1335	7.0	27.0	28.0
Feb. 9, 1978	1145	11	26.0	--
June 20, 1978	1310	8.4	26.5	28.0

Table 76. Water and air temperatures and instantaneous discharges at South Fork Ngerdorch River, Babelthuap

[Temperatures read to units until June 1973, to half units thereafter]

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Mar. 18, 1971	1145	8.8	25	
Apr. 19, 1971	1145	4.6	25	
June 24, 1971	1140	70	25	
July 15, 1971	1215	33	25	
Aug. 11, 1971	1055	10	25	
Aug. 31, 1971	1500	13	25	
Sept. 24, 1971	1210	5.0	27	
Oct. 6, 1971	1135	9.9	25	
Oct. 22, 1971	1505	19	25	
Nov. 8, 1971	1530	28	25	
Feb. 2, 1972	1050	17	25	
Mar. 8, 1972	1200	12	25	
Apr. 4, 1972	0945	20	25	
May 5, 1972	1000	17	24	
May 25, 1972	1120	6.3	24	

Table 76. Water and air temperatures and instantaneous discharges at South Fork Ngerdorch River, Babelthuap--Continued

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
June 22, 1972	1355	10	25	
July 27, 1972	0910	7.2	25	
Aug. 18, 1972	1125	13	25	
Oct. 1, 1972	1345	31	24	
Oct. 22, 1972	0940	8.9	24	
Nov. 22, 1972	1135	4.5	25	
Dec. 7, 1972	1105	12	25	
Jan. 4, 1973	1050	3.9	25	
Jan. 29, 1973	1400	1.8	24	
Feb. 23, 1973	1135	1.1	27	
Mar. 12, 1973	1240	.82	28	
Mar. 30, 1973	1115	.83	27	
Apr. 27, 1973	1320	4.8	26	
May 23, 1973	1200	13	25	
June 15, 1973	1025	14	25	
Aug. 27, 1973	1200	40	26.0	
Sept. 17, 1973	1040	30	26.5	
Nov. 1, 1973	1105	8.0	25.5	
Nov. 21, 1973	0835	25	25.5	
Dec. 14, 1973	1115	12	25.5	
Jan. 23, 1974	1115	23	25.5	
Feb. 27, 1974	1100	7.5	26.0	
Apr. 9, 1974	0910	12	25.5	
Apr. 29, 1974	1115	13	25.5	
May 17, 1974	1230	12	27.0	
July 8, 1974	1050	16	25.0	
Aug. 29, 1974	1255	8.8	26.5	29.0
Oct. 30, 1974	1345	41	25.0	28.0
Feb. 5, 1975	1220	11	26.5	29.5
Mar. 5, 1975	1120	2.8	26.0	29.5
Apr. 1, 1975	1035	7.2	25.5	29.0
May 1, 1975	1100	5.0	26.0	28.0
May 20, 1975	1145	4.2	26.0	27.0
June 18, 1975	1310	38	25.0	28.0
July 16, 1975	1205	24	25.0	27.0
Aug. 19, 1975	1045	16	25.0	27.5
Sept. 18, 1975	1140	4.9	25.5	26.5
Nov. 1, 1975	1215	8.4	26.0	29.0
Dec. 11, 1975	1320	20	26.0	27.5
Feb. 26, 1976	1120	4.2	24.5	27.0
Mar. 24, 1976	1225	4.0	25.5	29.0
Apr. 17, 1976	1105	9.9	26.0	30.0

Table 76. Water and air temperatures and instantaneous discharges at South Fork Ngerdorch River, Babelthuap--Continued

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
June 3, 1976	0940	3.3	25.5	28.0
July 1, 1976	1000	10	25.0	28.0
Jan. 13, 1977	1300	14	26.0	28.5
Feb. 17, 1977	1015	3.6	25.5	28.0
Mar. 22, 1977	1230	1.6	26.0	28.5
July 14, 1977	1235	23	25.0	27.5
Aug. 18, 1977	0910	28	26.0	28.0
Sept. 16, 1977	0930	8.5	26.0	28.0
Oct. 20, 1977	1155	12	27.5	30.5
Dec. 1, 1977	1200	8.4	26.0	29.0
Jan. 16, 1978	1325	6.2	27.0	30.0
Mar. 1, 1978	1200	16	26.0	29.0
July 14, 1978	1010	7.0	24.5	29.0
Aug. 31, 1978	1240	12	22.0	28.0
Dec. 21, 1978	1310	6.8	27.0	29.5
Jan. 30, 1979	1030	4.6	26.0	28.5
Mar. 14, 1979	1215	5.2	26.0	27.0
Apr. 20, 1979	1430	11	27.0	28.5
July 25, 1979	1350	64	26.0	27.0
Aug. 20, 1979	1245	18	27.0	31.0
Sept. 14, 1979	1445	9.7	26.0	27.5
Nov. 15, 1979	1125	11	26.5	30.0
Jan. 16, 1980	0950	5.4	25.0	27.0
Jan. 23, 1980	1055	5.8	25.0	27.0
Feb. 27, 1980	1150	10	26.0	29.0
Mar. 27, 1980	1250	7.4	26.0	30.0
May 2, 1980	1140	12	26.5	30.0
June 10, 1980	1300	9.3	26.0	29.0
July 18, 1980	1200	11	25.0	26.0
Aug. 28, 1980	1155	12	25.0	26.0
Sept. 24, 1980	1100	13	26.0	28.5
Oct. 8, 1980	1120	12	25.0	29.0
Nov. 13, 1980	1140	7.8	26.0	28.0

Table 77. Water and air temperatures and instantaneous discharges at North Fork Ngerdorch River, Babelthuap

[Temperatures read to half units]

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Jan. 15, 1976 ----------	1115	53	25.5	28.5
July 19, 1976 ----------	1110	67	25.5	27.0
Jan. 20, 1977 ----------	1040	35	25.0	28.0
Feb. 24, 1977 ----------	1010	13	25.0	27.0
Mar. 24, 1977 ----------	0910	9.4	26.0	28.0
June 7, 1977 ----------	0940	34	26.5	28.0
Sept. 29, 1977 ---------	1140	65	26.0	28.0
Nov. 11, 1977 ----------	0815	69	26.0	26.5
Jan. 30, 1978 ----------	1030	17	26.5	27.0
Nov. 17, 1978 ----------	0935	74	25.5	27.0
Jan. 17, 1979 ----------	1025	19	26.0	28.0
Feb. 23, 1979 ----------	1430	9.7	26.0	27.5
Mar. 29, 1979 ----------	1110	14	26.5	28.5
Apr. 23, 1979 ----------	1400	52	26.5	28.0
Aug. 22, 1979 ----------	1005	87	26.0	27.0
Oct. 7, 1979 ----------	1255	114	26.0	28.0
Jan. 18, 1980 ----------	0835	56	25.5	27.0
Jan. 23, 1980 ----------	1320	24	26.0	27.5
Feb. 27, 1980 ----------	1425	55	26.0	27.0
Mar. 27, 1980 ----------	1535	19	26.0	27.0
June 13, 1980 ----------	0920	76	25.5	27.5
July 18, 1980 ----------	1425	37	26.0	26.0
Sept. 24, 1980 ---------	1530	60	26.0	27.0
Oct. 8, 1980 ----------	1420	51	25.0	27.0
Nov. 13, 1980 ----------	1400	33	26.0	28.0

Table 78. Water and air temperatures and instantaneous discharges at North Fork Ngerdorch River tributary, Babelthuap

[Temperatures read to half units]

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Jan. 15, 1976 ----------	1220	8.5	25.0	28.5
July 19, 1976 ----------	1155	5.0	25.5	27.0
Jan. 20, 1977 ----------	1130	6.0	25.0	28.0
Feb. 24, 1977 ----------	1055	3.0	25.0	27.0
Mar. 24, 1977 ----------	0955	2.0	25.0	28.0
June 7, 1977 ----------	1030	4.0	26.5	28.0
Sept. 29, 1977 ---------	1220	7.4	26.0	28.0
Nov. 11, 1977 ----------	0915	8.5	26.0	26.5
Dec. 21, 1977 ----------	1325	4.8	25.0	27.5
Jan. 30, 1978 ----------	1220	4.2	26.0	27.0
Nov. 17, 1978 ----------	1035	14	25.5	27.0
Jan. 17, 1979 ----------	1110	4.3	25.5	--
Feb. 23, 1979 ----------	1505	2.3	25.5	27.5
Mar. 29, 1979 ----------	1150	2.6	26.5	28.5
Apr. 23, 1979 ----------	1425	4.0	26.0	28.0
Aug. 22, 1979 ----------	1040	10	26.0	27.0
Oct. 7, 1979 ----------	1240	10	26.0	28.0
Jan. 18, 1980 ----------	0915	16	25.0	27.0
Jan. 23, 1980 ----------	1340	5.1	25.5	27.5
Feb. 27, 1980 ----------	1455	9.2	26.0	27.0
Mar. 27, 1980 ----------	1605	4.2	26.0	27.0
June 17, 1980 ----------	1005	8.9	25.0	27.5
Sept. 24, 1980 ---------	1455	14	26.0	--
Oct. 8, 1980 ----------	1600	11	25.0	27.0
Nov. 13, 1980 ----------	1440	6.7	26.0	28.0

Table 79. Water and air temperatures and instantaneous discharges at Lmetmellasch River, Babelthuap

[Temperatures read to units until June 1973, to half units thereafter]

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Nov. 8, 1971	1115	3.4	25	--
May 4, 1972	0955	1.5	25	--
Dec. 5, 1972	1400	2.0	25	--
Feb. 7, 1973	1145	.26	24	--
Mar. 1, 1973	1230	.17	24.0	--
Apr. 3, 1973	1145	.13	26.0	--
May 2, 1973	0945	.17	25.0	--
June 5, 1973	0835	.70	25.0	--
Sept. 30, 1974	1005	.43	25.0	27.0
Mar. 18, 1975	0935	.48	25.5	27.0
Apr. 4, 1975	1145	.27	26.5	28.5
Apr. 5, 1977	1335	.16	26.0	27.0
June 8, 1977	1200	.16	27.0	29.0
Mar. 6, 1980	1245	1.1	25.5	26.5
Apr. 8, 1980	1200	.58	26.0	27.0
June 19, 1980	1310	.90	26.0	27.0
July 25, 1980	1155	1.6	26.0	27.0
Oct. 14, 1980	1200	1.0	26.0	28.0
Nov. 21, 1980	1150	.73	26.5	28.0

Table 80. Water and air temperatures and instantaneous discharges at unnamed west coast stream, Ngerekebesang

[Temperatures read to units until June 1973, to half units thereafter]

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Oct. 26, 1970	1130	0.07	27	
Nov. 13, 1970	0930	.10	25	
Dec. 21, 1970	0905	.10	25	
Jan. 28, 1971	1645	.08	26	
Mar. 3, 1971	0835	.05	25	
Mar. 27, 1971	1050	.06	26	
Apr. 12, 1971	1405	.04	26	
May 4, 1971	1400	.05	28	
June 22, 1971	1120	.18	25	
July 13, 1971	1325	.32	25	
Aug. 12, 1971	1345	.05	27	
Sept. 9, 1971	1455	.04	27	
Sept. 30, 1971	1005	.09	25	
Oct. 18, 1971	1005	.22	25	
Oct. 27, 1971	1535	.17	25	
Nov. 18, 1971	1415	.12	26	
Jan. 31, 1972	1440	.08	26	
Mar. 17, 1972	1435	.22	26	
Apr. 6, 1972	1405	.13	26	
May 3, 1972	1605	.09	25	
May 30, 1972	1545	.11	25	
June 29, 1972	1010	.29	25	
Aug. 1, 1972	1345	.08	25	
Aug. 29, 1972	1405	.17	26	
Oct. 4, 1972	0920	.09	26	
Oct. 25, 1972	1200	.08	26	
Nov. 28, 1972	1255	.10	26	
Dec. 11, 1972	1315	.07	26	
Jan. 3, 1973	1045	.06	26	
Feb. 5, 1973	1325	.01	26	
Mar. 2, 1973	1511	.02	26	
Mar. 14, 1973	0940	.02	26	
Apr. 4, 1973	1325	.01	29	
May 7, 1973	0945	.03	26	
May 29, 1973	1430	.05	26	
June 21, 1973	0840	.04	26	
Aug. 30, 1973	1035	.05	26.5	
Oct. 3, 1973	1325	.29	26.0	
Oct. 23, 1973	1005	.08	26.5	
Nov. 8, 1973	0905	.08	26.0	
Dec. 19, 1973	1040	.16	26.5	

Table 80. Water and air temperatures and instantaneous discharges at unnamed west coast stream, Ngerekebesang--Continued

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Jan. 23, 1974	1515	0.29	26.5	--
Feb. 26, 1974	1455	.06	28.0	--
Apr. 11, 1974	1405	.06	27.0	--
May 7, 1974	0950	.06	26.5	--
June 28, 1974	1355	.07	27.0	--
July 17, 1974	1320	.11	26.0	--
Aug. 2, 1974	1145	.09	26.0	--
Oct. 1, 1974	1005	.03	26.0	28.0
Jan. 28, 1975	1100	.12	26.5	30.0
Mar. 12, 1975	1420	.48	27.0	28.5
Apr. 18, 1975	1450	.05	28.0	30.0
May 29, 1975	1115	.11	26.0	28.5
July 1, 1975	0855	.20	25.5	27.5
July 23, 1975	1030	.14	26.0	27.0
Aug. 26, 1975	1155	.09	26.0	29.5
Oct. 18, 1975	1125	.20	26.0	27.5
Nov. 28, 1975	1045	.08	26.0	28.0
Feb. 6, 1976	1400	.04	27.0	27.0
Mar. 10, 1976	1100	.03	26.5	--
June 4, 1976	1125	.02	26.5	28.0
July 20, 1976	1410	.01	26.0	28.0
Jan. 25, 1977	0915	.03	25.5	28.0
Feb. 23, 1977	1110	.05	25.0	27.5
Apr. 6, 1977	1030	.01	26.5	28.0
June 14, 1977	1405	.01	27.0	27.0
Oct. 4, 1977	1545	.12	27.0	28.0
Jan. 6, 1978	1215	.01	26.5	28.5
Feb. 10, 1978	1355	.02	28.0	28.0
Dec. 15, 1978	1510	.14	27.5	28.5

Table 81. Water and air temperatures and instantaneous discharges at unnamed south coast stream, Ngerekebesang

[Temperatures read to units until June 1973, to half units thereafter]

Date	Time	Streamflow, instantaneous (ft^3/s)	Water temperature (^oC)	Air temperature (^oC)
May 5, 1970	0905	0.02	26	
May 14, 1970	1410	.04	27	
June 9, 1970	1255	.04	27	
June 29, 1970	1300	.09	26	
July 24, 1970	1355	.08	27	
Aug. 20, 1970	1640	.10	26	
Sept. 10, 1970	1040	.10	26	
Sept. 30, 1970	1535	.12	25	
Oct. 22, 1970	1515	.13	27	
Nov. 13, 1970	1035	.09	26	
Dec. 4, 1970	1030	.11	25	
Dec. 21, 1970	1145	.12	26	
Jan. 7, 1971	0825	.11	25	
Jan. 28, 1971	1315	.09	26	
Mar. 3, 1971	1445	.07	26	
Mar. 26, 1971	1150	.07	26	
Apr. 12, 1971	1150	.05	25	
May 4, 1971	1200	.05	26	
June 22, 1971	1000	.18	26	
July 13, 1971	1215	.31	26	
Aug. 12, 1971	1400	.06	26	
Sept. 9, 1971	1050	.07	26	
Sept. 30, 1971	0910	.12	25	
Oct. 18, 1971	1350	.19	25	
Oct. 27, 1971	1325	.17	26	
Nov. 18, 1971	1325	.14	25	
Jan. 31, 1972	1325	.08	26	
Mar. 17, 1972	1330	.18	26	
Apr. 6, 1972	1455	.11	26	
May 3, 1972	1455	.07	26	
May 30, 1972	1505	.11	25	
June 29, 1972	0920	.29	25	
Aug. 1, 1972	1315	.06	26	
Aug. 29, 1972	1310	.09	26	
Oct. 4, 1972	1210	.07	26	
Oct. 25, 1972	1110	.09	26	
Nov. 28, 1972	0955	.08	26	
Jan. 3, 1973	0955	.08	26	
Feb. 5, 1973	1110	.03	25	
Mar. 2, 1973	1425	.02	26	
Mar. 14, 1973	0900	.02	26	

Table 81. Water and air temperatures and instantaneous discharges at unnamed south coast stream, Ngerekebesang--Continued

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Apr. 4, 1973	1235	0.03	27	
May 7, 1973	1440	.03	26	--
May 29, 1973	0920	.08	25	--
June 21, 1973	0800	.06	25.0	--
Aug. 30, 1973	1005	.05	27.0	--
Sept. 28, 1973	0845	.11	26.5	--
Oct. 23, 1973	0915	.12	26.5	--
Nov. 8, 1973	0940	.10	26.5	--
Dec. 19, 1973	0915	.11	26.0	--
Jan. 27, 1974	1405	.26	28.0	--
Feb. 27, 1974	1605	.06	27.0	--
Apr. 11, 1974	1500	.13	26.5	--
May 7, 1974	0855	.07	26.5	--
June 28, 1974	1315	.09	26.5	--
July 17, 1974	1255	.17	26.5	28.0
Sept. 5, 1974	0840	.05	26.0	29.0
Oct. 1, 1974	0830	.04	26.0	27.5
Jan. 28, 1975	0930	.18	26.5	30.0
Mar. 12, 1975	1510	.03	25.0	29.5
Apr. 18, 1975	1545	.02	27.0	28.5
May 29, 1975	1005	.05	26.5	--
July 1, 1975	0805	.13	26.0	27.5
July 23, 1975	1150	.12	27.0	28.5
Aug. 26, 1975	1240	.06	26.5	28.0
Oct. 8, 1975	1025	.18	26.5	27.5
Nov. 28, 1975	0945	.05	26.0	27.5
Feb. 4, 1976	1220	.09	26.0	27.0
Mar. 10, 1976	0910	.06	26.0	27.0
June 4, 1976	1045	.03	26.5	28.0
July 20, 1976	1020	.03	26.0	28.0
Jan. 11, 1977	1230	.05	26.5	28.0
Feb. 23, 1977	0940	.03	26.0	27.5
Apr. 6, 1977	1330	.02	26.5	28.0
June 14, 1977	1305	.01	27.0	27.0
Oct. 4, 1977	1455	.15	27.0	28.5
Nov. 17, 1977	1420	.04	27.5	29.5
Jan. 6, 1978	1115	.02	26.0	28.5
Feb. 10, 1978	1035	.07	27.0	28.0
Dec. 15, 1978	1405	.13	27.5	29.0

Table 82. Water and air temperatures and instantaneous discharges at unnamed west coast stream, Malakal

[Temperatures read to units until June 1973, to half units thereafter]

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Oct. 8, 1970	1335	0.01	25	--
Oct. 27, 1970	1140	.02	25	--
Nov. 12, 1970	1015	.01	25	--
Dec. 2, 1970	1125	.01	25	--
Dec. 23, 1970	1020	.02	25	--
Jan. 11, 1971	1015	.06	25	--
Jan. 29, 1971	1040	.02	26	--
Feb. 19, 1971	1010	.02	25	--
Mar. 27, 1971	0925	.004	25	--
May 10, 1971	1405	.03	25	--
June 28, 1971	0915	.02	25	--
July 14, 1971	1015	.04	25	--
Sept. 28, 1971	1120	.03	25	--
Oct. 15, 1971	1035	.01	25	--
Oct. 28, 1971	1035	.03	25	--
Nov. 19, 1971	1430	.02	25	--
Jan. 31, 1972	1100	.008	25	--
Mar. 16, 1972	1100	.06	25	--
Apr. 7, 1972	1545	.01	25	--
June 29, 1972	1600	.03	25	--
Aug. 2, 1972	1525	.01	25	--
Aug. 30, 1972	1440	.06	27	--
Oct. 5, 1972	1105	.01	25	--
Oct. 26, 1972	1050	.004	25	--
Nov. 30, 1972	1445	.004	25	--
Dec. 12, 1972	1520	.01	25	--
June 21, 1973	1035	.01	26	--
Aug. 16, 1973	1440	.01	26.0	--
Sept. 6, 1973	1505	.02	26.5	--
Oct. 3, 1973	1040	.18	26.0	--
Nov. 15, 1973	1420	.04	26.5	--
Mar. 2, 1974	1600	.01	28.5	--
Apr. 9, 1974	1355	.01	26.0	--
May 8, 1974	0915	.002	26.0	--
July 19, 1974	1430	.04	25.5	--
Aug. 2, 1974	0925	.01	28.0	--
Jan. 28, 1975	1515	.02	26.5	30.0
May 29, 1975	1430	.02	26.0	27.5
July 7, 1975	1400	.03	26.0	27.5
July 23, 1975	1415	.014	26.0	28.5
Aug. 26, 1975	1500	.004	26.0	27.5
Oct. 8, 1975	1420	.01	25.0	27.0
Nov. 28, 1975	1450	.004	26.5	29.0

Table 83. Water and air temperatures and instantaneous discharges at unnamed north coast stream, Malakal

[Temperatures read to units until June 1973, to half units thereafter]

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Oct. 27, 1970	1040	0.02	25	--
Nov. 12, 1970	0925	.01	25	--
Dec. 7, 1970	1030	.02	25	--
Dec. 23, 1970	0900	.02	25	--
Jan. 11, 1971	0910	.14	25	--
Jan. 29, 1971	0910	.02	25	--
Feb. 19, 1971	1015	.04	25	--
Mar. 25, 1971	1125	.02	25	--
Apr. 14, 1971	0910	.005	25	--
May 10, 1971	1330	.08	25	--
June 28, 1971	0830	.04	25	--
July 14, 1971	0840	.08	25	--
Sept. 28, 1971	1040	.04	25	--
Oct. 15, 1971	0920	.05	25	--
Oct. 28, 1971	0945	.05	25	--
Nov. 19, 1971	1330	.02	25	--
Jan. 31, 1972	1025	.01	25	--
Mar. 16, 1972	1130	.06	25	--
Apr. 7, 1972	1515	.02	25	--
May 31, 1972	0915	.01	25	--
June 29, 1972	1510	.06	25	--
Aug. 2, 1972	1500	.01	25	--
Aug. 30, 1972	1400	.09	25	--
Oct. 5, 1972	1130	.02	25	--
Oct. 26, 1972	1015	.01	25	--
Nov. 30, 1972	1345	.01	25	--
Dec. 12, 1972	1435	.01	25	--
June 21, 1973	1000	.01	26	--
Aug. 16, 1973	1345	.01	26.0	--
Sept. 6, 1973	1420	.03	26.5	--
Oct. 3, 1973	1005	.13	26.0	--
Oct. 26, 1973	1315	.03	26.5	--
Nov. 15, 1973	1335	.06	26.5	--
Apr. 9, 1974	1330	.02	26.0	--
May 8, 1974	0815	.01	26.0	--
June 28, 1974	1345	.01	26.0	--
July 19, 1974	1345	.07	26.0	--
Aug. 2, 1974	0845	.02	25.5	28.0
Sept. 5, 1974	1055	.02	26.0	29.0
Oct. 1, 1974	1355	.02	26.0	29.0
Oct. 31, 1974	1020	.04	25.5	28.0

Table 83. Water and air temperatures and instantaneous discharges at unnamed north coast stream, Malakal--Continued

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Water temper-ature (^oC)	Air temper-ature (^oC)
Jan. 28, 1975 ----------	1425	0.04	26.5	30.0
Mar. 13, 1975 ----------	1425	.01	26.0	28.5
May 29, 1975 ----------	1350	.04	26.0	27.5
July 7, 1975 ----------	1445	.09	26.0	27.5
July 23, 1975 ----------	1325	.03	26.0	28.5
Aug. 26, 1975 ----------	1405	.007	26.5	29.5
Oct. 8, 1975 ----------	1515	.05	25.5	27.0
Nov. 28, 1975 ----------	1530	.02	26.0	27.5
Feb. 6, 1976 ----------	1045	.01	25.5	27.0
Mar. 10, 1976 ----------	1415	.01	25.5	28.0
Jan. 25, 1977 ----------	0930	.02	25.0	27.5
Feb. 23, 1977 ----------	1330	.05	25.5	28.0
Oct. 4, 1977 ----------	0905	.02	26.5	28.0
Dec. 15, 1978 ----------	0935	.02	26.0	27.5
Jan. 21, 1980 ----------	1545	.02	26.0	27.0

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