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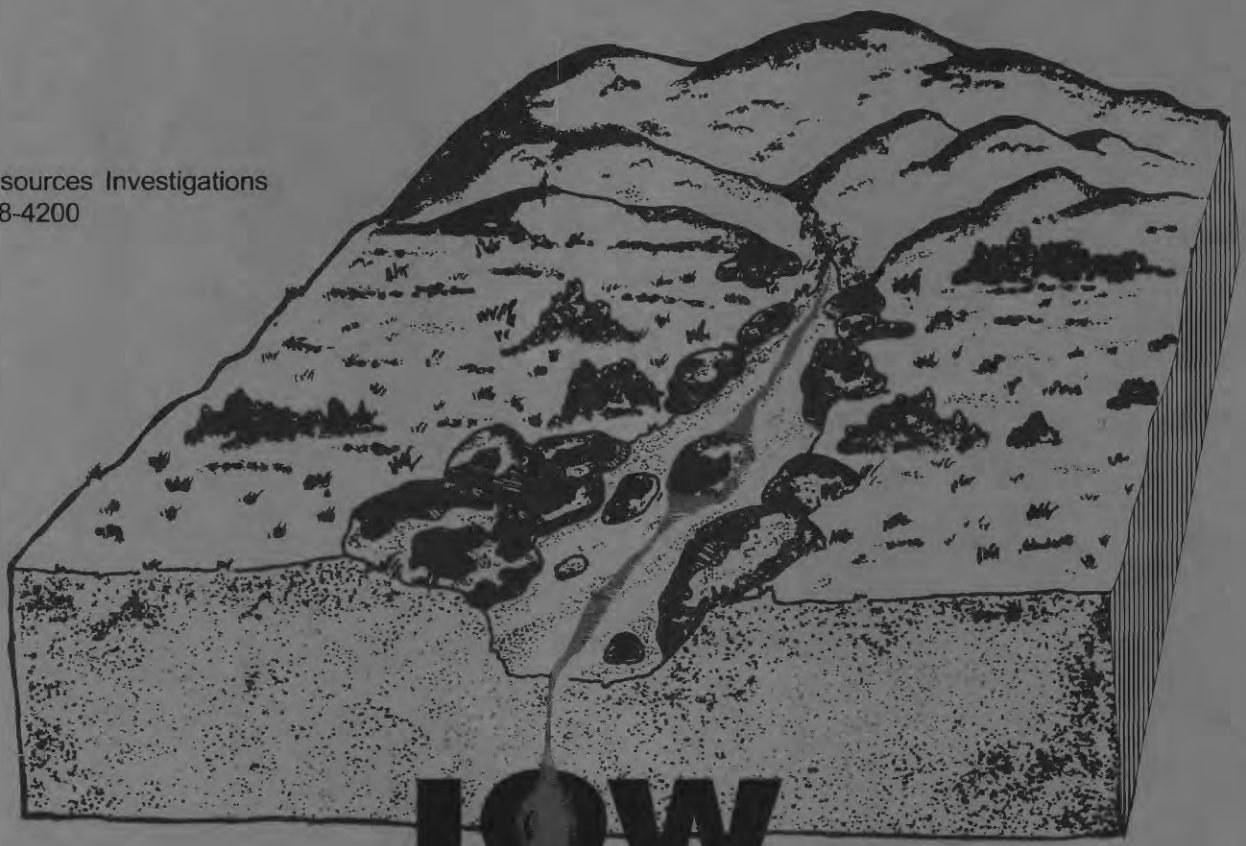
Water-Resources Investigations
Report 98-4200



LOW FLOW

Characteristics at Selected Sites on Streams in Northern and Central Puerto Rico

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

Low-Flow Characteristics at Selected Sites on Streams in Northern and Central Puerto Rico

By Luis Santiago-Rivera

U.S. GEOLOGICAL SURVEY

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San Juan, Puerto Rico
1998

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CONVERSION FACTORS AND ACRONYMS

Multiply	By	To obtain
inch (in.)	25.4	millimeter
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer
acre	4,047	square meter
square mile (mi^2)	2.590	square kilometer
foot per mile (ft/mi)	0.1894	meter per kilometer
cubic foot per second (ft^3/s)	0.02832	cubic meter per second

Acronyms used in this report:

PRASA Puerto Rico Aqueduct and Sewer Authority
PREQB Puerto Rico Environmental Quality Board
USGS United States Geological Survey

Low-Flow Characteristics at Selected Sites on Streams in Northern and Central Puerto Rico

By **Luis Santiago-Rivera**

Abstract

Knowledge of the magnitude and frequency of low flows is important for the optimal development of surface-water resources in Puerto Rico. The report provides analyses of low-flow data and tabulations of computed low-flow magnitude and frequency characteristics for 7, 14, 30, 60, and 90 consecutive days with recurrence intervals of 2 and 10 years for 15 continuous-record gaging stations in northern and central Puerto Rico based on the log-Pearson Type III frequency distribution or graphically adjusted log-Pearson frequency curves. Estimates of low-flow characteristics are provided for 94 partial-record gaging stations for 7, 14, and 30 consecutive days with recurrence intervals of 2 and 10 years. Low-flow characteristics at partial-record gaging stations were estimated based on the relation of base-flow discharge measurements at the partial-record gaging stations to concurrent discharges at nearby continuous-record gaging stations.

INTRODUCTION

A thorough analysis of low-flow magnitude and frequency characteristics of selected streams in Puerto Rico is necessary because of the increasing demand upon surface-water resources by industrial and public users, and the legal requirements for pollution control. As water demand and waste discharges to streams increase, knowledge of low-flow characteristics of streams becomes increasingly important. Low-flow information can be used as an index for water-management regulations, to assess the water-supply potential, and to adequately evaluate the capacity of a stream to receive waste loads. A good understanding of minimum streamflow characteristics is also vital to preserve aquatic and wildlife habitats.

Low-flow discharge data for streams in Puerto Rico have been collected over a number of years. Low-flow characteristics have been published in reports by Cobb (1978), Colón-Dieppa and Quiñones-Aponte (1985), Santiago-Rivera (1992), and Santiago-Rivera (1996). Since these studies were completed, additional streamflow data have been collected at continuous-record gaging stations.

PURPOSE AND SCOPE

The purpose of this report is to provide estimates of low-flow magnitude and frequency at selected sites on streams north of the insular hydrologic divide in Puerto Rico (fig. 1). In response to increasing needs for low-flow information, the U.S. Geological Survey (USGS), in cooperation with the Puerto Rico Aqueduct and Sewer Authority (PRASA) and the Puerto Rico Environmental Quality Board (PREQB) began a long-range study in 1983 to estimate low flows of streams in Puerto Rico.

The low-flow network in northern and central Puerto Rico includes 15 long-term continuous-record gaging stations (fig. 2) with at least 10 years of record (only 1 continuous-record gaging station with less than 10 years of record was used as a long-term record station) and 94 partial-record gaging stations (fig. 3).

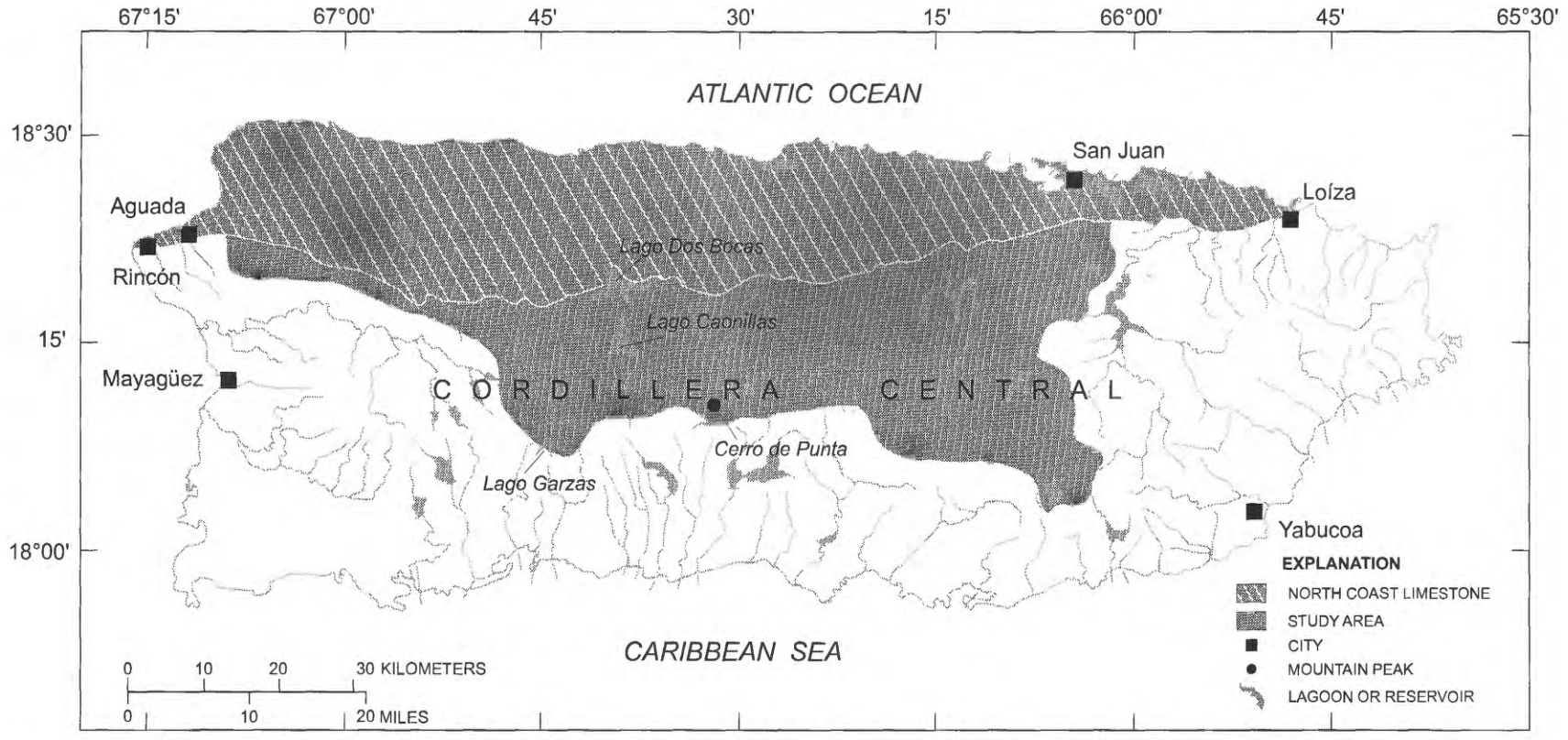


Figure 1. General features of Puerto Rico.

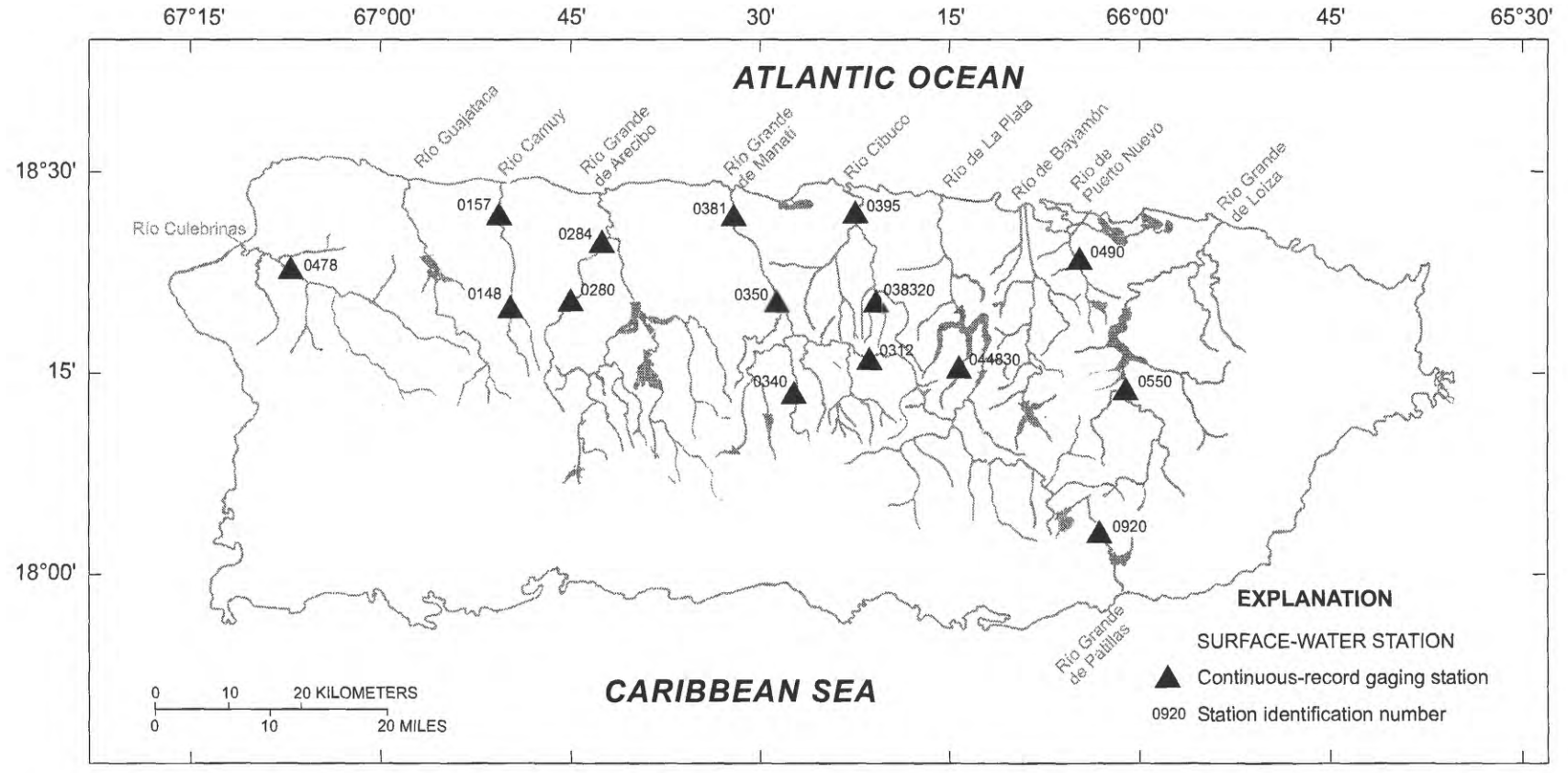


Figure 2. Location of low-flow continuous-record gaging stations in northern and central Puerto Rico.

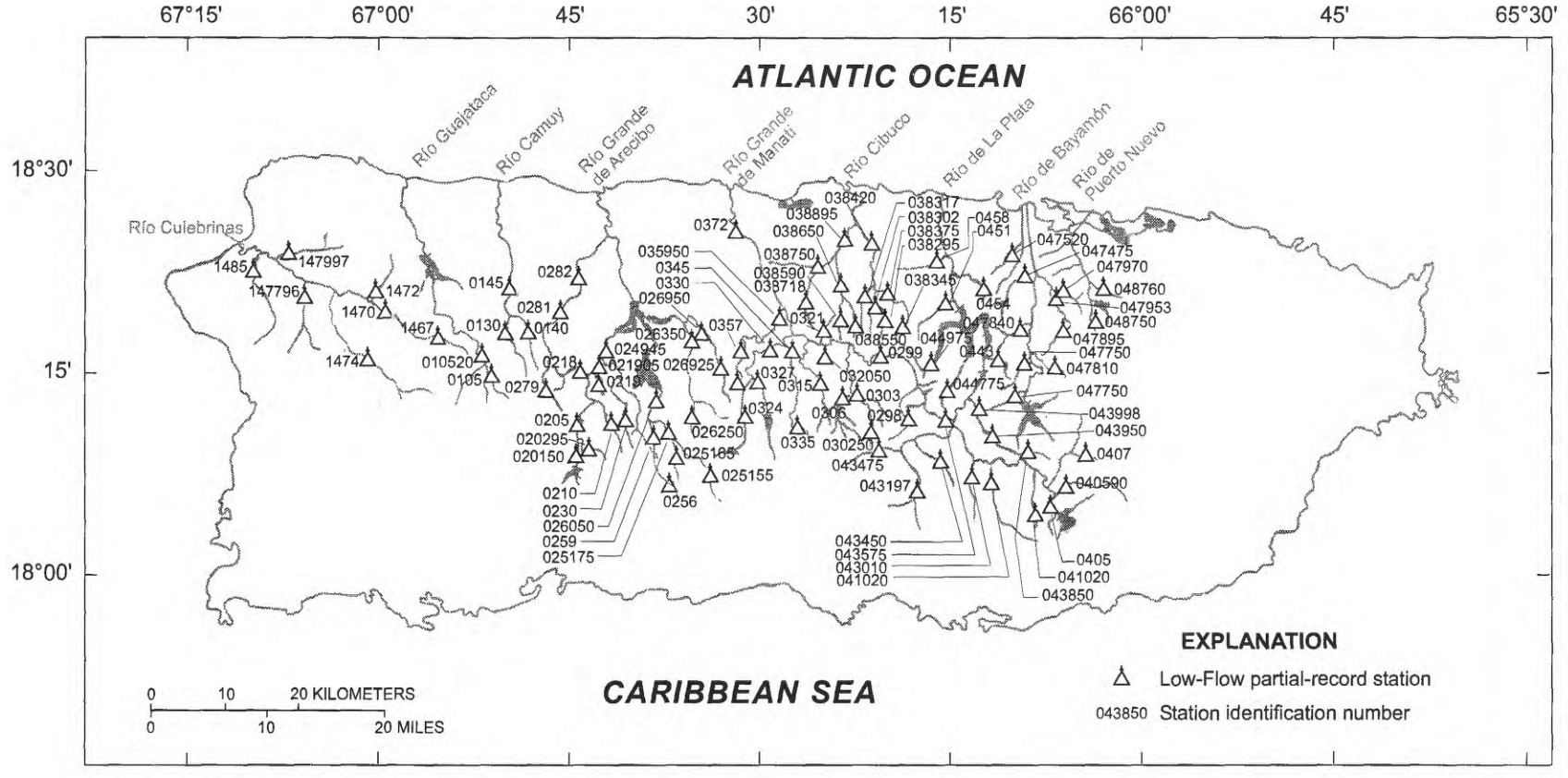


Figure 3. Location of low-flow partial-record gaging stations in northern and central Puerto Rico.

These stations are well distributed areally through out the study area. Long-term continuous-record streamflow-gaging stations are sites where daily flow data are systematically collected over a period of 10 or more years. Gaging stations with less than 10 years of record (short-term continuous-record gaging stations) were analyzed as partial-record gaging stations. Low-flow partial-record gaging stations are streamflow sites where periodic discharge measurements are made during different base-flow recessions over several years. Continuous- and partial-record gaging stations were measured at least twice a year during base-flow periods for a total of eight discharge measurements per station in 4 years. The study includes low-flow frequency analyses for periods of 7, 14, 30, 60, and 90 consecutive days for recurrence intervals of 2 and 10 years at continuous-record gaging stations and estimates of low-flow frequency characteristics for 7, 14, and 30 consecutive days with recurrence intervals of 2 and 10 years at selected partial-record gaging stations.

DESCRIPTION OF STUDY AREA

The study area covers northern and central Puerto Rico. All of the area is north of the insular hydrologic divide of Puerto Rico and extends from the city of Aguada in the northwest to the city of San Juan in the north (fig. 1). Located within this area is the North Coast Limestone Belt which extends from the city of Rincón on the west to the city of Loíza on the northeast (fig. 1).

The Cordillera Central mountain range is the most prominent topographic feature and the wettest (100 in. of rain per year) region in the study area. This mountain range extends the entire length of Puerto Rico from the city of Yabucoa on the southeast coast to the city of Mayagüez on the west coast.

The Río Grande de Arecibo (fig. 2) with a drainage area of about 206 mi^2 is the largest basin in the study area. Located within this basin (fig. 1) are the Lago Garzas (6.0 mi^2), Lago Caonillas (49 mi^2), and Lago Dos Bocas (115 mi^2), excluding 49 mi^2 captured by Lago Caonillas and 6.0 mi^2 captured by Lago Garzas reservoir. Lago Garzas does not contribute any surface flow to the Río Grande de Arecibo basin during base-flow conditions. The flow of Lago Caonillas and Lago Dos Bocas is regulated to generate hydroelectric power. Most river basins in the study area are characterized by turbulent streams with steep slopes. Land-surface altitudes range from mean sea level to 4,390 ft at Cerro de Punta, which is the highest peak in Puerto Rico (fig. 1).

Climate in the study area is humid tropical with winds approaching predominately from the east. Average annual rainfall ranges from about 60 in. along the coast to about 100 in. in the Cordillera Central, Calvesbert (1970). Average annual pan evaporation of 45 in. was reported by Giusti (1978) for the North Coast Limestone Belt. The dry season extends from January through April; the wet season extends from August through December. Normally, April is the driest month of the year. The minimum annual streamflow normally occurs during April or early May.

METHODS OF ANALYSES

Different techniques were applied to continuous- and partial-record gaging stations. Analyses for continuous-record gaging stations were based on frequency analyses of the annual minimum n-day low flows. For partial-record gaging stations, base-flow discharge measurements were related to concurrent base-flow discharge measurements or daily mean-flows at nearby continuous-record gaging stations. The low-flow characteristics at the partial-record gaging station were then determined through correlation using the corresponding characteristics at the continuous-record gaging station. A discussion of these techniques and the reliability of the estimates derived from them are provided in the following sections.

Low Flow at Continuous-Record Gaging Stations

Low-flow frequency curves were derived for 15 continuous-record gaging stations (fig. 2) using the method described by Riggs (1972) and by adaptation of the log-Pearson Type III flood-frequency program described by the Interagency Advisory Committee on Water Data (1982). The fitted log-Pearson Type III probability distribution and the recurrence interval

(RI) of the annual n-day low flows were plotted by computer for each continuous-record gaging station. Discharges were arrayed in order of magnitude and assigned order numbers. The lowest discharge was given the order number 1. The recurrence interval of each value in the array was computed using the plotting position formula currently in use by the USGS,

$$RI = (n+1)/m,$$

where n is the number of years of record and m is the order number in the array. The graphically-fitted curve based on the resulting plotting positions should be considered the basic frequency curve for annual low flows (Riggs, 1972). However, Riggs recommended that the computer plot be obtained and the log-Pearson Type III mathematical frequency curve (calculated value) be used if it is an adequate fit. For this report, the mathematical frequency curve was used because the mathematical and graphical frequency curves were similar, as shown by a typical computer plot (fig. 4).

Fifteen streamflow long-term continuous-record gaging stations (fig. 2) located on perennial streams with a minimum of 10 years of record were included in the analyses. The Río Guadiana gaging station (50044830) is the only continuous-record gaging station with less than 10 years of record that was used as a long-term record station. The data used for these analyses have been published through the 1996 water year (U.S. Geological Survey Water Resources Data-Puerto Rico and the U.S. Virgin Islands, water years 1958–96).

The basic data requirement needed to determine low-flow frequency characteristics at a continuous-record gaging station is the annual minimum daily-mean discharge for selected lengths of time. In Puerto Rico, annual minimum discharge for streams usually occurs in April or early May. Frequency curves for each continuous-record gaging station were derived using the log-Pearson Type III distribution, adapted from the Interagency Advisory Committee on Water Data (1982). This study analyzed daily-mean discharge for continuous-record gaging stations for 7, 14, 30, 60, and 90 consecutive days in each water year (October 1 to September 30). A 7-consecutive-day period was the shortest period analyzed. Low-flow discharges were determined from the frequency curve for recurrence intervals of 2 and 10 years.

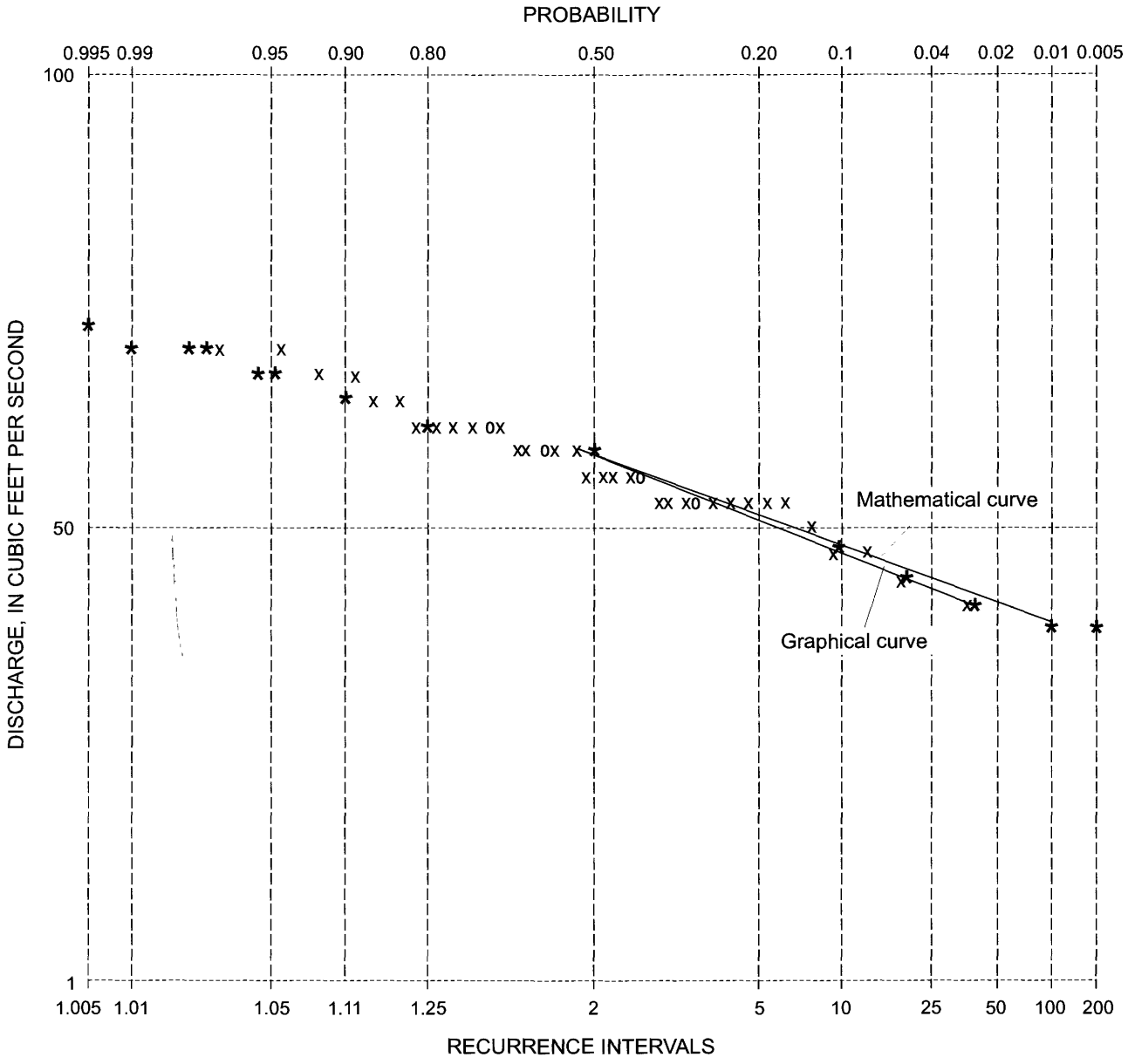
Low-flow characteristics of streams affected by reservoirs or irrigation canals may differ substantially from stations that exist under natural conditions, and data from regulated streams cannot be used to estimate the flow of nearby unregulated streams. Gaging stations where considerable anthropogenic regulation of stream flow existed were excluded from this study.

Low Flow at Partial-Record Gaging Stations

Low-flow characteristics for partial-record gaging stations were estimated using a relation curve (fig. 5) developed by correlating base-flow discharge measurements made at partial-record gaging stations with concurrent discharges at the continuous-record gaging stations (index stations) and the low-flow characteristic for the index station. This estimating technique, illustrated in figure 5, transfers the low-flow characteristic for 7 consecutive days at a 2-year recurrence interval (13.8 ft^3/s) computed by the log-Pearson Type III frequency distribution for the index station (50028000) to the graphically-determined relation curve to determine the corresponding low-flow characteristic (7-day, 2-year; 5.60 ft^3/s) for the partial-record gaging station (50025175). Low-flow characteristics for 7, 14, and 30 consecutive days for recurrence intervals of 2 or 10 years were estimated as described above for 94 low-flow partial-record gaging stations at which at least eight low-flow discharge measurements were available. The development of the control-point method (fig. 5) is described by Thomson and Carter (1963). This method is based on the observation that if correlation of simultaneous natural flows at gaging stations within short distances of each other were plotted on logarithmic coordinates, the relation curves tended to be straight lines which intersect the line of equal yield at a discharge about 1.5 times the average discharge at the independent station. The method is useful because the lower part of the relation curve can be consistently approximated by a straight line on a logarithmic plot. The relation curve must be defined by a sufficient number of simultaneous discharges. The line of equal yield (fig. 5) shows equal discharge per unit of drainage area and,

STATION-50028000
RÍO TANAMÁ NEAR UTUADO, PUERTO RICO
1961-96, 12-MONTH PERIOD ENDING SEPTEMBER 30
7-DAY LOW VALUE

N = 28



EXPLANATION

x AN INPUT DATA VALUE

* A CALCULATED VALUE

0 A CALCULATED VALUE AND ONE INPUT DATA VALUE AT SAME POSITION

N YEARS OF RECORD AT STATION

Figure 4. Computer generated low-flow frequency curve and graphical low-flow frequency curve for the Río Tanamá gaging station near Utuado, Puerto Rico.

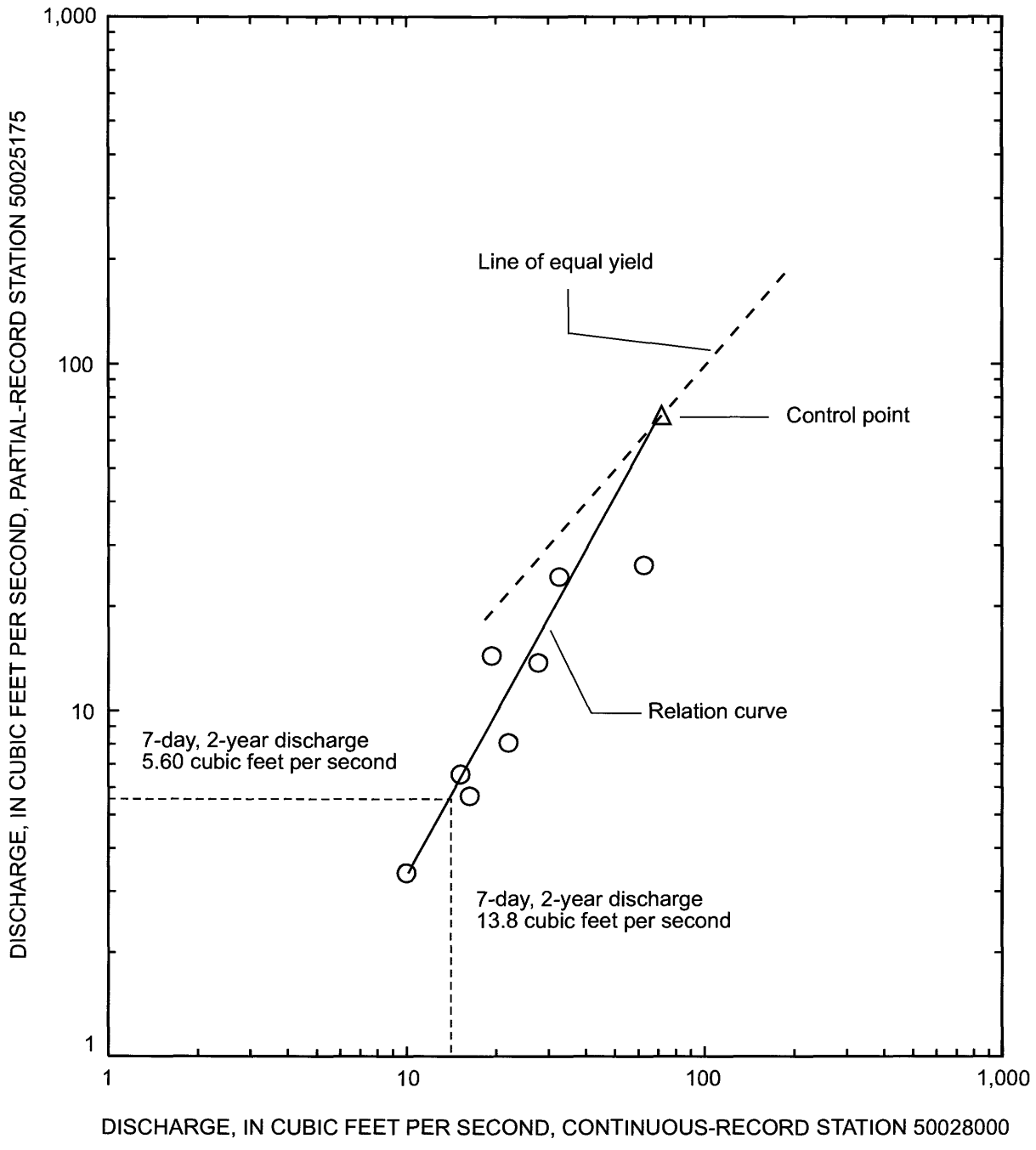


Figure 5. Relation between concurrent discharges at a partial-record station and a nearby continuous-record station.

in conjunction with the control-point method, helps establish the position of the relation curve which is used to estimate the low-flow frequency at the partial-record gaging stations. At stations located in the limestone zone where the drainage area was estimated or is indeterminate, a graphically determined best-fit line through the data was used to estimate the low-flow characteristics. The analyses and compilations used in this report were made from USGS data files stored in Reston, Virginia.

All continuous-record gaging stations included in this report are located on perennial streams. Partial-record gaging stations were located as near as possible to corresponding index stations that were similar in size of drainage area and geologic setting. The number of base-flow discharge measurements and the index station number used in the correlations are included in the station headings of the partial-record gaging stations table presented in appendix 2.

Reliability of Results

Low-flow frequency analyses are subject to errors. These errors are associated with many factors related to time, length of record, variability of flow, number of discharge measurements available for analyses, accuracy of discharge measurements, anthropogenic changes to streamflow (permanent or transitory), and compatibility of geologic features. The accuracy of estimates of low-flow characteristics is related to how accurately the correlation of concurrent discharges reflect the actual relation between partial-record gaging station and the index stations. The low-flow characteristics presented in this study for continuous-record gaging stations with less than 20 years of data will probably change to some degree as the length of record for these stations increases and more streamflow data are available for frequency analyses.

PRESENTATION OF LOW-FLOW CHARACTERISTICS OF STREAMS

Low-flow characteristics of streams are presented in appendices 1 and 2. Data for the 15 continuous-record gaging stations are presented first in appendix 1, followed by the data for the 94 partial-record gaging stations in appendix 2. Low-flow characteristic values less than 0.1 ft^3/s are reported as <0.1. The heading for continuous-record gaging stations includes:

1. Location and description of the gaging station.
2. Drainage area.
3. Period of record analyzed.
4. Remarks.

The heading for partial-record gaging stations includes:

1. Location and description of the gaging station.
2. Drainage area.
3. Number of base-flow discharge measurements used in the correlations and the index gaging station number used.
4. Remarks.

SUMMARY

Low-flow frequency characteristics are necessary in hydrologic studies for optimum development and utilization of streams. This report provides low-flow frequency analyses for 14 continuous-record streamflow gaging stations and 94 partial-record gaging stations. Low-flow frequency characteristics for 7, 14, 30, 60, and 90 consecutive days for recurrence intervals of 2 and 10 years are presented for continuous-record gaging stations. The log-Pearson Type III frequency distribution was used to analyze the annual n-day minimum streamflow records. Low flows for 7, 14, and 30 consecutive days for 2- and 10-year recurrence intervals are presented for partial-record stations. This information was estimated by relating discharges at partial-record gaging stations with concurrent discharges at nearby continuous-record gaging stations with similar geologic, climatic, and topographic characteristics. Low-flow data from gaging stations where flows were affected by considerable anthropogenic regulation were excluded from the report. Factors such as the length of record, location of site, flow diversions, number of measurements, and the period during which the discharge was measured can affect the accuracy of the low-flow characteristics.

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APPENDIXES

APPENDIX 1. CONTINUOUS-RECORD GAGING STATIONS

RÍO CAMUY BASIN

50014800 Río Camuy near Bayaney, Puerto Rico

LOCATION.--Lat 18°23'48", long 66°49'04", Hydrologic Unit 21010002, on left bank at Highway 488, 1.4 mi (2.2 km) southeast of school at Santiago, 0.9 mi (1.4 km) northwest from Escuela Manuel A. Rivera at Bayaney, and 9.1 mi (14.6 km) upstream from mouth.

DRAINAGE AREA.--Indeterminate.

PERIOD OF RECORD ANALYZED.--May 1984 to September 1997.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days				
	7	14	30	60	90
2	30	32	34	39	44
10	22	24	27	30	33

50015700 Río Camuy near Hatillo, Puerto Rico

LOCATION.--Lat 18°27'44", long 66°49'56", Hydrologic Unit 21010002, 1.8 mi (2.9 km) southwest of Hatillo plaza, and 1.8 mi (2.9 km) southeast of Camuy plaza, 1.2 mi (1.9 km) south of Planta de Purificación, and 3.3 mi (5.5 km) upstream from Atlantic Ocean.

DRAINAGE AREA.--Indeterminate.

PERIOD OF RECORD ANALYZED.--June 1984 to September 1996.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days				
	7	14	30	60	90
2	36	38	42	48	56
10	28	30	32	35	39

RÍO GRANDE DE ARECIBO BASIN

50028000 Río Tanamá near Utuado, Puerto Rico

LOCATION.--Lat 18°18'02", long 66°46'58", Hydrologic Unit 21010001, on downstream side of left abutment of bridge on Highway 111, 1.2 mi (1.9 km) upstream from natural tunnel, 1.5 mi (2.4 km) northeast of Angeles, and 5.8 mi (9.3 km) northwest of Utuado.

DRAINAGE AREA.--18 mi^2 (48 km^2).

PERIOD OF RECORD ANALYZED.--November 1959 to September 1997.

REMARKS.--Minor diversions are made above the station to filter plant for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days				
	7	14	30	60	90
2	14	15	17	20	22
10	9.1	10	11	13	15

50028400 Río Tanamá at Charco Hondo, Puerto Rico

LOCATION.--Lat 18°24'52", long 66°42'52", Hydrologic Unit 21010002, on right bank at abandoned power house at Charco Hondo, 1.5 mi (2.4 km) upstream from mouth, and 4.0 mi (6.0 km) south of Arecibo.

DRAINAGE AREA.--58 mi^2 (149 km^2).

PERIOD OF RECORD ANALYZED.--April 1969 to June 1971, October 1981 to September 1997.

REMARKS.--Minor diversions are made above the station to filter plant for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days				
	7	14	30	60	90
2	29	30	32	36	39
10	12	13	17	20	23

RÍO GRANDE DE MANATÍ BASIN

50031200 Río Grande de Manatí near Morovis, Puerto Rico

LOCATION.--Lat 18°17'45", long 66°24'47", Hydrologic Unit 21010001, on right bank, 0.1 mi (0.2 km) downstream from Quebrada Perchas, 0.8 mi (1.3 km) upstream from Río Sana Muerto, and 2.2 mi (3.5 km) south of Morovis.

DRAINAGE AREA.--55 mi^2 (143 km^2).

PERIOD OF RECORD ANALYZED.--January 1965 to September 1997.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days				
	7	14	30	60	90
2	22	25	28	33	36
10	9.2	11	12	14	16

50034000 Río Bauta near Orocovis, Puerto Rico

LOCATION.--Lat 18°14'10", long 67°27'18", Hydrologic Unit 21010001, on left bank, at bridge on Highway 157, 4.2 mi (6.8 km) west of Orocovis.

DRAINAGE AREA.--17 mi^2 (43 km^2).

PERIOD OF RECORD ANALYZED.--October 1969 to September 1982, October 1988 to September 1997.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days				
	7	14	30	60	90
2	5.9	6.3	7.0	8.1	9.5
10	3.4	3.6	4.0	4.4	4.9

50035000 Río Grande de Manatí at Ciales, Puerto Rico

LOCATION.--Lat 18°19'26", long 66°27'36", Hydrologic Unit 21010001, on left bank, 1.6 mi (2.6 km) upstream from Highway 145 bridge, 0.8 mi (1.3 km) downstream from Quebrada Saliente, 0.9 mi (1.4 km) upstream from Quebrada Cojo Vales, and 1.2 mi (1.9 km) southeast of Ciales.

DRAINAGE AREA.--128 mi^2 (332 km^2).

PERIOD OF RECORD ANALYZED.--October 1960 to September 1997.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days				
	7	14	30	60	90
2	52	56	64	75	87
10	25	28	32	37	44

RÍO GRANDE DE MANATÍ BASIN--Continued

50038100 Río Grande de Manatí at Highway 2 near Manatí, Puerto Rico

LOCATION.--Lat 18°25'52", long 66°31'37", Hydrologic Unit 21010002, at bridge on Highway 2, and 2.3 mi (3.7 km) west of Manatí.

DRAINAGE AREA.--197 mi^2 (510 km^2), approximately, of which about 38 mi^2 (98 km^2) is partly or entirely noncontributing, excludes 6.0 mi^2 (15.5 km^2) upstream from Lago El Guineo and Lago de Matrullas.

PERIOD OF RECORD ANALYZED.--February 1970 to September 1997.

REMARKS.--Considerable diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days				
	7	14	30	60	90
2	82	89	100	113	127
10	47	53	61	72	78

RÍO CIBUCO BASIN

50038320 Río Cibuco below Corozal, Puerto Rico

LOCATION.--Lat 18°21'13", long 66°20'07", Hydrologic Unit 21010001, on right bank, 150 ft (46.0 m) downstream from junction with Río Corozal, and 1.4 mi (2.3 km) northwest of Corozal.

DRAINAGE AREA.--15 mi^2 (39 km^2).

PERIOD OF RECORD ANALYZED.--May 1969 to September 1997.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days				
	7	14	30	60	90
2	4.9	5.5	6.6	8.0	9.2
10	2.0	2.4	3.1	3.6	4.2

50039500 Río Cibuco at Vega Baja, Puerto Rico

LOCATION.--Lat 18°26'53", long 66°22'29", Hydrologic Unit 21010002, on left bank at bridge on Highway 2, 0.6 mi (1.0 km) downstream from Río Hondo, and 0.8 mi (1.3 km) east of Vega Baja.

DRAINAGE AREA.--99 mi^2 (257 km^2).

PERIOD OF RECORD ANALYZED.--January 1973 to September 1997.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days				
	7	14	30	60	90
2	19	22	28	34	40
10	9.8	11	14	18	21

RÍO DE LA PLATA BASIN

50044830 Río Guadiana at Guadiana, Puerto Rico

LOCATION.--Lat 18°18'08", long 66°13'24", Hydrologic Unit 21010005, on left bank, 1.3 mi (2.1 km) east of Naranjito plaza, 0.9 mi (1.4 km) west of the intersection of Highways 167 and 164 at km 8.9, and 2.9 mi (4.7 km) northwest from Represa Comerío.

DRAINAGE AREA.--9.2 mi^2 (24 km^2).

PERIOD OF RECORD ANALYZED.--July 1990 to September 1997.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days				
	7	14	30	60	90
2	2.5	2.7	3.6	4.8	6.2
10	1.3	1.4	1.5	1.9	2.4

RÍO PIEDRAS BASIN

50049000 Río Piedras at Río Piedras, Puerto Rico

LOCATION.--Lat 18°23'48", long 66°03'24", Hydrologic Unit 21010005, on left bank, at bridge on Highway 1, 0.3 mi (0.5 km) southwest of Río Piedras plaza, and 0.4 mi (0.6 km) downstream from diversion for water supply.

DRAINAGE AREA.--12 mi^2 (32 km^2).

PERIOD OF RECORD ANALYZED.--July 1971 to September 1982, October 1987 to September 1988.

REMARKS.--Minor diversion are made above station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days				
	7	14	30	60	90
2	3.6	4.6	6.3	8.8	11
10	1.2	1.8	2.5	3.8	4.7

RÍO GRANDE DE LOÍZA BASIN

50055000 Río Grande de Loíza at Caguas, Puerto Rico

LOCATION.--Lat 18°14'33", long 66°00'34", Hydrologic Unit 21010005, on right bank, 250 ft (76 m) upstream from bridge on Highway 189, 1.2 mi (1.9 km) downstream from Río Turabo, and 1.8 mi (2.9 km) east of Caguas plaza.

DRAINAGE AREA.--90 mi^2 (232 km^2).

PERIOD OF RECORD ANALYZED.--October 1961 to September 1996.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days				
	7	14	30	60	90
2	32	36	47	58	68
10	18	20	27	34	39

RÍO GRANDE DE PATILLAS BASIN

50092000 Río Grande de Patillas near Patillas, Puerto Rico

LOCATION.--Lat 18°02'04", long 66°01'58", Hydrologic Unit 21010004, on left bank, at abutment of destroyed pedestrian bridge, off Highway 184, 1.2 mi (1.9 km) upstream from Lago Patillas Dam, and 2.2 mi (3.5 km) northwest of Patillas.

DRAINAGE AREA.--18 mi^2 (47 km^2).

PERIOD OF RECORD ANALYZED.--October 1967 to September 1996.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days				
	7	14	30	60	90
2	10	11	14	17	20
10	6.7	7.2	8.4	11	13

RÍO CULEBRINAS BASIN

50147800 Río Culebrinas at Highway 404 near Moca, Puerto Rico

LOCATION.--Lat 18°21'42", long 67°05'33", Hydrologic Unit 21010003, on right bank, at bridge on Highway 404, 0.3 mi (0.5 km) downstream from Quebrada Yagruma, and 2.8 mi (4.5 km) southeast of Moca.

DRAINAGE AREA.--71 mi^2 (184 km^2).

PERIOD OF RECORD ANALYZED.--July 1967 to September 1997.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days				
	7	14	30	60	90
2	31	34	38	47	54
10	23	24	27	32	38

APPENDIX 2. PARTIAL-RECORD GAGING STATIONS

RÍO GUAJATACA BASIN

50010500 Río Guajataca at Lares, Puerto Rico

LOCATION.--Lat 18°18'01", long 66°52'24", Hydrologic Unit 21010001, at bridge on Highway 111, 0.1 mi (0.2 km) upstream from Quebrada Anón, and 0.4 mi (0.6 km) east of Lares.

DRAINAGE AREA.--3.2 mi^2 (8.2 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50014800.

REMARKS.--Minor diversion is made above the station for sewage treatment plant. This is a continuous-record gaging station with 7 years of record. The low-flow characteristics computed for the period of record are similar to the characteristis estimated and published in this report.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.7	.8	.9
10	.4	.5	.6

50010520 Río Guajataca above sewage treatment plant at Lares, Puerto Rico

LOCATION.--Lat 18°18'13", long 66°52'34", Hydrologic Unit 21010001, at barrio Pueblo, 0.5 mi (0.8 km) downstream from Highway 111, 1.5 mi (2.4 km) northwest from Cerro Palma, and 0.5 mi (0.8 km) north of Lares plaza.

DRAINAGE AREA.--5.4 mi^2 (14 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50014800.

REMARKS.--Minor diversion is made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	2.7	2.8	3.1
10	1.7	1.9	2.3

RÍO CAMUY BASIN

50013000 Río Camuy near Lares, Puerto Rico

LOCATION.--Lat 18°17'49", long 66°49'31", Hydrologic Unit 21010001, at bridge on Highway 111, 1.1 mi (1.8 km) upstream from Río Criminales, 1.8 mi (2.9 km) downstream from Río Angeles and Río Piedras confluence, and 3.5 mi (5.6 km) east of Lares.

DRAINAGE AREA.--7.6 mi^2 (20 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50014800.

REMARKS.--Minor diversion is made above station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	6.8	7.3	7.8
10	5.2	5.6	6.2

50014000 Río Criminales near Lares, Puerto Rico

LOCATION.--Lat 18°17'57", long 66°49'22", Hydrologic Unit 21010001, at bridge on Highway 111, 0.7 mi (1.1 km) upstream from Río Camuy, and 3.7 mi (5.6 km) east of Lares.

DRAINAGE AREA.--4.7 mi^2 (12 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50014800.

REMARKS.--Minor diversion is made above station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	4.0	4.2	4.6
10	3.0	3.2	3.6

50014500 Río Camuy off Highway 129 near Lares, Puerto Rico

LOCATION.--Lat 18°19'01", long 66°49'38", Hydrologic Unit 21010002, at barrio Callejones, 1.1 mi (1.8 km) downstream from Río Criminales, 1.9 mi (3.1 km) east from Cueva Pajita, and 4.0 mi (6.4 km) northeast from Lares.

DRAINAGE AREA.--14 mi^2 (35 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50014800.

REMARKS.--Minor diversions are made above station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	9.5	10	11
10	6.8	7.3	8.5

RÍO GRANDE DE ARECIBO BASIN

50020150 Río Vacas near Adjuntas, Puerto Rico

LOCATION.--Lat 18°10'29", long 66°44'16", Hydrologic Unit 21010001, at barrio Garzas on Highway 522, 0.6 mi (1.0 km) upstream from Highway 135, 2.2 mi (3.5 km) north of Lago Garzas, and 1.2 mi (1.9 km) northwest of Adjuntas plaza.

DRAINAGE AREA.--3.1 mi^2 (8.0 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50028000.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	2.1	2.3	2.6
10	1.4	1.5	1.7

50020295 Río Cidra at Adjuntas, Puerto Rico

LOCATION.--18°09'58", long 66°43'37", Hydrologic Unit 21010001, at Adjuntas, 0.1 mi (0.2 km) downstream from Highway 10, 1.9 mi (3.1 km) northeast of Lago Garzas, and 0.3 mi (0.5 km) northwest of Adjuntas plaza.

DRAINAGE AREA.--6.7 mi^2 (17 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50028000.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	3.0	3.2	3.8
10	1.7	1.8	2.2

50020500 Río Grande de Arecibo near Adjuntas, Puerto Rico

LOCATION.--Lat 18°10'54", long 66°44'12", Hydrologic Unit 21010001, at bridge on Highway 135, 1.0 mi (1.6 km) upstream from Lago Adjuntas, and 1.5 mi (2.4 km) northwest of Adjuntas plaza.

DRAINAGE AREA.--13 mi^2 (33 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50028000.

REMARKS.--Minor diversions are made above station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	6.4	7.0	8.2
10	3.8	4.1	4.9

50021000 Río Pellejas at Central Pellejas, Puerto Rico

LOCATION.--Lat 18°12'07", long 66°42'16", Hydrologic Unit 21010001, at barrio Pellejas near Highway 524, 0.1 mi (0.2 km) upstream from unnamed tributary and diversion tunnel, 1.0 mi (1.6 km) upstream from Lago Pellejas, and 2.9 mi (4.7 km) northeast of Adjuntas plaza.

DRAINAGE AREA.--5.5 mi^2 (14 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50028000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	3.6	3.9	4.4
10	2.3	2.4	2.8

50021800 Río Guaónica near Utuado, Puerto Rico

LOCATION.--Lat 18°15'18", long 66°43'47", Hydrologic Unit 21010001, at barrio Guaónica 50 ft (15 m) off Highway 603, 0.5 mi (0.8 km) upstream from Río Grande de Arecibo, 0.4 mi (0.6 km) downstream from Río Roncador, and 2.2 mi (3.5 km) southwest of Utuado plaza.

DRAINAGE AREA.--6.1 mi^2 (16 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50028000.

REMARKS.--Minor diversions are made above station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	4.2	4.6	5.2
10	2.7	2.9	3.4

50021900 Quebrada Arenas near Utuado, Puerto Rico

LOCATION.--Lat 18°15'40", long 66°43'19", Hydrologic Unit 21010001, at barrio Arenas on Highway 10, 200 ft (61 m) upstream from Río Grande de Arecibo, and 1.5 mi (2.4 km) southwest of Utuado plaza.

DRAINAGE AREA.--2.6 mi^2 (6.7 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50028000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	1.1	1.2	1.4
10	.6	.7	.8

50021905 Río Grande de Arecibo below Quebrada Arenas near Utuado, Puerto Rico

LOCATION.--Lat 18°15'46", long 66°43'15", Hydrologic Unit 21010001, at barrio Arenas, 200 ft (61 m) off Highway 10, 0.1 mi (0.2 km) downstream from Quebrada Arenas, 1.7 mi (2.7 km) upstream from Río Viví, and 1.4 mi (2.2 km) southwest from Utuado plaza.

DRAINAGE AREA.--40 mi^2 (103 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50028000.

REMARKS.--Diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	5.4	6.3	8.0
10	2.3	2.6	3.5

50023000 Río Viví near Central Pellejas, Puerto Rico

LOCATION.--Lat 18°12'52", long 66°40'25", Hydrologic Unit 21010001, at barrio Viví Arriba on Highway 605, 2.0 mi (3.2 km) upstream from Lago Viví, 2.1 mi (3.4 km) northeast from Lago Pellejas, and 1.3 mi (2.1 km) northwest from Cerro Prieto.

DRAINAGE AREA.--5.7 mi^2 (15 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50028000.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	3.3	3.6	4.1
10	2.0	2.2	2.6

50024945 Río Caguana on Highway 10 near Utuado, Puerto Rico

LOCATION.--Lat 18°18'09", long 66°42'20", Hydrologic Unit 21010001, at barrio Sabana Grande, 3.4 mi (5.5 km) southwest of Lago Dos Bocas spillway, 2.2 mi (3.5 km) northeast from Parcelas Cayuco, and 2.4 mi (3.9 km) north of Utuado plaza.

DRAINAGE AREA.--4.5 mi^2 (11 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent low flows at gaging station 50028000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	2.3	2.5	2.9
10	1.4	1.5	1.8

50025155 Río Saliente at Coabey near Jayuya, Puerto Rico

LOCATION.--Lat 18°12'48", long 66°33'49", Hydrologic Unit 21010002, 2.0 mi, (3.2 km) southeast of Jayuya, and 1.4 mi (2.2 km) northeast of Hacienda Gripiñas.

DRAINAGE AREA.--9.2 mi^2 (24 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 12 base-flow measurements with concurrent base flows at gaging station 50028000

REMARKS.--Minor diversions are made above station to filter plant for public-water supply. This is a continuous-record gaging station with 7 years of record. The low-flow characteritics computed for the period of record are similar to the characteritics estimated and published in this report..

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	4.6	5.1	5.9
10	2.7	2.9	3.4

50025165 Río Caricaboa at Jayuya, Puerto Rico

LOCATION.--Lat 18°13'10", long 66°35'12", Hydrologic Unit 21010001, at barrio Veguitas on Highway 144, 0.4 mi (0.6 km) upstream from Río Grande de Jayuya, 1.6 mi (2.6 km) northwest of Hacienda Gripiñas, and 0.5 mi (0.8 km) east of Jayuya plaza.

DRAINAGE AREA.--4.2 mi^2 (11 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50028000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	1.0	1.1	1.4
10	.5	.5	.7

50025175 Río Grande de Jayuya at Jayuya, Puerto Rico

LOCATION.--Lat 18°13'01", long 66°36'28", Hydrologic Unit 21010001, 1.5 mi (2.4 km) downstream from Río Caricaboa, 1.4 mi (2.2 km) upstream from Río Zamas, and 1.0 mi (1.6 km) southwest from Jayuya plaza.

DRAINAGE AREA.--19 mi^2 (49 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50028000.

REMARKS.--Minor diversions are made above station to filter plant for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	5.6	6.4	7.5
10	2.9	3.2	4.0

50025600 Río Jauca near Jayuya, Puerto Rico

LOCATION.--Lat 18°11'16", long 66°38'25", Hydrologic Unit 21010001, at barrio Jauca on Highway 140, 1.7 mi (2.7 km) southeast from Cerro Prieto, 4.6 mi (7.4 km) southeast from Lago Pellejas, and 3.8 mi (6.1 km) southwest of Jayuya plaza.

DRAINAGE AREA.--4.4 mi^2 (12 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50028000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	2.5	2.8	3.1
10	1.5	1.7	1.9

50025900 Río Jauca at mouth near Jayuya, Puerto Rico

LOCATION.--Lat 18°13'08", long 66°38'35", Hydrologic Unit 21010001, at barrio Paso Palma on Highway 140, 0.2 mi (0.3 km) upstream from Río Grande de Jayuya, 2.5 mi (4.0 km) southeast from Lago Viví, and 2.0 mi (3.2 km) south of Lago Caonillas.

DRAINAGE AREA.--7.1 mi^2 (18 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50028000.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	3.6	4.0	4.6
10	2.2	2.3	2.8

50026050 Río Caonillas above Lago Caonillas, Puerto Rico

LOCATION.--Lat 18°14'26", long 66°38'22", Hydrologic Unit 21010001, at barrio Caonillas Arriba, 300 ft (91 m) off Highway 531, 700 ft (213 m) upstream from Lago Caonillas, and 3.3 mi (5.3 km) northwest of Jayuya plaza.

DRAINAGE AREA.--40 mi^2 (105 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50028000.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	11	13	15
10	5.7	6.4	8.0

50026250 Río Limón on Highway 613 near Tetuán, Puerto Rico

LOCATION.--Lat 18°16'57", long 66°35'52", Hydrologic Unit 21010001, at barrio Tetuán on Highway 613, 0.4 mi (0.6 km) upstream from Río Naranjito, 1.3 mi (2.1 km) northwest from Cerro Magoyo, and 1.3 mi (2.1 km) from Escuela Segunda Unidad de Mameyes.

DRAINAGE AREA.--5.6 mi^2 (14 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50028000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	4.9	5.2	5.8
10	3.4	3.6	4.0

50026350 Río Limón above confluence with Río Yunes, Puerto Rico

LOCATION.--Lat 18°19'26", long 66°36'42", Hydrologic Unit 21010001, 3.4 mi (5.5 km) upstream from Lago Caonillas, 100 ft (30 m) upstream from Río Yunes, and 4.0 (6.4 km) southwest of Florida plaza.

DRAINAGE AREA.--17 mi^2 (43 km^2)

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50028000.

REMARKS.--Minor diversions are made above station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	10	11	13
10	6.5	6.8	8.0

50026925 Río Yunes at Frontón, Puerto Rico

LOCATION.--Lat 18°18'11", long 66°34'09", Hydrologic Unit 21010001, at barrio Frontón, 0.9 mi (1.4 km) southwest from Escuela Segunda Unidad de Frontón, 2.9 mi (4.7 km) northeast from Cerro Magoyo, and 4.2 mi (6.8 km) of Florida plaza.

DRAINAGE AREA.--9.6 mi^2 (25 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50028000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	3.0	3.4	4.0
10	1.6	1.7	2.2

50026950 Río Yunes at mouth near Mameyes Abajo, Puerto Rico

LOCATION.--Lat 18°19'30", long 66°36'39", Hydrologic Unit 21010001, 3.4 mi (5.5 km) upstream from Lago Caonillas, 100 ft (30 m) upstream from Río Limón, 1.5 mi (2.4 km) northwest from Hacienda Piedra Gorda, and 4.0 mi (6.4 km) southwest of Florida plaza.

DRAINAGE AREA.--14 mi^2 (35 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50028000.

REMARKS.--Minor diversion is made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	4.9	5.4	6.4
10	2.6	2.8	3.6

50027900 Río Tanamá near Caguana, Puerto Rico

LOCATION.--Lat 18°15'42", long 66°46'55", Hydrologic Unit 21010001, near barrio Caguana, 4.4 mi (7.1 km) upstream from Highway 111, 2.5 mi (4.0 km) south of Parque Ceremonial Indígena Caguana, and 2.1 mi (3.4 km) southeast of comunidad Angeles.

DRAINAGE AREA.--11 mi^2 (30 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50028000.

REMARKS.--Minor diversion is made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	8.8	9.4	11
10	5.9	6.3	7.2

50028100 Río Tanamá above Observatorio de Arecibo, Puerto Rico

LOCATION.--18°20'22", long 66°45'25", Hydrologic Unit 21010002, at barrio Esperanza, 0.5 mi (0.8 km) southwest from Observatorio de Arecibo, 3.2 mi (5.1 km) southeast of comunidad Bayaney, and 3.2 mi (5.1 km) northeast of Parque Ceremonial Indígena Caguana.

DRAINAGE AREA.--Indeterminate.

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50028000.

REMARKS.--Minor diversions are made above station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	20	21	24
10	13	14	15

50028200 Río Tanamá at Esperanza, Puerto Rico

LOCATION.--Lat 18°22'45", long 66°44'02", Hydrologic Unit 21010002, at barrio Esperanza, 0.9 mi (1.4 km) upstream from Highway 623, 200 ft (61 m) upstream of pump house, 3.2 mi (5.1 km) west from Río Grande de Arecibo, and 6.7 mi (11 km) southwest from Arecibo plaza.

DRAINAGE AREA.--Indeterminate.

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50028000.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	33	36	40
10	22	23	27

RÍO GRANDE DE MANATÍ BASIN

50029800 Río Grande de Manatí near Barranquitas, Puerto Rico

LOCATION.--Lat 18°14'00", long 66°18'53", Hydrologic Unit 21010001, at barrio Barrancas, 300 ft (91 m) east of Highway 771, 2.4 mi (3.9 km) northeast from Cerro La Torrecilla, 0.7 mi (1.1 km) southeast of Cerro El Farallón, and 3.1 mi (5.0 km) from Barranquitas plaza.

DRAINAGE AREA.--3.8 mi^2 (10 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50031200.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	2.3	2.5	2.8
10	1.1	1.3	1.4

50029900 Río Grande de Manatí near Corozal, Puerto Rico

LOCATION.--Lat 18°16'48", long 66°20'03", Hydrologic Unit 21010001, at barrio Negros on Highway 568, 0.2 mi (0.3 km) upstream from Highway 568, 1.7 mi (2.7 km) northeast of El Salto Grande, and 4.4 mi (7.1 km) southwest of Corozal plaza.

DRAINAGE AREA.--13 mi^2 (34 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50031200.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	8.2	9.1	10
10	4.1	4.6	5.1

50030250 Río Botijas near Carro, Puerto Rico

LOCATION.--Lat 18°11'45", long 66°21'09", Hydrologic Unit 21010001, at barrio Palo Hincado, 200 ft (61 m) upstream from Highway 156, 100 ft (30 m) upstream from pumping station intake, 1.4 mi (2.2 km) southwest from Cerro La Torrecilla, and 3.1 mi (5.0 km) west of Barranquitas plaza.

DRAINAGE AREA.--3.8 mi^2 (10 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50031200.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	1.4	1.6	1.9
10	.7	.8	.9

50030300 Río Botijas near Botijas, Puerto Rico

LOCATION.--Lat 18°14'15", long 66°22'36", Hydrologic Unit 21010001, at barrio Botijas on Highway 548, 0.5 mi (0.8 km) upstream from Río Orocovis, 0.8 mi (1.3 km) north from Highway 156, and 1.1 mi (1.8 km) northeast of Orocovis plaza.

DRAINAGE AREA.--12 mi^2 (32 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50031200.

REMARKS.--Minor diversions are made above the station for plublic-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	7.2	8.0	8.8
10	3.4	3.8	4.3

50030600 Río Orocovis at Orocovis, Puerto Rico

LOCATION.--18°13'58", long 66°23'23", Hydrologic Unit 21010001, at Orocovis, 0.5 mi (0.8 km) downstream from Quebrada Los Saltos, 1.3 mi (2.1 km) upstream from Río Botijas, and 0.3 mi (0.5 km) northeast of Orocovis plaza.

DRAINAGE AREA.--8.8 mi^2 (23 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50031200.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	4.7	5.2	5.8
10	2.1	2.4	2.8

50031500 Río Sana Muerto near Orocovis, Puerto Rico

LOCATION.--Lat 18°16'14", long 66°24'47", Hydrologic Unit 21010001, at barrio Pesas, 2.5 mi (4.0 km) southwest from Cerro Magueyes, 2.5 mi (4.0 km) upstream from Río Grande de Manatí, 4.0 mi (6.4 km) south of Morovis plaza.

DRAINAGE AREA.--3.7 mi^2 (10 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50031200.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	2.2	2.4	2.6
10	1.2	1.3	1.5

50032050 Quebrada Riachuelo at mouth, Puerto Rico

LOCATION.--Lat 18°18'18", long 66°26'15", Hydrologic Unit 2101000, at barrio San Lorenzo, 50 ft (15 m) off Highway 567, 0.2 mi (0.3 km) upstream from Río Grande de Manatí, 1.0 mi (1.6 km) north from Cerro Avispa, and 2.5 mi (4.0 km) southwest of Morovis plaza.

DRAINAGE AREA.--1.7 mi^2 (4.4 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50031200.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.9	1.0	1.1
10	.4	.5	.5

50032100 Quebrada Grande near Morovis, Puerto Rico

LOCATION.--Lat 18°18'45", long 66°26'40", Hydrologic Unit 21010001, at barrio San Lorenzo, 50 ft (15 m) off Highway 567, 0.6 mi (1.0 km) upstream from Río Grande de Manatí, 2.3 mi (3.7 km) southeast from Ciales, and 2.6 (4.2 km) southwest from Morovis plaza.

DRAINAGE AREA.--2.6 mi^2 (6.8 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50031200.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	1.2	1.3	1.5
10	.5	.6	.7

50032400 Río Toro Negro on Highway 157 at Cacaos, Puerto Rico

LOCATION.--Lat 18°13'57", long 66°30'46", Hydrologic Unit 21010001, at barrio Cacaos on Highway 157, 0.5 mi (0.8 km) upstream from Quebrada Palma, 2.2 mi (3.5 km) northeast of Los Tres Picachos, and 5.3 mi (8.5 km) northeast of Jayuya plaza.

DRAINAGE AREA.--12 mi^2 (31 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50035000.

REMARKS.--Minor diversion is made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	5.6	6.0	6.8
10	2.8	3.2	3.5

50032700 Río Matrullas at mouth, Puerto Rico

LOCATION.--Lat 18°15'29", long 66°30'04", Hydrologic Unit 21010001, at barrio Cacaos, 100 ft (30 m) upstream from Río Toro Negro, 0.8 mi (1.3 km) east from Cerro Vista Alegre, and 2.6 mi (4.2 km) south from Cerro Gordo.

DRAINAGE AREA.--3.7 mi^2 (9.5 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50035000.

REMARKS.--Minor diversion is made above the station for pubblic-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	2.5	2.7	3.0
10	1.4	1.6	1.7

50033000 Río Toro Negro near Ciales, Puerto Rico

LOCATION.--Lat 18°17'20", long 66°29'06", Hydrologic Unit 21010001, at barrio Toro Negro on Highway 615, 0.6 mi (1.0 km) south from Escuela Segunda Unidad de Pesas, 2.3 mi (3.7 km) northwest from Cerro Gordo, and 3.7 mi (6.0 km) southwest from Ciales plaza.

DRAINAGE AREA.--25 mi^2 (65 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50035000.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	12	13	14
10	5.8	6.6	7.2

50033500 Río Bauta near Divisoria, Puerto Rico

LOCATION.--Lat 18°11'45", long 66°26'30", Hydrologic Unit 21010001, at barrio Bauta Abajo, 2.6 mi (4.2 km) southeast from Lago Matrullas, 1.9 mi (3.1 km) northeast from Cerro El Malo, 4.0 mi (6.4 km) southwest of Orocovis plaza.

DRAINAGE AREA.--8.6 mi^2 (22 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50034000.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	2.5	2.6	3.0
10	1.3	1.4	1.6

50034500 Río Bauta at Pozas, Puerto Rico

LOCATION.--Lat 18°17'47", long 66°27'35", Hydrologic Unit 21010001, at barrio Pozas, 100 ft (30 m) upstream from Río Toro Negro, 4.0 mi (6.4 km) southwest of Morovis, and 2.9 mi (4.7 km) southeast of Ciales plaza.

DRAINAGE AREA.--28 mi^2 (73 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50034000.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	7.8	8.3	9.5
10	4.0	4.4	5.0

50035600 Río Cialitos at Cialitos, Puerto Rico

LOCATION.--Lat 18°14'29", long 66°31'30", Hydrologic Unit 21010001, at barrio Cialitos, 0.3 mi (0.5 km) north of Highway 149 and 566 intersection, 2.0 mi (3.2 km) northeast from Los Tres Picachos, and 4.7 mi (7.6 km) northeast of Jayuya plaza.

DRAINAGE AREA.--3.2 mi^2 (8.2 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50034000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	1.8	1.9	2.1
10	1.2	1.2	1.3

50035700 Río Cialitos on Highway 614 near Ciales, Puerto Rico

LOCATION.--Lat 18°17'13", long 66°30'53", Hydrologic Unit 21010001, at barrio Pesas on Highway 614, 1.0 mi (1.6 km) southwest from Cerro Gordo, 1.8 mi (2.9 km) north of Cerro Vista Alegre, and 6.4 mi (10 km) southeast of Florida plaza.

DRAINAGE AREA.--6.7 mi^2 (17 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50034000.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	4.5	4.8	5.1
10	3.0	3.2	3.4

50035950 Río Cialitos on Highway 649 at Ciales, Puerto Rico

LOCATION.--Lat 18°20'18", long 66°28'28", Hydrologic Unit 21010001, at Ciales, 100 ft (30 m) upstream from bridge on Highway 649, 0.7 mi (1.1 km) upstream from Río Grande de Manatí, and 0.4 mi (0.6 km) west of Ciales plaza.

DRAINAGE AREA.--17 mi^2 (44 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50034000

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	6.3	6.8	7.5
10	3.6	3.8	4.2

50037200 Río Grande de Manatí near Manatí, Puerto Rico

LOCATION.--Lat 18°24'52", long 66°29'37", Hydrologic Unit 21010002, at barrio Río Arriba Poniente, 100 ft (30 m) off Highway 149, 1.2 mi (1.9 km) southwest of comunidad Sabana Seca, 5.1 mi (8.2 km) upstream from Highway 2, and 1.0 mi (1.6 km) south of Manatí plaza.

DRAINAGE AREA.--Indeterminate.

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50038100.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	78	83	95
10	44	49	56

RÍO CIBUCO BASIN

50038295 Río de los Negros at mouth at Corozal, Puerto Rico

LOCATION.--Lat 18°20'29", long 66°19'08", Hydrologic Unit 21010001, at Corozal, 100 ft (30 m) upstream from Río Corozal, 0.3 mi (0.5 km) upstream from Highway 159, and 0.1 mi (0.2 km) southwest of Corozal plaza.

DRAINAGE AREA.--4.0 mi^2 (10 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50038320.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.9	1.1	1.4
10	.3	.4	.6

50038302 Río Corozal above sewage treatment plant at Corozal, Puerto Rico

LOCATION.--Lat 18°20'52", long 66°19'43", Hydrologic Unit 21010001, at barrio Cibuco, 0.8 mi (1.3 km) upstream from Río Cibuco, 0.7 mi (1.1 km) downstream from Highway 159, and 0.8 mi (1.3 km) northwest of Corozal plaza.

DRAINAGE AREA.--9.8 mi^2 (25 km).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50038320.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	3.2	3.7	4.4
10	1.3	1.6	2.1

50038317 Río Cibuco at Cibuco, Puerto Rico

LOCATION.--Lat 18°20'54", long 66°20'09", Hydrologic Unit 21010001, at barrio Cibuco, 0.3 mi (0.5 km) upstream from Río Corozal, 1.8 mi (2.9 km) southeast from Escuela Cienegueta, and 1.3 mi (2.1 km) northwest of Corozal plaza.

DRAINAGE AREA.--5.0 mi^2 (13 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50038320

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	1.8	2.0	2.4
10	.8	.9	1.2

50038345 Río Mavilla on Highway 164 near Corozal, Puerto Rico

LOCATION.--Lat 18°19'07", long 66°17'21", Hydrologic Unit 21010001, at barrio Palmarejo on Highway 164, 0.6 mi (1.0 km) southwest from Escuela Segunda Unidad de Palmarejo, 1.3 mi (2.1 km) downstream from Quebrada La Jacinta, and 2.5 mi (4.0 km) southeast of Corozal plaza.

DRAINAGE AREA.--7.8 mi^2 (20 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50038320.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	4.7	5.2	5.8
10	2.5	2.9	3.4

50038375 Río Mavilla on Highway 821 near Maricao, Puerto Rico

LOCATION.--Lat 18°22'11", long 66°20'02", Hydrologic Unit 21010002, at barrio Abras on Highway 821, 1.4 mi (2.2 km) upstream from Río Cibuco, 1.3 mi (2.1 km) southwest from Cerro Santa Bárbara, and 2.2 mi (3.5 km) northwest of Corozal plaza.

DRAINAGE AREA.--16 mi^2 (43 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50038320.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	6.6	7.3	8.5
10	2.9	3.5	4.4

50038420 Río Cibuco on Highway 620 near Vega Alta, Puerto Rico

LOCATION.--Lat 18°24'08", long 66°20'39", Hydrologic Unit 21010001, at barrio Candelaria on Highway 620, 3.6 mi (5.8 km) downstream from Río Mavilla, 6.2 mi (10 km) northwest from Toa Alta, and 1.2 mi (1.9 km) southwest of Vega Alta plaza.

DRAINAGE AREA.--39 mi^2 (100 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50038320.

REMARKS.--Minor diversions are made above the station for public-wat.er supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	16	18	21
10	7.0	8.5	11

50038550 Río Unibón above sewage treatment plant at Unibón, Puerto Rico

LOCATION.--Lat 18°20'00", long 66°22'18", Hydrologic Unit 21010001, at barrio Unibón, 0.7 mi (1.1 km) upstream from Río Las Carreras, 2.5 mi (4.0 km) northeast from Morovis, and 3.6 mi (5.8 km) southwest of Corozal plaza.

DRAINAGE AREA.--1.6 mi^2 (4.2 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50038320.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.6	.6	.8
10	.2	.3	.4

50038590 Río Las Carreras at Unibón near Morovis Puerto Rico

LOCATION.--Lat 18°19'36", long 66°22'47", Hydrologic Unit 21010001, at barrio Unibón, 1.3 mi (2.1 km) upstream from Highway 159, 2.8 mi (4.5 km) northeast of Cerro Quirós, and 1.9 mi (3.1 km) east of Morovis plaza.

DRAINAGE AREA.--2.6 mi^2 (6.9 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50038320.

REMARKS.--Minor diversions are made above the station to filter plant for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.8	.9	1.1
10	.3	.4	.5

50038650 Río Unibón off Highway 160 near Almirante Sur, Puerto Rico

LOCATION.--Lat 18°21'05", long 66°23'12", Hydrologic Unit 21010002, at barrio Almirante Sur, 0.4 mi (0.6 km) downstream from Quebrada Monte Llano, 1.9 mi (3.1 km) upstream from Río Morovis, and 2.2 mi (3.5 km) northeast of Morovis plaza.

DRAINAGE AREA.--7.5 mi^2 (20 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50039500.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	1.6	1.8	2.3
10	.8	1.0	1.2

50038718 Río Morovis above sewage treatment plant near Morovis, Puerto Rico

LOCATION.--Lat 18°20'12", long 66°25'15", Hydrologic Unit 21010002, at barrio Morovis Norte, 0.3 mi (0.5 km) upstream of Highway 155, 3.1 mi (5.0 km) east of Ciales, and 1.0 mi (1.6 km) northwest of Morovis plaza.

DRAINAGE AREA.--2.7 mi^2 (7.0 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50039500.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	2.0	2.2	2.3
10	1.5	1.7	1.8

50038750 Quebrada Grande de Morovis on Highway 634 near Morovis, Puerto Rico

LOCATION.--Lat 18°21'33", long 66°24'39", Hydrologic Unit 21010002, at barrio Fránquez, 0.8 mi (1.3 km) upstream from Río Morovis, 4.1 mi (6.6 km) northeast from Ciales, and 2.2 mi (3.5 km) north of Morovis plaza.

DRAINAGE AREA.--7.4 mi^2 (19 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50039500.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.2	.3	.4
10	<.1	<.1	.1

50038895 Río Indio on Highway 22 at Río Abajo, Puerto Rico

LOCATION.--Lat 18°25'47", long 66°22'55", Hydrologic Unit 21010002, at barrio Río Abajo on Highway 22, 1.2 mi (1.9 km) south from Highway 2, 7.2 mi (12 km) east of Manatí, and 3.6 mi (5.8 km) northwest of Vega Alta plaza.

DRAINAGE AREA.--Indeterminate.

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50039500.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	6.2	7.3	9.5
10	2.9	3.5	4.6

RÍO DE LA PLATA BASIN

50040500 Río de la Plata on Highway 738 near Cayey, Puerto Rico

LOCATION.--Lat 18°07'25", long 66°07'56", Hydrologic Unit 21010005, at barrio Monte Llano on Highway 738, 100 ft (33 m) upstream from pumping station intake, 0.5 mi (0.8 km) southwest of Central Cayey, and 2.6 mi (4.2 km) northeast of Cayey plaza.

DRAINAGE AREA.--13 mi^2 (35 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 10 base-flow measurements with concurrent base flows at gaging station 50092000.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	4.2	4.8	6.2
10	2.5	2.7	3.4

50040590 Río Guavate on Highway 52 near Cayey, Puerto Rico

LOCATION.--Lat 18°07'51", long 66°07'04", Hydrologic Unit 21010005, at barrio Vegas, 1.2 mi (1.9 km) upstream from Río de la Plata, 2.9 mi (4.7 km) southwest from Cerro Las Piñas, and 4.3 mi (6.9 km) southeast of Cidra plaza.

DRAINAGE AREA.--6.6 mi^2 (17 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50092000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	1.9	2.1	2.8
10	1.0	1.2	1.4

50040700 Quebrada Beatriz on Highway 1 near Cayey, Puerto Rico

LOCATION.--Lat 18°08'30", long 66°06'57", Hydrologic Unit 21010005, at barrio Beatriz on Highway 1, 2.2 mi (3.5 km) upstream from Río de la Plata, 2.5 mi (4.0 km) southwest from Cerro Las Piñas, and 3.9 mi (6.3 km) southeast of Cidra plaza.

DRAINAGE AREA.--3.4 mi^2 (8.9 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50092000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.6	.7	1.0
10	.3	.4	.5

50041020 Quebrada Santo Domingo at Cayey, Puerto Rico

LOCATION.--Lat 18°06'22", long 66°09'55", Hydrologic Unit 21010005, at Cayey on Highway 1, 3.2 mi (5.1 km) northeast from Cerro Planada, 1.7 mi (2.7 km) northeast from Monte El Gato, and 0.5 mi (0.8 km) southeast of Cayey plaza.

DRAINAGE AREA.--0.8 mi^2 (2.2 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50092000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.1	.1	.2
10	<.1	<.1	<.1

50042800 Río Matón on Highway 14 at Matón Abajo, Puerto Rico

LOCATION.--Lat 18°08'29", long 66°12'40", Hydrologic Unit 21010005, at barrio Matón Abajo on Highway 14, 250 ft (76 m) upstream of Río de la Plata, 1.0 mi (1.6 km) south of Cerro Plana, and 4.1 mi (6.6 km) southwest of Cidra plaza.

DRAINAGE AREA.--6.6 mi^2 (17 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50092000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.6	.7	1.1
10	.3	.3	.4

50043010 Quebrada Honda at mouth at Proyecto La Plata, Puerto Rico

LOCATION.--Lat 18°09'36", long 66°13'48", Hydrologic Unit 21010005, at barrio Plata, 100 ft (30 m) upstream from Río de la Plata, 1.3 mi (2.1 km) northwest from Cerro Plana, 0.9 mi (1.4 km) from Cerro Amoldadero, and 4.7 mi (7.6 km) southwest of Cidra plaza.

DRAINAGE AREA.--2.7 mi^2 (6.9 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50092000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.2	.2	.4
10	<.1	.1	.1

50043197 Río Usabón on Highway 162 near Barranquitas, Puerto Rico

LOCATION.--Lat 18°09'41", long 66°18'26", Hydrologic Unit 21010005, at barrio Helechal on Highway 162, 2.1 mi (3.4 km) northeast from Cerro Pulguillas, 3.0 mi (4.8 km) northwest from Aibonito, and 1.8 mi (2.9 km) south of Barranquitas plaza.

DRAINAGE AREA.--8.6 mi^2 (22 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50092000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.6	.8	1.1
10	.3	.3	.5

50043450 Río Aibonito at Llanos near Aibonito, Puerto Rico

LOCATION.--Lat 18°09'19", long 66°17'07", Hydrologic Unit 21010005, at barrio Llanos, 2.1 mi (3.4 km) southeast from Cañón de San Cristóbal, 2.7 mi (4.3 km) southeast from Barranquitas, and 1.5 mi (2.4 km) northwest of Aibonito plaza.

DRAINAGE AREA.--6.5 mi^2 (17 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 10 base-flow measurements with concurrent base flows at gaging station 50092000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	1.2	1.4	2.0
10	.6	.8	1.0

50043475 Río Barranquitas at Barranquitas, Puerto Rico

LOCATION.--Lat 18°11'19", long 66°18'15", Hydrologic Unit 21010005, at Barranquitas, 0.1 mi (0.2 km) upstream from Highway 156, 2.1 mi (3.4 km) southeast from Cerro La Torrecilla, 1.6 mi (2.6 km) northwest from Cañón de San Cristóbal, and 0.2 mi (0.3 km) east of Barranquitas.

DRAINAGE AREA.--3.8 mi^2 (9.7 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 10 base-flow measurements with concurrent base flows at gaging station 50044830.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	1.0	1.1	1.4
10	.5	.5	.6

50043575 Río Hondo on Highway 776 at Río Hondo, Puerto Rico

LOCATION.--Lat 18°13'18", long 66°15'07", Hydrologic Unit 21010005, at barrio Río Hondo on Highway 776, 0.4 mi (0.6 km) north of Escuela Segunda Unidad de Río Hondo, 4.4 mi (7.1 km) northeast of Cañón de San Cristóbal, and 4.3 mi (6.9 km) northeast of Barranquitas.

DRAINAGE AREA.--9.1 mi^2 (24 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 10 base-flow measurements with concurrent base flows at gaging station 50044830.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	2.8	3.0	3.9
10	1.5	1.6	1.8

50043850 Río Arroyata on Highway 171 at Cidra, Puerto Rico

LOCATION.--Lat 18°10'16", long 66°09'44", Hydrologic Unit 21010005, at barrio Sud on Highway 171, 0.8 mi (1.3 km) southwest from Lago de Cidra, 2.8 mi (4.5 km) northeast from Cerro Gordo, and 0.5 mi (0.8 km) south of Cidra plaza.

DRAINAGE AREA.--0.70 mi^2 (1.8 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50044830.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.1	.1	.2
10	<.1	<.1	<.1

50043950 Río Arroyata on Highway 7774 near Cidra, Puerto Rico

LOCATION.--Lat 18°12'04", long 66°12'34", Hydrologic Unit 21010004, at barrio Vega Redonda on Highway 7774, 1.5 mi (2.4 km) of Cerro Almirante, 1.6 mi (2.6 km) north of Cerro Viento Caliente, and 1.8 mi (2.9 km) southeast of Comerío plaza.

DRAINAGE AREA.--9.4 mi^2 (24 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50044830.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.8	1.0	1.5
10	.3	.3	.4

50043998 Río Arroyata at mouth near Comerío, Puerto Rico

LOCATION.--Lat 18°14'26", long 66°12'32", Hydrologic Unit 21010005, at barrio Naranjo on Highway 156, 150 ft (46 m) upstream from Río de la Plata, 1.6 mi (2.6 km) southwest from Cerro La Tiza, and 1.8 mi (2.9 km) northeast of Comerío plaza.

DRAINAGE AREA.--16 mi^2 (42 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50044830.

REMARKS.--Minor diversions are made above the station for public-water supply. RÍO DE LA PLATA BASIN—Continued

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	2.6	2.9	4.1
10	1.1	1.2	1.4

50044300 Río Cuesta Arriba on Highway 816 at Nuevo, Puerto Rico

LOCATION.--Lat 18°17'56", long 66°12'24", Hydrologic Unit 21010005, at barrio Nuevo on Highway 816, 0.3 mi (0.5 km) upstream from Río de la Plata, 1.3 mi (2.1 km) northeast of Cerro Avispa, and 2.6 mi (4.2 km) southeast of Naranjito plaza.

DRAINAGE AREA.--5.5 mi^2 (14 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50044830.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	1.8	1.9	2.5
10	.9	1.0	1.1

50044775 Río Guadiana above sewage treatment plant at Naranjito, Puerto Rico

LOCATION.--Lat 18°18'08", long 66°14'18", Hydrologic Unit 21010005, at barrio Guadiana, 0.2 mi (0.3 km) upstream from Quebrada Anones, 1.7 mi (2.7 km) from Cerro Avispa, and 0.6 mi (1.0 km) east of Naranjito plaza.

DRAINAGE AREA.--5.4 mi^2 (14 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50044830.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	1.4	1.6	2.0
10	.7	.8	.9

50044975 Río Cañas at Achiote near Naranjito, Puerto Rico

LOCATION.--Lat 18°19'21", long 66°15'14", Hydrologic Unit 21010005, at barrio Achiote, 1.7 mi (2.7 km) upstream from Lago la Plata, 1.5 mi (2.4 km) northwest of Naranjito plaza, and 4.5 mi (7.2 km) southeast of Corozal plaza.

DRAINAGE AREA.--3.1 mi^2 (8.1 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50038320.

REMARKS.--Minor diversions are made above the station for public-water supply. RÍO DE LA PLATA BASIN—Continued

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.9	1.0	1.2
10	.3	.4	.5

50045100 Quebrada Cruz on Highway 824 near Toa Alta, Puerto Rico

LOCATION.--Lat 18°21'26", long 66°14'50", Hydrologic Unit 21010005, at barrio Quebrada Cruz on Highway 824, 0.3 mi (0.5 km) upstream from Río de la Plata, 1.1 mi (1.8 km) northwest from Lago La Plata spillway, and 3.7 mi (6.0 km) north of Naranjito plaza.

DRAINAGE AREA.--2.1 mi^2 (5.5 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50038320.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.5	.5	.6
10	.2	.2	.3

50045400 *Río Bucarabones near Toa Alta, Puerto Rico*

LOCATION.--Lat 18°21'49", long 66°12'54", Hydrologic Unit 21010005, at barrio Ortiz, 4.7 mi (7.6 km) northeast from Naranjito, 3.1 mi (5.0 km) northwest from barrio Cerro Gordo Arriba, and 2.8 mi (4.5 km) southeast of Toa Alta plaza.

DRAINAGE AREA.--1.2 mi^2 (3.2 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50038320.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.7	.8	.9
10	.4	.4	.5

RÍO DE LA PLATA BASIN—Continued

50045800 Río Lajas at Toa Alta, Puerto Rico

LOCATION.--Lat 18°23'39", long 66°15'16", Hydrologic Unit 21010005, at Toa Alta on Highway 165, 0.2 mi (0.3 km) upstream from Río de la Plata, 1.8 mi (2.9 km) downstream of Quebrada Arenas, and 0.3 mi (0.5 km) northwest of Toa Alta plaza.

DRAINAGE AREA.--8.6 mi^2 (22 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50038320.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	1.1	1.4	1.8
10	.3	.4	.6

RÍO HONDO BASIN

50047475 Quebrada Cerro Gordo at La Aldea at Bayamón, Puerto Rico

LOCATION.--Lat 18°22'38", long 66°10'31", Hydrologic Unit 21010005, at barrio Cerro Gordo on Highway 840, 1.2 mi (1.9 km) upstream of Río Hondo, 4.9 mi (7.9 km) southeast of Toa Alta, and 2.0 mi(3.2 km) southwest of Bayamón plaza.

DRAINAGE AREA.--2.2 mi^2 (5.6 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50044830.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.5	.5	.7
10	.2	.3	.3

50047520 Río Hondo II at Sabana Seca, Puerto Rico

LOCATION.--Lat 18°25'24", long 66°11'07", Hydrologic Unit 21010005, at barrio Sabana Seca, 1.2 mi (1.9 km) northwest from Puerto Rico National Cemetery, 4.7 mi (7.6 km) northeast of Toa Alta, and 2.5 mi (4.0 km) northwest of Bayamón plaza.

DRAINAGE AREA.--2.6 mi^2 (6.7 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50044830.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.3	.4	.5
10	.1	.1	.2

RÍO DE BAYAMÓN BASIN

50047598 Quebrada Vicente at mouth, Puerto Rico

LOCATION.--Lat 18°14'36", long 66°08'41", Hydrologic Unit 21010005, at barrio Bayamoncito off Highway 156, 100 ft (30 m) upstream from Río de Bayamón, 1.2 mi (1.9 km) northeast from Cerro Santa Bárbara, and 4.6 mi (7.4 km) northeast of Cidra plaza.

DRAINAGE AREA.--2.2 mi^2 (5.7 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base-flows at gaging station 50092000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.7	.8	1.0
10	.4	.4	.5

50047750 Quebrada Grande near Aguas Buenas, Puerto Rico

LOCATION.--Lat 18°16'02", long 66°08'33", Hydrologic Unit 21010005, at barrio Juan Asencio, 0.2 mi (0.3 km) upstream from Río de Bayamón, 0.7 mi (1.1 km) southeast from Cerro Mula, 1.0 mi (1.6 km) southwest from Cerro El Chícharo, and 2.6 mi (4.2 km) northwest of Aguas Buenas plaza.

DRAINAGE AREA.--4.1 mi^2 (11 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50092000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	1.3	1.4	1.9
10	.7	.8	1.0

50047810 Quebrada Sonadora at Sonadora, Puerto Rico

LOCATION.--Lat 18°17'47", long 66°07'58", Hydrologic Unit 21010005, at barrio Sonadora, 0.7 mi (1.1 km) upstream from Río de Bayamón, 1.4 mi (2.2 km) northeast from Cerro La Peña, 1.2 mi (1.9 km) north from Cerro El Chícharo, and 3.2 mi (5.1 km) northwest of Aguas Buenas plaza.

DRAINAGE AREA.--2.6 mi^2 (6.7 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50092000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	1.0	1.1	1.4
10	.6	.6	.8

50047840 Quebrada Santa Olaya on Highway 174 near Bayamón, Puerto Rico

LOCATION.--Lat 18°19'46", long 66°08'35", Hydrologic Unit 21010005, at barrio Guaraguao Abajo on Highway 174, 0.1 mi (0.2 km) upstream from Río de Bayamón, 1.2 mi (1.9 km) northeast of Cerro de Vergara, 2.9 mi (4.7 km) southwest of Guaynabo plaza.

DRAINAGE AREA.--4.1 mi^2 (11 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50055000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	1.4	1.6	2.0
10	.7	.8	1.1

50047860 Río Minillas on Highway 174 near Minillas, Puerto Rico

LOCATION.--Lat 18°21'34", long 66°08'38", Hydrologic Unit 21010005, at barrio Minillas on Highway 174, 0.1 mi (0.2 km) upstream from Río de Bayamón, 2.1 mi (3.4 km) northeast from Cerro Gordo Arriba, and 2.9 mi (4.7 km) southeast of Bayamón plaza.

DRAINAGE AREA.--4.8 mi^2 (12 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50055000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	1.7	2.0	2.5
10	.9	1.1	1.4

50047895 Río Guaynabo at Highway 836 near Guaynabo, Puerto Rico

LOCATION.--Lat 18°20'05", long 66°06'10", Hydrologic Unit 21010005, at barrio Mamey on Highway 836, 0.6 mi (1.0 km) southwest of Cerro Magueyes, 3.7 mi (6.0 km) from Cerro Marquesa, and 1.8 mi (2.9 km) southeast of Guaynabo plaza.

DRAINAGE AREA.--8.4 mi^2 (22 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50055000.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	3.6	4.1	5.2
10	2.1	2.3	3.0

50047953 Río Guaynabo below Guaynabo, Puerto Rico

LOCATION.--18°22'00", long 66°07'09", Hydrologic Unit 21010005, at barrio Santa Rosa, 0.4 mi (0.6 km) upstream from Quebrada Frailes, 3.1 mi (5.0 km) northwest from Cerro Magueyes, and 0.7 mi (1.1 km) northwest of Guaynabo plaza.

DRAINAGE AREA.--13 mi^2 (33 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50055000.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	5.4	6.2	7.7
10	3.1	3.5	4.5

50047970 Quebrada Frailes on Highway 169 at Guaynabo, Puerto Rico

LOCATION.--Lat 18°22'07", long 66°06'42", Hydrologic Unit 21010005, at Guaynabo on Highway 169, 1.9 mi (3.1 km) northwest from Cerro Magueyes, 1.2 mi (1.9 km) upstream from Río Guaynabo, and 0.6 mi (1.0 km) north of Guaynabo plaza.

DRAINAGE AREA.--3.5 mi^2 (9.0 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50055000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	3.0	3.2	3.8
10	2.0	2.2	2.6

RÍO PIEDRAS BASIN

50048750 Quebrada Las Curias tributary near Caimito, Puerto Rico

LOCATION.--Lat 18°20"19", long 66°03'33", Hydrologic Unit 21010005, at barrio Caimito, 0.7 mi (1.1 km) upstream from Quebrada Las Curias, 0.7 mi (1.1 km) southwest from Aljibe Las Curias, and 2.9 mi (4.7 km) northwest of Lago Carraízo spillway.

DRAINAGE AREA.--1.7 mi^2 (4.5 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50049000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.4	.5	.7
10	.1	.2	.2

50048760 Quebrada Los Guanos near Río Piedras, Puerto Rico

LOCATION.--Lat 18°21'24", long 66°03'20", Hydrologic Unit 21010005, at barrio Cupey, 0.8 mi (1.3 km) upstream from Río Piedras, 3.2 mi (5.1 km) northwest from Lago Carraízo spillway, and 3.1 mi (5.0 km) west of Trujillo Alto plaza.

DRAINAGE AREA.--0.8 mi^2 (1.0 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50049000.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.2	.3	.4
10	<.1	.1	.1

RÍO CULEBRINAS BASIN

50146700 Río Culebrinas at Perchas No. 1, Puerto Rico

LOCATION.--Lat 18°18'09", long 66°56'49", Hydrologic Unit 21010003, at barrio Perchas No. 1, 1.4 mi (2.2 km) upstream of Quebrada Lajas, 1.2 mi (1.9 km) downstream from Quebrada Grande, and 3.8 mi (6.1 km) southeast of San Sebastián plaza.

DRAINAGE AREA.--6.8 mi^2 (18 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50147800.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	4.3	4.6	5.2
10	3.3	3.4	3.8

50147000 Río Culebrinas at San Sebastián, Puerto Rico

LOCATION.--Lat 18°20'08", long 66°59'46", Hydrologic Unit 21010003, at San Sebastián on Highway 109, 0.9mi (1.4 km) upstream from Río Guatemala, 200 ft (61 m) upstream from sewage treatment plant discharge point, and 0.4 mi (0.6 km) southwest of San Sebastián plaza.

DRAINAGE AREA.--17 mi^2 (43 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50147800.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	5.2	5.8	6.5
10	3.6	3.8	4.4

50147200 Río Guatemala at San Sebastián, Puerto Rico

LOCATION.--Lat 18°20'42", long 67°00'00", Hydrologic Unit 21010003, at San Sebastián on Highway 111, 1.2 mi (1.9 km) upstream from Río Culebrinas, 0.9 mi (1.4 km) southeast of Central La Plata, and 0.7 mi (1.1 km) northwest of San Sebastián plaza.

DRAINAGE AREA.--10 mi^2 (27 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50147800.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.7	.8	1.0
10	.4	.5	.6

50147400 Río Sonador near San Sebastián, Puerto Rico

LOCATION.--Lat 18°18'49", long 67°00'29", Hydrologic Unit 21010003, at barrio Culebrinas on Highway 109, 1.3 mi (2.1 km) northeast of Cerro Yaitini, 2.1 mi (3.4 km) northeast from Cerro Cascajillo, and 2.0 mi (3.2 km) southwest from San Sebastián plaza.

DRAINAGE AREA.--6.1 mi^2 (16 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent low flows at gaging station 50147800.

REMARKS.--Minor diversions are made above the station for public-water supply.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	4.7	5.2	5.6
10	3.7	3.9	4.2

50147796 Quebrada Los Morones near Moca, Puerto Rico

LOCATION.--Lat 18°21'24", long 67°05'23", Hydrologic Unit 21010003, at barrio Cerro Gordo, 0.6 mi (1.0 km) upstream from Río Culebrinas, 3.6 mi (5.8 km) northwest from Cerro Pichón, 2.8 mi (4.5 km) northeast from Cerro Pelao, and 5.1 mi (8.2 km) northwest of Central La Plata.

DRAINAGE AREA.--7.2 mi^2 (19 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 9 base-flow measurements with concurrent base flows at gaging station 50147800.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	6.6	7.0	7.6
10	5.2	5.4	5.8

50147997 Quebrada Grande near Moca, Puerto Rico

LOCATION.--Lat 18°22'50", long 67°06'49", Hydrologic Unit 21010003, at barrio Cruz, 0.2 mi (0.3 km) upstream from Río Culebrinas, 2.6 mi (4.2 km) southwest from Monte El Ojo, and 1.0 mi (1.6 km) south of Moca plaza.

DRAINAGE AREA.--4.7 mi^2 (12 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50147800.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	.2	.3	.4
10	.1	.2	.2

RÍO CULEBRINAS BASIN—Continued

50148500 Río Caños near Aguada, Puerto Rico

LOCATION.--Lat 18°22'19", long 67°09'06", Hydrologic Unit 21010003, at barrio Naranjo on Highway 417, 2.4 mi (3.9 km) northwest from Cerro Gordo, 4.5 mi (7.2 km) northeast of Cerro Canta Gallo, and 6.1 mi (9.8 km) north of Añasco plaza.

DRAINAGE AREA.--5.1 mi^2 (13 km^2).

LOW-FLOW ESTIMATES.--Based on correlation of 8 base-flow measurements with concurrent base flows at gaging station 50147800.

MAGNITUDE AND FREQUENCY OF ANNUAL LOW FLOWS

Recurrence interval, in years	Lowest average flow, in cubic feet per second, for indicated number of consecutive days		
	7	14	30
2	1.8	2.1	2.3
10	1.3	1.4	1.6

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