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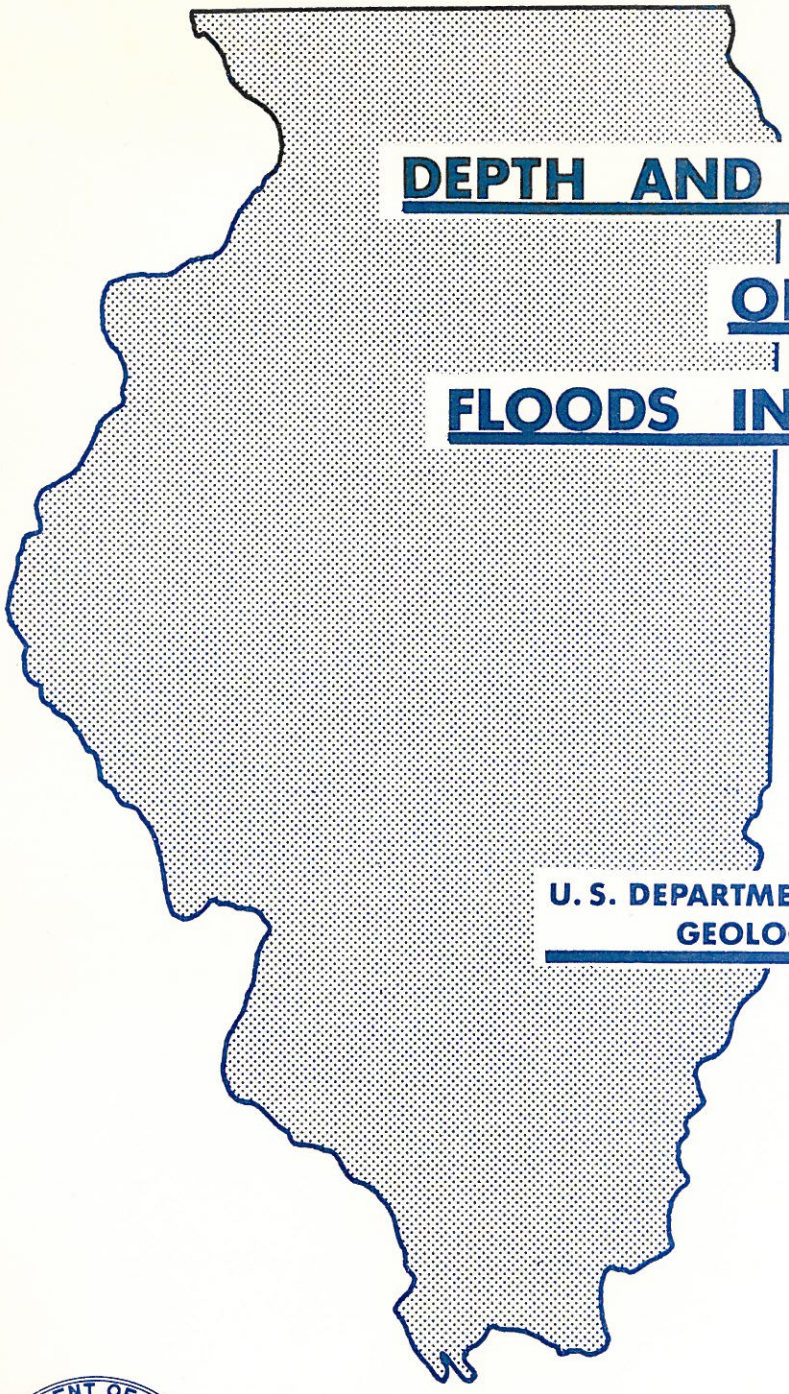

DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS

U. S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Prepared in cooperation with
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION
DIVISION OF WATER RESOURCES

DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS - U.S.G.S. - Water Resources

DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS

By
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GEOLOGICAL SURVEY

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION
DIVISION OF WATER RESOURCES

1976

PRINTED BY AUTHORITY OF THE STATE OF ILLINOIS

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Table 1. Factors for converting English units to International System (SI) units

Multiply English units	By	To obtain SI units
	Length	
inches (in)	25.4	millimetres (mm)
	.0254	metres (m)
feet (ft)	.3048	metres (m)
miles (mi)	1.609	kilometres (km)
feet/mile (ft/mi)	.1894	metres/kilometres (m/km)
	Area	
square miles (mi^2)	2.590	square kilometres (km^2)
	Volume	
gallons (gal)	3.785	litres (l)
	3.785×10^{-3}	cubic metres (m^3)
cubic feet (ft^3)	.02832	cubic metres (m^3)
	Flow	
cubic feet per second (ft^3/s)	28.32	litres per second (l/s)
	.02832	cubic metres per second (m^3/s)
million gallons per day (mgd)	.04381	cubic metres per second (m^3/s)

DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS

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ABSTRACT

A method is presented for estimating flood depths of 2-, 5-, 10-, 25-, 50-, and 100-year frequency at ungaged sites in Illinois.

Data from 177 U.S. Geological Survey gaging sites in Illinois were analyzed by multiple-regression techniques. Equations to predict depth of water above channel bottom for various frequency floods were developed. The 2-year-flood discharge was used as the descriptive variable.

The depth-frequency equations assume normal rainfall-runoff relationships and should be used only for Illinois streams flowing under natural conditions. They do not apply to streams affected by backwater, or significant artificial controls, or in situations where ice or debris jams cause peak stages.

INTRODUCTION

Purpose and Previous Work

The primary purpose of this report is to present the methodology and documentation needed to estimate flood depths of various recurrence intervals for streams in Illinois. It is intended mostly for planners, designers, and consultants who need a quick estimate of flood depths for preliminary designs, provisional flood-plain zoning, or a starting point for more detailed hydrologic studies.

Previous investigators (Thomas, 1964a, 1964b; Gann, 1968; R. V. Swisshelm, written commun., 1971) describe methods for estimating flood depths in New Jersey, Missouri, and Indiana, respectively. However, the differences in geography and hydrology between Illinois and these other States preclude the direct application of their results in Illinois.

A number of reports (Mitchell, 1954; Speer and Gamble, 1965; Wiitala, 1965; Patterson and Gamble, 1968, Ellis, 1968; Carns, 1973) describe procedures for estimating flood discharges for various recurrence intervals in Illinois. These discharges can be utilized to estimate depth of flooding provided a depth-discharge relation either is developed from field data or can be assumed from experience. The first method can be costly and time-consuming; the second requires considerable engineering judgment and introduces an uncertain amount of error.

The method described in this report to predict flood depths of 2-, 5-, 10-, 25-, 50-, and 100-year frequency can be applied to many ungaged sites in Illinois. All required parameters can be obtained from existing topographic maps of Illinois and from the charts and diagrams included in this report. An illustrated example is presented to assist the user in their application. The method is intended as a tool to help planners and designers estimate flood depths at various sites. It is not proposed to replace more complete hydrologic studies where greater accuracy or precision is needed.

Cooperation and Acknowledgments

This report has been prepared as part of a cooperative water-resources program between the State of Illinois, Department of Transportation, Division of Water Resources and the United States Department of the Interior, Geological Survey.

The data were assembled and analyzed, and the manuscript prepared in the district office of the Water Resources Division of the Geological Survey at Champaign, Illinois.

This report is seventh in the series of U.S. Geological Survey cooperative publications on Illinois hydrology and is intended to supplement the information contained in the earlier publications.

METHOD OF ANALYSIS

Review and Supplementation of Data

Data from 340 U.S. Geological Survey gaging sites in Illinois with greater than 5 years of record were reviewed. From these initial sites, 210 (shown in fig. 5) with sufficient information on stage and discharge to define a rating curve up to the expected 100-year-flood discharge were selected for further study.

Discharge-frequency studies had been conducted previously at 166 of these sites (Carns, 1973). Carns used Log-Pearson Type III analyses to determine the various frequency discharge values at sites with greater than 15 years of record. At sites with less than 15 years of record he used Log-Pearson Type III analyses to obtain discharge values of less than 50-year recurrence intervals and regional-frequency regression equations to obtain the 50- and 100-year recurrence interval values.

Frequency discharge values for the remaining 44 sites were obtained by regional discharge-frequency regression equations for all recurrence intervals as part of this study.

Stage-discharge rating curves were utilized to obtain the stage corresponding to discharges at the 2-, 5-, 10-, 25-, 50-, and 100-year recurrence intervals.

Techniques of Analysis

Depth and discharge data were first transformed from arithmetic to logarithmic values to facilitate mathematical analysis. Depth equations were then derived by stepwise multiple-regression techniques using drainage area, slope, and the 2-year-flood discharge as independent variables. The 2-year-flood discharge is defined as that discharge which has a 50 percent probability of being exceeded in any given year.

Other factors such as area of lakes and ponds, soils index, mean annual precipitation, forest cover, and main channel length were considered by Carns (1973) as to their effect on the magnitude and frequency of floods in Illinois. The improvement in the standard error of estimate was not appreciably affected by the inclusion of these variables; consequently, they were not considered in this study.

Two different dependent variables were evaluated by regression analysis. The first was height above the bottom of the channel and the second was height above average depth in the channel. Average depth is the depth of water above the channel bottom which corresponds to average discharge at the site. The average discharge is the arithmetic average of the mean annual discharges at the site.

Both dependent variables were analyzed for their relationship to, first, drainage area and channel slope, and second, to the 2-year-flood discharge (Q_2). Equations using these different independent variables have advantages and disadvantages for use in predicting flood depths. Drainage area and channel slope can be measured on topographic maps and no additional information is needed. The 2-year-flood discharge can be derived from four parameters: drainage area, slope, precipitation intensity, and a regional factor. The latter two terms require additional descriptive maps. The standard error of prediction for the various flood depths is less using the 2-year-flood discharge relationship but more computational work is involved.

Heights above the channel bottom calculated from the equations containing the 2-year-flood discharge were considered the best combination for estimating flood depths. The main advantages are threefold. First, all the needed information can be obtained from topographic maps and data provided in this report; second, the standard error of estimate is lower; and third, some subjective evaluation of discharges is possible on the basis of good engineering judgment.

FINAL ANALYSIS

The initial regression analysis showed that depths at 33 sites affected by artificial controls and backwater conditions could not be predicted with confidence and data at these sites were excluded from the final regression analysis. Several of these sites also showed abnormalities in their rating curve extensions.

Depth-Frequency Equations

Data for 177 sites not rejected by the aforementioned criteria were used in computing the final depth equations. The sites used in the analysis had drainage areas that ranged from 0.452 to 9,520 square miles and slopes that ranged from 0.69 to 145.20 feet per mile. The 2-year-flood discharges ranged from 83 to 24,900 cubic feet per second.

An indication of the reliability of the equations is expressed by the standard error of estimate. Assuming a normal distribution of data, approximately two-thirds of the data will plot within one standard error from the prediction curve. The values of standard error given are the average of the maximum and minimum error values; the actual values are in terms of log units and hence have greater plus than minus values of error. The log values are the result of the logarithmic transformations performed earlier on the input data.

The equations for the various recurrence intervals with their associated standard errors of estimate are given below:

		Standard error (percent)
D_2	$= 0.84\ Q_2^{0.298}$	31.1
D_5	$= 1.15\ Q_2^{0.282}$	26.1
D_{10}	$= 1.33\ Q_2^{0.274}$	27.4
D_{25}	$= 1.52\ Q_2^{0.267}$	23.7
D_{50}	$= 1.66\ Q_2^{0.263}$	23.0
D_{100}	$= 1.80\ Q_2^{0.259}$	22.7

where D_x is the depth in feet, measured above the channel bottom for a flood having the indicated recurrence interval (x) and Q_2 is the 2-year-flood discharge in cubic feet per second.

Using the flood-depth equations and station data, actual versus predicted values (A/P) ratios of flood depths were computed for all the sites in the study. Sites with backwater conditions usually have depths greater than expected with correspondingly larger A/P ratios. A bias in ratios is also noted at some artifically-controlled sites such as dams and weirs and at sites where the channel bottom is bedrock. These locations tend to be shallower than those where the bed material is more easily eroded, and they have correspondingly lower A/P ratios.

The A/P ratios were plotted on a map of Illinois to evaluate any regional trends. Areal patterns of the A/P ratios were generally similar for the 2-, 5-, 10-, 25-, 50-, and 100-year-flood depths.

Individual basins in the State did show some trends. An attempt to apply sufficient local factors to improve the data-fit produced an excessive number of regions and consequently, no general regional factors were applied to the final equations. In general however, the streams in the extreme northern part of the State are characterized by being shallower than predicted while those in the southern part are deeper.

A subsequent section of this report describes how the A/P ratios at the sites studied can be utilized to improve depth estimates in the immediate vicinity of their respective locations.

USE OF REPORT

Application of Equations

The regression equations are applicable to streams in Illinois which are not affected by backwater conditions or by abnormal geologic or hydrologic constraints. The equations are not recommended for use in urban areas unless one recognizes that their accuracy can be impaired by man-made changes to natural conditions. Insufficient data are available to predict their suitability for streams with drainage areas less than 0.5 square mile.

Discharge Equation for 2-year Flood

There are several accepted procedures for determining the 2-year-flood discharge (Q_2). For use in the depth-frequency equations the method described by Carns (1973) is recommended. The 2-year-flood discharge for Illinois streams is predicted by the equation:

$$Q_2 = 0.17\ A^{0.79}\ S^{0.50}\ I^{4.33}\ Rf$$

where Q_2 is discharge in cubic feet per second

A is drainage area in square miles

S is channel slope in feet per mile obtained by determining the difference in elevation between points at 10 percent and 85 percent of the distance along the channel measured from the site under consideration to the basin divide, divided by the distance between these two points

I is the 2-year, 24-hour rainfall in inches

Rf is a regional factor

Area and slope can be computed from data obtained from topographic maps. Many Illinois maps of the 15-minute series are culturally obsolete; however, the topographic features generally retain sufficient similarity for use with this report. Maps of the 7½-minute series are periodically updated and, when available, are probably the most suitable for stream studies.

Once the drainage area and slope are determined from the appropriate topographic maps, rainfall intensity data and the regional factor can be determined from figures 1 and 2, respectively, for the stream under evaluation. Table 2 gives computed values of $A^{0.79}$ for various drainage areas, table 3 gives computed values of $S^{0.50}$ for various slopes, and table 4 gives computed values of $I^{4.33}$ for different rainfall intensities.

A nomograph (fig. 3) was prepared to permit rapid graphical solutions of the discharge equation.

The 2-year-flood discharge value obtained from figure 3 can be inserted into one of the depth equations presented earlier in this report to calculate the flood depth for the selected frequency. Another nomograph (fig. 4) is provided to simplify this computational procedure.

Adjustment of Flood-Depth Values

For estimates in the immediate vicinity of a gaging site, the known A/P ratio can be used to refine the computed flood depth. Figure 5 shows the location of gaging sites used in developing the regression equations. Station data for these sites are included in table 5. The computed flood depth can be refined by multiplying by the proper A/P ratio from table 5. At locations with no nearby stations or where the location under consideration is of significantly different drainage-area magnitude than the nearest gaging site, engineering judgment will be necessary to adjust the depth values. When in doubt or for general estimating purposes, use the unmodified basic equation.

Recent studies (Espey and Winslow, 1974) indicate that urbanization increases flood discharges for short-term recurrences but that there are less significant differences in 100-year-flood discharges between natural and urbanized areas. Flood depths should behave in a similar fashion although the constrained nature of urban channels probably will cause greater depths than in natural environments. The use of nearby gaging station data to adjust the calculated value of flood depths is strongly recommended in urban situations. For other than gross estimating purposes, however, the use of these regression equations is not advised for urban or high-value land areas. A more detailed hydrologic study is advisable.

Channel Bottom Elevation

To compute the elevation of flooding with the depth-frequency equations, the mean sea level elevation of the channel bottom is needed. The simplest method to determine the elevation of the channel bottom is to measure the difference between the bottom and a known elevation in the field. This may not always be possible or desirable for preliminary studies.

Channel bottom elevations computed from interpolating contour crossings on U.S. Geological Survey $7\frac{1}{2}$- and 15-minute topographic maps at 193 gaging sites in Illinois were compared with actual bottom elevations for the same sites. The actual mean sea level elevations of the channel bottom were determined from gaging station data. This comparison indicated that known channel bed elevations were 1 to 3.5 feet lower than those predicted from topographic maps and that these differences varied directly with drainage area.

The curve of figure 6 shows variation of the actual channel bottom from the value predicted from topographic maps as a function of drainage area. This is an empirical relationship based on topographic-map and gaging-station data and can be used to adjust map values. Where more accurate data are desired, field measurements will need to be made.

Example of Application

An application of the depth-frequency equations is illustrated in the following example:

Suppose it is desired to know the 100-year flood depth and the 100-year flood elevation at the county road bridge over Indian Creek near Wyoming, Stark County, Illinois.

1. The drainage area, A, is 62.7 square miles.

2. The stream length above the site to the basin divide is 26.67 miles. The elevations at 10 percent (2.67 miles) and 85 percent (22.67 miles) of this distance are 626 and 754 feet above mean sea level. The distance between the sites is 22.67 - 2.67 or 20.00 miles. The slope, S, then is (754 - 626)/20.00 or 6.4 feet per mile.

3. The 2-year, 24-hour rainfall, I, from figure 1 is 3.1 inches.

4. The regional factor, Rf, from figure 2 is 0.89.

5. The 2-year-flood discharge, Q_2, can be determined from the Carns' equation $Q_2 = 0.17\ A^{0.79}\ S^{0.50}\ I^{4.33}\ Rf$. Using the discharge nomograph (fig. 3), enter the appropriate values to get Q_2; Q_2 is 1,350 ft^3/s.

6. The depth equation for the 100-year flood is $D_{100} = 1.80\ Q_2^{0.259}$. Using the flood-depth nomograph (fig. 4) with a Q_2 of 1,350 ft^3/s, D_{100} is 11.6 feet.

7. Adjust the D_{100} value from local station data. Referring to fig. 5, one finds a USGS gaging station in the immediate vicinity: station number 05568800, Indian Creek near Wyoming. Table 5 lists data for this and other sites. The A/P_{100} ratio is 1.07 for this site. Multiplying the 11.6 by this ratio gives an adjusted depth of 12.4 feet. Either the adjusted or unadjusted value could be used depending upon the desires of the user and the needs of his study.

8. The mean sea level elevation of the channel bottom is estimated from figure 6 and the Kewanee 15-minute topographic map. Interpolating from the topographic map gives an elevation at the site of 620.6. Entering figure 6 with a drainage area of 62.9 square miles gives an adjustment value of -1.1 or a channel bottom elevation of 620.6 - 1.1 = 619.5 feet. The estimated 100-year flood elevation (adjusted) would then be 619.5 + 12.4 = 631.9 feet above mean sea level.

Actual station data for the same site gives the channel bottom elevation as 617.8 feet msl and a depth of 12.5 feet for the 100-year flood depth. The 100-year-flood elevation determined on the basis of station data would be 617.8 + 12.5 = 630.3 feet above mean sea level.

This example of the application of the depth frequency equations was prepared entirely through office computations and produced an estimate of the 100-year flood elevation within 1.6 feet of the expected value. Note that the estimate of the flood depth was in better agreement with actual values than was the estimate of the channel bottom elevation. A field measurement to determine the channel bottom elevation would, of course, greatly improve the accuracy of the prediction.

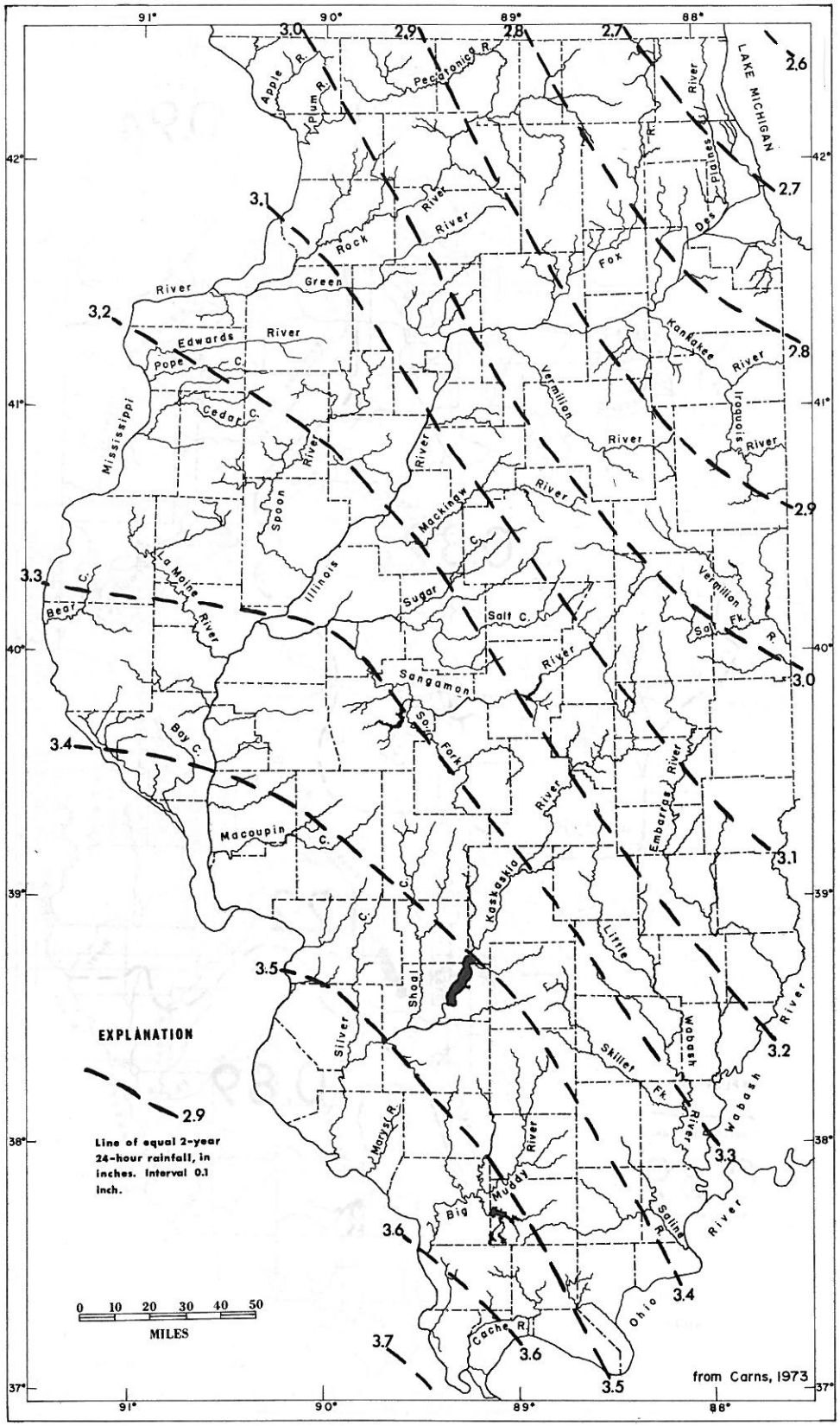

Figure I. Values of I, 2-year 24-hour rainfall used in flood-frequency equation

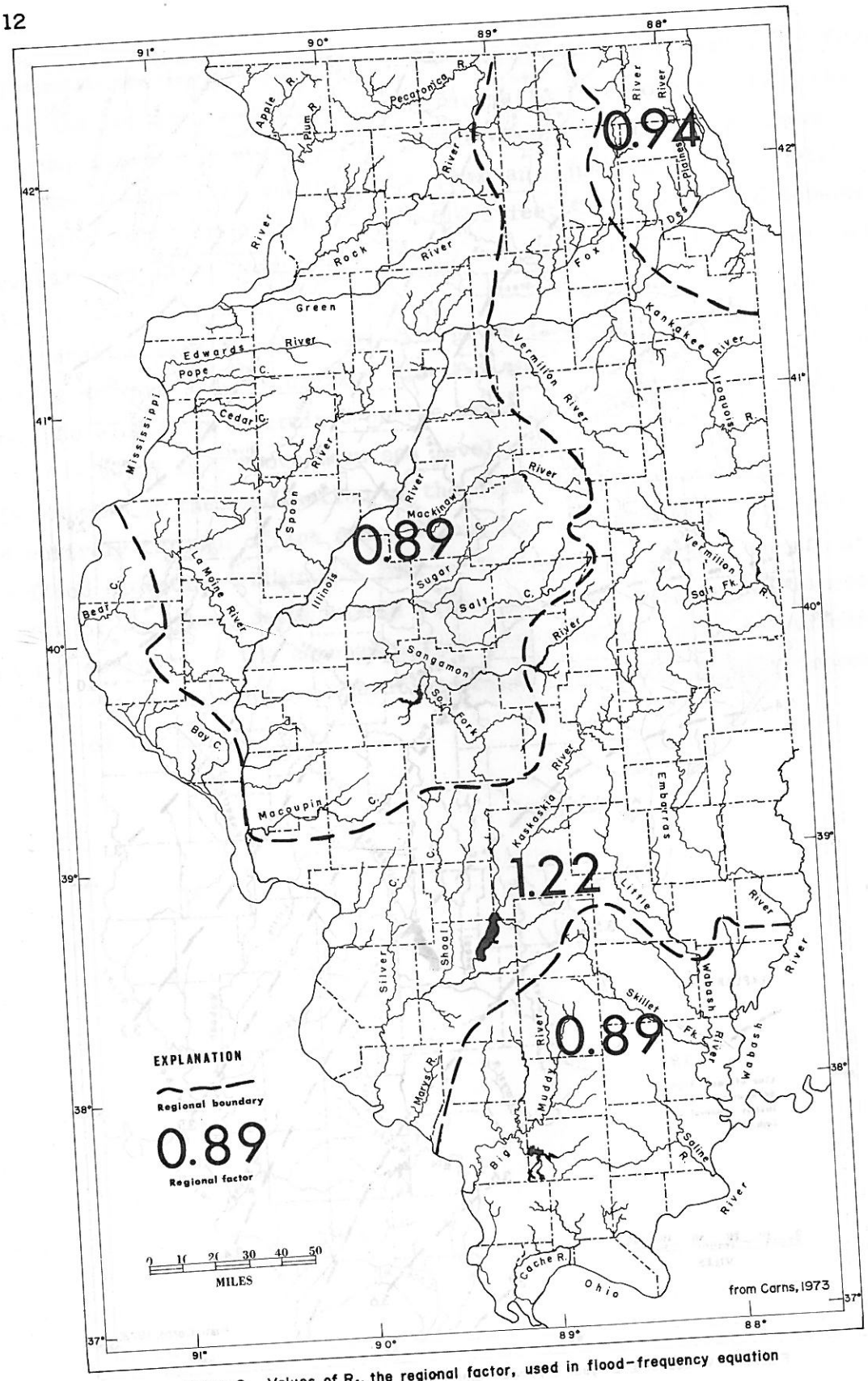

Figure 2. Values of R_f, the regional factor, used in flood-frequency equation

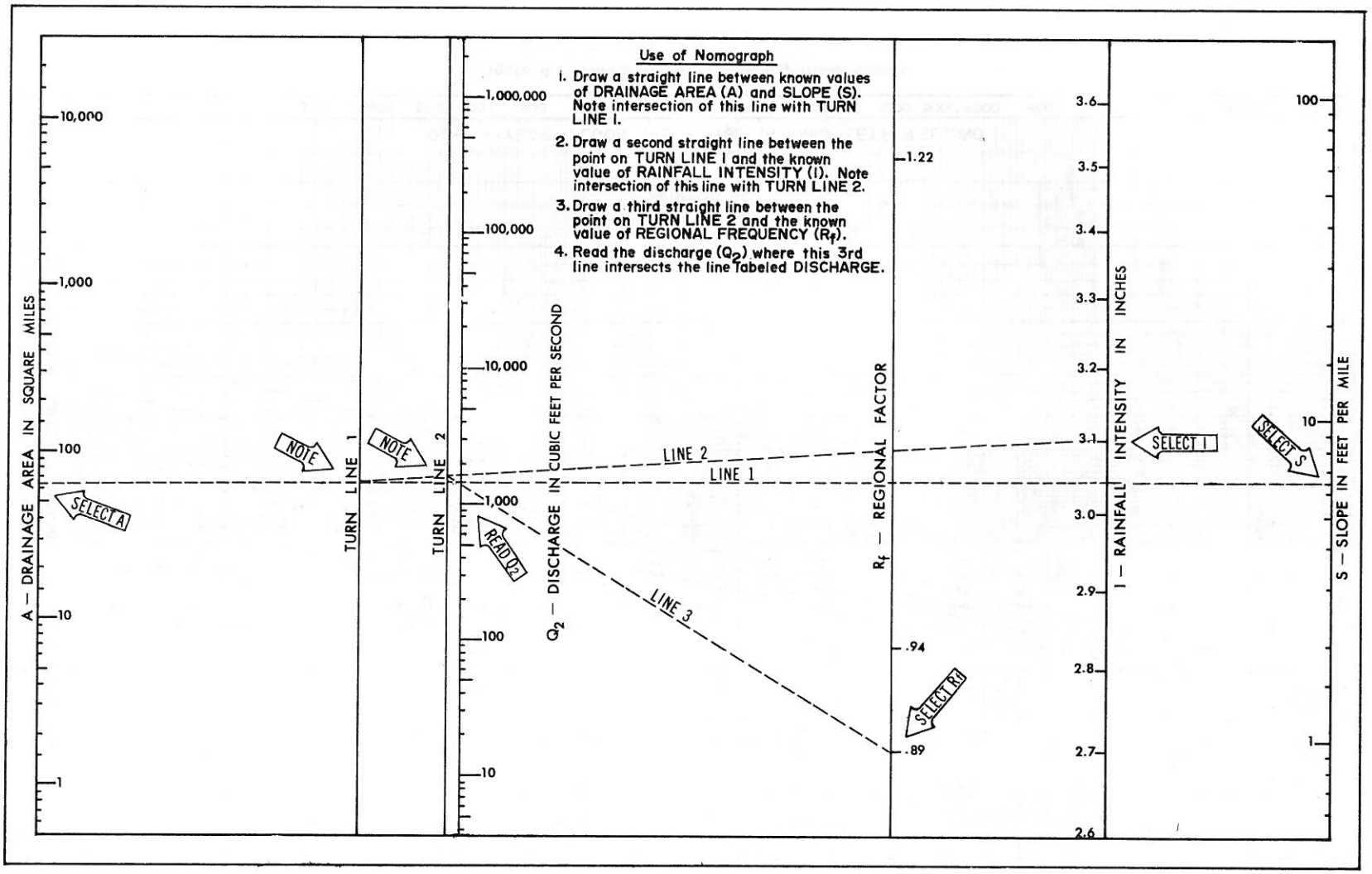

Figure 3. Nomograph for computing Q_2, 2-year flood discharge

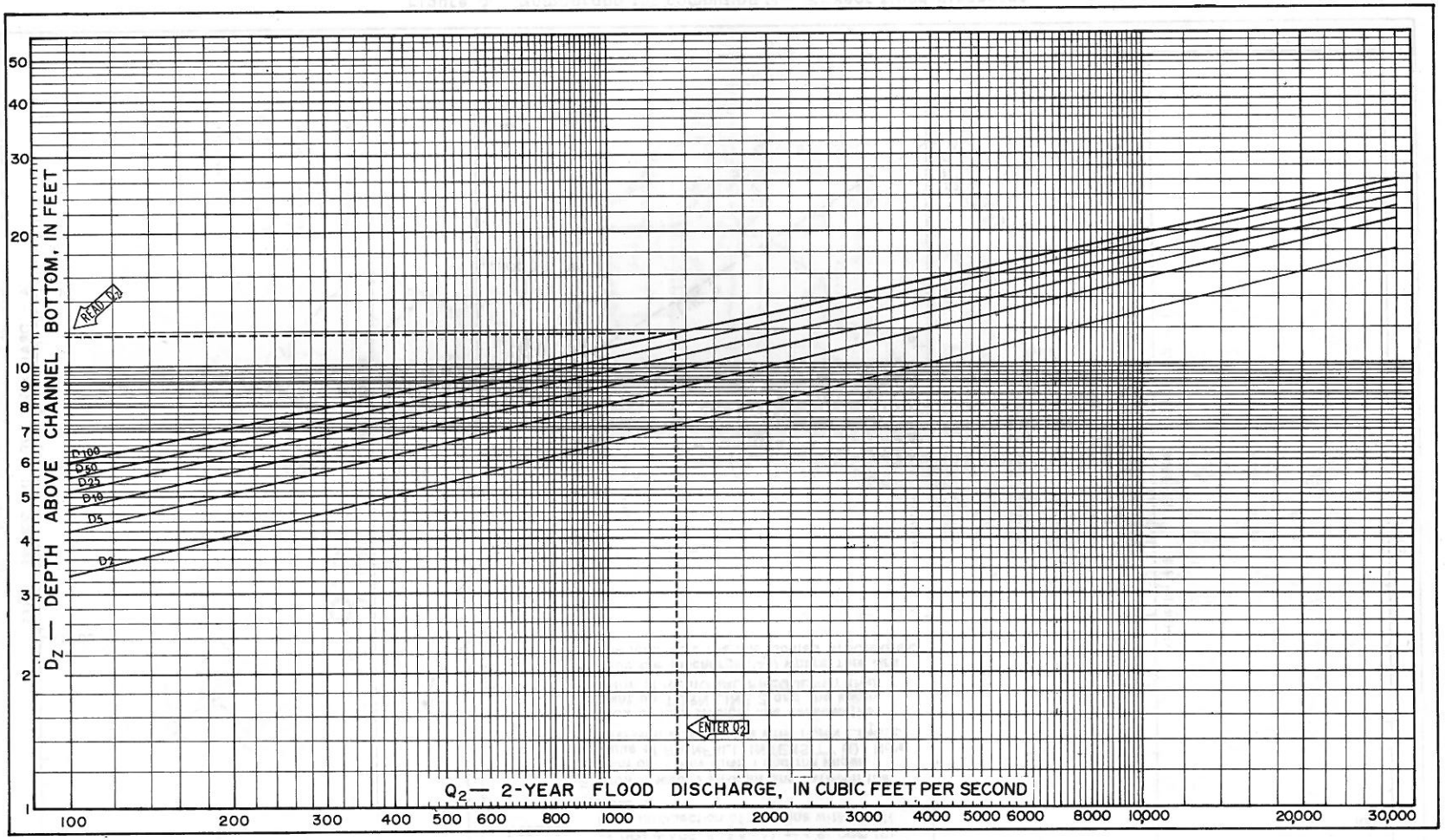

Figure 4. Nomograph for computing flood depths

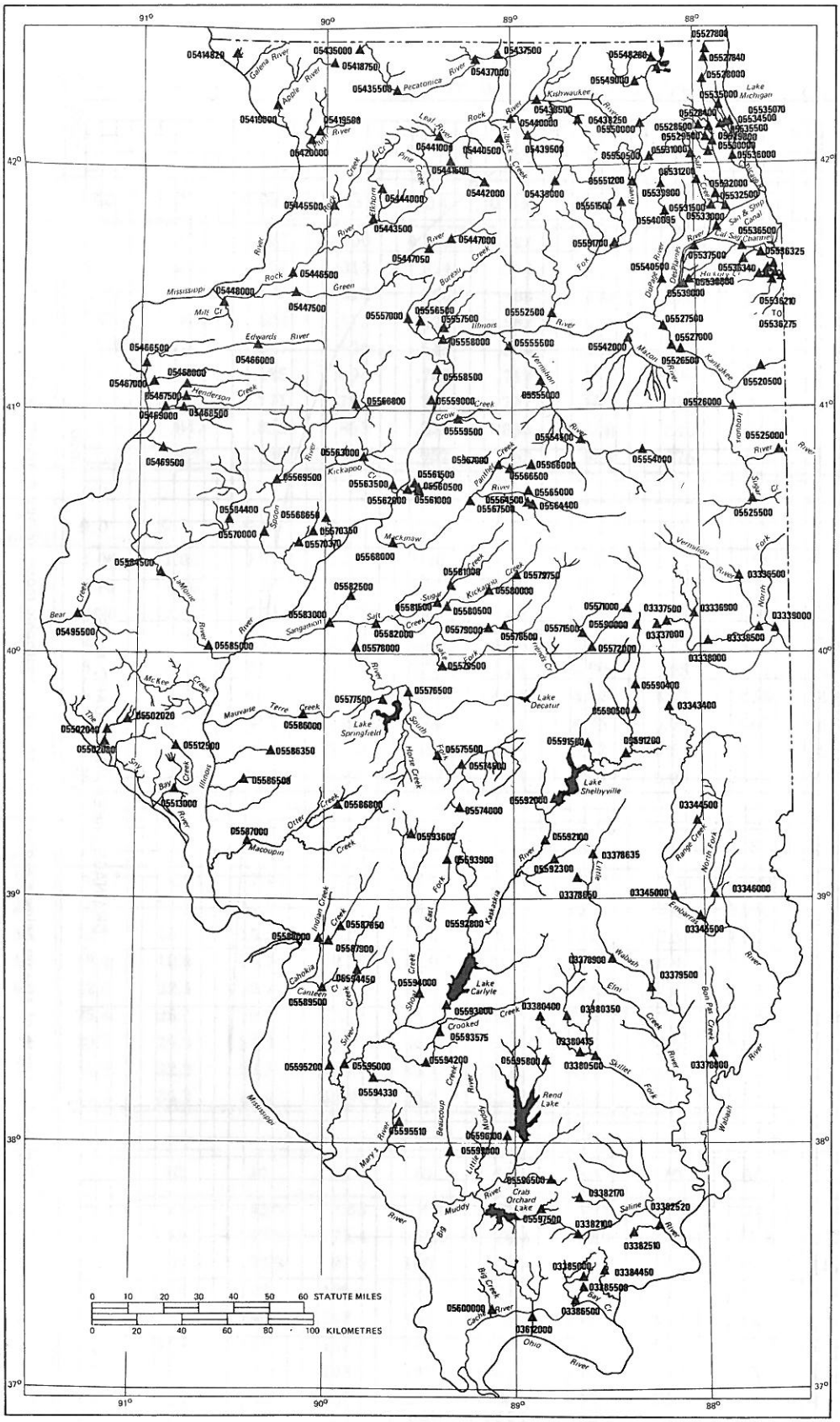

Figure 5. Gaging stations used in depth-frequency analysis

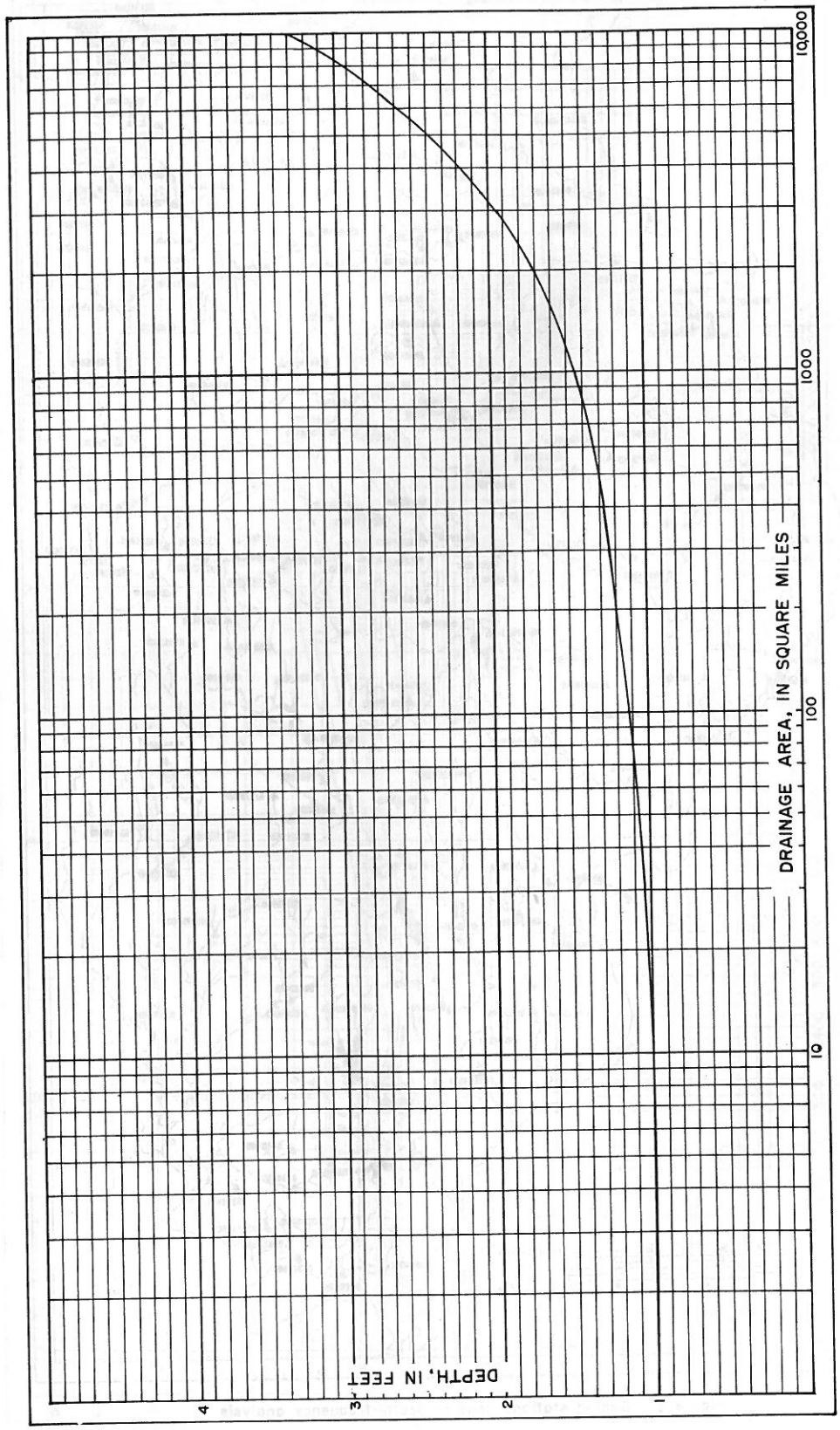

Figure 6. Depth of stream below elevation indicated on topographic maps versus drainage area

Table 2.--Values of $A^{0.79}$ for use in flood-frequency equation

A (mi^2)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.1	0.162	0.175	0.187	0.200	0.212	0.223	0.235	0.247	0.258	0.269
.2	.280	.291	.302	.313	.324	.334	.345	.355	.366	.376
.3	.386	.396	.407	.417	.426	.436	.446	.456	.466	.475
.4	.485	.494	.504	.513	.523	.532	.541	.551	.560	.569
.5	.578	.587	.597	.606	.615	.624	.633	.641	.650	.659
.6	.668	.677	.685	.694	.703	.712	.720	.729	.737	.746
.7	.754	.763	.771	.780	.788	.797	.805	.813	.822	.830
.8	.838	.847	.855	.863	.871	.880	.888	.896	.904	.912
.9	.920	.928	.936	.944	.952	.960	.968	.976	.984	.992

A (mi^2)	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
1	1.00	1.08	1.15	1.23	1.30	1.38	1.45	1.52	1.59	1.66
2	1.73	1.80	1.86	1.93	2.00	2.06	2.13	2.19	2.26	2.32
3	2.38	2.44	2.51	2.57	2.63	2.69	2.75	2.81	2.87	2.93
4	2.99	3.05	3.11	3.17	3.22	3.28	3.34	3.40	3.45	3.51
5	3.57	3.62	3.68	3.73	3.79	3.84	3.90	3.95	4.01	4.06
6	4.12	4.17	4.23	4.28	4.33	4.39	4.44	4.49	4.55	4.60
7	4.65	4.70	4.76	4.81	4.86	4.91	4.96	5.02	5.07	5.12
8	5.17	5.22	5.27	5.32	5.37	5.42	5.47	5.52	5.57	5.62
9	5.67	5.72	5.77	5.82	5.87	5.92	5.97	6.02	6.07	6.12

A (mi^2)	0	1	2	3	4	5	6	7	8	9
10	6.17	6.65	7.12	7.59	8.04	8.49	8.94	9.38	9.81	10.2
20	10.7	11.1	11.5	11.9	12.3	12.7	13.1	13.5	13.9	14.3
30	14.7	15.1	15.5	15.8	16.2	16.6	17.0	17.3	17.7	18.1
40	18.4	18.8	19.2	19.5	19.9	20.2	20.6	20.9	21.3	21.6
50	22.0	22.3	22.7	23.0	23.4	23.7	24.0	24.4	24.7	25.1
60	25.4	25.7	26.1	26.4	26.7	27.1	27.4	27.7	28.0	28.4
70	28.7	29.0	29.3	29.6	30.0	30.3	30.6	30.9	31.2	31.6
80	31.9	32.2	32.5	32.8	33.1	33.4	33.7	34.1	34.4	34.7
90	35.0	35.3	35.6	35.9	36.2	36.5	36.8	37.1	37.4	37.7

A (mi^2)	0	10	20	30	40	50	60	70	80	90
100	38.0	41.0	43.9	4.68	49.6	52.4	55.1	57.8	60.5	63.1
200	65.7	68.3	70.9	73.4	75.9	78.4	80.9	83.3	85.8	88.2
300	90.6	92.9	95.3	97.6	100	102	105	107	109	111
400	114	116	118	120	123	125	127	129	131	133
500	136	138	140	142	144	146	148	150	152	155
600	157	159	161	163	165	167	169	171	173	175
700	177	179	181	183	185	187	189	191	193	195
800	197	198	200	202	204	206	208	210	212	214
900	216	218	219	221	223	225	227	229	231	233

Table 3.--Values of $S^{0.50}$ for use in flood-frequency equation

S (ft/mi)	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
1	1.00	1.05	1.10	1.14	1.18	1.22	1.26	1.30	1.34	1.38
2	1.41	1.45	1.48	1.52	1.55	1.58	1.61	1.64	1.67	1.70
3	1.73	1.76	1.79	1.82	1.84	1.87	1.90	1.92	1.95	1.98
4	2.00	2.02	2.05	2.07	2.10	2.12	2.14	2.17	2.19	2.21
5	2.24	2.26	2.28	2.30	2.32	2.34	2.37	2.39	2.41	2.43
6	2.45	2.47	2.49	2.51	2.53	2.55	2.57	2.59	2.61	2.63
7	2.65	2.66	2.68	2.70	2.72	2.74	2.76	2.78	2.79	2.81
8	2.83	2.85	2.86	2.88	2.90	2.92	2.93	2.95	2.97	2.98
9	3.00	3.02	3.03	3.05	3.07	3.08	3.10	3.11	3.13	3.15

S (ft/mi)	0	1	2	3	4	5	6	7	8	9
10	3.16	3.32	3.46	3.61	3.74	3.87	4.00	4.12	4.24	4.36
20	4.47	4.58	4.69	4.80	4.90	5.00	5.10	5.20	5.29	5.39
30	5.48	5.57	5.66	5.74	5.83	5.92	6.00	6.08	6.16	6.24
40	6.32	6.40	6.48	6.56	6.63	6.71	6.78	6.86	6.93	7.00
50	7.07	7.14	7.21	7.28	7.35	7.42	7.48	7.55	7.62	7.68
60	7.75	7.81	7.87	7.94	8.00	8.06	8.12	8.19	8.25	8.31
70	8.37	8.43	8.49	8.54	8.60	8.66	8.72	8.77	8.83	8.89
80	8.94	9.00	9.06	9.11	9.17	9.22	9.27	9.33	9.38	9.43
90	9.49	9.54	9.59	9.64	9.70	9.75	9.80	9.85	9.90	9.95
100	10.0	10.0	10.1	10.1	10.2	10.2	10.3	10.3	10.4	10.4
110	10.5	10.5	10.6	10.6	10.7	10.7	10.8	10.8	10.9	10.9
120	11.0	11.0	11.0	11.1	11.1	11.2	11.2	11.3	11.3	11.4
130	11.4	11.4	11.5	11.5	11.6	11.6	11.7	11.7	11.7	11.8
140	11.8	11.9	11.9	12.0	12.0	12.0	12.1	12.1	12.2	12.2
150	12.2	12.3	12.3	12.4	12.4	12.4	12.5	12.5	12.6	12.6
160	12.6	12.7	12.7	12.8	12.8	12.8	12.9	12.9	13.0	13.0
170	13.0	13.1	13.1	13.2	13.2	13.2	13.3	13.3	13.3	13.4
180	13.4	13.5	13.5	13.5	13.6	13.6	13.6	13.7	13.7	13.7
190	13.8	13.8	13.9	13.9	13.9	14.0	14.0	14.0	14.1	14.1

Table 4.--Values of $I^{4.33}$ for use in flood-frequency equation

I (inches)	$I^{4.33}$ (Q_2)
2.6	62.7
2.7	73.8
2.8	86.4
2.9	101
3.0	116
3.1	134
3.2	154
3.3	176
3.4	200
3.5	227
3.6	256
3.7	289

GAGING STATION DATA

The following table contains a summary of the gaging station data used to develop the multiple-regression equations for depth-frequency prediction. The parameters for each station are:

Station number	-	USGS water-data collection-site number. These unique numbers become larger in a downstream direction.
Station name	-	USGS water-data collection-site name.
DA	-	drainage area in square miles
S	-	slope in feet per mile
Q_2	-	2-year-flood discharge in cubic feet per second
D_x	-	depth above channel bottom in feet, where x is the recurrence interval in years
A/P_x	-	actual versus predicted value ratio of depth for x-year flood
*	-	denotes station used in initial regression analysis but not in the final analysis

Table 5. Station data used in regression analysis

Station Number	Station Name	DA	S	Q_2	D_2	D_5	D_{10}	D_{25}	D_{50}	D_{100}	A/P_2	A/P_5	A/P_{10}	A/P_{25}	A/P_{50}	A/P_{100}
03336500	Bluegrass Creek at Potomac, Ill.	35.0	6.92	1660	7.6	9.3	9.9	10.7	11.1	11.7	0.99	1.00	0.98	0.97	0.95	0.95
03336900	Salt Fork nr St. Joseph	134	4.12	2450	13.0	15.0	15.9	16.9	17.5	18.0	1.51	1.45	1.41	1.38	1.35	1.32
03337000	Boneyard Creek at Urbana	4.46	12.51	425	6.4	7.0	7.3	7.7	7.9	8.1	1.26	1.11	1.05	1.01	.97	.94
03337500	Saline Branch at Urbana	68.0	2.32	1230	7.0	10.3	11.4	12.4	13.1	13.7	1.00	1.21	1.22	1.22	1.21	1.20
03338000	Salt Fork nr Homer	340	3.01	3600	9.1	11.5	12.3	13.1	13.5	14.1	.94	1.00	.98	.97	.94	.94
03338500	Vermilion River nr Catlin	958	3.12	8340	11.9	15.5	17.4	19.2	20.7	22.0	.96	1.06	1.10	1.13	1.16	1.18
03339000	Vermilion River nr Danville	1290	3.22	12800	15.8	21.1	23.5	25.0	25.7	26.4	1.12	1.28	1.32	1.31	1.29	1.27
03343400	Embarras River nr Camargo	186	2.96	3170	11.0	13.4	13.9	14.1	16.2	17.0	1.19	1.20	1.15	1.08	1.17	1.17
03344500	Range Creek nr Casey	7.61	15.73	952	8.3	9.9	10.7	11.5	11.9	12.3	1.28	1.25	1.23	1.21	1.18	1.16
03345000	Embarras River at Newton	1392	1.55	10500	16.0	17.1	17.9	18.3	18.9	19.4	1.21	1.09	1.06	1.01	1.00	.98
03345500	Embarras River at Ste. Marie	1516	1.58	13200	18.7	21.0	23.0	25.3	26.9	28.6	1.32	1.26	1.28	1.32	1.34	1.36
03346000	N. F. Embarras River nr Oblong	318	4.33	7320	17.4	19.3	20.7	22.5	23.8	24.8	1.46	1.37	1.36	1.37	1.38	1.37
*03378000	Bonpas Creek at Browns	228	2.85	2750	18.0	20.3	21.6	23.1	24.3	25.5	2.03	1.90	1.86	1.84	1.82	1.82
03378635	Little Wabash River nr Effingham	240	5.34	6400	9.5	11.1	11.7	12.2	12.7	13.1	.83	.82	.80	.77	.76	.75
03378650	Second Creek trib at Keptown	1.62	19.59	216	4.4	5.4	5.8	6.3	7.4	7.6	1.06	1.03	1.00	.99	1.08	1.05
03378900	Little Wabash River at Louisville	745	2.66	11100	18.6	20.6	21.6	22.4	23.4	24.0	1.38	1.30	1.26	1.22	1.21	1.19
03379500	Little Wabash River below Clay City	1131	2.01	12400	19.0	20.7	21.8	23.4	24.6	25.7	1.36	1.26	1.24	1.24	1.24	1.24
*03380350	Skillet Fork nr Iuka	208	2.78	3410	18.1	20.0	20.8	21.4	22.2	22.9	1.92	1.76	1.69	1.61	1.57	1.55
03380400	Horse Creek nr Cartter	1.13	36.06	201	5.6	6.5	7.0	7.4	7.6	7.8	1.38	1.27	1.23	1.18	1.13	1.10
*03380475	Horse Creek nr Keenes	97.2	4.07	2450	13.4	15.1	16.1	17.4	20.4	21.3	1.57	1.46	1.43	1.43	1.58	1.57
03380500	Skillet Fork at Wayne City	464	1.90	7870	15.0	16.2	17.0	18.1	19.0	19.8	1.23	1.12	1.09	1.08	1.08	1.08
03382100	S. F. Saline River nr Carrier Mills	147	4.26	3670	12.8	15.0	15.7	16.6	17.6	18.3	1.32	1.29	1.24	1.22	1.22	1.21
*03382170	Brushy Creek nr Harco	13.3	12.16	812	7.7	11.9	14.9	18.3	19.9	23.4	1.25	1.57	1.79	2.02	2.21	2.29
03382510	Eagle Creek nr Equality	8.51	25.49	828	8.2	10.4	11.4	12.4	12.7	13.3	1.32	1.36	1.36	1.36	1.30	1.30
03382520	Black Branch trib nr Junction	1.10	28.25	179	2.6	3.0	3.3	3.5	3.7	4.0	.66	.61	.60	.58	.57	.58
*03384450	Lusk Creek nr Eddyville	42.9	16.23	2690	10.0	15.7	18.0	21.7	25.8	29.7	1.14	1.48	1.56	1.74	1.95	2.14
03385000	Hayes Creek at Glendale	19.1	21.44	2130	12.5	13.8	14.5	15.4	15.7	16.2	1.52	1.38	1.33	1.31	1.26	1.24
03385500	Lake Glendale Inlet nr Dixon Springs	1.05	145.20	687	3.2	4.1	4.6	5.0	5.7	6.8	.54	.57	.58	.58	.62	.70
03386500	Sugar Creek nr Dixon Springs	9.93	25.24	1380	6.8	7.5	7.8	8.2	8.5	8.6	.94	.85	.81	.78	.76	.73
*03612000	Cache River at Forman	244	2.69	3710	19.8	23.7	25.7	28.1	29.6	30.9	2.05	2.04	2.04	2.07	2.05	2.05
05414820	Sinsinawa River nr Menominee	39.6	18.91	1390	4.6	5.6	6.1	6.6	7.2	7.7	.63	.63	.63	.63	.65	.66
05418750	S. F. Apple River nr Nora	1.93	36.70	162	4.8	5.9	6.4	6.9	7.4	7.7	1.26	1.22	1.19	1.17	1.17	1.14
*05419000	Apple River nr Hanover	247	10.93	5210	15.0	19.2	21.7	24.6	26.6	28.7	1.40	1.50	1.57	1.60	1.69	1.74
05419500	Plum River nr Savanna	162	7.56	2720	13.0	15.2	16.2	17.1	18.2	19.0	1.47	1.42	1.39	1.36	1.37	1.36
*05420000	Plum River below Carroll Creek nr Savanna	230	6.55	3350	17.3	19.1	20.1	21.3	22.1	22.8	1.84	1.69	1.64	1.61	1.57	1.55
05435000	Cedar Creek nr Winslow	1.31	40.87	83	1.5	2.4	3.0	3.5	3.7	4.0	.48	.60	.67	.71	.70	.71
05435500	Pecatonica River at Freeport	1326	2.01	6210	13.4	15.5	16.6	18.1	19.0	19.9	1.18	1.15	1.14	1.16	1.15	1.15
05437000	Pecatonica River at Shirland	2550	2.01	8520	12.3	14.2	15.4	16.8	17.6	18.5	.99	.96	.97	.99	.98	.99
05437500	Rock River at Rockton	6363	.84	15100	8.9	11.5	13.0	15.1	16.0	17.2	.60	.66	.70	.76	.77	.79
05438250	Coon Creek at Riley	85.1	5.65	679	3.8	5.1	5.4	5.8	7.3	7.7	.65	.71	.68	.67	.79	.79
05438500	Kishwaukee River at Belvidere	538	4.59	3150	7.5	11.1	12.8	13.5	14.2	14.7	.81	1.00	1.06	1.03	1.03	1.01
*05439000	S. B. Kishwaukee River at DeKalb	77.7	2.96	572	5.8	7.1	8.0	9.0	16.9	18.9	1.05	1.03	1.06	1.09	1.91	2.03
05439500	S. B. Kishwaukee River nr Fairdale	387	2.27	3390	6.5	7.8	8.5	9.1	9.6	9.9	.69	.69	.69	.68	.68	.67
05440000	Kishwaukee River nr Perryville	1099	4.07	6130	8.5	12.3	14.6	17.5	19.5	21.6	.75	.92	1.00	1.12	1.18	1.25
05440500	Killbuck Creek nr Monroe Center	117	6.34	2070	7.0	9.4	10.3	11.8	12.7	13.5	.86	.95	.95	1.01	1.03	1.04

Table 5. Station data used in regression analysis--Continued

Station Number	Station Name	DA	S	Q_2	D_2	D_5	D_{10}	D_{25}	D_{50}	D_{100}	A/P_2	A/P_5	A/P_{10}	A/P_{25}	A/P_{50}	A/P_{100}
05441000	Leaf River at Leaf River, Ill.	103	10.45	2380	10.0	11.4	12.2	12.9	13.6	14.1	1.17	1.11	1.09	1.06	1.06	1.05
05441500	Rock River at Oregon	8205	.95	15600	6.2	8.9	10.5	11.4	12.9	13.7	.42	.51	.56	.57	.61	.62
05442000	Kyte River nr Flagg Center	116	5.17	1570	6.0	7.6	8.5	9.2	10.1	10.9	.80	.83	.85	.85	.88	.90
05443500	Rock River at Como	8755	1.00	24900	9.6	11.9	12.8	13.7	14.2	14.6	.56	.60	.60	.60	.60	.59
05444000	Elkhorn Creek nr Penrose	146	4.28	3070	9.3	11.4	12.2	12.7	13.0	13.2	1.01	1.03	1.02	1.02	.95	.92
05445500	Rock Creek nr Morrison	158	3.91	2250	8.8	10.7	11.7	12.6	13.3	13.9	1.05	1.06	1.06	1.05	1.05	1.05
05446500	Rock River nr Joslin	9551	1.11	20800	10.8	13.6	15.1	16.7	17.7	18.7	.66	.72	.74	.77	.78	.79
05447000	Green River at Amboy	201	3.85	2500	8.0	9.5	10.1	10.7	10.9	11.2	.93	.91	.89	.87	.84	.82
*05447050	Green River trib nr Ohio	4.95	20.91	201	5.6	6.5	9.3	10.2	11.0	11.8	1.38	1.27	1.64	1.63	1.64	1.66
05447500	Green River nr Geneseo	1003	2.53	5460	10.6	11.5	11.9	12.3	12.5	12.7	.97	.88	.85	.81	.78	.76
05448000	Mill Creek at Milan	62.4	7.44	2920	7.4	9.4	10.4	11.4	12.0	12.7	.82	.86	.88	.89	.89	.89
05466000	Edwards River nr Orion	155	5.07	3100	10.1	12.7	14.0	15.4	16.2	17.0	1.10	1.15	1.16	1.18	1.17	1.18
05466500	Edwards River nr New Boston	445	1.74	3670	10.4	10.9	11.1	11.3	11.4	11.5	1.07	.94	.88	.83	.79	.76
05467000	Pope Creek nr Keithsburg	183	3.59	2040	9.6	10.9	11.5	12.1	12.4	12.7	1.18	1.11	1.07	1.04	1.00	.98
05467500	Henderson Creek nr Little York	151	4.22	2090	11.0	12.7	13.1	13.6	13.9	14.3	1.34	1.28	1.21	1.16	1.12	1.10
05468000	North Henderson Creek nr Seaton	67.1	5.02	1120	9.7	10.3	10.6	10.8	11.0	11.2	1.43	1.24	1.16	1.09	1.04	1.01
05468500	Cedar Creek at Little York	130	4.49	2140	11.9	12.7	13.3	14.1	14.4	14.8	1.44	1.27	1.22	1.20	1.15	1.13
05469000	Henderson Creek nr Oquawka	432	3.96	4670	13.6	14.6	15.1	15.7	16.1	16.3	1.31	1.17	1.12	1.08	1.05	1.01
05469500	South Henderson Creek at Biggsville	82.9	6.12	1740	6.9	9.6	11.3	13.4	15.0	16.6	.89	1.02	1.10	1.20	1.27	1.33
05495500	Bear Creek nr Marcelline	349	3.70	8670	14.5	18.2	20.2	22.3	23.8	25.1	1.16	1.23	1.26	1.30	1.32	1.33
05502020	Hadley Creek nr Barry	40.9	19.75	5060	7.0	8.3	8.9	9.2	12.0	13.4	.66	.65	.65	.62	.77	.82
05502040	Hadley Creek at Kinderhook	72.7	15.00	6810	6.2	8.4	9.4	10.5	11.1	11.6	.53	.61	.63	.65	.65	.66
05502080	Hadley Creek nr Shinn	73.6	13.68	4580	10.0	12.2	13.7	15.3	17.2	19.1	.97	.99	1.02	1.06	1.13	1.20
05512500	Bay Creek at Pittsfield	39.4	11.25	5010	10.8	12.2	12.8	13.3	13.6	13.9	1.02	.96	.93	.90	.87	.85
05513000	Bay Creek at Nebo	161	7.02	7070	13.4	15.6	16.8	17.9	18.7	19.3	1.14	1.12	1.11	1.10	1.09	1.08
*05520500	Kankakee River at Momence	2294	.90	6050	4.0	4.6	5.0	5.3	5.4	5.6	.36	.34	.35	.34	.33	.33
*05525000	Iroquois River at Iroquois	686	1.11	3180	16.0	19.4	21.1	22.8	23.8	24.8	1.73	1.74	1.74	1.75	1.72	1.70
05525500	Sugar Creek at Milford	446	4.86	6200	14.6	17.4	18.9	20.9	22.2	23.7	1.29	1.29	1.30	1.33	1.34	1.37
05526000	Iroquois River nr Chebanse	2091	.69	11300	10.2	13.1	14.7	16.2	17.5	18.4	.75	.82	.86	.88	.90	.91
05526500	Terry Creek nr Custer Park	12.1	11.93	137	2.6	3.9	4.6	5.1	5.4	5.7	.72	.85	.90	.90	.89	.89
05527000	Kankakee River at Custer Park	4810	1.06	15100	7.1	9.4	10.6	11.3	12.1	12.7	.48	.54	.57	.57	.58	.58
*05527500	Kankakee River nr Wilmington	5150	1.27	20300	5.3	6.6	7.5	8.4	9.1	9.8	.33	.35	.37	.39	.40	.42
05527800	Des Plaines River at Russell	123	1.76	702	7.1	8.5	9.4	10.0	10.8	11.5	1.20	1.17	1.17	1.14	1.16	1.17
05527840	Des Plaines River at Wadsworth	145	1.42	720	8.3	9.7	10.6	11.1	11.8	12.3	1.39	1.32	1.31	1.26	1.26	1.24
05528000	Des Plaines River nr Gurnee	232	1.27	1200	6.8	8.3	8.9	9.6	10.0	10.4	.98	.98	.96	.95	.93	.92
05528400	Des Plaines River at Wheeling	325	1.16	1220	3.5	5.1	6.1	6.8	7.7	8.4	.50	.60	.65	.67	.71	.74
05528500	Buffalo Creek nr Wheeling	19.6	15.42	253	4.0	5.4	6.0	6.6	7.0	7.4	.92	.99	.99	.99	.98	.98
05529000	Des Plaines River nr Des Plaines	360	1.11	1980	4.0	6.4	7.5	8.3	8.9	9.3	.50	.66	.70	.72	.73	.72
05529500	McDonald Creek nr Mount Prospect	7.93	9.66	108	4.0	5.7	6.3	6.9	7.3	7.7	1.18	1.33	1.31	1.30	1.28	1.27
*05530000	Weller Creek at Des Plaines	13.2	10.98	381	3.5	5.3	6.8	9.3	11.5	14.1	.71	.87	1.01	1.26	1.45	1.68
05531000	Salt Creek nr Arlington Heights	32.1	13.04	365	6.7	7.6	8.0	8.4	8.7	8.9	1.38	1.25	1.19	1.14	1.11	1.07
05531200	Salt Creek at Addison	83.2	3.10	800	5.0	6.5	7.4	8.0	8.8	9.5	.81	.86	.89	.88	.91	.93
05531500	Salt Creek at Western Springs	114	3.01	1000	5.9	6.4	6.6	6.9	7.0	7.2	.90	.80	.75	.72	.68	.67
05532000	Addison Creek at Bellwood	17.9	6.92	352	5.0	6.3	7.2	8.3	9.0	9.8	1.04	1.05	1.09	1.14	1.16	1.19
*05532500	Des Plaines River at Riverside	630	1.06	3760	4.2	5.1	5.6	6.2	6.5	6.9	.43	.44	.44	.45	.45	.45

Table 5. Station data used in regression analysis--Continued

Station Number	Station Name	DA	S	Q_2	D_2	D_5	D_{10}	D_{25}	D_{50}	D_{100}	A/P_2	A/P_5	A/P_{10}	A/P_{25}	A/P_{50}	A/P_{100}
05533000	Flag Creek nr Willow Springs, Ill.	16.5	14.04	612	4.4	5.7	6.6	7.9	8.9	10.0	0.78	0.81	0.85	0.94	0.99	1.05
05534500	N. B. Chicago River at Deerfield	19.7	3.54	243	5.5	5.7	5.8	5.9	6.0	6.1	1.28	1.06	.97	.90	.85	.82
05535000	Skokie River at Lake Forest	13.0	5.44	187	4.3	5.2	5.8	6.4	6.8	7.2	1.08	1.04	1.04	1.04	1.03	1.03
05535070	Skokie River nr Highland Park	21.1	4.61	280	4.8	5.6	6.2	6.6	7.0	7.5	1.07	1.00	1.00	.96	.96	.97
05535500	W. F. N. B. Chicago River at Northbrook	11.5	3.91	356	4.6	6.3	7.2	8.1	8.6	9.2	.95	1.05	1.08	1.11	1.10	1.12
05536000	N. B. Chicago River at Niles	100	2.90	1050	7.3	8.4	9.0	9.6	9.9	10.3	1.09	1.03	1.01	.99	.95	.94
05536210	Thorn Creek nr Chicago Heights	17.2	16.54	451	2.6	3.4	4.0	4.5	5.0	5.5	.50	.53	.56	.58	.60	.63
05536215	Thorn Creek at Glenwood	24.7	15.68	830	7.1	7.7	8.1	8.6	8.9	9.3	1.14	1.01	.97	.94	.91	.91
05536235	Deer Creek nr Chicago Heights	23.1	9.72	471	7.9	8.8	9.1	9.4	9.5	9.7	1.50	1.35	1.27	1.20	1.13	1.09
05536255	Butterfield Creek at Flossmoor	23.5	6.34	478	5.4	6.5	7.0	7.7	8.2	8.6	1.02	.99	.97	.98	.97	.97
05536265	Lansing ditch nr Lansing	8.84	8.71	226	4.9	6.2	6.8	7.3	7.7	8.0	1.16	1.17	1.16	1.13	1.11	1.09
05536270	North Creek nr Lansing	16.8	6.34	399	6.0	6.3	6.5	6.7	6.8	6.9	1.20	1.01	.95	.89	.85	.81
05536275	Thorn Creek at Thornton	104	10.82	1970	10.9	12.7	13.4	14.1	14.5	14.9	1.35	1.30	1.26	1.22	1.19	1.16
05536325	Little Calumet River at Harvey	252	6.23	2000	5.2	6.7	8.0	8.4	8.9	9.5	.64	.68	.75	.73	.72	.74
05536340	Midlothian Creek at Oak Forest	12.6	3.27	258	3.8	5.0	5.8	7.0	7.9	8.8	.86	.91	.95	1.05	1.10	1.16
05536500	Tinley Creek nr Palos Park	11.2	11.46	460	5.0	5.9	6.4	7.0	7.5	7.9	.96	.91	.90	.90	.90	.90
05537500	Long Run nr Lemont	20.9	7.81	541	6.4	7.5	8.3	9.2	10.0	10.7	1.17	1.11	1.11	1.13	1.15	1.16
05538500	Spring Creek at Joliet	19.6	11.09	317	3.0	4.4	5.5	7.2	8.4	9.3	.64	.76	.85	1.02	1.11	1.16
05539000	Hickory Creek at Joliet	107	7.55	2660	5.0	7.9	9.5	11.3	12.7	14.3	.57	.74	.82	.90	.96	1.03
05539900	W. B. Du Page River nr West Chicago	28.5	6.76	492	5.8	6.6	7.0	7.3	7.5	7.8	1.09	1.00	.96	.92	.88	.87
*05540095	W. B. Du Page River nr Warrenville	90.4	5.03	1070	2.6	3.4	3.9	4.3	4.6	5.3	.39	.41	.43	.44	.44	.48
05540500	Du Page River at Shorewood	324	4.38	3640	4.6	6.2	7.3	8.9	10.0	11.3	.48	.53	.58	.65	.70	.75
05542000	Mazon River nr Coal City	455	4.33	7270	9.9	13.6	15.6	17.6	18.7	19.5	.83	.97	1.02	1.08	1.08	1.08
05548280	Nippersink Creek nr Spring Grove	192	7.68	2090	7.7	9.4	10.5	11.2	12.1	12.9	.94	.95	.97	.96	.97	.99
05549000	Boone Creek nr McHenry	15.5	7.34	126	2.9	3.9	4.3	4.7	4.9	5.1	.82	.87	.86	.85	.83	.81
*05550000	Fox River at Algonquin	1403	.90	3060	2.0	2.5	2.8	3.1	3.3	3.4	.22	.23	.23	.24	.24	.24
05550500	Poplar Creek at Elgin	35.2	9.08	295	2.5	3.1	3.5	4.1	4.6	5.1	.55	.54	.55	.59	.62	.65
05551200	Ferson Creek nr St. Charles	51.7	13.31	569	4.3	5.6	6.3	7.3	8.0	8.7	.77	.82	.83	.88	.91	.93
*05551500	Fox River at Aurora	1705	.57	3180	2.1	2.8	3.3	3.7	4.1	4.4	.23	.25	.27	.28	.30	.30
05551700	Blackberry Creek nr Yorkville	70.2	5.60	1210	6.2	7.6	8.5	9.1	9.9	10.7	.89	.89	.91	.90	.92	.95
05552500	Fox River at Dayton	2642	1.64	11100	8.5	11.1	12.8	14.6	15.8	17.1	.63	.70	.75	.80	.82	.85
05554000	N. F. Vermilion River nr Charlotte	186	5.39	1840	9.2	11.8	13.5	15.5	16.9	18.3	1.17	1.23	1.29	1.37	1.41	1.45
05554500	Vermilion River at Pontiac	579	1.11	4330	8.8	12.5	14.8	16.7	17.7	18.6	.86	1.03	1.12	1.17	1.18	1.18
*05555000	Vermilion River at Streator	1084	1.27	7310	13.7	19.1	22.1	25.6	27.9	29.9	1.16	1.36	1.45	1.67	1.71	1.66
05555500	Vermilion River at Lowell	1278	1.43	10700	6.3	8.2	9.4	11.0	12.1	13.0	.47	.52	.56	.61	.63	.65
05556500	Bureau Creek at Princeton	196	6.07	4200	8.5	10.5	11.4	12.2	12.7	13.1	.84	.87	.87	.86	.85	.84
05557000	West Bureau Creek at Wyanet	86.7	9.03	2590	7.3	8.7	9.5	10.1	10.6	11.0	.84	.83	.83	.81	.81	.80
05557500	East Bureau Creek nr Bureau	99.0	12.72	2550	6.9	8.8	9.8	10.7	11.3	11.7	.79	.84	.86	.87	.86	.85
05558000	Bureau Creek at Bureau	485	6.28	7960	8.5	9.2	9.5	9.9	10.1	10.4	.70	.64	.61	.59	.57	.56
05558500	Crow Creek (West) nr Henry	56.2	10.24	1770	6.1	7.2	8.0	9.0	9.8	10.7	.78	.76	.77	.80	.82	.86
05559000	Gimlet Creek at Sparland	5.66	53.86	911	5.5	7.8	9.2	11.0	12.3	13.5	.86	.99	1.07	1.17	1.23	1.28
05559500	Crow Creek nr Washburn	115	6.07	2260	6.5	8.4	9.4	10.4	10.8	11.3	.78	.83	.85	.87	.85	.85
*05560500	Farm Creek at Farmdale	27.4	17.21	536	2.1	2.3	2.5	2.7	2.8	3.0	.39	.34	.34	.34	.32	.33
05561000	Ackerman Creek at Farmdale	11.2	39.86	439	2.8	3.7	4.5	5.4	6.1	6.6	.54	.58	.64	.70	.74	.76
*05561500	Fondulac Creek nr East Peoria	5.54	53.80	306	1.9	2.1	2.2	2.4	2.4	2.6	.41	.36	.35	.34	.32	.33

Table 5. Station data used in regression analysis--Continued

Station Number	Station Name	DA	S	Q_2	D_2	D_5	D_{10}	D_{25}	D_{50}	D_{100}	A/P_2	A/P_5	A/P_{10}	A/P_{25}	A/P_{50}	A/P_{100}
*05562000	Farm Creek at East Peoria, Ill.	61.2	18.90	3740	3.1	4.3	5.2	6.3	7.2	8.1	0.32	0.37	0.41	0.46	0.50	0.53
05563000	Kickapoo Creek nr Kickapoo	119	10.93	7010	11.5	13.0	13.7	14.9	15.6	16.2	.98	.93	.91	.92	.91	.91
05563500	Kickapoo Creek at Peoria	297	7.50	7760	14.1	16.4	17.5	18.7	19.3	19.8	1.16	1.14	1.13	1.12	1.10	1.08
05564400	Money Creek nr Towanda	49.0	5.00	965	6.0	7.3	8.1	8.7	9.4	10.1	.92	.92	.93	.91	.93	.95
05564500	Money Creek above Lake Bloomington	53.1	4.91	1000	6.6	7.4	7.7	8.1	8.3	8.4	1.00	.92	.87	.84	.81	.78
05565000	Hickory Creek above Lake Bloomington	9.81	11.88	530	4.4	5.8	6.6	7.4	7.9	8.2	.81	.86	.89	.91	.91	.90
05566000	E. B. Panther Creek nr Gridley	6.30	11.14	143	5.7	6.5	6.9	7.5	7.8	8.1	1.55	1.40	1.33	1.31	1.27	1.24
05566500	E. B. Panther Creek at El Paso	30.5	4.54	453	5.0	6.5	7.5	8.4	8.8	9.2	.96	1.01	1.06	1.08	1.06	1.05
05567000	Panther Creek nr El Paso	93.9	4.22	1730	8.0	9.4	10.6	12.3	13.6	15.1	1.03	1.00	1.03	1.10	1.15	1.22
05567500	Mackinaw River nr Congerville	767	2.27	7560	12.7	14.8	16.0	17.4	18.2	19.0	1.06	1.04	1.04	1.05	1.04	1.04
05568000	Mackinaw River nr Green Valley	1089	2.48	6960	9.7	12.0	12.8	13.9	14.9	15.7	.83	.86	.85	.86	.87	.88
*05568650	Duck Creek nr Canton	.49	43.61	65	4.2	4.8	5.3	5.8	8.2	9.2	1.45	1.29	1.27	1.26	1.65	1.74
05568800	Indian Creek nr Wyoming	62.7	6.44	1360	8.9	10.3	10.9	11.4	11.9	12.5	1.24	1.17	1.13	1.09	1.07	1.07
05569500	Spoon River at London Mills	1062	2.27	10400	18.5	20.2	21.0	21.9	22.5	22.7	1.40	1.30	1.25	1.22	1.19	1.15
05570000	Spoon River at Seville	1636	1.98	11800	18.2	21.0	22.7	24.7	26.1	27.2	1.33	1.30	1.31	1.33	1.33	1.33
05570350	Big Creek at St. David	26.7	12.47	1110	7.5	8.7	9.5	10.2	10.9	11.5	1.11	1.05	1.04	1.03	1.04	1.04
05570370	Big Creek nr Bryant	40.3	9.95	1380	6.0	6.8	7.3	7.7	8.1	8.4	.83	.77	.76	.73	.73	.72
05571000	Sangamon River at Mahomet	362	3.59	3730	11.8	14.2	15.7	17.7	19.2	20.8	1.21	1.22	1.24	1.29	1.33	1.37
05571500	Goose Creek nr De Land	47.9	4.33	1220	9.2	10.6	11.2	11.7	12.3	12.9	1.32	1.24	1.20	1.15	1.14	1.14
05572000	Sangamon River at Monticello	550	2.75	5090	11.4	13.7	14.7	14.7	15.2	15.7	1.07	1.08	1.06	.99	.97	.96
05574000	S. F. Sangamon River nr Nokomis	11.0	18.80	685	8.2	9.1	9.6	10.5	11.2	11.8	1.40	1.26	1.21	1.21	1.21	1.21
05574500	Flat Branch nr Taylorville	276	2.01	3240	11.9	14.0	15.5	17.1	18.2	18.9	1.27	1.25	1.27	1.30	1.31	1.29
*05575500	S. F. Sangamon River at Kincaid	562	2.01	4290	13.0	16.6	18.6	20.9	22.5	24.2	1.29	1.37	1.42	1.48	1.50	1.54
05576500	Sangamon River at Riverton	2618	1.48	15000	18.0	20.8	22.1	23.6	24.5	25.3	1.22	1.20	1.19	1.19	1.17	1.16
05577500	Spring Creek at Springfield	107	5.39	1420	7.9	9.4	10.2	11.2	11.9	12.5	1.08	1.06	1.05	1.06	1.06	1.06
05578000	Sangamon River at Petersburg	3063	1.33	17100	14.6	15.2	16.6	17.6	19.0	19.8	.95	.85	.86	.86	.88	.88
05578500	Salt Creek nr Rowell	335	2.59	3570	12.4	14.7	16.3	18.3	19.6	21.0	1.29	1.27	1.30	1.36	1.37	1.40
05579000	Salt Creek nr Kenney	390	2.44	4070	11.1	15.0	17.2	18.7	20.3	21.5	1.11	1.25	1.32	1.34	1.37	1.39
*05579500	Lake Fork nr Cornland	214	4.65	1800	12.7	16.8	18.3	18.9	19.3	19.8	1.63	1.77	1.77	1.69	1.62	1.57
05579750	Kickapoo Creek trib at Heyworth	3.06	21.75	374	4.0	5.6	6.9	8.3	9.0	9.6	.82	.92	1.02	1.12	1.14	1.15
05580000	Kickapoo Creek at Waynesville	227	6.23	3680	11.2	11.8	12.1	12.5	12.8	13.1	1.16	1.01	.96	.92	.89	.87
05580500	Kickapoo Creek nr Lincoln	306	5.12	3820	10.6	12.0	12.6	13.3	13.7	14.0	1.08	1.02	.99	.97	.94	.92
05581000	Sugar Creek nr Armington	314	6.33	5410	10.7	12.6	13.7	14.5	15.5	16.2	.98	.97	.98	.96	.97	.97
05581500	Sugar Creek nr Hartsburg	333	5.76	4230	9.3	12.1	13.8	15.6	17.0	18.5	.92	1.00	1.05	1.10	1.14	1.18
05582000	Salt Creek nr Greenview	1804	2.22	11000	12.3	14.6	16.0	17.5	18.6	19.7	.92	.92	.94	.96	.97	.98
05582500	Crane Creek nr Easton	26.5	2.16	187	4.6	6.4	7.4	8.6	9.4	10.1	1.15	1.28	1.33	1.40	1.43	1.45
05583000	Sangamon River nr Oakford	5093	1.27	20200	14.5	17.1	18.0	18.8	19.2	19.6	.90	.91	.89	.87	.85	.84
05584400	Drowning Fork at Bushnell	26.3	5.76	564	6.8	7.3	7.6	7.8	8.2	8.4	1.23	1.07	1.01	.95	.93	.90
05584500	La Moine River at Colmar	655	3.70	7520	19.1	20.4	21.3	22.5	23.3	24.3	1.59	1.43	1.39	1.36	1.34	1.34
05585000	La Moine River at Ripley	1293	1.85	8200	19.9	21.8	22.7	23.6	24.3	24.8	1.62	1.50	1.44	1.40	1.36	1.33
05586000	N. F. Mauvaise Terre Creek nr Jacksonville	29.1	9.03	755	6.5	7.6	8.0	8.5	8.8	9.0	1.08	1.02	.98	.95	.93	.90
05586350	Little Sandy Creek trib nr Murrayville	1.82	53.86	382	6.0	7.9	9.0	10.1	10.8	11.8	1.22	1.29	1.33	1.36	1.36	1.40
05586500	Hurricane Creek nr Roodhouse	2.30	24.29	157	5.2	7.1	7.9	8.5	9.0	9.5	1.37	1.49	1.49	1.45	1.43	1.42
05586800	Otter Creek nr Palmyra	61.1	11.30	1690	8.9	9.5	9.8	10.1	10.3	10.5	1.16	1.02	.96	.91	.88	.85
05587000	Macoupin Creek nr Kane	868	2.32	8710	17.4	19.7	21.3	23.2	24.4	25.5	1.39	1.33	1.33	1.35	1.35	1.35

Table 5. Station data used in regression analysis--Continued

Station Number	Station Name	DA	S	Q_2	D_2	D_5	D_{10}	D_{25}	D_{50}	D_{100}	A/P_2	A/P_5	A/P_{10}	A/P_{25}	A/P_{50}	A/P_{100}
05587850	Cahokia Creek trib nr Carpenter, Ill.	0.45	42.50	153	2.5	3.4	4.0	4.8	5.5	6.2	0.67	0.72	0.76	0.82	0.88	0.94
*05587900	Cahokia Creek at Edwardsville	212	5.12	7210	17.8	21.5	23.5	25.3	27.3	28.8	1.51	1.53	1.55	1.56	1.59	1.60
*05588000	Indian Creek at Wanda	36.7	7.92	1740	12.6	16.0	17.5	19.4	20.9	22.9	1.63	1.70	1.71	1.75	1.77	1.85
05589500	Canteen Creek at Caseyville	22.6	11.09	2190	10.2	13.7	14.9	16.0	16.7	17.5	1.23	1.36	1.36	1.35	1.33	1.33
*05590000	Kaskaskia Ditch at Bondville	12.4	17.16	301	5.9	8.5	10.2	12.2	13.7	15.3	1.29	1.48	1.61	1.75	1.84	1.94
05590400	Kaskaskia River nr Pesotum	109	2.46	1790	10.1	13.2	14.3	15.2	16.0	16.5	1.29	1.39	1.38	1.35	1.34	1.32
05590500	Kaskaskia River at Ficklin	126	2.22	1920	10.2	11.6	12.3	13.0	13.5	14.0	1.28	1.20	1.16	1.14	1.11	1.10
05591200	Kaskaskia River at Cooks Mills	473	1.52	4340	12.5	14.8	16.0	16.8	17.9	18.9	1.23	1.21	1.21	1.18	1.19	1.20
05591500	Asa Creek at Sullivan	8.05	5.23	312	5.1	7.1	8.4	9.6	10.4	11.0	1.10	1.23	1.31	1.36	1.38	1.38
05592000	Kaskaskia River at Shelbyville	1054	1.43	9590	17.4	20.4	21.3	22.2	22.8	23.2	1.35	1.34	1.30	1.26	1.23	1.20
05592100	Kaskaskia River nr Cowden	1330	1.59	13600	17.9	19.0	19.4	19.7	20.1	20.4	1.25	1.13	1.07	1.02	.99	.96
05592300	Wolf Creek nr Beecher City	47.9	6.60	3260	9.7	10.5	10.8	11.1	11.2	11.5	1.04	.93	.88	.84	.80	.79
*05592800	Hurricane Creek nr Mulberry Grove	152	5.83	5310	14.9	16.1	16.6	17.1	17.5	17.8	1.38	1.25	1.19	1.14	1.10	1.07
05593000	Kaskaskia River at Carlyle	2719	1.27	14100	20.7	23.8	25.4	27.4	28.6	29.8	1.43	1.40	1.39	1.40	1.39	1.39
05593575	Little Crooked Creek nr New Minden	84.3	4.42	2890	13.5	14.8	15.4	16.1	16.9	17.5	1.50	1.36	1.30	1.26	1.25	1.23
05593600	Blue Grass Creek nr Raymond	17.3	4.28	576	9.8	10.7	11.3	11.9	12.3	12.6	1.76	1.55	1.49	1.44	1.39	1.35
05593900	E. F. Shoal Creek nr Coffeen	55.5	5.54	2320	10.3	11.8	12.6	13.3	14.1	14.5	1.22	1.16	1.13	1.10	1.10	1.08
05594000	Shoal Creek nr Breese	735	2.32	8090	16.9	19.4	21.0	22.3	23.1	23.7	1.38	1.34	1.34	1.32	1.30	1.28
05594200	Williams Creek nr Cordes	1.90	17.16	278	5.6	6.5	6.8	7.0	7.2	7.2	1.25	1.16	1.09	1.03	.99	.93
05594330	Mud Creek nr Marissa	72.4	5.72	3300	13.9	15.1	15.6	16.1	16.4	16.8	1.48	1.34	1.27	1.22	1.17	1.14
05594450	Silver Creek nr Troy	154	4.00	4880	13.2	13.8	14.2	14.5	14.9	15.2	1.25	1.10	1.04	.99	.96	.94
*05595000	Kaskaskia River at New Athens	5181	1.11	22800	24.5	27.8	32.2	37.0	40.2	43.8	1.47	1.43	1.55	1.67	1.73	1.81
*05595200	Richland Creek nr Hecker	129	6.43	5600	20.9	24.9	27.0	28.8	30.3	31.0	1.91	1.91	1.91	1.90	1.88	1.84
*05595510	Lick Branch nr Eden	1.22	35.22	335	6.6	9.1	10.5	11.9	12.6	13.8	1.40	1.54	1.61	1.66	1.64	1.70
05595800	Sevenmile Creek nr Mt. Vernon	21.1	14.52	775	9.7	10.1	10.4	10.7	10.9	11.1	1.59	1.35	1.26	1.19	1.14	1.10
05596100	Andy Creek trib at Valier	1.03	39.02	224	4.6	5.9	6.7	7.4	8.2	8.6	1.09	1.12	1.14	1.15	1.19	1.18
05596500	Tilley Creek nr West Frankfort	3.87	20.11	461	3.5	4.4	4.9	5.5	5.8	6.4	.67	.68	.69	.70	.70	.71
05597500	Crab Orchard Creek nr Marion	31.7	8.08	1560	7.6	8.0	8.1	8.3	8.4	8.5	1.01	.88	.81	.77	.73	.70
*05599000	Beaucoup Creek nr Matthews	292	2.64	4370	17.1	19.1	20.6	23.0	25.0	27.0	1.68	1.57	1.56	1.62	1.66	1.71
05600000	Big Creek nr Wetaug	32.2	11.30	2220	12.9	14.4	15.0	15.6	15.9	16.1	1.55	1.43	1.36	1.31	1.26	1.22

* These sites excluded from final regression analysis.

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