C.R. Burchett

Low-Flow Frequency Curves for Selected Long-Term Stream-Gaging Stations in Eastern United States

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1669-G

Low-Flow Frequency Curves for Selected Long-Term Stream-Gaging Stations in Eastern United States

By C. H. HARDISON *and* R. O. R. MARTIN

CONTRIBUTIONS TO THE HYDROLOGY OF THE UNITED STATES

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1669-G

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1963

UNITED STATES DEPARTMENT OF THE INTERIOR

STEWART L. UDALL, *Secretary*

GEOLOGICAL SURVEY

Thomas B. Nolan, *Director*

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington 25, D.C.

CONTENTS

ILLUSTRATIONS

TABLES

CONTRIBUTIONS TO THE HYDROLOGY OF THE UNITED STATES

LOW-FLOW FREQUENCY CURVES FOR SELECTED LONG-TERM STREAM-GAGING STATIONS IN EASTERN UNITED STATES

By C. H. HARDISON and R. O. R. MARTIN

ABSTRACT

Curves showing the magnitude and frequency of annual low flow at 85 stream-gaging stations located in 17 States east and 5 States west of the Mississippi River have been smoothed and adjusted to one of four long-term periods. They are presented to show the similarity and dissimilarity of curves even in the same State and to provide background information for studies of the statistical properties of low-flow frequency curves and for studies of the relation between hydrologic environment and low flow. The results are presented as greatly reduced graphs to facilitate comparison and are summarized in tables from which expanded graphs can be plotted.

INTRODUCTION

Low-flow frequency curves, such as those presented in this report, are useful in planning the development of surface water resources. They show the magnitude and frequency of annual minimum flow for periods of given length and can be used to estimate the amount of storage required to deliver the average flow shown by the curves.

Each curve in this report has been smoothed and adjusted to represent flow characteristics during one of four long-term periods. The curves were initially constructed to facilitate the extension of short-period records of low-flow frequency to a longer time period and have been so used in several States. They can also be used to show representative shapes that are useful in studying the statistical properties of low-flow frequency curves and in studying their relation to hydrologic parameters. This report was prepared to aid in the prosecution of these secondary objectives.

The gaging stations used in this report are distributed throughout most of the States east of the Mississippi River and south of the Great Lakes and in the States of Arkansas, Louisiana, Missouri, Oklahoma,

and Texas. Four different long-term periods were used as reference periods because of the variation in length of the streamflow records available in different parts of the area. The location of the stations and the identification of reference periods are shown in figure 1.

This report describes the method of analysis and the tabular and graphical presentation of results. A brief discussion of the results is followed by the tables and graphs (figs. 2–13).

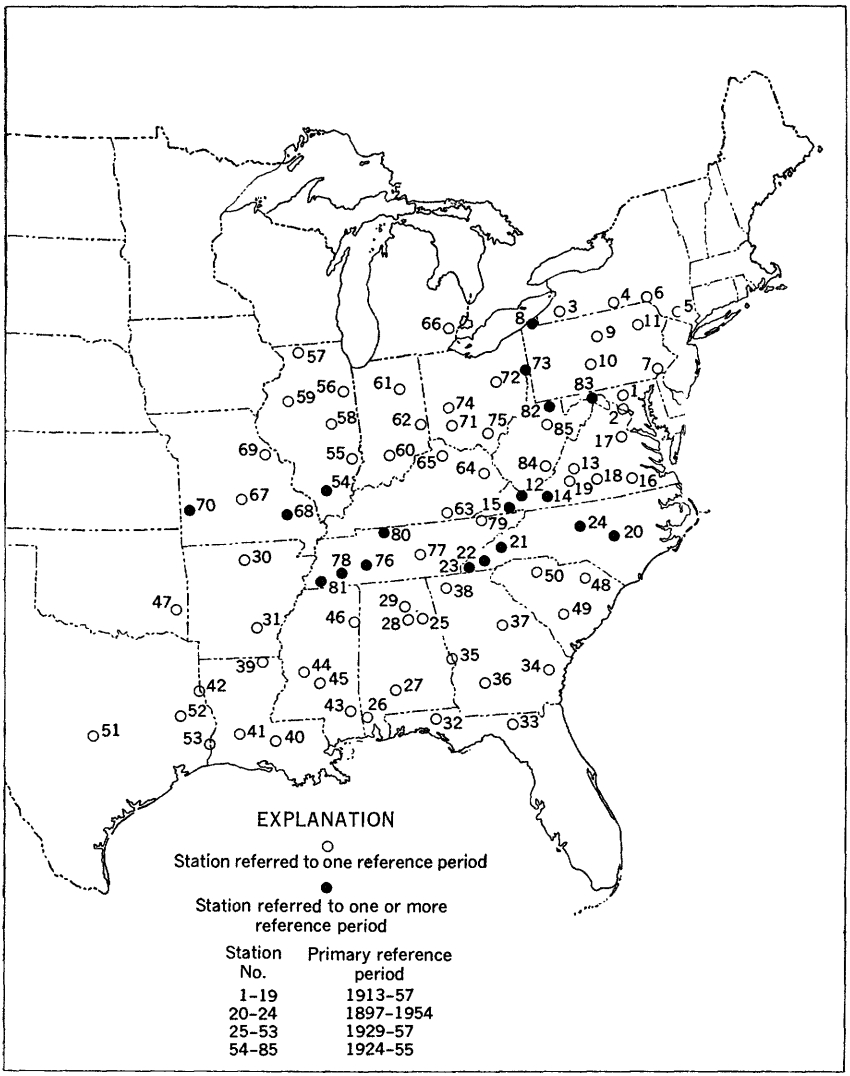

FIGURE 1.—Location of stream-gaging stations and identification of reference periods.

METHOD OF ANALYSIS

Most of the gaging stations for which low-flow frequency curves are given in this report have records that cover the entire long-term period used as a reference period. For a few of these stations, records of periods other than the long-term reference period were used as a guide to the shape of the curves. For gaging stations where the period of record does not cover the full reference period, the low-flow frequency data were extended to the full period by extrapolation from the low-flow data from nearby long-term stations.

The basic data used in the analysis are summaries of annual low flow obtained through use of an electric computer. These summaries show the lowest mean discharge each year (April to March) for selected numbers of consecutive days. Copies of the summaries for specific gaging stations can be obtained from the district office in charge of surface water investigations in the State in which the gaging station is located.

The recurrence interval used in plotting the annual low flows is computed from the formula

$$\text{Recurrence interval}=\frac{n+1}{m},$$

in which n is the number of annual events and m is the number starting with the lowest as number 1.

Low-flow frequency curves for stations with records for the full length of a reference period were smoothed by comparing the observed annual minimums with those at two or more other long-term stations used in the analysis. Each comparison was made by plotting on logarithmic paper the annual minimums arranged in order of magnitude at each of the two stations being compared and by drawing a smooth curve of relation. The relation curve was then used to obtain estimates of the discharge for each order number at the station being analyzed based on the experience at the other station. Discharge estimated in this way was averaged with the observed discharge for the same order number at the station being analyzed to obtain adjusted values which were then plotted on extreme-value probability paper with a logarithmic ordinate. The results shown in this report are taken from smooth curves drawn to average these points. By this procedure, a plotted value of an anomalously low discharge at one of the stations is raised by the experience at the other stations; at the same time this procedure tends to lower the plotted values of the lowest discharge experienced at the other stations. The relations between the low flows at pairs of gaging stations, which are based on all the points in the array, are assumed to express the true difference in low-flow characteristics at the two stations so that the departures from the relations can be assumed to be due to chance.

The extension of low-flow frequency data at stations with records shorter than the reference period was made by relating the annual minimum flows to the annual minimum flows at long-term stations through use of an unregressed line of relation. That is, the relation curves were drawn so as to be equally applicable regardless of which station was used as the dependent variable. This procedure serves to maintain the variability of the observed data but can result in a decrease in accuracy unless a sufficient degree of correlation between stations is present. In general, the plotting of annual minimum discharge for concurrent years of record showed a correlation coefficient of 0.7 or greater. For a few stations where the correlation coefficient was less than 0.7, adjustment was made only to the extent that the trend of all long-term stations on all sides of the short-term station was the same.

DESCRIPTION OF TABLES AND FIGURES

The low-flow frequency curves for each station are summarized in tables and graphs. The tabular data are sufficiently detailed to permit the low-flow frequency curves to be plotted on any type of scale; the graphical data are presented only for visual comparison. The tabular data are presented in four tables starting on page 7; each table is for a different reference period. Within each table the gaging stations are arranged alphabetically, first by States and then by station name within each State. The map number identifies the location of the gaging station in figure 1, and the station number is the number assigned to the gaging station in recent reports on "Surface Water Supply of the United States," issued annually by the U.S. Geological Survey. The numeral before the hyphen designates the number of the part in the annual series, and the letter following the numeral designates a subdivision of the part; the numerals following the hyphen are the station numbers within the part, assigned in downstream order. A complete description of the location of each gaging station together with information on the period of record and the amount of regulation can be found in one of the recent reports on surface-water supply for the indicated part.

The flow figures given in the table are mean discharge for the indicated period of consecutive days of low flow. To obtain the volume of low flow in cfs-days, the figures should be multiplied by the number of days, and to obtain flow per square mile, they should be divided by the drainage area. At some stations the figures shown for 15 consecutive days of low flow are really the flow for 14 consecutive days, and at all stations, the 15-day figures can be used as the flow for 14 consecutive days. A change in the computer program from 15 to 14 consecutive days was made after the project was started, but all

results are considered to be equivalent. The change was made to obtain a more natural figure of flow at stations where the flow was affected by a weekly pattern of regulation. At such stations the average flow for 14 consecutive days is more likely to represent natural flow than is the flow for 15 days. The difference in the average flow for 14 days and that for 15 days is probably not more than a few percent at most stations.

For some gaging stations located near the boundary separating the areas of different reference periods, low-flow frequency curves were prepared for both reference periods. Only the curves for the reference period applicable to the State in which the station is located are given in this report, but footnotes to the table indicate how the curves for such stations can be made applicable to the other reference period.

The content of each of the 4 tables is as follows:

Table	*Reference period*	*State and number of stations*
1	1913–57	Maryland 2
		New York 4
		Pennsylvania 5
		Virginia 8
2	1897–1957	North Carolina 5
3	1929–57	Alabama 5
		Arkansas 2
		Florida 2
		Georgia 5
		Louisiana 4
		Mississippi 4
		Oklahoma 1
		South Carolina 3
		Texas 3
4	1924–55	Illinois 6
		Indiana 3
		Kentucky 3
		Michigan 1
		Missouri 4
		Ohio 5
		Tennessee 6
		West Virginia 4

For other reference periods, such as the period 1931–60 that is used as the climatological standard period by the World Meteorological Organization, the curves in this report can be adjusted to the new reference period by plotting the observed annual low flows for the new reference period on the same graphs used for the smoothed curves. The position of the adjusted curves would be based largely on the plotted points, and the shape and slope of the curves would be based largely on the smoothed curves taken from this report.

675121—63——2

Low-flow frequency curves for all 85 gaging stations included in this report are shown in figures 2–13 at the end of this report. The curves are identified by station number, and the map number is shown in parentheses. The lowest of the four curves shown for each station is that for 7 consecutive days, and the other three curves are for 30, 120, and 274 consecutive days. Curves for 15, 60, and 183 consecutive days have been omitted for clarity.

The curves are plotted with an extreme-value probability scale as the abscissa and a logarithmic scale as the ordinate. The extreme-value probability scale is graduated to conform with Gumbel's theory of extreme values by use of a scale developed by Powell.[1] The logarithmic scale is used because it tends to make the curves plot more nearly as straight lines than does an arithmetic scale. The lower ends of some curves were made straight lines when the basic data could be so interpreted, but for the most part no attempt was made to fit straight lines or any other predetermined type of distribution.

DISCUSSION OF RESULTS

The low-flow frequency curves for the 85 gaging stations range in shape from the closely spaced mildly sloping curves of station 49 to the widely spaced steep curves of station 47. (See fig. 7.) Most of the curves tend to be concave upward, but some are concave downward; very few plot as straight lines on the type of graph paper used. There is no obvious relation between spacing and slope; some of the widely spaced curves are concave upward, and some are concave downward. The variation in shape of these curves indicates the difficulty of finding a type of statistical distribution that would fit the data for all lengths of periods at every station.

The differences and similarities in the low-flow frequency curves for the 85 gaging stations presented in this report raise some interesting questions. To what extent, for example, does the slope of the curves depend on the rate of base-flow recession and to what extent on the frequency distribution of the length of dry periods. Also, to what extent does the spacing between curves depend on the two factors just mentioned and to what extent on how greatly the runoff of a drainage basin is affected by rainfall that occurs during periods of low flow. These questions would probably be studied in any investigation of the effect of hydrologic environment on low flows.

Although low flow for short periods is largely ground-water effluent, the flow for longer periods such as 60 and 120 days generally contains some contribution from rainfall during those periods. This con-

[1] Powell, R. W., 1943, A simple method of estimating flood frequency: Am. Soc. Civil Engineers Trans. v. 13, no. 2, pp. 105–106.

tribution may vary from basin to basin not so much from differences in amount of rainfall as from differences in amount of infiltration.

It is not the intent of this report to discuss reasons for the variation in shape, slope, and spacing of low-flow frequency curves from station to station or to fit curves to a statistical distribution. The curves should serve, however, as a convenient starting point for such studies because they consolidate data from many stations located over a wide area.

A further use of the low-flow frequency curves presented in this report is in the computation of the amount of storage required to provide the average flow shown by the curves. The amount of storage required can be computed by drawing a mass curve for the discharges taken from the low-flow frequency curves for a given recurrence interval.[2] The amount of storage thus computed makes no allowance for seepage and evaporation losses, both of which serve to increase the amount of storage required or to decrease the allowable draft. In addition, the method has a small bias that requires that the computed amount of storage be increased by about 10 percent.

TABLE 1.—*Magnitude and frequency of annual low flow for selected long-term stream-gaging stations in Maryland, New York, Pennsylvania, and Virginia, 1913–57*

[Observed or extended data for the reference period April 1, 1913, to March 31, 1958, smoothed by comparison with records at other long-term stations. See figures 2 and 3 for corresponding curves]

Map	Station No.	Station name	Drainage area (sq mi)	Period (consecutive days)	Annual low flow (cfs) for indicated recurrence interval (years)						
					1.03	1.2	2	5	10	20	50
1	1B–6430	Monocacy River at Jug Bridge near Frederick, Md.[1]	817	7	262	172	105	64	50	39	29
				15	298	195	116	71	55	44	32
				30	370	241	140	85	66	52	38
				60	518	332	188	108	82	64	46
				120	778	506	288	160	120	91	64
				183	1,030	701	419	240	176	133	92
				274	1,280	980	679	437	327	249	173
2	1B–6385	Potomac River at Point of Rocks, Md.	9,651	7	2,330	1,780	1,270	944	837	741	640
				15	2,570	1,930	1,360	1,000	881	782	673
				30	2,980	2,200	1,530	1,100	955	852	736
				60	4,010	2,900	1,930	1,310	1,110	961	803
				120	5,690	4,100	2,700	1,800	1,490	1,250	1,010
				183	7,910	5,600	3,670	2,470	2,040	1,680	1,310
				274	10,400	8,000	5,740	4,110	3,360	2,750	2,150
3	3A–0115	Allegheny River at Red House, N.Y.	1,690	7	485	303	194	141	115	95	74
				15	565	346	214	154	127	104	81
				30	716	437	259	181	149	122	95
				60	1,130	633	333	219	179	148	114
				120	1,900	1,040	521	308	244	196	148
				183	2,330	1,510	887	540	400	300	207
				274	3,040	2,270	1,630	1,150	921	740	560

See footnote at end of table.

[2] Martin, R. O. R., and Hulme, A. E., 1957, Surface Water, *in* Rasmussen, W. C., and others, The water resources of northern Delaware: Delaware Geol. Survey Bull., no. 6, v. 1, pp. 55–59.

TABLE 1.—*Magnitude and frequency of annual low flow for selected long-term stream-gaging stations in Maryland, New York, Pennsylvania, and Virginia, 1913–57*—Continued

[Observed or extended data for the reference period April 1, 1913, to March 31,1958, smoothed by comparsion with records at other long-term stations. See figures 2 and 3 for corresponding curves]

Map	Station No.	Station name	Drainage area (sq. mi.)	Period (consecutive days)	Annual low flow (cfs) for indicated recurrence interval (years)						
					1.03	1.2	2	5	10	20	50
4	1B–5310	Chemung River at Chemung, N.Y.	2,530	7	394	259	163	116	96	80	62
				15	451	291	181	127	104	87	68
				30	598	353	206	147	121	101	79
				60	995	522	269	175	144	120	94
				120	1,630	873	423	233	186	150	113
				183	2,210	1,310	680	367	283	228	171
				274	2,290	2,100	1,340	837	638	516	384
5	1B–3700	Wallkill River at Pellets Island Mountain, N.Y.[1]	385	7	160	76	37	23	19	15	12
				15	192	91	43	27	21	17	13
				30	251	119	54	32	25	20	15
				60	388	180	77	42	33	26	20
				120	666	311	128	62	48	38	28
				183	753	422	210	116	91	72	54
				274	842	568	353	232	182	146	108
6	1B–4265	West Branch Delaware River at Hale Eddy, N.Y.	593	7	212	130	73	46	40	35	30
				15	268	158	87	52	46	42	35
				30	363	210	111	67	57	49	40
				60	541	300	151	87	71	60	47
				120	821	502	272	153	119	94	69
				183	1,030	717	443	269	204	156	111
				274	1,270	998	721	502	407	335	263
7	1B–4810	Brandywine Creek at Chadds Ford, Pa.[1]	287	7	216	157	111	80	67	57	46
				15	238	171	120	86	72	61	50
				30	275	193	134	96	80	68	56
				60	312	222	153	107	89	76	62
				120	371	268	187	131	108	90	71
				183	427	319	228	160	132	110	87
				274	521	408	301	221	182	152	120
8	3A–0215	French Creek at Carters Corners, Pa.[2]	208	7	50	28	18	12	9.4	7.4	5.4
				15	58	32	19	13	10	8.1	6.0
				30	84	43	24	16	12	9.6	7.1
				60	143	67	33	21	16	12	8.4
				120	251	122	55	30	23	17	12
				183	328	207	114	64	47	36	25
				274	463	351	252	178	140	112	84
9	1B–5480	North Bald Eagle Creek at Beech Creek Station, Pa.	559	7	228	183	148	127	116	108	98
				15	249	195	155	130	120	112	102
				30	281	214	165	139	128	118	107
				60	386	263	187	147	134	124	113
				120	530	355	235	176	155	140	123
				183	702	468	312	225	189	167	142
				274	946	681	486	358	298	252	201
10	1B–5620	Raystown Branch Juniata River at Saxton, Pa.	756	7	196	144	103	82	72	63	54
				15	212	156	111	88	76	67	57
				30	247	177	123	95	83	72	62
				60	324	228	151	108	92	81	68
				120	474	327	207	135	113	95	76
				183	719	491	303	187	151	124	96
				274	955	730	518	354	276	217	159
11	1B–5365	Susquehanna River at Wilkes-Barre, Pa.	9,960	7	2,930	1,940	1,290	978	838	712	580
				15	3,200	2,110	1,390	1,050	989	764	624
				30	4,020	2,490	1,560	1,170	1,010	873	720
				60	5,510	3,370	1,960	1,330	1,160	1,010	852
				120	8,320	5,210	3,000	1,830	1,530	1,310	1,060
				183	11,100	7,590	4,660	2,850	2,250	1,830	1,410
				274	14,000	10,700	7,780	5,660	4,610	3,760	2,900

See footnotes at end of table.

TABLE 1.—*Magnitude and frequency of annual low flow for selected long-term stream-gaging stations in Maryland, New York, Pennsylvania, and Virginia, 1913–57*—Continued

[Observed or extended data for the reference period April 1, 1913, to March 31, 1953, smoothed by comparison with records at other long-term stations. See figures 2 and 3 for corresponding curves]

Map	Station No.	Station name	Drainage area (sq mi)	Period (consecutive days)	Annual low flow (cfs) for indicated recurrence interval (years)						
					1.03	1.2	2	5	10	20	50
12	3B–5240	Clinch River at Cleveland, Va.[1 3]	528	7	154	115	82	64	56	51	44
				15	170	125	88	68	60	54	47
				30	223	153	101	74	65	58	50
				60	321	203	121	82	70	62	52
				120	513	316	177	107	89	75	61
				183	674	431	250	153	121	98	74
				274	918	681	462	304	238	189	142
13	2A–0195	James River at Buchanan, Va.	2,084	7	655	511	383	314	296	277	256
				15	722	555	405	330	309	290	268
				30	835	618	437	345	321	301	278
				60	1,290	801	500	382	350	323	292
				120	1,790	1,130	660	440	389	353	308
				183	2,540	1,640	958	587	488	421	351
				274	3,170	2,320	1,640	1,070	808	620	439
14	3A–1680	New River at Allisonia, Va.[1 4]	2,202	7	1,690	1,270	945	737	634	551	480
				15							
				30	2,100	1,530	1,120	846	720	629	538
				60	2,520	1,800	1,280	940	792	693	593
				120	3,110	2,180	1,510	1,090	927	806	686
				183	3,590	2,540	1,800	1,300	1,090	945	804
				274	4,200	3,050	2,270	1,690	1,420	1,220	1,040
15	3B–4900	North Fork Holston River near Gate City, Va.[1 4]	672	7	226	135	91	67	58	52	46
				15							
				30	333	183	114	80	67	58	50
				60	475	243	140	94	76	65	54
				120	810	397	213	127	100	83	67
				183	1,060	540	292	178	139	112	90
				274	1,340	796	504	317	243	192	145
16	2A–0455	Nottoway River near Stony Creek, Va.[1]	586	7	213	126	61	26	14	8.2	4.0
				15	244	146	72	32	18	11	5.6
				30	311	185	90	40	24	15	7.7
				60	396	236	117	54	33	21	11
				120	574	350	181	88	58	38	23
				183	652	433	252	142	98	70	44
				274	760	600	416	246	172	122	79
17	1B–6680	Rappahannock River near Fredericksburg, Va.	1,599	7	609	381	198	79	40	20	7.5
				15	721	450	233	97	50	25	10
				30	868	552	289	125	67	35	15
				60	1,120	724	393	180	101	58	25
				120	1,520	1,040	612	320	200	120	57
				183	1,810	1,340	877	527	370	250	140
				274	2,410	1,870	1,310	848	611	431	261
18	2A–0625	Roanoke River at Brookneal, Va.[1]	2,420	7	1,280	978	670	440	343	269	215
				15	1,390	1,050	722	474	373	304	233
				30	1,590	1,190	813	536	421	345	271
				60	1,920	1,420	948	617	488	410	327
				120	2,410	1,760	1,190	782	640	540	431
				183	2,900	2,120	1,440	1,000	827	699	558
				274	3,240	2,590	1,970	1,440	1,170	961	741
19	2A–0550	Roanoke River at Roanoke, Va.	388	7	141	98	64	47	41	36	31
				15	154	106	70	50	44	39	32
				30	184	126	80	56	48	42	36
				60	252	166	99	63	53	47	39
				120	337	222	132	80	65	57	48
				183	419	284	173	104	84	72	61
				274	505	373	248	159	125	102	76

[1] Observed record extended to reference period 1913–57 by relation with records at other stations.
[2] Data are applicable to reference period 1924–55 if 7- and 120-day discharge is lowered 10 percent.
[3] Data are applicable to reference period 1924–55 if all discharge is lowered 5 percent.
[4] Data are applicable to reference period 1897 to 1954 if all discharge is raised 10 percent.

TABLE 2.—*Magnitude and frequency of annual low flow for selected long-term stream-gaging stations in North Carolina, 1897–1954*

[Observed or extended data for the reference period April 1, 1897, to March 31, 1955, smoothed by comparison with records at other long-term stations. See figure 4 for corresponding curves]

Map	Station No.	Station name	Drainage area (sq mi)	Period (consecutive days)	Annual low flow (cfs) for indicated recurrence interval (years)						
					1.03	1.2	2	5	10	20	50
20	2A–1025	Cape Fear River at Lillington, N.C.[1 2]	3,440	7	1,050	631	311	133	82	54	34
				15							
				30	1,380	871	462	215	131	88	56
				60	1,910	1,210	639	298	182	123	78
				90	2,330	1,470	779	362	222	149	94
				120	2,990	1,930	1,080	539	363	257	163
				183	3,900	2,540	1,460	860	612	441	289
				274	5,020	3,490	2,290	1,450	1,100	850	604
21	3B–4515	French Broad River at Asheville, N.C.[3]	945	7	1,260	942	700	507	411	338	262
				15							
				30	1,570	1,150	841	606	494	410	314
				60	1,830	1,340	980	700	567	437	362
				90	2,060	1,490	1,080	778	632	520	408
				120	2,340	1,690	1,210	866	712	600	486
				183	2,780	1,980	1,400	1,040	879	751	622
				274	3,100	2,250	1,700	1,280	1,080	939	786
22	3B–5030	Little Tennessee River at Needmore, N.C.[1 4]	436	7	624	428	318	249	214	186	154
				15							
				30	746	508	370	281	243	210	174
				60	880	594	431	317	269	233	193
				90	1,010	672	473	349	298	257	213
				120	1,140	757	523	390	338	291	242
				183	1,410	921	637	480	415	371	329
				274	1,640	1,140	840	641	559	497	432
23	3B–5500	Valley River at Tomotla, N.C.[1 4]	104	7	111	72	48	34	27	22	16
				15							
				30	143	88	59	41	33	26	19
				60	173	104	69	48	38	30	23
				90	203	120	78	54	43	34	25
				120	260	144	90	63	52	43	34
				183	319	184	113	78	67	60	51
				274	358	253	168	117	101	92	82
24	2A–1165	Yadkin River at Yadkin College, N.C.[1 3]	2,280	7	2,180	1,660	1,230	874	716	618	507
				15							
				30	2,650	2,010	1,470	1,040	848	739	609
				60	3,020	2,270	1,670	1,180	970	831	682
				90	3,380	2,530	1,860	1,320	1,070	922	760
				120	3,680	2,720	2,010	1,430	1,190	1,030	839
				183	4,230	3,110	2,300	1,740	1,500	1,300	1,070
				274	4,680	3,550	2,720	2,120	1,830	1,580	1,310

[1] Observed record extended to reference period 1897–1954 by relation with records at other stations.
[2] Data are applicable to reference period 1929–57 if 7- and 30-day discharge is lowered 30 percent and 60-day discharge 15 percent.
[3] Data are applicable to reference period 1929–57 if all discharge is lowered 15 percent.
[4] Data are applicable to reference periods 1929–57 and 1924–55 if all discharge is lowered 15 percent.

TABLE 3.—*Magnitude and frequency of annual low flow for selected long-term stream-gaging stations in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, Oklahoma, South Carolina, and Texas, 1929–57*

[Observed or extended data for the reference period April 1, 1929, to March 31, 1958, smoothed by comparison with records at other long-term stations. See figures 5–8 for corresponding curves]

Map	Station No.	Station name	Drainage area (sq mi)	Period (consecutive days)	Annual low flow (cfs) for indicated recurrence interval (years)						
					1.03	1.2	2	5	10	20	50
25	2B–4040	Choccolocco Creek near Jenifer, Ala.[1]	281	7	133	105	85	69	58	47	36
				15	139	110	88	72	60	49	38
				30	154	118	93	75	63	52	40
				60	203	146	107	82	67	54	42
				120	241	173	127	96	80	67	54
				183	313	218	153	113	93	77	61
				274	542	356	243	181	150	126	100
26	2B–4795	Escatawpa River near Wilmer, Ala.[1]	506	7	300	171	102	66	50	38	27
				15	342	193	113	84	56	43	30
				30	393	218	124	82	63	49	35
				60	528	302	166	106	82	63	45
				120	702	435	245	148	120	98	75
				183	894	616	376	224	170	138	107
				274	1,340	933	642	497	416	352	283
27	2B–4285	Flat Creek at Fountain, Ala.[1]	245	7	27	12	5.5	2.8	1.7	1.0	.5
				15	34	14	6.4	3.3	2.1	1.3	.7
				30	44	18	7.6	4.0	2.5	1.6	.9
				60	72	28	12	5.7	3.7	2.5	1.5
				120	141	51	20	10	7.0	5.2	3.5
				183	271	92	36	17	12	8.9	6.0
				274	474	205	96	52	37	28	20
28	2B–4555	Locust Fork at Trafford, Ala.[1]	[2]625	7	85	43	22	15	11	10	8.0
				15	104	52	27	17	14	12	9.3
				30	161	74	35	22	18	15	12
				60	313	127	52	29	24	20	15
				120	540	237	96	50	39	32	24
				183	783	402	187	86	64	51	38
				274	1,320	808	457	287	223	176	130
29	2B–4500	Mulberry Fork near Garden City, Ala.[1]	368	7	40	17	8.0	5.3	4.3	3.6	2.7
				15	54	22	9.6	5.9	4.8	4.0	3.1
				30	106	36	13	6.6	5.4	4.4	3.4
				60	222	72	22	9.7	7.4	6.0	4.7
				120	380	156	56	24	17	14	10
				183	521	265	115	52	36	29	21
				274	884	525	301	200	155	123	91
30	7–0570	Buffalo River near Rush, Ark.	1,091	7	139	79	46	30	22	17	12
				15	168	93	53	34	25	19	13
				30	221	119	64	40	30	22	16
				60	303	157	78	48	36	27	19
				120	582	302	141	78	59	46	33
				183	1,110	581	262	128	95	74	53
				274	1,570	1,030	597	349	263	203	143
31	7–3635	Saline River near Rye, Ark.[1]	2,062	7	133	56	26	13	9.0	6.6	4.5
			*	15	177	70	30	15	10	7.7	5.2
				30	256	101	39	18	12	9.0	6.0
				60	406	161	56	25	17	12	7.7
				120	1,170	428	133	50	34	24	16
				183	2,270	960	329	115	71	49	30
				274	3,610	2,090	1,010	447	275	183	123
32	2B–3655	Choctawhatchee River at Caryville, Fla.[1]	3,499	7	2,640	1,820	1,230	980	886	811	720
				15	2,830	1,940	1,300	1,030	930	848	757
				30	3,240	2,220	1,480	1,130	1,020	903	786
				60	4,130	2,740	1,740	1,290	1,120	982	824
				120	5,220	3,500	2,230	1,640	1,430	1,250	1,060
				183	6,580	4,410	2,810	2,060	1,790	1,560	1,320
				274	8,610	5,780	3,630	2,620	2,290	2,000	1,690

See footnotes at end of table.

TABLE 3.—*Magnitude and frequency of annual low flow for selected long-term stream-gaging stations in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, Oklahoma, South Carolina, and Texas, 1929–57*—Continued

[Observed or extended data for the reference period April 1, 1929, to March 31, 1958, smoothed by comparison with records at other long-term stations. See figures 5-8 for corresponding curves]

Map	Station No.	Station name	Drainage area (sq mi)	Period (consecutive days)	Annual low flow (cfs) for indicated recurrence interval (years)						
					1.03	1.2	2	5	10	20	50
33	2B-3195	Suwannee River at Ellaville, Fla.[1]	6,580	7	3,930	2,550	1,480	1,120	961	839	698
				15	4,230	2,730	1,530	1,150	985	858	710
				30	4,580	2,930	1,590	1,180	1,010	878	722
				60	5,440	3,410	1,790	1,220	1,050	910	757
				120	7,220	4,420	2,230	1,380	1,160	981	796
				183	9,640	5,790	2,840	1,680	1,370	1,130	874
				274	12,500	7,230	3,390	2,010	1,590	1,280	961
34	2B-2260	Altamaha River at Doctortown, Ga.[1]	13,600	7	5,790	4,090	3,200	2,560	2,200	1,900	1,570
				15	6,350	4,430	3,460	2,720	2,340	2,030	1,690
				30	7,540	5,120	3,760	2,980	2,540	2,200	1,820
				60	8,560	6,070	4,190	3,210	2,750	2,390	1,970
				120	10,700	7,200	4,970	3,910	3,370	2,910	2,420
				183	12,300	8,400	5,820	4,630	4,000	3,470	2,890
				274	16,800	11,100	7,510	5,800	4,870	4,120	3,330
35	2B-3395	Chattahoochee River at West Point, Ga.	3,550	7	2,430	1,720	1,100	700	526	403	283
				15	2,700	1,910	1,240	788	597	454	320
				30	3,120	2,240	1,470	944	712	542	383
				60	3,710	2,690	1,810	1,180	883	678	477
				120	4,240	3,170	2,240	1,550	1,230	979	733
				183	5,030	3,720	2,620	1,940	1,610	1,350	1,070
				274	6,410	4,730	3,380	2,550	2,150	1,830	1,480
36	2B-3525	Flint River at Albany, Ga.[1]	5,310	7	2,850	2,210	1,630	1,290	1,130	980	823
				15	3,280	2,410	1,760	1,370	1,200	1,050	881
				30	3,590	2,670	1,920	1,500	1,300	1,130	948
				60	4,360	3,160	2,200	1,680	1,430	1,240	1,020
				120	5,180	3,780	2,670	2,060	1,750	1,520	1,250
				183	6,040	4,470	3,180	2,470	2,110	1,830	1,510
				274	8,100	5,800	4,000	3,070	2,620	2,270	1,880
37	2B-2185	Oconee River near Greensboro, Ga.[1]	1,090	7	667	467	296	169	117	82	52
				15	717	500	321	189	133	96	62
				30	793	559	373	230	168	123	83
				60	954	670	459	290	215	162	112
				120	1,160	818	568	377	289	223	161
				183	1,400	958	674	491	398	325	251
				274	1,700	1,190	850	654	551	470	378
38	2B-3875	Oostanaula River at Resaca, Ga.	1,610	7	886	631	461	363	322	288	249
				15	980	684	492	382	340	303	262
				30	1,140	777	541	410	362	322	279
				60	1,530	994	632	471	413	370	319
				120	2,010	1,320	832	620	550	491	426
				183	2,520	1,650	1,060	805	719	640	554
				274	3,850	2,620	1,740	1,370	1,210	1,080	940
39	7-3645	Bayou Bartholomew near Beekman, La.[1]	1,645	7	247	160	103	70	57	49	40
				15	278	174	110	75	62	52	42
				30	339	200	121	80	66	55	44
				60	490	260	144	90	71	60	48
				120	943	450	211	123	96	80	62
				183	1,660	770	330	179	143	116	88
				274	2,530	1,530	792	420	313	247	183
40	2B-4920	Bogue Chitto near Bush, La.[1]	1,210	7	837	691	578	500	468	441	407
				15	882	721	597	519	486	455	423
				30	949	764	621	538	499	470	432
				60	1,110	867	684	575	532	496	456
				120	1,330	1,020	795	667	612	567	516
				183	1,680	1,230	928	762	703	652	591
				274	2,610	1,730	1,250	1,050	960	889	803

See footnote at end of table.

TABLE 3.—*Magnitude and frequency of annual low flow for selected long-term stream-gaging stations in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, Oklahoma, South Carolina, and Texas, 1929–57*—Continued

[Observed or extended data for the reference period April 1, 1929, to March 31, 1958, smoothed by comparison with records at other long-term stations. See figures 5–8 for corresponding curves]

Map	Station No.	Station name	Drainage area (sq mi)	Period (consecutive days)	Annual low flow (cfs) for indicated recurrence interval (years)						
					1.03	1.2	2	5	10	20	50
41	8-0135	Calcasieu River near Oberlin, La.[1]	753	7	135	80	52	42	37	33	28
				15	146	84	54	43	38	34	29
				30	167	94	58	45	40	35	30
				60	279	136	74	50	43	38	33
				120	641	225	100	61	51	46	39
				183	1,310	423	176	94	72	58	47
				274	2,370	1,050	503	270	197	150	106
42	8-0225	Sabine River at Logansport, La.	4,858	7	372	183	74	32	22	17	13
				15	433	209	84	35	24	18	14
				30	619	278	103	39	26	20	15
				60	1,030	424	140	49	31	23	17
				120	2,190	798	233	75	46	35	26
				183	4,060	1,650	551	207	136	94	58
				274	5,740	3,270	1,640	841	553	370	219
43	2B-4790	Pascagoula River at Merrill, Miss.[1]	6,600	7	2,560	1,730	1,230	962	861	774	670
				15	2,740	1,840	1,290	1,020	904	808	703
				30	3,090	2,030	1,400	1,070	948	848	740
				60	4,090	2,580	1,690	1,220	1,050	940	808
				120	5,630	3,500	2,240	1,590	1,360	1,200	1,030
				183	7,900	4,800	3,030	2,080	1,730	1,520	1,280
				274	13,100	8,110	5,220	3,700	3,160	2,740	2,280
44	2B-4860	Pearl River at Jackson, Miss.	3,100	7	379	241	146	105	92	81	69
				15	463	279	159	111	97	86	73
				30	605	337	179	118	104	92	78
				60	980	484	228	138	117	102	84
				120	1,890	878	396	228	174	134	96
				183	3,320	1,540	661	354	270	209	151
				274	5,210	3,130	1,720	1,060	859	701	542
45	2B-4875	Strong River at Dlo, Miss.	429	7	59	37	25	21	19	17	15
				15	69	41	27	22	19	18	15
				30	88	49	29	23	20	18	16
				60	129	66	35	25	22	20	17
				120	228	113	53	32	28	25	21
				183	404	202	90	48	39	32	25
				274	736	429	227	133	107	88	69
46	2B-4415	Tombigbee River at Columbus, Miss.	4,490	7	850	537	333	244	204	173	139
				15	950	595	367	268	225	189	152
				30	1,160	700	418	299	250	212	170
				60	1,750	938	518	360	300	254	204
				120	2,930	1,420	728	484	400	334	265
				183	4,720	2,260	1,070	643	524	434	339
				274	8,390	5,100	2,830	1,710	1,390	1,130	878
47	7-3390	Mountain Fork River near Eagletown, Okla.[1]	787	7	76	23	2.0	0	0	0	0
				15	106	36	3.5	.1	0	0	0
				30	153	56	6.2	.1	0	0	0
				60	269	118	21	1.1	.2	0	0
				120	699	354	98	19	6.4	2.2	.6
				183	1,120	714	324	112	56	28	12
				274	1,450	1,070	703	423	303	220	145

See footnote at end of table.

TABLE 3.—*Magnitude and frequency of annual low flow for selected long-term stream-gaging stations in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, Oklahoma, South Carolina, and Texas, 1929–57*—Continued

[Observed or extended data for the reference period April 1, 1929, to March 31, 1958, smoothed by comparison with records at other long-term stations. See figures 5–8 for corresponding curves]

Map	Station No.	Station name	Drainage area (sq mi)	Period (consecutive days)	Annual low flow (cfs) for indicated recurrence interval (years)						
					1.03	1.2	2	5	10	20	50
48	2A-1320	Lynches River at Effingham, S.C.[1]	1,030	7	350	278	208	154	132	114	95
				15	389	308	229	168	144	124	103
				30	456	356	258	183	156	134	111
				60	541	417	296	207	174	149	122
				120	722	550	387	270	230	197	160
				183	943	701	482	333	281	240	197
				274	1,230	899	610	425	360	310	253
49	2A-1730	South Fork Edisto River near Denmark, S.C.[1]	720	7	461	361	292	233	202	174	146
				15	513	390	315	245	211	184	153
				30	578	437	341	269	231	201	166
				60	677	489	368	292	252	219	182
				120	782	577	440	351	302	262	219
				183	885	653	502	402	349	302	251
				274	1,110	782	592	471	407	353	293
50	2A-1590	South Tyger River near Woodruff, S.C.[1]	174	7	123	89	60	35	24	17	11
				15	138	98	67	40	28	20	13
				30	160	113	77	47	34	24	16
				60	191	135	92	59	44	33	23
				120	235	165	114	78	62	49	36
				183	281	194	135	96	78	64	48
				274	344	240	168	127	106	90	72
51	8-1710	Blanco River at Wimberley, Tex.	364	7	33	20	12	6.4	4.2	2.9	1.7
				15	37	22	13	6.8	4.5	3.1	1.9
				30	44	25	14	7.6	5.0	3.4	2.0
				60	68	34	18	9.4	6.2	4.2	2.5
				120	133	56	23	12	8.0	5.5	3.3
				183	234	84	30	14	9.5	6.5	3.9
				274	407	130	40	17	11	7.6	4.5
52	8-0335	Neches River near Rockland, Tex.	3,623	7	287	128	45	14	6.2	2.9	1.1
				15	324	145	51	15	7.0	3.3	1.2
				30	395	172	60	18	8.2	3.8	1.4
				60	661	272	90	27	12	5.7	2.1
				120	1,530	554	164	54	28	14	6.3
				183	3,030	1,160	381	149	90	56	30
				274	4,240	2,190	1,000	507	340	233	143
53	8-0305	Sabine River near Ruliff, Tex.	9,440	7	1,840	1,130	632	408	343	291	237
				15	1,960	1,200	663	425	357	302	244
				30	2,300	1,380	731	454	381	323	261
				60	3,380	1,840	862	487	407	343	277
				120	6,060	2,960	1,290	699	548	438	332
				183	10,400	5,070	2,230	1,160	904	726	550
				274	14,700	8,500	4,480	2,640	2,110	1,690	1,270

[1] Observed record extended to reference period 1929–57 by relation with records at other stations.
[2] Drainage area of 555 square miles should be used for low flow comparisons, as area upstream from dam on Blackburn Fork is assumed not to contribute to the low flow at Trafford.

TABLE 4.—*Magnitude and frequency of annual low flow for selected long-term stream-gaging stations in Illinois, Indiana, Kentucky, Michigan, Missouri, Ohio, Tennessee, and West Virginia, 1924–55*

[Observed or extended data for the reference period April 1, 1924, to March 31, 1956, smoothed by comparison with records at other long-term stations. See figures 9–13 for corresponding curves]

Map	Station No.	Station name	Drainage area (sq mi)	Period (consecutive days)	Annual low flow (cfs) for indicated recurrence interval (years)						
					1.03	1.2	2	5	10	20	50
54	5-5970	Big Muddy River at Plumfield, Ill.[1]	753	7	15	5.4	1.4	0.3	0.1	0.1	0
				15	20	7.2	1.8	.4	.2	.1	0
				30	38	13	3.3	.8	.3	.1	0
				60	139	42	9.2	2.0	.7	.3	.1
				120	443	136	32	7.2	2.7	1.1	.3
				183	638	261	74	17	6.2	2.4	.7
				274	1,080	605	242	72	32	14	5.0
55	3A-3455	Embarras River at Ste. Marie, Ill.	1,540	7	116	59	28	15	10	7.5	4.8
				15	142	74	35	19	13	9.4	6.1
				30	198	101	46	24	17	12	7.7
				60	414	190	73	31	22	15	9.9
				120	938	402	137	48	29	21	13
				183	1,460	667	237	81	46	31	20
				274	2,070	1,250	612	249	131	66	27
56	5-5260	Iroquois River near Chebanse, Ill.	2,120	7	179	87	43	24	19	15	12
				15	234	111	51	29	22	18	14
				30	304	142	62	35	27	23	18
				60	536	252	93	45	36	30	23
				120	1,130	546	200	72	51	42	32
				183	1,780	894	338	120	78	59	42
				274	2,910	1,660	761	313	200	133	78
57	5-4355	Pecatonica River at Freeport, Ill.	1,330	7	522	393	280	213	190	170	146
				15	561	421	305	236	209	187	161
				30	613	456	326	252	225	203	175
				60	718	527	367	281	255	231	204
				120	972	658	427	319	289	261	231
				183	1,270	808	490	351	316	287	252
				274	1,580	1,010	612	432	388	351	310
58	5-5720	Sangamon River at Monticello, Ill.	550	7	37	18	6.5	2.4	1.4	1.0	.6
				15	46	22	8.2	3.1	1.9	1.3	.8
				30	65	30	12	4.8	3.2	2.1	1.3
				60	134	56	20	7.4	4.8	3.2	2.0
				120	293	116	37	12	7.7	5.2	3.1
				183	620	231	69	21	12	8.3	5.0
				274	740	417	186	71	37	20	9.2
59	5-5700	Spoon River at at Seville, Ill.	1,600	7	161	89	42	21	16	12	9.1
				15	196	106	49	25	19	15	11
				30	283	145	65	32	24	19	14
				60	510	239	100	48	36	29	22
				120	972	431	168	78	59	48	37
				183	1,640	705	264	117	86	70	54
				274	2,060	1,170	578	304	206	141	86
60	3A-3735	East Fork White River at Shoals, Ind.	4,954	7	983	610	380	284	244	213	177
				15	1,030	640	399	298	256	224	186
				30	1,220	744	444	320	275	239	199
				60	1,850	1,080	581	366	312	270	224
				120	3,090	1,710	837	446	352	306	256
				183	4,650	2,580	1,230	603	444	362	282
				274	7,800	4,900	2,600	1,270	831	579	404
61	3A-3265	Mississinewa River at Marion, Ind.	677	7	82	51	30	20	16	12	9.0
				15	96	60	36	24	19	16	12
				30	123	74	42	28	23	19	15
				60	184	104	55	34	28	24	19
				120	357	190	90	48	38	32	25
				183	526	292	139	69	51	42	33
				274	879	555	298	146	95	66	44
62	3A-2765	Whitewater River at Brookville, Ind.[1]	1,239	7	280	190	123	92	82	73	64
				15	326	215	136	99	88	78	68
				30	388	251	154	110	98	88	76
				60	536	331	191	123	107	96	84
				120	818	500	273	156	124	110	95
				183	1,070	687	381	209	154	126	110
				274	1,830	1,250	739	390	258	184	127

See footnote at end of table.

TABLE 4.—*Magnitude and frequency of annual low flow for selected long-term stream-gaging stations in Illinois, Indiana, Kentucky, Michigan, Missouri, Ohio, Tennessee, and West Virginia, 1924–55*—Continued

[Observed or extended data for the reference period April 1, 1924, to March 31, 1956, smoothed by comparison with records at other long-term stations. See figures 9–13 for corresponding curves]

Map	Station No.	Station name	Drainage area (sq mi)	Period (consecutive days)	Annual low flow (cfs) for indicated recurrence interval (years)						
					1.03	1.2	2	5	10	20	50
63	3B–4045	Cumberland River at Cumberland Falls, Ky.	1,977	7	328	116	41	19	13	9.1	5.7
				15	402	147	51	24	16	11	7.1
				30	550	208	71	31	22	15	9.4
				60	1,020	385	122	47	3[illegible]	22	14
				120	1,690	786	297	113	7[illegible]	49	31
				183	2,370	1,300	590	251	157	108	68
				274	3,650	2,590	1,610	902	62[illegible]	434	271
64	3A–2125	Levisa Fork at Paintsville, Ky.[1]	2,143	7	310	122	42	20	14	9.4	5.8
				15	378	149	50	24	16	11	6.6
				30	578	238	70	30	20	14	8.3
				60	966	405	124	40	25	17	9.6
				120	1,980	890	292	87	49	28	14
				183	2,610	1,380	561	192	103	57	27
				274	3,280	2,250	1,340	715	471	306	159
65	3A–2535	Licking River at Catawba, Ky.[1]	3,250	7	350	121	41	19	14	9.8	6.5
				15	461	156	50	22	16	12	7.6
				30	788	258	78	32	22	16	9.9
				60	1,270	421	121	44	29	20	12
				120	2,150	910	312	113	68	41	22
				183	3,260	1,770	784	335	200	125	67
				274	4,280	3,390	2,060	1,050	630	352	165
66	4–1665	River Rouge at Detroit, Mich.[1]	185	7	23	16	9.6	6.6	5.5	4.5	3.5
				15	26	17	10	7.0	5.8	4.8	3.8
				30	32	21	12	8.4	7.0	6.0	4.8
				60	46	28	15	9.5	8.0	6.7	5.4
				120	70	41	22	13	11	8.9	7.2
				183	99	60	32	18	14	12	9.5
				274	154	102	59	32	24	18	15
67	6B–9335	Gasconade River at Jerome, Mo.	2,840	7	936	662	481	372	324	285	241
				15	1,040	717	506	389	338	297	251
				30	1,180	783	540	407	355	312	265
				60	1,410	894	598	448	388	341	288
				120	2,190	1,250	765	545	459	388	313
				183	3,370	1,780	1,010	667	545	452	350
				274	5,410	2,680	1,410	880	697	557	415
68	7–0375	St. Francis River near Patterson, Mo.[2]	956	7	96	56	30	18	13	10	6.9
				15	114	67	36	20	15	11	7.8
				30	146	84	43	24	18	13	9.4
				60	233	123	58	29	22	17	11
				120	476	249	112	54	40	30	21
				183	959	487	207	92	64	48	34
				274	1,790	1,060	546	283	190	131	80
69	5–5080	Salt River near New London, Mo.	2,480	7	121	44	13	3.1	1.2	.2	------
				15	188	65	19	4.6	1.7	.5	------
				20	317	107	31	7.4	2.9	1.2	.4
				60	875	247	70	16	7.1	3.3	1.3
				120	1,760	615	181	44	20	10	4.2
				183	2,270	1,080	383	111	54	29	13
				274	2,630	1,610	820	360	201	100	34
70	7–1860	Spring River near Waco, Mo.[2]	1,164	7	219	126	62	26	15	8.7	4.3
				15	249	140	69	29	17	9.6	4.8
				30	304	160	79	33	19	11	5.5
				60	469	211	95	40	23	13	6.6
				120	852	341	134	57	33	19	9.4
				183	1,420	600	223	93	53	31	15
				274	1,900	960	436	185	106	62	31
71	3A–2475	East Fork Little Miami River at Perintown, Ohio.[1]	477	7	34	10	2.9	1.2	.8	.6	.4
				15	45	14	3.7	1.4	1.0	.7	.4
				30	100	23	5.7	2.2	1.5	1.0	.6
				60	186	54	13	4.1	2.6	1.7	1.0
				120	338	132	40	12	6.4	3.7	1.9
				183	519	244	87	27	13	7.1	3.1
				274	709	500	289	125	57	19	5.8

See footnotes at end of table.

TABLE 4.—*Magnitude and frequency of annual low flow for selected long-term stream-gaging stations in Illinois, Indiana, Kentucky, Michigan, Missouri, Ohio, Tennessee, and West Virginia, 1924–55*—Continued

[Observed or extended data for the reference period April 1, 1924, to March 31, 1956, smoothed by comparison with records at other long-term stations. See figures 9–13 for corresponding curves]

Map	Station No.	Station name	Drainage area (sq mi)	Period (consecutive days)	Annual low flow (cfs) for indicated recurrence interval (years)						
					1.03	1.2	2	5	10	20	50
72	3A-1370	Kokosing River at Millwood, Ohio.	454	7	98	75	56	45	40	36	31
				15	106	80	59	48	43	37	33
				30	123	90	64	52	46	41	35
				60	178	111	71	56	50	44	38
				120	259	155	92	66	57	49	41
				183	402	233	128	84	72	62	51
				274	598	401	238	137	103	82	63
73	3A-1095	Little Beaver Creek near East Liverpool, Ohio.[3]	505	7	58	40	29	21	17	14	11
				15	70	46	33	24	19	16	12
				30	94	59	40	29	23	19	15
				60	156	90	55	38	30	24	19
				120	277	154	89	57	43	33	24
				183	473	252	141	85	62	46	31
				274	624	437	277	166	119	87	57
74	3A-2630	Miami River at Taylorsville, Ohio.	1,155	7	177	112	74	57	51	45	39
				15	197	122	80	61	54	48	42
				30	232	142	92	68	59	52	44
				60	319	185	114	80	68	61	52
				120	564	286	156	98	82	72	61
				183	921	428	216	127	103	89	74
				274	1,380	825	454	242	168	126	92
75	3A-2020	Raccoon Creek at Adamsville, Ohio.[1]	587	7	77	33	12	4.8	3.2	2.2	1.4
				15	84	42	16	5.6	3.6	2.5	1.6
				30	111	55	20	7.4	4.7	3.2	1.9
				60	178	88	33	11	6.9	4.4	2.5
				120	352	174	66	22	13	7.4	3.7
				183	553	301	130	47	26	15	7.0
				274	1,400	562	329	173	103	50	19
76	3B-6040	Buffalo River near Flat Woods, Tenn.[4]	447	7	211	169	134	114	103	92	80
				15	225	179	141	119	107	97	84
				30	240	192	152	127	115	103	90
				60	309	217	165	142	129	118	104
				120	447	296	207	171	153	137	118
				183	564	373	251	204	180	160	136
				274	847	593	402	310	271	238	200
77	3B-4210	Collins River near McMinnville, Tenn.	624	7	166	113	83	67	60	54	47
				15	187	124	88	71	63	57	50
				30	233	146	98	76	68	62	54
				60	334	191	118	88	78	69	59
				120	613	301	165	114	100	88	76
				183	992	450	233	152	130	115	98
				274	1,300	895	554	342	274	240	204
78	7-0295	Hatchie River at Bolivar, Tenn.[1 4]	1,430	7	447	278	184	135	114	98	80
				15	506	311	201	145	123	105	85
				30	621	366	228	163	138	118	96
				60	878	483	285	195	165	141	114
				120	1,590	782	417	267	219	187	152
				183	2,600	1,160	580	359	293	250	203
				274	3,210	2,100	1,260	790	657	558	450
79	3B-5320	Powell River near Arthur, Tenn.	685	7	214	150	103	82	75	68	61
				15	251	169	112	88	80	72	64
				30	308	199	125	94	86	78	69
				60	441	258	147	104	92	84	73
				120	694	374	213	137	112	96	80
				183	1,010	562	323	202	157	129	101
				274	1,370	977	637	406	327	272	212
80	3B-4355	Red River near Adams, Tenn.[1 4]	678	7	143	92	58	44	39	35	30
				15	162	104	65	48	43	38	32
				30	201	127	76	54	47	41	35
				60	272	167	96	63	54	47	39
				120	467	279	151	88	71	59	47
				183	692	413	219	121	94	76	57
				274	1,260	821	475	278	210	159	112

See footnotes at end of table.

TABLE 4.—*Magnitude and frequency of annual low flow for selected long-term stream-gaging stations in Illinois, Indiana, Kentucky, Michigan, Missouri, Ohio, Tennessee, and West Virginia, 1924–55*—Continued

[Observed or extended data for the reference period April 1, 1924, to March 31, 1956, smoothed by comparison with records at other long-term stations. See figures 9–13 for corresponding curves]

Map	Station No.	Station name	Drainage area (sq mi)	Period (consecutive days)	Annual low flow (cfs) for indicated recurrence interval (years)						
					1.03	1.2	2	5	10	20	50
81	7-0305	Wolf River near Rossville, Tenn.[1 4]	503	7	220	182	149	128	116	107	95
				15	238	194	156	134	122	112	100
				30	253	206	165	140	128	118	105
				60	292	231	179	151	137	126	113
				120	381	296	219	177	162	149	133
				183	520	385	270	207	188	173	154
				274	820	583	389	276	250	229	204
82	3A-0705	Big Sandy Creek at Rockville, W. Va.[5]	200	7	42	23	10	3.9	1.9	.8	.2
				15	58	32	14	5.4	2.7	1.1	.3
				30	92	52	23	8.6	4.5	2.0	.6
				60	157	89	40	16	8.2	3.5	1.0
				120	245	155	82	38	22	11	3.0
				183	368	248	144	74	47	27	8.4
				274	473	371	266	177	135	91	40
83	1B-6115	Cacapon River near Great Cacapon, W. Va.[5]	677	7	92	70	53	44	40	36	31
				15	104	78	56	47	42	38	33
				30	128	91	63	50	44	40	35
				60	181	123	79	58	51	45	38
				120	297	189	113	73	62	53	43
				183	479	307	175	103	80	66	50
				274	679	477	300	185	140	107	76
84	3A-1835	Greenbriar River at Alderson, W. Va.	1,357	7	328	188	96	54	42	32	23
				15	422	227	110	58	45	35	25
				30	578	300	137	72	54	40	27
				60	1,100	508	203	94	68	49	33
				120	1,600	853	354	155	105	73	46
				183	1,940	1,210	591	271	174	115	68
				274	2,410	1,860	1,240	685	456	310	185
85	3A-0510	Tygart River at Belington, W. Va.	408	7	102	52	20	6.3	2.6	.9	.2
				15	138	70	27	8.5	3.5	1.2	.3
				30	197	100	39	12	5.0	1.9	.4
				60	361	191	78	25	11	4.2	.9
				120	555	340	173	67	31	11	2.2
				183	748	507	295	150	84	40	8.9
				274	1,020	780	532	332	231	136	43

[1] Observed record extended to reference period 1924–55 by relation with records at other stations.
[2] Data are applicable to reference period 1929–57 if all discharge is lowered 10 percent.
[3] Data are applicable to reference period 1913–57 if all discharge is raised 10 percent.
[4] Data are also applicable to reference period 1929–57.
[5] Data are also applicable to reference period 1913–57.

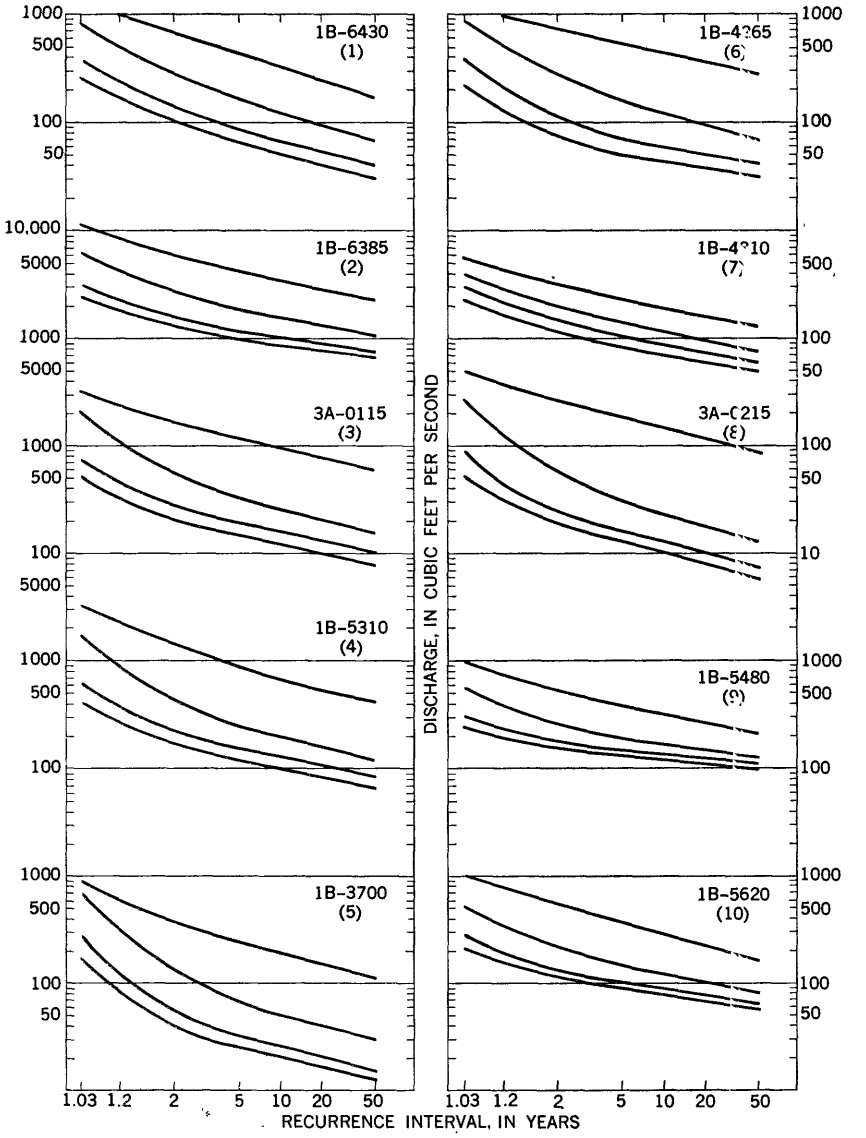

FIGURE 2.—Low-flow frequency curves of 7-, 30-, 120-, and 274-day data for first 10 stations listed in table 1.

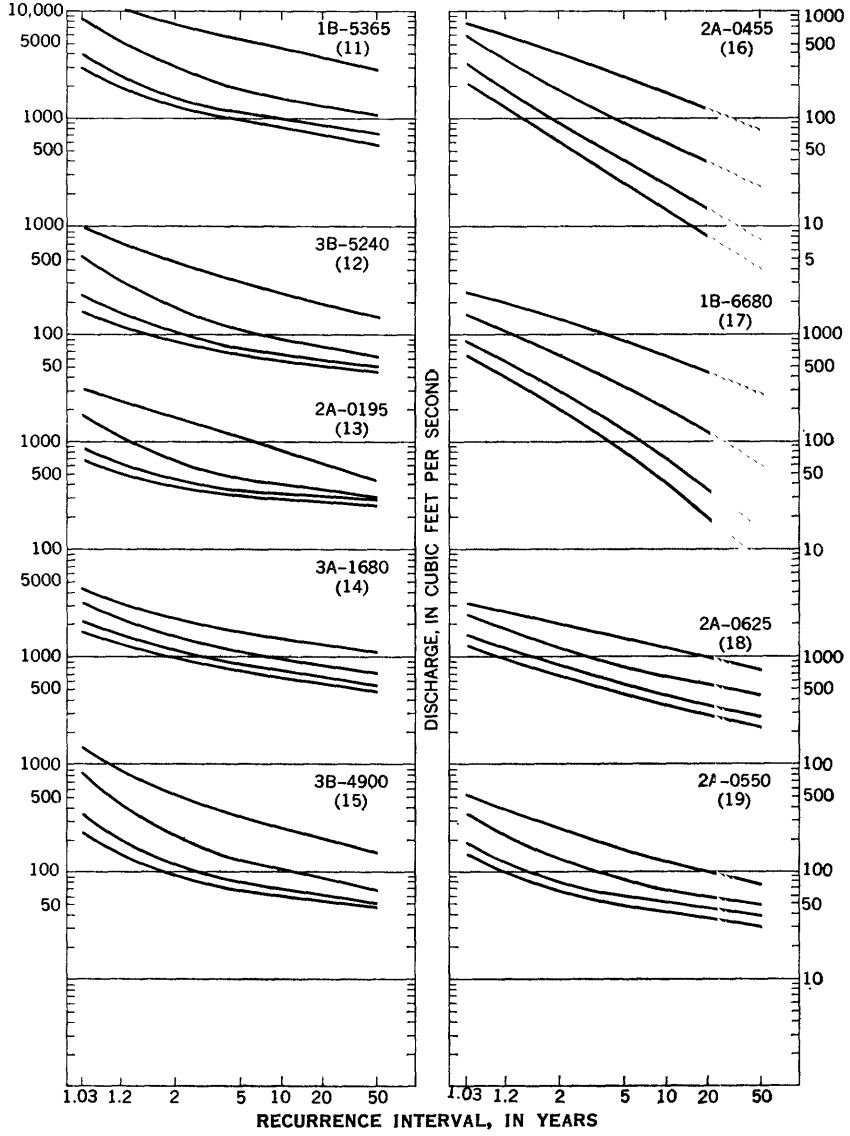

FIGURE 3.—Low-flow frequency curves of 7-, 30-, 120-, and 274-day data for last nine stations listed in table 1.

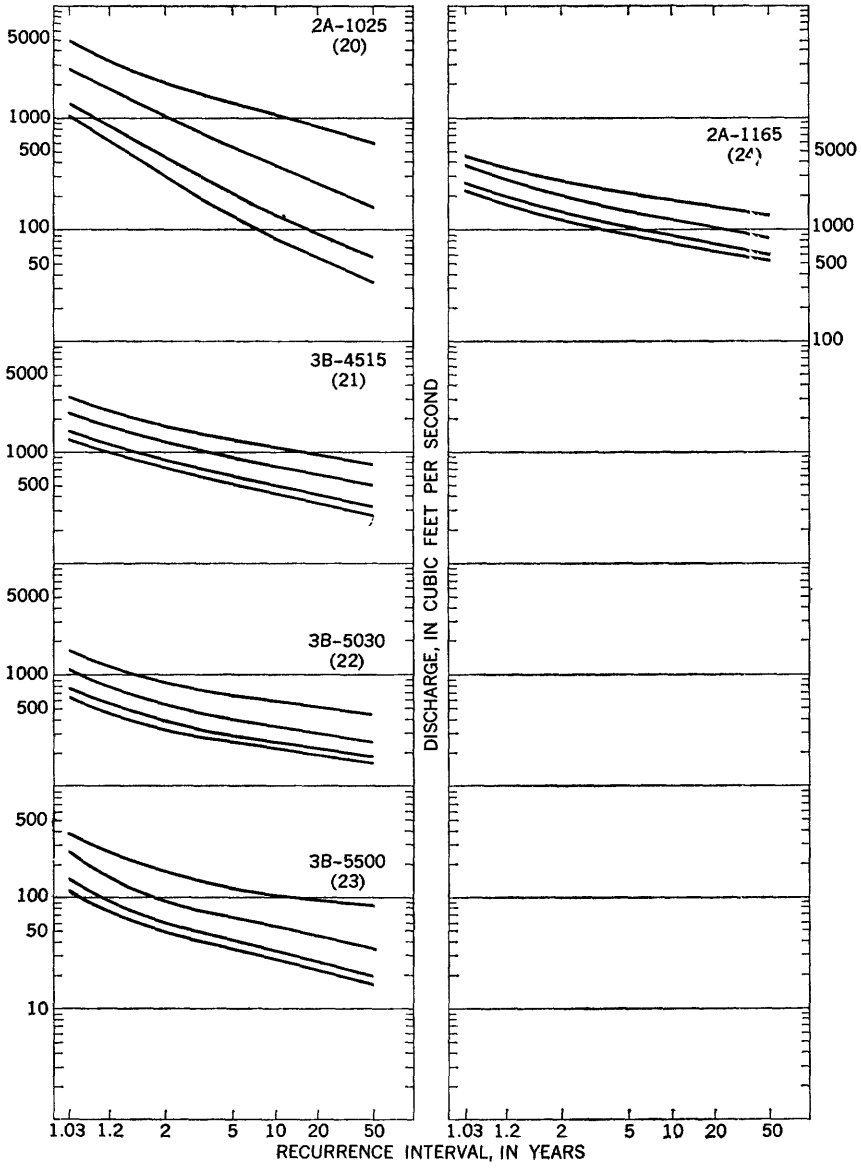

FIGURE 4.—Low-flow frequency curves of 7- 30-, 120-, and 274-day data for the stations listed in table 2.

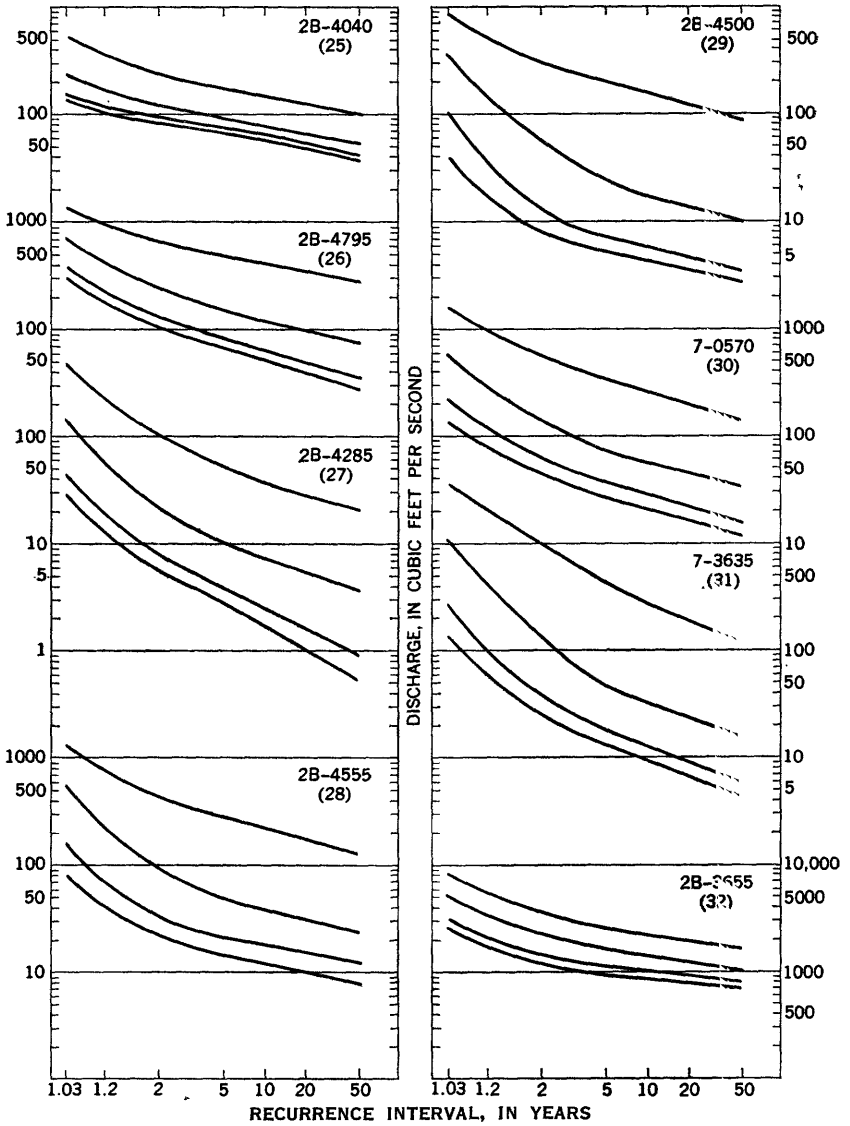

FIGURE 5.—Low-flow frequency curves of 7-, 30-, 120-, and 274-day data for first eight stations listed in table 3.

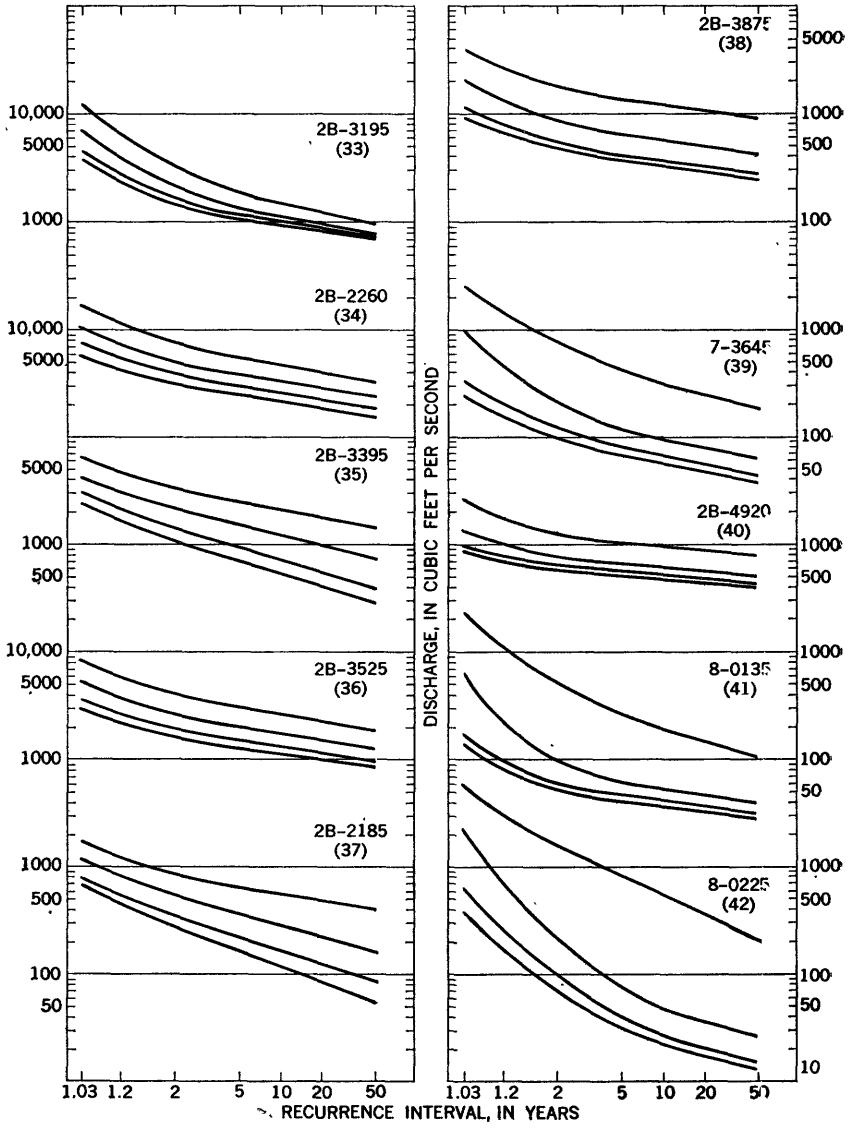

FIGURE 6.—Low-flow frequency curves of 7-, 30-, 120-, and 274 day data for second group of 10 stations listed in table 3.

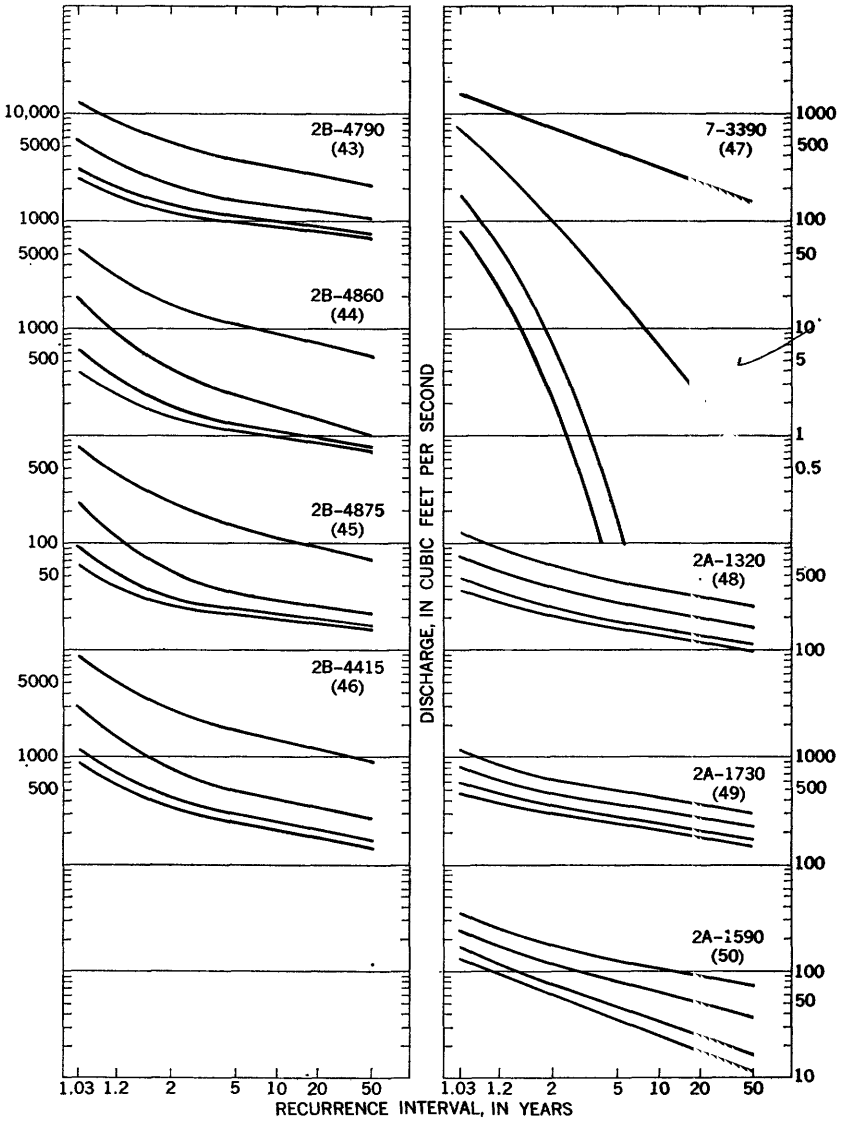

FIGURE 7.—Low-flow frequency curves of 7-, 30-, 120-, and 274-day data for third group of eight stations listed in table 3.

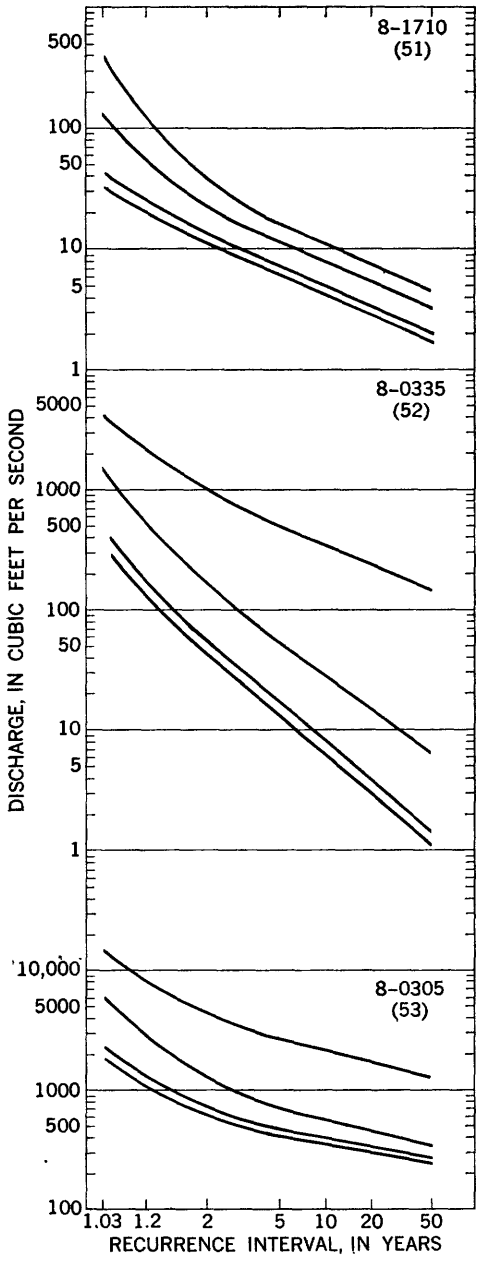

FIGURE 8.—Low-flow frequency curves of 7-, 30-, 120-, and 274-day data for last three stations listed in table 3.

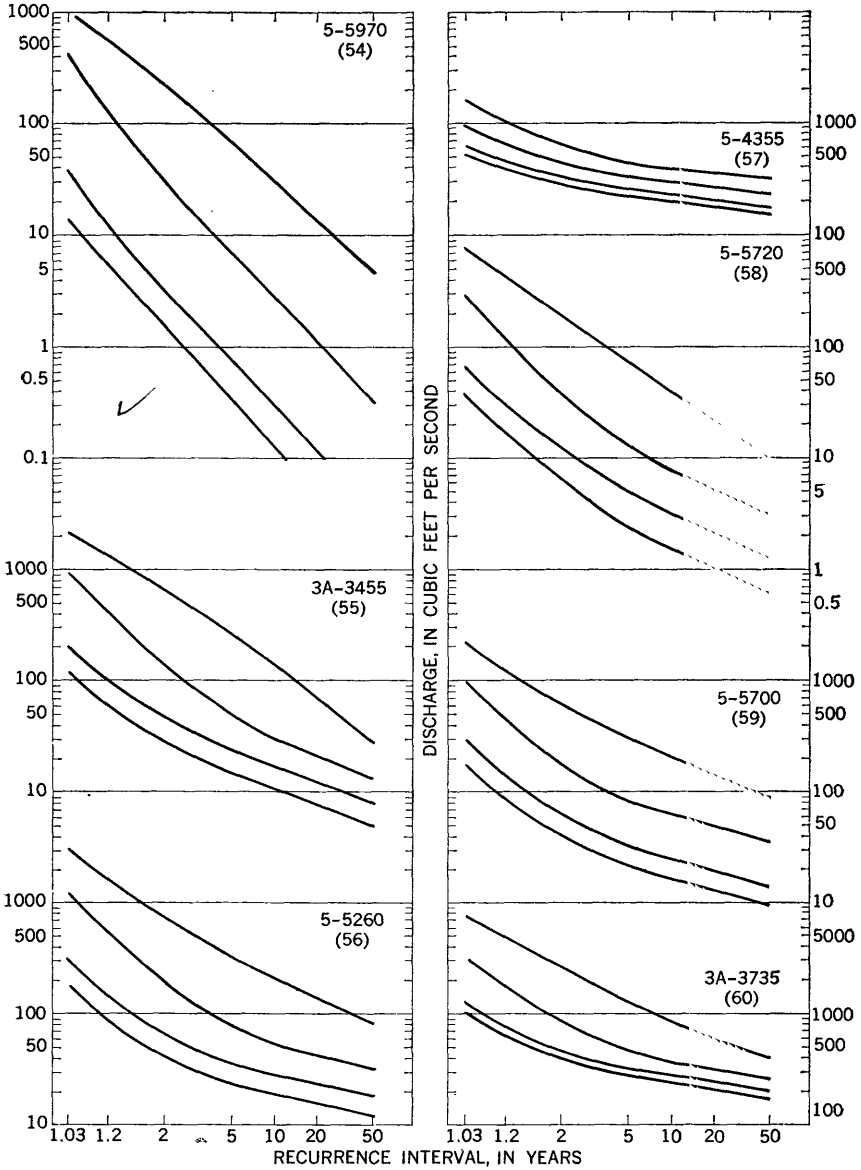

FIGURE 9.—Low-flow frequency curves of 7-, 30-, 120-, and 274-day data for first seven stations listed in table 4.

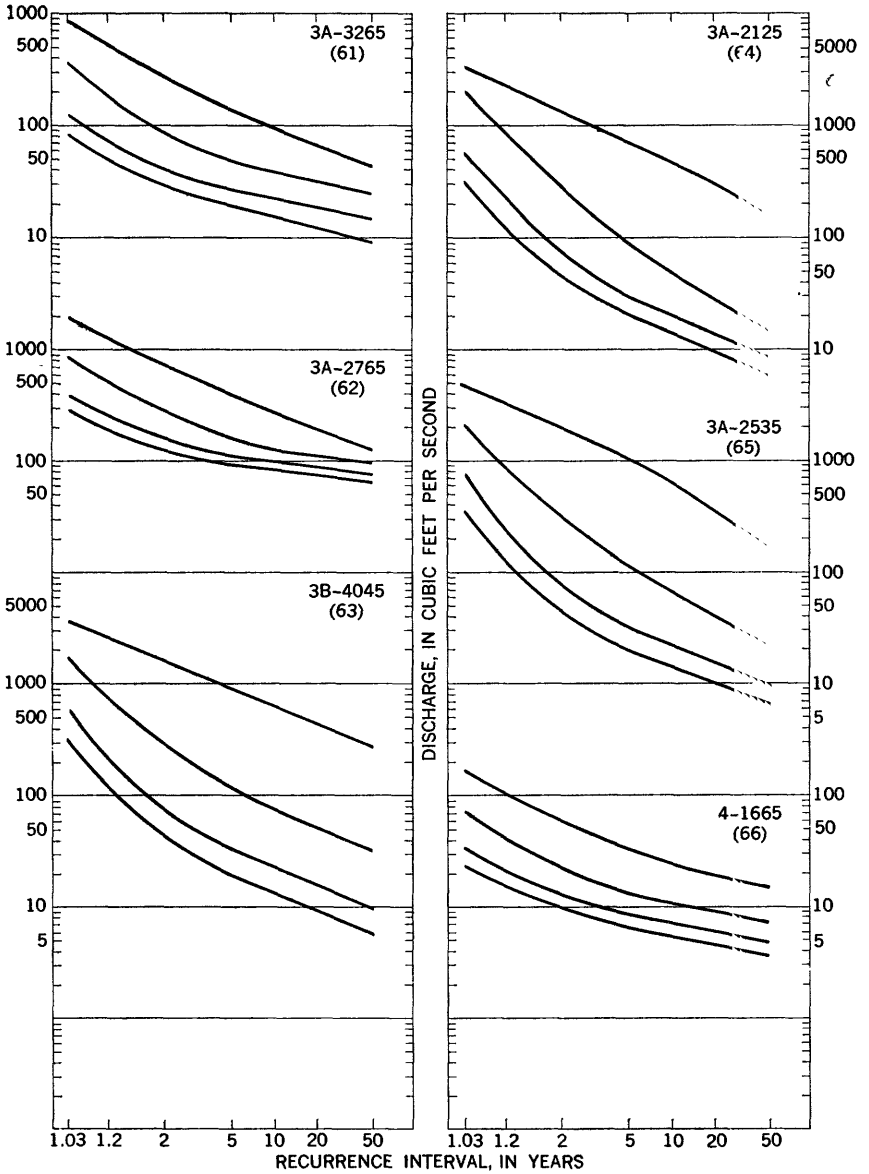

FIGURE 10.—Low-flow frequency curves of 7-, 30-, 120-, and 274-day data for second group of six stations listed in table 4.

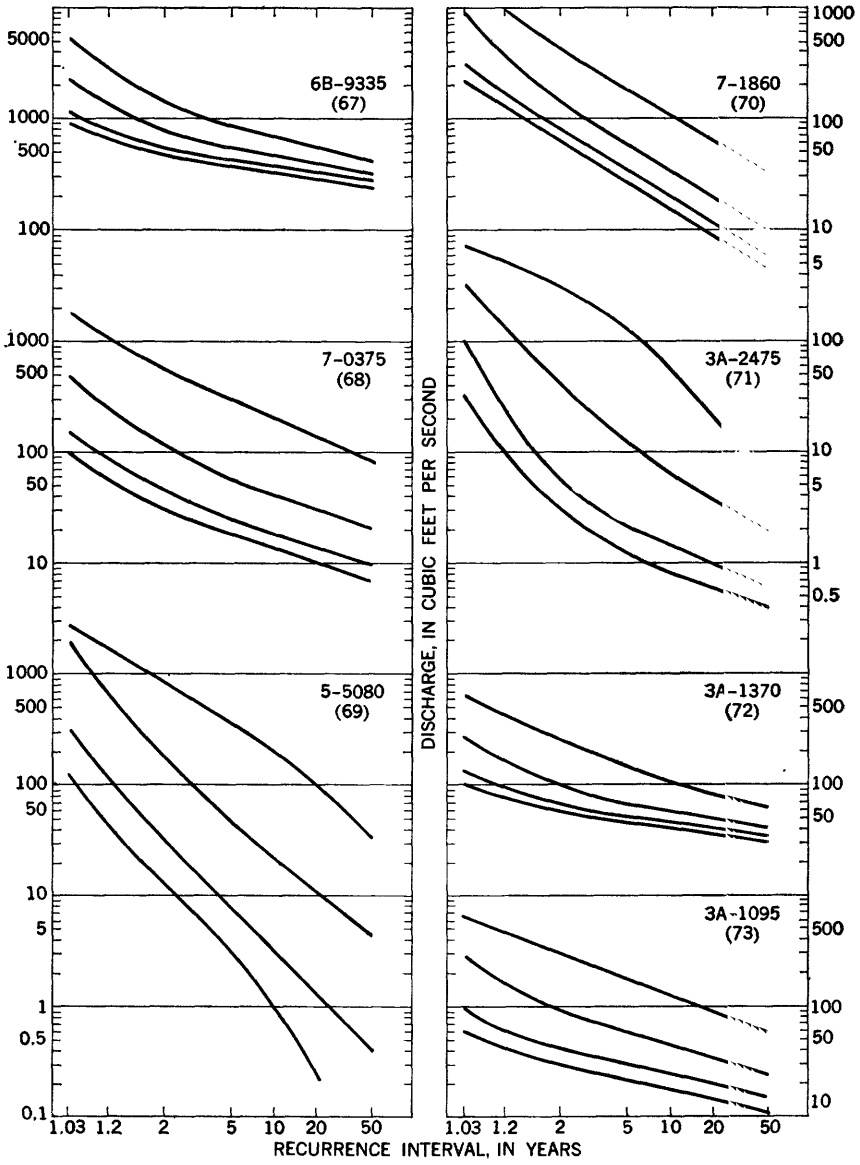

FIGURE 11.—Low-flow frequency curves of 7-, 30-, 120-, and 274-day data for third group of seven stations listed in table 4.

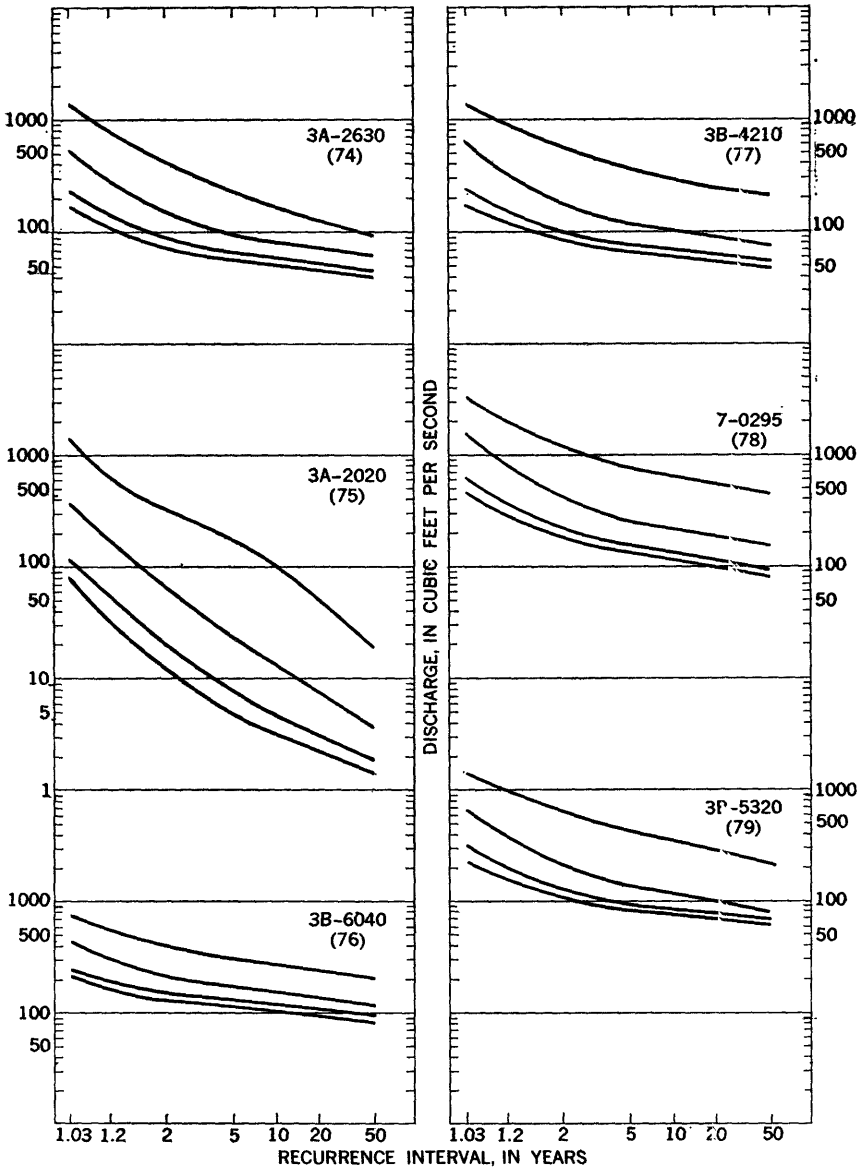

FIGURE 12.—Low-flow frequency curves of 7-, 30-, 120-, and 274-day data for fourth group of six station listed in table 4.

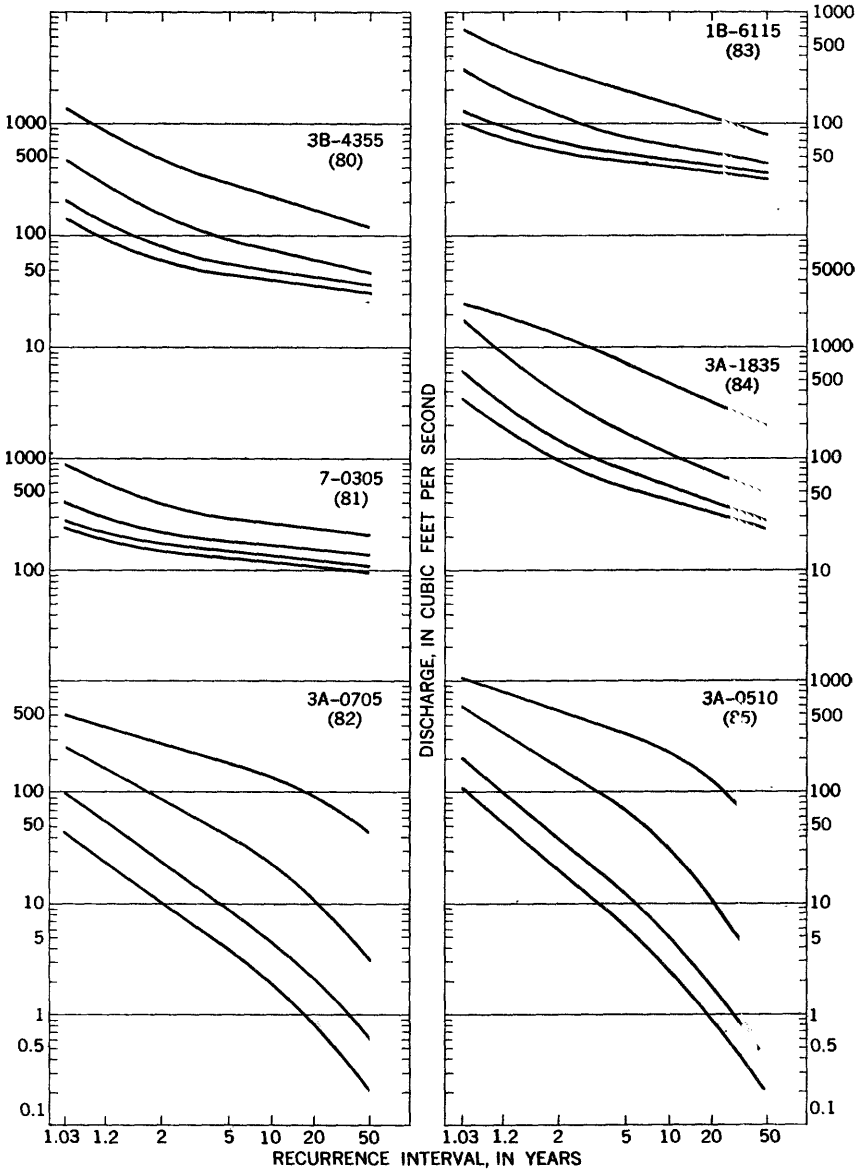

FIGURE 13.—Low-flow frequency curves of 7-, 30-, 120-, and 274-day data for last six stations listed in table 4.