

University of Arkansas  
Water Resources Research Center

Quantitative Analysis of Stream Flow Rate Extremes

By

Hugh M. Jeffus  
Fayetteville, Arkansas

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## ABSTRACT

Stream discharge data for the State of Arkansas is analyzed for representative statistical parameters. The statistical distribution most applicable to stream discharge data in Arkansas is the Pearson type III skew frequency curve. The parameters of the Pearson type III curve for all available records in Arkansas are included as Appendix A. The parameters of the logarithmically normal frequency distribution are included as Appendix B for mean daily discharge, minimum daily discharge and instantaneous minimum daily discharge. The logarithmically normal frequency distribution may be used for the lower discharge rates in lieu of the Pearson type III distribution except where instances of zero discharge are likely.

The following determinations are applicable to the State of Arkansas. There is no correlation between the coefficient of variation and area for minimum daily discharge. There is no correlation between skewness and area. The mean daily discharge rate is one cubic foot per second per square mile.

Suggested applications of the parameters in Appendix A are set forth for flood control, pollution control and water supply.

KEYWORDS /\*hydrology/ \*streamflow/ water supply/ runoff/ \*flow frequency analysis/ pollution abatement/ Pearson type III distribution/ \*flow rate extremes/ minimum flow/ maximum flow/ mean flow/ discharge rates/ flood flow

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records. Several different types of distributions are suggested in the literature such as normal, logarithmically normal (abbreviated log normal), Pearson's Type I and Type III and Extremal Type I, Type II and Type III.

The more commonly used statistical distributions applicable to stream discharges were investigated for possible application to stream discharge rates in Arkansas. Several statistical distributions infrequently fit certain stream gaging station records. However, upon detailed scrutiny most of these statistical distributions proved to have no general application. Often it was readily discernible why a particular statistical distribution would not apply even though curve fitting is for the most part empirical. For example, the Extremal type I or Gumbel distribution will not provide an exact distribution for flood peaks for several reasons (Benson, 1962, page A8). One of the more important of these reasons is that the Gumbel distribution has a constant coefficient of skewness whereas the skewness data for stream discharge rates in Arkansas varies between stream gaging stations.

A graph paper was developed to fit the curve derived from the sum of all of the observations for each flow rate extreme. This paper suffered the same shortcomings as the "Gumbel" paper in that it had a constant coefficient of skew and skewness of the individual stream gaging station records varied. It is obvious that in order to have a straight line plot for a given

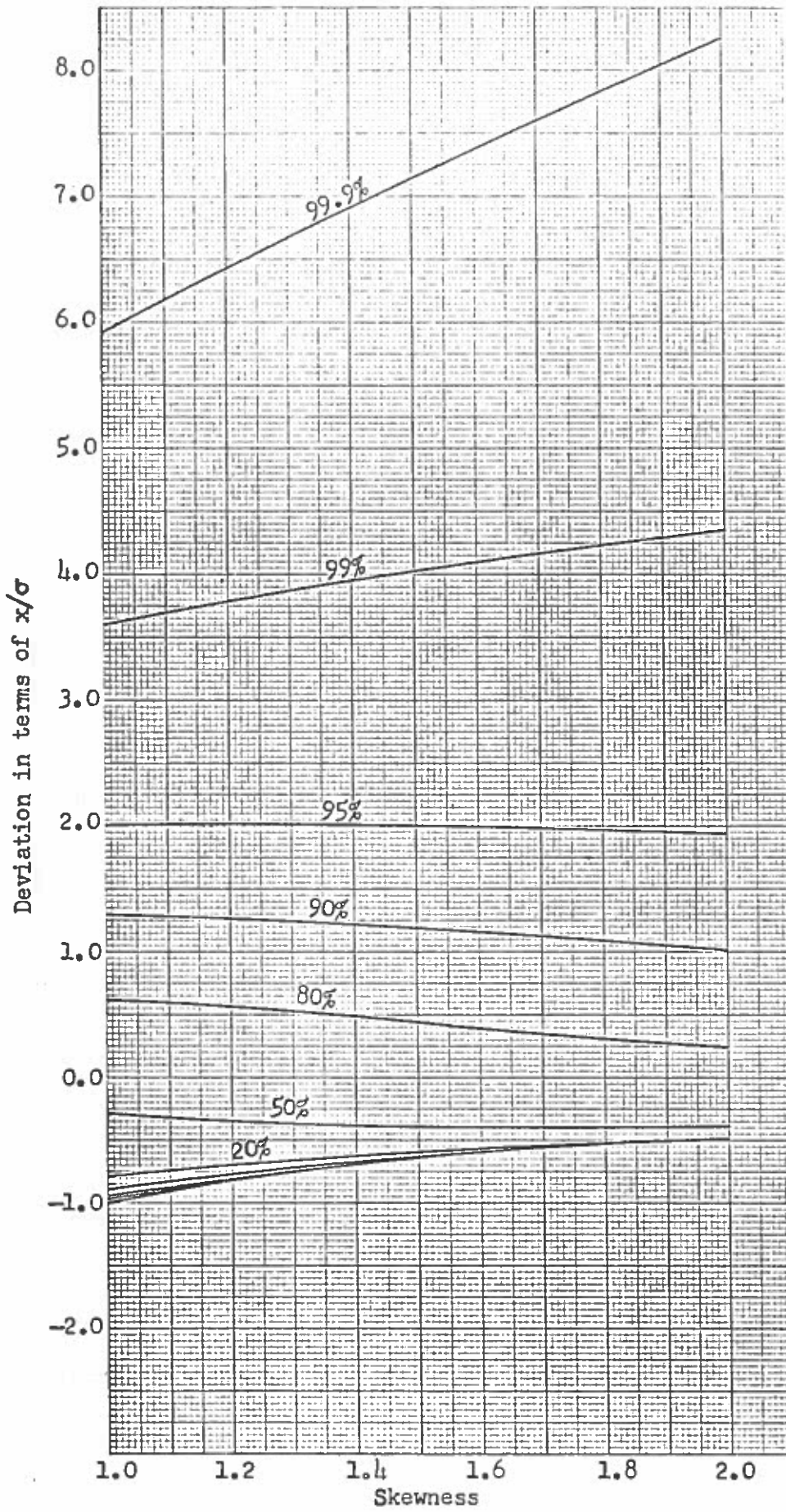


Figure 1 b.—Areas of Pearson's Type III skew frequency curves

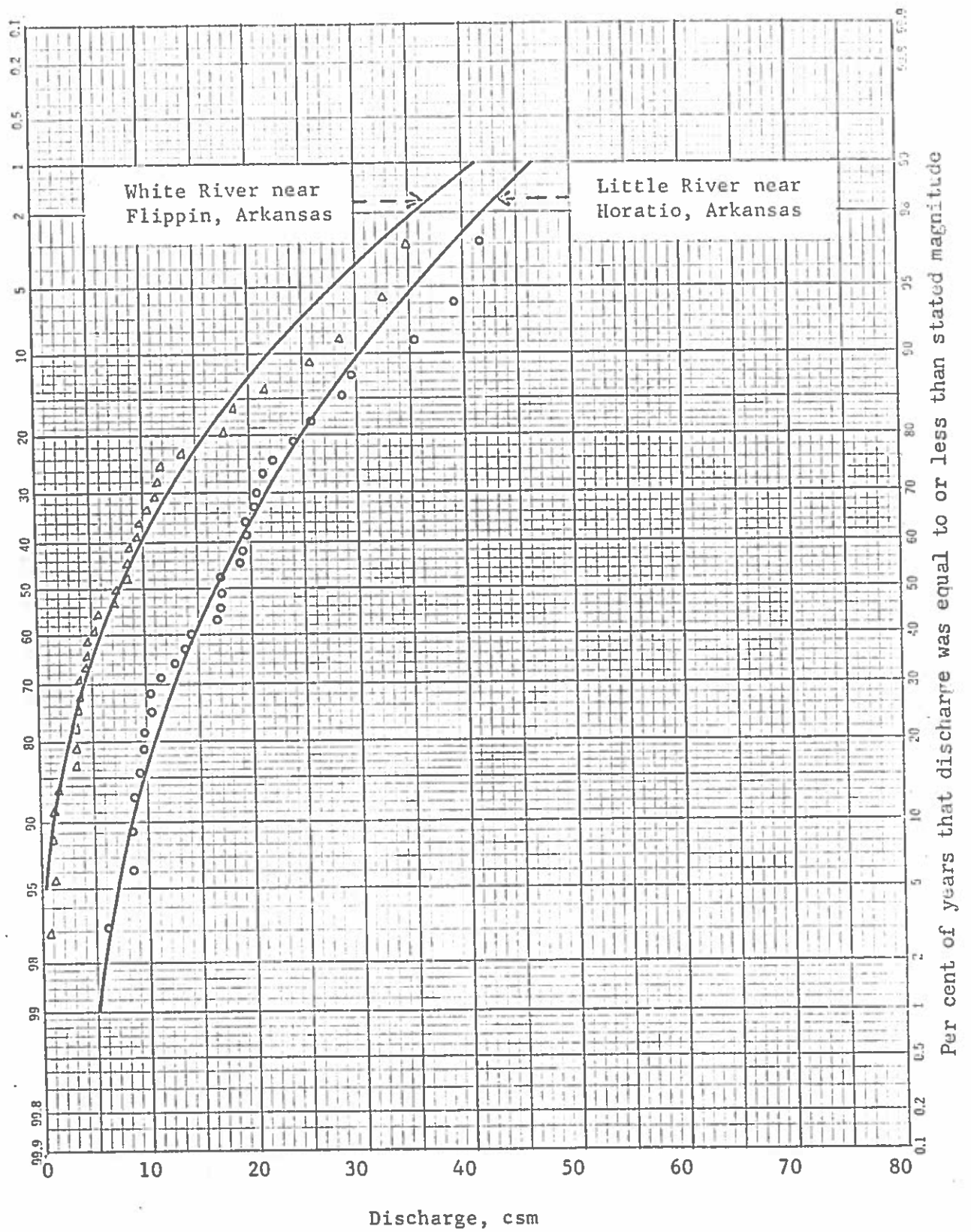


Figure 2 . — Pearson's Type III Curves for average annual maximum daily discharge

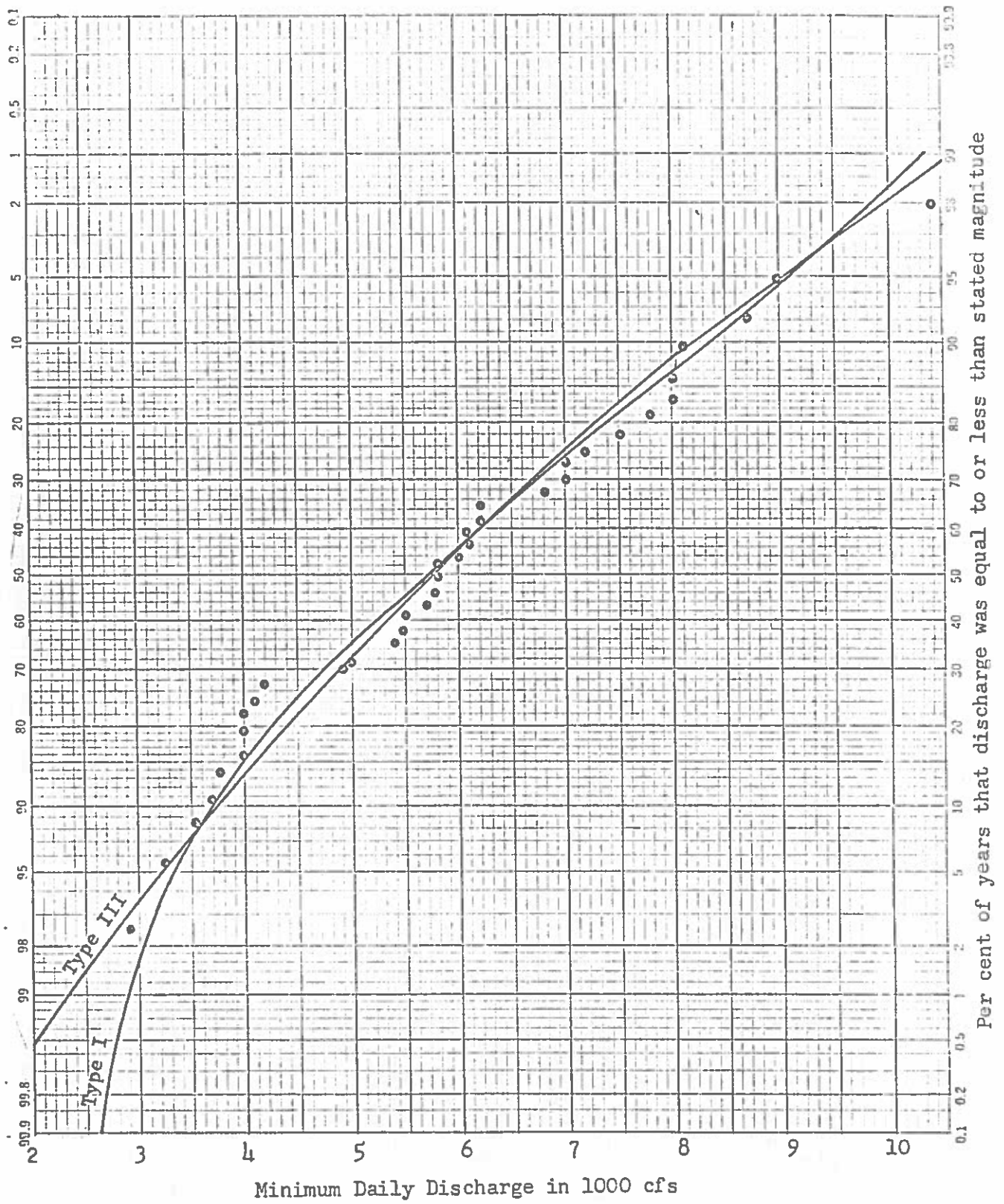


Figure 4. — Pearson's Type I and Type III Curves for White River at Clarendon, Arkansas



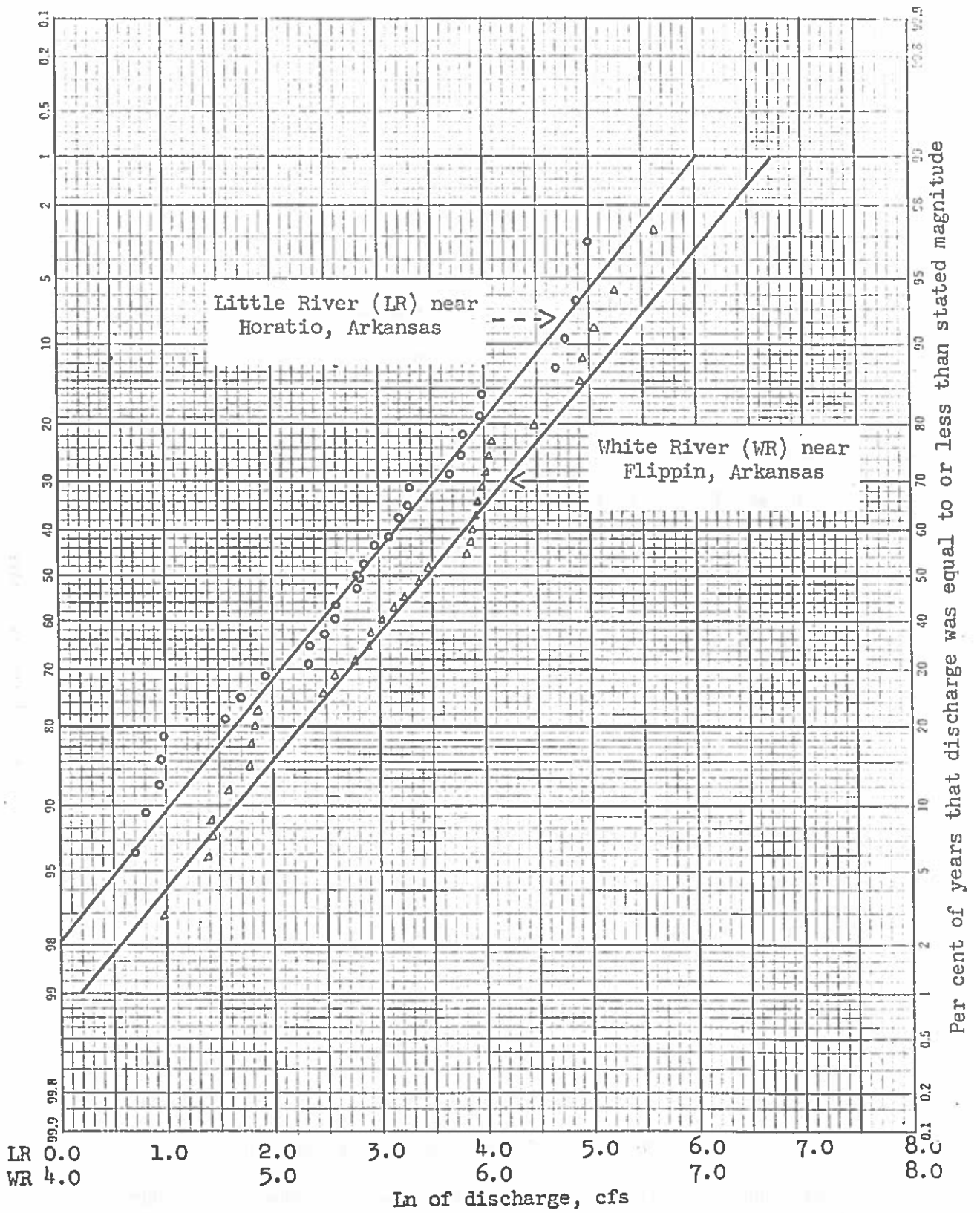


Figure 6. — Log normal plots of average annual minimum daily discharge

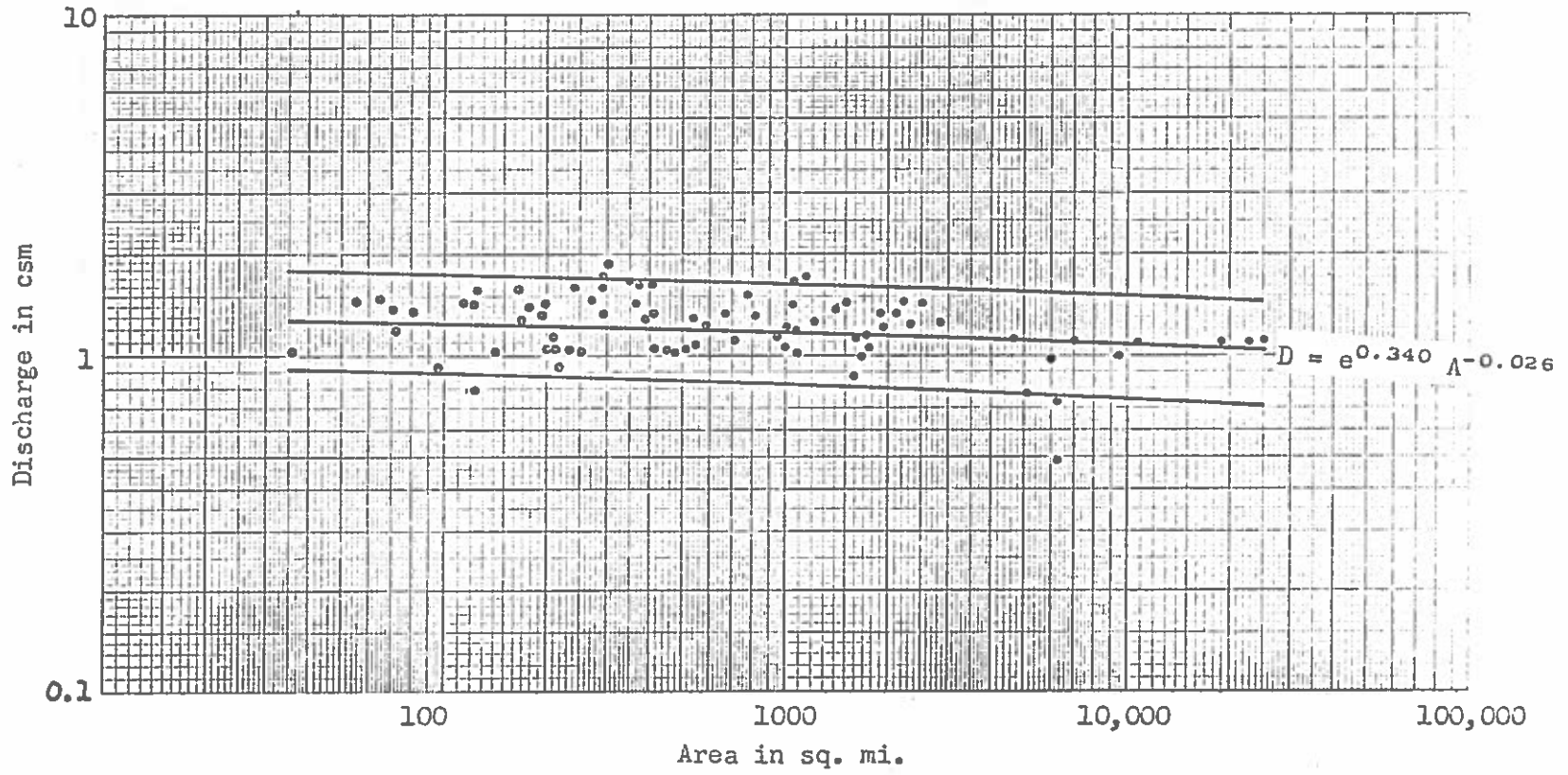


Figure 7. — Average annual mean daily discharge vs. area

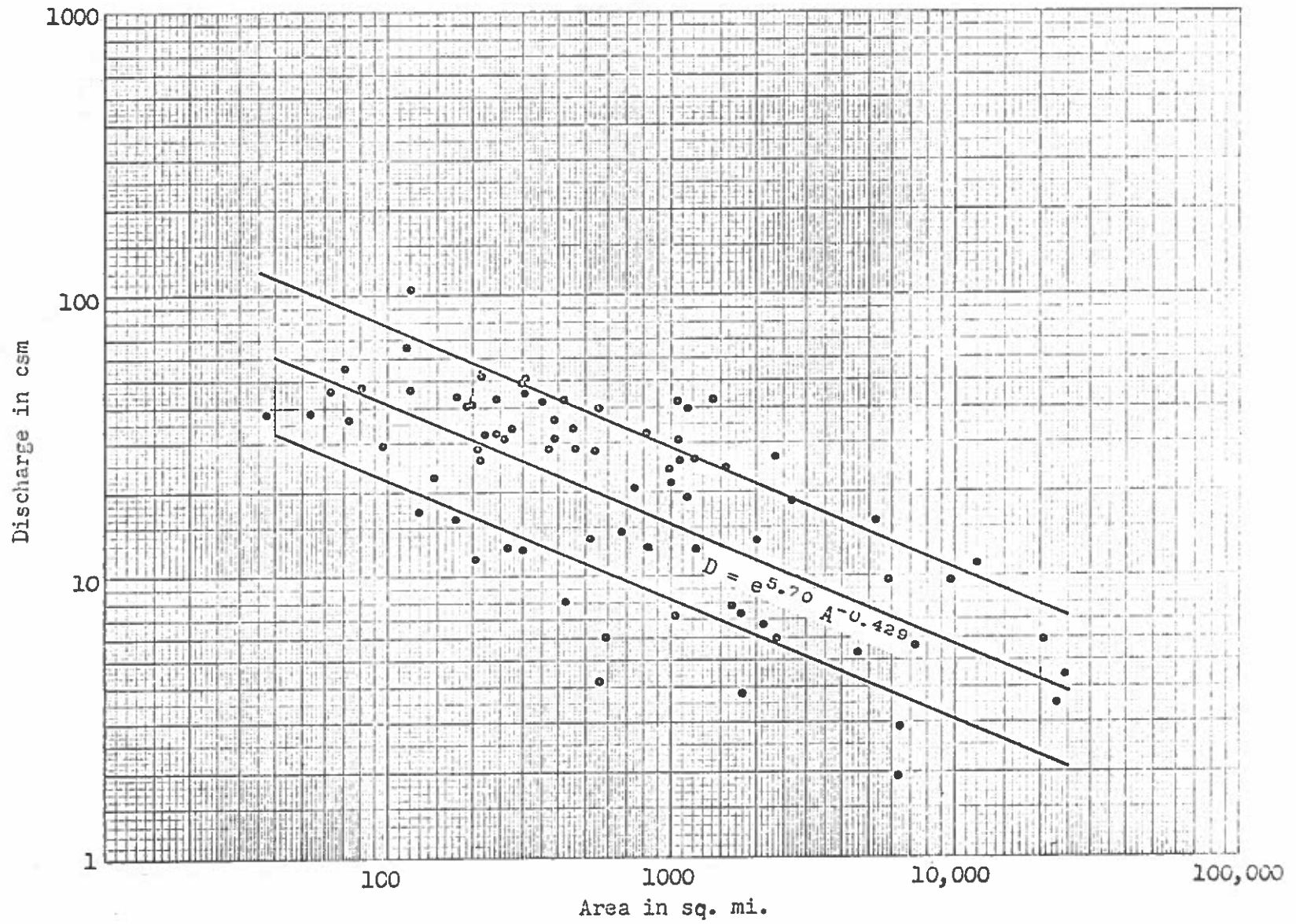


Figure 9. — Average annual maximum daily discharge vs. area

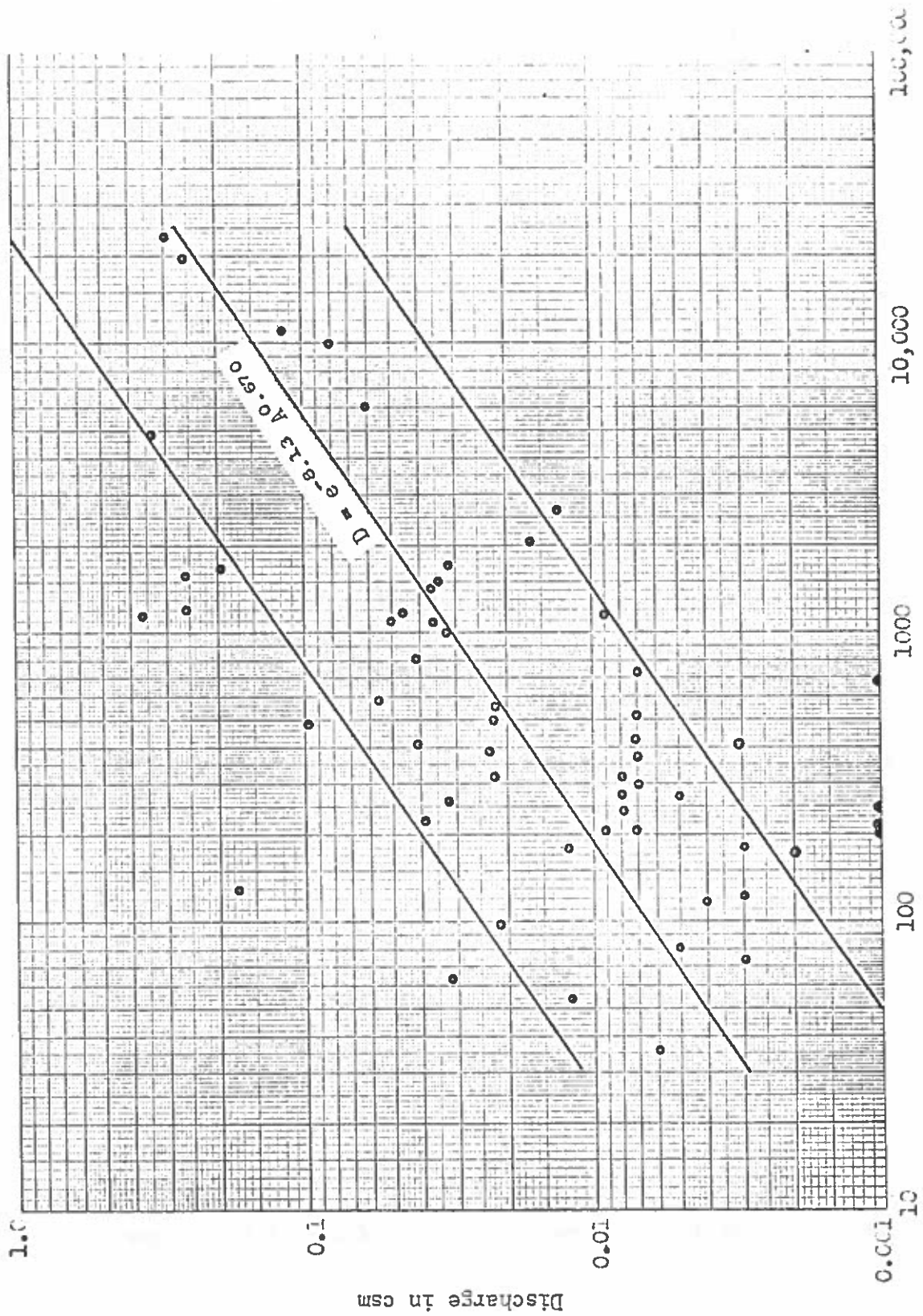


Figure 11. --- Average annual instantaneous minimum daily discharge vs. area

8 and 9 is probably caused by difference in the length of record of these variables and the fact that some stations have records of only one of the two discharge rates. The relationships between minimum daily discharge, instantaneous minimum daily discharge and area, Figures 10 and 11, show wide variations in discharge per unit area. When these discharge rates for each drainage were plotted a similar variation in discharge per unit area was noted. This would seem to indicate that for small drainage areas the minimum discharge rates are independent of the size of drainage area.

A marked similarity of the scatter of the plotted points exists between minimum seven day discharge versus area and minimum thirty day discharge versus area, Figures 12 and 13. The minimum thirty day discharge is only slightly larger than the minimum seven day discharge.

There is no correlation between coefficient of variation and area for minimum daily discharge as indicated by Figure 14. The relationship between coefficient of variation and area is shown in Figure 15 and 16 for mean daily discharge and maximum daily discharge respectively. The coefficients of variation for mean daily discharge vary from approximately 0.35 to approximately 0.65. This range fits very well with Hazen's values for a region along the Mississippi River, (Hazen, p. 13-36).

No correlation exists between skewness and area as indicated by Figure 17, 18, and 19.

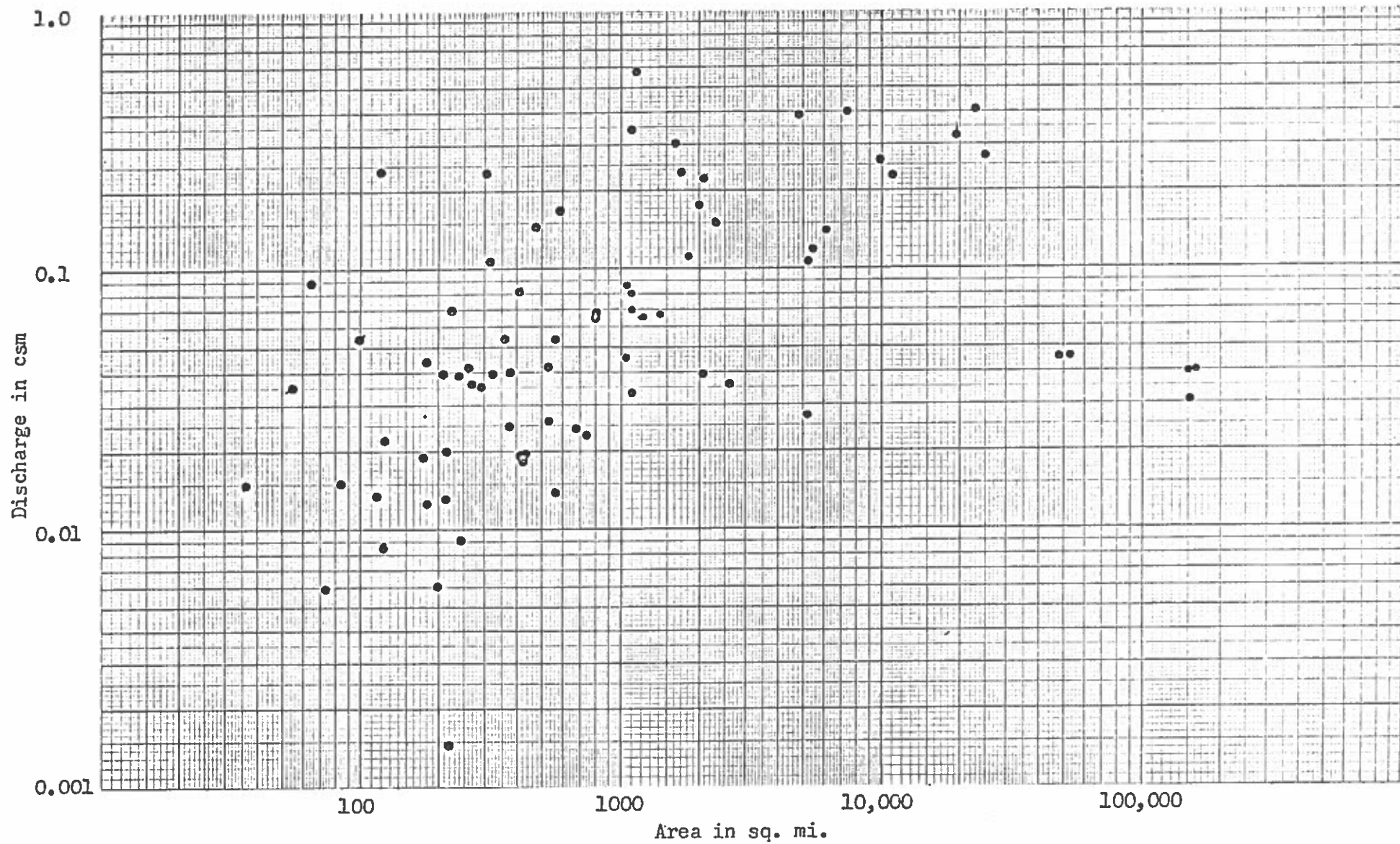


Figure 13.— Average annual minimum 30 day discharge vs. area

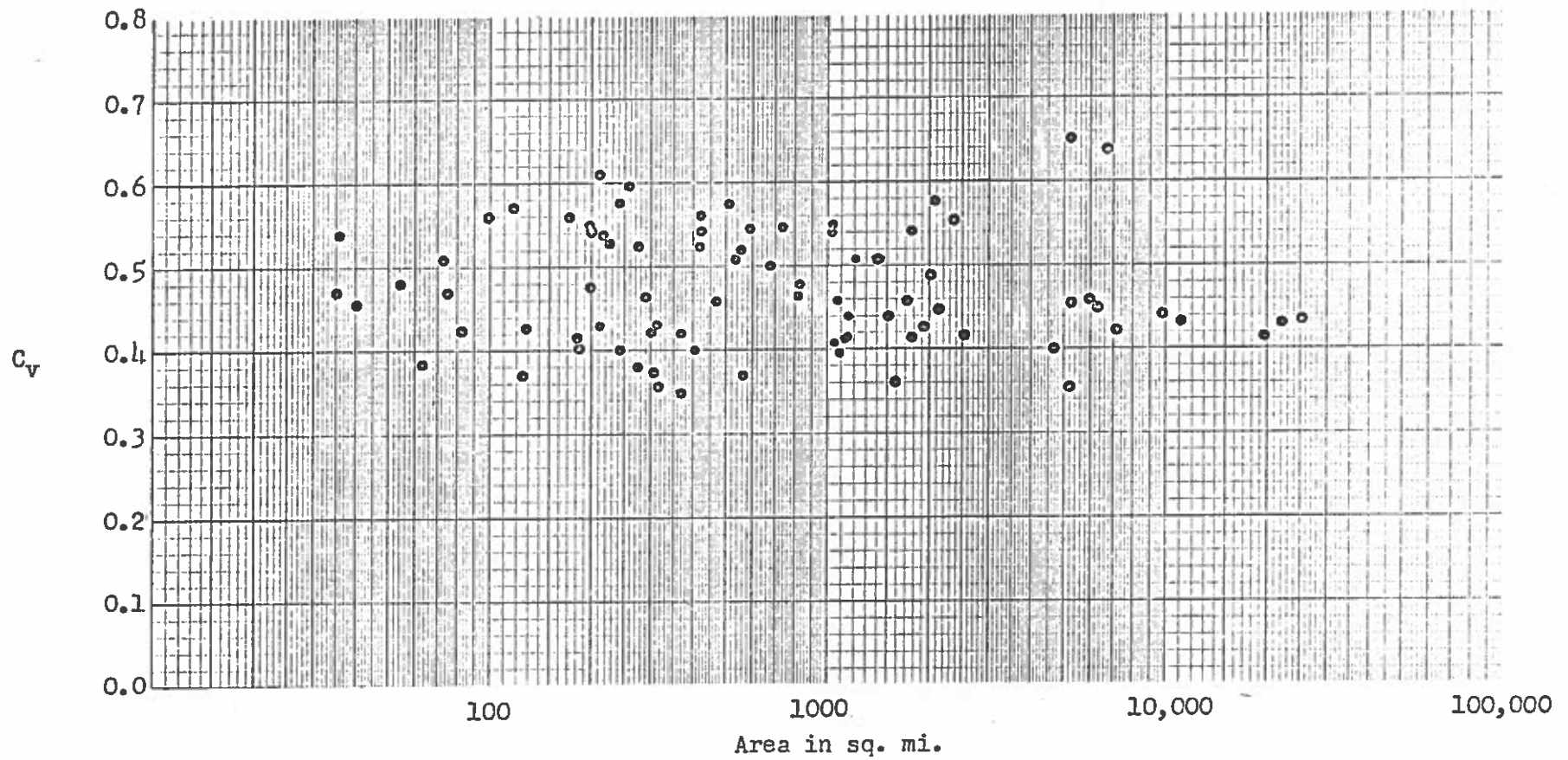


Figure 15. — Coefficient of variation of average annual mean daily discharge vs. area

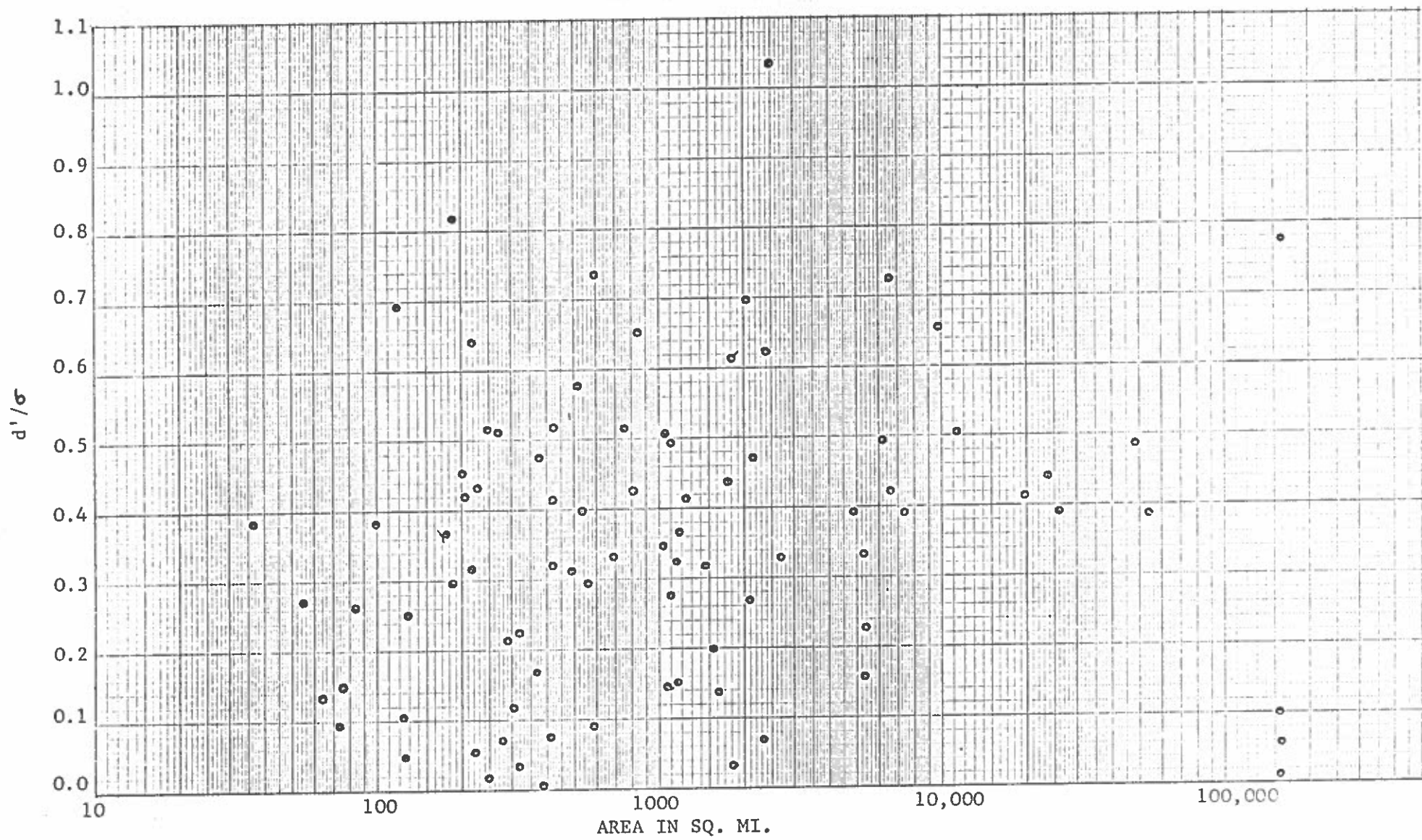


Figure 17. — Adjusted skewness of average annual mean daily discharge vs. area



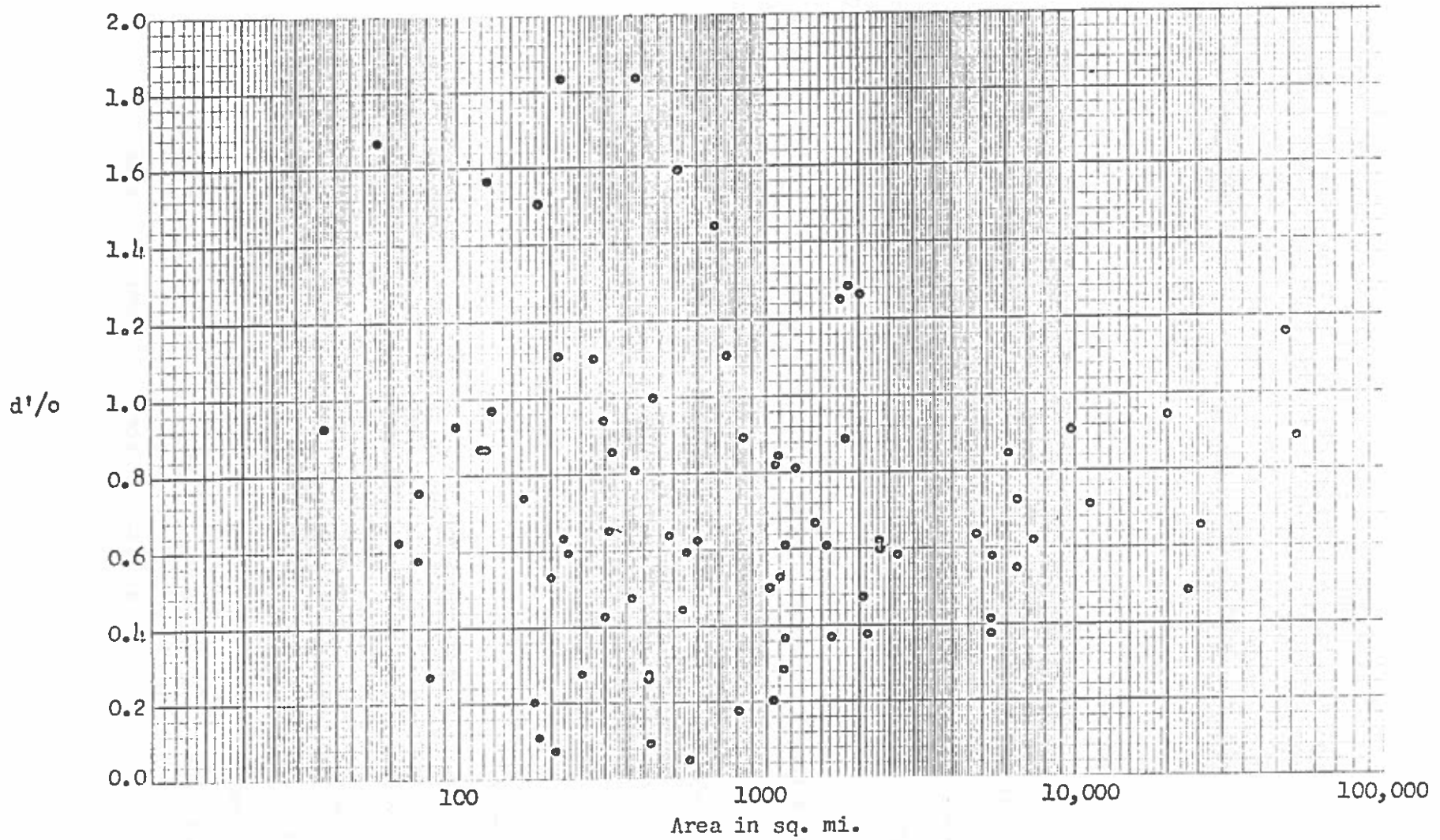


Figure 19. — Adjusted skewness of average annual maximum daily discharge vs. area

will have to be improved. Therefore more efficient and more costly treatment facilities will be demanded. The term pollution control seems preferable to pollution abatement for it implies using the capacity of the stream to assimilate wastes while remaining compatible with most indigenous aquatic life and most other stream uses.

The temperature of a given stream can be easily estimated, (Ward, p. 33). The dissolved oxygen content of water decreases with increasing temperature as indicated by Figure 21. Two extreme oxygen deficit situations may occur. An extreme oxygen deficit may occur during the time that a stream has a continuous ice cover preventing reaeration. An extreme oxygen deficit may also occur during high temperatures and low flow. The latter usually governs in Arkansas. With a knowledge of the stream temperature and stream flow at the worst possible conditions, i.e., when the stream flow is lowest and the stream temperature is highest, the capacity of the stream to assimilate waste can be theoretically determined. The accuracy of this determination will be affected by such unknown quantities as algae action etc., mentioned before which may be positive or negative depending upon the circumstances. An inherent factor of safety in extreme stream conditions is that the highest temperature of the stream will normally occur some weeks before the lowest flow occurs, (See Figure 20). The highest stream temperature would be expected the latter part of July or the first part of August (Ward, page 35), whereas the extreme low flow tends to occur between the latter part of August and latter

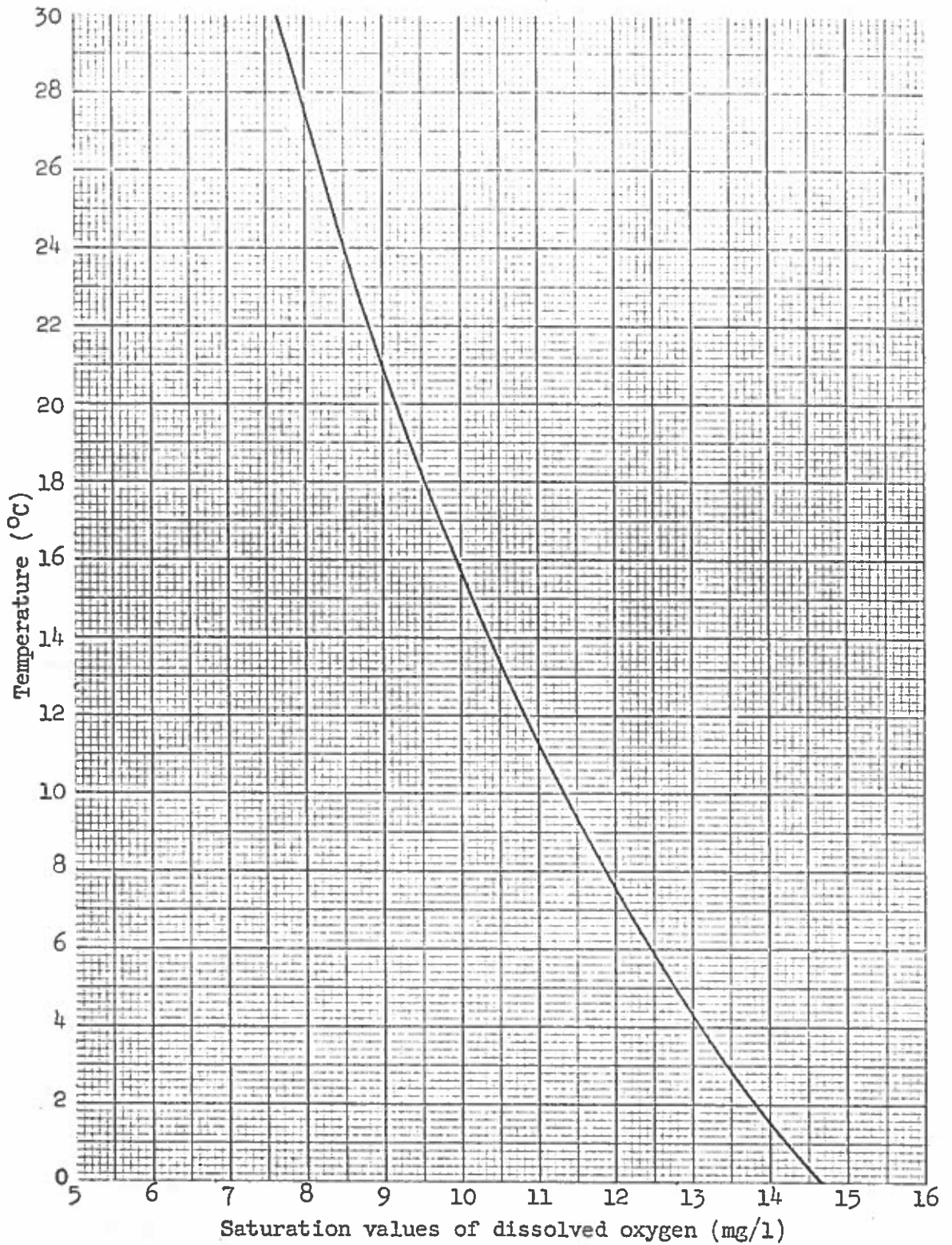


Figure 21.--Saturation values of dissolved oxygen in fresh and sea water exposed to an atmosphere containing 20.9% oxygen under a pressure of 760 mm of mercury and zero concentration of chloride.

liter. If we follow the recommendations of a state regulatory agency, which suggests 25 milligrams per liter or less of 5 day 20°C BOD in discharged waste water, 250 million gallons per day of waste water could be discharged at Newport.

1781 square miles gives 15,940 cfs. Thus the 20 year instantaneous maximum daily discharge rate is 15,940 cfs and will be exceeded, on the average, one day every 20 years.

It should be remembered that a stated percentage of time does not mean a firm return period, but rather an average return period. For example to have an even chance of a given flow not being exceeded in 20 years one must use a 29.4 year return interval, (Riggs p. 21).

volume requirements calculated from the coefficient of variation and the mean annual flow are in most cases greater than storage volume requirements calculated by the mass diagram method. This might raise some objections because the larger storage volumes would be more costly to provide. However, the monetary loss to the user because of a water shortage might be greater than the additional cost of lowering the probability of water deficiency. A study of the economics of the project should be made before design criteria are completed.

The mean annual flow and the coefficient of variation are part of the tabulation of data of this study. Therefore, little effort would be required to determine a storage volume using these parameters. As an example, Osage Creek near Elm Springs, Arkansas, has a drainage area of 129 square miles, a mean daily flow of 66.5 million gallons daily (mgd) (see stream identification number 1950, number 44, Appendix A) and a coefficient of variation of 0.534. The maximum constant draft available by the Rippl method is 26.3 mgd, with a required storage of 4200 million gallons (see Figure 23). A draft of 26.3 mgd is 39.6% of the mean daily flow. Entering Figure 22 with a draft of 0.396 and a coefficient of variation of 0.534 one finds the storage to be 0.465 times the mean annual flow. The mean annual flow of 0.797 csm multiplied by a drainage area of 129 square miles gives 102.8 cfs or 66.5 mgd. The necessary storage volume would then be  $0.465 \times 66.5 \text{ mgd} \times 365 \text{ days} = 14,300$  million gallons.

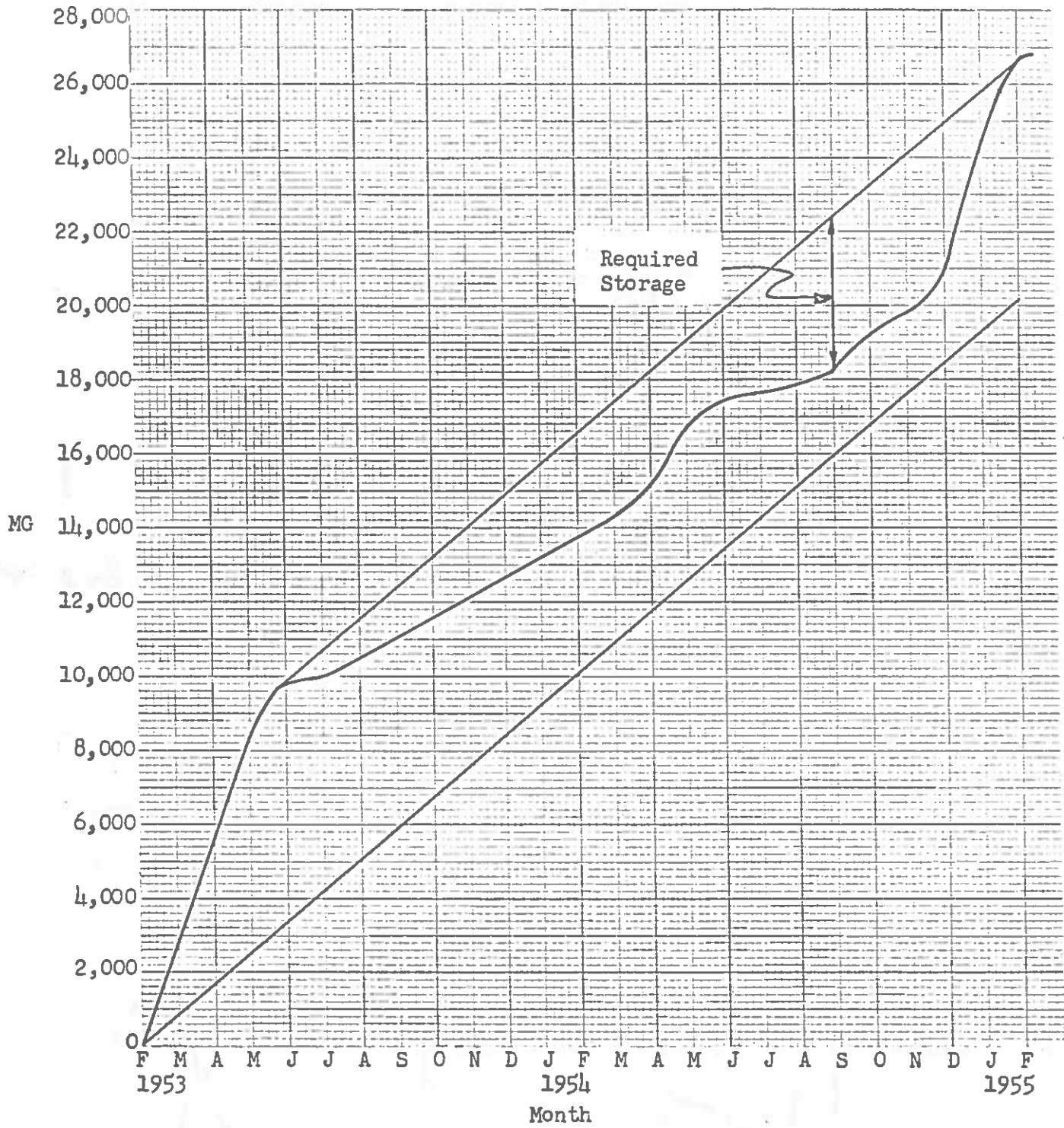


Figure 23.—Mass-storage diagram of Osage Creek near Elm Springs, Arkansas from March 1953 - March 1955

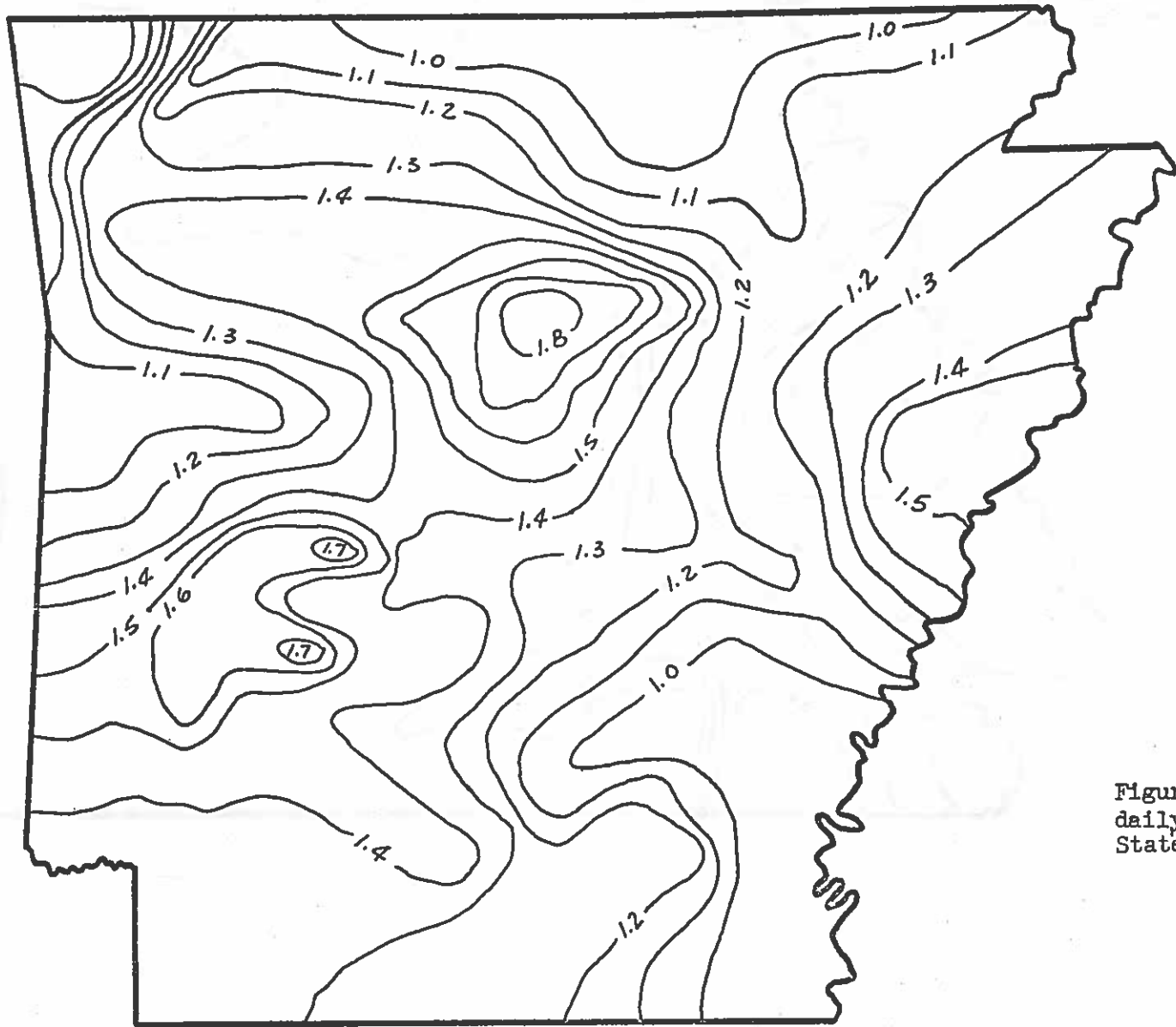


Figure 25.--Mean values of mean daily discharge in csm for the State of Arkansas



## Summary

Several statistical distributions have been examined for possible application to stream discharge data in Arkansas. The statistical distribution most applicable to stream discharge data in Arkansas is the Pearson type III skew frequency distribution. The log normal distribution fits the lower discharge rates, but cannot be used where zero discharge is likely to occur.

The mean daily discharge rate is approximately one cubic foot per second per square mile. The minimum discharge rates are independent of the size of the drainage area. There is no correlation between coefficient of variation and area for minimum daily discharge.

No correlation exists between skewness and area.

Examples of the application of the parameters of the Pearson type III distribution to pollution control, flood forecasting and water supply are set forth.

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APPENDIX A

401. ST FRANCIS RIVER AT ST FRANCIS, ARKANSAS 1  
DRAINAGE AREA: 1781 SQ. MI. MILE 229

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	34	7.276	4.914	0.675	0.843	0.596	0.113	0.733	0.917
DAILY MAX	34	7.345	4.916	0.669	0.843	0.596	0.112	0.711	0.889
MEAN	34	1.180	0.634	0.538	0.109	0.077	0.082	0.496	0.619
DAILY MIN	34	0.074	0.032	0.432	0.006	0.004	0.061	0.352	0.440
INST MIN	0								

404.5 ST FRANCIS RIVER AT LAKE CITY, ARKANSAS 2  
DRAINAGE AREA: 2385 SQ. MI. MILE 173.6

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	28	6.169	3.020	0.490	0.571	0.404	0.080	0.448	0.584
DAILY MAX	33	5.912	2.892	0.489	0.503	0.356	0.073	0.496	0.624
MEAN	33	1.235	0.688	0.557	0.120	0.085	0.087	0.495	0.622
DAILY MIN	33	0.091	0.061	0.674	0.011	0.008	0.115	0.766	0.964
INST MIN	0								

465 BIG LAKE OUTLET NEAR MANILA 3  
DRAINAGE AREA: 2000 SQ. MI. MILE

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	0								
DAILY MAX	6	5.854	2.437	0.416	0.995	0.703	0.139	-0.523	-1.264
MEAN	6	1.315	0.556	0.423	0.227	0.160	0.142	-0.288	-0.696
DAILY MIN	6	0.153	0.102	0.670	0.042	0.030	0.266	0.199	0.480
INST MIN	0								

466 RIGHT HAND CHUTE OF LITTLE RIVER AT RIVERDALE, ARK. 4  
DRAINAGE AREA: 2113 SQ. MI. MILE

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	19	6.777	4.226	0.624	0.970	0.686	0.135	0.220	0.318
DAILY MAX	17	6.608	4.331	0.655	1.050	0.743	0.153	0.255	0.382
MEAN	17	1.341	0.774	0.578	0.188	0.133	0.128	0.314	0.471
DAILY MIN	17	0.134	0.089	0.665	0.022	0.015	0.157	0.473	0.710
INST MIN	0								

479 ST FRANCIS RAY AT RIVERFRONT, ARKANSAS  
DRAINAGE AREA: 6475 SQ. MI. MILE

9

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. $C_v$	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	31	4.249	2.173	0.511	0.390	0.276	0.080	0.574	0.731
DAILY MAX	36	2.880	1.984	0.689	0.331	0.234	0.113	0.446	0.551
MEAN	29	0.765	0.491	0.641	0.091	0.054	0.114	0.325	0.420
DAILY MIN	31	0.028	0.032	1.121	0.006	0.004	0.267	0.958	1.233
INST MIN									

479.5 L'ANGVILLE RIVER AT PALESTINE, ARKANSAS  
DRAINAGE AREA: 807 SQ. MI. MILE

10

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. $C_v$	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	15	12.680	4.624	0.365	1.194	0.844	0.075	-0.107	-0.167
DAILY MAX	15	12.477	4.744	0.380	1.225	0.866	0.079	-0.115	-0.180
MEAN	15	1.547	0.721	0.466	0.186	0.132	0.102	0.268	0.421
DAILY MIN	15	0.012	0.021	1.781	0.005	0.004	0.881	0.606	0.950
INST MIN									

480 WEST FORK WHITE RIVER AT GREENLAND, ARKANSAS  
DRAINAGE AREA: 83 SQ. MI. MILE 10.5

11

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. $C_v$	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	18	142.778	107.215	0.751	25.271	17.869	0.183	0.619	0.912
DAILY MAX	18	46.991	23.961	0.510	5.648	3.994	0.105	0.186	0.274
MEAN	18	1.324	0.560	0.423	0.132	0.093	0.082	-0.177	-0.250
DAILY MIN	18	0.006	0.013	2.194	0.003	0.002	1.192	1.336	1.967
INST MIN	18	0.005	0.012	2.256	0.003	0.002	1.257	1.308	1.926

485 WEST FORK OF WHITE RIVER NEAR FAYETTEVILLE, ARKANSAS  
DRAINAGE AREA: 118 SQ. MI. MILE 3.5

12

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. $C_v$	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	8	165.752	150.002	0.905	53.034	37.501	0.367	0.408	0.841
DAILY MAX	8	64.333	56.495	0.878	19.974	14.124	0.350	0.425	0.877
MEAN	8	1.429	0.815	0.570	0.288	0.204	0.183	0.336	0.692
DAILY MIN	8	0.005	0.002	0.445	0.001	0.001	0.132	0.758	1.564
INST MIN	8	0.004	0.002	0.448	0.001	0.00049	0.133	0.633	1.306

		550 WHITE RIVER NEAR FLIPPIN, ARKANSAS							17	
		DRAINAGE AREA: 5,067 SQ. MI. MILE 406.7								
	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS	
INST PEAK	35	10.519	9.141	0.859	1.545	1.093	0.165	0.683	0.849	
DAILY MAX	35	9.969	9.020	0.905	1.525	1.078	0.176	0.679	0.844	
MEAN	35	0.995	0.455	0.458	0.077	0.054	0.055	0.397	0.494	
DAILY MIN	35	0.065	0.056	0.874	0.010	0.007	0.166	1.468	1.825	
INST MIN	35	0.062	0.057	0.921	0.010	0.007	0.181	1.500	1.865	
		560 BUFFALO RIVER NEAR ST. JOE, ARKANSAS							18	
		DRAINAGE AREA: 825 SQ. MI. MILE								
	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS	
INST PEAK	24	48.346	33.858	0.700	6.911	4.887	0.142	0.589	0.797	
DAILY MAX	24	31.933	21.891	0.686	4.469	3.160	0.138	0.653	0.885	
MEAN	24	1.299	0.618	0.476	0.126	0.089	0.083	0.477	0.646	
DAILY MIN	24	0.043	0.025	0.575	0.005	0.004	0.107	0.214	0.289	
INST MIN	24	0.042	0.024	0.577	0.005	0.003	0.107	0.220	0.299	
		570 BUFFALO RIVER NEAR RUSH, ARKANSAS							19	
		DRAINAGE AREA: 1,091 SQ. MI. MILE 24.3								
	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS	
INST PEAK	35	40.141	26.590	0.662	4.495	3.178	0.108	0.632	0.785	
DAILY MAX	35	30.433	20.395	0.670	3.447	2.438	0.110	0.684	0.850	
MEAN	35	1.219	0.557	0.457	0.094	0.067	0.065	0.400	0.497	
DAILY MIN	35	0.049	0.023	0.459	0.004	0.003	0.065	0.165	0.205	
INST MIN	35	0.049	0.023	0.463	0.004	0.003	0.066	0.182	0.226	
		590 NORTH FORK RIVER NEAR HENDERSON, ARKANSAS							20	
		DRAINAGE AREA: 1,612 SQ. MI. MILE 19								
	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS	
INST PEAK	14	16.090	8.366	0.520	2.236	1.581	0.122	0.040	0.064	
DAILY MAX	14	12.230	7.167	0.586	1.915	1.354	0.144	0.232	0.373	
MEAN	14	0.882	0.318	0.360	0.085	0.060	0.076	-0.086	-0.138	
DAILY MIN	14	0.272	0.053	0.196	0.014	0.010	0.038	0.559	0.899	
INST MIN	14	0.265	0.045	0.168	0.012	0.008	0.033	0.386	0.621	

		690 BLACK RIVER AT POCAHONTAS							25	
		DRAINAGE AREA: 4,843 SQ. MI.					MILE 90.1			
	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS	
INST PEAK	27	5.253	2.967	0.565	0.571	0.404	0.098	0.455	0.599	
DAILY MAX	26	5.159	2.996	0.581	0.588	0.415	0.104	0.480	0.637	
MEAN	26	1.161	0.464	0.400	0.091	0.064	0.064	0.294	0.390	
DAILY MIN	25	0.338	0.072	0.214	0.014	0.010	0.031	0.316	0.419	
INST MIN	26	0.336	0.070	0.208	0.013	0.010	0.030	0.280	0.371	
		695 SPRING RIVER AT IMBODEN, ARKANSAS							26	
		DRAINAGE AREA: 1,162 SQ. MI.					MILE 12.1			
	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS	
INST PEAK	27	25.217	16.227	0.643	3.123	2.208	0.118	0.412	0.542	
DAILY MAX	27	18.998	11.221	0.591	2.159	1.527	0.105	0.280	0.368	
MEAN	27	1.121	0.495	0.442	0.095	0.067	0.071	0.278	0.366	
DAILY MIN	27	0.284	0.066	0.234	0.013	0.009	0.033	0.680	0.894	
INST MIN	21	0.250	0.071	0.285	0.016	0.011	0.047	0.473	0.664	
		720 ELEVEN POINT RIVER, RAVENDEN SPRINGS, ARKANSAS							27	
		DRAINAGE AREA: 1,123 SQ. MI.					MILE 21			
	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS	
INST PEAK	25	13.806	9.313	0.675	1.863	1.317	0.132	0.387	0.519	
DAILY MAX	25	11.045	7.210	0.653	1.442	1.020	0.126	0.220	0.295	
MEAN	25	1.011	0.413	0.409	0.083	0.058	0.067	0.243	0.326	
DAILY MIN	25	0.367	0.104	0.283	0.021	0.015	0.043	0.315	0.422	
INST MIN	25	0.364	0.104	0.285	0.021	1.015	0.043	0.317	0.424	
		725 BLACK RIVER AT BLACK ROCK, ARKANSAS							28	
		DRAINAGE AREA: 7,323 SQ. MI.					MILE 68.3			
	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS	
INST PEAK	59	6.513	3.917	0.601	0.510	0.361	0.073	0.782	0.895	
DAILY MAX	24	5.750	3.255	0.566	0.664	0.470	0.105	0.458	0.620	
MEAN	24	1.140	0.483	0.424	0.099	0.070	0.071	0.285	0.387	
DAILY MIN	24	0.343	0.079	0.230	0.016	0.011	0.035	0.297	0.402	
INST MIN										

750 MIDDLE FORK LITTLE RED RIVER SHIRLEY, ARKANSAS  
DRAINAGE AREA: 294 SQ. MI. MILE

34

	N	MEAN	STD. DEV.	COEFF. VAR.	STD.DEV. MEAN	STD.DEV. STD.DEV.	STD.DEV. C <sub>v</sub>	SKEW- NESS	ADJ. SKEW- NESS
INST PEAK	24	95.551	70.985	0.743	14.490	10.246	0.156	0.937	1.269
DAILY MAX	24	48.040	28.272	0.589	5.771	4.031	0.111	0.698	0.946
MEAN	24	1.632	0.760	0.466	0.155	0.110	0.080	0.156	0.211
DAILY MIN	24	0.008	0.016	2.003	0.003	0.002	0.868	1.272	1.723
INST MIN	24	0.007	0.015	2.093	0.003	0.002	0.944	1.396	1.891

755 SOUTH FORK LITTLE RED RIVER CLINTON, ARKANSAS  
DRAINAGE AREA: 316 SQ. MI. MILE

35

	N	MEAN	STD. DEV.	COEFF. VAR.	STD.DEV. MEAN	STD.DEV. STD.DEV.	STD.DEV. C <sub>v</sub>	SKEW- NESS	ADJ. SKEW- NESS
INST PEAK	22	80.350	50.834	0.633	10.838	7.664	0.128	0.708	0.982
DAILY MAX	22	46.764	23.494	0.502	5.009	3.542	0.093	0.476	0.659
MEAN	22	1.841	0.801	0.435	0.171	0.121	0.077	0.159	0.221
DAILY MIN	22	0.008	0.015	1.819	0.003	0.002	0.757	0.857	1.189
INST MIN	22	0.008	0.014	1.846	0.003	0.002	0.778	0.878	1.218

760 LITTLE RED RIVER NEAR HEBER SPRINGS, ARKANSAS  
DRAINAGE AREA: 1,141 SQ. MI. MILE

36

	N	MEAN	STD. DEV.	COEFF. VAR.	STD.DEV. MEAN	STD.DEV. STD.DEV.	STD.DEV. C <sub>v</sub>	SKEW- NESS	ADJ. SKEW- NESS
INST PEAK	25	49.273	21.633	0.439	4.327	3.059	0.073	0.396	0.531
DAILY MAX	25	39.495	19.631	0.497	3.926	2.776	0.086	0.462	0.519
MEAN	25	1.711	0.709	0.415	0.142	0.100	0.068	0.110	0.148
DAILY MIN	25	0.009	0.016	1.787	0.003	0.002	0.687	1.041	1.395
INST MIN	25	0.009	0.015	1.783	0.003	0.002	0.684	1.025	1.373

770 WHITE RIVER AT DeVALLS BLUFF, ARKANSAS  
DRAINAGE AREA: 23,431 SQ. MI. MILE 125.3

39

	N	MEAN	STD. DEV.	COEFF. VAR.	STD.DEV. MEAN	STD.DEV. STD.DEV.	STD.DEV. C <sub>v</sub>	SKEW- NESS	ADJ. SKEW- NESS
INST PEAK	15	3.913	2.042	0.522	0.527	0.373	0.118	0.649	1.018
DAILY MAX	14	3.519	1.418	0.403	0.379	0.268	0.088	0.300	0.483
MEAN	14	1.140	0.483	0.424	0.129	0.091	0.093	0.274	0.440
DAILY MIN	14	0.295	0.119	0.403	0.032	0.022	0.088	0.488	0.784
INST MIN	14	0.293	0.117	0.400	0.031	0.022	0.087	0.474	0.752



1950	OSAGE CREEK AT ELM SPRINGS, ARKANSAS DRAINAGE AREA: 129 SQ. MI. MILE								44
	N	MEAN	STD. DEV.	COEFF. VAR.	STD.DEV. MEAN	STD.DEV. STD.DEV.	STD.DEV. C <sub>v</sub>	SKEW- NESS	ADJ. SKEW- NESS
INST PEAK	12	41.363	46.399	1.122	13.394	9.471	0.429	1.058	1.807
DAILY MAX	13	17.603	18.453	1.048	5.118	3.619	0.368	0.590	0.976
MEAN	13	0.797	0.425	0.534	0.118	0.083	0.131	0.150	0.248
DAILY MIN	13	0.195	0.108	0.552	0.030	0.021	0.137	0.076	0.125
INST MIN	12	0.173	0.098	0.536	0.028	0.020	0.148	0.073	0.125
2470	POTEAU RIVER AT CAUTHRCU, ARKANSAS DRAINAGE AREA: 200 SQ. MI. MILE								45
	N	MEAN	STD. DEV.	COEFF. VAR.	STD.DEV. MEAN	STD.DEV. STD.DEV.	STD.DEV. C <sub>v</sub>	SKEW- NESS	ADJ. SKEW- NESS
INST PEAK	24	64.444	42.939	0.666	8.765	6.198	0.132	0.467	0.632
DAILY MAX	24	39.673	24.314	0.613	4.963	3.509	0.117	0.390	0.528
MEAN	24	1.086	0.599	0.552	0.122	0.086	0.101	0.333	0.451
DAILY MIN	24	0.001	0.002	2.095	0.0004	0.0003	0.946	1.086	1.470
INST MIN	24	0.001	0.002	2.234	0.0004	0.0003	1.068	1.138	1.541
2495	COVE CREEK NEAR LEE CREEK, ARKANSAS DRAINAGE AREA: 36.9 SQ. MI. MILE 5.75								47
	N	MEAN	STD. DEV.	COEFF. VAR.	STD.DEV. MEAN	STD.DEV. STD.DEV.	STD.DEV. C <sub>v</sub>	SKEW- NESS	ADJ. SKEW- NESS
INST PEAK	13	228.726	255.983	1.119	70.997	50.202	0.411	0.830	1.373
DAILY MAX	13	38.328	24.198	0.631	6.711	4.746	0.166	0.564	0.932
MEAN	13	1.048	0.566	0.540	0.157	0.111	0.133	0.230	0.381
DAILY MIN	13	0.007	0.012	1.650	0.003	0.002	0.821	0.907	1.499
INST MIN	13	0.006	0.009	1.491	0.002	0.002	0.682	0.618	1.022
2500	LEE CREEK NEAR VAN BUREN, ARKANSAS DRAINAGE AREA: 427 SQ. MI. MILE 7.9								48
	N	MEAN	STD. DEV.	COEFF. VAR.	STD.DEV. MEAN	STD.DEV. STD.DEV.	STD.DEV. C <sub>v</sub>	SKEW- NESS	ADJ. SKEW- NESS
INST PEAK	13	66.583	54.136	0.813	15.015	10.617	0.243	0.691	1.143
DAILY MAX	13	33.682	23.339	0.693	6.473	4.577	0.190	0.609	1.008
MEAN	13	1.053	0.569	0.541	0.158	0.112	0.133	0.187	0.310
DAILY MIN	13	0.007	0.013	1.849	0.004	0.003	1.015	1.197	1.980
INST MIN	13	0.007	0.012	1.849	0.003	0.002	1.015	1.195	1.977

## 2555 SPADRA CREEK AT CLARKSTOWN, ARKANSAS

54

DRAINAGE AREA: 54.3 SQ. MI. MILE 4.5

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEWNESS	ADJ. SKEWNESS
INST PEAK	11	104.814	70.105	0.669	21.138	14.947	0.196	0.628	1.113
DAILY MAX	11	37.026	26.233	0.709	7.911	5.594	0.214	0.954	1.691
MEAN	11	1.420	0.687	0.483	0.207	0.145	0.125	0.153	0.271
DAILY MIN	11	0.020	0.018	0.831	0.005	0.004	0.300	0.012	0.021
INST MIN	11	0.012	0.012	0.989	0.004	0.003	0.362	0.093	0.165

## 2570 PINEY CREEK NEAR DOVER, ARKANSAS

55

DRAINAGE AREA: 274 SQ. MI. MILE

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEWNESS	ADJ. SKEWNESS
INST PEAK	13	74.231	38.367	0.517	10.641	7.524	0.126	0.309	0.512
DAILY MAX	13	33.419	18.152	0.543	5.034	3.550	0.134	0.671	1.110
MEAN	13	1.467	0.557	0.379	0.154	0.109	0.084	-0.041	-0.067
DAILY MIN	13	0.008	0.010	1.155	0.003	0.002	0.434	0.219	0.362
INST MIN	13	0.008	0.009	1.160	0.003	0.002	0.437	0.233	0.385

## ILLINOIS BAYOU NEAR SCOTTSVILLE, ARKANSAS

56

DRAINAGE AREA: 242 SQ. MI. MILE

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEWNESS	ADJ. SKEWNESS
INST PEAK	15	87.164	55.470	0.753	16.617	11.750	0.198	1.348	2.064
DAILY MAX	15	42.461	33.566	0.791	8.391	5.934	0.210	1.358	2.080
MEAN	15	1.614	0.653	0.408	0.165	0.116	0.083	0.012	0.013
DAILY MIN	15	0.009	0.011	1.250	0.003	0.002	0.449	0.442	0.677
INST MIN	15	0.008	0.010	1.263	0.003	0.002	0.457	0.450	0.689

## 2580 ARKANSAS RIVER AT DARDENELLE, ARKANSAS

57

DRAINAGE AREA: 153,707 SQ. MI. MILE

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEWNESS	ADJ. SKEWNESS
INST PEAK	26	1.760	1.007	0.572	0.197	0.140	0.102	0.451	0.599
DAILY MAX	25	1.732	1.014	0.585	0.199	0.141	0.105	0.431	0.573
MEAN	26	0.241	0.120	0.499	0.024	0.017	0.085	-0.009	-0.011
DAILY MIN	25	0.022	0.014	0.614	0.003	0.002	0.113	0.190	0.252
INST MIN	26	0.022	0.013	0.619	0.003	0.002	0.114	0.220	0.292

2615 FOURCHE LA FAVE RIVER NEAR GRAYLIE, ARKANSAS  
DRAINAGE AREA: 413 SQ. MI. MILE

63

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	24	50.139	38.010	0.532	7.759	5.486	0.122	0.527	0.714
DAILY MAX	24	40.053	23.118	0.577	4.719	3.337	0.108	0.189	0.256
MEAN	24	1.298	0.680	0.524	0.139	0.098	0.094	0.301	0.408
DAILY MIN	24	0.003	0.005	1.800	0.001	0.001	0.710	1.169	1.534
INST MIN	24	0.003	0.006	1.857	0.001	0.001	0.761	1.248	1.690

2625 FOURCHE LA FAVE RIVER NEAR NIMROD, ARKANSAS  
DRAINAGE AREA: 680 SQ. MI. MILE

64

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	27	14.205	12.489	0.879	2.404	1.700	0.191	1.119	1.471
DAILY MAX	27	13.455	11.457	0.852	2.205	1.559	0.181	1.105	1.453
MEAN	27	1.293	0.646	0.500	0.124	0.088	0.083	0.250	0.329
DAILY MIN	27	0.002	0.003	1.572	0.001	0.00045	0.521	1.594	2.095
INST MIN	20	0.001	0.001	1.028	0.00032	0.00023	0.287	1.289	1.836

2630 SOUTH FOURCHE LA FAVE RIVER NEAR HOLLIS, ARKANSAS  
DRAINAGE AREA: 211 SQ. MI. MILE 5.8

65

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	22	112.021	52.269	0.457	11.144	7.830	0.084	0.608	0.843
DAILY MAX	22	51.654	22.628	0.438	4.824	3.411	0.078	0.831	1.152
MEAN	22	1.418	0.612	0.432	0.131	0.092	0.076	0.226	0.314
DAILY MIN	22	0.001	0.002	2.272	0.00032	0.00023	1.153	1.180	1.636
INST MIN	22	0.001	0.001	2.201	0.00029	0.00021	1.085	1.093	1.516

2635 ARKANSAS RIVER AT LITTLE ROCK, ARKANSAS  
DRAINAGE AREA: 15,201 SQ. MI. MILE 165.5

66

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	35	1.591	0.758	0.477	0.126	0.089	0.068	0.303	0.374
DAILY MAX	30	1.610	0.804	0.499	0.147	0.104	0.079	0.261	0.335
MEAN	30	0.266	0.130	0.491	0.024	0.017	0.077	0.046	0.059
DAILY MIN	30	0.025	0.015	0.610	0.003	0.002	0.104	0.224	0.287
INST MIN	30	0.025	0.015	0.603	0.003	0.002	0.102	0.214	0.274

## 3395 ROLLING FORK NEAR DE QUEEN, ARKANSAS

72

DRAINAGE AREA: 181 SQ. MI. MILE 17

	N	MEAN	STD. DEV.	COEFF. VAR.	STD.DEV. MEAN	STD.DEV. STD.DEV.	STD.DEV. C <sub>v</sub>	SKEW- NESS	ADJ. SKEW- NESS
INST PEAK	15	81.871	45.023	0.550	11.625	8.220	0.127	0.439	0.688
DAILY MAX	15	39.613	16.193	0.409	4.181	2.957	0.086	0.075	0.118
MEAN	15	1.605	0.645	0.402	0.167	0.118	0.084	0.186	0.292
DAILY MIN	15	0.012	0.013	1.058	0.003	0.002	0.348	0.445	0.697
INST MIN	15	0.012	0.013	1.067	0.003	0.002	0.353	0.465	0.729

## 3400 LITTLE RIVER NEAR HORATIO, ARKANSAS

73

DRAINAGE AREA: 2,674 SQ. MI. MILE 72

	N	MEAN	STD. DEV.	COEFF. VAR.	STD.DEV. MEAN	STD.DEV. STD.DEV.	STD.DEV. C <sub>v</sub>	SKEW- NESS	ADJ. SKEW- NESS
INST PEAK	32	19.584	9.742	0.497	1.722	1.218	0.076	0.442	0.559
DAILY MAX	32	18.446	9.112	0.494	1.611	1.139	0.075	0.463	0.586
MEAN	32	1.452	0.593	0.409	0.105	0.074	0.059	0.259	0.327
DAILY MIN	32	0.013	0.017	1.277	0.003	0.002	0.329	0.847	1.072
INST MIN	32	0.013	0.017	1.278	0.003	0.002	0.330	0.839	1.062

## 3405 COSSATOT RIVER NEAR DE QUEEN, ARKANSAS

74

DRAINAGE AREA: 361 SQ. MI. MILE

	N	MEAN	STD. DEV.	COEFF. VAR.	STD.DEV. MEAN	STD.DEV. STD.DEV.	STD.DEV. C <sub>v</sub>	SKEW- NESS	ADJ. SKEW- NESS
INST PEAK	25	78.529	36.845	0.469	7.369	5.211	0.080	0.218	0.292
DAILY MAX	25	41.758	18.773	0.450	3.755	2.655	0.075	0.356	0.478
MEAN	25	1.680	0.602	0.358	0.120	0.085	0.057	0.123	0.165
DAILY MIN	25	0.023	0.017	0.727	0.003	0.002	0.147	0.357	0.479
INST MIN	25	0.022	0.016	0.729	0.003	0.002	0.148	0.318	0.427

## 3410 SALINE RIVER NEAR DIERKS, ARKANSAS

76

DRAINAGE AREA: 124 SQ. MI. MILE

	N	MEAN	STD. DEV.	COEFF. VAR.	STD.DEV. MEAN	STD.DEV. STD.DEV.	STD.DEV. C <sub>v</sub>	SKEW- NESS	ADJ. SKEW- NESS
INST PEAK	25	95.271	83.139	0.873	16.628	11.758	0.196	1.325	1.776
DAILY MAX	25	45.394	34.137	0.752	6.827	4.828	0.155	1.169	1.566
MEAN	25	1.542	0.577	0.374	0.115	0.082	0.060	-0.035	-0.046
DAILY MIN	25	0.0035	0.006	1.660	0.001	0.001	0.599	0.885	1.186
INST MIN	25	0.003	0.005	1.730	0.001	0.001	0.647	0.996	1.334

3580 QUACHITA RIVER NEAR HOT SPRINGS, ARKANSAS  
DRAINAGE AREA: 1,405 SQ. MI. MILE

84

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	8	47.874	33.843	0.707	11.965	8.461	0.250	0.315	0.649
DAILY MAX	8	41.904	29.074	0.694	10.279	7.268	0.243	0.326	0.672
MEAN	8	1.461	0.750	0.513	0.265	0.187	0.158	0.152	0.314
DAILY MIN	8	0.037	0.009	0.245	0.003	0.002	0.065	-0.022	-0.044
INST MIN	8	0.036	0.009	0.242	0.003	0.002	0.064	0.031	0.064

3595 QUACHITA RIVER NEAR MALVERN, ARKANSAS  
DRAINAGE AREA: 1,562 SQ. MI. MILE

85

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	41	34.157	22.085	0.647	3.449	2.439	0.097	0.477	0.576
DAILY MAX	35	24.602	16.158	0.657	2.731	1.931	0.107	0.491	0.610
MEAN	35	1.481	0.650	0.439	0.110	0.078	0.062	0.161	0.200
DAILY MIN	35	0.073	0.041	0.560	0.007	0.005	0.085	0.613	0.762
INST MIN	26	0.034	0.010	0.287	0.002	0.001	0.043	0.549	0.728

3597 CADDO RIVER AT GLENWOOD, ARKANSAS  
DRAINAGE AREA: 192 SQ. MI. MILE

86

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	14	139.695	71.695	0.513	19.161	13.549	0.120	0.737	1.184
DAILY MAX	0								
MEAN	0								
DAILY MIN	0								
INST MIN	0								

3598 CADDO RIVER AT ALPINE, ARKANSAS  
DRAINAGE AREA: 312 SQ. MI. MILE 33.8

87

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	12	83.654	31.851	0.381	9.195	6.502	0.088	0.355	0.607
DAILY MAX	17	49.732	31.301	0.629	7.592	5.368	0.145	0.574	0.861
MEAN	17	1.759	0.642	0.365	0.156	0.110	0.070	-0.022	-0.033
DAILY MIN	17	0.077	0.032	0.422	0.008	0.006	0.084	-0.064	-0.096
INST MIN	0								

## 3615 ALTOHIA RIVER AT ALTOHIA, ARKANSAS

92

DRAINAGE AREA: 181 SQ. MI. MILE 8.5

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	13	64.343	44.102	0.685	12.232	8.649	0.187	1.052	1.740
DAILY MAX	9	42.910	29.329	0.684	9.776	6.913	0.224	0.776	1.508
MEAN	9	1.408	0.578	0.411	0.193	0.136	0.112	0.418	0.813
DAILY MIN	9	0.002	0.003	1.231	0.001	0.001	0.583	0.465	0.905
INST MIN	9	0.002	0.003	1.247	0.001	0.001	0.596	0.511	0.993

## 3616 LITTLE MISSOURI RIVER NEAR BOUGHTON, ARKANSAS

93

DRAINAGE AREA: 1,068 SQ. MI. MILE

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	21	35.132	22.677	0.645	4.948	3.499	0.135	0.657	0.923
DAILY MAX	18	24.761	13.616	0.550	3.209	2.269	0.116	0.560	0.824
MEAN	18	1.436	0.581	0.405	0.137	0.097	0.078	-0.100	-0.147
DAILY MIN	18	0.049	0.047	0.974	0.011	0.008	0.277	0.935	1.377
INST MIN	0								

## 3620 OUACHITA RIVER AT CAMDEN, ARKANSAS

95

DRAINAGE AREA: 5,391 SQ. MI. MILE

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	0								
DAILY MAX	28	15.663	10.722	0.685	2.026	1.433	0.127	0.448	0.585
MEAN	28	1.418	0.639	0.450	0.121	0.085	0.071	0.173	0.226
DAILY MIN	28	0.085	0.057	0.667	0.011	0.008	0.122	0.569	0.741
INST MIN	0								

## 3621 SMACKOVER CREEK AT SMACKOVER, ARKANSAS

96

DRAINAGE AREA: 377 SQ. MI. MILE 23

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	20	22.042	16.424	0.745	3.673	2.597	0.171	0.518	0.738
DAILY MAX	0								
MEAN	0								
DAILY MIN	0								
INST MIN	0								

## 3635 SALINE RIVER NEAR RYE, ARKANSAS

102

DRAINAGE AREA: 2,062 SQ. MI. MILE

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	26	13.700	7.890	0.576	1.547	1.094	0.103	0.348	0.461
DAILY MAX	26	13.372	7.672	0.574	1.505	1.064	0.102	0.358	0.476
MEAN	26	1.281	0.623	0.487	0.122	0.086	0.082	0.204	0.270
DAILY MIN	26	0.017	0.015	0.879	0.003	0.002	0.194	0.560	0.744
INST MIN	26	0.016	0.014	0.879	0.003	0.003	0.195	0.566	0.752

## 3640 SALINE RIVER NEAR WARREN, ARKANSAS

103

DRAINAGE AREA: 2,476 SQ. MI. MILE

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	3	14.230	8.287	0.582	4.785	3.383	0.308	0.108	0.416
DAILY MAX	0								
MEAN	3	1.241	0.756	0.609	0.437	0.309	0.329	-0.270	-1.035
DAILY MIN	3	0.009	0.003	0.313	0.002	0.001	0.140	-0.136	-0.521
INST MIN	0								

## 3641.2 BAYOU BARTHOLOMEW NEAR STARY CITY, ARKANSAS

105

DRAINAGE AREA: 215 SQ. MI. MILE

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	17	8.865	3.628	0.409	0.880	0.622	0.081	0.483	0.724
DAILY MAX	0								
MEAN	0								
DAILY MIN	0								
INST MIN	0								

## 3641.5 BAYOU BARTHOLOMEW NEAR McGEHEE, ARKANSAS

106

DRAINAGE AREA: 592 SQ. MI. MILE

	N	MEAN	STD. DEV.	COEFF. VAR.	STD. DEV. MEAN	STD. DEV. STD. DEV.	STD. DEV. C <sub>v</sub>	SKEW-NESS	ADJ. SKEW-NESS
INST PEAK	25	5.698	2.424	0.425	0.485	0.343	0.070	0.213	0.285
DAILY MAX	7	5.835	3.110	0.533	1.175	0.831	0.178	0.281	0.621
MEAN	7	1.231	0.665	0.540	0.251	0.178	0.182	0.332	0.735
DAILY MIN	7	0.056	0.029	0.521	0.011	0.008	0.173	0.097	0.214
INST MIN	7	0.056	0.029	0.515	0.011	0.008	0.170	0.100	0.221

APPENDIX B



The sample moments are calculated as follows

$$M_2 = \frac{(X_i - \bar{X})^2}{n}$$

$$M_3 = \frac{(X_i - \bar{X})^3}{n}$$

$$M_4 = \frac{(X_i - \bar{X})^4}{n}$$

The standard normal deviates for testing normality and skewness are used to test the hypothesis that the skewness and kurtosis (flatness) of the distribution curves are not from a normal distribution. The confidence level chosen for this study was 95%. Therefore, if the value of both standard normal deviates is less than  $\pm 1.96$  the curves are assumed to be from a normal distribution.

SN(X) is calculated as the order divided by the number of observations.

The fitted C.D.F. is a fitted cumulative distribution function. This curve may be closely approximated by plotting on log-probability paper as follows. Plot the mean of the logarithms of discharge, given as sample mean, at the 50% point. Plot the mean times the standard deviation at the 15.9% point and the mean divided by the standard deviation at the 84.1% point.

## 1781 ST. FRANCIS RIVER, ST. FRANCIS, ARK.

MINIMUM DAILY  
 NO. OF OBSERVATIONS = 34  
 MEDIAN = 4.77912  
 SAMPLE MEAN = 4.79716  
 SAMPLE VARIANCE = 0.13800  
 SAMPLE STANDARD DEVIATION = 0.43689  
 RANGE = 1.56862  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = -0.05174  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = -0.97811

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
55.0	4.00733	0.02941	0.03531
58.0	4.06044	0.05882	0.04587
63.0	4.14313	0.08824	0.06719
64.0	4.15888	0.11765	0.07201
70.0	4.24850	0.14706	0.10458
78.0	4.35671	0.17647	0.15669
78.0	4.35671	0.20588	0.15669
81.0	4.39445	0.23529	0.17832
89.0	4.48864	0.26471	0.24004
91.0	4.51086	0.29412	0.25613
100.0	4.60517	0.32353	0.33017
100.0	4.60517	0.35294	0.33017
106.0	4.66344	0.38235	0.37977
115.0	4.74493	0.41176	0.45242
115.0	4.74493	0.44118	0.45242
115.0	4.74493	0.47059	0.45242
119.0	4.77912	0.50000	0.48353
120.0	4.78749	0.52941	0.49117
125.0	4.82831	0.55882	0.52842
127.0	4.84419	0.58824	0.54286
137.0	4.91998	0.61765	0.61069
150.0	5.01064	0.64706	0.68745
150.0	5.01064	0.67647	0.68745
154.0	5.03695	0.70588	0.70845
159.0	5.06890	0.73529	0.73303
163.0	5.09375	0.76471	0.75139
172.0	5.14749	0.79412	0.78869
177.0	5.17615	0.82353	0.80716
180.0	5.19296	0.85294	0.81752
212.0	5.35659	0.88235	0.89981
230.0	5.43808	0.91176	0.92881
240.0	5.48064	0.94118	0.94114
250.0	5.52146	0.97059	0.95133
264.0	5.57595	1.00000	0.96267

## 2385 ST. FRANCIS RIVER, LAKE CITY, ARK.

MINIMUM DAILY  
 NO. OF OBSERVATIONS = 33  
 MEDIAN = 5.22575  
 SAMPLE MEAN = 5.19760  
 SAMPLE VARIANCE = 0.36618  
 SAMPLE STANDARD DEVIATION = 0.60988  
 RANGE = 2.33214  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = 0.70815  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = -0.36929

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
60.0	4.09434	0.03030	0.03523
71.0	4.26268	0.06061	0.06264
73.0	4.29046	0.09091	0.06845
83.0	4.41884	0.12121	0.10082
97.0	4.57471	0.15152	0.15355
99.0	4.59512	0.18182	0.16161
100.0	4.60517	0.21212	0.16568
109.0	4.69135	0.24242	0.20324
126.0	4.83628	0.27273	0.27678
129.0	4.85981	0.30303	0.28984
129.0	4.85981	0.33333	0.28984
140.0	4.94164	0.36364	0.33736
142.0	4.95583	0.39394	0.34589
152.0	5.02388	0.42424	0.38788
157.0	5.05625	0.45455	0.40836
168.0	5.12396	0.48485	0.45195
186.0	5.22575	0.51515	0.51841
189.0	5.24175	0.54545	0.52885
198.0	5.28827	0.57576	0.55909
217.0	5.37990	0.60606	0.61750
220.0	5.39362	0.63636	0.62606
232.0	5.44674	0.66667	0.65855
240.0	5.48064	0.69697	0.67671
243.0	5.49306	0.72727	0.68597
248.0	5.51343	0.75758	0.69772
250.0	5.52146	0.78788	0.70230
265.0	5.57973	0.81818	0.73453
319.0	5.76519	0.84848	0.82399
368.0	5.90808	0.87879	0.87798
368.0	5.90808	0.90909	0.87798
565.0	6.33683	0.93939	0.96912
615.0	6.42162	0.96970	0.97763
618.0	6.42649	1.00000	0.97805

## 2000.0 BIG LAKE OUTLET NEAR MANILA

## MINIMUM DAILY

NO. OF OBSERVATIONS = 6  
 MEDIAN = 5.27300  
 SAMPLE MEAN = 5.51586  
 SAMPLE VARIANCE = 0.51769  
 SAMPLE STANDARD DEVIATION = 0.75615  
 RANGE = 1.73123  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = 0.05420  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = -1.16221

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
105.0	4.65396	0.16667	0.12717
125.0	4.82831	0.33333	0.18160
195.0	5.27300	0.50000	0.37403
305.0	5.72031	0.66667	0.60657
510.0	6.23441	0.83333	0.82901
593.0	6.38519	1.00000	0.87486

## 2113 RIGHT HAND CHUTE, LITTLE RIVER, RIVERDALE

## MINIMUM DAILY

NO. OF OBSERVATIONS = 17  
 MEDIAN = 5.33754  
 SAMPLE MEAN = 5.44925  
 SAMPLE VARIANCE = 0.42921  
 SAMPLE STANDARD DEVIATION = 0.65844  
 RANGE = 2.05935  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = 0.40321  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = -0.99477

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
88.0	4.47734	0.05882	0.06996
101.0	4.61512	0.11765	0.10261
110.0	4.70048	0.17647	0.12773
125.0	4.82831	0.23529	0.17283
131.0	4.87520	0.29412	0.19165
177.0	5.17615	0.35294	0.33916
180.0	5.19296	0.41176	0.34855
204.0	5.31812	0.47059	0.42107
208.0	5.33754	0.52941	0.43264
235.0	5.45959	0.58824	0.50626
251.0	5.52545	0.64706	0.54607
355.0	5.87212	0.70588	0.73964
428.0	6.05912	0.76471	0.82284
430.0	6.06379	0.82353	0.82467
449.0	6.10702	0.88235	0.84110
660.0	6.49224	0.94118	0.94341
690.0	6.53669	1.00000	0.95069

## 5258.0 ST. FRANCIS RIVER FLOODWAY AT MARKED TREE

MINIMUM DAILY  
 NO. OF OBSERVATIONS = 5  
 MEDIAN = 5.01064  
 SAMPLE MEAN = 4.60259  
 SAMPLE VARIANCE = 0.67692  
 SAMPLE STANDARD DEVIATION = 0.87528  
 RANGE = 2.05412  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = -1.81386  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = 1.35156

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
25.0	3.21888	0.20000	0.05695
90.0	4.49981	0.40000	0.45326
150.0	5.01064	0.60000	0.67946
150.0	5.01064	0.80000	0.67946
195.0	5.27300	1.00000	0.77814

## 525851. FRANCIS RIVER AT MARKED TREE, ARK.

MINIMUM DAILY  
 NO. OF OBSERVATIONS = 29  
 MEDIAN = 4.87520  
 SAMPLE MEAN = 4.99761  
 SAMPLE VARIANCE = 0.37793  
 SAMPLE STANDARD DEVIATION = 0.62031  
 RANGE = 2.31192  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = 1.42847  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = -0.21171

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
64.0	4.15888	0.03448	0.08817
64.0	4.15888	0.06897	0.08817
66.0	4.18965	0.10345	0.09637
68.0	4.21951	0.13793	0.10485
76.0	4.33073	0.17241	0.14117
86.0	4.45435	0.20690	0.19057
90.0	4.49981	0.24138	0.21113
96.0	4.56435	0.27586	0.24244
96.0	4.56435	0.31034	0.24244
112.0	4.71850	0.34483	0.32637
114.0	4.73620	0.37931	0.33672
118.0	4.77068	0.41379	0.35725
118.0	4.77068	0.44828	0.35725
124.0	4.82028	0.48276	0.38749
131.0	4.87520	0.51724	0.42178
150.0	5.01064	0.55172	0.50837
164.0	5.09987	0.58621	0.56547
169.0	5.12990	0.62069	0.58444
170.0	5.13580	0.65517	0.58814
177.0	5.17615	0.68966	0.61326
185.0	5.22036	0.72414	0.64023
186.0	5.22575	0.75862	0.64348
240.0	5.48064	0.79310	0.78192
260.0	5.56068	0.82759	0.81799
272.0	5.60580	0.86207	0.83657
373.0	5.92158	0.89655	0.93182
406.0	6.00635	0.93103	0.94804
426.0	6.05444	0.96552	0.95578
646.0	6.47080	1.00000	0.99122

## 301 TYRONZA RIVER, TYRONZA, ARK.

## MEAN DAILY

NO. OF OBSERVATIONS = 15  
 MEDIAN = 6.08450  
 SAMPLE MEAN = 5.92626  
 SAMPLE VARIANCE = 0.21574  
 SAMPLE STANDARD DEVIATION = 0.47394  
 RANGE = 1.49242  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = -0.74167  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = -0.83943

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
163.0	5.09375	0.06667	0.03914
180.0	5.19296	0.13333	0.06040
227.0	5.42495	0.20000	0.14413
263.0	5.57215	0.26667	0.22622
293.0	5.68017	0.33333	0.30033
321.0	5.77144	0.40000	0.37037
324.0	5.78074	0.46667	0.37781
439.0	6.08450	0.53333	0.62918
463.0	6.13773	0.60000	0.67075
483.0	6.18002	0.66667	0.70236
540.0	6.29157	0.73333	0.77834
556.0	6.32077	0.80000	0.79622
569.0	6.34388	0.86667	0.80975
641.0	6.46303	0.93333	0.87042
725.0	6.58617	1.00000	0.91746



## 5931 ST. FRANCIS RIVER, PORKIN, ARK.

MEAN DAILY  
 NO. OF OBSERVATIONS = 34  
 MEDIAN = 7.88608  
 SAMPLE MEAN = 7.92066  
 SAMPLE VARIANCE = 0.18162  
 SAMPLE STANDARD DEVIATION = 0.42940  
 RANGE = 1.79472  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = 0.26764  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = -0.02251

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
1125.0	7.02554	0.02941	0.01858
1325.0	7.18917	0.05882	0.04428
1400.0	7.24423	0.08824	0.05765
1470.0	7.29302	0.11765	0.07198
1830.0	7.51207	0.14706	0.17079
2020.0	7.61085	0.17647	0.23545
2040.0	7.62071	0.20588	0.24257
2040.0	7.62071	0.23529	0.24257
2140.0	7.66856	0.26471	0.27873
2230.0	7.70976	0.29412	0.31183
2250.0	7.71869	0.32353	0.31922
2270.0	7.72754	0.35294	0.32662
2270.0	7.72754	0.38235	0.32662
2320.0	7.74932	0.41176	0.34512
2510.0	7.82804	0.44118	0.41480
2645.0	7.88043	0.47059	0.46286
2660.0	7.88608	0.50000	0.46810
2800.0	7.93737	0.52941	0.51571
2895.0	7.97074	0.55882	0.54661
2986.0	8.00169	0.58824	0.57502
3040.0	8.01961	0.61765	0.59131
3120.0	8.04559	0.64706	0.61463
3250.0	8.08641	0.67647	0.65043
3330.0	8.11073	0.70588	0.67115
3340.0	8.11373	0.73529	0.67368
3380.0	8.12563	0.76471	0.68361
3590.0	8.18591	0.79412	0.73177
3950.0	8.28147	0.82353	0.79975
3975.0	8.28778	0.85294	0.80384
4675.0	8.44998	0.88235	0.89124
4690.0	8.45319	0.91176	0.89263
5610.0	8.63231	0.94118	0.95132
6380.0	8.76092	0.97059	0.97484
6770.0	8.82026	1.00000	0.98193

## 6475 ST. FRANCIS BAY, RIVERFRONT, ARK.

MEAN DAILY  
 NO. OF OBSERVATIONS = 29  
 MEDIAN = 8.35232  
 SAMPLE MEAN = 8.26591  
 SAMPLE VARIANCE = 0.62126  
 SAMPLE STANDARD DEVIATION = 0.79527  
 RANGE = 3.54593  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = -2.18152  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = 1.84217

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
350.0	5.85793	0.03448	0.00124
1140.0	7.03878	0.06897	0.06172
1650.0	7.40853	0.10345	0.14106
1750.0	7.46737	0.13793	0.15827
1845.0	7.52023	0.17241	0.17486
1950.0	7.57558	0.20690	0.19337
2420.0	7.79152	0.24138	0.27626
2500.0	7.82405	0.27586	0.29010
2770.0	7.92660	0.31034	0.33573
2910.0	7.97591	0.34483	0.35862
2930.0	7.98276	0.37931	0.36185
2950.0	7.98956	0.41379	0.36506
3060.0	8.02617	0.44828	0.38249
3510.0	8.16337	0.48276	0.44970
4240.0	8.35232	0.51724	0.54426
5320.0	8.57923	0.55172	0.65413
5350.0	8.58485	0.58621	0.65673
5510.0	8.61432	0.62069	0.67026
5740.0	8.65521	0.65517	0.68866
6190.0	8.73069	0.68966	0.72138
6450.0	8.77184	0.72414	0.73849
6890.0	8.83783	0.75862	0.76475
7390.0	8.90788	0.79310	0.79096
8010.0	8.98845	0.82759	0.81887
8300.0	9.02401	0.86207	0.83041
8660.0	9.06647	0.89655	0.84355
10400.0	9.24956	0.93103	0.89240
11400.0	9.34137	0.96552	0.91227
12100.0	9.40096	1.00000	0.92361

## 83WEST FORK WHITE RIVER AT GREENLAND, ARK.

MEAN DAILY  
 NO. OF OBSERVATIONS = 18  
 MEDIAN = 4.64439  
 SAMPLE MEAN = 4.56817  
 SAMPLE VARIANCE = 0.36504  
 SAMPLE STANDARD DEVIATION = 0.61313  
 RANGE = 2.15434  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = -2.86563  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = 1.69789

UBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
22.5	3.11352	0.05556	0.00883
25.2	3.22684	0.11111	0.01435
44.3	3.79098	0.16667	0.10248
85.7	4.45085	0.22222	0.42413
88.7	4.48526	0.27778	0.44622
94.9	4.55282	0.33333	0.49002
98.4	4.58904	0.38889	0.51358
103.0	4.63473	0.44444	0.54322
104.0	4.64439	0.50000	0.54947
116.0	4.75359	0.55556	0.61883
130.0	4.86753	0.61111	0.68732
130.0	4.86753	0.66667	0.68732
133.0	4.89035	0.72222	0.70037
139.0	4.93447	0.77778	0.72489
144.0	4.96981	0.83333	0.74379
162.0	5.08760	0.88889	0.80155
164.0	5.09987	0.94444	0.80708
194.0	5.26786	1.00000	0.87310

## 83WEST FORK WHITE RIVER AT GREENLAND, ARK.

## INSTANTANEOUS DAILY

NO. OF OBSERVATIONS = 12  
 MEDIAN = -2.30259  
 SAMPLE MEAN = -1.40055  
 SAMPLE VARIANCE = 1.70154  
 SAMPLE STANDARD DEVIATION = 1.33438  
 RANGE = 3.66356  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = 2.22939  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = 0.62270

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
0.1	-2.30259	0.08333	0.24952
0.1	-2.30259	0.16667	0.24952
0.1	-2.30259	0.25000	0.24952
0.1	-2.30259	0.33333	0.24952
0.1	-2.30259	0.41667	0.24952
0.1	-2.30259	0.50000	0.24952
0.2	-1.60944	0.58333	0.43780
0.2	-1.60944	0.66667	0.43780
0.2	-1.60944	0.75000	0.43780
0.7	-0.35667	0.83333	0.78298
2.3	0.83291	0.91667	0.95291
3.9	1.36098	1.00000	0.98075

## 118WEST FORK WHITE RIVER NEAR FAYETTEVILLE

MINIMUM DAILY

NO. OF OBSERVATIONS = 8  
 MEDIAN = -0.91629  
 SAMPLE MEAN = -0.66410  
 SAMPLE VARIANCE = 0.13247  
 SAMPLE STANDARD DEVIATION = 0.37716  
 RANGE = 1.01160  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = 2.11583  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = 1.41040

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
0.4	-0.91629	0.12500	0.25186
0.4	-0.91629	0.25000	0.25186
0.4	-0.91629	0.37500	0.25186
0.4	-0.91629	0.50000	0.25186
0.5	-0.69315	0.62500	0.46931
0.5	-0.69315	0.75000	0.46931
0.7	-0.35667	0.87500	0.79250
1.1	0.09531	1.00000	0.97797

## 262WAR EAGLE CREEK HINDSVILLE, ARK.

## MEAN DAILY

NO. OF OBSERVATIONS = 11  
 MEDIAN = 5.57215  
 SAMPLE MEAN = 5.46103  
 SAMPLE VARIANCE = 0.54405  
 SAMPLE STANDARD DEVIATION = 0.73824  
 RANGE = 2.59810  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = -1.48362  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = 0.83588

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
47.7	3.86493	0.09091	0.01740
99.0	4.59512	0.18182	0.12610
155.0	5.04343	0.27273	0.29040
216.0	5.37528	0.36364	0.45486
256.0	5.54518	0.45455	0.54430
263.0	5.57215	0.54545	0.55841
290.0	5.66988	0.63636	0.60879
324.0	5.78074	0.72727	0.66377
392.0	5.97126	0.81818	0.75007
488.0	6.19032	0.90909	0.83257
641.0	6.46303	1.00000	0.90741

## 262WAR EAGLE CREEK HINDSVILLE, ARK.

## INSTANTANEOUS DAILY

NO. OF OBSERVATIONS = 11  
 MEDIAN = 1.43508  
 SAMPLE MEAN = 1.55356  
 SAMPLE VARIANCE = 1.97482  
 SAMPLE STANDARD DEVIATION = 1.44080  
 RANGE = 4.70048  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = -1.58661  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = 0.94725

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
0.2	-1.60944	0.09091	0.01407
1.9	0.64185	0.18182	0.26344
2.1	0.74194	0.27273	0.28661
2.1	0.74194	0.36364	0.28661
3.8	1.33500	0.45455	0.43971
4.2	1.43508	0.54545	0.46723
11.0	2.39790	0.63636	0.72107
15.0	2.70805	0.72727	0.78852
16.0	2.77259	0.81818	0.80125
17.0	2.83321	0.90909	0.81277
22.0	3.09104	1.00000	0.85704

## 1020WHITE RIVER NEAR ROGERS, ARK.

MINIMUM DAILY  
 NC. OF OBSERVATIONS = 11  
 MEDIAN = 2.99573  
 SAMPLE MEAN = 3.12943  
 SAMPLE VARIANCE = 1.05622  
 SAMPLE STANDARD DEVIATION = 1.05370  
 RANGE = 3.27532  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = -0.80875  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = -0.32895

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
3.1	1.13140	0.09091	0.02897
8.4	2.12823	0.18182	0.17101
10.0	2.30259	0.27273	0.21631
15.0	2.70805	0.36364	0.34461
18.0	2.89037	0.45455	0.41026
20.0	2.99573	0.54545	0.44952
36.0	3.58352	0.63636	0.66675
55.0	4.00733	0.72727	0.79762
61.0	4.11087	0.81818	0.82418
64.0	4.15888	0.90909	0.83571
82.0	4.40672	1.00000	0.88728



## 1238WHITE RIVER AT BEAVER, ARK.

MEAN DAILY  
 NO. OF OBSERVATIONS = 35  
 MEDIAN = 7.33237  
 SAMPLE MEAN = 7.24260  
 SAMPLE VARIANCE = 0.32957  
 SAMPLE STANDARD DEVIATION = 0.57858  
 RANGE = 2.63683  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = -1.97362  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = 1.40516

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
257.0	5.54908	0.02857	0.00171
492.0	6.19848	0.05714	0.03557
509.0	6.23245	0.08571	0.04041
632.0	6.44889	0.11429	0.08506
716.0	6.57368	0.14286	0.12381
940.0	6.84588	0.17143	0.24646
1010.0	6.91771	0.20000	0.28721
1080.0	6.98472	0.22857	0.32790
1090.0	6.99393	0.25714	0.33367
1125.0	7.02554	0.28571	0.35377
1141.0	7.03966	0.31429	0.36289
1150.0	7.04752	0.34286	0.36799
1164.0	7.05962	0.37143	0.37590
1220.0	7.10661	0.40000	0.40708
1236.0	7.11964	0.42857	0.41585
1260.0	7.13887	0.45714	0.42885
1359.0	7.21450	0.48571	0.48063
1529.0	7.33237	0.51429	0.56165
1574.0	7.36138	0.54286	0.58132
1610.0	7.38399	0.57143	0.59653
1636.0	7.40001	0.60000	0.60721
1695.0	7.43544	0.62857	0.63054
1695.0	7.43544	0.65714	0.63054
1747.0	7.46566	0.68571	0.65007
1800.0	7.49554	0.71429	0.66901
1918.0	7.55904	0.74286	0.70778
1922.0	7.56112	0.77143	0.70902
2308.0	7.74414	0.80000	0.80698
2500.0	7.82405	0.82857	0.84254
2650.0	7.88231	0.85714	0.86556
2677.0	7.89245	0.88571	0.86932
2709.0	7.90433	0.91429	0.87363
3060.0	8.02617	0.94286	0.91218
3311.0	8.10501	0.97143	0.93196
3590.0	8.18591	1.00000	0.94849

## 1238 WHITE RIVER AT BEAVER, ARK.

## INSTANTANEOUS DAILY

NO. OF OBSERVATIONS = 35  
 MEDIAN = 3.80666  
 SAMPLE MEAN = 3.66377  
 SAMPLE VARIANCE = 1.12339  
 SAMPLE STANDARD DEVIATION = 1.07009  
 RANGE = 5.20401  
 STANDARD NORMAL DEViate FOR TESTING SKEWNESS = -4.04498  
 STANDARD NORMAL DEViate FOR TESTING KURTOSIS = 4.65686

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
1.0	0.00000	0.02857	0.00031
3.0	1.09861	0.05714	0.00826
7.3	1.98787	0.08571	0.05866
11.0	2.39790	0.11429	0.11841
14.0	2.63906	0.14286	0.16913
20.0	2.99573	0.17143	0.26622
21.0	3.04452	0.20000	0.28140
24.0	3.17805	0.22857	0.32495
33.0	3.49651	0.25714	0.43790
33.0	3.49651	0.28571	0.43790
33.0	3.49651	0.31429	0.43790
34.0	3.52636	0.34286	0.44891
35.0	3.55535	0.37143	0.45965
38.0	3.63754	0.40000	0.49024
39.0	3.66356	0.42857	0.49992
42.0	3.73767	0.45714	0.52753
44.0	3.78419	0.48571	0.54480
45.0	3.80666	0.51429	0.55311
47.0	3.85015	0.54286	0.56913
48.0	3.87120	0.57143	0.57685
52.0	3.95124	0.60000	0.60590
54.0	3.98898	0.62857	0.61940
57.0	4.04305	0.65714	0.63850
61.0	4.11087	0.68571	0.66196
68.0	4.21951	0.71429	0.69824
72.0	4.27667	0.74286	0.71659
82.0	4.40672	0.77143	0.75625
86.0	4.45435	0.80000	0.76998
90.0	4.49981	0.82857	0.78268
93.0	4.53260	0.85714	0.79158
109.0	4.69135	0.88571	0.83154
121.0	4.79579	0.91429	0.85494
127.0	4.84419	0.94286	0.86501
141.0	4.94876	0.97143	0.88509
182.0	5.20401	1.00000	0.92497

## 532KINGS RIVER NEAR BERRYVILLE, ARK.

MINIMUM DAILY  
 NO. OF OBSERVATIONS = 24  
 MEDIAN = 2.12823  
 SAMPLE MEAN = 1.87414  
 SAMPLE VARIANCE = 1.81050  
 SAMPLE STANDARD DEVIATION = 1.36025  
 RANGE = 5.39363  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = -1.82644  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = 0.45123

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
0.2	-1.60944	0.04167	0.00522
0.7	-0.35667	0.08333	0.05050
1.2	0.18232	0.12500	0.10679
1.5	0.40547	0.16667	0.14013
1.6	0.47000	0.20833	0.15097
2.2	0.78846	0.25000	0.21239
3.1	1.13140	0.29167	0.29252
4.5	1.50408	0.33333	0.39279
5.0	1.60944	0.37500	0.42285
5.6	1.72277	0.41667	0.45569
6.8	1.91692	0.45833	0.51254
8.4	2.12823	0.50000	0.57409
9.2	2.21920	0.54167	0.60013
12.0	2.48491	0.58333	0.67329
13.0	2.56495	0.62500	0.69422
14.0	2.63906	0.66667	0.71306
16.0	2.77259	0.70833	0.74553
17.0	2.83321	0.75000	0.75962
17.0	2.83321	0.79167	0.75962
22.0	3.09104	0.83333	0.81450
22.0	3.09104	0.87500	0.81450
23.0	3.13549	0.91667	0.82311
38.0	3.63759	0.95833	0.90258
44.0	3.78419	1.00000	0.91987

## 6067 WHITE RIVER NEAR FLIPPIN, ARK.

MEAN DAILY  
 NO. OF OBSERVATIONS = 35  
 MEDIAN = 8.53223  
 SAMPLE MEAN = 8.60492  
 SAMPLE VARIANCE = 0.21017  
 SAMPLE STANDARD DEVIATION = 0.46182  
 RANGE = 1.83276  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = -0.03232  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = -1.04465

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
2206.0	7.69894	0.02857	0.02489
2831.0	7.94839	0.05714	0.07757
2862.0	7.95928	0.08571	0.08105
2943.0	7.98718	0.11429	0.09051
3061.0	8.02650	0.14286	0.10520
3135.0	8.05038	0.17143	0.11492
3299.0	8.10137	0.20000	0.13778
3317.0	8.10682	0.22857	0.14039
3980.0	8.28904	0.25714	0.24699
4060.0	8.30894	0.28571	0.26079
4109.0	8.32094	0.31429	0.26930
4291.0	8.36428	0.34286	0.30115
4388.0	8.38663	0.37143	0.31822
4636.0	8.44161	0.40000	0.36181
4760.0	8.46800	0.42857	0.38343
5035.0	8.52417	0.45714	0.43060
5230.0	8.56217	0.48571	0.46312
5336.0	8.58223	0.51429	0.48041
6370.0	8.75935	0.54286	0.63096
6446.0	8.77122	0.57143	0.64061
6625.0	8.79861	0.60000	0.66253
6663.0	8.80433	0.62857	0.66705
6804.0	8.82527	0.65714	0.68336
6968.0	8.84908	0.68571	0.70149
7160.0	8.87627	0.71429	0.72158
7177.0	8.87864	0.74286	0.72330
7334.0	8.90028	0.77143	0.73876
7719.0	8.95144	0.80000	0.77347
7942.0	8.97992	0.82857	0.79160
9100.0	9.11603	0.85714	0.86579
10250.0	9.23503	0.88571	0.91378
10320.0	9.24184	0.91429	0.91607
10350.0	9.24474	0.94286	0.91704
10740.0	9.28173	0.97143	0.92861
13790.0	9.53170	1.00000	0.97761

## 0067WHITE RIVER NEAR FLIPPIN, ARK.

## INSTANTANEOUS DAILY

NO. OF OBSERVATIONS = 35  
 MEDIAN = 5.67675  
 SAMPLE MEAN = 5.65514  
 SAMPLE VARIANCE = 0.50968  
 SAMPLE STANDARD DEVIATION = 0.71918  
 RANGE = 3.20376  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = 0.95825  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = 0.26897

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
80.0	4.38203	0.02857	0.03835
95.0	4.55388	0.05714	0.06285
105.0	4.65396	0.08571	0.08194
110.0	4.70048	0.11429	0.09218
121.0	4.79579	0.14286	0.11606
134.0	4.89784	0.17143	0.14617
134.0	4.89784	0.20000	0.14617
136.0	4.91265	0.22857	0.15094
182.0	5.20401	0.25714	0.26524
183.0	5.20949	0.28571	0.26774
199.0	5.29330	0.31429	0.30744
204.0	5.31812	0.34286	0.31967
213.0	5.36129	0.37143	0.34142
222.0	5.40268	0.40000	0.36278
245.0	5.50126	0.42857	0.41529
264.0	5.57595	0.45714	0.45616
281.0	5.63835	0.48571	0.49069
292.0	5.67675	0.51429	0.51199
295.0	5.68698	0.54286	0.51765
345.0	5.84354	0.57143	0.60333
348.0	5.85220	0.60000	0.60796
349.0	5.85507	0.62857	0.60949
376.0	5.92959	0.65714	0.64862
383.0	5.94804	0.68571	0.65809
395.0	5.97889	0.71429	0.67370
400.0	5.99146	0.74286	0.67998
406.0	6.00635	0.77143	0.68735
413.0	6.02345	0.80000	0.69572
608.0	6.41017	0.82857	0.85311
627.0	6.44095	0.85714	0.86272
632.0	6.44889	0.88571	0.86513
684.0	6.52796	0.91429	0.88755
742.0	6.60935	0.94286	0.90771
912.0	6.81564	0.97143	0.94670
1970.0	7.58579	1.00000	0.99637

## 825BUFFALO RIVER NEAR ST. JOE, ARK.

MINIMUM DAILY  
 NO. OF OBSERVATIONS = 24  
 MEDIAN = 3.33220  
 SAMPLE MEAN = 3.37552  
 SAMPLE VARIANCE = 0.46031  
 SAMPLE STANDARD DEVIATION = 0.68588  
 RANGE = 2.37158  
 STANDARD NORMAL DEViate FOR TESTING SKEWNESS = -1.16224  
 STANDARD NORMAL DEViate FOR TESTING KURTOSIS = -0.61916

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
7.0	1.94591	0.04167	0.01856
8.6	2.15176	0.08333	0.03719
12.0	2.48491	0.12500	0.09706
12.0	2.48491	0.16667	0.09706
13.0	2.56495	0.20833	0.11864
19.0	2.94444	0.25000	0.26484
20.0	2.99573	0.29167	0.28988
23.0	3.13549	0.33333	0.36319
25.0	3.21888	0.37500	0.40967
27.0	3.29584	0.41667	0.45376
27.0	3.29584	0.45833	0.45376
28.0	3.33220	0.50000	0.47482
37.0	3.61092	0.54167	0.63428
38.0	3.63759	0.58333	0.64880
39.0	3.66356	0.62500	0.66274
43.0	3.76120	0.66667	0.71305
47.0	3.85015	0.70833	0.75553
49.0	3.89182	0.75000	0.77420
50.0	3.91202	0.79167	0.78296
51.0	3.93183	0.83333	0.79134
58.0	4.06044	0.87500	0.84101
69.0	4.23411	0.91667	0.89468
73.0	4.29046	0.95833	0.90889
75.0	4.31749	1.00000	0.91518

## 1091 BUFFALO RIVER NEAR RUSH, ARK.

## MEAN DAILY

NO. OF OBSERVATIONS = 35  
 MEDIAN = 7.19068  
 SAMPLE MEAN = 7.08262  
 SAMPLE VARIANCE = 0.24739  
 SAMPLE STANDARD DEVIATION = 0.50106  
 RANGE = 2.17185  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = -1.38031  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = -0.02362

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
377.0	5.93225	0.02857	0.01084
437.0	6.07993	0.05714	0.02269
507.0	6.22851	0.08571	0.04413
518.0	6.24998	0.11429	0.04828
630.0	6.44572	0.14286	0.10185
728.0	6.59030	0.17143	0.16291
769.0	6.64509	0.20000	0.19128
837.0	6.72982	0.22857	0.24069
843.0	6.73697	0.25714	0.24515
880.0	6.77992	0.28571	0.27288
962.0	6.86901	0.31429	0.33494
1070.0	6.97541	0.34286	0.41529
1089.0	6.99302	0.37143	0.42904
1157.0	7.05359	0.40000	0.47690
1165.0	7.06048	0.42857	0.48238
1210.0	7.09838	0.45714	0.51255
1262.0	7.14045	0.48571	0.54595
1327.0	7.19068	0.51429	0.58537
1340.0	7.20042	0.54286	0.59294
1346.0	7.20489	0.57143	0.59640
1371.0	7.22330	0.60000	0.61055
1527.0	7.33106	0.62857	0.69000
1563.0	7.35436	0.65714	0.70621
1607.0	7.38212	0.68571	0.72500
1609.0	7.38337	0.71429	0.72582
1670.0	7.42058	0.74286	0.75000
1756.0	7.47079	0.77143	0.78075
1767.0	7.47704	0.80000	0.78441
1787.0	7.48829	0.82857	0.79093
1885.0	7.54168	0.85714	0.82022
1897.0	7.54803	0.88571	0.82352
2032.0	7.61678	0.91429	0.85680
2093.0	7.64635	0.94286	0.86973
2206.0	7.69894	0.97143	0.89066
3308.0	8.10410	1.00000	0.97926

## 1091BUFFALO RIVER NEAR RUSH, ARK.

## INSTANTANEOUS DAILY

NO. OF OBSERVATIONS = 35  
 MEDIAN = 3.98898  
 SAMPLE MEAN = 3.84447  
 SAMPLE VARIANCE = 0.29597  
 SAMPLE STANDARD DEVIATION = 0.54804  
 RANGE = 2.24248  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = -1.96779  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = 0.21795

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
12.0	2.48491	0.02857	0.00655
15.0	2.70805	0.05714	0.01906
18.0	2.89037	0.08571	0.04085
20.0	2.99573	0.11429	0.06073
20.0	2.99573	0.14286	0.06073
30.0	3.40120	0.17143	0.20930
30.0	3.40120	0.20000	0.20930
32.0	3.46574	0.22857	0.24476
36.0	3.58352	0.25714	0.31698
38.0	3.63759	0.28571	0.35290
38.0	3.63759	0.31429	0.35290
40.0	3.68888	0.34286	0.38824
42.0	3.73767	0.37143	0.42274
42.0	3.73767	0.40000	0.42274
43.0	3.76120	0.42857	0.43961
46.0	3.82864	0.45714	0.48848
50.0	3.91202	0.48571	0.54905
54.0	3.98898	0.51429	0.60399
56.0	4.02535	0.54286	0.62932
60.0	4.09434	0.57143	0.67578
60.0	4.09434	0.60000	0.67578
62.0	4.12713	0.62857	0.69699
62.0	4.12713	0.65714	0.69699
64.0	4.15888	0.68571	0.71691
64.0	4.15888	0.71429	0.71691
65.0	4.17439	0.74286	0.72641
68.0	4.21951	0.77143	0.75311
71.0	4.26268	0.80000	0.77730
72.0	4.27667	0.82857	0.78483
75.0	4.31749	0.85714	0.80596
81.0	4.39445	0.88571	0.84220
82.0	4.40672	0.91429	0.84754
90.0	4.49981	0.94286	0.88411
103.0	4.63473	0.97143	0.92534
113.0	4.72739	1.00000	0.94641



## 1612 NORTH FORK RIVER NEAR HENDERSON, ARK.

MINIMUM DAILY

NO. OF OBSERVATIONS = 14

MEDIAN = 6.02345

SAMPLE MEAN = 6.06806

SAMPLE VARIANCE = 0.03375

SAMPLE STANDARD DEVIATION = 0.18727

RANGE = 0.74163

STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = 1.24051

STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = 1.08284

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
312.0	5.74300	0.07143	0.04131
380.0	5.94017	0.14286	0.24735
380.0	5.94017	0.21429	0.24735
380.0	5.94017	0.28571	0.24735
392.0	5.97126	0.35714	0.30264
405.0	6.00389	0.42857	0.36595
413.0	6.02345	0.50000	0.40588
414.0	6.02587	0.57143	0.41090
445.0	6.09807	0.64286	0.56370
460.0	6.13123	0.71429	0.63209
460.0	6.13123	0.78571	0.63209
486.0	6.18621	0.85714	0.73598
563.0	6.33328	0.92857	0.92166
655.0	6.48464	1.00000	0.98695

## 1800.0 NORTH FORK RIVER AT NORFOLK DAM

MEAN DAILY  
 NO. OF OBSERVATIONS = 19  
 MEDIAN = 7.47647  
 SAMPLE MEAN = 7.41896  
 SAMPLE VARIANCE = 0.26528  
 SAMPLE STANDARD DEVIATION = 0.52225  
 RANGE = 2.12332  
 STANDARD NORMAL DEVIATE FOR TESTING SKEWNESS = -2.43623  
 STANDARD NORMAL DEVIATE FOR TESTING KURTOSIS = 2.44187

OBS.	LN(OBS.)	SN(X)	FITTED C.D.F.
379.0	5.93754	0.05263	0.00228
948.0	6.85435	0.10526	0.13983
981.0	6.88857	0.15789	0.15492
1201.0	7.09091	0.21053	0.26495
1272.0	7.14835	0.26316	0.30217
1280.0	7.15462	0.31579	0.30637
1360.0	7.21524	0.36842	0.34824
1611.0	7.38461	0.42105	0.47378
1614.0	7.38647	0.47368	0.47520
1766.0	7.47647	0.52632	0.54384
2058.0	7.62949	0.57895	0.65657
2064.0	7.63240	0.63158	0.65862
2257.0	7.72179	0.68421	0.71899
2393.0	7.78030	0.73684	0.75550
2475.0	7.81400	0.78947	0.77530
2507.0	7.82684	0.84211	0.78260
2726.0	7.91059	0.89474	0.82674
3124.0	8.04687	0.94737	0.88538
3168.0	8.06086	1.00000	0.89048