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Runoff Estimates for Small Rural Watersheds and Development of a Sound Design Method: Volume I. Research Report

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FOREWORD

This report is composed of three volumes: Volume I is the Research Report; Volume II consists of recommendations for establishing design manuals and Appendices B, C, D, E, F, G, and H, which are the design aids required for establishing design manuals; Volume III consists of Appendix A, an accumulation of the data base used in the study. FHWA chose to arrange the report as described to facilitate distribution of the results. The methods reported herein and designated as the Federal Highway Administration Methods are designed to be applied to watersheds smaller than 50 square miles but may be used on areas up to 100 square miles in size.

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Sufficient copies of Volumes I and II will be distributed to provide a minimum of one copy to each FHWA Regional office, FHWA Division office and State Highway Agency. Volume III will be distributed only upon special request since it will be of interest primarily to individuals wishing to verify equations or develop new equations. Direct distribution is being made to the Division offices.

Charles F. Scheffey

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16. Abstract

Potter's method for runoff peak forecasting was examined on its original watersheds and it was found to be soundly conceived. The method was modified to extend it to other watersheds in the same States for which it was originally developed. The results after modifying Potter's C parameter were found to be satisfactory.

The method was simplified and extended to all of the contiguous United States, Alaska, Hawaii, and Puerto Rico. After beginning with a 7-parameter method, it was found that 3-parameters, namely area, rainfall erosivity factor and difference in elevation from top to bottom of the watershed produced peak flow estimates of virtually equal reliability. The standard error of estimates of the ten year peak flow as computed by the different equations for a random sample of 51 watersheds from throughout the United States and Puerto Rico were: 39 percent for the 3-parameter all zone, 62 percent for 7-parameter all zone, 50 percent for 3-parameter zone, and 38 percent for 7-parameter zone equations. Consequently the three parameter equations were selected for design purposes and nomographs for solving the equations were developed for each hydrophysiographic zone of the United States and Puerto Rico. The other volumes of this report are:

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77-159	Vol II Recommendations for preparing design manuals and Apps B, C, D, E, F, and H
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LIST OF SYMBOLS

A	Area of watershed acres, 1000's of acres or square miles.
L'	The length of the principal stream channel from the proposed crossing to the end of the solid or broken blue line shown on the USGS map defining Potter's principal stream channel. L' is in miles.
T	Topographic factor of Potter. L' is in miles. $$T = \frac{(0.7L')^{1.5}}{(E_2-E_1)^{1/2}} + \frac{(0.3L')^{1.5}}{(E_3-E_2)^{1/2}}$$
P_{60}	Precipitation factor. This is the 10-year 60-minute rainfall at the centroid of the drainage area. Inches.
DD	Drainage density. This is the total length of all channels in blue on the topographic map, or the LL of the watershed, in miles, divided by the area, A, in thousands of acres. Miles/1000 acres.
C factor	Potter's correction factor. It is the number by which a 10-year peak estimated from area, topographic factor, and precipitation factor must be multiplied to obtain the correct estimate of the 10-year peak flow or $q_{10}/\hat{q}_{10(ATP)}$ as derived from $T/\hat{T}_{AP}$.
q_{10}	The 10-year flood peak flow, cubic feet per second or thousands of cubic feet per second. Other subscripts indicate other return periods.
$\bar{q}_{10}$	Average of the measured 10-year peak flow. In general, the bar over a symbol denotes an average or mean value.
$\hat{q}_{10}$	Estimated 10-year peak flow.
$\hat{q}_{10(A)}$	Estimated 10-year peak flow based on area A. In general, the symbols enclosed in the subscript parentheses denote the independent variables used in obtaining the estimate.
r	Simple correlation coefficient.
t	"Students" t for testing the level of probability of differences.
e	Potter's error percentage $= \left(\frac{\hat{T}_{AP} - T}{\hat{T}_{AP}}\right) 100.$
Mcfs	Thousands of cubic feet per second.

a	Acres.
Mi	Mile.
ft	Foot or feet.
in	Inch.
ΔH or DH	Difference in elevation between the top of a watershed and the gaging site--feet.
L	Length in miles up the principal channel from the proposed crossing to the upper watershed boundary.
LL	The total length in miles of all stream channels within a watershed. On a USGS map all channels show in solid or dashed blue lines.
s	Slope gradient, feet/100 feet.
S	Storage, percent of the area of a watershed occupied by storages such as swamps, lakes, and playas.
ARS	Agricultural Research Service.
SCS	Soil Conservation Service.
USGS	U.S. Geological Survey.
B.P.R.	Bureau of Public Roads--Federal Highway Administration.
FHWA	Federal Highway Administration.
E_1	Elevation at culvert site. Feet above reference datum.
E_2	Elevation at a point 0.7L upstream from culvert site. Feet above reference datum.
E_3	Elevation at the most remote point on the watershed opposite the upper end of the main channel. Feet above reference datum.
$\hat{q}_{10(AP)}$	$\hat{q}_{10}$ estimated utilizing A and P.
$\hat{q}_{10(ATP)}$	$\hat{q}_{10}$ estimated utilizing A, T, and P.
$\hat{T}_{(AP)}$	$\hat{T}$ estimated from A and P.
$\hat{q}_{10(ATPC)}$	$\hat{q}_{10}$ estimated utilizing A, T, P, and C.
$\hat{q}_{10(ATPK)}$	$\hat{q}_{10}$ estimated utilizing A, T, P, and K.

s_1 — Slope of channel segment from culvert site upstream a distance of 0.7L. Feet/mile.

s_2 — Slope of channel segment from the watershed boundary downstream a distance of 0.3L. Feet/mile.

R — The mean annual rainfall kinetic energy times the maximum respective 30-minute annual maximum rainfall.

K — USU correction factor. It is the number by which a 10-year peak estimated from area, topographic factor, and precipitation factor must be multiplied to obtain the correct estimate of the 10-year peak flow or $q_{10}/\hat{q}_{10(ATP)}$.

x — Independent variables in regression or graphical correlation.

y — Dependent variable in regression or graphical correlation.

PS_e — The standard error of a regression equation in its linear form as a percent of the mean value of the measured dependent variable in its linear form. For most of the regression equations derived in this report, the $\log_{10}$ transformation was used, therefore

$$PS_e = \frac{100}{\log_{10}\bar{y}} \sqrt{\frac{\Sigma(\log_{10}y - \log_{10}\hat{y})^2}{df}}$$

PS_{EE} — The standard error of a point estimate made from any estimating equation as a percentage of the mean value of the measured dependent variable in its original untransformed state. For the equations derived in this report

$$S_{EE} = \frac{100}{\bar{y}} \sqrt{\frac{\Sigma(y - \hat{y})^2}{n - 2}}$$

n — Number of observations.

df — Degrees of freedom for hypothesis testing, in general, df = n - k - 1.

k — Is the number of independent variables used in an estimating equation.

DY or ΔY — Residual difference between the observed value of a dependent variable and the corresponding computed or estimated value.

L'_2 — Potter's length of lower reach of channel from culvert site elevation E_1 to upstream elevation E_2; a distance of 0.7 L' in miles.

L'_3 — Potter's length of upper reach of channel from point elevation E_2 to the end of the solid or broken blue line at elevation E_3; a distance of 0.3 L' in miles.

CONVERSION FACTORS

English to International System

1 mile	= 1.609 kilometers (km)
1,000 cubic feet per second (cfs)	= 28.32 cubic meters/second (m^3/s)
1 foot	= 0.3048 meters (m)
1 acre (a)	= 0.4047 hectares (ha) or 4047 square meters (m^2)
1 square mile (mi^2)	= 640 acres = 2,590 square kilometers (km^2) = 259 ha
1 cubic foot	= 0.02832 cubic meters (m^3)
1 acre-foot	= 1,233 cubic meters = 0.01028 hectare meters (ha-m)
1 ton/acre/year	= 2.24 tonnes/hectare/year (tonnes (t)/ha/yr)
inches (in)	= 25.4 millimeters (mm) = 2.54 centimeters (cm)

VOLUME I: RESEARCH REPORT

RUNOFF ESTIMATES FOR SMALL RURAL WATERSHEDS AND DEVELOPMENT OF A SOUND DESIGN METHOD

by

Joel E. Fletcher, A. Leon Huber,
Frank W. Haws, and Calvin G. Clyde

Introduction

Problem statement

A basic consideration in the design of bridges and culverts is the estimation of the rate of runoff expected during peak flow periods. Watershed area alone does not account for the wide variation in peak rates of runoff found among watersheds. Area alone is insufficient even within homogeneous physiographic areas. The addition of other indices such as precipitation, topography, etc., is needed to reduce the unexplained variation in the magnitude of peak rates of runoff to workable limits. However, this technique does not always explain the large discrepancies between the estimated and measured peaks that sometimes occur.

Potter (ref. 13) realized that a design engineer cannot always wait for streamflow measurements. He used watershed data at hand and developed the method commonly known as the ''Bureau of Public Roads Method'' or simply Potter's method. This method is the subject of the present investigation.

Objective

The objective of this study is to improve the accuracy of Potter's method using more recent data while retaining its basic simplicity and independence from complicated computational aides.

Statement of work

Work conducted in the present investigation proceeded as follows:

1. Verify, update, and extend Potter's method.
2. Refine Potter's method and other methods.
3. Field visits and evaluation.
4. Evaluation and analysis.

Summary of Potter's Method

Introduction

The method proposed by Potter (ref. 13) depends on a graphical correlation between the logs of the 10-year peak flow and the logs of the area, a topographic factor, a precipitation factor, and a correction factor largely representing the drainage density. The procedure begins with an estimate of the 10-year peak, $q_{10(ATP)}$, based on the area, a topographic factor, T, and a precipitation factor, P. A built-in check using the topographic factor, T, estimates an approximate error at this point. If the error is greater than 30 percent, the correction factor, C, is utilized. Prior to any computations the unknown watershed is classified from a physiographic map into a zone depending on and reflecting its climatic and geologic properties.

Procedure

1. Zone. Locate the desired crossing on a United States Geological Survey (USGS) 7½ minute quadrangle topographic map. Carefully outline the watershed boundaries leading to the location of the desired culvert. By eye locate the center of mass of the enclosed area and record its latitude and longitude. With this location enter Potter's zone map and read the proper zone.

2. Area. Carefully measure the watershed area outlined in No. 1. This may be done by planimetering, digitizing, or counting the intersections or dots on a dense grid. The area is expressed in thousands of acres.

3. Topographic factor, T. On the topographic map, carefully measure the distance up the main stream channel to its most remote point shown as either a solid or broken blue line. This distance is expressed in miles and designated as L'. Record the elevation, E_1, at the culvert site. At a point 0.7 L upstream from the culvert site again read the elevation. This is elevation E_2. Lastly determine the elevation of the most remote point on L'. This elevation is E_3. From these elevations E_1, E_2, and E_3 and distances L'_2 and L'_3 the topographic factor, T is calculated as follows:

$$T = 0.7L'/(s_1)^{1/2} + 0.3L'/(s_2)^{1/2} \quad \ldots \quad (1)$$

where $0.7L' = L'_2$ and $0.3L' = L'_3$

or

$$T = \frac{(0.7L')^{1.5}}{(E_2-E_1)^{1/2}} + \frac{(0.3L')^{1.5}}{(E_3-E_2)^{1/2}} \quad \ldots \quad (2)$$

4. Precipitation factor. Utilizing the location of the centroid of the watershed to the nearest second, locate this centroid on the 1-hour 10-year rainfall map and read the precipitation to the nearest 0.01 inch. This value is recorded as the precipitation factor, P_{60}.

5. Drainage density. Measure the total length of all drainage channels shown as blue lines on the watershed map. This length in miles is called LL. Drainage density, DD, is computed by dividing this length by the watershed area in thousands of acres. The units of DD are miles per thousand acres.

6. "C" factor. Potter (ref. 13) constructed correction factor curves by plotting the logs of the ratio, $q_{10}/\hat{q}_{10(ATP)}$, against the logs of the ratio, $T/\hat{T}_{AP}$. After he had obtained the curves, he called the values of the ratio $q_{10}/\hat{q}_{10(ATP)}$, read from the curves "C." Thus "C" is the value the estimated $\hat{q}_{10(ATP)}$ must be multiplied by to obtain $\hat{q}_{10(ATPC)}$.

7. Potter's flood frequency. Potter (ref. 12) developed what can be termed an upper and lower frequency curve method for extrapolating short records to determine the less frequent flood peaks. In Potter's own words,

> Frequency studies of the maximum annual peak rates of runoff were made for each watershed. In order to minimize the error that might result from the many short periods of runoff record, relations between peak rates of high and low frequency were used to obtain values of peaks that could be expected to be equalled or exceeded on an average of once in 10 years (q_{10}) and once in 50 years (q_{50}). It has been found that when the maximum annual peaks for these watersheds were plotted on extremal probability paper, they defined two straight line frequency curves. (Potter, ref. 12)

A high degree of correlation ($r^2 > 0.9$) was found to exist between the 10-year peak as defined by the lower curve and the 10- and 50-year peaks as defined by the upper curve. Thus, it is only necessary to determine the q_{10} on the lower curve to estimate the true q_{10} or q_{50}. The lower curve is usually well defined by even short records.

8. Peak flow estimate. Enter the appropriate zone curves with the area, A, the topographic factor, T, and the precipitation factor, P, and read peak flow $\hat{q}_{10}$. This yields a value for $\hat{q}_{10(ATP)}$. Now, enter the corresponding curves for the relation between T, A, and P and read a value for $\hat{T}_{(AP)}$. Express the difference between this value and the measured value of T as a percentage of error or

$$\text{error} = \frac{\hat{T}_{AP} - T}{\hat{T}_{AP}} \times 100$$

If this error is smaller than 30 percent, the estimate of $q_{10(ATP)}$ is considered to be an adequate estimate of the 10-year peak flow. If the error is greater than 30 percent, the estimate $q_{10(ATP)}$ must be multiplied by a "C" value obtained by entering the correction curve with T/T_{AP}.

9. Errors and assumptions described by Potter.

a. Map scale. Potter (ref. 13) did not specify the scale of the USGS maps from which he determined the watershed parameters. He presumably preferred the 1/24,000 maps. From Potter's notes, however, it appears that four or five of his watersheds were located in areas where only 1/62,500 scale maps were available. He made no mention of any adjustments for map scale.

b. Area. Potter used the published USGS areas which are in square miles and converted them to thousands of acres by multiplying by the factor 0.640. He recognized that these areas are subject to periodic revision.

PHASE I

Verify, Update, and Extend Potter's Method

Parameters and measurement

1. Map scales. Only two map scales were encountered on the Potter watersheds, 1/24,000 and 1/62,500. No corrections were made for map scale until the section on areal extension of the Potter method. These effects will be discussed at that time.

2. Area. Potter's areas and those determined by Utah State University (USU) differ by only about 1 percent (1.08). Errors in area appear insignificant so no correction for map scale need be made. The major differences found were due to new and more accurate maps which actually indicated some differing watershed boundaries.

3. Operator differences. The differences between operators were small and non-significant so long as the same external controls were applied. In the most complex operation, that of determining the topographic factor, T, the differences, though larger, were still not significant as indicated by Students t test (ref. 16). Both sets of topographic factors are given in Table 1 (p. 5-9) along with other data on the Potter watersheds. These data are basic to all additional studies in this paper.

4. Interrelationships among parameters. Potter (ref. 13) stated that he found a close correlation between drainage density, DD, and the topographic factor, T, and thus decided to discard DD in favor of T. The Utah State University data show a significant correlation between DD and T but there is sufficient residue to justify retention of DD. Furthermore, there are better interrelationships among all of the other parameters that Potter did retain than between DD and T.

5. Comparison between Potter's original curves and new curves using Potter's data. The values of the 10-year peak flow, q_{10}, were determined by USU as outlined by Potter (ref. 12). For example, Figure 1 (p. 10) shows the extraction of the q_{10} upper value for Potter Zone I Watershed 19. In this particular 16 years of record the values read from the upper and lower frequency curves are not materially different. The second example is for a shorter (10-year) record station, Figure 2 (p. 11). In this example, there is a sharp break upward because of the outlier at 0.99 thousand cubic feet per second (Mcfs)

The regression line for the relationship between Potter's 10-year peak flows, q_{10}, and the USU 10-year peak flows, q_{10}, has a one to one slope and an r^2 value of 0.94 using 96 watersheds. The two series of peak flows are not significantly different as indicated by the t test.

The derivation of the curves for the relationships between the individual parameters and the 10-year peak flow can also be influenced by operator differences. The curves for the relationships between q_{10} and area were fitted graphically as Potter described plus a least squares fit in the ordinary

Table 1. Data for Potter watersheds.

SEQ #	1 POTTER #	2 ARS #	3 USGS #	STATION NAME	4 LAT	5 LONG	6 USU AREA	7 PT AREA	8 PTR ZN PR	9 AREA	10 PTR P60	11 USU P60	12 PTR T	13 USU T
A 1	1-1	31,3		ARS FENNIMORE WISCONSIN WATERSHED W-III	42-42	93-34	,053	0,052	1	C10	2,2	2,08	0,027	0,031
A 2	1-2	31,4		ARSFENNIMORE WISCONSIN WATERSHED W-IV	42-42	93-34	0,171	0,171	1	C10	2,2	2,08	0,044	0,057
A 3	1-3	17,4		ARS EDWARDSVILLE ILLINOIS WATERSHED W-IV	38-51	90-34	0,298	0,290	1	C6	2,5	2,27	0,121	0,121
A 4	1-4	31,1		ARS FENNIMORE WISCONSIN WATERSHED W-I	42-42	93-34	0,330	0,330	1	C10	2,2	2,08	0,099	0,055
A 5	1-5	44,1		ARS HASTINGS NEBRASKA WATERSHED W-3	40-09	99-40	0,481	0,481	1	B14	2,4	2,46	,288	0,279
A 6	1-6	.	05455000	RALSTON CR AT IOWA CITY IOWA	41-40	91-29	1,926	1,930	1	C9	2,2	2,23	0,470	0,647
A 7	1-8	.	03247100	PATTERSON RUN NR OWENSVILLE OHIO	39-07	84-08	2,138	2,140	1	B16	2,0	1,97	0,772	1,084
A 8	1-9	.	04198100	NORWALK CR NR NORWALK OHIO	41-12	82-31	3,140	2,580	1	B15	2,0	1,79	0,949	1,062
A 9	1-10	.	04200100	PLUM CR AT OBERLIN OHIO	41-15	82-15	3,091	3,120	1	B15	1,9	1,76	1,040	1,265
A 10	1-19	.	05565000	HICKORY CR ABOVE LAKE BLOOMINGTON ILL	40-37	88-57	6,464	6,460	1	C09	2,0	1,70	1,790	1,989
A 11	1-20	.	01328000	BOND CR AT DUNHAM BASIN NEW YORK	43-20	73-34	9,408	9,410	1	B9	1,5	1,86	0,960	1,444
A 12	1-22	.	05415500	EF GALENA R COUNCIL HILL ILLINOIS	42-29	90-17	12,864	12,900	1	C10	2,2	2,08	1,220	1,815
A 13	1-12A	.	01501500	SAGE BROOK NR SOUTH NEW BERLIN NEW YORK	42-32	75-20	,446	0,446	1	B8	1,7	1,70	0,045	0,077
A 14	1-13A		03102900	CLEAR CR AT DILWORTH OHIO	41-27	80-41	,582	0,582	1	B15	1,9	1,70	0,191	0,280
A 15	1-180		01425500	COLD SPRING BROOK AT CHINA NEW YORK	42-10	75-24	,966	0,966	1	B8	1,7	1,76	0,130	1,090
A 16	1-38	.	04210100	HOSKINS CR AT HARTSGROVE OHIO	41-36	81-00	3,270	4,440	1	B8	1,8	1,69	1,390	1,330
A 17	1-39	.	01506500	ALBRIGHT CT AT EAST HOMER NEW YORK	42-42	76-07	4,350	4,53	1	B6	1,8	1,62	0,490	0,570
A 18	1-41	.	03094000	WALNUT CR AT COURTLAND OHIO	41-21	80-42	5,400	5,83	1	B8	1,8	1,72	1,310	1,367
A 19	1-42	.	03101000	SUGAR RUN AT PYMATUNING DAM PENNA	41-29	80-30	5,970	5,98	1	B15	1,9	1,66	0,935	1,184
A 20	1-44	.	01369500	QUAKER CR AT FLORIDA NEW YORK	41-19	74-21	6,234	6,23	1	B2	1,9	2,03	0,797	0,717
A 21	1-47	.	03092100	HINKLEY CR NR CHARLESTOWN OHIO	41-12	81-09	6,764	6,92	1	B8	1,8	1,73	1,810	2,119
A 22	1-49	.	03116100	LITTLE CHIPPEWA CR NR SMITHVILLE OHIO	40-52	81-47	10,490	8,90	1	B8	1,8	1,76	1,750	2,701
A 23	1-50	.	01415500	TERRY CLOVE KILL NR PEPACTON NEW YORK	42-10	74-55	9,024	8,96	1	B8	1,7	1,80	0,552	0,520
A 24	1-53	.	03089500	MILL CR NR BERLIN OHIO	40-58	80-58	12,224	12,6	1	B8	1,8	1,73	2,300	1,172
A 25	1-55	.	03092000	KALE CR NR PRICETOWN OHIO	41-05	81-03	14,016	13,4	1	B8	1,8	1,73	2,690	3,016
A 26	1-55	.	04216500	LITTLE TONAWANDA CR AT LINDEN NEW YORK	42-53	78-10	14,144	14,1	1	B7	1,6	1,59	1,560	1,254
A 27	1-58	.	01414500	MILL BROOK AT ARENA NEW YORK	42-05	74-39	16,000	16,00	1	B8	1,7	1,66	0,694	0,925
A 28	2-1	42,10		ARS WACO(RIESEL) TEX WATERSHED W-10	31-38	96-38	,020	0,020	2	A6	3,1	3,01	0,021	,0012
A 29	2-2	26,27		ARS COSHOCTON OHIO WATERSHED NO 169	40-33	84-00	,029	0,029	2	B15	1,8	1,79	0,014	0,012
A 30	2-3	42,8		ARS WACO(RIESEL) TEX WATERSHED W-6	31-38	96-38	,042	0,042	2	A6	3,1	3,01	0,030	0,028
A 31	2-4	26,29		ARS COSHOCTON OHIO WATERSHED NO 183	40-33	84-00	,074	0,074	2	B15	1,8	1,79	0,032	0,031
A 32	2-5	26,28		ARS COSHOCTON OHIO WATERSHED NO 177	40-22	81-46	,076	0,076	2	B15	1,8	1,79	0,027	0,027
A 33	2-6	26,31		ARS COSHOCTON OHIO WATERSHED NO 10	40-24	81-48	,122	0,122	2	B15	1,8	1,79	0,041	0,050
A 34	2-7	42,7		ARS WACO TEX (RIESEL)WATERSHED W-2	31-38	96-38	,130	0,130	2	A6	3,1	3,01	0,055	0,054
A 35	2-8	42,6		ARS WACO TEX (RIESEL)WATERSHED W-1	31-38	96-38	,176	0,178	2	A6	3,1	3,01	0,068	0,106
A 36	2-9	.	03274100	BLAKE RUN NR REILY OHIO	39-28	84-46	,186	0,186	2	C4	1,8	1,97	0,050	0,097
A 37	2-10	26,30		ARS COSHOCTON OHIO WATERSHED NO 196	40-22	81-47	,303	0,301	2	B15	1,8	1,79	0,051	0,049
A 38	2-11	26,32		ARS COSHOCTON OHIO WATERSHED NO 5	40-24	81-46	,349	0,349	2	B15	1,7	1,79	0,061	0,024
A 39	2-14	42,2		ARS WACO TEXAS WATERSHED C	31-38	96-38	,579	0,597	2	A6	3,1	3,01	0,291	0,277
A 40	2-15	.	03150100	BELL CR AT MCCONNELSVILLE OHIO	39-39	81-50	,665	0,621	2	B15	2,0	1,84	0,124	0,133
A 41	2-16	26,33		ARS COSHOCTON OHIO WATERSHED NO 92	40-24	81-46	,926	0,926	2	B15	1,8	1,79	0,142	0,046
A 42	2-20	42,2		ARS WACO TEXAS WATERSHED D	31-38	96-38	1,110	1,110	2	A6	3,1	3,01	0,510	0,460
A 43	2-21	26,34		ARS COSHOCTON OHIO WATERSHED NO 94	40-23	81-48	1,520	1,52	2	B15	1,8	1,79	0,250	0,267
A 44	2-22	.	03119000	JEFFERSON CR NR JEWETT OHIO	40-24	80-57	1,626	1,59	2	B15	1,6	1,78	0,377	0,325
A 45	2-23	.	03145000	OTTER FORK NR CENTERBURG OHIO	40-19	82-43	2,029	1,96	2	C4	1,6	1,62	0,599	0,609
A 46	2-26	.	03115000	BARNES RUN NR SUMMERFIELD OHIO	39-47	81-21	2,214	2,26	2	B15	2,1	1,63	0,391	0,369
A 47	2-27	.	03236100	SBR LITTLE SALT CR AT JACKSON OHIO	39-01	82-30	2,400	2,50	2	B15	2,0	1,94	0,754	0,653
A 48	2-28	26,35		ARS COSHOCTON OHIO WATERSHED NO 85	40-23	81-49	2,070	2,070	2	B15	1,8	1,79	0,400	0,415

Table 1. Continued.

SEQ #	14 USU P10	15 USU L	16 USU DD	17 USU STR	18 L/RTS	19 PHY ZN	20 PTR Q10	21 USU Q10	22 SBYR QM	23 SBY Q25	24 SBY Q50	25 Q2.33	26 Q10	27 Q10 LOG	28 Q25	29 Q50	30 Q10/A
A 1	6.00	0.43	7.45	0.0	.097	12B	0.096	0.072	0.021	0.087	0.096	0.012	0.069	0.067	0.062	0.093	1.2762
A 2	6.60	0.67	5.55	0.0	.108	12B	0.270	0.236	0.067	0.312	0.397	0.066	0.214	0.224	0.285	0.341	1.2515
A 3	7.27	1.02	6.57	12.1	.156	12D	0.440	0.659	0.232	0.895	1.081	0.238	0.663	0.731	0.699	1.062	2.2878
A 4	6.60	0.51	13.63	0.0	.142	12B	0.400	0.403	0.130	0.536	0.636	0.083	0.352	0.333	0.566	0.622	1.0667
A 5	7.04	1.68	4.02	0.0	.260	13D	0.690	0.713	0.253	0.941	1.159	0.252	0.824	0.824	0.654	0.951	1.7131
A 6	7.04	5.60	3.89	0.0	.374	12E	1.060	1.130	0.420	1.[illegible]	1.910	0.505	1.160	1.230	1.595	1.860	0.6127
A 7	6.30	4.30	2.12	.2	.863	12D	0.860	0.800	0.625	0.695	0.960	0.601	0.836	0.840	0.960	1.055	0.3910
A 8	6.60	4.40	2.56	0.0	.674	12D	0.860	0.670	0.350	0.875	1.030	0.375	1.030	1.050	1.750	2.275	0.3271
A 9	5.60	4.70	2.44	1.1	.731	12A	0.910	0.710	0.390	0.785	0.872	0.300	0.780	0.850	1.560	2.100	0.2523
A 10	5.35	6.50	2.18	0.0	1.201	12D	1.750	1.350	0.600	1.780	2.040	0.620	1.220	1.350	1.743	2.040	0.1687
A 11	5.58	9.10	2.92	.1	.893	10	1.600	1.350	0.920	1.602	1.790	0.800	1.200	1.200	1.440	1.620	0.1276
A 12	6.65	9.50	4.11	.0	.844	12C	5.600	6.450	2.900	6.420	9.000	2.400	6.830	7.600	12.800	17.000	0.5309
A 13	5.41	1.40	2.55	0.0	.108	8C	0.110	0.096	0.037	0.260	0.590	0.034	0.093	0.094	0.218	0.298	0.2076
A 14	5.41	1.50	4.30	.4	.274	8C	0.142	.600	0.090	0.260	0.390	0.070	0.242	0.250	0.407	0.537	0.4156
A 15	5.58	1.90	2.58	00.0	.161	8C	0.179	0.165	0.084	0.230	0.300	0.090	0.155	0.155	0.190	0.220	0.1605
A 16	5.37	6.00	4.06	1.3	1.208	8C	0.660	0.460	0.255	0.577	0.666	0.200	0.555	0.620	0.880	1.165	0.1697
A 17	5.15	5.80	2.11	.1	.449	8C	0.830	0.695	0.470	0.890	1.030	0.465	0.720	0.700	0.750	0.800	0.1652
A 18	5.43	5.60	3.79	.4	.891	8C	1.300	1.070	0.740	1.390	1.630	0.700	1.110	1.150	1.400	1.730	0.2067
A 19	5.34	6.90	3.37	0.0	.665	8C	1.050	1.870	0.600	2.940	3.720	0.600	1.770	1.700	2.800	3.590	0.2961
A 20	6.49	5.80	3.18	6.3	.579	8C	0.660	0.810	0.360	1.120	1.320	0.378	0.750	0.720	0.976	1.230	0.1203
A 21	5.45	9.80	2.59	.3	1.511	8C	0.020	0.620	0.370	0.755	0.652	0.410	0.595	0.630	0.690	0.755	0.0677
A 22	5.58	6.60	3.69	.01	1.176	8C	1.150	1.350	0.850	1.465	1.560	0.850	1.550	1.800	1.950	2.270	0.1477
A 23	5.70	5.80	2.29	.2	.426	8C	1.550	1.610	0.725	3.150	3.975	0.780	1.500	1.750	2.660	3.530	0.1762
A 24	5.49	6.60	3.03	.5	1.520	8C	1.670	1.700	1.140	1.980	2.120	1.000	1.000	1.720	1.825	1.025	0.1473
A 25	5.49	2.00	4.85	.7	1.764	8C	2.050	2.425	1.280	3.270	3.925	1.225	2.150	2.400	3.750	4.260	0.1534
A 26	4.89	9.70	3.87	1.3	1.057	12A	2.050	1.945	1.190	2.610	3.010	1.085	1.840	1.600	2.400	2.820	0.1301
A 27	5.86	10.90	2.37	.02	.640	8B	3.900	3.700	2.060	4.950	5.800	1.740	3.300	3.200	4.140	4.625	0.2063
A 28	9.56	0.02	2.23	0.0	.093	3F	0.107	0.083	0.044	0.105	0.123	0.033	0.072	0.070	0.095	0.114	3.6548
A 29	5.66	0.26	5.97	0.0	.089	8E	0.061	0.068	0.024	0.093	0.110	0.018	0.054	0.053	0.075	0.091	1.6621
A 30	9.56	0.24	6.90	0.0	.099	3F	0.165	0.134	0.065	0.174	0.200	0.060	0.113	0.111	0.130	0.180	2.6905
A 31	5.66	0.59	8.25	1.0	.100	8E	0.092	0.160	0.033	0.260	0.344	0.033	0.141	0.162	0.211	0.273	1.9854
A 32	5.66	0.50	12.20	0.0	.097	8E	0.096	0.152	0.030	0.340	0.630	0.029	0.118	0.107	0.202	0.269	1.5608
A 33	5.66	0.65	12.71	0.0	.108	8E	0.092	0.162	0.033	0.280	0.367	0.034	0.127	0.135	0.214	0.280	1.0410
A 34	9.56	0.49	4.23	0.0	.114	3F	0.420	0.452	0.157	0.630	0.760	0.131	0.360	0.354	0.537	0.655	2.7692
A 35	9.56	0.77	4.86	0.0	.123	3F	0.620	0.597	0.275	0.788	0.927	0.183	0.515	0.497	0.511	0.596	2.9261
A 36	6.35	1.00	5.38	.2	.111	12D	0.160	0.158	0.095	0.220	0.268	0.080	0.178	0.182	0.260	0.325	0.9570
A 37	5.66	0.75	10.19	1.5	.112	8E	0.295	0.565	0.135	1.280	2.200	0.134	0.467	0.437	0.758	0.996	1.5413
A 38	5.66	0.47	9.78	0.0	.462	8E	0.150	0.265	0.072	0.420	0.525	0.077	0.236	0.215	0.341	0.415	0.6762
A 39	9.56	1.50	1.70	0.0	.262	3F	0.960	0.654	0.333	0.683	0.765	0.288	0.712	0.759	0.954	1.146	1.2297
A 40	5.02	1.70	2.82	0.0	.124	8E	0.630	0.824	0.340	1.320	1.665	0.300	0.757	0.800	1.250	1.400	1.1197
A 41	5.66	0.79	8.35	0.0	.169	8E	0.320	0.425	0.102	0.720	1.000	1.165	0.482	0.482	0.649	0.779	0.5239
A 42	9.56	2.39	1.82	0.0	.399	3F	1.420	1.083	0.540	1.276	1.409	0.448	1.267	1.265	2.015	2.283	1.1595
A 43	5.60	2.50	10.67	0.0	.240	8E	0.630	0.065	0.305	1.100	1.350	0.383	0.843	0.874	1.272	1.686	0.5546
A 44	5.64	2.30	3.01	.9	.316	8E	0.230	0.220	0.100	0.327	0.410	0.110	0.220	0.167	0.330	0.410	0.1402
A 45	5.76	3.50	2.45	1.7	.201	12D	0.386	0.360	0.203	0.440	0.513	0.130	0.335	0.340	0.345	0.528	0.1661
A 46	5.79	3.56	5.15	0.0	.236	8E	1.400	2.280	0.060	3.100	3.700	0.626	1.837	1.900	2.326	2.695	0.6297
A 47	6.12	3.70	3.11	.1	.663	8E	0.010	0.965	0.730	1.130	1.260	0.700	1.000	0.960	1.320	1.570	0.4156
A 48	5.66	3.39	10.12	0.0	.330	8E	0.660	1.090	0.520	1.450	1.730	0.544	1.140	1.000	1.451	1.710	0.4436

Table 1. Continued.

SEQ #	POTTER #	ARS #	USGS #	STATION NAME	LAT	LONG	USU AREA	PT AREA	PTR ZN	PR AREA	PTR P60	USU P60	PTR T	USU T
A 49	2-29	.	03231000	E F PAINT CR NR SEDALIA OHIO	39-42	83-29	2.445	2.71	2	C4	1.8	1.90	1.730	0.711
A 50	2-30	.	03241000	SHAWNEE CR AT ZENIA OHIO	39-40	83-53	2.694	2.77	2	C4	1.8	1.91	0.875	0.872
A 51	2-31	.	04180100	TIDERISHI CR NR JENERA OHIO	40-55	83-42	2.976	2.89	2	C4	1.8	1.86	1.490	1.531
A 52	2-32	.	04190500	ROLLER CREEK AT OHIO CITY OHIO	40-46	84-39	3.290	3.16	2	C4	1.8	1.88	1.250	1.091
A 53	2-33	.	03130500	TOUBY RUN AT ZANSFIELD OHIO	40-45	82-34	3.482	3.31	2	C4	2.0	1.79	0.566	0.676
A 54	2-34	.	03263700	BRIDGE CR NR GREENVILLE OHIO	40-03	84-38	3.891	3.51	2	C4	1.8	1.92	1.120	1.165
A 55	2-35	.	03109000	LISBON CR AT LISBON OHIO	40-49	80-41	3.962	3.89	2	B15	1.8	1.73	0.696	0.675
A 56	2-36	.	03230600	HOMINY CR AT CIRCLEVILLE OHIO	39-35	82-53	3.622	4.02	2	C4	1.8	1.89	0.705	0.848
A 57	2-37	.	03266500	MAD RIVER AT ZANESFIELD OHIO	40-22	83-41	4.878	4.10	2	C4	1.8	1.87	0.577	0.639
A 58	2-40	26.30		ARS COSHOCTON OHIO WATERSHED NO 97	40-22	81-50	4.580	4.580	2	B15	1.8	1.79	0.802	0.712
A 59	2-43	.	03234100	INDIAN CR AT MASSIEVILLE OHIO	39-14	82-59	6.144	6.22	2	B15	1.9	1.93	0.646	0.749
A 60	2-45	.	03235000	SALT CR AT TARLTON OHIO	39-38	82-47	7.360	6.78	2	C4	1.8	1.87	1.220	1.389
A 61	2-46	.	03147900	TIMBER RUN NR ZANESVILLE OHIO	39-57	82-06	6.784	6.79	2	B15	1.8	1.82	0.927	0.863
A 62	2-48	.	03228000	SCIOTA BIG RUN AT BRIGGSDALE OHIO	39-56	83-07	7.640	7.64	2	C4	1.8	1.67	0.998	1.338
A 63	2-51	.	03110700	CONNOTTON CR AT JEWETT OHIO	40-22	80-58	9.152	9.02	2	B15	1.7	1.78	0.862	1.058
A 64	2-57	.	01552500	MUNCY CR NR SONESTOWN PENNA	41-23	76-28	15.232	15.2	2	B8	1.7	1.86	0.964	0.943
A 65	2-59	.	07163000	COUNCIL CR NR STILLWATER OKLA	36-09	96-54	19.840	19.8	2	024	2.2	2.76	2.180	2.334
A 66	3-1	13.2		ARS BLACKSBURG VA WATERSHED W-III	37-08	80-32	.019	.019	3	B13	2.0	2.17	0.018	0.016
A 67	3-2	.	07012000	BEHMKE BR NR ROLLA MISSOURI	37-55	91-42	.672	0.672	3	B20	2.3	2.39	0.212	0.246
A 68	3-3	.	01448500	DILLDOWN CR NR KING POND PENNA	41-02	75-32	1.530	1.53	3	B8	1.9	1.97	0.219	0.227
A 69	3-4	.	01508000	SHACKHAM BROOK NR TRUXTON NEW YORK	42-47	76-01	1.688	2.08	3	B8	1.8	1.62	0.170	0.194
A 70	3-6	.	01609500	SAWPIT RUN NR OLDTOWN MARYLAND	39-34	78-35	3.251	3.20	3	B14	1.7	1.99	0.693	0.723
A 71	3-7	.	06931500	LITTLE BEAVER CR NR ROLLA MISSOURI	37-57	91-49	4.100	4.10	3	B20	2.2	2.39	0.379	0.362
A 72	3-9	.	01624000	BELL CR AT FRANK MILL STAUNTON VA	38-11	79-08	6.144	6.14	3	B14	1.9	2.15	0.746	1.057
A 73	3-10	.	01571000	PAXTON CR NR PENBROOK PENNA	40-20	76-50	7.106	7.17	3	B11	1.9	2.03	0.844	0.830
A 74	3-12	.	01573200	MANADA CR AT MANADA GAP PENNA	40-25	76-42	8.640	9.02	3	B11	1.9	2.04	0.878	1.004
A 75	3-13	.	06931000	BEAVER CR NR ROLLA MISSOURI	37-51	91-46	6.960	6.96	3	B20	2.2	2.39	0.913	1.005
A 76	3-14	.	03477500	BEAVER CR NR WALLACE VA	36-41	82-05	8.768	8.77	3	B14	1.9	2.16	1.150	1.147
A 77	3-17	.	01612500	LITTLE TONOLOWAT CR NR HANCOCK MARYLAND	39-43	78-15	10.816	10.8	3	B6	1.8	1.99	0.673	0.617
A 78	3-18	.	03307500	SF LITTLE BARREN RIVER AT EDMONTON KY	36-56	85-34	11.712	11.6	3	B17	2.0	2.12	2.150	2.303
A 79	3-19	.	03293000	MF BEARGRASS CR AT LOUISVILLE KY	38-14	85-35	12.095	11.6	3	B16	1.8	2.03	1.710	2.390
A 80	3-20	.	03292500	SF BEARGRASS CR AT LOUISVILLE KY	38-12	85-39	11.808	12.0	3	B16	1.8	2.03	2.250	2.265
A 81	3-21	.	07015000	BOURBEUSE RIVER NR ST JAMES MO	38-08	91-40	13.632	13.6	3	B20	2.3	2.39	1.090	1.145
A 82	3-22	.	01620500	NORTH RIVER NR STOKESVILLE VA	38-23	79-17	11.072	15.80	3	B14	1.8	2.13	0.786	0.770
A 83	4-2	.	01397500	WALNUT BR NR FLEMINGTON NEW JERSY	41-32	74-53	1.434	1.43	4	B11	2.0	2.11	0.172	0.288
A 84	4-3	.	01646550	LITTLE FALLS BRANCH NR BETHESDA MD	38-58	77-06	2.624	2.62	4	B11	2.4	2.84	0.296	0.303
A 85	4-5	.	02086000	DIAL CR NR BAHAMA NORTH CAROLINA	36-13	78-51	3.014	3.14	4	B12	2.2	2.61	0.800	0.980
A 86	4-6	.	01579000	BASIN RUN AT LIBERTY GROVE MARYLAND	39-40	76-05	3.396	3.40	4	B10	2.2	2.27	0.536	0.522
A 87	4-7	.	01477800	SHELLPOT CR AT WILMINGTON DEL	39-47	75-32	4.774	4.77	4	B10	2.2	2.25	0.667	0.756
A 88	4-8	.	03444500	SF MILLS RIVER AT THE PINK BEDS N C	35-22	82-46	6.394	6.39	4	B13	2.1	2.33	0.534	0.436
A 89	4-9	.	03442000	CRAB CR NR PENROSE NORTH CAROLINA	35-15	82-34	6.978	6.98	4	B13	2.1	2.34	0.505	0.267
A 90	4-10	.	01586000	PINEY RUN NR SYKESVILLE MARYLAND	39-25	77-01	7.296	7.30	4	B10	2.2	2.59	1.150	1.227
A 91	4-11	.	03513500	NOLAND CR NR BYSON CITY NORTH CAROLINA	35-31	83-24	8.832	8.83	4	B13	2.2	2.31	0.430	0.415
A 92	4-12	.	02099000	EF DEEP RIVER NR HIGH POINT N C	36-04	79-58	9.406	9.40	4	B13	2.2	2.36	1.310	1.410
A 93	4-13	.	03444000	BOYLSTON CR NR HORSESHOE N C	35-21	82-38	9.472	9.47	4	B13	2.1	2.33	2.050	1.896
A 94	4-15	.	01478000	CHRISTINA RIVER AT COOCHS BRIDGE DEL	39-41	75-47	13.128	13.1	4	B10	2.3	2.26	2.490	2.373
A 95	4-16	.	02115500	FORBUSH CR NR YADKINVILLE NORTH CAROLINA	36-11	80-36	13.866	13.9	4	B13	2.2	2.26	1.620	2.203
A 96	4-17	.	01654000	ACCOTINK CR NR ANNANDALE VIRGINIA	38-52	77-16	16.104	16.1	4	B10	2.3	2.62	2.320	1.929

Table 1. Continued.

SEQ #	USU P10	USU L	USU DD	USU STR	L/RTS	PHY ZN	PTR Q10	USU Q10	5SYR QM	5SY Q25	5SY Q50	Q2.33	Q10	Q10 LOG	Q25	Q50	Q10/A
A 49	6.00	2.60	1.39	0.0	.700	12D	0.530	0.295	0.237	0.325	0.350	0.230	0.420	0.410	0.560	0.690	0.1718
A 50	6.09	4.50	1.91	.1	.509	12D	0.630	0.840	0.560	0.950	1.070	0.520	1.000	1.000	1.450	1.820	0.3712
A 51	5.85	4.30	2.39	.02	.604	12D	0.590	0.330	0.225	0.387	0.430	0.210	0.350	0.350	0.440	0.510	0.1176
A 52	5.94	3.50	2.40	.3	.663	12D	0.520	0.355	0.248	0.410	0.450	0.225	0.360	0.330	0.540	0.694	0.1094
A 53	5.61	4.50	2.76	.5	.385	12D	0.940	0.900	0.460	1.130	1.310	0.450	0.825	1.000	5.150	7.660	0.2369
A 54	6.06	3.50	.76	.04	.781	12D	0.920	0.745	0.530	0.860	0.952	0.475	0.660	0.670	0.775	0.825	0.2135
A 55	5.49	5.40	4.34	.4	.516	8E	1.140	1.340	0.570	1.780	2.110	0.450	1.025	0.980	1.475	1.850	0.2587
A 56	5.97	5.70	4.19	.1	.587	8E	1.250	1.333	0.670	3.550	6.300	0.850	1.890	2.000	2.600	3.240	0.5218
A 57	5.61	4.70	5.66	.1	.400	12D	1.300	1.360	0.640	1.300	1.950	0.500	1.050	1.100	1.377	1.650	0.2245
A 58	5.66	5.00	11.18	0.0	.582	8E	1.100	1.500	0.700	2.500	3.270	0.831	2.217	2.078	2.956	3.553	0.4891
A 59	6.12	5.40	4.23	.2	.610	12D	2.300	4.650	1.100	13.000	26.000	1.200	4.240	4.100	6.130	7.610	0.6901
A 60	5.91	7.50	3.00	.02	.710	12D	2.100	2.625	1.100	3.550	4.270	2.900	2.850	1.300	2.900	5.320	0.3940
A 61	5.76	5.60	3.36	.2	.615	8E	1.900	1.755	0.990	2.250	2.575	0.900	1.610	1.550	2.270	2.770	0.2373
A 62	5.91	6.80	2.62	.2	.649	12D	2.350	2.680	1.200	3.500	4.150	1.200	2.300	2.400	2.970	3.490	0.3267
A 63	5.64	5.30	4.24	.5	.620	8E	1.420	0.972	0.530	1.290	1.495	0.555	0.990	0.980	1.155	1.305	0.1082
A 64	5.90	10.30	2.23	.3	.711	8C	3.950	5.210	1.700	8.300	10.400	1.600	4.400	4.300	8.700	8.450	0.2889
A 65	5.76	9.60	3.49	.01	1.274	12F	5.600	11.300	1.900	19.900	26.500	2.450	12.250	10.000	20.700	27.750	0.6174
A 66	6.88	0.24	13.13	0.0	.091	6A	0.014	0.028	0.004	0.041	0.051	0.003	0.027	0.025	0.038	0.047	1.3990
A 67	7.57	2.21	2.99	.3	.071	14A	0.635	1.190	0.370	1.680	2.840	0.388	0.960	0.940	1.290	1.560	1.4286
A 68	6.26	2.50	1.29	1.6	.118	6C	0.370	0.340	0.177	0.425	0.485	0.152	0.392	0.370	0.564	0.784	0.2562
A 69	5.16	2.60	2.01	.03	.104	8C	0.490	0.285	0.210	0.315	0.348	0.185	0.269	0.265	0.302	0.328	0.1425
A 70	6.32	5.50	4.22	.03	.473	6B	0.710	0.860	0.380	1.060	1.250	0.207	0.560	0.589	0.797	0.960	0.1723
A 71	7.57	3.30	3.59	.5	.322	14A	3.600	6.500	1.450	14.300	26.200	1.300	4.720	4.400	7.350	9.300	1.1512
A 72	6.62	6.10	3.30	.2	.287	6A	1.150	1.050	0.255	1.490	1.910	0.180	1.182	1.300	1.207	1.380	0.1924
A 73	6.46	5.50	1.98	0.0	.376	6B	2.000	1.820	1.450	2.120	2.350	1.425	1.750	1.620	2.025	2.225	0.2441
A 74	6.48	5.70	1.03	0.0	.594	6B	1.500	2.300	0.650	2.850	3.250	0.540	2.360	2.300	2.820	3.180	0.2731
A 75	7.57	6.60	3.44	.1	.692	14A	3.900	3.200	1.980	3.860	4.400	1.913	3.900	4.000	4.965	5.925	0.4353
A 76	6.85	7.80	4.92	.02	.696	6A	0.580	4.000	2.000	6.800	7.700	2.250	4.050	4.100	4.420	5.450	0.4619
A 77	6.34	6.00	4.24	.04	.346	6B	1.720	1.460	0.990	1.760	1.980	0.580	1.320	1.360	1.450	1.585	0.1220
A 78	6.73	9.50	3.43	.02	1.130	11A	2.380	2.050	1.550	2.350	2.580	1.340	1.920	1.950	2.100	2.240	0.1639
A 79	6.45	9.90	2.71	.1	1.144	11B	1.850	1.740	1.180	2.060	2.310	1.250	3.450	3.200	4.800	6.460	0.2852
A 80	6.45	9.00	2.07	.1	1.096	11B	1.550	2.100	0.930	3.500	5.200	1.200	2.925	3.200	4.210	5.400	0.2657
A 81	7.57	6.70	4.28	.6	.472	14A	8.700	7.610	4.300	11.200	13.700	3.840	6.720	6.600	8.100	9.480	0.4938
A 82	6.16	9.50	1.21	0.0	.697	6A	2.500	2.390	0.850	4.200	3.950	0.750	1.725	1.980	7.800	10.650	0.1558
A 83	6.63	2.70	1.69	0.0	.337	8C	0.490	0.440	0.235	0.550	0.640	0.220	0.470	0.470	0.610	0.720	0.3278
A 84	8.38	2.46	1.69	0.0	.289	4A	1.910	1.900	1.100	2.500	2.950	1.140	2.120	2.100	2.680	3.120	0.8879
A 85	7.97	5.00	2.80	0.0	.875	4A	0.740	1.050	0.420	1.510	1.870	0.378	1.200	1.100	5.800	9.400	0.3981
A 86	7.20	3.60	3.07	.1	.418	4A	1.240	1.480	0.670	1.920	2.260	0.870	2.420	2.500	3.410	4.200	0.7122
A 87	7.15	6.00	2.73	.1	.498	4A	2.900	3.090	1.480	4.500	5.490	1.235	2.775	3.150	3.825	4.650	0.5813
A 88	7.40	4.60	4.56	0.0	.133	5B	1.060	1.325	0.610	2.020	2.550	0.620	1.595	1.530	2.265	5.795	0.2495
A 89	7.43	4.20	2.91	.1	.125	5B	1.150	1.285	0.580	1.900	2.600	0.475	1.375	1.300	1.875	2.270	0.1971
A 90	8.04	8.00	3.59	0.0	1.069	4A	2.200	2.540	1.030	3.960	5.000	0.800	1.920	2.050	3.940	5.440	0.2632
A 91	7.32	8.30	3.90	0.0	.274	5B	1.800	1.350	0.980	1.610	1.790	1.010	1.585	1.680	1.980	2.270	0.1795
A 92	7.49	6.40	3.75	.1	1.022	4A	2.900	3.525	1.860	4.250	5.150	1.800	3.450	3.500	5.300	6.800	0.3667
A 93	7.40	11.40	24.96	.3	1.108	5B	0.750	0.760	0.586	0.863	0.940	0.576	0.760	0.760	0.865	0.940	0.0802
A 94	7.16	12.50	1.82	.1	1.698	4B	2.280	2.300	1.450	2.785	3.060	1.420	2.080	2.080	2.520	2.880	0.1585
A 95	7.17	11.00	3.74	.2	1.762	4A	2.130	2.180	1.010	1.763	4.000	1.290	2.200	2.130	2.720	3.080	0.1584
A 96	6.30	8.60	3.24	.1	2.265	4B	3.700	3.600	1.410	5.700	8.200	1.820	4.680	4.900	6.700	8.250	0.3099

Table 1. Continued. Explanation of numbered column headings.

[1]Potter's zone and watershed number.
[2]ARS#. These are the numbers the Agricultural Research Service has given to their experimental watersheds.
[3]USGS#. These are the standard gaging station numbers used in the U.S. Geological Survey water supply papers.
[4]Lat. This column is the latitude of the watershed center. Degrees and minutes.
[5]Long. This column is the longitude of the watershed center. Degrees and minutes.
[6]USU Area. The watershed area as measured by Utah State University personnel. Thousands of acres.
[7]Pt Area. The watershed area as reported by Potter. Thousands of acres.
[8]PTR ZN. Potter zone.
[9]PR Area. Soil Conservation Service problem area.
[10]PTP P60. The 10-year 1-hour precipitation as reported by Potter. Inches.
[11]USU P60. The 10-year 1-hour precipitation as determined by the authors. Inches.
[12]PTR T. The T value as reported by Potter.

$$T = 0.7L/\sqrt{S_1} + 0.3L/\sqrt{S_2}$$

[13]USU T. The T value as determined by the authors.
[14]USU P10. The 10-year 10-minute precipitation intensity in inches per hour.
[15]USU L'. The length in miles up the principal drainage channel from the culvert site to end of the channel delineated as either a solid or dashed blue line on the 7½ minute topographic map.
[16]USU DD. The drainage density as determined by the authors. Miles per 1000 acres.
[17]USU STR. Percent storage. The percentage of the surface area of the watershed occupied by lakes, swamps, playas, etc.
[18]L'/RTS. The length of the principal drainage divided by its mean slope.
[19]PHY ZN. The physiographic section of the watershed center from the map of Fenneman and Johnson.
[20]PTR Q10. The 10-year instantaneous peak runoff as reported by Potter. Thousands of cfs.
[21]USU Q10. The 10-year instantaneous peak runoff as determined by the authors with runoff data prior to 1958. Thousands of cfs.
[22]584 QM. The 2.33-year instantaneous peak runoff from data prior to 1958. Thousands of cfs.
[23]584 Q25. The 25-year instantaneous peak runoff from peaks prior to 1958. Thousands of cfs.
[24]584 Q50. The 50-year instantaneous peak runoff from peaks prior to 1958.
[25]Q2.33. The 2.33 year instantaneous peak runoff from peaks for the entire period of record.
[26]Q10. The 10-year instantaneous peak runoff from peaks for the entire period of record.
[27]Q10 L06. The 10-year instantaneous peak runoff from peaks for the entire period of record and using log Gumbel paper with a graphical method.
[28]Q25. The 25-year instantaneous peak runoff from peaks for the entire period of record.
[29]Q50. The 50-year instantaneous peak runoff from peaks for the entire period of record.
[30]Q10/A. The 10-year runoff peak per unit of area for the entire period of record.

manner and with log q_{10} minimized. These curves for Potter group 1 watersheds are shown complete with Potter's data points and USU measured data points in Figures 3 through 6 for Zones I through IV, respectively (p. 13-16). Potter's curve through the mean is also shown for reference. The reader is invited to draw his own conclusions regarding goodness of fit. In an effort to determine exactly how Potter obtained his line USU also minimized the log x deviations squared for the same data points. This line was nearer but still did not agree with Potter's line. The q_{10} vs. area relationships as represented by Potter's curves would tend to overemphasize the parameters other than area below the mean and reverse this affect above the mean. The most plausible explanation for the seemingly poor fit of Potter's line to the data is that Potter used graphical correlation to fit the data points and must have plotted the data to different scales than those used in Figures 3 through 6 (p. 13-16). The fit obtained by graphical correlation is scale dependent and can produce results similar to those in the referenced figures. Figure 7 (p. 17) shows the regres sion line relating ten year peak flow, q_{10}, to the watershed area, A, for all Potter watersheds with no zoning.

The watershed parameters and other appropriate data as determined by both Potter and USU are tabulated in Table 1 (p. 5-9). These basic data were either determined from USGS maps or from the publications of the USGS, the Agricultural Research Service (ARS), the Soil Conservation Service (SCS), and various State agencies concerned with water data.

Statistical t tests (Steel and Torrie, ref. 16) show no significant differences between the values of any of the basic parameters such as A, P factor, T factor or q_{10} determined by Potter or USU. The individual differences on watersheds appear to be higher or lower on an essentially random basis since there were no significant group differences. In the instance of drainage density, Potter's values were not published so could not be compared. However, the high correlation mentioned by Potter between DD and T factors yielded an r^2 value of 0.1602 with a log-log transform on 96 watersheds. This value is significant at the 1 percent level but obviously does not account for a major portion of the variability by itself.

The correlation between DD and area is similar to that between DD and T having an r^2 value of 0.1647 with the same 96 watersheds. Both of the DD relationships are much less correlated with area than the T factor where the r^2 value is 0.5479 using the same watersheds and 0.2405 with 545 watersheds (watersheds from all of the United States).

The relationship between the T factor and $L/\sqrt{S}$ has an r^2 of 0.9216 using 96 watersheds, and the t value between them is not significant, thus, there appears to be little choice between these parameters. This relationship is similar to the precision obtained for the two sets of measurements. $L/\sqrt{S}$ is a simpler parameter to visualize so should be a preferred parameter if all else were equal. It appears that the value of T published by Potter for the Zone II Watershed 29 is in error, possibly in printing, since the (1) in front of the decimal should be deleted to agree with the measured value.

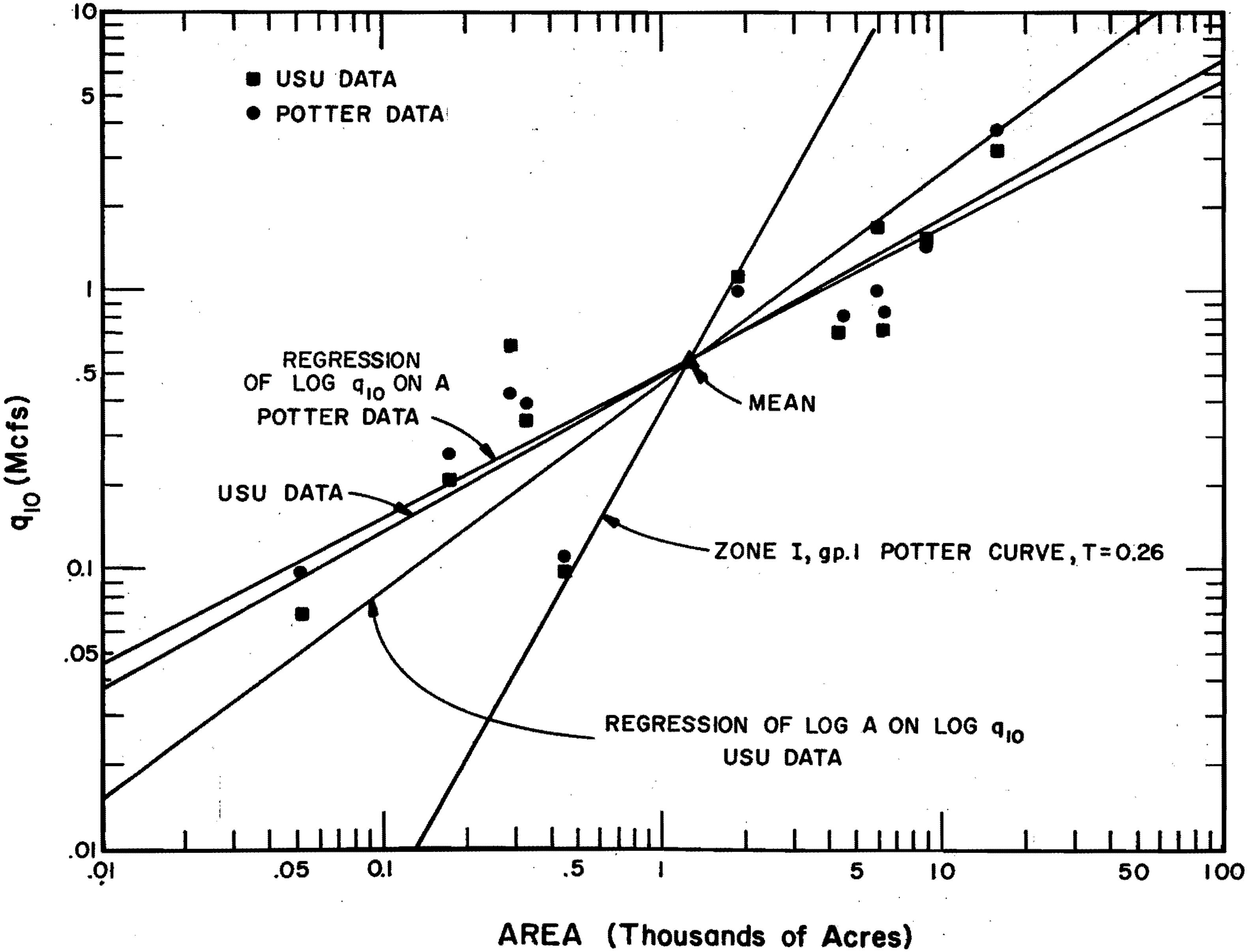

Figure 3. The relationship between 10-year peak flow and area for Potter Zone I, Group 1, watersheds obtained by regression analysis from Potter data and USU data and the graphical correlation curve for $\hat{Q}_{10(AT)}$ reported by Potter that goes through the mean of the data.

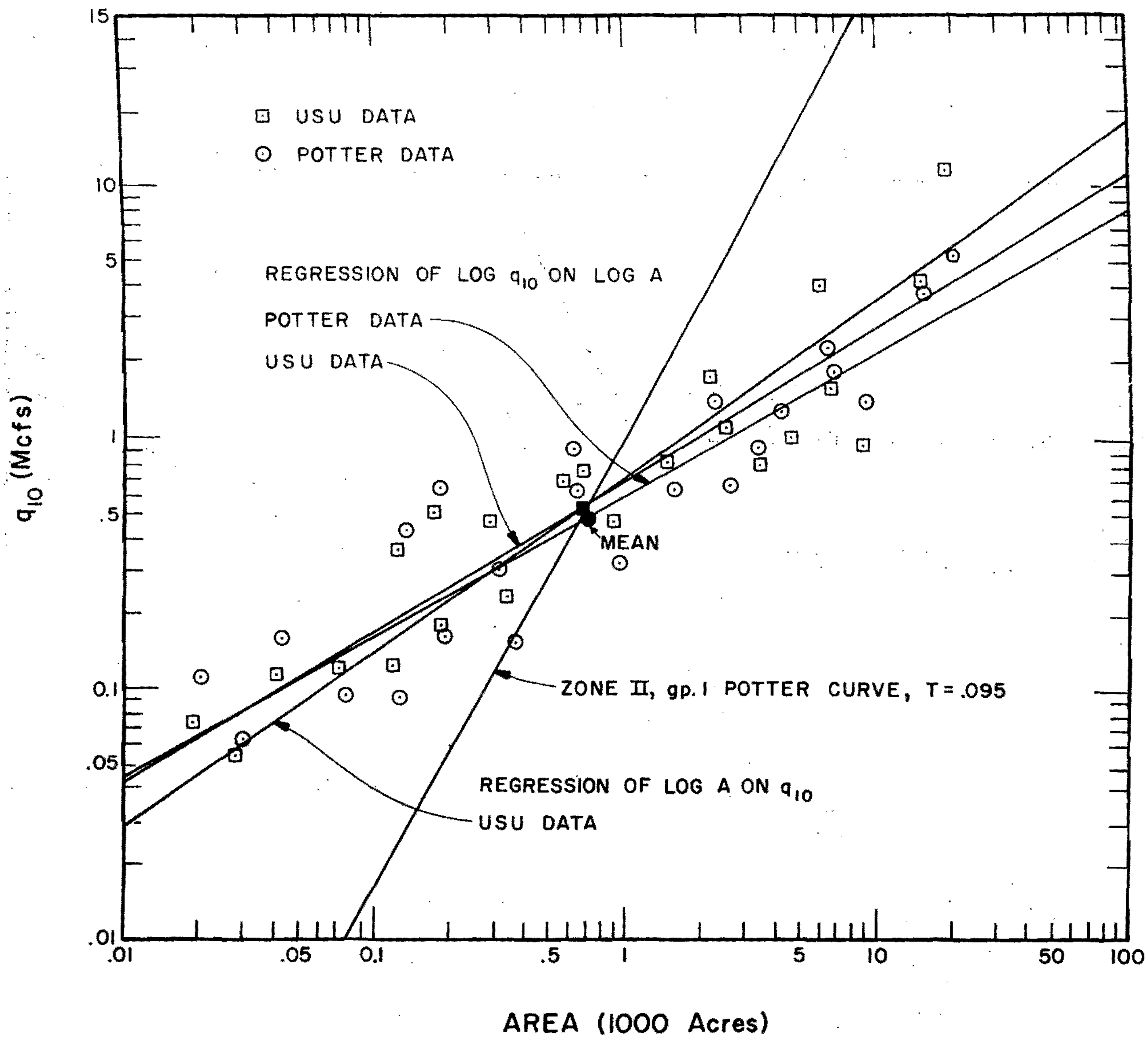

Figure 4. The relationship between 10-year peak flow and area for Potter Zone II, Group 1, watersheds obtained by regression analysis from Potter data, USU data and the graphical correlation [illegible] by Potter that [illegible] through the mean [illegible] the [illegible]ta.

Figure 5. The relationship between 10-year peak flow and area for Potter Zone III, Group 1, watersheds obtained by regression analysis from Potter data, USU data and the graphical correlation curve for $\hat{q}_{10(AT)}$ reported by Potter that goes through the mean of the data.

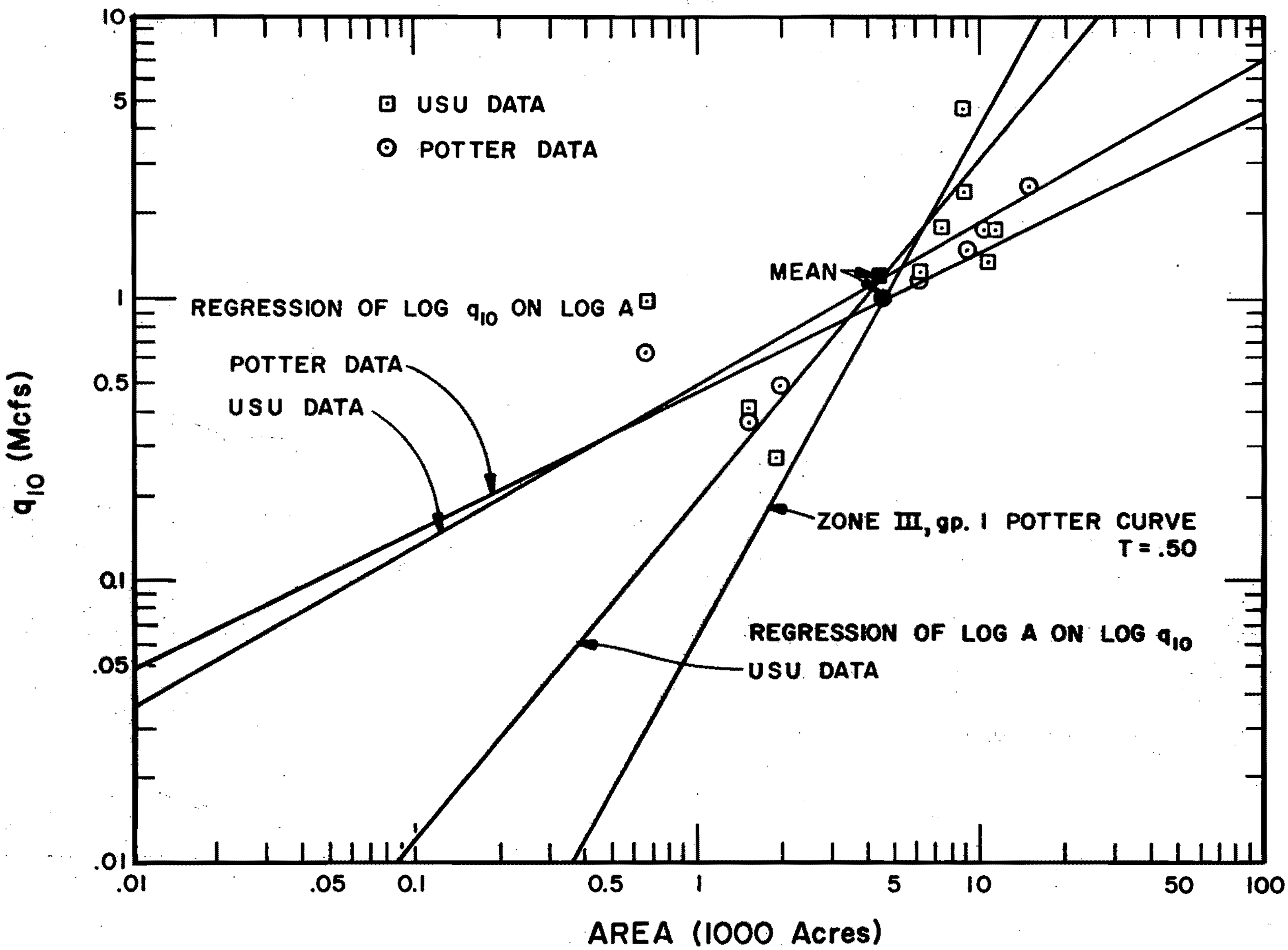

Figure 5. The relationship between 10-year peak flow and area for Potter Zone III, Group 1, watersheds obtained by regression analysis from Potter data, USU data and the graphical correlation curve for $\hat{q}_{10(AT)}$ reported by Potter that goes through the mean of the data.

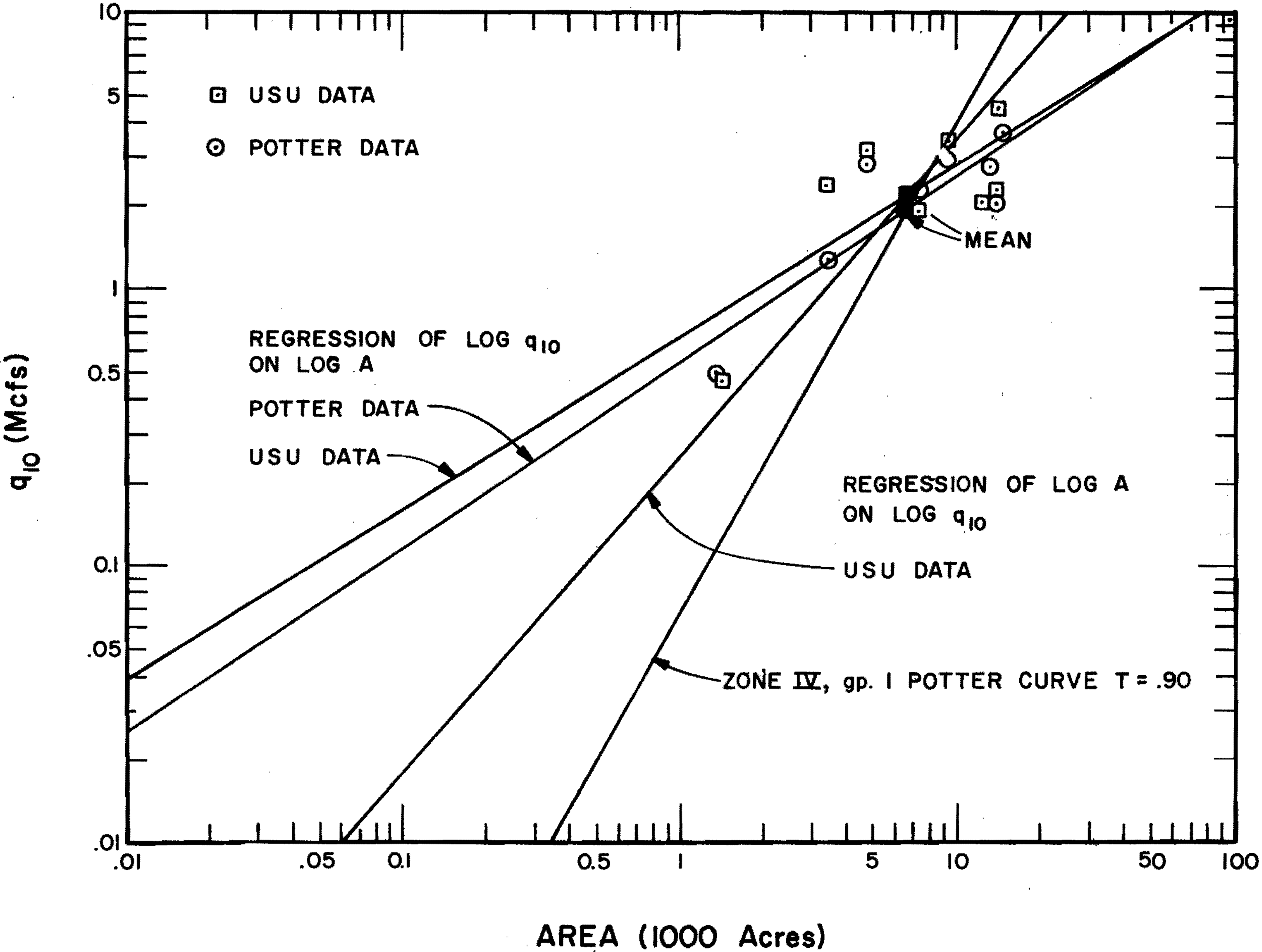

Figure 6. The relationship between 10-year peak flow and area for Potter Zone IV, Group 1, watersheds [illegible]ine[illegible] r[illegible]ssi[illegible]nal[illegible] fr[illegible] Pott[illegible] data, USU data and the graphical correlation [illegible] through[illegible] mean of the data.

Figu[illegible]. [illegible] re[illegible]ons[illegible] bet[illegible] 10-year peak flow and [illegible] for Potter Zone IV, Group I, [illegible] obtained by regression analysis from Potter data, USU data and the [illegible]hic [illegible]orr[illegible]tion curve for $\hat{q}_{10(AT)}$ reported by Potter that goes through the mean of the data.

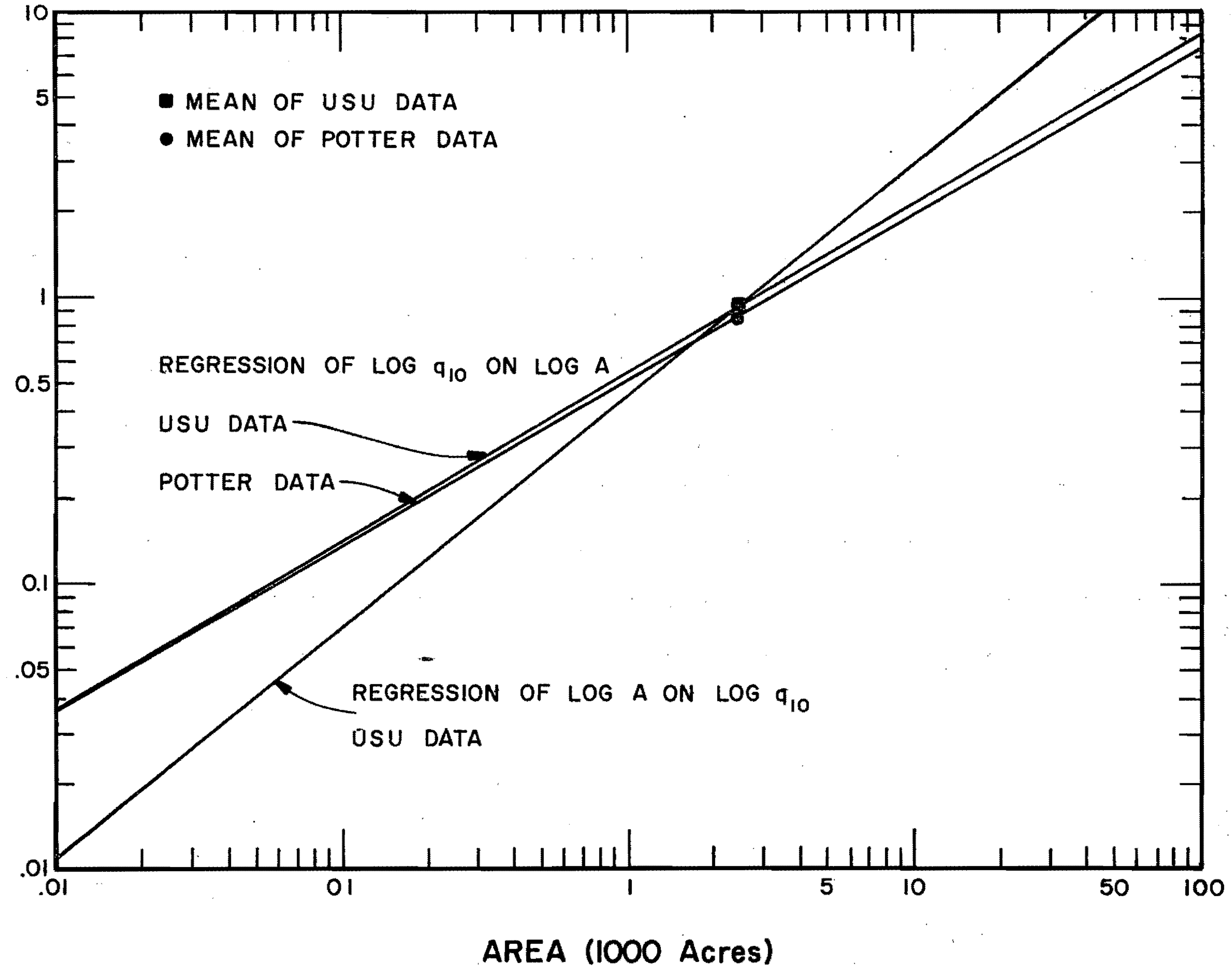

Figure 7. Comparison between the various regression equations relating the 10-year peak flow and area obtained from the USU data and the Potter data for all 96 Potter watersheds.

Potter zones. A study of the performance of Potter's four zones seemed to be in order. The map, "Problem Areas in Soil Conservation," Figure 8 (p. 19), was entered with the centroid location of each of Potter's watersheds to obtain the problem area. The problem areas indicated are:

Zone I	Zone II	Zone III	Zone IV
B-2	A-6	B-8	B-10
B-7	B-5	B-11	B-11
B-8	B-8	B-13	B-12
B-9	B-15	B-14	B-13
B-14	C-4	B-16	
B-15	D-24	B-17	
B-16		B-20	
C-8		B-26	
C-9			
C-10			

Note: B-8 appears in three zones, B-15 appears in two zones, and B-16 appears in two zones.

The 10-year peak flow per 1000 acres (q_{10}/A) was chosen as the parameter to represent runoff. The q_{10}/A values were tabulated, and t values were computed for each pair of problem areas where sufficient samples existed. The significant t values are compiled in Table 2 (p. 20).

The t values suggest the following conclusions:

1. Problem area A-6 is significantly different from all other problem areas where sufficient data exist to make the t test.

2. Problem area B-20 is significantly different from problem areas B-10, 1 and 16, and no other significant differences exist.

If this information is applied to Potter's zones, it suggests that Zone I is significantly different from the other zones except for the inclusion of problem areas B-8 and B-15. Because B-13, 16, and 20 are all in Zone III, the are differences between Zones III and IV. The t value for Zone II was signi cantly different from the other zones except III and in Zone III the value was just below the 5 percent level. The same weak differences are borne out b the similar slopes of the lines for each zone in Figures 3, 4, 5, and 6 (p. 1 16). Furthermore, if log q_{10}/A is plotted against log A, the range of diffe between the extremes is in the order of 14 percent which is certainly within t point spread about the lines.

Graphical correlation. If we adopt the division of watersheds of Potter (ref. 13) into Group 1 and Group 2, follow the graphical correlation technique as outlined by Ezekial and Fox (ref. 6), and construct a set of curves from Group 1 data for the relation between log q_{10} and log A, the curves of Figu 3 through 6 (p. 13-16) are obtained for each respective zone. All values are those derived by Potter. The residual y deviations or Δy_1 values from the

Figure 8. Map of the problem areas in soil conservation. Soil Conservation Service, Washington, D.C.

Table 2. Significance of t values for differences between peak flows per unit area and pairs of problem areas.

Problem Area	B8	B10	B11	B13	B14	B16	B20	C4
A6	**	**	**	**	*	**	*	**
B8								
B10							*	
B11								
B13							**	
B14								
B16							*	

*t value significant at the 5 percent level.

**t value significant at the 1 percent level.

Blank spaces and missing problem areas indicate non-significant t values or insufficient data to make the t test.

respective curves of Figures 3 through 6 (p. 13-16) are regressed against log T. Table 3 (p. 21) gives the equations derived during this process for each zone along with the correlation coefficient, r, indicating the goodness of f[it] of each equation. Note that the relative magnitude of the effect of T is smal[l] when compared to A as represented by the much smaller exponents and smaller [r] values given by the Δy_1 vs. log T relationship.

The residual y deviations from the regression of Δy_1 on log T or Δy_2 are next regressed against the log of the precipitation factor P_{60}, to get t[he] relationships also shown in Table 3 (p. 21).

In order to allow some of the beneficial effect of the interaction that may exist among the three independent variables being considered, A, T, and P_{60}, a correction equation is then obtained by regressing q_{10} against $\hat{q}_{10(ATP)}$ as estimated from applying the proper zone equations for each of the 52 Group Potter watersheds. This results in the correction equation also shown in Ta[ble] 3 (p. 21) and shown graphically as Figure 9 (p. 22).

The results of the above derived equations were then tested against th[e] Group 2 watersheds, data from which were not used in the derivation of the equations and are tabulated in Table 4 (p. 23). The error for the Group 2 data seems to be of the same order of magnitude as that for the Group 1 data thus indicating the validity of the approach.

When Potter tested his graphically derived equations against the Group 2 data, it became apparent that a correction factor was necessary. His appro[ach] was to relate the correction factor, C, to an error in the estimate of the topographic factor, $\hat{T}_{(AP)}$, as a function of area and 10-year 60-minute precipitation. He found that the relative errors in the Group 2 data could be

Table 3. Equations relating 10 year peak flow, q_{10}, to area, A, topographic factor, T, and the 10 year-60 minute precipitation, P_{60}, derived from Potter Group 1 data.

Zone	Equation	(1) n	(2) r
I	$\hat{q}_{10(A)} = 0.5043\ A^{0.5218}$	11	0.893
	$DY_1 = 1.0863\ T^{0.0544}$	11	0.147
	$DY_2 = 0.2239\ P_{60}^{2.1855}$	11	0.592
II	$\hat{q}_{10(A)} = 0.6187\ A^{0.5759}$	24	0.922
	$DY_1 = 1.0790\ T^{0.0398}$	24	0.117
	$DY_2 = 0.2643\ P_{60}^{1.8489}$	24	0.839
III	$\hat{q}_{10(A)} = 0.4647\ A^{0.4933}$	9	0.754
	$DY_1 = 1.0053\ T^{0.00805}$	9	0.013
	$DY_2 = 0.2852\ P_{60}^{1.9448}$	9	0.323
IV	$\hat{q}_{10(A)} = 0.5450\ A^{0.6646}$	8	0.851
	$DY_1 = 1.0018\ T^{0.0102}$	8	0.027
	$DY_2 = 0.2515\ P_{60}^{1.7523}$	8	0.224
All Zones Correction Equation	$\hat{q}_{10(K)} = 1.02901\ \hat{q}_{10(ATP)}^{1.0810}$	52	0.963

Notes explaining the column headings:

(1) n is the number of watersheds used in the analysis.

(2) r is the correlation coefficient between two variables x + y. It is calculated by:

$$r = \frac{\Sigma(x - \overline{x})(\Sigma y - \overline{y})}{\sqrt{\Sigma(x - \overline{x})^2\,\Sigma(y - \overline{y})^2}}$$

where x and y are the independent and dependent variables respectively.

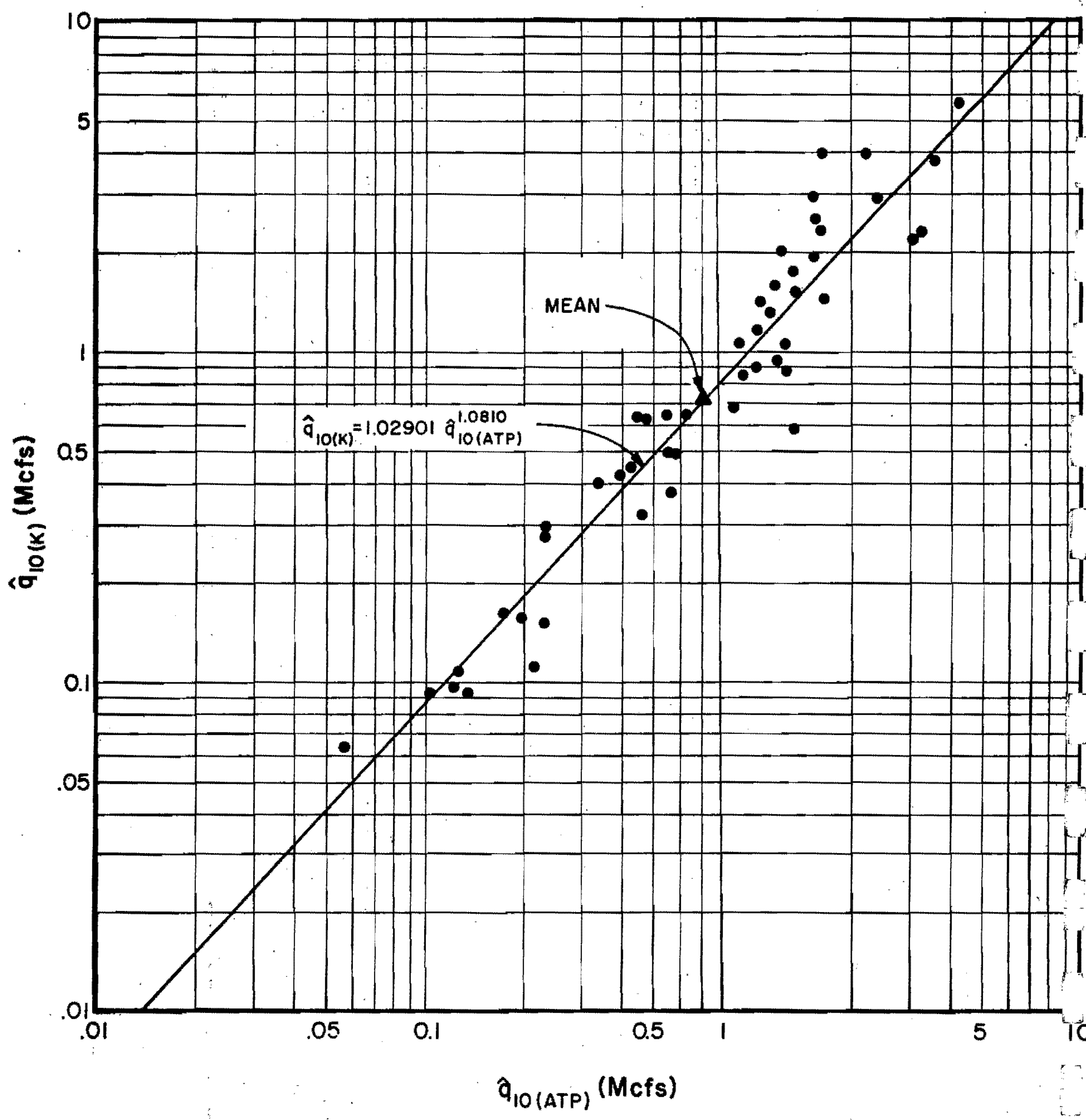

Figure 9. The K correction curve. The relationship between the observed values of the 10-year flow peaks and those estimated by graphical correlation with area, topographic factor, and precipitation factor for Potter Group 1 data.

Table 4. Comparison of 10-year runoff peaks and estimates (Potter methods).

	Watershed No.	$\hat{q}_{10}$ Mcfs	$\hat{q}_{10(ATP_{60})}$ Mcfs	$\hat{q}_{10(K)}$ Mcfs	Error % of $\hat{q}_{10(K)}$
Zone I					
Group 1	1	0.096	0.121	0.105	8.5
	2	0.270	0.231	0.211	-27.9
	3	0.440	0.424	0.407	- 8.1
	4	0.400	0.340	0.321	-24.8
	6	1.060	0.921	0.941	-12.6
	12a	0.110	0.217	0.197	44.2
	39	0.830	0.938	0.960	13.6
	42	1.050	1.263	1.324	20.7
	44	0.860	1.280	1.344	36.0
	50	1.550	1.189	1.241	-24.9
	58	3.900	1.652	1.770	-120.3
Group 1 $\hat{q}_{10}$ mean = 0.9605 Mcfs					
Percent Standard Error of Estimate = 77.5					
Group 2	5	0.690	0.530	0.518	-33.2
	8	0.860	0.818	0.828	- 3.8
	9	0.860	0.930	0.952	9.6
	10	0.910	0.905	0.924	1.5
	19	1.750	1.523	1.622	- 7.9
	20	1.800	0.957	0.981	-83.4
	22	5.600	2.638	2.936	-90.7
	13a	0.142	0.344	0.324	56.1
	18b	0.179	0.344	0.324	44.9
	38	0.660	0.982	1.009	34.6
	41	1.300	1.125	1.169	- 7.7
	47	0.820	1.256	1.316	37.7
	49	1.150	1.429	1.514	24.0
	53	1.870	1.739	1.872	0.1
	55	2.050	1.812	1.956	- 4.8
	56	2.050	1.396	1.476	-38.9
Group 2 $\hat{q}_{10}$ mean = 1.4182					
Percent Standard Error of Estimate = 55.7					
Zone II					
Group 1	1	0.107	0.129	0.112	4.9
	2	0.061	0.057	0.047	-31.2
	3	0.155	0.200	0.181	14.2
	4	0.092	0.102	0.087	- 5.5
	5	0.096	0.103	0.088	- 8.9
	6	0.092	0.137	0.120	23.3
	7	0.420	0.393	0.375	-12.0
	8	0.620	0.472	0.457	-35.7
	9	0.160	0.176	0.157	- 1.7
	10	0.295	0.233	0.213	-38.4
	11	0.150	0.230	0.210	28.6
	14	0.900	1.011	1.041	13.6
	15	0.630	0.444	0.428	-47.3
	16	0.320	0.461	0.446	28.2
	21	0.630	0.630	0.624	-0.9
	26	1.400	1.071	1.108	-26.3
	28	0.660	0.868	0.883	25.3
	33	0.940	1.234	1.292	27.2
	37	1.300	1.153	1.200	- 8.3
	43	2.300	1.627	1.742	-32.1
	46	1.900	1.571	1.677	-13.3
	51	1.420	1.660	1.780	20.2
	57	3.950	2.252	2.475	-59.6
	59	5.600	4.364	5.060	-10.7
Group 1 $\hat{q}_{10}$ mean = 1.008					
Percent Standard Error of Estimate = 38.7					
Zone II (Continued)					
Group 2	20	1.420	1.477	1.569	9.5
	22	0.230	0.657	0.653	64.8
	23	0.385	0.737	0.740	47.9
	27	0.918	1.065	1.102	16.7
	29	0.530	0.949	0.973	45.5
	30	0.830	0.935	0.957	13.3
	31	0.590	0.979	1.006	41.3
	32	0.520	1.024	1.055	50.7
	34	0.920	1.083	1.121	16.6
	35	1.140	1.127	1.171	2.7
	36	1.250	1.149	1.196	- 4.5
	40	1.100	1.245	1.304	15.7
	45	2.100	1.587	1.695	-23.8
	48	2.350	1.609	1.721	-36.6
Group 2 $\hat{q}_{10}$ mean = 1.0202					
Percent Standard Error of Estimate = 36.7					
Zone III					
Group 1	2	0.635	0.546	0.535	-18.7
	3	0.370	0.566	0.556	33.5
	4	0.490	0.580	0.571	14.2
	9	1.150	1.134	1.179	2.4
	10	2.000	1.225	1.281	-56.1
	12	1.500	1.372	1.448	- 3.6
	14	0.580	1.356	1.430	59.4
	17	1.720	1.347	1.420	-21.1
	22	2.500	1.586	1.694	-47.6
Group 1 $\hat{q}_{10}$ mean = 1.216					
Percent Standard Error of Estimate = 44.3					
Group 2	1	0.014	0.070	0.058	75.9
	6	0.710	0.662	0.659	- 7.8
	7	3.600	1.229	1.286	-180.0
	13	3.900	1.820	1.965	-98.4
	18	2.380	1.729	1.860	-28.0
	19	1.850	1.418	1.501	-23.2
	20	1.550	1.433	1.518	- 2.1
	21	8.700	2.441	2.700	-222.2
Group 2 $\hat{q}_{10}$ mean = 2.838					
Percent Standard Error of Estimate = 97.0					
Zone IV					
Group 1	2	0.490	0.575	0.566	13.4
	6	1.240	1.223	1.279	3.1
	7	2.900	1.536	1.636	-77.2
	10	2.200	2.049	2.235	1.5
	12	2.900	2.427	2.683	- 8.1
	15	2.280	3.293	3.732	38.9
	16	2.130	3.155	3.563	40.2
	17	3.700	3.616	4.129	10.4
Group 1 $\hat{q}_{10}$ mean = 2.230					
Percent Standard Error of Estimate = 44.8					
Group 2	3	1.910	1.191	1.243	-55.6
	5	0.740	1.652	1.214	39.0
	8	1.060	1.715	1.844	42.5
	9	1.150	1.818	1.963	41.4
	11	1.600	2.302	2.534	36.9
	13	0.750	2.258	2.482	69.8
Group 2 $\hat{q}_{10}$ mean = 1.202					
Percent Standard Error of Estimate = 100.3					

Error % of $q_{10(K)}$ is defined as

$$\frac{\hat{q}_{10} - \hat{q}_{10(K)}}{\hat{q}_{10(K)}} \times 100$$

percent standard error of estimate is defined as

$$\frac{100}{\hat{q}_{10\,mean}} \sqrt{\frac{\Sigma(\hat{q}_{10} - \hat{q}_{10(K)})^2}{n-2}}$$

greatly reduced by the development of a correction factor derived from using the Group 2 data. However, this left no possibility of an independent check of the method as this exhausted the data available to him at that time, but gave the best fit he could achieve by graphical methods, which he then published. USU tested an extension of the method described above which may be termed as a modified Potter method and is described in the following sections.

Improve Potter's Method with Additional Years of Data

Determination of 10-year flood peak

Climate, record length, and the procedure for determining the 10-year annual flood peaks influence the values obtained. Schmidt (ref. 14) compared the commonly used distributions for determination of flood frequencies on 167 watersheds within the Great Basin and the Colorado River Drainage Basin. He found that within the range of the data, the inverse cubic polynomial fit the flood data consistently best; and Gumbel, log normal, and log Pearson III wer good fitting functions within the range of the data.

It was mentioned earlier, that the Potter values of q_{10} and those derive by USU using the same upper and lower frequency method were not significantly different by the t test. The r^2 value for this comparison was 0.789 indicating that some differences in the form of "noise" exist but are sufficiently random in nature that the t value is not significant. The r^2 values for Potter q_{10} versus USU q_{10} with additional years of record were 0.679 and for USU q_{10} to 1958 and q_{10} to date, 0.895. The difference or unexplained variation is random in nature. Note that there is a greater difference between operators than between the two different sets with different numbers of years of record.

Other return periods

Table 5 (p. 25) shows the simple correlation coefficients between different return values of annual flood peaks determined from the data through 1958 and to the present. Some watersheds were discontinued during the period between 1958 and the present so the record lengths are variable but most watersheds had additional years of record between 1958 and the present. The distribution of the record lengths may be seen in Figure 10 (p. 26).

The correlations between the various frequencies are all close but there is a consistently closer relation between the q_{10} and q_{50} values than between q_{10} and $q_{2.33}$. There is a poorer relation with the q_{10} values derived by the log extreme method than between values derived from different record lengths. The correlations between the peak flow values to 1958 and the same frequencies of q to date are as follows: 2.33 yr., r = 0.743; 10 yr., r = 0.946; 25 yr. r = 0.885; and 50 yr., r = 0.765. This suggests that Potter showed wisdom in working with q_{10} values and then calculating other return periods from the q_{10}

Table 5. Correlation coefficients, r, for various frequencies and record lengths.

	USU q_{10} to 58	Potter q_{10}	USU q_{10} to Date	USU Log q_{10} to Date	USU q_{25}	USU q_{50}
USU to 1958						
q_{10}	---	0.888	0.972	0.963	0.921	0.890
$q_{2.33}$	0.835	0.933	0.812	0.856	0.708	0.661
q_{25}	0.963	0.786	0.923	0.903	---	0.858
q_{50}	0.883	0.682	0.830	0.809	0.970	---
USU to Date						
q_{10}	0.972	0.862	---	0.985	0.943	0.916
$q_{2.33}$	0.827	0.871	0.832	0.838	0.714	0.683
q_{25}	0.921	0.795	0.932	0.936	---	0.992
q_{50}	0.890	0.752	0.916	0.897	0.992	---
log q_{10}	0.963	0.888	0.985	---	0.932	0.897

Effects of record length on interrelationships among parameters

Table 6 (p. 27) shows a group of correlation coefficients for watershed parameters for the period through 1958 and with the records to date. Consistently, the coefficients are higher as the record gets longer, as one would expect. All relationships have the same number of watersheds (96) in the correlation.

Map scale effects

Map scales effect the physical parameters read therefrom principally because the smaller the map scale ratio, the shorter are the lengths of the drainages drafted in blue lines. If scales are other than the 7½ minute quadrangles, a correction factor must be used to make values comparable. Figure 11 (p. 28) shows the relationship between L values derived from the 1:24,000 and 1:250,000 scale maps. The r^2 is about 0.9 for this relationship. It appears to be within the errors in the determination of q_{10}, but note that the curve slope is not 1:1 and that maps with scales nearer the 7½ minute maps would be between the 1:1 and the line of Figure 11 (p. 28).

Figure 12 (p. 29) gives the relationship between DD from the 1:24,000 and the DD from the 1:250,000 scale maps. The r^2 for this relation is naturally

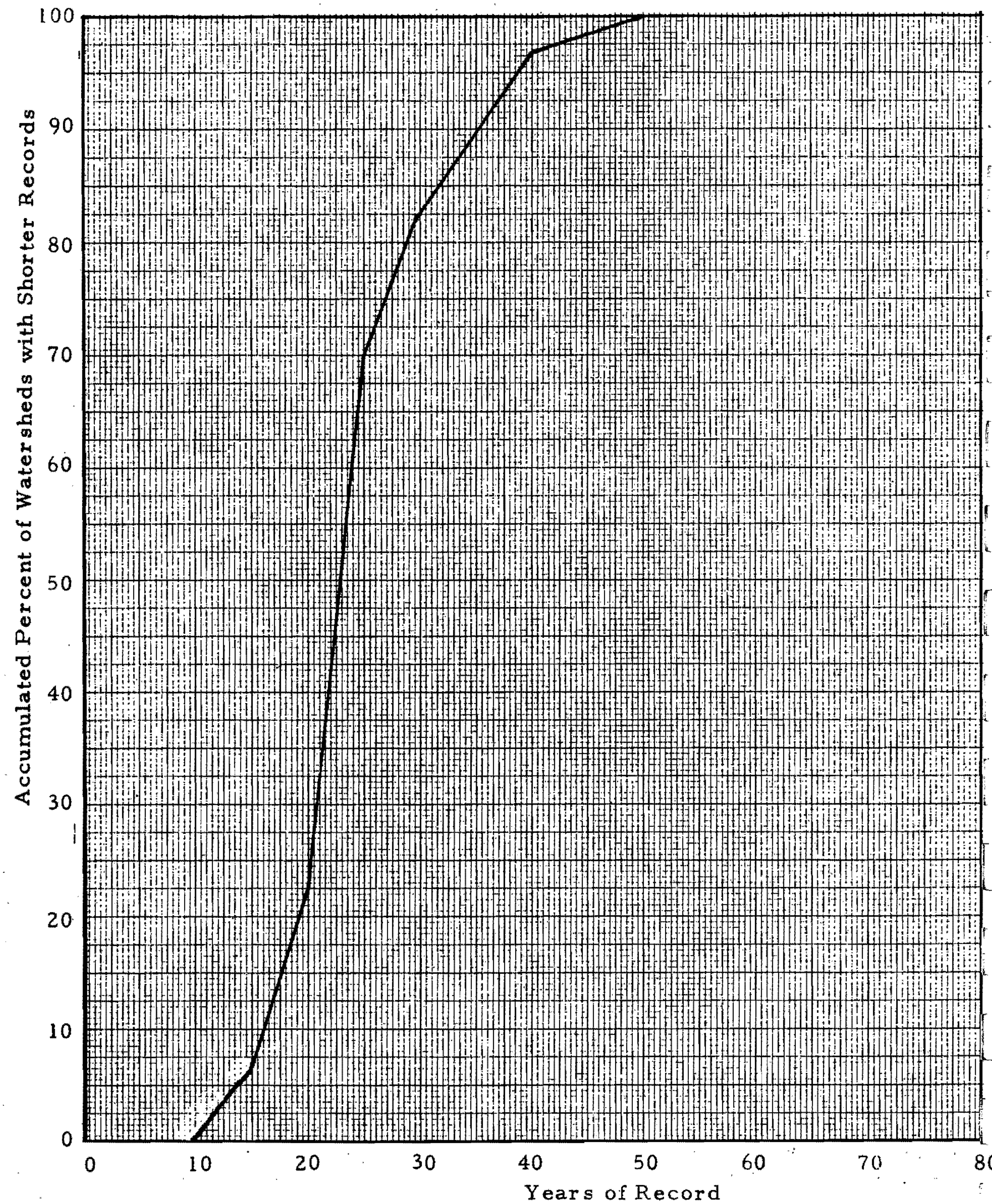

Figure 10. The distribution of record lengths on the Potter watersheds in the "to date" sample.

Table 6. Correlation coefficients, r, for watershed parameters with 10-year peak flows, q_{10}, derived from watershed records through 1958 and with additional years to date.

	USU q_{10} to 58	q_{10} to Date	q_{10}/A to Date
<u>Linear</u>			
USU Area	0.691**	0.711**	-0.498**
USU T	0.417**	0.470**	-0.529**
USU P_{60}	0.215*	0.266*	0.552**
L	0.523**	0.545**	-0.601**
USU DD	-0.240	-0.179*	0.244**
Storage	-0.173	-0.168	0.518**
P_{10}	0.209*	0.234*	0.558**
q_{50}	0.883**	0.830**	-0.172
<u>Log-log</u>			
USU T	0.619**	0.641**	-0.727**
USU DD	-0.275**	-0.288**	0.367**

* is 5 percent probability.
** is 1 percent probability.
(Note that the transformed data correlates better than the untransformed.)

somewhat poorer than for the L values, but the DD values are still usable if no better maps are available.

The mean slope of a watershed can readily be determined even on the 1:250,000 map. Thus an estimate of $L/\sqrt{S}$ can readily be made. The relation between Potter's T and $L/\sqrt{S}$ values measured from the same scale maps are given in Figure 13 (p. 30). The r^2 for this relation is 0.9216, so it could be used with confidence.

<u>Extend Potter's Method to Additional Areas in States Sampled by Potter</u>

<u>Location of Potter and new watersheds</u>

The locations of Potter's watersheds and the additional watersheds in the same States are shown in Figure 14 (p. 31). The descriptions of each of the Potter watersheds are given in Table 1 (p. 5-9) and the data for the additional watersheds considered in this phase are given in Table 7 (p. 32-36). As may be seen in Figure 14 (p. 31), the Potter States are Delaware, Illinois, Iowa, Kentucky, Maryland, Missouri, Nebraska, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Texas, Virginia, and Wisconsin.

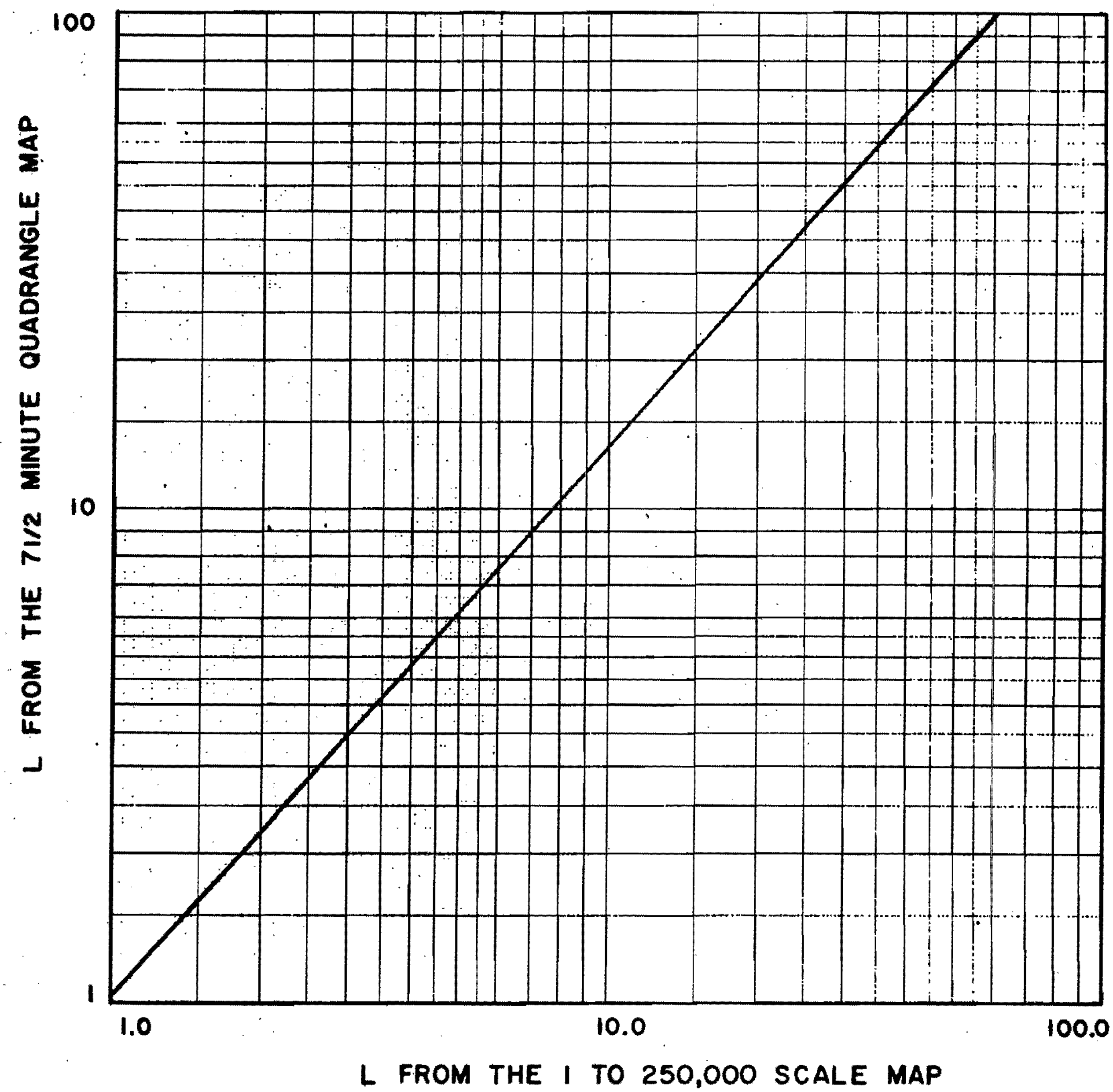

Figure 11. The relationship of L values measured on 1:24,000 maps to those measured on 1:250,000 maps.

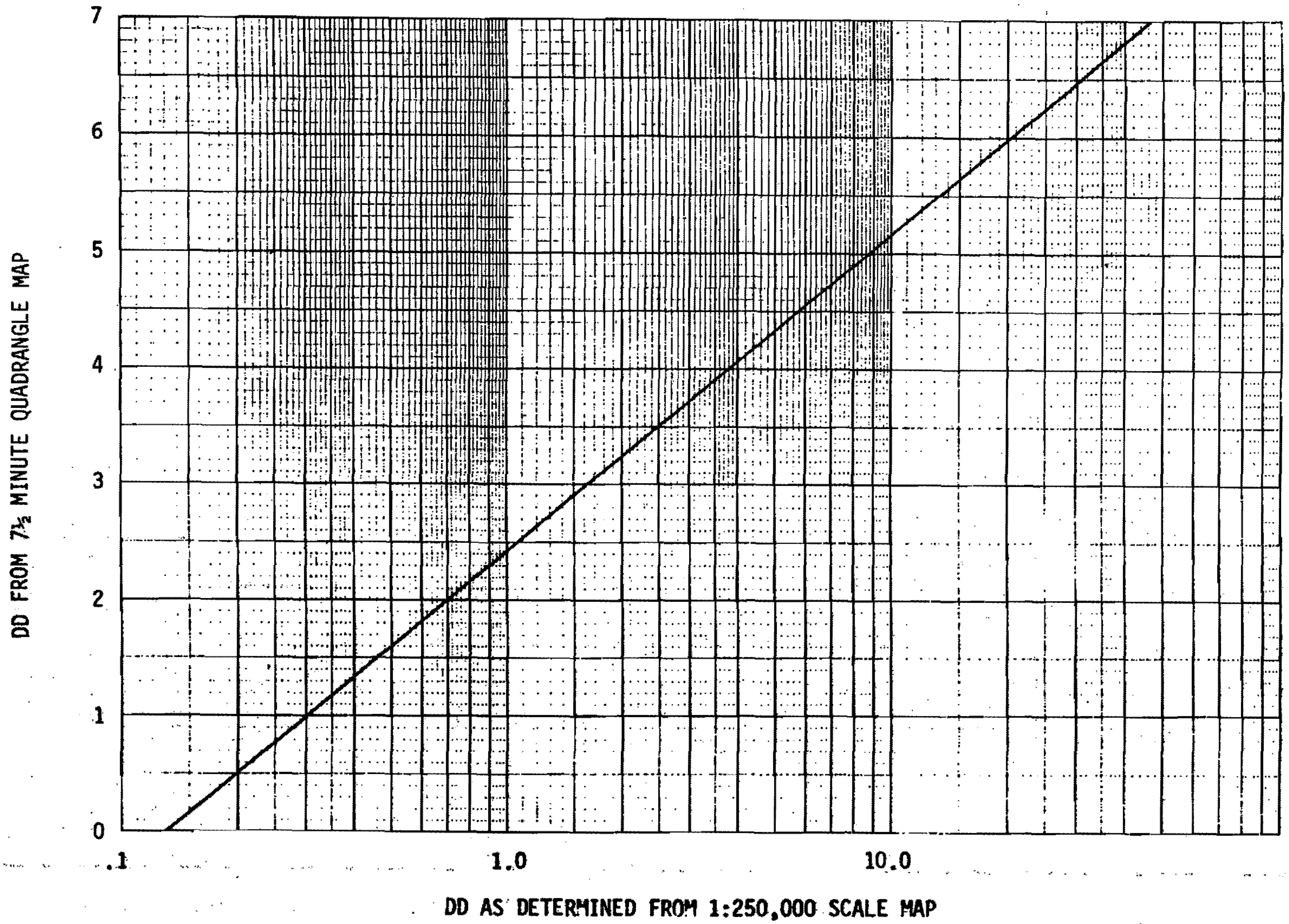

Figure 12. The relationship of DD from 1:24,000 scale maps to DD from the 1:250,000 scale maps.

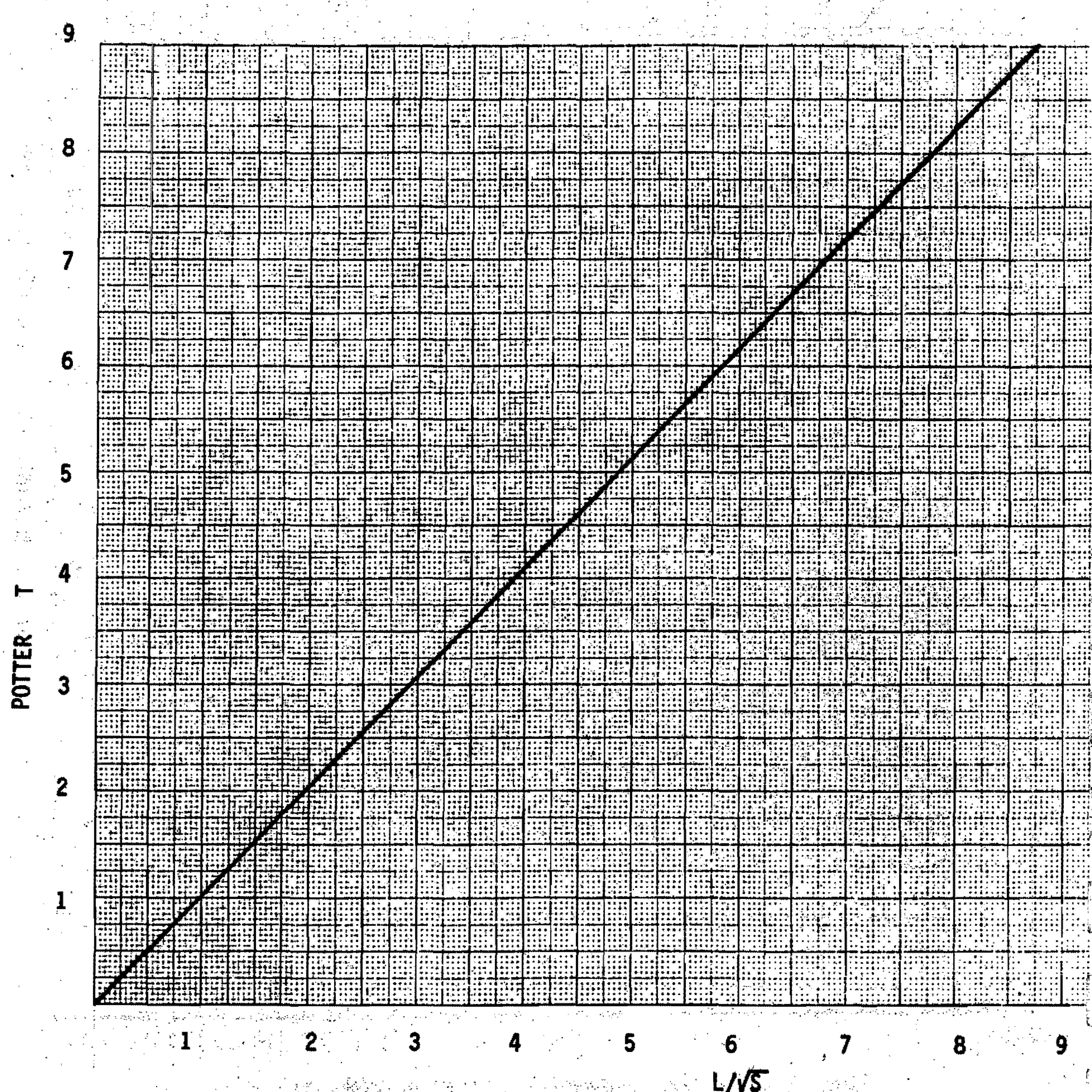

Figure 13. The relationship of Potter's T to $L/\sqrt{s}$ for the Potter watersheds.

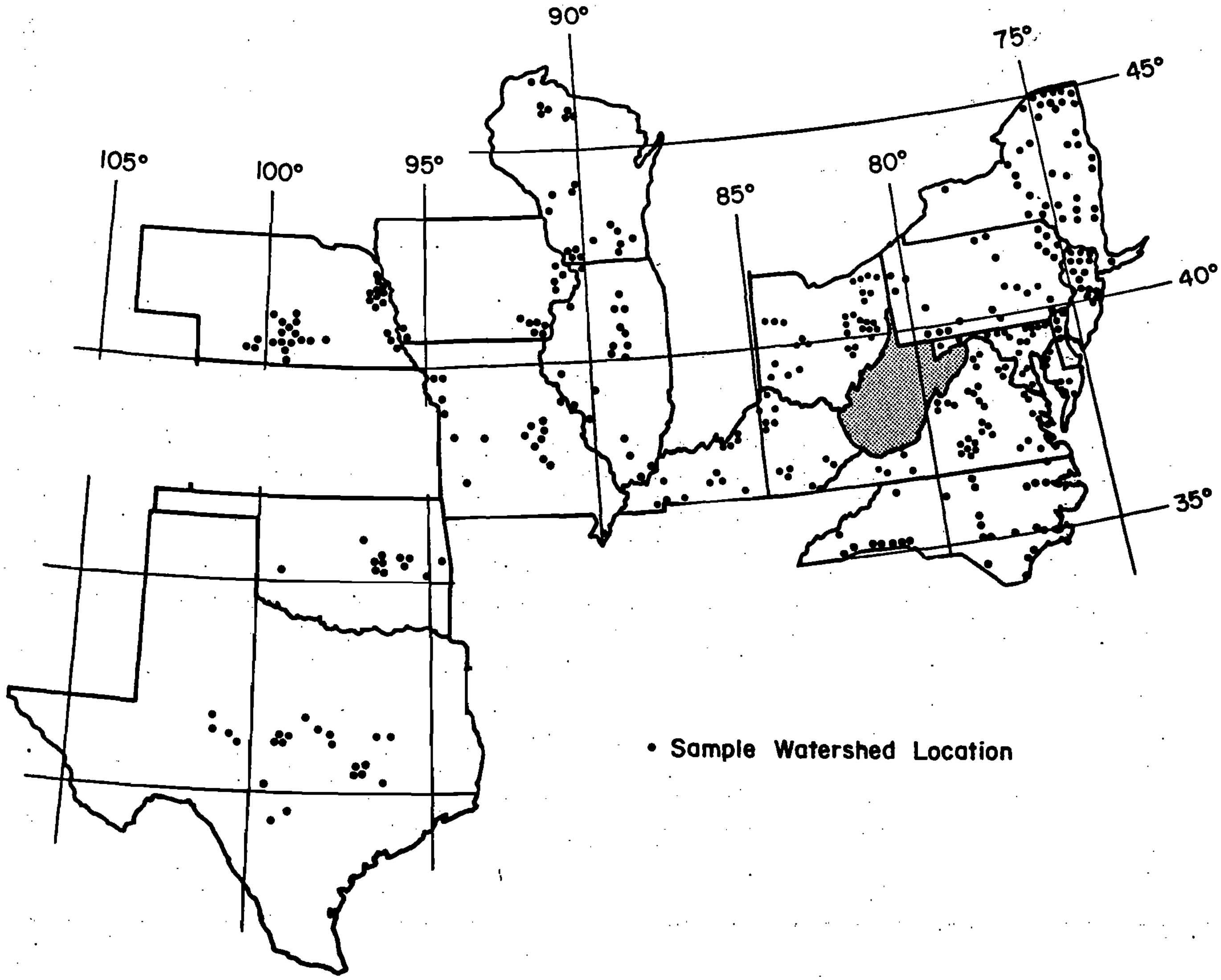

Figure 14. The location of the 270 sample watersheds in the States considered by Potter.

Table 7. Data on additional watersheds in Potter States.

SEQ	#	STATION	STATION NAME	LAT	LONG	1 SQ MI	2 TH ACRE	3 PTR ZN	4 PRB AREA	5 P60	6 P10	7 PTR T	8 DD	9 STORAGE	10 LENGTH	11 PHYS ZN	12 Q10	13 Q50	14 Q10/A
B	1	01483500	LEIPSIC R NR CHESWOLD DELAWARE	39-14	075-38	9.35	5.9840	4	A1	2.46	7.67	1.572	0.947	0.0	5.09	3A	0.636	1.108	0.107
B	2	01483200	BLACKBIRD CR AT BLACKBIRD DELAWARE	39-22	075-40	3.85	2.4640	4	A1	2.42	7.77	1.159	2.151	0.0	5.20	3A	0.387	0.593	0.157
B	3	01484500	STOCKLEY BR AT STOCKLEY DELAWARE	38-30	075-21	5.24	3.3536	4	A2	2.60	8.35	0.875	0.716	0.0	2.40	3A	0.100	0.135	0.030
B	4	01490470	TAPPAHANNA DITCH NR HARTLY DELAWARE	39-07	075-42	5.93	3.7952	4	A2	2.51	7.97	1.540	0.725	0.0	2.79	3A	0.120	0.156	0.032
B	5	03344500	RANGE CR NR CASEY ILLINOIS	39-20	088-02	7.60	4.8640	1	C8	2.08	6.67	1.271	0.945	0.0	4.59	12D	2.443	3.703	0.502
B	6	03385000	HAYES CR AT GLENDALE ILLINOIS	37-25	088-40	18.90	12.0960	3	B19	2.22	7.03	2.926	1.536	0.0	11.75	3D	4.384	6.166	0.361
B	7	03386500	SUGAR CR NR DIXON SPRINGS ILLINOIS	37-24	088-40	9.70	6.2080	3	B19	2.22	7.08	1.148	1.107	1.0	6.08	3D	1.692	1.987	0.273
B	8	05435000	CEDAR CR NR WINSLOW ILLINOIS	42-28	89-50	1.29	.8256	1	C10	2.08	6.58	0.323	1.050	0.0	2.10	12D	0.106	.156	0.131
B	9	05526500	TERRY CR NR CUSTER PARK ILLINOIS	41-14	098-08	12.00	7.6800	1	C8	1.96	6.40	2.205	1.088	0.0	6.65	12D	0.869	1.107	0.087
B	10	05536500	TINLEY CR NR PALOS PARK ILLINOIS	41-39	087-46	11.30	7.2320	1	C4	1.94	6.28	1.612	1.280	0.0	7.58	12D	0.875	1.233	0.121
B	11	05537500	LONG RUN NR LEMONT ILLINOIS	41-39	088-00	20.80	13.3120	1	C5	1.95	6.31	3.014	1.027	0.0	8.58	12D	1.712	2.864	0.129
B	12	05549000	BOONE CR NR MCHENRY ILLINOIS	42-19	088-19	15.30	9.7920	1	C11	1.96	6.31	2.389	1.114	0.0	7.68	12D	0.228	0.260	0.023
B	13	05559000	GIMLET CR AT SPARLAND ILLINOIS	41-02	089-26	5.42	3.4688	1	B8	2.08	6.67	0.576	1.050	0.0	4.30	12D	1.860	2.893	0.536
B	14	05566000	EAST BR PANTHER NR GRIDLEY ILLINOIS	40-46	088-54	6.30	4.0320	1	C9	2.06	6.61	0.826	0.544	0.0	2.40	12D	0.435	1.085	0.108
B	15	05574000	SOUTH FK SANGAMON R NR NOKOMIS ILLINOIS	39-21	089-15	10.80	6.9120	1	C8	2.17	6.88	1.813	0.941	0.0	5.45	12D	4.252	6.836	0.615
B	16	05586500	HURRICANE CR NR ROODHOUSE ILLINOIS	39-29	090-25	2.33	1.4912	1	C9	2.25	7.15	0.447	0.870	0.0	2.35	12D	0.566	1.166	0.380
B	17	05589500	CANTEEN CR AT CASEYVILLE ILLINOIS	38-39	090-01	22.50	14.4000	1	C7	2.27	7.21	2.833	1.254	0.0	10.48	12D	5.120	9.068	0.358
B	18	05590000	KASKASKIA R AT BONDVILLE ILLINOIS	40-07	088-21	12.30	7.8720	1	C8	2.06	6.58	1.294	0.806	0.0	5.00	12D	0.893	1.652	0.113
B	19	05591500	ASA CR AT SULLIVAN ILLINOIS	39-37	088-36	7.93	5.0752	1	C9	2.10	6.73	1.314	0.882	0.0	2.89	12D	0.797	1.199	0.157
B	20	05595500	MARYS R NR SPARTA ILLINOIS	38-08	089-39	17.80	11.3920	1	C8	2.27	7.24	2.592	1.133	0.0	8.40	12D	4.454	9.884	0.391
B	21	05414450	NFK L MAQUOKETA R NR RICKARDSVILLE IOWA	42-35	090-51	22.80	14.5920	1	C10	2.10	6.67	2.703	1.145	0.0	12.24	12E	4.131	6.231	0.263
B	22	05414600	L MAQUOKETA R TRIB AT DUBUQUE IOWA	42-33	090-42	1.51	0.9664	1	C10	2.09	6.64	0.244	1.050	0.0	2.28	12C	1.912	2.970	0.368
B	23	05453600	RAPID CR BELOW MORSE IOWA	41-44	091-25	8.12	5.1968	1	C11	2.21	7.00	1.146	1.362	0.0	4.55	12E	1.779	2.746	0.342
B	24	05453700	RAPID CR TRIB NO 4 NR OASIS IOWA	41-43	091-25	1.95	1.2480	1	C9	2.21	7.00	0.421	0.883	0.0	2.17	12E	0.821	0.958	0.498
B	25	05453750	RAPID CR SUBWTRSD AT MORSE IOWA	41-43	091-26	15.20	9.7280	1	C9	2.21	7.00	1.689	0.915	0.0	8.28	12E	2.909	4.419	0.299
B	26	05453850	RAPID CR TRIB NO 3 NR OASIS IOWA	41-42	091-27	1.62	1.0368	1	C9	2.21	7.00	0.263	0.806	0.0	1.82	12E	2.528	4.150	2.439
B	27	05454000	RAPID CR NR IOWA CITY IOWA	41-41	091-29	25.30	16.1920	1	C21	2.22	7.02	3.142	1.229	0.0	10.88	12E	4.676	6.500	0.289
B	28	05455280	SF ENGLISH R TRIB NR BARNES CITY IOWA	41-33	092-28	2.51	1.6064	1	C21	2.30	7.21	0.403	0.819	0.0	2.28	12E	0.791	1.138	0.493
B	29	06610500	INDIAN CR AT COUNCIL BLUFFS IOWA	41-18	095-50	7.99	5.1136	1	C20	2.48	7.89	0.898	1.075	0.0	5.35	12E	2.116	3.211	0.413
B	30	06808000	MULE CR NR MALVERN IOWA	40-58	095-35	10.60	6.7840	1	C20	2.49	7.94	1.438	1.094	0.0	8.31	12E	1.820	2.662	0.268
B	31	03283000	STILLWATER CR AT STILLWATER KY	37-45	083-29	24.00	15.3600	2	B15	2.06	6.55	1.515	0.826	0.0	7.13	8E	5.321	7.617	0.346
B	32	03288500	COVE CR NR FORT SPR2NG KY	38-01	084-38	2.53	1.6192	3	B16	2.04	6.48	0.441	0.947	0.0	2.65	11B	0.248	0.405	0.153
B	33	03289000	SOUTH ELKHORN CR AT FORT SPRING KY	38-03	084-38	24.00	15.3600	3	B16	2.03	6.45	2.670	1.171	0.0	10.13	11B	1.605	2.229	0.104
B	34	03304500	MCGILLS CR NR MCKINNEY KY	37-27	084-42	2.14	1.3696	3	B17	2.08	6.61	0.182	0.710	0.0	1.83	11A	1.021	1.538	0.745
B	35	03305000	GREEN R NR MCKINNEY KY	37-25	084-45	22.40	14.3360	3	B17	2.09	6.64	1.387	1.016	0.0	6.46	11A	6.944	12.283	0.824
B	36	03309500	MCDOUGAL CR NR HODGENVILLE KY	37-32	085-40	5.34	3.4176	3	B17	2.08	6.64	1.574	2.192	0.0	4.98	11A	2.089	3.047	0.611
B	37	03313500	WEST BAYS FK AT SCOTTSVILLE KY	36-45	086-12	7.47	4.7808	3	B17	2.14	6.83	0.660	0.960	0.0	4.63	11A	3.235	4.610	0.677
B	38	03384000	ROSE CR AT NEBO KY	37-23	087-36	2.10	1.3440	2	B28	2.16	6.86	0.486	0.749	0.0	1.91	11D	1.017	1.359	0.757
B	39	03406000	WOOD CR NR LONDON KY	37-10	084-07	3.89	2.4896	2	B15	2.11	6.69	0.417	0.742	0.0	2.50	8F	0.495	0.670	0.199
B	40	07022500	PERRY CR NR MAYFIELD KY	36-41	088-36	1.72	1.1008	4	A7	2.23	7.05	0.366	0.619	0.0	1.98	3D	1.126	1.593	1.025
B	41	01486000	MANOKIN BR NR PRINCESS ANNE MARYLAND	38-12	075-40	5.80	3.7120	4	A1	2.71	8.61	1.462	0.636	0.0	3.65	3A	0.313	0.461	0.084
B	42	01490000	CHICAMACOMICO R NR SALEM MARYLAND	38-31	075-53	15.00	9.6000	4	A2	2.68	8.42	7.436	0.875	0.0	6.04	3A	0.422	0.592	0.044
B	43	01492000	BEAVERDAM BR AT MATTHEWS MARYLAND	38-49	075-58	5.85	3.7440	4	A2	2.60	8.26	1.179	0.915	0.0	3.90	3A	1.029	1.619	0.276
B	44	01493000	UNICORN BRANCH NR MILLINGTON MARYLAND	39-15	075-52	22.30	14.2720	4	A1	2.46	7.94	4.284	1.242	0.0	10.33	3A	0.740	1.160	0.052
B	45	01493500	MORGAN CR NR KENNEDYVILLE MARYLAND	39-17	076-01	10.50	6.7200	4	A1	2.50	8.10	1.795	0.947	0.0	5.42	3A	1.586	4.602	0.236

Table 7. Continued.

SEQ #	STATION	STATION NAME	LAT	LONG	SQ MI	TH ACRE	PTR ZN	PRB AREA	P60	P10	PTR T.	DD	STORAGE	LENGTH	PHYS ZN	Q10	Q50	Q10/A
B 46	01496000	NORTHEAST CR AT LESLIE MARYLAND	39-38	075-57	24.30	15.5520	4	A1	2.30	7.31	2.664	1.058	0.0	14.39	3A	3.159	4.485	0.203
B 47	01581500	BYNUM RUN AT BEL AIR MARYLAND	39-32	076-20	8.52	5.4528	4	B10	2.45	7.76	0.904	1.120	0.0	5.77	3A	2.737	4.183	0.502
B 48	01583000	SLADE RUN NR GLYNDON MARYLAND	39-30	076-48	2.09	1.3376	4	B10	2.60	7.88	0.245	0.984	0.0	2.43	4A	0.342	0.494	0.256
B 49	01585500	CRANNBERRY BRANCH NR WESTMINISTER MD	39-38	076-58	3.29	2.1056	4	B15	2.40	7.47	0.451	1.043	0.0	3.33	4A	0.758	1.217	0.360
B 50	01590000	NORTH R NR ANNAPOLIS MARYLAND	38-59	076-37	8.50	5.4400	2	B11	2.62	8.36	1.129	0.832	0.0	4.27	3A	1.262	2.252	0.232
B 51	01597000	CRABTREE CR NR SWANTON MARYLAND	39-30	079-10	16.70	10.6880	2	B15	1.95	6.19	0.910	1.254	0.0	9.06	8D	1.535	2.404	0.144
B 52	01637000	LITTLE CATOCTIN CR AT HARMONY MARYLAND	39-29	077-30	8.83	5.6512	4	B12	2.35	6.80	0.299	0.755	0.0	3.97	5A	2.622	4.249	0.464
B 53	01640500	OWENS CR AT LANTZ MARYLAND	39-41	077-28	5.93	3.7952	4	B12	2.18	6.99	0.288	0.883	0.0	3.75	5B	1.377	2.181	0.363
B 54	01641000	HUNTING CR AT JIMTOWN MARYLAND	39-36	077-24	18.40	11.7760	4	B10	2.28	6.99	0.891	1.312	0.0	9.92	3B	1.222	1.670	0.104
B 55	01661000	CHAPTICO CR AT CHAPTICO MARYLAND	38-23	076-47	10.70	6.8480	4	A2	2.71	8.61	1.429	1.133	0.0	6.54	3A	2.695	4.645	0.394
B 56	01661500	ST MARYS R AT GREAT MILLS MARYLAND	38-23	076-30	24.00	15.3600	4	A1	2.75	8.67	2.379	0.960	0.0	8.30	3A	3.620	6.097	0.249
B 57	05503000	DOUGLAS CR NR EMDEN MISSOURI	39-45	091-55	2.69	1.7216	1	C9	2.33	7.39	0.503	0.838	0.0	2.42	12E	1.282	1.766	0.745
B 58	06816000	MILL CR AT OREGON MISSOURI	39-59	095-08	4.90	3.1360	1	C20	2.58	8.08	0.447	0.742	0.0	2.89	12E	2.307	3.594	0.736
B 59	06820000	WHITE CLOUD CR NR MARYVILLE MISSOURI	40-23	094-55	6.08	3.8784	1	C20	2.52	7.96	1.136	1.120	0.0	4.87	12E	2.531	3.947	0.653
B 60	06820300	BIG SLOUGH NR WILCOX MISSOURI	40-23	094-56	1.30	0.8320	1	C20	2.52	7.96	0.301	0.794	0.0	1.60	12E	0.934	1.336	1.123
B 61	06894500	EFK FISHING R AT EXCELSIOR SPRINGS MO	39-20	094-13	20.00	12.8000	1	C20	2.53	7.99	2.404	1.498	0.0	11.81	12E	7.416	11.453	0.579
B 62	06907500	EBR SFK BLACKWATER R NR ELM MISSOURI	38-49	094-02	16.40	10.4960	3	C8	2.54	8.02	2.120	1.286	0.0	9.18	12F	5.091	7.428	0.485
B 63	06908500	SHILOH BRANCH NR MARSHALL MISSOURI	39-07	093-06	2.87	1.8368	1	C20	2.47	7.78	0.558	0.980	0.0	2.86	12F	0.944	1.279	0.514
B 64	06929000	COYLE BRANCH AT HOUSTON MISSOURI	37-19	091-57	1.10	0.7040	3	B20	2.45	7.75	0.160	0.819	0.0	1.52	14A	0.541	0.823	0.768
B 65	06935000	RUMBO BRANCH AT DANVILLE MISSOURI	38-55	091-32	1.40	0.8960	1	B20	2.35	7.48	0.316	0.979	0.0	02.04	12E	0.582	0.884	0.650
B 66	07015900	LANES FORK NR VICHY MISSOURI	38-06	091-43	24.10	15.4240	3	B20	2.39	7.57	0.092	1.114	0.0	9.65	14A	0.514	9.612	0.422
B 67	07185500	STAHL CR NR MILLER MISSOURI	37-12	093-51	3.86	2.4704	3	B20	2.62	8.33	0.461	0.819	0.0	2.84	14A	1.291	1.815	0.523
B 68	07011500	GREEN ACRE BRANCH NR ROLLA MISSOURI	37-55	091-44	0.62	0.3968	3	B20	2.39	7.57	0.134	.742	0.0	6.05	14A	0.847	1.314	2.128
B 69	06600500	SOUTH OMAHA CR TRIB NR WALTHILL NEBRASKA	42-05	096-29	2.64	1.6896	1	C20	2.43	7.72	0.293	0.826	0.0	2.36	12E	1.089	1.489	0.597
B 70	06600700	SOUTH OMAHA CR NR WALTHILL NEBRASKA	42-07	096-29	15.10	9.6640	1	C20	2.43	7.72	1.229	0.896	0.0	6.16	12E	6.147	9.757	0.636
B 71	06607700	S BRANCH TEKAMAH CR NR CRAIG NEBRASKA	41-50	096-20	2.64	1.6896	1	C20	2.45	7.78	0.282	0.832	0.0	2.33	12E	1.756	2.677	1.080
B 72	06607800	S BRANCH TEKAMAH CR TRIB NR TEKAMAH NEB	41-50	096-20	4.08	2.6112	1	C20	2.45	7.78	0.649	1.139	0.0	4.05	12E	2.287	3.644	0.876
B 73	06607900	S BRANCH TEKAMAH CR NR TEKAMAH NEBRASKA	41-50	096-20	9.73	6.2272	1	C20	2.45	7.78	0.926	0.992	0.0	5.45	12E	2.942	4.345	0.472
B 74	06608000	TEKAMAH CR NR TEKAMAH NEBRASKA	41-46	096-13	23.00	14.7200	1	C20	2.45	7.78	2.421	1.338	0.0	11.32	12E	4.529	6.637	0.308
B 75	06608700	NEW YORK CR TRIB NR SPIKER NEBRASKA	41-40	096-17	1.55	0.9920	1	C20	2.46	7.82	0.348	1.050	0.0	2.31	12E	1.040	1.647	1.056
B 76	06608800	NEW YORK CR NORTH OF SPIKER NEBRASKA	41-40	096-17	6.50	4.1600	1	C20	2.46	7.82	0.675	0.941	0.0	4.22	12E	2.819	4.227	0.678
B 77	06608900	NEW YORK CR EAST OF SPIKER NEBRASKA	41-40	096-17	13.90	8.8960	1	C20	2.48	7.82	1.193	1.018	0.0	6.66	12E	4.896	7.609	0.526
B 78	06768100	EAST BUFFALO CR NR BUFFALO NEBRASKA	41-01	099-50	5.21	3.3344	1	D14	2.40	7.66	1.269	1.562	0.0	6.29	13D	0.119	0.182	0.036
B 79	03736400	WEST BUFFALO CR NR BUFFALO NEBRASKA	40-59	099-52	17.10	10.9440	1	D14	2.40	7.66	2.299	1.421	0.0	10.37	13D	0.242	0.388	0.022
B 80	06769100	ELM CR TRIB NR OVERTON NEBRASKA	40-53	099-43	0.58	0.3712	1	D14	2.46	7.70	0.187	.723	0.0	00.94	13D	0.124	0.175	0.334
B 81	06769200	ELM CR NR SUMNER NEBRASKA	40-52	099-32	14.90	9.5360	1	D14	2.46	7.70	2.062	1.414	0.0	9.64	13D	0.630	1.084	0.066
B 82	06769300	ELM CR TRIB NO 2 NR OVERTON NEBRASKA	40-50	099-32	6.02	3.8528	1	D14	2.46	7.70	0.979	1.018	0.0	4.10	13D	0.403	0.609	0.112
B 83	03770300	WOOD R TRIB NR LODI NEBRASKA	41-12	099-50	2.02	1.2928	1	D14	2.39	7.66	0.568	1.248	0.0	3.13	13D	0.252	0.492	0.195
B 84	06779700	WOOD R NR LODI NEBRASKA	41-10	099-40	12.90	8.2560	1	D14	2.40	7.66	2.344	1.019	0.0	10.24	13D	0.128	0.196	0.015
B 85	06777600	LILLIAN CR TRIB NR BROKEN BOW NEB	41-31	099-39	2.02	1.2928	1	D14	2.39	7.66	0.348	0.898	0.0	2.24	13D	0.010	0.016	0.008
B 86	06777700	LILLIAN CR NR BROKEN BOW NEBRASKA	41-31	099-39	4.77	3.0528	1	D14	2.39	7.66	0.694	0.966	0.0	3.72	13D	0.637	1.033	0.209
B 87	03777800	LILLIAN CR TRIB NRWALWORTH NEB	41-37	099-34	2.04	1.3056	1	D14	2.36	7.66	0.621	1.623	0.0	3.03	13D	0.313	0.566	0.240
B 88	06782600	S BR MUD CR TRIB NR BROKEN BOW NEB	41-26	099-43	0.43	0.2752	1	D14	2.38	7.66	0.187	1.075	0.0	1.24	13D	0.154	0.239	0.560
B 89	06782900	MUD CR TRIB NR BROKEN BOW NEBRASKA	41-22	099-38	5.98	3.8272	1	D14	2.40	7.66	0.857	1.178	0.0	5.07	13D	0.898	1.538	0.234
B 90	06789200	DAVIS CR TRIB NO 2 NR NORTH LOUP NEB	41-26	098-54	6.79	4.3456	1	D14	2.43	7.72	1.238	1.274	0.0	5.88	13D	1.998	1.843	0.261

Table 7. Continued.

SEQ #	STATION	STATION NAME	LAT	LONG	SQ MI	TH ACRE	PTR ZN	PRB AREA	P60	P10	PTR T	DD	STORAGE	LENGTH	PHYS ZN	Q10	Q50	Q10/A
B 91	06790600	E BRANCH SPRING CR TRIB NR WOLBACH NEB	41-27	098-26	1.52	0.9728	1	D14	2.44	7.76	0.440	1.139	0.0	2.73	13D	0.722	1.208	0.742
B 92	06790700	W BRANCH SPRING CR AT BRAYTON NEBRASKA	41-27	098-26	19.50	12.4800	1	D14	2.44	7.76	3.309	1.651	0.0	12.66	13D	5.133	8.642	0.411
B 93	06806110	STOVE CR AT ELMWOOD NEBRASKA	40-45	096-16	10.30	6.5920	1	C20	2.50	7.97	1.350	1.016	0.0	5.66	12E	4.957	7.769	0.752
B 94	06810100	HOOPER CR TRIB NR PALMYRA NEBRASKA	40-40	096-22	8.00	5.1200	1	C20	2.50	7.97	2.120	1.779	0.0	0.78	12E	2.360	3.727	0.466
B 95	06810400	LITTLE NEMAHA R TRIB NR SYRACUSE NEB	40-35	096-10	0.71	0.4544	1	C20	2.52	8.00	0.157	1.030	0.0	1.58	12E	0.701	1.076	1.543
B 96	06839600	FRAZIER CR NR MAYWOOD NEBRASKA	40-35	100-30	11.30	7.2320	1	D14	2.29	7.37	0.845	0.851	0.0	5.03	13D	5.974	10.007	0.826
B 97	06839950	CUT CANYON NR CURTIS NEBRASKA	40-44	100-32	25.40	16.2560	1	D14	2.30	7.37	3.155	1.760	0.0	15.72	13D	1.006	1.540	0.062
B 98	06840500	DRY CR NR CURTIS NEBRASKA	40-38	100-26	21.70	13.8880	1	D14	2.32	7.43	2.193	1.470	0.0	11.64	13D	3.429	6.126	0.247
B 99	01384500	RINGWOOD CR NR WANAQUE NEW JERSY	41-08	074-16	19.10	12.2240	3	B2	2.04	6.70	1.226	1.290	0.0	10.02	9B	0.061	1.221	0.072
B 100	01386000	WEST BROOK NR WANAQUE NEW JERSY	41-04	074-19	11.80	7.5520	3	B2	2.04	6.72	0.446	.794	3.0	4.61	9B	1.000	1.539	0.144
B 101	01390500	SADDLE R AT RIDGEWOOD NEW JERSY	40-59	074-05	21.60	13.8240	2	B2	2.06	6.80	2.128	1.300	0.0	10.60	4B	1.909	2.767	0.130
B 102	01391000	HOHOKUS BROOK AT HOHOKUS NEW JERSY	41-00	074-07	16.40	10.4960	2	B2	2.06	6.60	1.051	1.016	0.0	7.27	4B	1.611	2.602	0.173
B 103	01394000	W BR RAHWAY R AT MILLBURN NEW JERSY	40-44	074-18	7.10	4.5440	3	B8	2.18	6.84	1.144	1.402	0.0	6.57	4B	0.993	1.430	0.219
B 104	01466000	MIDSR MT MISERY BRS IN LEB ST FOREST N J	39-55	074-30	2.73	1.7472	4	Z1	2.29	7.26	0.917	1.101	0.0	3.22	3A	0.034	0.051	0.019
B 105	01482500	SALEM R AT WOODSTOWN NEW JERSY	39-39	075-20	14.60	9.3440	4	A1	2.34	7.44	2.355	0.665	0.0	7.16	3A	4.530	5.574	0.486
B 106	01300000	BLIND BROOK AT RYE NEW YORK	40-59	073-41	9.20	5.8880	4	A1	2.12	8.76	0.958	1.344	0.0	7.20	4B	1.284	1.820	3.215
B 107	01303000	MILL NECK CR AT MILL NECK NEW YORK	40-53	073-34	11.50	7.3600	4	A1	2.13	8.82	0.422	0.454	12.0	2.72	3A	0.069	0.123	0.012
B 108	01307000	CHAMPLIN CR AT ISLIP NEW YORK	40-44	073-12	6.50	4.1600	4	A1	2.18	6.97	0.674	0.435	0.0	1.97	3A	0.068	0.092	0.016
B 109	01307500	PENATAQUIT CR AT BAY SHORE NEW YORK	40-43	073-14	5.00	3.2000	4	A1	2.18	6.97	0.413	0.378	0.0	1.50	3A	0.060	0.076	0.019
B 110	01308000	SAMPAWAMS CR AT BABYLON NEW YORK	40-42	073-19	23.00	14.7200	4	A1	2.18	6.97	0.944	0.442	0.0	3.74	3A	0.098	0.134	0.007
B 111	01309000	SANTAPOQUE R AT LINDENHURST NEW YORK	40-41	073-21	7.00	4.4800	4	A1	2.19	6.97	0.529	0.378	0.0	1.75	3A	0.035	0.046	0.006
B 112	01365500	CHESTNUT CR AT GRAHAMSVILLE NEW YORK	41-51	074-32	20.90	13.3760	1	B8	1.89	5.94	0.484	0.691	0.0	5.56	8B	3.053	4.574	0.226
B 113	01423500	DRYDEN CR NR GRANTON NEW YORK	42-07	075-14	8.85	5.6640	1	B8	1.70	5.64	0.436	0.979	0.0	5.13	8B	0.557	0.750	0.096
B 114	01424000	TROUT CR NR ROCK ROYAL NEW YORK	42-10	075-16	20.40	13.0560	1	B8	1.76	5.61	0.828	0.909	0.0	7.24	8C	1.496	2.014	0.115
B 115	02081000	SMITHWICK CR TRIB NR WILLIAMSTON N C	35-44	077-05	0.92	0.5888	4	A3	2.82	8.06	0.442	0.785	0.0	1.26	3A	0.285	0.308	0.348
B 116	02082630	HARTS MILL RUN NR TARBORO NORTH CAROLINA	35-56	077-37	8.58	5.4912	2	B10	2.77	8.80	1.750	1.050	0.0	5.43	3A	0.496	0.692	0.091
B 117	02083410	DEEPCR NR SCOTLAND NECK N C	36-09	077-28	11.70	7.4880	4	A2	2.75	8.74	2.630	1.075	0.0	0.58	3A	1.395	2.196	0.186
B 118	02087240	STIRRUP IRON CR TRIB NR NELSON N C	35-53	078-50	0.25	0.1600	2	B11	2.58	8.23	0.378	2.317	0.0	2.04	4A	0.120	0.174	0.750
B 119	02088140	STONE CR NR NEWTON GROVE N C	35-20	078-22	27.90	17.8560	4	A3	2.74	8.71	3.216	0.922	0.0	8.57	3B	1.964	3.075	0.110
B 120	02088420	LONG CR NR SELMA NORTH CAROLINA	35-36	078-15	6.87	4.3968	2	B12	2.72	8.64	1.254	1.062	0.0	5.80	3B	1.390	2.085	0.316
B 121	02090560	LEE SWAMP TRIB NR LUCAMA NORTH CAROLINA	35-38	078-02	2.83	1.8112	4	A3	2.74	8.74	0.485	0.499	0.0	1.48	3B	0.371	0.533	0.205
B 122	02090780	WHITEOAK SWAMP TRIB NR WILSON NC	35-42	077-47	2.60	1.6640	4	A3	2.76	8.70	0.556	0.668	0.0	1.69	3B	0.358	0.537	0.215
B 123	02092020	PALMETTO SWAMP NR VANCEBORO N C	35-20	077-10	24.20	15.4880	4	A2	2.85	9.00	3.034	0.613	0.0	7.00	3A	1.692	2.973	0.122
B 124	02092520	VINE SWAMP NR KINSTON NORTH CAROLINA	35-09	077-33	5.64	3.6096	4	A3	2.84	9.03	0.990	0.632	0.0	3.69	3A	0.578	0.853	0.160
B 125	02103390	SOUTH PRONG ANDERSON CR NR LILLINGTON NC	35-16	078-55	7.20	4.6080	4	A4	2.66	8.25	1.345	0.986	0.0	4.79	3A	0.277	0.406	0.050
B 126	02107620	MATTHEWS CR NR PINK HILL NORTH CAROLINA	35-05	077-40	9.29	5.9456	4	A3	2.63	9.00	1.171	.749	0.0	3.89	3B	0.526	0.633	0.086
B 127	02106630	TURKEY CR NR CASTLE HAYNE N C	34-24	077-55	10.20	6.5280	4	A2	2.87	9.09	1.456	0.819	0.0	4.55	3B	1.724	2.600	0.264
B 128	02108960	BUCKHEAD BRANCH NR BOLTON NORTH CAROLINA	34-21	078-26	15.30	9.7920	4	A2	2.83	9.00	3.355	0.547	0.0	6.55	3B	0.959	1.407	0.096
B 129	02110020	MILL BRANCH NR TABOR CITY NORTH CAROLINA	34-11	078-47	3.85	2.4640	4	A2	2.62	9.00	1.300	1.152	0.0	3.95	3B	0.525	0.822	0.213
B 130	02162420	BIG KNOB CR NR FALLSTON NORTH CAROLINA	35-29	081-32	16.40	10.4960	4	D20	2.32	7.37	1.261	1.088	0.0	7.70	4A	2.254	3.240	0.218
B 131	03456000	BEETREE CR NR SWANNANDA NORTH CAROLINA	35-39	082-24	5.46	3.4944	2	B12	2.30	7.28	0.159	0.613	0.0	3.34	5B	0.576	0.865	0.165
B 132	03457000	ALLEN CR NR HAZELWOOD NORTH CAROLINA	35-25	083-00	14.40	9.2160	2	B14	2.31	7.37	1.151	.717	0.0	4.79	5B	1.235	1.858	0.134
B 133	03500500	CULLASAJA R AT HIGHLANDS NORTH CAROLINA	35-04	083-14	14.90	9.5360	2	B12	2.35	7.53	0.648	0.906	0.0	6.70	5B	2.305	3.428	0.242
B 134	07322000	E BR SANDSTONE CR NR ELK CITY OKLAHOMA	35-31	099-32	23.00	14.7200	2	D20	2.59	7.23	2.270	2.753	1.0	10.86	12F	0.940	1.352	0.064
B 135	35.1	GUTHRIE ARS WATERSHED NO W-1 OKLAHOMA	35-46	97-48	.0522	.0334	2	D24	2.75	8.71	.804	2.27	0.0	.0758	12F	0.084	0.120	2.515

Table 7. Continued.

SEQ #	STATION	STATION NAME	LAT	LONG	SQ MI	TH ACRE	PTR ZN	PRB AREA	P60	P10	PTR T	OD	STORAGE	LENGTH	PHYS ZN	Q10	Q50	Q10/A
B 136	35.3	GUTHRIE ARS WATERSHED NO W-3 OKLAHOMA	35-46	097-48	.00489	.00313	2	D24	2.75	8.71	.0262	96.81	0.0	.0303	12F	0.007	0.010	2.236
B 137	35.4	GUTHRIE ARS WATERSHED NO W-4 OKLAHOMA	35-46	097-48	.00670	.00562	2	D24	2.75	8.71	.0162	44.75	0.0	.2515	12F	0.005	0.009	0.890
B 138	37.2	STILLWATER ARS WATERSHED NO 3 OKLAHOMA	36-06	097-10	.1430	.0920	2	D24	2.76	8.76	.0640	11.16	21.0	.6735	12F	0.294	0.466	3.196
B 139	37.3	STILLWATER ARS WATERSHED NO 4OKLAHOMA	36-06	097-10	.3219	.206	2	D24	2.76	8.76	.0045	7.07	1.4	.1212	12F	0.354	0.520	1.716
B 140	01516500	COREY CR NR MAINESBURG PENNA	41-47	077-01	12.20	7.8080	1	B6	1.74	5.53	0.603	0.826	0.0	5.10	8D	1.436	2.066	0.184
B 141	01517000	ELK RUN NR MAINESBURG PENNA	41-49	076-50	10.20	6.5280	1	B6	1.74	5.53	0.652	1.171	0.0	6.59	8D	0.934	1.273	0.143
B 142	01567500	BIXLER RUN NR LOYSVILLE PENNA	40-22	077-24	15.00	9.6000	3	B6	1.90	6.30	1.000	1.024	0.0	6.99	8B	3.879	6.497	0.404
B 143	03026500	SEVENMILE RUN NR RASSELAS PENNA	41-38	078-35	7.84	5.0176	2	B15	1.71	5.43	0.533	1.011	0.0	5.00	8E	1.159	1.745	0.231
B 144	03078500	BIG PINEY RUN NR SALISBURY PENNA	39-44	079-03	24.50	15.6800	2	B15	1.93	6.16	1.607	1.114	0.0	9.72	8D	3.039	4.653	0.194
B 145	03083000	GREEN LICK RUN AT GREEN LICK RES PENNA	40-03	079-30	3.07	1.9648	2	B15	1.65	5.91	0.122	0.717	0.0	2.22	8D	0.617	0.923	0.314
B 146	08139000	DEEP CR SWS NO 3 NR PLACID TEXAS	31-17	099-09	3.42	2.1888	3	D26	2.71	8.61	0.293	0.766	0.0	2.50	13K	2.963	5.116	1.354
B 147	08160000	DRY CR AT BUESCHER LAKE SMITHVILLE TEX	30-03	097-09	1.48	0.9472	4	A3	3.12	9.94	0.251	0.838	0.0	1.80	3F	0.446	0.744	0.471
B 148	01621200	WAR BRANCH NR HINTON VIRGINIA	38-28	078-59	9.45	6.0480	3	B14	2.13	6.82	0.505	1.030	0.0	5.56	6B	1.523	2.305	0.252
B 149	01655500	CEDAR RUN NR WARRENTON VIRGINIA	38-44	077-47	13.00	8.3200	4	B11	2.36	7.49	0.475	0.717	0.0	4.54	5A	5.660	9.610	0.663
B 150	01656200	BROAD RUN NR WARRENTON VIRGINIA	38-46	077-49	2.94	1.8816	3	B10	2.36	7.49	0.157	0.499	0.0	1.50	4A	0.160	0.217	0.085
B 151	01658500	SF QUANTICO CR NR INDEPENDENT HILL VA	38-35	077-28	7.64	4.8896	4	B10	2.60	8.26	3.010	2.144	0.0	10.35	4A	0.684	1.220	0.181
B 152	01670000	BEAVERDAM SWAMP NR ARK AIRGINIA	37-28	076-34	7.10	4.5440	4	A1	2.74	8.64	1.161	0.838	0.0	3.93	3A	0.338	0.532	0.074
B 153	01671500	HUDSON CR NR BOSWELLS TAVERN VIRGINIA	38-02	078-11	4.10	2.6240	2	B10	2.34	7.62	0.793	1.178	0.0	4.20	4A	1.075	1.769	0.410
B 154	01673500	TOTOPOTOMOY CR NR ATLEE VIRGINIA	37-40	077-23	6.00	3.8400	4	A1	2.62	8.32	1.169	1.088	0.0	4.70	4A	0.347	0.541	0.090
B 155	02015600	COWPASTURE R NR HEAD WATERS VIRGINIA	38-19	079-26	11.30	7.2320	3	B14	2.12	6.73	0.698	0.909	0.0	5.40	6B	2.061	3.533	0.280
B 156	02020200	CALFPASTURE R NR WEST AUGUSTA VA	38-16	079-15	12.80	8.1920	3	B14	2.13	6.76	0.599	0.870	0.0	8.50	6B	2.106	3.486	0.257
B 157	02023300	SOUTH R NR STEELS TAVERN VIRGINIA	37-55	079-10	15.70	10.0480	3	B14	2.16	6.93	0.802	1.120	0.0	7.01	6B	2.482	3.713	0.239
B 158	02029400	SBR NFK HARDWARE R NR NORTH GARDEN VA	37-57	078-39	6.59	4.2176	2	B16	2.24	7.20	0.310	0.755	0.0	3.41	4A	2.919	4.669	0.692
B 159	02031500	NFK MOORMANS R NR WHITEHALL VIRGINIA	38-06	078-45	11.40	7.2960	2	B12	2.19	7.06	0.369	1.016	0.0	3.07	4A	3.128	5.192	0.426
B 160	02036500	FINE CR AT FINE CREEK MILLS VA	37-36	077-49	23.00	14.7200	2	B10	2.58	8.09	2.359	1.133	0.0	9.60	4A	1.638	2.644	0.111
B 161	02043500	CYPRESS SWAMP AT CYPRESS CHAPEL VA	36-37	076-38	23.00	14.7200	4	A2	2.76	8.84	2.060	0.853	0.0	5.50	3A	2.696	4.369	0.183
B 162	02042700	COLLINS RIN NR PROVIDENCE F3RGE VA	37-24	077-03	2.84	1.8176	2	B10	2.67	8.50	0.531	0.838	0.0	2.50	3A	0.828	1.374	0.456
B 163	02049400	CYPRESS SWAMP NR BURDETTE VIRGINIA	36-44	076-56	8.55	5.4720	4	B10	2.72	8.73	0.246	0.847	0.0	4.88	3A	0.282	0.373	0.046
B 164	02050500	NORTH MEHERIN R NR KEYSVILLE VA	37-03	078-25	9.20	5.8880	4	B12	2.45	7.78	0.825	0.736	0.0	3.94	4A	1.411	2.018	0.240
B 165	02061300	NININGER CR NR BEDFORD VIRGINIA	37-16	079-29	4.77	3.0528	4	B10	2.24	7.65	0.485	0.979	0.0	3.76	4A	1.317	1.920	0.431
B 166	02076500	GEORGES CR NR GRETNA VIRGINIA	36-56	079-18	9.20	5.8880	4	A3	2.32	7.30	1.141	1.203	0.0	8.92	4A	1.010	1.512	0.172
B 167	03207400	PRATER CR AT VANSANT VIRGINIA.	37-13	082-05	19.80	12.6720	2	B15	2.12	7.73	0.555	0.787	0.0	6.20	6E	2.662	4.104	0.210
B 168	03473500	MID FK HOLSTON R AT GROSECLOSE VA	36-53	081-21	7.39	4.7296	3	B14	2.16	8.05	0.869	0.653	0.0	3.12	6A	0.499	0.726	0.106
B 169	03473000	STALEY CR NR MARION VIRGINIA	36-48	081-28	8.33	5.3312	3	B14	2.18	6.84	0.432	0.973	0.0	4.94	5B	0.325	0.421	0.061
B 170	03489000	COVE CR NR SHELLEYS VIRGINIA	36-38	082-21	17.30	11.0720	3	B14	2.18	6.88	1.288	1.312	0.0	9.02	6A	1.481	2.805	0.132
B 171	05408500	KNAPP CR NR BLOOMINGDALE WISCONSIN	43-40	090-47	8.47	5.4208	1	C10	2.07	6.01	0.033	1.098	0.0	6.00	12C	6.051	10.450	1.110
B 172	05426500	WHITEWATER CR NR WHITEWATER WISCONSIN	42-46	088-41	7.20	4.6080	1	C11	1.98	6.34	1.303	0.659	0.0	3.12	12A	0.019	0.028	0.004
B 173	05427000	WHITEWATER CR AT WHITEWATER WISCONSIN	42-49	088-42	16.70	10.6880	1	C11	1.98	6.34	2.145	0.982	0.0	6.62	12A	0.422	0.609	0.039
B 174	05430000	MT VERNON CR NR MT VERNON WISCONSIN	42-55	089-37	16.10	10.3040	1	C10	2.04	6.85	2.508	1.382	0.0	10.69	12C	0.797	1.177	0.077

Table 7. Continued. Explanation of numbered column headings.

[1]Area in square miles.
[2]Area in thousands of acres.
[3]Potter zone as derived from Potter's maps.
[4]PRB Area. Soil Conservation Service Problem area.
[5]P60. 10-year 60-minute rainfall. Inches.
[6]P10. 10-year 10-minute rainfall intensity. Inches per hour.
[7]PTR T. Potter T value as computed by the authors.
[8]DD. Drainage density at the total length of all drainage channels on the watershed in miles divided by the watershed area. Miles/thousand acres.
[9]Storage. The percentage of the watershed covered by lakes, swamps, playas, etc.
[10]Length. The length of the principal drainage channel as shown as either a solid or broken blue line on the topographic map. Miles.
[11]Phys ZN. The physiographic section as taken from the Fenneman and Johnson map. Figure 20.
[12]Q10. The 10-year runoff peak as determined from tabulations of flow data. Thousands of cfs.
[13]Q50. The 50-year peak runoff as determined from actual measurement data. Thousands of cfs.
[14]Q10/A. The 10-year peak runoff per unit of area. cfs/acre.

Watershed parameters

The data showing the additional watersheds and parameters are given in Table 7 (p. 32-36). The values for the parameters in the additional watersheds from the Potter states are considered to be representative of the Potter watersheds themselves except that the additional watersheds represent more physiographic sections than Potter's original watersheds.

Deviation of the modified Potter method curves for testing the new data

The method described previously relating the 10-year peak flow to area, topographic factor, and precipitation using only Potter Group 1 data was now repeated using the USU extended data from all 96 Potter watersheds. Potter's zonation was retained primarily for testing purposes. The derived equations are given in Table 8 (p. 38) and are shown graphically in Figures 15 through 18 (p. 39-42). Equations for each of the four Potter zones as well as a set lumping all the zones together were derived. The equations were then tested against a sample of 25 watersheds selected randomly from Table 7 (p. 32-36). The sampling was done by first randomly selecting one watershed from each State, then by taking one more sample from each State in which six or more watersheds were shown in Table 7 (p. 32-36) until a total of 25 watersheds were selected.

Estimation of 10-year peak flow from Potter type curves

Three different estimates of the 10-year peak flow were made for comparison purposes for each of the 25 watersheds. This comparison is given in Table 9 (p. 43). A 10-year peak flow estimate is obtained as follows using Figures 15-18 (p. 39-43): First, enter Figure 15 (p. 39) with the watershed area and read the $\hat{q}_{10(A)}$ value from the proper curve (zone or lumped). For example, if the area is 5.200 thousand acres in Zone I, read $\hat{q}_{10(A)}$ as 1.15 Mcfs. Second, enter Figure 16 (p. 40) with the value of T and read DY_1. To continue the example, if T for the above Zone I watershed was 1.15, read DY_1 as 0.99. DY_2 is similarly determined from Figure 17 (p. 41) using P_{60} as the argument. For example, if the above watershed had a P_{60} of 2.20 inches, read DY_2 as 1.70. The fourth step is to multiply the three above numbers together to obtain $\hat{q}_{10(ATP)} = 1.15 \times 0.99 \times 1.70 = 1.94$ Mcfs. The final step is to enter Figure 18 (p. 42) with $\hat{q}_{10(ATP)}$ as the argument and read $\hat{q}_{10(K)}$ which is the estimate of q_{10}. To conclude the above example, entering Figure 19 (p. 44) with a value of 1.94 on the $\hat{q}_{10(ATP)}$ axis the value for $\hat{q}_{10(K)}$ is read as 2.66 Mcfs. Alternatively, the same value could have been obtained by solving the respective Zone I equations given in Table 8 (p. 38) for $\hat{q}_{10(A)}$, DY_1, DY_2, and $\hat{q}_{10(K)}$. The values given in the comparison, Table 9 (p. 43), were developed in a manner similar to that described above.

The comparison shown in Table 9 (p. 43) was designed to indicate the value of zoning as opposed to lumping all of the data together to derive a single set of equations. In addition, a third comparison was made to evaluate whether there was much difference between the USU derived equations and those curves published by Potter (ref. 13).

Table 8. Equations relating 10 year runoff peak, q_{10}, to area, A, topographic factor, T, and 10 year 60 minute precipitation, P_{60}, derived from all Potter watersheds using USU data.

Zone	Equation	(1) $\bar{q}_{10}$ Mcfs	(2) PS_{EE} percent	(3) n	(4) r
I	$\hat{q}_{10(A)} = 0.45894\ A^{0.55730}$	-	-	27	0.835
	$DY_1 = 0.98877\ T^{-0.02446}$	-	-	27	-0.054
	$DY_2 = 0.15197\ P_{60}^{3.06468}$	-	-	27	0.612
	$\hat{q}_{10(K)} = 1.08688\ \hat{q}_{10(ATP)}^{1.34956}$	1.238	54.2	27	0.933
II	$\hat{q}_{10(A)} = 0.59009\ A^{0.57097}$			38	0.862
	$DY_1 = 0.97075\ T^{-0.02191}$			38	-0.061
	$DY_2 = 0.35418\ P_{60}^{1.49032}$			38	0.468
	$\hat{q}_{10(K)} = 1.07015\ \hat{q}_{10(ATP)}^{1.15286}$	1.301	85.7	38	0.902
III	$\hat{q}_{10(A)} = 0.47989\ A^{0.72245}$			17	0.879
	$DY_1 = 1.01359\ T^{0.02862}$			17	0.054
	$DY_2 = 0.01752\ P_{60}^{5.42379}$			17	0.820
	$\hat{q}_{10(K)} = 1.00742\ \hat{q}_{10(ATP)}^{0.97539}$	2.249	41.0	17	0.962
IV	$\hat{q}_{10(A)} = 0.81093\ A^{0.43263}$			14	0.506
	$DY_1 = 1.00137\ T^{0.00638}$			14	0.010
	$DY_2 = 0.06867\ P_{60}^{3.11099}$			14	0.399
	$\hat{q}_{10(K)} = 1.03877\ \hat{q}_{10(ATP)}^{0.93455}$	2.072	45.0	14	0.614
Lumped	$\hat{q}_{10(A)} = 0.54572\ A^{0.58863}$			96	0.854
	$DY_1 = 0.98095\ T^{-0.02463}$			96	-0.059
	$DY_2 = 0.24383\ P_{60}^{1.99847}$			96	0.534
	$\hat{q}_{10(K)} = 1.00959\ \hat{q}_{10(ATP)}^{1.09129}$	1.564	69.4	96	0.902

Notes explaining the column headings:

(1) $\bar{q}_{10}$ is the mean 10 year peak flow calculated from the observed 10 year peak flows for each zone.

(2) PS_{EE} is the standard error of estimate expressed as a percent of the zone $\bar{q}_{10}$. It is calculated by the equation:

$$PS_{EE} = \frac{100}{\bar{q}_{10}} \sqrt{\frac{\Sigma(q_{10} - \hat{q}_{10(K)})^2}{n - 2}}$$

(3) n is the number of watersheds used in deriving the data.

(4) r is the correlation coefficient between two variables x and y. It is calculated by:

$$r = \frac{\Sigma(x - \bar{x})\ (y - \bar{y})}{\sqrt{\Sigma(x - \bar{x})^2\ \Sigma(y - \bar{y})^2}}$$

where x and y are any two independent and dependent variables, respectively.

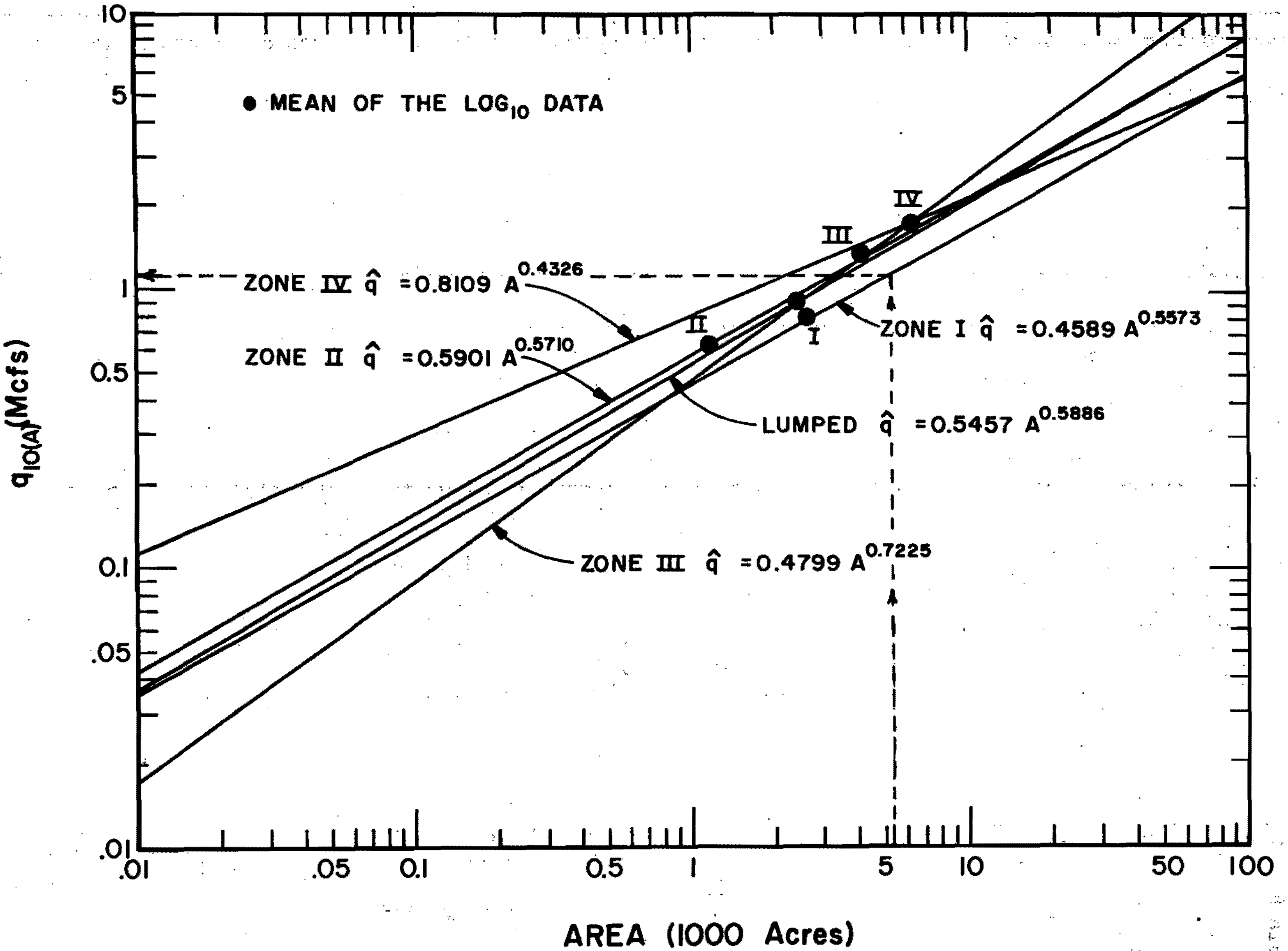

Figure 15. The relationship of the 10-year peak flow to area for Potter watersheds using USU data.

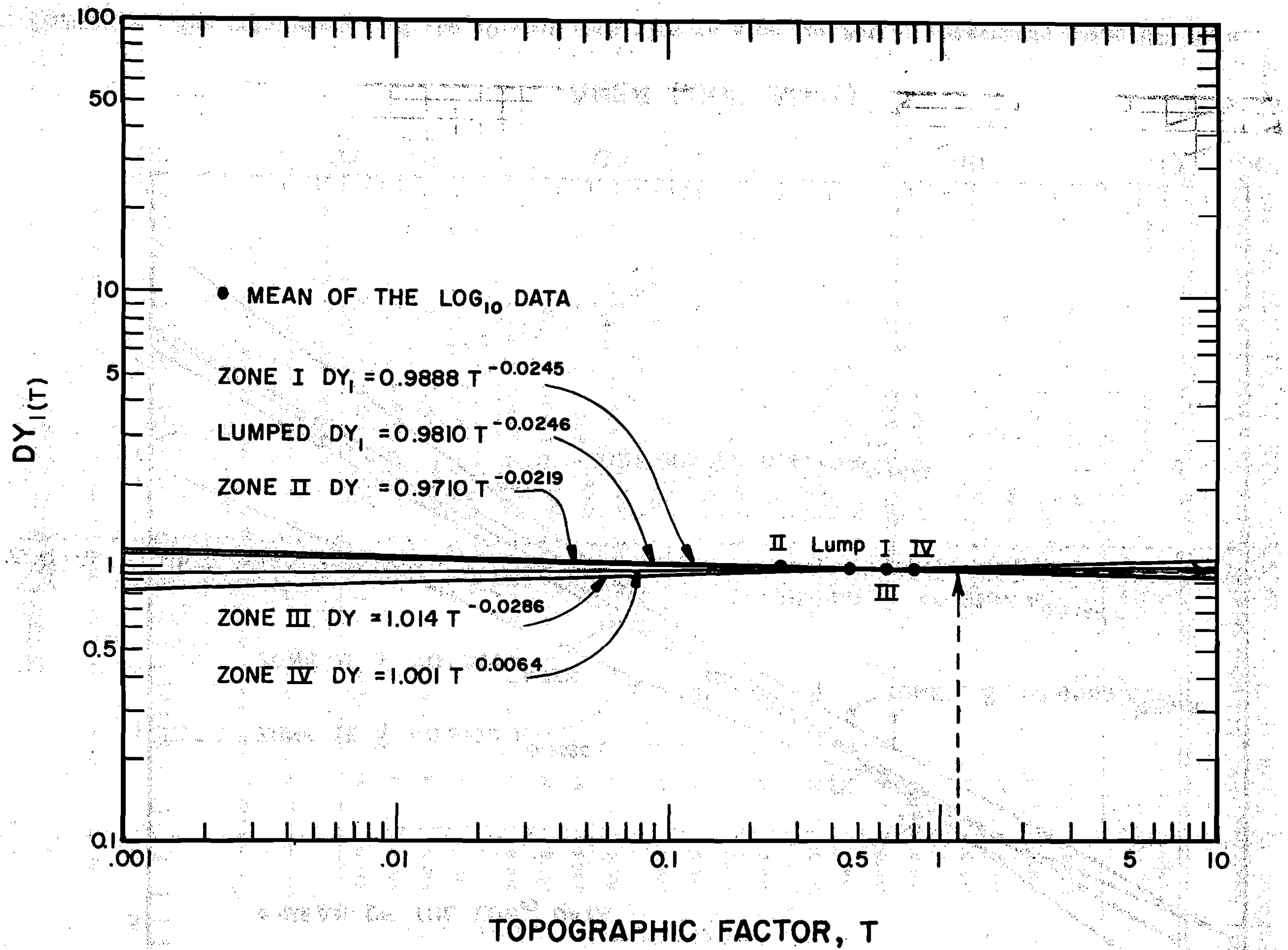

Figure 16. The relationship of the y deviations, Δy_1, from each line from Figure 9 to its topographic factor, T.

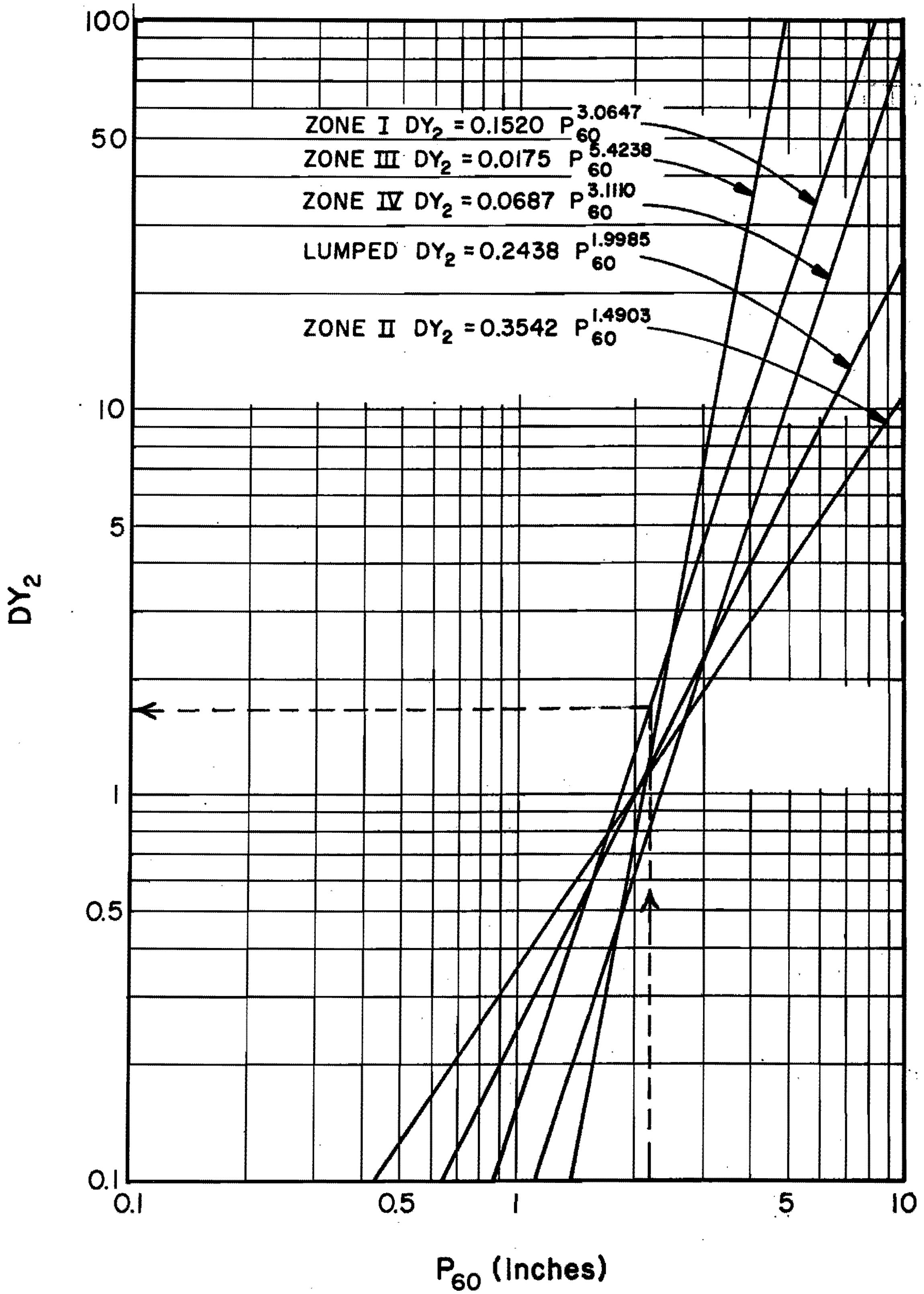

Figure 17. The relationship of the y deviations, Δy_2, from Figure 10 to its P_{60} value.

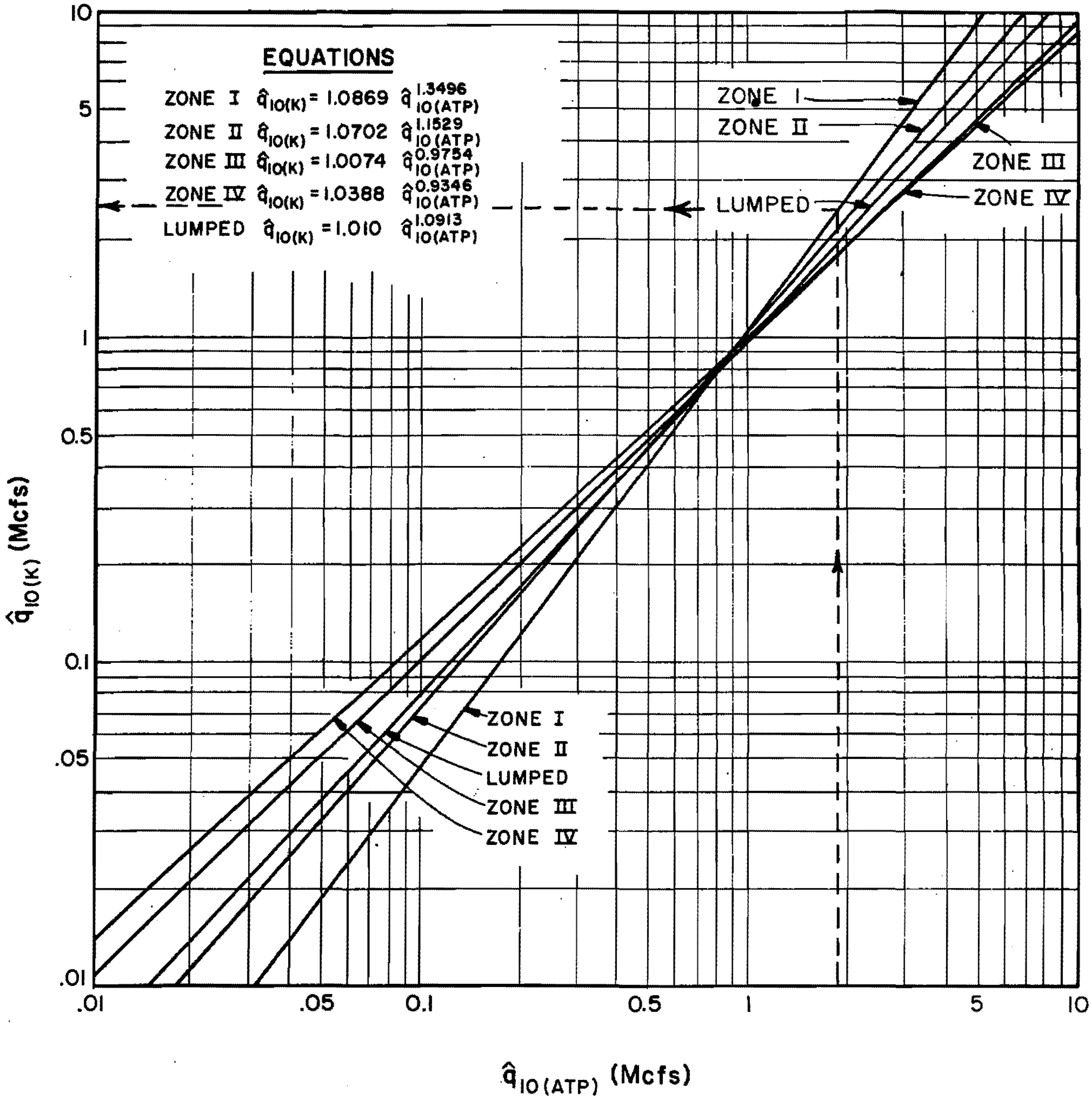

Figure 18. Correction curves, K, for Potter States to be used with Figures 15, 16, and 17.

Table 9. A selected sample of watersheds from Potter's states used to test the areal extension of Potter's method to other watersheds in the original states.

State	Watershed No.	Potter Zone	$\hat{q}_{10}$ Mcfs	A 1000 Acres	T	P_{60}	Lumped: $\hat{q}_{10(K)}$ Inches	Lumped: 1st Error Percent	Zone Eq.: $\hat{q}_{10(K)}$ Mcfs	Zone Eq.: 2nd Error Percent	Potter Curves: $\hat{q}_{10(ATPC)}$ Mcfs	Potter Curves: 3rd Error Percent
Delaware	2	IV	0.387	2.464	1.159	2.42	1.397	72.3	1.317	70.6	0.126	-207.3
Illinois	12	I	0.228	9.792	2.389	1.96	2.008	88.6	2.572	91.1	1.230	81.5
Illinois	13	I	1.860	3.469	0.576	2.08	1.219	-52.5	1.579	-17.8	1.60	-16.3
Iowa	23	I	1.779	5.197	1.148	2.21	1.771	-0.4	2.689	33.8	1.800	1.2
Iowa	30	I	1.620	6.784	1.436	2.49	2.710	40.2	5.341	69.6	4.100	60.5
Kentucky	35	III	8.944	14.336	1.387	2.19	3.316	-169.7	4.023	-122.3	6.760	-32.3
Kentucky	40	IV	1.128	1.101	0.368	2.23	0.687	-64.1	0.745	-51.4	0.169	-567.6
Maryland	45	IV	1.585	6.72	1.795	2.50	2.701	41.3	2.178	27.2	0.702	-125.8
Maryland	54	IV	1.222	11.776	0.891	2.28	3.229	62.0	2.081	41.3	1.960	37.7
Missouri	60	I	0.934	0.832	0.301	2.52	0.754	-23.9	1.219	23.4	0.830	-12.5
Missouri	68	III	0.847	0.398	0.134	2.39	0.427	-98.3	0.479	-77.0	0.580	-46.0
Nebraska	74	I	4.529	14.72	2.421	2.45	4.243	- 6.7	8.792	48.5	7.600	40.4
Nebraska	90	I	1.090	4.346	1.230	2.43	1.939	43.8	3.472	68.6	1.700	35.9
Nebraska	98	I	3.429	13.888	2.193	2.32	3.639	5.8	6.739	49.1	6.000	42.9
New Jersey	101	II	1.909	13.824	2.128	2.06	2.802	31.9	3.255	41.4	5.440	64.9
New York	108	IV	0.068	4.160	0.674	2.18	1.512	95.5	1.198	94.3	0.300	77.3
N. Carolina	118	II	0.120	0.160	0.378	2.58	0.273	56.2	0.266	54.9	0.268	55.3
N. Carolina	129	IV	0.525	2.464	1.300	2.82	1.86	71.8	2.056	74.5	0.050	-950.1
Oklahoma	134	II	0.940	14.720	2.27	2.59	4.799	80.4	5.020	81.3	12.500	92.5
Pennsylvania	141	I	0.934	6.528	0.852	1.74	1.227	23.9	1.199	22.1	1.200	22.5
Texas	147	IV	0.446	0.947	0.251	3.12	1.311	66.0	1.856	76.0	0.600	25.7
Virginia	151	IV	0.884	4.890	3.010	2.60	2.366	62.6	2.153	58.9	0.029	-2948.6
Virginia	169	III	0.325	5.331	0.432	2.16	1.759	81.5	1.803	82.0	1.836	82.3
Virginia	163	IV	0.262	5.472	0.246	2.72	3.000	91.3	2.531	89.7	2.640	90.1
Wisconsin	173	I	0.422	10.688	2.146	1.98	2.178	80.6	2.875	85.3	2.280	81.5
		$\hat{q}_{10}$ mean	1.4567	Range absolute error				0.4 to 169.7%		17.8 to 122.3%		1.2 to 2948.6%
				Mean absolute error				60.5%		62.1%		232.0%
				Standard deviation				1.856 Mcfs		2.291 Mcfs		2.870 Mcfs
				Standard error of estimate percent of measured				127.4%		157.3%		197.0%

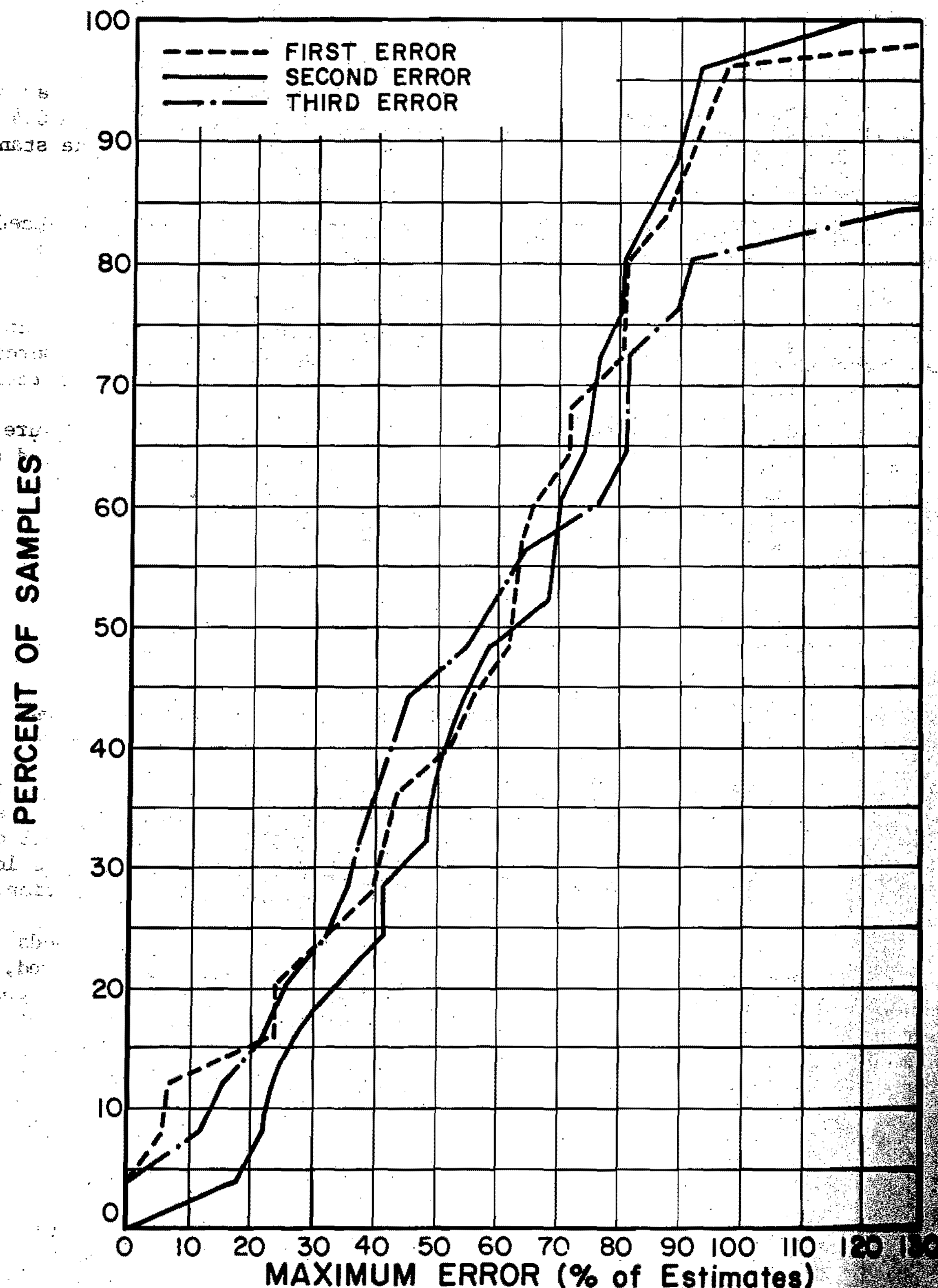

Figure 19. Mass error curves for 25 sample watersheds located in the [illegible] States.

The first error estimates were made using the lumped curves or equations. The range in absolute error as a percent of the estimated q_{10} was from 0.4 percent to 169.7 percent with a mean absolute error of 60.5 percent. The standard error of estimate was 127.4 percent of the mean q_{10}.

The second error estimates utilized the zone equations. They produced a mean absolute error of 62.1 percent with a range from 17.8 to 122.3 percent and a percent standard error of estimate of 157.3.

The third error estimates utilized the published Potter curves directly. They produced a mean absolute error of 232.0 percent ranging from 1.2 percent to 2948.6 percent. The percent standard error of estimate was 197.0 percent.

The mass error curves for these three comparisons are shown in Figure 19 (p. 44). The general conclusion evident from this phase of the study and supported by the testing on the 25 independently selected watersheds is that a Potter type method is reliable and that the error distribution was not significantly improved by zoning.

PHASE II

Refinement of Potter's Method and Other Improved Methods

Flood frequency studies

Comparison of methods. The common comparisons between frequency methods generally compare the goodness of fit of a particular set of data to a curve of a known distribution. This criterion was used by Bock, Enger, Malhotra and Chisholm (ref. 3) on 459 watersheds in the United States with Chi-square as a test of the goodness of fit. Their trials indicated that the log normal distribution was superior to Gumbel or log-Pearson Type III distributions and log normal and Gumbel were both superior to log-Pearson Type III distribution.

In the first portion of the present study, data from 167 watersheds in the Great Basin and Colorado River Basin were studied. The data were ranked, normalized and plotted on extremal probability paper against the plotting position, $(n + 1)/m$, where n is the number of years in the array and m is the position in the array. Selected return period values were computed and tabulated for each watershed and each distribution. The distributions and fitting equations used were the cubic polynomial, the log normal, log-Pearson III, Gumbel, log-Gumbel, gamma, the normal, Pearson III, and log-gamma.

Within the range of the data (11 to 100 years) the cubic gave the best fit. All others except log-gamma fit sufficiently well to be satisfactory. Since the cubic polynomial scored best by every goodness of fit test[1] over the range of the data, it demonstrates the inability of the goodness of fit tests to indicate

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[1] These tests were Chi-square, probability of Chi-square, Smirnov-Kolmogorov, binomial, Cramer-VonMises, and Anderson-Darling.

the extrapolation reliability of any distribution. Because of this, the data were all plotted along with the three most commonly used distributions for flood frequency analysis; the double exponential or Gumbel, the log normal, and the log Pearson Type III distributions to serve as a guide to extrapolation. The flood frequency plots are included as Appendix A to this report.

Ten-year flood peaks from these computations were compared on the Potter watersheds to the Potter values of q_{10} and Potter's (ref. 12) graphical upper and lower frequency method by USU. The differences were not statistically different by the t test. The absolute values of the peaks were somewhat higher with the Gumbel distribution though not significantly so.

Extrapolation. In the previous section we dealt with the problem of fitting a set of data to a distribution or an equation. In this section we will consider record lengths and extrapolation to return periods beyond the range of the data.

A search was made for very long records which would most likely be a sample of the variability of the local climate. Four such records were located, i.e., the Lake Erie outlet, Logan River, Santa Fe, New Mexico, precipitation and Mississippi River at Cairo, Illinois. The same kinds of results were obtained for the four records so the illustrations presented here will be drawn from the Santa Fe precipitation record. Figure 20 (p. 47) shows curves constructed by by dividing the hundred plus years of record into consecutive periods of 5 year, 10 year, 20 year, 50 year, and 100 year records. The highest and lowest 5-year value from the 20, 5-year records are the two points shown at 5 years in Figure 20 (p. 47) as ratios to the value read from the 100 year record. The two points at 10 years were derived in similar fashion from the ten 10-year records and so on until the upper and lower curves are complete.

The third curve is the mean value of all the members of each group derived from the same groups of records from which the extremes were drawn.

Figure 21 (p. 48) has similar curves to those in Figure 20 (p. 47) except the 50-year event is forecast from the different record lengths. Figure 22 (p. 49) is constructed similarly to Figures 20 (p. 47) and 21 (p. 48) except the 100-year event is being predicted from each record length.

Figures 23 through 28 (p. 50-55) show the same error distributions with the log-Gumbel and log-normal distributions. The Gumbel distribution appears to be somewhat superior to either of the log methods for general extrapolation, but appreciable errors may be present when records are shorter than about 25 years on any of the distributions. This observation contrasts with the conclusions found by the fitting of curves within the range of the data where only 11 years of record produced satisfactory data fits to a distribution. This finding is similar to that of Benson (ref. 2) for a synthetic 1000 years of record.

One item observed is that one consecutive record period of even up to 50 years in length may have a widely divergent population from the next 50-year record indicating long term persistence of climatic highs and lows rather than

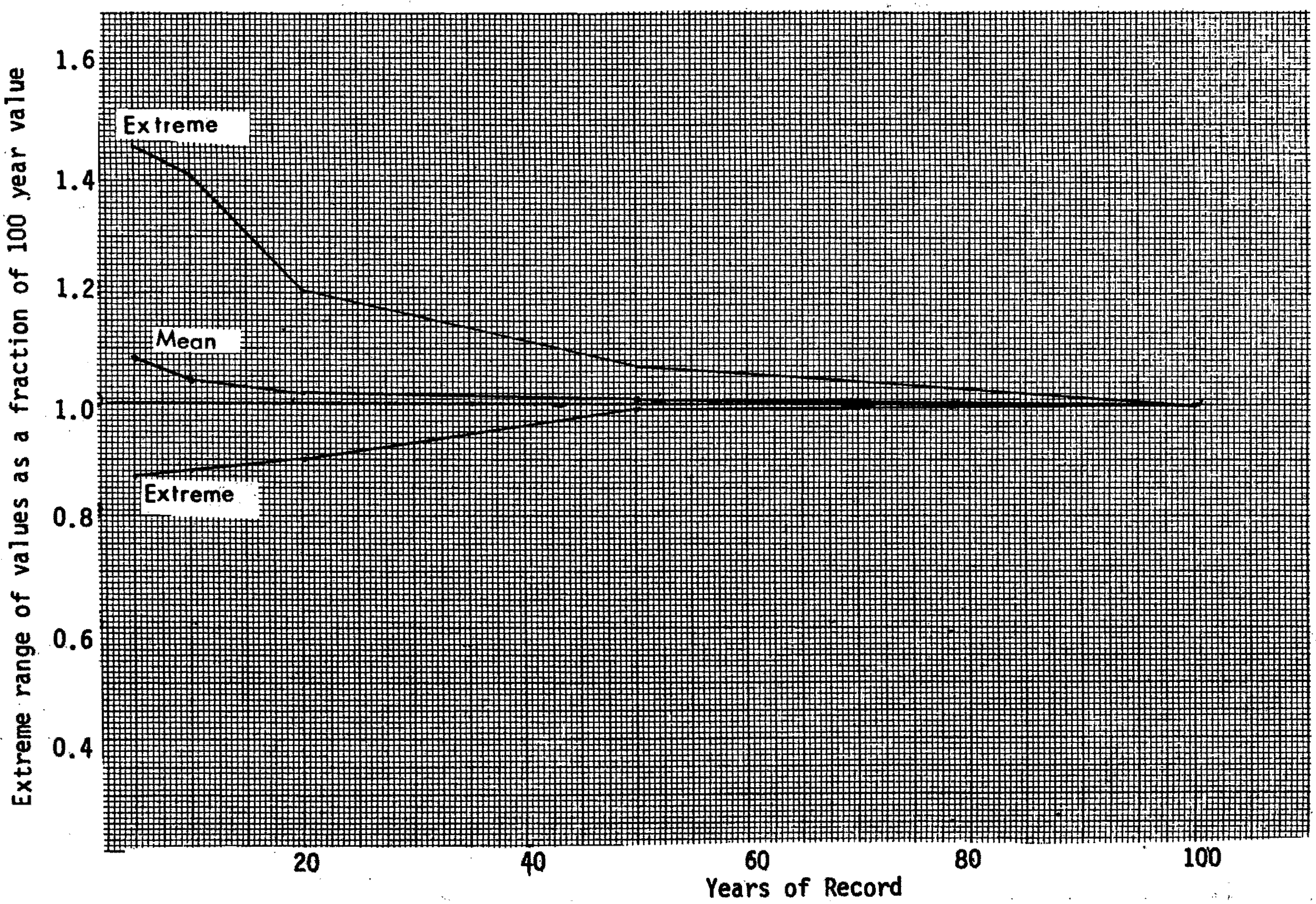

Figure 20. Maximum error distribution in the 10-year storm prediction. Gumbel distribution Santa Fe, New Mexico precipitation record.

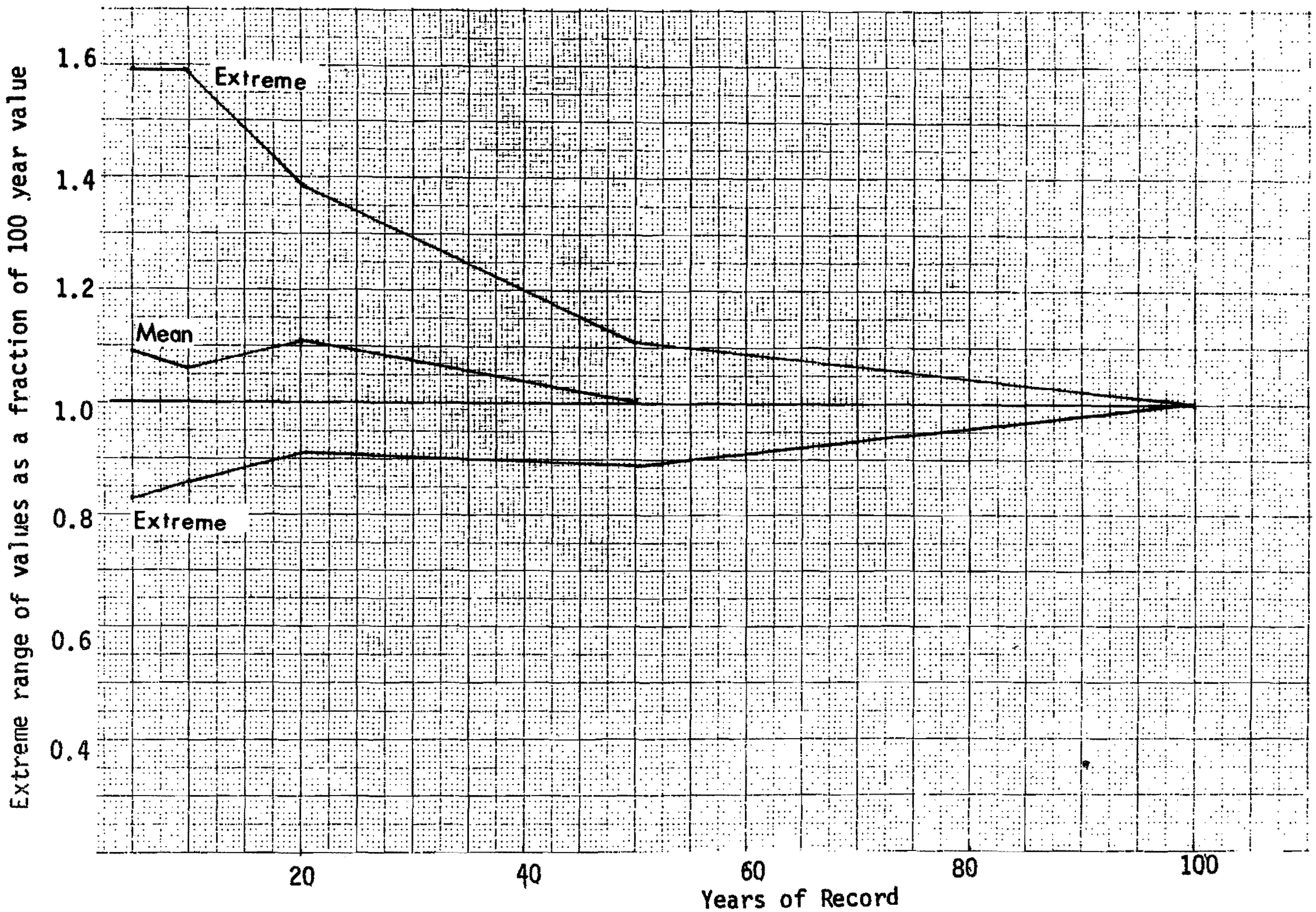

Figure 21. Maximum error distribution in the 50-year storm prediction. Gumbel distribution and Santa Fe, New Mexico precipitation data.

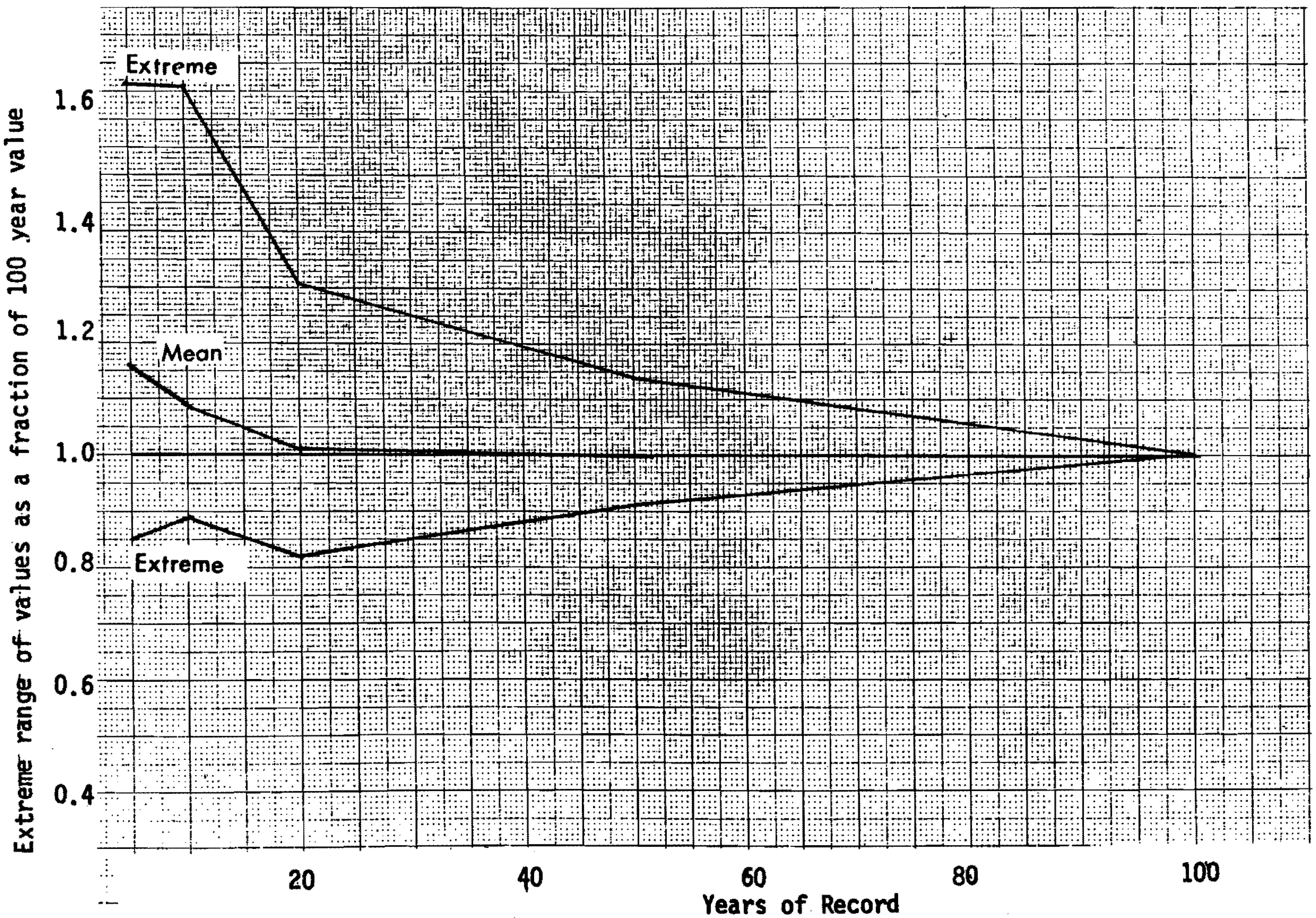

Figure 22. Maximum error distributions in the 100-year storm prediction. Gumbel distribution Santa Fe, New Mexico precipitation data.

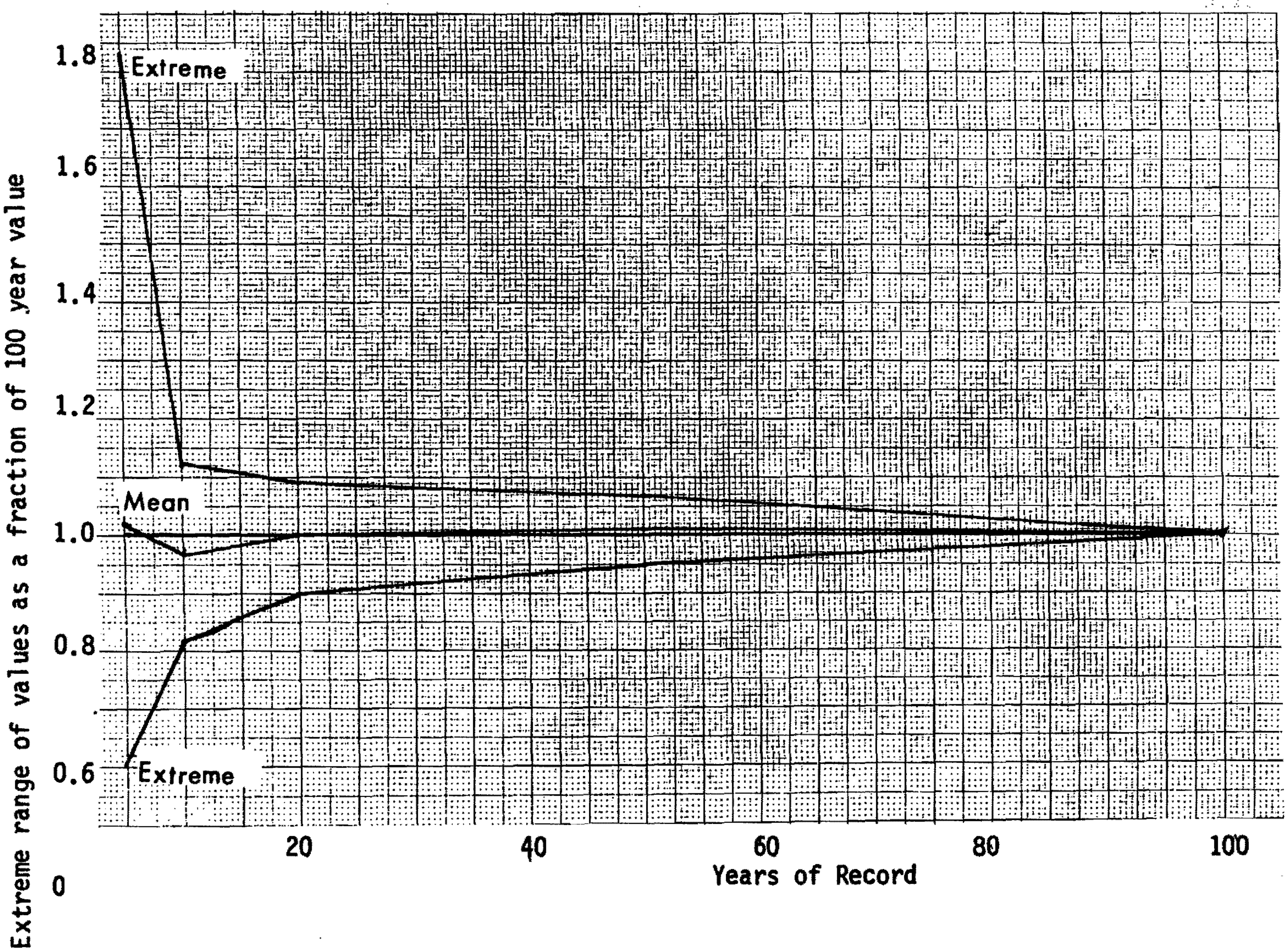

Figure 23. Maximum error distributions in the 10-year storm predictions. Log Gumbel distribution. Santa Fe, New Mexico precipitation.

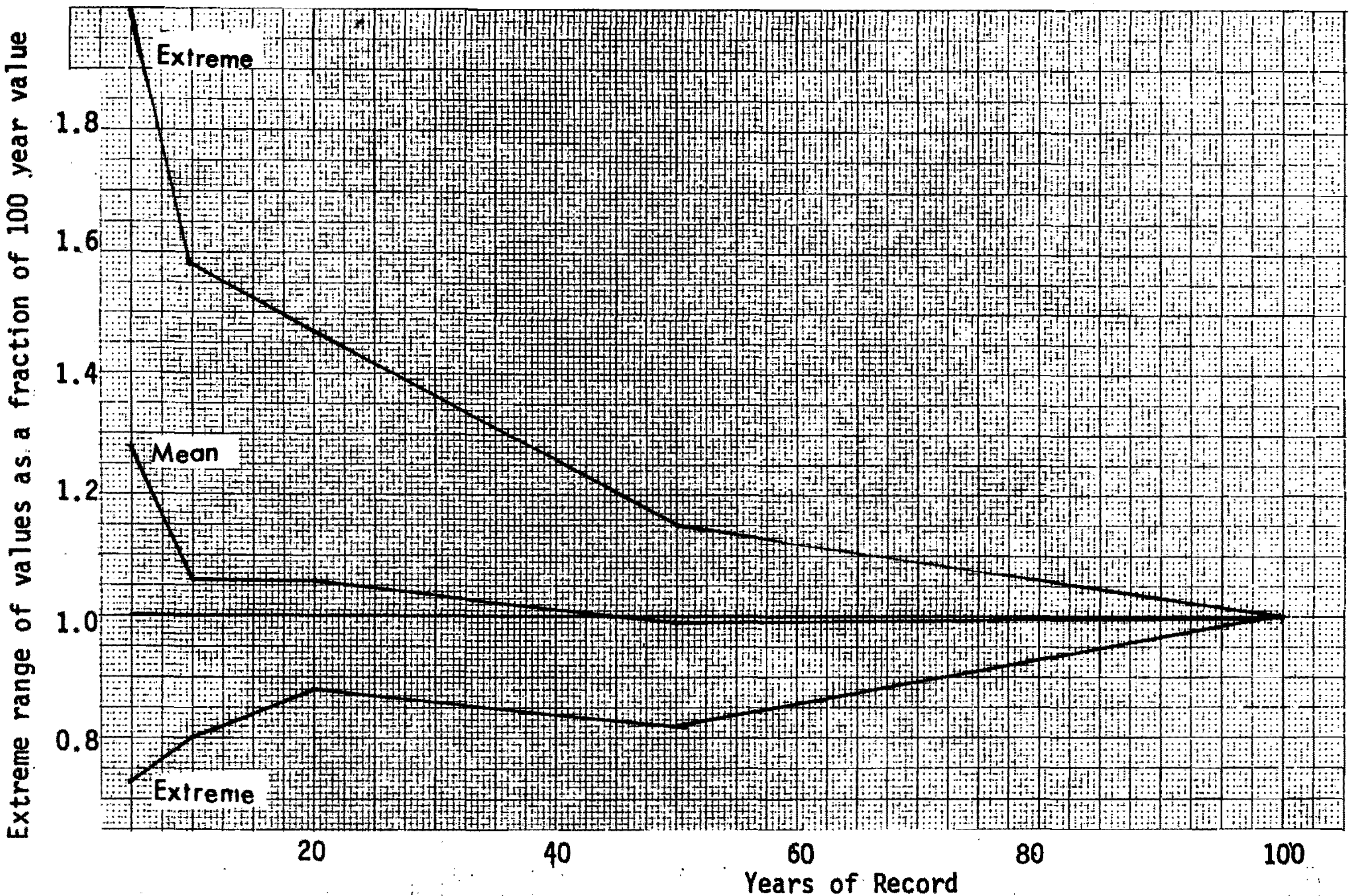

Figure 24. Maximum error distributions in the 50-year storm prediction. Log Gumbel distribution, Santa Fe, New Mexico precipitation.

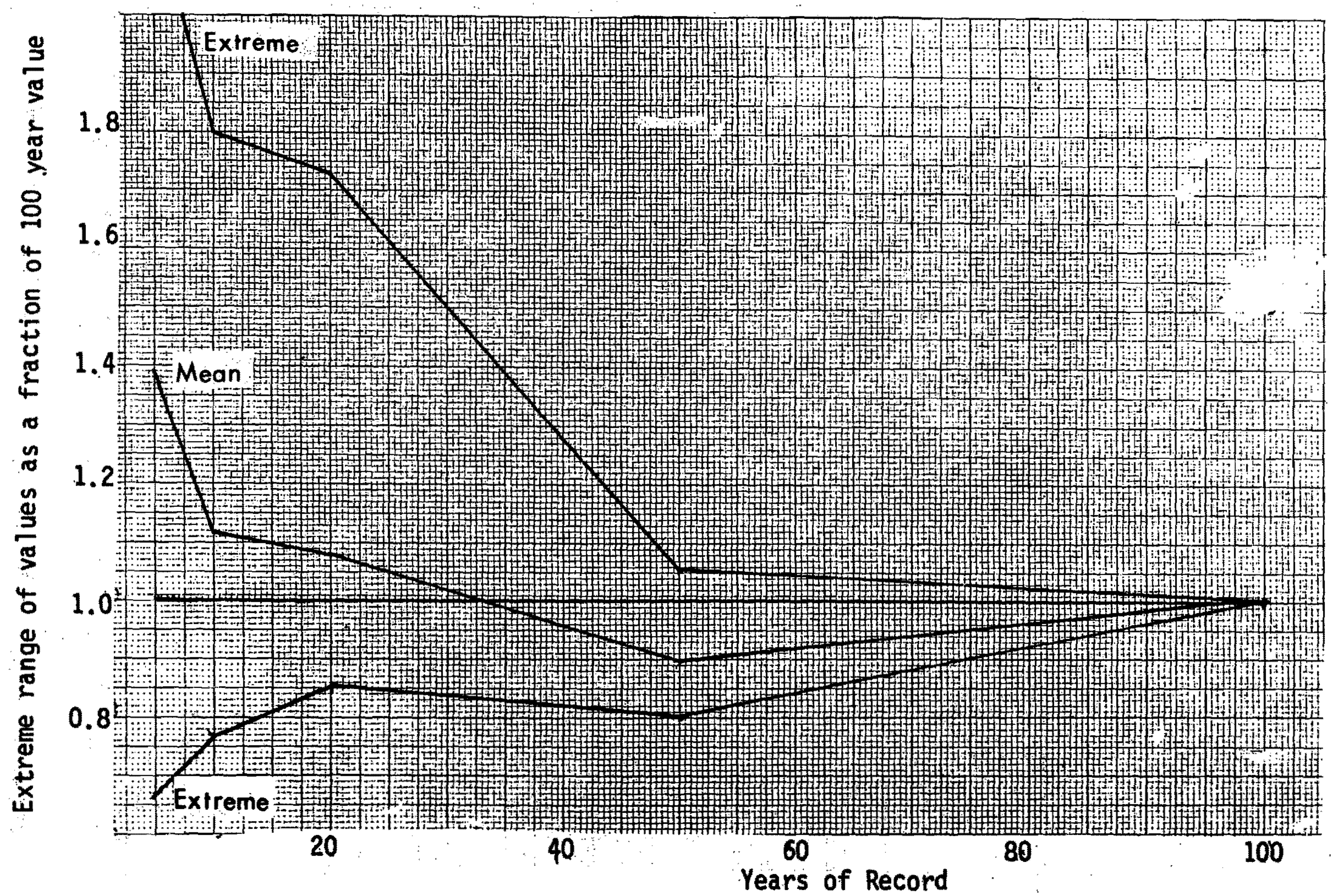

Figure 25. Maximum error distributions in the 100-year storm prediction. Log Gumbel distribution, Santa Fe, New Mexico precipitation.

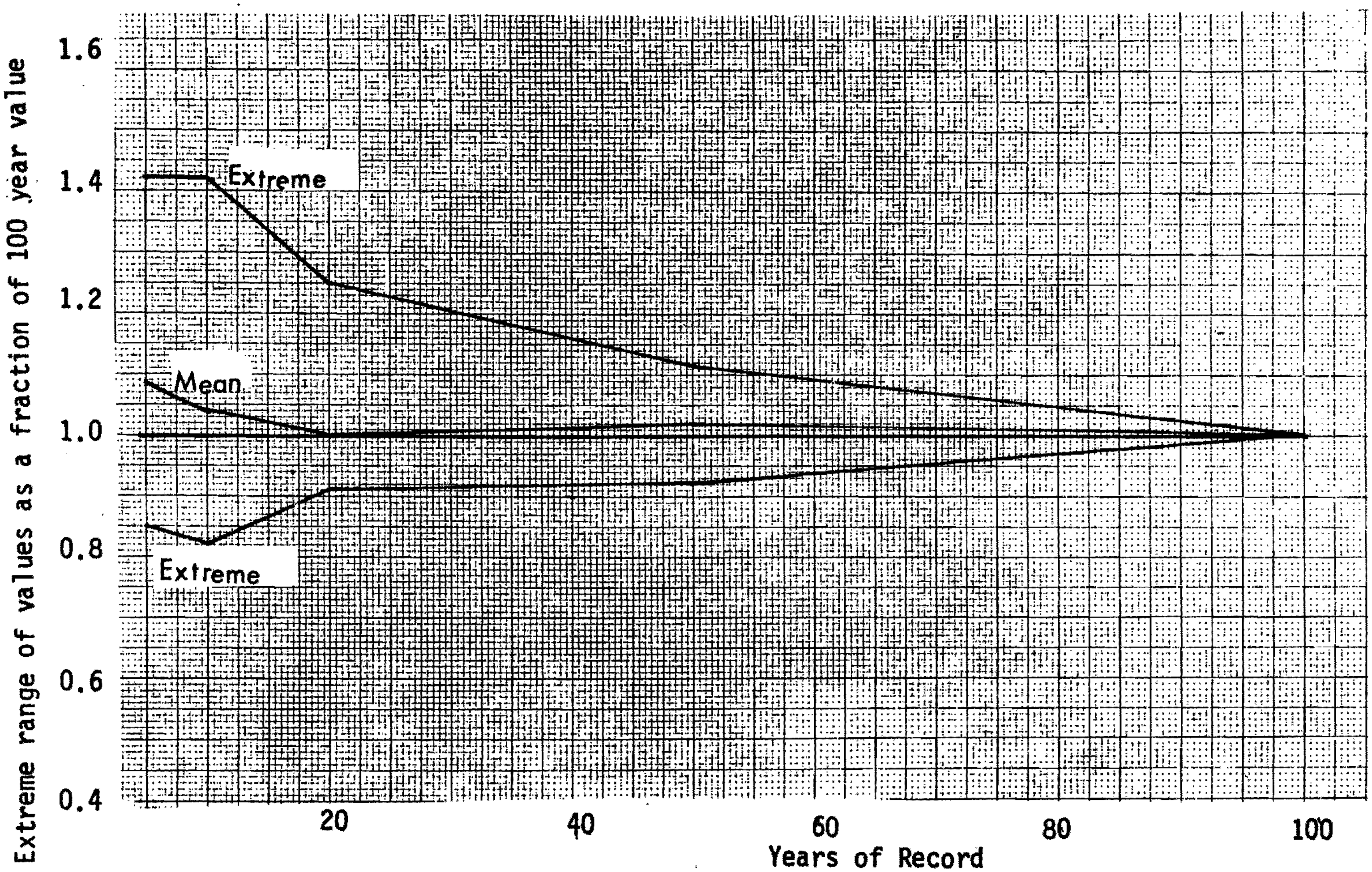

Figure 26. Maximum error distribution in the 10-year storm prediction. Log Normal distribution, Santa Fe, New Mexico precipitation.

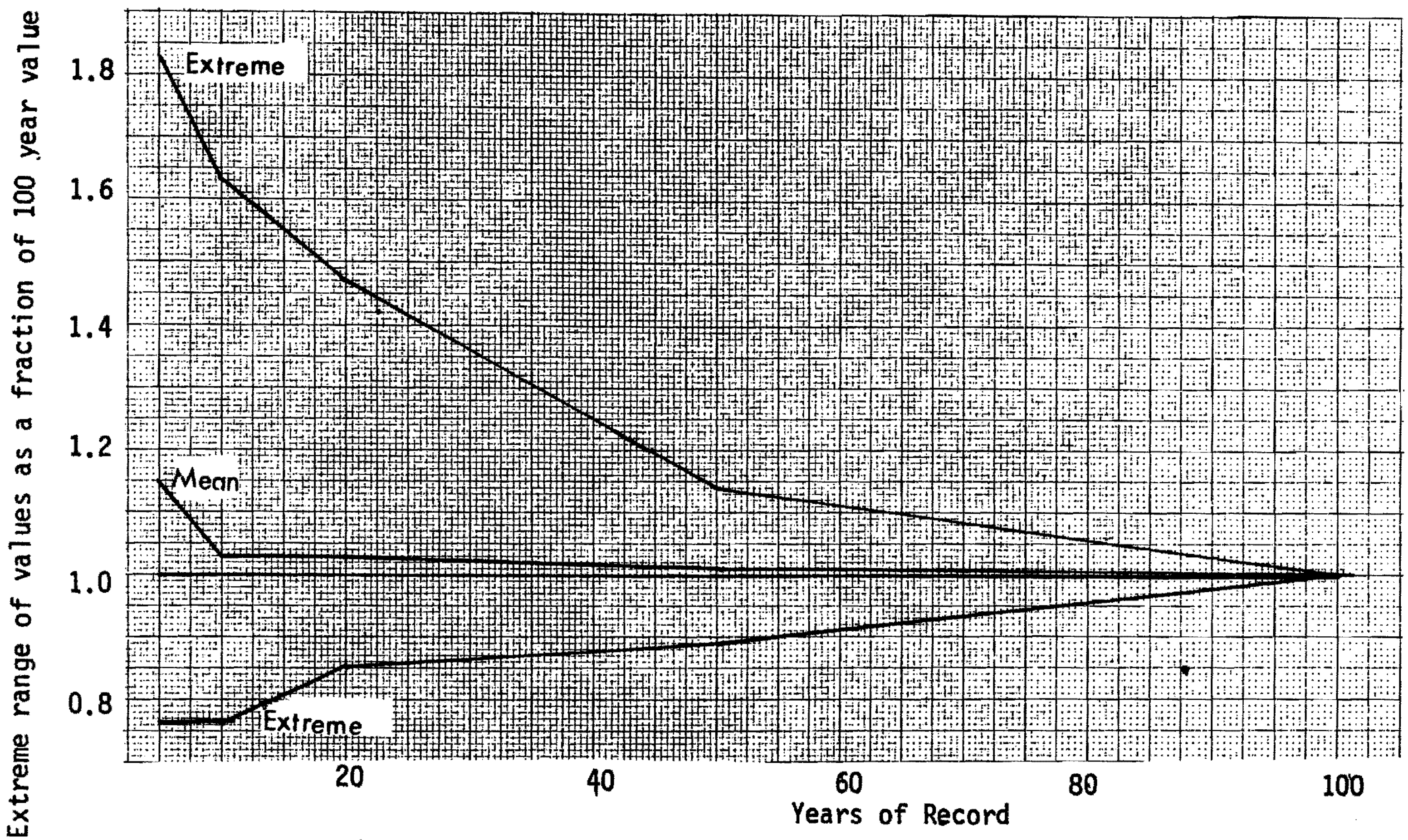

Figure 27. Maximum error distribution in the 50-year storm prediction. Log Normal distribution Santa Fe, New Mexico distribution.

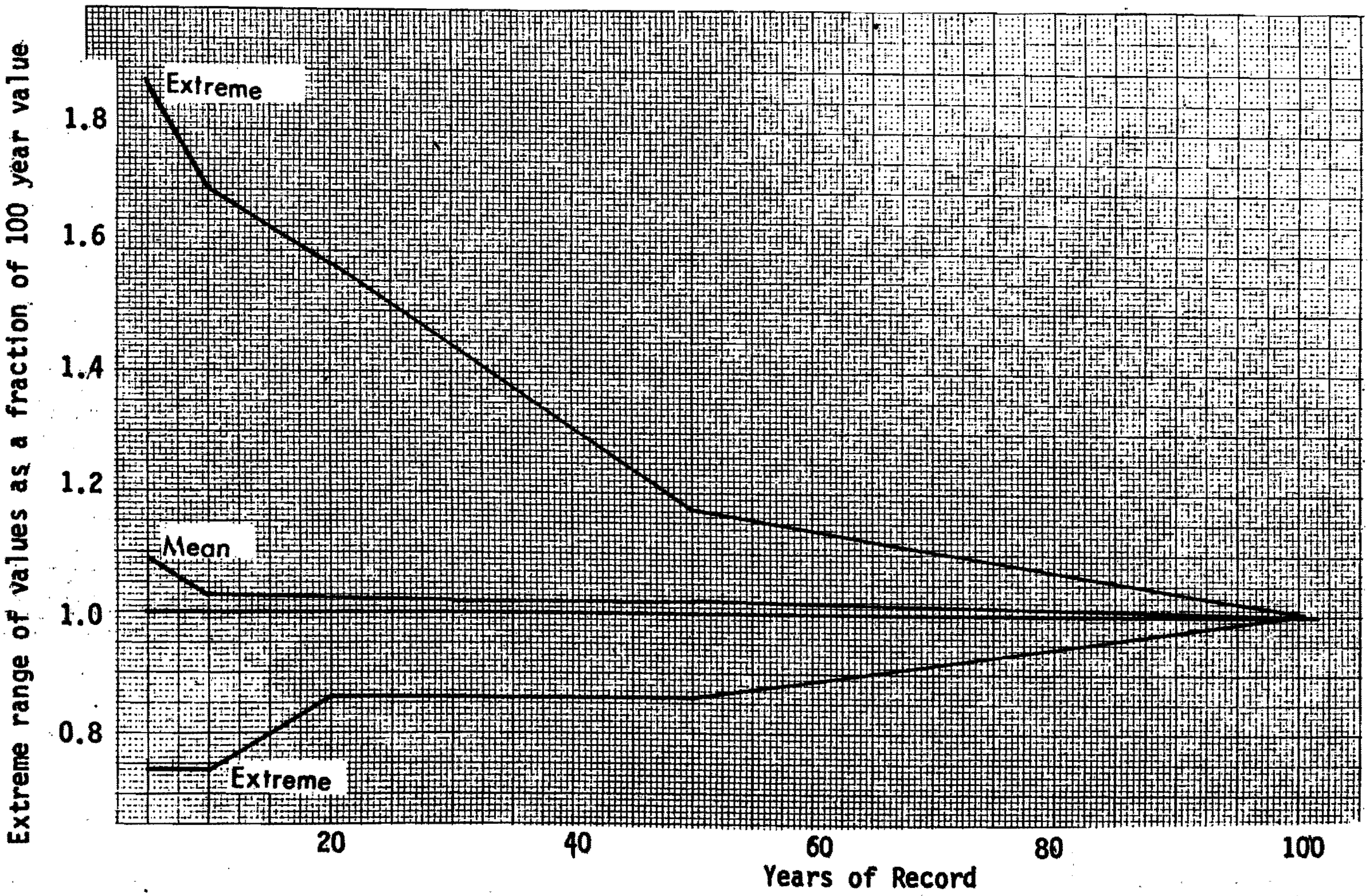

Figure 28. Maximum error distribution in the 100-year storm prediction. Log Normal distribution, Santa Fe, New Mexico precipitation.

short term variability only. Even with 50 years of record, the 50-year annual peak from one period of time might be as much as 200 percent different at the extreme than the next 50-year period. In a practical record, one is never sure where his estimate may lie in the possible range of climatic changes for the site.

Determination of other frequencies from the q_{10} value. Potter determined the 50-year flood peak, q_{50}, from a curve made by plotting the log of the q_{10} against the log of the q_{50}. The $\hat{q}_{10}$ value is determined from the estimating procedure. This $\hat{q}_{10}$ is then entered on the vertical scale and moved horizontally to the curve where the value of the $\hat{q}_{50}$ is read from the horizontal scale. See Figure 29 (p. 57).

Potter reasoned that greater precision could be had on the 10-year peak from frequency plotting than either more or less frequent returns. USU's present investigation verifies that the greatest prediction accuracy is obtained for the q_{10}. The curve Potter gives has slightly lower values of $\hat{q}_{50}$ than USU obtained from the Potter test watersheds only, but agreed very closely when USU used all of the samples from the Potter States. This suggests that perhaps Potter developed his relationship from a larger sample. Other return intervals are related to the 10-year flood peak on Figure 30 (p. 58).

The USU writers believe that no single distribution can be used for all of the United States. Where computers are available, the data points should be plotted on extremal paper and the multiple functions mentioned plotted, thus allowing the engineer to inspect the result to determine whether they conform to any of the distributions or whether a new relation such as Potter's upper and lower frequency should be drawn.

Examples of the data fit from selected stations in each State are given in Appendix A.

Probable maximum peak runoff. All of the "period of record" instantaneous maximum flood peaks for each station with data available (well over 1000 in the proper size range) were plotted against the area of the watershed from which each came on log-log paper. The upper boundary of these points defines a curve known as the probable maximum peak runoff curve. The curve derived for the 50 States and Puerto Rico is shown in Figure 31 (p. 59). For very small drainages where the culvert cost is not prohibitive, this curve might be an acceptable guide to sizing. Normally hydrologists consider this flow peak to be the one used where human lives are involved. This value would almost certainly be adequate for setting maximum watershed sizes for which no other peak flow estimates need be made.

Conclusions. It appears reasonable from this investigation and that reported by Schmidt (ref. 14) as discussed previously to conclude that within the range of the data, there is little choice between the different distributions or methods except the log-gamma distribution.

When extrapolation becomes necessary, all of the methods tested--Gumbel, log-Gumbel, log normal, log-Pearson III, gamma, Pearson III, and normal--gave

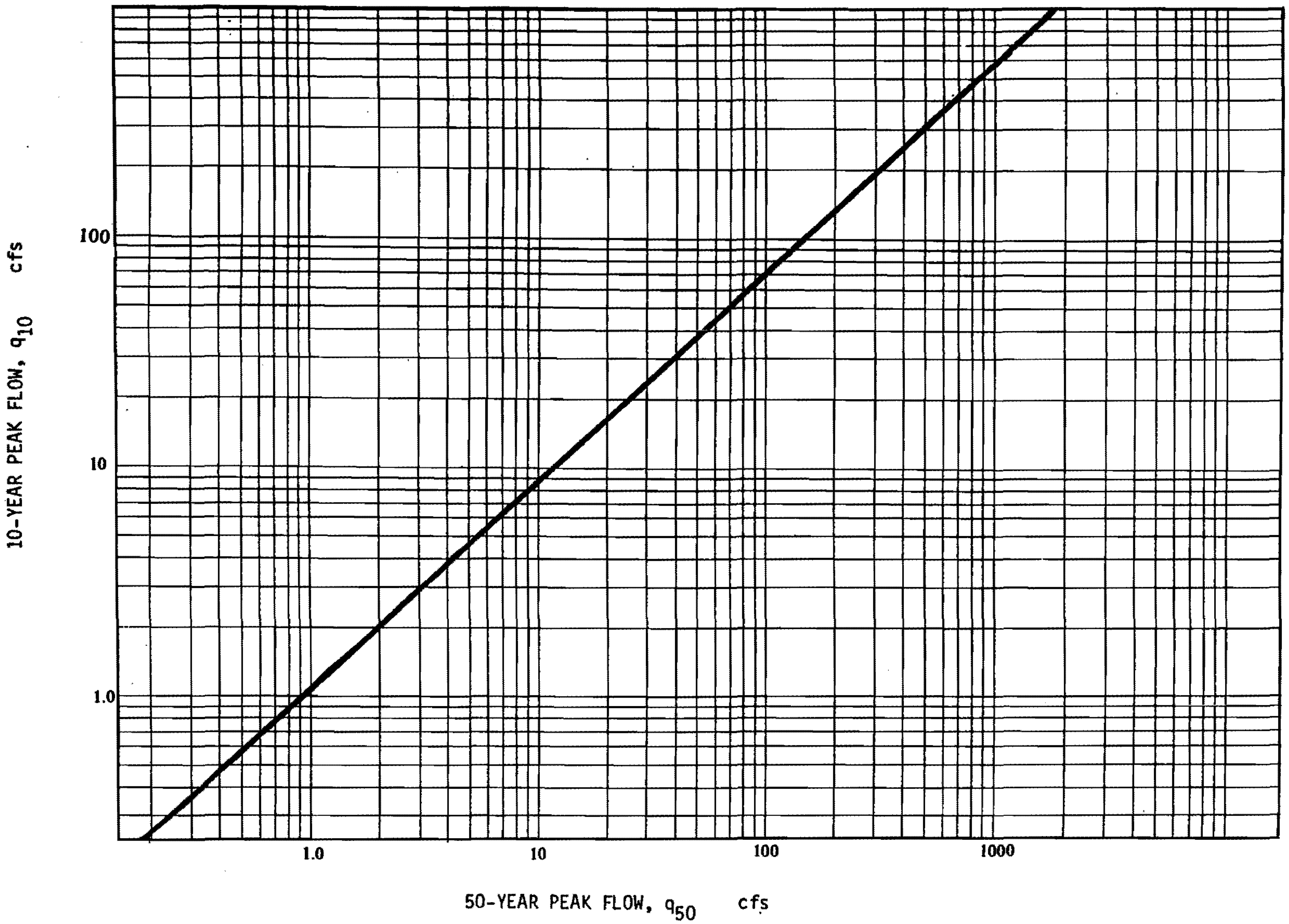

Figure 29. Relationship of q_{10} to q_{50} in the Potter States.

closer results than the variability of the climate with time. It would appear to be desirable to establish zonal norms through indirect methods such as tree rings, varves, or some other technique, in order to determine whether or not a time period when measurements were available was characteristic of the climatic range for the area.

These USU writers feel strongly that where records must be extrapolated appreciably beyond the range of the data, no single distribution should be adopted, but all points should be plotted on extremal paper and a visual determination made where the extrapolation line should go. The upper and lower frequency procedure of Potter can be a good guide at this point.

Extend the Potter Type Procedures

Selection and location of watershed samples

Watersheds were selected so there were at least seven watersheds in each physiographic section of the United States as defined by Fenneman and Johnson (ref. 7). Whenever more than the minimum numbers of samples were located in the same section the watersheds with the longest records were retained. The first samples inspected in each section were those compiled by Bock, Enger, Malhotra and Chisholm (ref. 3).

Figure 32 (p. 61) shows the location of all the sample watersheds within the contiguous United States. Figure 33 (p. 62) shows the location of the watersheds in Alaska, Figure 34 (p. 63) shows the location of those watersheds in the Hawaiian Islands, and Figure 35 (p. 64) shows the location of watersheds in Puerto Rico.

Parameters Investigated

Potter limited the parameters used in the method he recommended to a zoning or geologic parameter, a precipitation factor, area, a topographic factor, and a correction factor "C." In the USU extension of the method to the balance of the United States, it seemed desirable to include parameters which would tend to make the method simpler and more versatile. No attempt will be made to make a literature review on the subject but instead the reader is referred to the reviews of Bock, Enger, Malhotra, and Chisholm (ref. 3), Chow (ref. 4), Hydrocomp, Inc. (ref. 9), and Ben Chie Yen (ref. 22) for references on the subject. Potter considered the parameters: geophysical zone, area, watershed slope or topographic factor, precipitation factor, drainage density and "C" factor. Several of these parameters require manipulation to obtain a usable value after the direct measurement. Each of the basic elements is measured in the field or from maps, charts, etc. Each parameter to be tested in this section is considered in the following subheadings.

Area

In this section the area used is that given in the USGS publications or tapes except when their area was labeled "approximate." In this instance, the watershed area was planimetered from the largest scale topographic map available

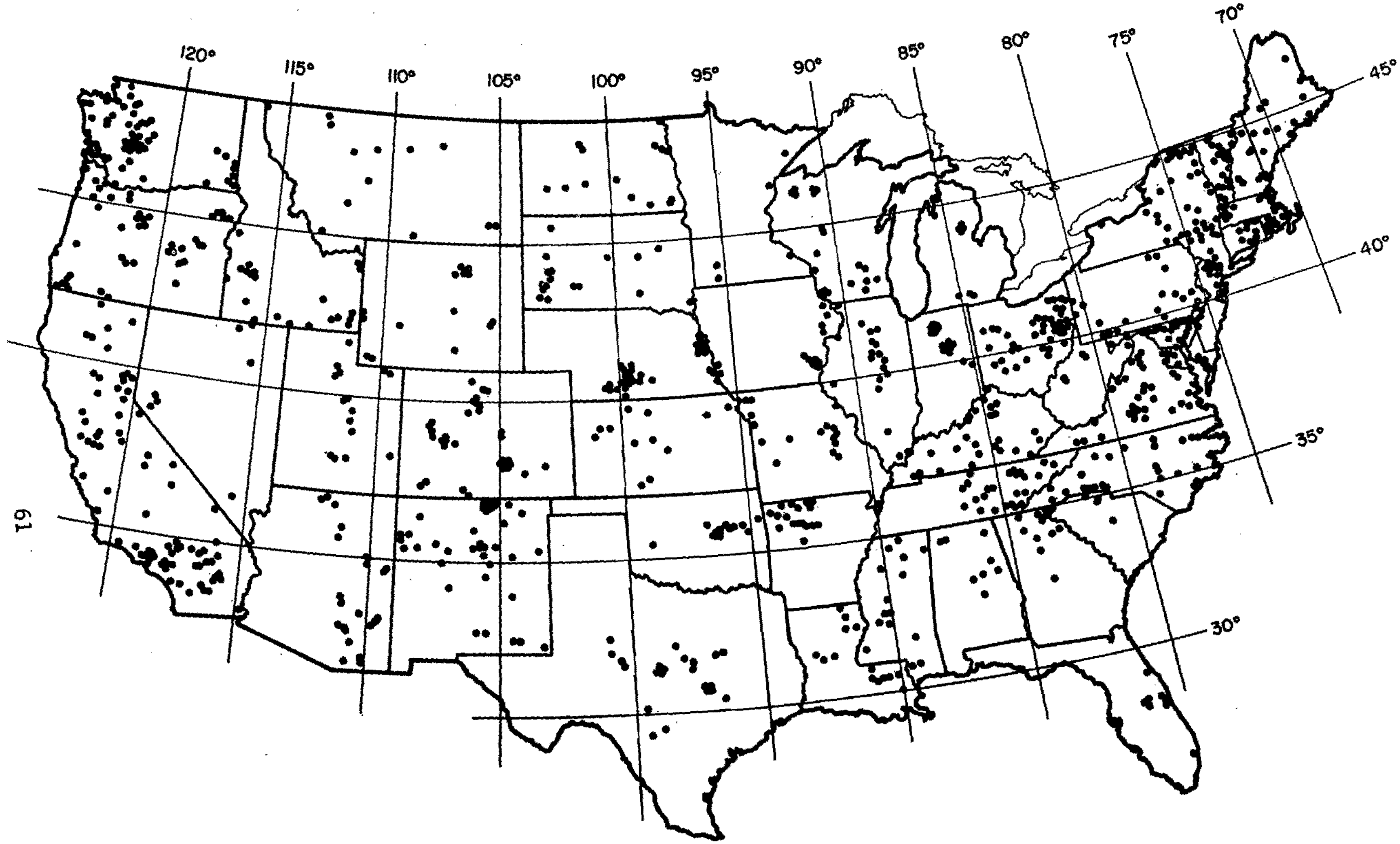

Figure 32. Location of all sample watersheds in the contiguous United States.

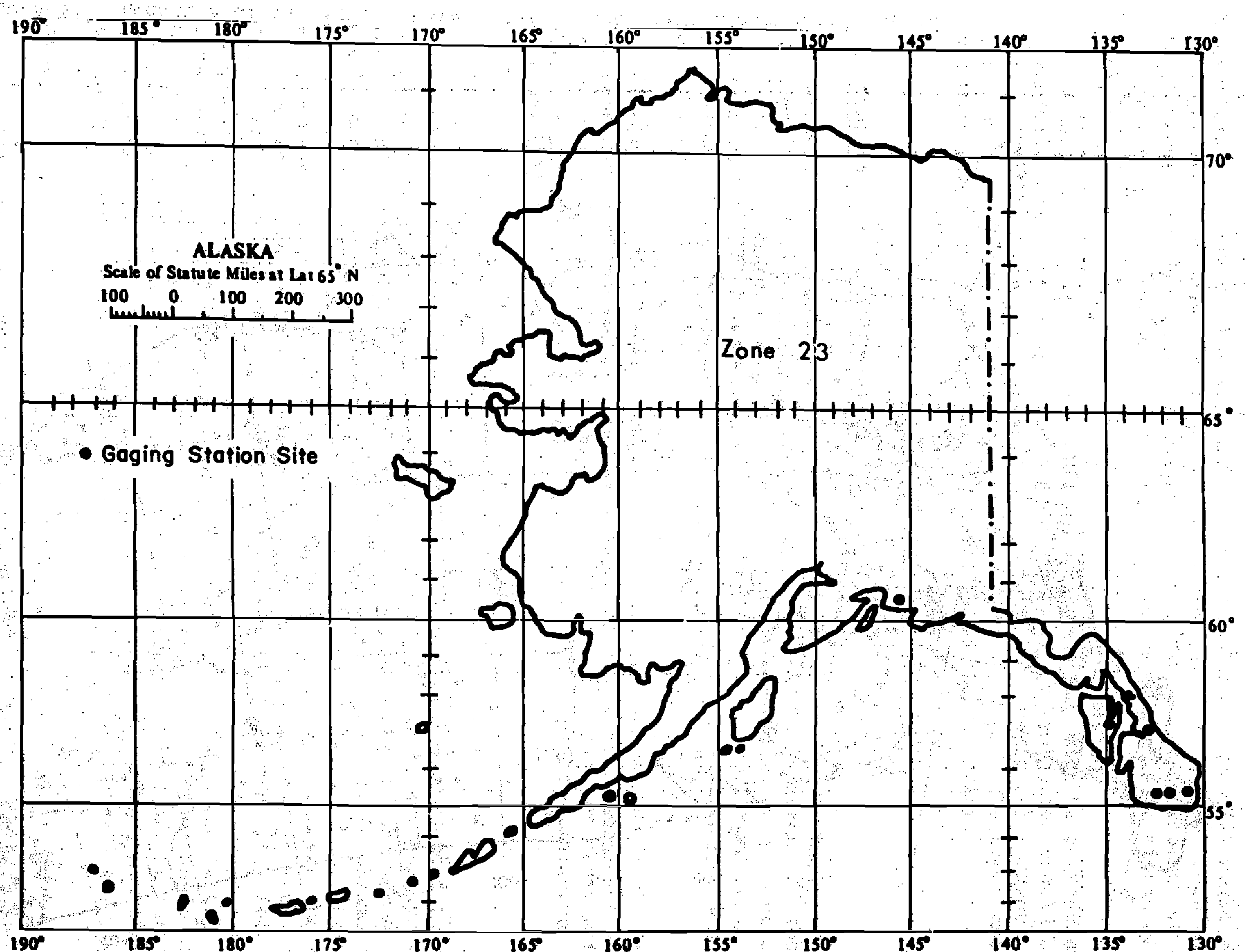

Figure 33. Location of sample watersheds in Alaska.

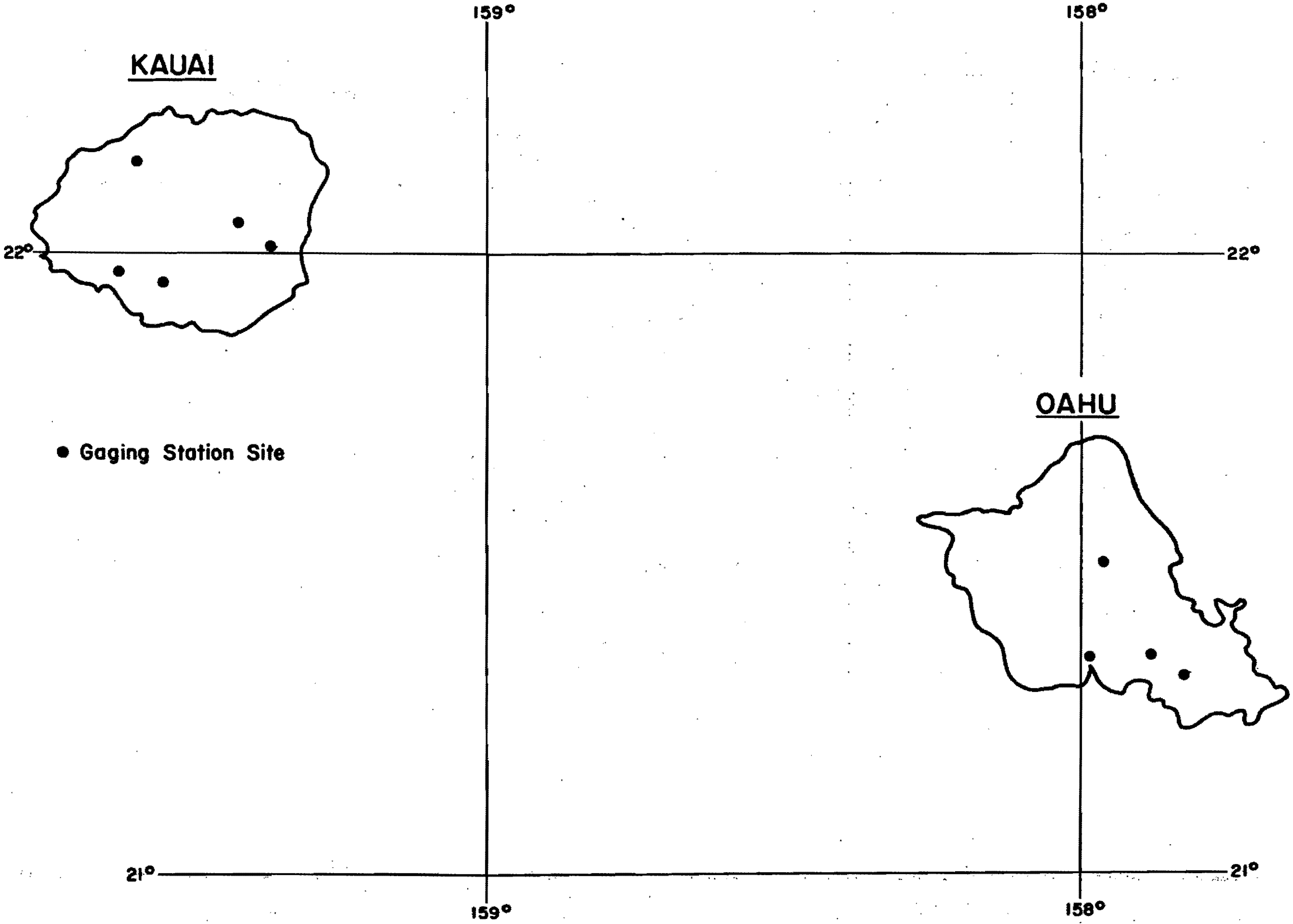

Figure 34. Location of sample watersheds in Hawaii.

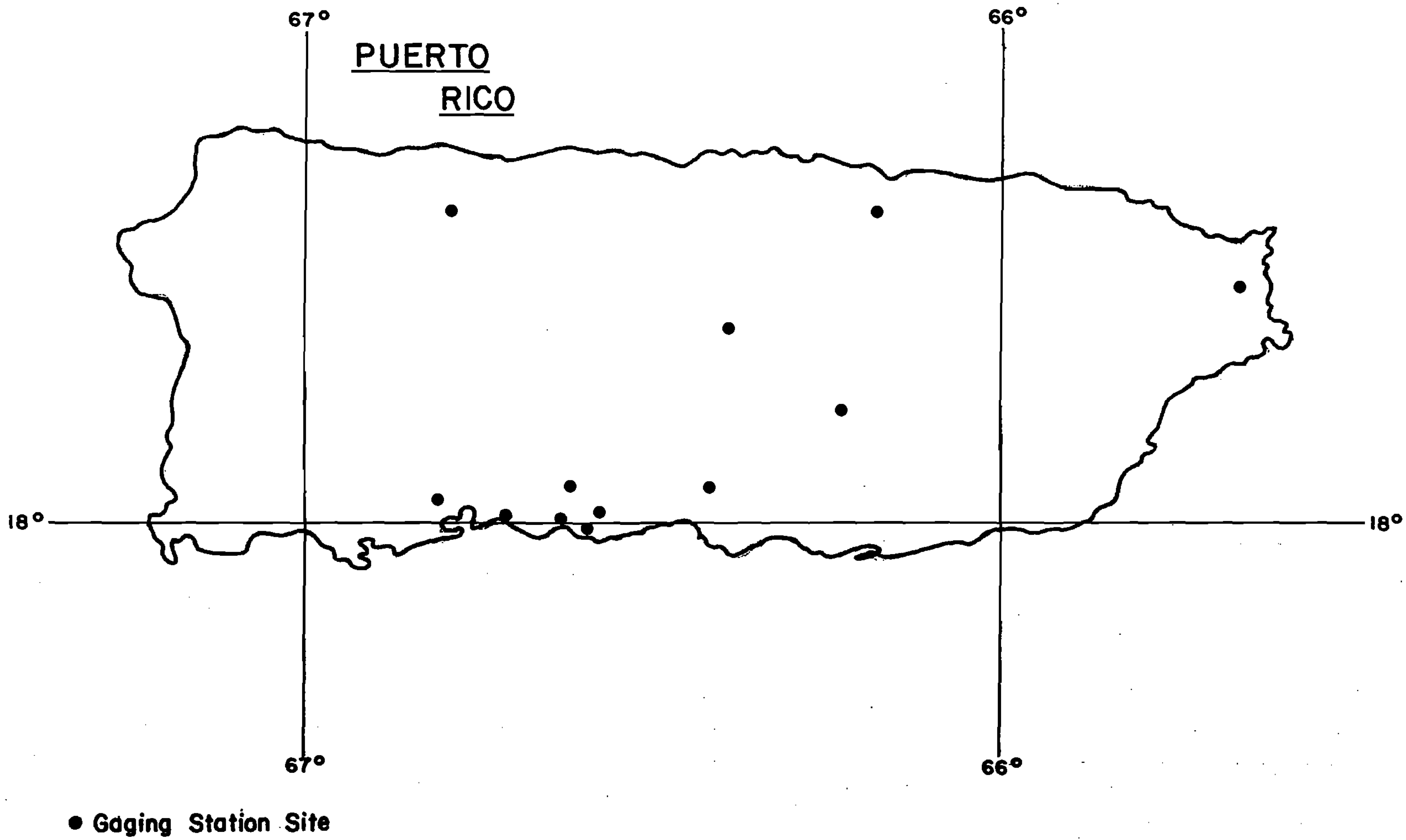

Figure 35. Location of sample watersheds in Puerto Rico.

most commonly this was the 7½ minute quadrangle map. No corrections for map scale were made in the instance of areas. The area is expressed in square miles.

Snow

In many areas of the United States a large portion of the annual peak runoff events occur as a result of snowmelt. Fletcher and Reynolds (ref. 8) showed that percent normal ($q_{2.33}$) annual runoff peaks were closely associated with the percent normal annual 1 April snow waterequivalent. The 1 April snow water equivalent was thus introduced to supplement the other precipitation factors and to take advantage of the valuable data by the Soil Conservation Service Cooperative Snow Surveys in the western United States. The parameter used herein is the 10-year snow water equivalent in inches of water. The values are read from the appropriate snow water equivalent maps in Appendix F.

Storage

Potter stated that he carefully avoided surface storage in his selection of the watersheds used to develop his method. It may be seen in Table 1 (p. 5-9), that, out of 96 Potter's watersheds, only two had significant storage. Another 7 watersheds had 1.7% of storage or less. Bar-Kochba and Simon (ref. 1) indicated that small watersheds are much more susceptible to the effects of storage than large watersheds, but that storages smaller than 25 acre-feet per square mile could be considered as negligible for watersheds larger than 70 square miles. If this storage had an average depth of 1 foot, it would be equivalent to less than 4 percent of the total area. In correlations here storages smaller than 1 percent are considered to be negligible. Because so many watersheds have values of storage below this value, storage is handled as a correction after the estimate of $\hat{q}_{10}$ is made from the other parameters. To make this correction Figure 36 (p.65) is entered with the percent of the area occupied by storage and a multiplier is read off the vertical axis. The $\hat{q}_{10}$ is multiplied by this multiplier to get the proper 10-year peak flow corrected for storage.

Slope parameter

During the visits to the States several people complained about the complexity of the Potter T. Consequently, the parameter of channel length up to the crest of the watershed divided by the square root of the main stream slope, $L/\sqrt{S}$, was investigated. There was no difference between T and $L/\sqrt{S}$ as measured by their respective correlations with q_{10}. In view of this finding USU decided to extend this reasoning one step further and try the difference in elevation between the top and bottom of the watershed, ΔH, as a parameter. Since ΔH is read directly from a topographic map, it is much simpler than either of the other slope parameters and if anything, the correlations between ΔH and q_{10} proved to be even better than the more complex slope parameters. ΔH is in feet.

Precipitation parameters

During the confirmation of Potter's original method, some of the log q_{10} values correlated poorly with log P factor, P_{60}, whereas, log q_{10} correlated

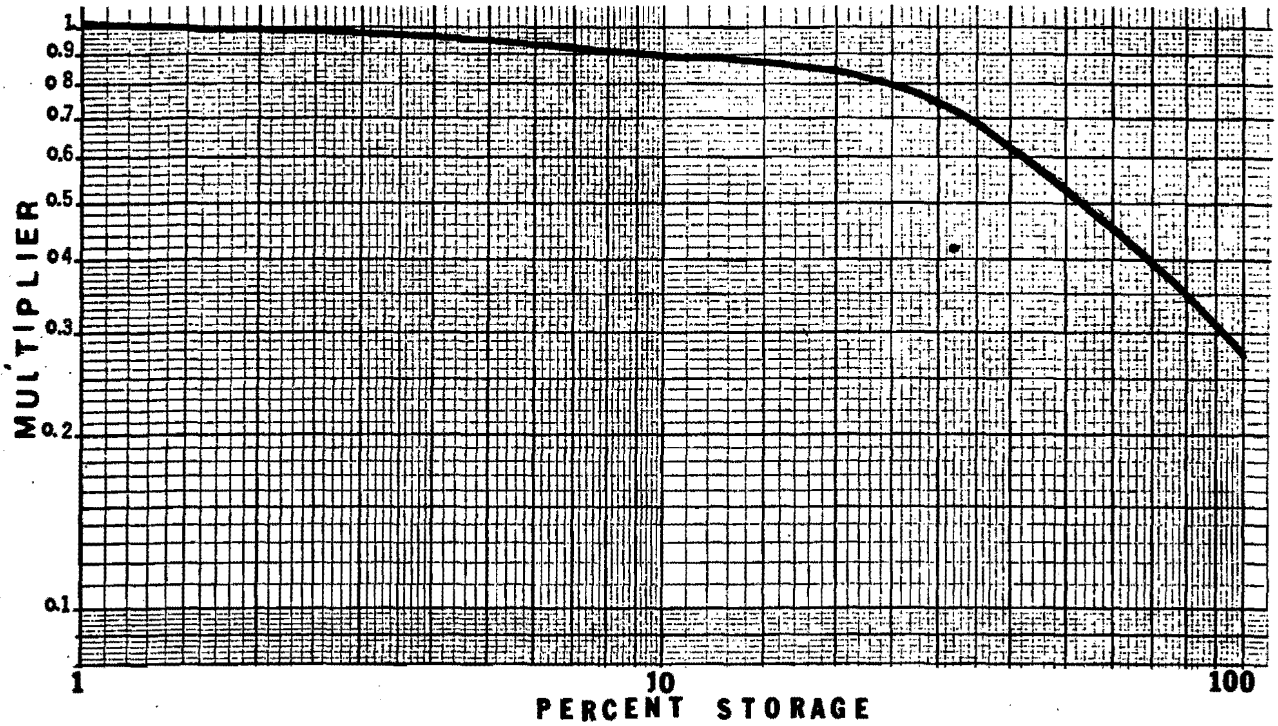

Figure 36. The relationship between percentage of watershed area covered by lakes, ponds, swamps, playas, etc. to the multiplier required to correct a peak runoff estimate for storage.

better with the corresponding arithmetic 10 minute precipitation, P_{10}, intensity, even though the two parameters are closely correlated with each other ($r^2 > 0.9$) through a log-log transform. The third precipitation parameter, the R value, was included when a national map became available from Transportation Research Board Project 16-3. Each of these three precipitation parameters are read from a map. R is defined as the mean annual rainfall erosivity index, EI, or the total mean annual kinetic energy* times the annual maximum 30 minute rainfall intensity (see Wischmeier and Smith (ref. 21) and Dragoon (ref. 5)).

Drainage density parameters

The so-called drainage density parameter, drainage density, D-factor or DD is a relatively simple parameter. It is derived from the total lengths in miles

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*$E = \Sigma_0^{12} (916 + 332 \log I)d$ wherein I = rainfall intensity for a constant period of time and d = depth during the same period. These E values are summed for all storms each year and multiplied by the annual maximum 30 minute rainfall intensity to get the year's EI.

of all drainage channels shown as blue lines within the watershed, LL, divided by the area of the watershed in square miles. The second drainage density parameter is the simple primary unit LL. LL is read directly from a 7½ minute quadrangle sheet, where one is available with a map measure. It is the total length in miles of all blue lines which indicates stream channels within the watershed boundary on the USGS map. If only a 1:250,000 scale map is available the curve in Figure 37 (p. 68) is utilized to correct to the 1 to 24,000 scale value. LL is in miles. DD calculated from a 1:250,000 map may be corrected to the 1:24,000 scale value with Figure 12 (p. 29).

Shape factors

Potter's length of principal drainage channel L' is related to shape of the watershed. The method Potter used to determine L', however, was map scale dependent. This measurement was therefore modified to extend the length measured past the end of the blue stream channel line to the nearest most remote crest of the watershed. With this modification, it was found that the simple correlations with q_{10} were actually improved and the L values were independent of map scale.

The original USU idea was to use one main axis and two minor axes at right angles to this main axis as indices of shape of the watershed. The preliminary correlations, however, indicated that the L/A parameter was equally well correlated with q_{10} so the former was discarded in favor of L/A for simplicity. This ratio was later reduced to just L since A was already a parameter. Whenever the different forms of each parameter showed similar correlation values, the simplest form was chosen for further investigation. When 958 watersheds were used in a multiple regression covering all of the states plus Puerto Rico the parameter most pertinent to the 10-year flood peak was the precipitation parameter, R, followed closely by area, ΔH and LL. P_{60}, L, and P_{10} had somewhat lower weights but were still significant.

The reduction in the percent of explained variation of q_{10} from these variables with no zonation, is just under 74 percent. Dropping the latter three parameters decreased the reduction by about 1 percent only, and substituting L for the LL decreased the reduction by about 1 percent additional. The three variables A, R, and ΔH give just over 72 percent reduction.

Zonation

Potter's original zones were deduced from the SCS problem area map (Figure 8, p. 19). The physiographic sections from the map of the physical divisions of the United States prepared by Fenneman and Johnson (ref. 7) were selected for the present zonation which both Potter and USU felt was desirable. The preliminary work which USU did on the Potter watersheds (Phase I) indicated that q_{10}/A could be used as a parameter to show the effects of zonation. From this and using t as the statistical test method, Potter's Zone II was significantly different from his other three zones. As the Potter method was extended to other watersheds, the similar physiographic boundaries and the smaller amounts of other data on the map of Fenneman and Johnson made it the most desirable of the two maps to use.

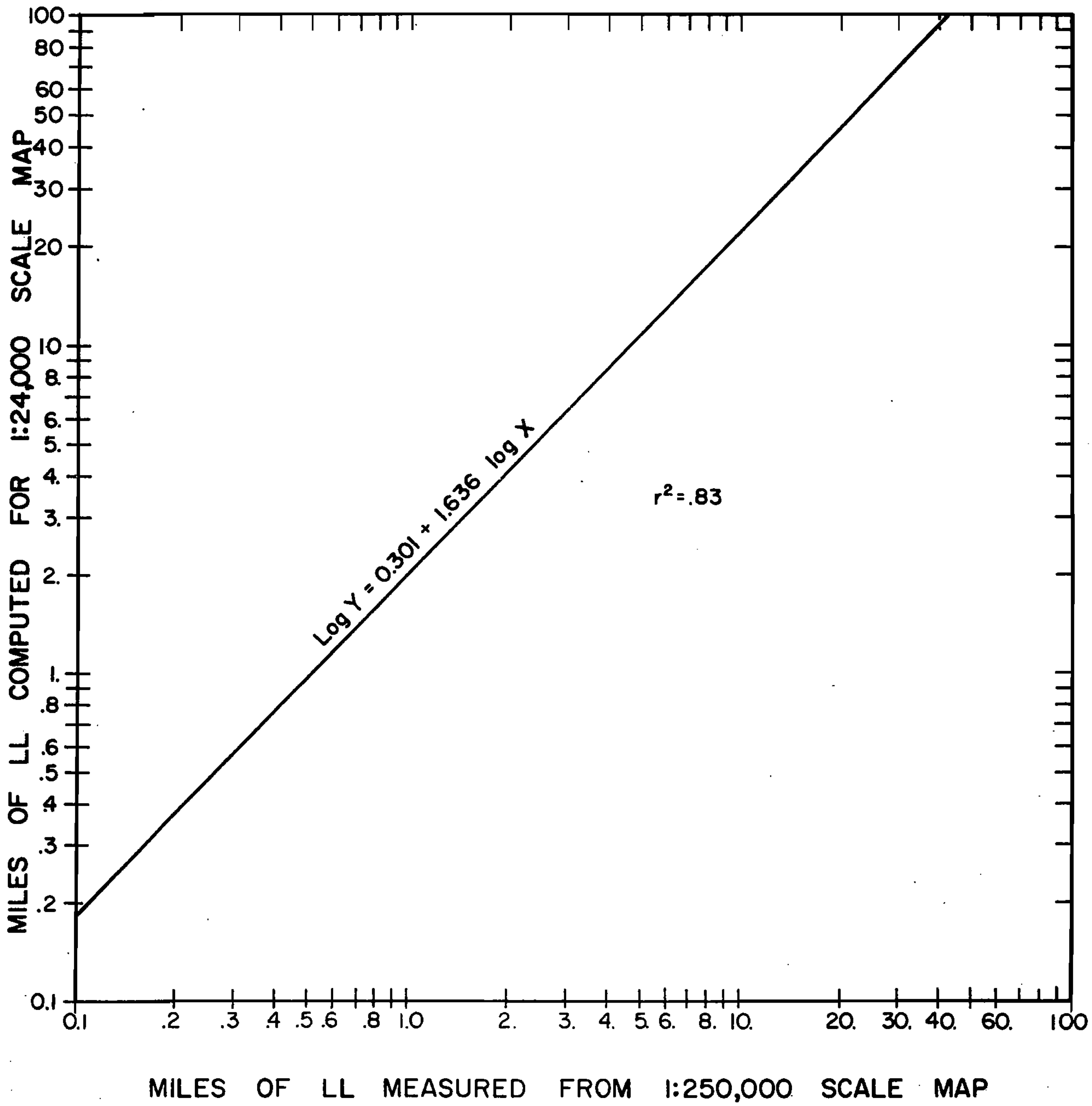

Figure 37. The relation of LL measured on a 1:250,000 scale map to that derived from a 1:24,000 scale map.

When the physiographic sections from the Fenneman and Johnson map were compared to each other on the basis of their q_{10}/A value utilizing the t test as the criterion of differences, the physiographic sections were grouped into hydrophysiographic zones in Potter's states. Two or more sections were grouped in the same zone when the t values between them were not significant and they were in the same general area. These USU zones are as follows:

USU Hydrophysiographic Zone	Physiographic Sections from Fenneman and Johnson
1	1, 3A, 3B, 3C
2	3D, 3E
3	3F
4	4A, 4B, 5A, 5B
5	6A, 6B, 7A, 7B
6	6C, 8A
7	8B, 8C, 8D
8	8E, 8F, 8G
9	9A, 9B, 9C, 9D
10	9E, 10
11	11A, 11B, 11C, 11D
12	12A, 12B, 13C
13	12C, 12D, 12E, 12F, 13B, 13E, 13F, 13G, 13H, 13I, 13K, 14A, 14B, 15A, 15B
14	13A, 13D
19	22B, 22C, 22D, 22E, 21F

These 15 hydrophysiographic zones cover all of the 16 Potter States. The same zonality test was applied to the balance of the test watersheds in the United States and Puerto Rico. The additional sections combined are tabulated as follows:

USU Hydrophysiographic Zone	Physiographic Sections from Fenneman and Johnson
15	16, 17, 18, 19
16	20A, 20B, 23A
17	20C, 20D, 20E, 21A, 21B, 21C, 22A
18	21D, 21E
20	23B, 23D, 24A
21	24B, 24D, 24E, 24F, 24G
22	23C, 24C, 25
23	No zones available--Alaska
24	Hawaii and Puerto Rico combined

It is interesting that no significant differences exist between the watersheds in Hawaii and Puerto Rico even without zoning of either being considered. These two were combined since they were not significantly different even though little physiography was considered. A map delineating the USU hydrophysiographic zones of the contiguous United States is given as Figure 38 (p. 70).

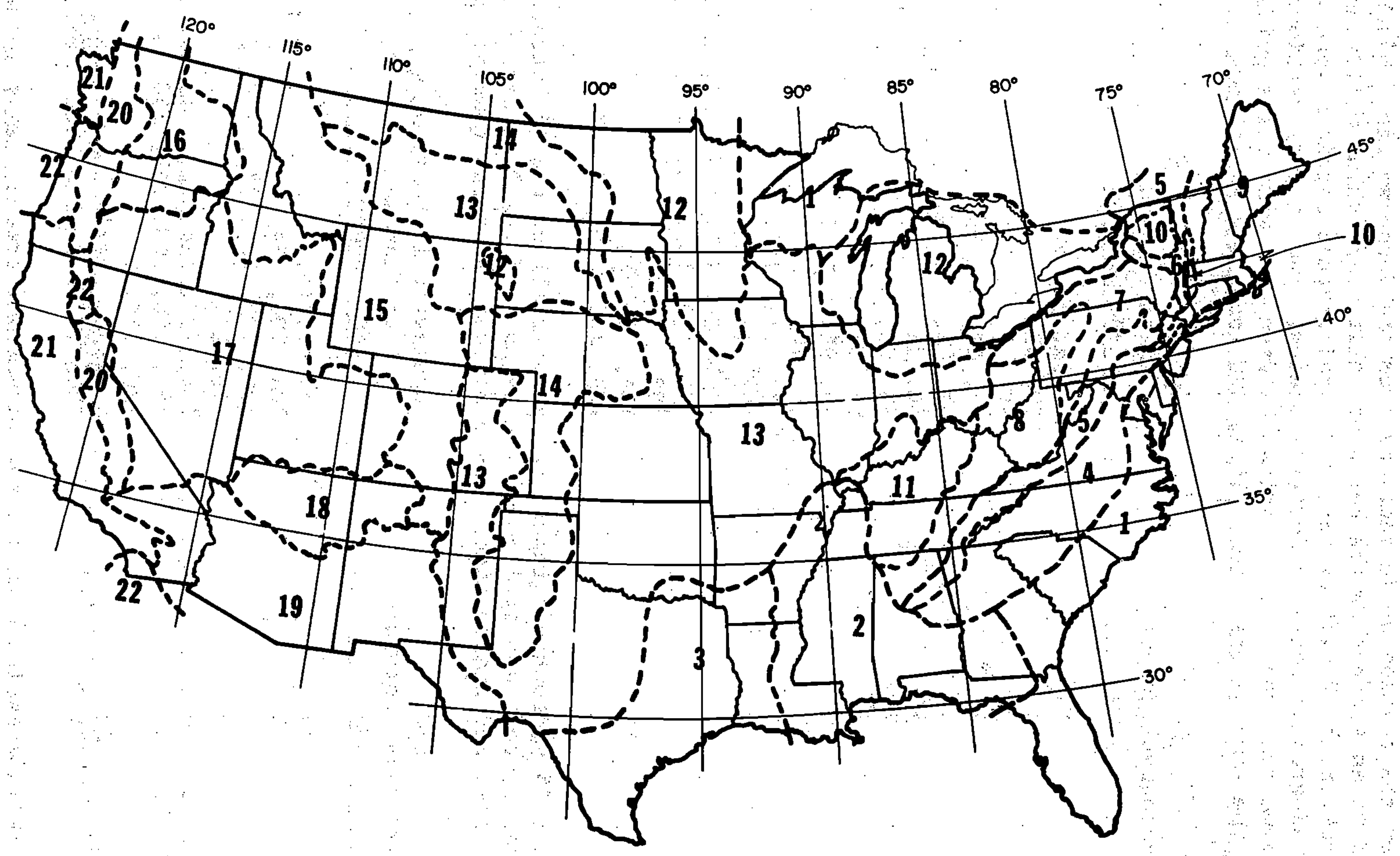

Figure 38. USU hydrophysiographic zones for the contiguous United States as determined by an analysis of the physiographic sections defined by Fenneman and Johnson (ref. 7).

The 958 watersheds and their associated basic data used in this phase of the study are given in Table 10 (p. 72-91) and are grouped within the 24 USU hydrophysiographic zones defined above.

New Methods

The basic data used in the development and testing of the new methods are compiled in Tables 1 (p. 5-9), 7 (p. 32-36), and 10 (p. 72-91). The watershed numbers are in two categories. First, where available, the U.S. Geological Survey (ref. 19) numbers and second, the USDA Agricultural Research Service (refs. 17, 18) numbers are used to identify the watershed. The two services official names are also given for each watershed. The other data have been discussed earlier under parameters and frequency studies.

The problem of new method development was approached on the basis of supplying directly usable techniques for field use. The methods were investigated starting from the simplest and most direct to those of increasing complexity. They may be summarized as follows: The first procedure was to determine the probable maximum peak runoff for the United States and Puerto Rico by plotting the maximum flood peak of record, q_p, from Tables 1 (p. 5-9), 7 (p. 32-36), and 10 (p. 72-91) against the area of the watershed in square miles from which it came. The curve enveloping the upper perimeter of these points was determined from the data and is shown in Figure 39 (p. 92).

For many uses the probable maximum peak runoff is needed since it forms the boundary for the upper limit of runoff peaks for each fixed area. Thus all finite frequency runoff peaks are smaller than the values represented by the probable maximum peak runoff curve.

The second category of approaches was to assume that zonation was unnecessary. Combinations of the physical parameters are utilized to obtain a combination which would be at the first portion of diminishing returns between accuracy and simplicity. During the preliminary regressions and throughout, the methods of Steel and Torrie (ref. 16) were used. The reader is referred to this or other standard texts for explanations of the methods and limitations.

The preliminary filtering of variables consisted of simple correlations with all variables. All of the significantly correlated variables were retained for the preliminary multiple regression. The weighting of each variable was determined from the values by the F test. Only those with significant weights were retained for the later work and involved the seven variables A, R, DH, L, P_{60}, P_{10}, and LL. The F tests further revealed that the most important three variables were R, A, and DH in that order and the most important five variables were R, A, DH, L, and P_{60}.

The first regression equation involving the three most important parameters, A, R, and DH was derived from data from all of the watersheds tabulated in Table 10 (p. 72-91) except those that had 4 percent or more of their area in surface water storage. It is called the 3-parameter all zone equation and is:

$$\hat{q}_{10} = 1.28015\ A^{0.56172}\ R^{0.94356}\ DH^{0.16887}$$

Table 10. Properties of watersheds used in the study by Utah State University arranged by hydro-physiographic zones.

Zone 01

1			2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SEQ	STATION	STATION NAME	SECT	AREA	S10	LAT	LONG	R	P10	P60	DH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
1	2784815000	SECOND CREEK NEAR AURORA, MINN.	1	86.30	813.8	47 31	92 12	62	3.20	1.84	375	9.35	86.79	7.0	136.2	136.0	258.8	273.1	235.0
2	5604024400	STONEY BROOK NEAR SUPERIOR, WISCONSIN	1	5.29	581.0	46 35	92 07	92	3.74	1.62	320	3.90	0.28	0.0	179.8	161.0	593.3	719.2	460.0
3	5004028200	PEARSON CREEK NEAR MAPLE, WISCONSIN	1	4.91	1232.1	46 38	91 42	89	3.83	1.74	338	4.90	11.15	0.0	535.7	417.8	1807.1	1928.5	1360.0
4	5504009300	SIOUX RIVER NEAR WASHBURN, WISCONSIN	1	10.30	1093.4	46 42	90 55	85	8.81	1.73	437	9.00	25.00	2.21	632.3	505.6	2908.6	3485.8	1830.0
5	6504020400	SPILLERBERG CREEK NR CAYUGA, WISCONSIN	1	9.15	133.6	46 11	90 41	84	8.86	1.77	51	4.45	10.90	39.4	78.6	74.6	211.1	244.3	157.0
6	5504020702	TROUT BROOK TRIB NR MARENGO, WISCONSIN	1	8.77	264.1	46 20	90 47	83	3.00	1.76	277	1.39	3.10	0.0	136.6	150.3	418.0	475.4	295.0
7	5504020700	BOOHER CREEK NEAR BAXON, WISCONSIN	1	9.78	309.0	46 29	90 21	88	3.47	1.72	495	3.85	12.80	13.1	151.9	153.4	437.5	480.0	349.0
8	1501403200	BLACKBIRD CREEK AT BLACKBIRD, DEL.	3A	3.69	309.8	39 22	75 40	170	7.77	2.42	25	3.20	8.36	0.0	177.7	165.3	985.2	1334.5	712.0
9	1001403500	LEIPSIC RIVER NR CHESWOLD, DEL.	3A	9.35	704.9	39 14	75 38	170	7.07	2.45	88	9.55	26.70	0.0	318.7	293.2	1608.7	2128.9	1340.0
10	1001484800	STOCKLEY BRANCH AT STOCKLEY, DEL.	3A	8.24	108.4	38 38	75 21	188	8.36	2.00	20	2.40	3.75	0.0	65.3	66.8	146.3	163.2	132.0
11	1001485470	TAPPAHANNA DITCH NR HARTLY, DEL.	3A	5.05	119.4	39 07	75 42	180	7.07	2.91	7	2.79	4.38	0.0	77.0	75.5	158.0	174.0	127.0
12	3401486000	MANOKIN BRANCH NEAR PRINCESS ANNE, MD.	3A	9.00	322.8	38 12	75 48	195	8.81	2.71	21	3.35	4.85	0.0	162.6	162.8	525.2	614.3	947.0
13	2401490000	CHICAMACOMICO RIVER NEAR SALEM, MD.	3A	16.00	480.2	38 31	75 53	190	8.42	2.65	21	8.04	13.12	0.0	250.1	230.1	727.8	855.3	542.0
14	2401492000	BEAVERDAM BRANCH AT MATTHEWS, MD.	3A	6.08	801.8	38 49	75 58	180	8.26	2.66	43	5.90	13.28	0.0	431.2	293.2	2016.0	2448.6	2200.0
15	2401493000	UNICORN BRANCH NEAR MILLINGTON, MD.	3A	24.30	886.9	39 19	75 52	175	7.94	2.46	85	10.33	35.04	0.0	391.7	372.1	1320.9	1562.9	1060.0
16	2401405000	MORGAN CREEK NEAR KENNEDYVILLE, MD.	3A	13.30	2173.8	39 17	76 01	160	8.10	3.30	58	3.42	28.11	0.0	798.2	553.1	5175.8	6582.4	7500.0
17	2401606000	NORTHEAST CREEK AT LESLIE, MD.	3A	24.30	3413.7	39 38	75 57	160	7.51	2.38	365	14.39	38.19	0.0	1815.8	1706.9	5355.8	6954.5	4800.0
18	2401801000	SYNUM RUN AT BEL AIR, MD.	3A	8.88	8801.8	39 32	76 26	160	7.79	2.43	240	8.77	9.84	0.0	1351.3	1061.0	5513.3	6553.0	4650.0
19	2401950000	NORTH RIVER NEAR ANNAPOLIS, MD.	3A	4.08	409.8	36 50	76 37	175	8.36	2.62	53	4.27	15.42	0.0	206.1	157.4	1616.5	2002.7	3000.0
20	2401991000	CHAPTICO CREEK AT CHAPTICO, MD.	3A	10.79	2007.8	38 23	76 47	180	0.61	2.71	160	8.34	31.22	0.0	717.8	356.5	4461.2	5449.2	7000.0
21	2401951300	ST. MARYS RIVER AT GREAT MILLS, MD.	3A	24.00	4306.9	38 23	76 30	199	9.07	2.75	111	8.30	66.46	0.0	1311.2	785.8	9526.6	11560.7	7950.0
22	3401368000	MID BR NY MISERY BROOK IN LEB ST FOREST, N.J.	3A	3.73	42.8	39 56	74 30	138	7.26	2.29	18	3.22	3.22	0.0	17.3	13.8	62.0	78.0	50.0
23	3401482000	SALEM RIVER AT WOODSTOWN, N.J.	3A	14.30	3805.7	39 39	75 20	106	7.44	2.34	38	7.18	19.62	0.0	1596.8	1085.9	8142.7	10377.9	22000.0
24	3601303000	MILL NECK CREEK AT MILL NECK, N.Y.	3A	11.50	86.6	40 53	73 34	132	6.02	2.13	184	2.72	4.10	12.9	34.7	38.3	184.1	190.4	137.0
25	3301307000	CHAMPLIN CREEK AT ISLIP, N.Y.	3A	0.50	73.3	40 44	73 12	188	8.97	2.18	17	1.97	1.97	0.0	43.3	42.9	99.2	103.0	91.0
26	3301307800	PENATAQUIT CREEK AT BAY SHORE, N.Y.	3A	5.68	38.9	40 43	73 14	188	8.97	2.18	20	1.38	4.31	0.0	44.2	43.5	74.5	78.3	71.0
27	3301358000	SAMPAWAMS CREEK AT BABYLON, N.Y.	3A	23.00	102.9	40 42	73 19	180	8.97	2.18	60	3.74	3.74	0.0	61.8	60.4	133.7	141.7	136.0
28	3601309000	SANTAPOGUE RIVER AT LINDENHURST, N.Y.	3A	7.00	37.0	40 41	73 21	131	8.97	2.19	20	1.70	1.70	0.0	24.2	21.0	38.3	53.7	42.0
29	3702081000	SMITHWICK C TRIBUTARY NR WILLIAMSTON, N.C.	3A	6.02	217.4	35 44	77 00	275	8.90	2.32	11	1.28	1.54	0.0	99.7	75.3	309.1	399.0	232.0
30	3702082030	HARTS MILL RUN NEAR TARBORO, N.C.	3A	8.04	848.0	35 58	77 37	270	8.08	2.77	39	3.43	3.97	0.0	388.8	265.5	772.8	870.0	330.0
31	3702083410	DEEP CREEK NEAR SCOTLAND NECK, N.C.	3A	11.70	2073.0	36 09	77 26	285	9.74	2.75	36	5.50	26.61	0.0	583.8	370.0	3510.0	4260.0	2300.0
32	3702092020	PALMETTO SWAMP NEAR VANCEBORO, N.C.	3A	24.20	1029.8	35 20	77 10	383	9.80	2.86	45	7.00	10.04	0.0	797.1	837.7	3826.1	4623.2	3780.0
33	3702092520	VINE SWAMP NEAR KINSTON, N.C.	3A	9.84	986.8	35 09	77 33	318	9.23	2.84	88	3.89	7.23	0.0	388.4	278.4	885.1	886.2	840.0
34	3702195300	SOUTH PRONG ANDERSON C NR LILLINGTON, N.C.	3A	7.50	208.1	35 16	78 55	290	8.25	2.80	157	4.79	7.40	0.0	145.9	131.3	461.8	525.2	482.0
35	5101670000	BEAVERDAM SWAMP NEAR ARK, VA.	3A	7.10	389.1	37 28	76 34	190	8.64	2.74	55	3.93	19.44	0.0	141.5	113.2	806.6	962.2	570.0
36	5102042700	COLLINS RUN NEAR PROVIDENCE FORGE, VA.	3A	2.64	334.5	37 24	77 03	220	8.68	2.67	78	9.50	3.16	0.0	273.6	191.5	2065.7	2558.2	1630.0
37	5102043500	FOLLY SWAMP NEAR SUNBURY N.C.	3A	23.00	1499.7	36 37	75 36	245	8.64	2.76	30	5.50	15.50	0.0	999.8	789.8	5498.9	6948.6	6200.0
38	5102049700	CYPRESS SWAMP NEAR BURDETTE, VA.	3A	0.80	266.4	36 44	76 56	240	8.73	2.72	77	4.86	15.45	0.0	149.3	147.8	433.9	510.6	450.0
39	3702088140	STONE CREEK NEAR NEWTON GROVE, N.C.	3B	27.00	2259.6	35 20	78 22	303	8.71	2.74	106	6.57	20.72	0.0	836.9	544.6	5272.3	6444.1	3110.0
40	3702088420	LONG CREEK NEAR SELMA, N.C.	3B	6.07	1589.4	35 36	78 15	285	8.84	2.72	138	5.00	19.06	0.0	885.1	682.9	2555.4	2911.7	2050.0
41	3702090500	LEE SWAMP TRIBUTARY NR LUCAMA, N.C.	3B	2.03	409.7	35 36	78 02	200	8.74	2.74	15	1.48	1.48	0.0	208.9	208.9	899.3	815.2	508.0
42	3702090700	WHITEOAK SWAMP TRIBUTARY NR WILSON, N.C.	3B	2.60	398.9	35 42	77 42	290	8.78	2.76	25	1.09	2.39	0.0	176.4	167.6	582.1	643.9	585.0
43	3702107020	MATHEWS CREEK NEAR PINK HILL, N.C.	3B	3.81	684.2	37 06	77 49	220	9.08	2.83	57	3.89	0.89	0.0	215.6	86.3	1168.9	1435.1	859.0
44	3702105630	TURKEY CREEK NEAR CASTLE HAYNE, N.C.	3B	10.20	1847.4	34 24	77 26	380	9.89	2.87	40	4.55	11.97	0.0	373.1	266.6	3839.5	4814.6	4080.0
45	3702106900	BUCKHEAD BRANCH NEAR BOLTON, N.C.	3B	19.30	998.2	34 21	77 26	355	9.20	2.83	25	8.55	14.73	0.0	497.6	447.6	1408.2	1582.4	1570.0
46	3702110020	MILL BRANCH NEAR TABOR CITY, N.C.	3B	3.30	382.1	34 11	78 47	320	9.86	2.82	42	3.05	7.67	0.0	223.9	167.9	1184.3	1410.6	861.0
47	4502169570	GILLS CR AT COLUMBIA S.C.	3B	59.00	2894.8	33 59	80 58	245	9.18	2.56	295	11.37	63.88	61.0	1179.1	1861.2	4174.0	4834.3	2950.0
48	1202232200	WOLF CREEK NEAR DEER PARK, FLA.	3C	26.30	8382.9	28 13	80 54	540	9.82	2.84	58	8.28	35.90	17.0	1966.4	1391.9	17800.5	22767.2	7780.0
49	1202247000	MOULTRIE CREEK NR ST. AUGUSTINE, FLA.	3C	23.30	1266.	29 50	81 21	530	8.85	3.86	25	7.58	11.81	31.0	835.8	835.8	1971.8	2278.2	1450.0
50	1202249000	CRANE CREEK AT MELBOURNE, FLA.	3C	12.50	887.7	28 05	80 36	520	8.78	2.80	25	5.44	16.90	33.0	297.9	300.9	777.5	1310.6	668.0
51	1202264000	CYPRESS CREEK AT VINELAND, FLA.	3C	36.30	141.2	28 23	81 31	620	9.71	3.80	25	7.75	12.12	36.0	61.4	52.2	426.7	589.4	354.0

Table 10. Continued.

1			2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SEQ	STATION	STATION NAME	SECT	AREA	Q10	LAT	LONG	R	P10	P60	DH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
		Zone 01																	
52	1202294000	LAKE LULU OUTLET AT ELOISE, FLA.	3C	23.00	155.5	27 59	81 44	550	9.99	3.14	28	5.97	7.00	28.0	78.7	80.1	321.7	403.0	218.0
53	1202306500	SWEETWATER CREEK NR SULPHER SPRINGS, FLA.	3C	7.43	150.0	28 03	82 31	540	10.00	3.40	15	2.17	2.17	7.0	82.1	69.0	229.9	250.4	438.0
54	1202300000	SEMINOLE LAKE OUTLET NR LARGO, FLA.	3C	14.00	464.9	27 50	82 47	560	10.32	3.24	50	8.40	19.43	5.0	223.5	212.3	882.0	1004.0	842.0
55	12AR8 8.3	VERO BEACH FLORIDA WATERSHED W-3	3C	15.70	2664.5	26 00	80 00	500	9.05	3.00	23	9.30	24.81	0.0	887.2	455.4	5525.5	8831.0	2533.4
		Zone 02																	
56	0102425000	HUSH CREEK NR AELMA, ALA.	3D	48.40	17874.0	32 14	85 46	300	8.93	2.77	350	13.00	41.00	0.	7533.0	6441.4	29360.2	33817.1	22100.0
57	0102465000	LAKE CREEK NR NORTHPORT, ALA.	3D	3.20	238.5	33 17	87 41	410	8.33	2.61	225	3.25	5.07	0.0	181.5	73.1	472.0	696.2	440.0
58	1703385000	HAYES CREEK AT GLENDALE, ILL.	3D	10.00	4719.9	37 25	88 40	195	7.00	2.22	410	11.75	40.32	0.0	2537.0	2305.3	8490.3	7262.9	8409.0
59	1703386000	SUGAR CREEK NEAR DIXON SPRINGS, ILL.	3D	0.70	1725.0	37 24	88 40	196	7.06	2.22	204	6.80	30.60	1.0	1391.5	1391.5	2017.7	2142.9	1070.0
60	2107022500	PERRY CREEK NEAR MAYFIELD, KY.	3D	1.72	1190.5	36 41	88 30	240	7.00	2.22	54	1.90	3.29	0.0	673.3	767.0	1972.0	2382.7	1070.0
61	2202400000	BOGUE LUSA CREEK NEAR FRANKINTON LA.	3D	12.10	6457.4	30 52	90 00	920	9.54	3.00	100	5.17	19.42	0.0	2532.3	2283.1	13294.0	10400.0	9750.0
62	2207375000	WASHLEY CREEK NEAR ROBERT, LA.	3D	25.30	2500.7	30 30	90 10	710	9.04	3.13	110	5.50	10.45	0.0	1075.9	2020.0	3005.2	3370.0	2890.0
63	2207376000	PONCHATOULA CREEK AT NATALBANY, LA.	3D	13.00	2204.9	30 34	90 29	765	9.00	3.10	40	7.85	27.77	0.0	1020.5	1702.0	2722.4	2064.5	2306.9
64	2207380130	COLYELL CREEK AT LIVINGSTON, LA.	3D	80.70	3767.1	30 30	90 46	850	9.03	3.11	40	13.07	27.01	0.0	1366.2	1024.0	8872.0	0230.2	4950.0
65	2002434000	EUCLAUTUBBA CREEK AT SALTILLO, MISS.	3D	10.70	4061.2	34 42	88 42	530	7.70	2.45	117	6.51	40.00	0.0	3000.0	3157.1	6795.4	7517.0	5750.0
66	2002474650	BUCK CREEK NEAR RUNNELSTOWN, MISS.	3D	10.10	3634.3	31 22	88 04	695	9.50	3.02	200	11.02	59.73	0.0	1333.7	1333.7	5001.4	5000.2	3900.0
67	0000479040	BIG CREEK NEAR LUCEDALE, MISS.	3D	20.00	4442.3	30 50	88 30	600	10.20	3.20	110	5.79	16.00	0.0	1045.3	1486.0	8954.1	11502.0	7000.0
68	2002491400	MURDER CREEK NEAR POPLARVILLE, MISS.	3D	21.60	6033.0	30 47	80 32	740	9.96	3.11	190	10.37	42.37	0.0	1935.0	1365.2	11112.0	13552.2	7000.0
69	2002485650	PURPLE CREEK NEAR JACKSON, MISS.	3D	5.06	2410.0	32 22	90 07	540	0.72	2.71	121	6.50	19.57	0.0	1307.5	1464.4	4002.5	4037.0	2000.0
70	2002405700	HANGING MOSS CREEK NEAR JACKSON, MISS.	3D	10.00	3650.0	32 03	90 00	030	0.02	2.74	127	0.32	44.00	0.0	2301.0	2410.1	5292.3	5002.0	5320.0
71	2002486600	RHODES CREEK NEAR TERRY, MISS.	3D	20.00	4600.0	32 00	90 17	490	0.03	2.74	130	0.97	20.00	0.0	2045.0	1042.0	6339.5	7239.3	4700.0
72	2007266200	FICE CREEK AT ETTA, MISS.	3D	0.00	4045.3	34 20	00 14	075	7.02	2.46	140	5.09	10.70	0.0	2332.7	2510.3	7404.6	7040.0	0240.0
73	2007000000	NORTH TIPPAH CREEK NEAR RIPLEY, MISS.	3D	20.00	0172.0	34 44	00 02	040	7.00	2.42	103	0.00	37.00	0.0	2031.2	2463.1	7927.4	0003.5	7100.0
74	2007271000	CLEAR CREEK NEAR OXFORD, MISS.	3D	10.30	5201.0	34 21	00 30	025	7.05	2.47	135	3.05	10.04	0.0	3100.1	3170.3	6962.1	7770.2	6500.0
75	2007200000	TILOA BOGUE NEAR CANTON, MISS.	3D	10.20	5000.0	32 40	90 02	500	0.50	2.07	110	10.31	34.50	0.0	2920.0	2920.0	0144.3	0310.1	0000.0
76	2207373000	ALEXANDER CREEK NEAR ST. FRANCISVILLE, LA.	3E	23.00	13005.0	30 40	91 22	500	0.00	3.03	105	5.50	10.35	0.0	0906.0	6902.0	20105.1	23020.0	15200.0
77	2007373000	BAYOU BATON ROUGE ABOVE BAKER, LA.	3E	13.70	3703.7	30 37	91 12	610	0.00	3.07	31	0.23	14.02	0.0	1370.0	022.5	5204.3	5094.0	4300.0
78	2207300100	MIDDLE COLYELL CREEK NEAR WALKER, LA.	3E	20.30	1673.2	30 30	00 50	000	9.00	3.10	100	17.10	32.00	0.0	1153.0	1327.0	1015.5	2007.0	1730.0
79	2007200000	ABIALMORE CREEK NEAR CHARLESTON, MISS.	3E	31.00	12063.1	33 05	90 04	720	9.15	2.54	240	10.00	51.00	0.0	0070.0	0795.0	13514.3	14330.5	12200.0
80	2007200500	THOMPSON CREEK AT MCCARLEY, MISS.	3E	14.40	3501.0	33 31	00 01	540	0.24	2.56	000	0.00	21.00	0.0	2574.7	2574.7	4000.2	5350.4	3000.0
81	0007200010	DURDEN CREEK NEAR VICKSBURG, MISS.	3E	0.00	3002.4	32 10	00 02	300	0.00	2.75	200	3.00	0.15	0.0	1970.0	2000.2	5695.0	6464.6	4070.0
82	2007204400	OBSERVERS DRAW NEAR DOLOROSO, MISS.	3E	0.22	402.5	31 10	91 21	500	9.34	2.92	100	1.30	2.00	0.0	220.2	212.0	405.3	477.0	410.0
83	2007046000	LITTLE RIVER DITCH 200 NEAR KENNETT, MO.	3E	00.00	3200.3	36 14	39 50	245	7.56	0.30	27	15.40	44.00	0.0	1950.5	1907.7	4152.0	4524.1	4140.0
		Zone 03																	
84	2207340100	MCCAIN CREEK NEAR SHREVEPORT, LA.	3F	13.00	005.3	32 30	93 50	370	9.22	2.01	120	9.94	27.00	0.0	570.0	007.5	1157.2	1255.6	1000.0
85	2207304000	LITTLE SANDY CREEK AT KISATCHIE, LA.	3F	21.40	5001.0	31 24	93 10	470	9.51	3.05	165	10.42	57.23	0.0	2043.1	3031.4	7240.0	0003.5	5000.0
86	2207354002	HORSEPEN CREEK NEAR PROVENCAL, LA.	3F	5.27	1040.5	31 30	93 12	470	0.47	3.02	110	3.90	11.64	0.0	002.2	507.6	2021.1	3301.0	2040.0
87	2207307000	CYPRESS CREEK NEAR VIXEN, LA.	3F	10.00	0312.0	32 17	00 14	300	0.00	2.70	130	5.03	27.00	0.0	1056.7	1015.3	12011.2	10330.0	7000.0
88	2207371000	BARRETT CREEK AT JONESBORO, LA.	3F	2.14	1324.3	32 14	92 44	305	0.00	2.00	120	2.37	2.37	0.0	536.7	534.0	2405.0	2022.4	1070.0
89	2200012050	FLOCTAW CREEK NEAR LACAMP	3F	10.70	1303.1	31 11	92 50	400	0.70	3.00	100	0.23	50.74	0.0	924.2	924.2	1072.0	1002.2	1050.0
90	2200024050	HARPOON BAYOU AT MANY, LA.	3F	22.70	11713.2	31 34	93 20	430	9.70	3.00	140	10.00	35.31	0.0	3904.4	2537.0	25573.0	31110.1	03000.0
91	40AR0 42.2	WACO TEXAS WATERSHED C	3F	0.000	740.0	31 31	00 53	075	0.30	0.03	56	1.50	2.290	0.0	313.0	202.5	1250.7	1404.0	020.4
92	40AR0 42.3	WACO TEXAS WATERSHED D	3F	1.730	1400.0	31 31	00 53	200	0.00	3.04	00	2.30	5.401	0.0	500.7	070.0	2033.5	3000.2	2301.6
93	40AR0 42.6	WACO TEXAS (RIESEL) WATERSHED W-1	3F	0.270	500.0	31 27	96 53	200	0.00	3.04	50	0.77	1.210	0.0	249.3	274.2	072.0	007.2	000.4
94	40AR0 42.7	WACO TEXAS (RIESEL) WATERSHED W-2	3F	0.203	401.7	31 27	06 53	200	0.06	3.04	40	0.40	0.017	0.0	104.5	142.1	720.2	055.2	633.1
95	40AR0 42.0	WACO TEXAS (RIESEL) WATERSHED W-0	3F	0.000	120.2	31 31	06 00	200	0.00	3.04	30	0.24	0.300	0.0	53.4	56.0	107.0	220.6	160.2
96	40AR042.10	WACO TEXAS (RIESEL) WATERSHED W-10	3F	0.031	75.2	31 31	00 53	300	0.00	3.04	23	0.10	0.10	0.0	33.4	33.4	116.0	133.0	00.0
97	4000100000	DRY CREEK AT SUESCHER LAKE NR SMITHVILLE TEX.	3F	1.40	400.0	30 30	97 00	200	0.00	3.07	100	1.00	2.70	0.0	145.1	76.0	1070.0	1320.0	700.0

Table 10. Continued.

Zone 04

1			2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SEQ	STATION	STATION NAME	SECT	AREA	Q10	LAT	LONG	R	P10	P60	DH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
98	0102414600	HARBUCK CREEK NR HACKNEYVILLE, ALA.	4A	8.70	2070.5	33 07	88 07	355	8.40	2.85	190	3.88	5.77	0.0	1176.4	1180.2	2985.7	3270.4	2180.0
99	1001477000	SHELLPOT CREEK AT WILMINGTON, DEL.	4A	7.40	3408.7	39 47	75 32	165	7.10	2.25	390	6.00	20.36	0.1	1701.6	1582.7	9274.8	13359.1	6850.0
100	1302177100	ASHLEY CREEK NEAR CLAYTON, GA.	4A	0.52	150.3	34 52	83 20	200	7.47	2.36	240	5.77	10.57	0.0	66.5	66.5	283.7	341.7	212.0
101	1302181000	LITTLE PANTHER CREEK NEAR CLARKESVILLE, GA.	4A	2.00	567.9	34 43	83 24	276	7.85	2.41	276	2.43	5.12	0.0	212.7	182.9	1265.6	1674.0	710.0
102	1302180000	PANTHER CREEK NEAR TOCCOA, GA.	4A	32.50	6842.7	34 41	83 21	200	7.50	2.40	1000	9.55	27.60	0.0	3015.0	2412.6	17582.1	23624.8	15100.0
103	1302190000	N F BOARD R SUBWATERSHED 14 NR AVALON GA.	4A	1.20	867.1	34 30	83 13	298	7.67	2.41	157	1.62	3.69	0.0	342.1	342.1	1019.5	1163.7	720.0
104	1302205000	WILDCAT CREEK NEAR STOCK BRIDGE, GA.	4A	1.50	391.4	34 00	84 00	295	7.00	2.58	115	1.60	3.11	0.0	222.4	249.1	571.6	649.4	686.0
105	1302217000	ALLEN CREEK AT TALMO, GA.	4A	17.30	3201.2	34 12	83 43	290	7.87	2.47	368	10.36	40.02	0.0	1577.5	1419.8	5663.2	6941.8	4390.0
106	1302221000	MURDER CREEK NEAR MONTICELLO, GA.	4A	24.00	2702.3	33 25	83 40	380	8.24	2.60	250	7.05	26.83	0.0	1417.4	1374.9	4053.6	4549.9	3240.0
107	1302238000	ROCK CREEK NEAR FAIRMOUNT, GA.	4A	6.01	1145.7	34 21	84 46	208	7.78	2.43	185	2.59	7.79	0.0	538.4	466.8	2036.7	2174.6	2200.0
108	2401579000	BASIN RUN AT LIBERTY GROVE, MD.	4A	5.31	2437.0	39 40	76 08	185	7.83	2.24	186	3.60	16.30	0.1	1050.7	802.6	3655.4	4412.9	2880.0
109	2401583000	SLADE RUN NEAR GLYNDON, MD.	4A	2.00	377.7	39 30	78 40	160	7.06	2.58	275	2.43	1.98	0.0	187.9	163.5	729.0	879.4	515.0
110	2401585500	CRANBERRY BRANCH NEAR WESTMINSTER, MD.	4A	3.28	708.0	39 36	76 58	160	7.41	2.41	190	3.33	3.43	0.0	292.0	175.7	1569.4	2436.1	1510.0
111	0401586000	PINEY RUN NEAR SYKESVILLE, MD.	4A	11.40	2421.0	39 25	77 01	155	8.02	2.69	430	6.00	46.93	0.0	1216.5	786.6	4963.0	6852.5	9780.0
112	2401646550	LITTLE FALLS BRANCH NEAR BETHESDA, MD.	4A	3.94	2507.2	38 58	77 06	160	8.34	2.63	185	2.46	6.93	0.0	1492.4	1313.3	5462.2	6586.9	7502.0
113	3702066000	DIAL CREEK NEAR BAHAMA, N. C.	4A	4.71	1197.7	36 13	78 51	240	8.00	2.53	226	4.70	6.30	0.0	532.3	346.0	2022.7	2427.3	4480.0
114	3702067240	STIRRUP IRON CREEK TRI NR NELSON, N. C.	4A	6.80	137.4	35 53	78 50	295	8.24	2.50	60	2.04	2.04	0.0	64.8	58.3	246.9	292.2	172.0
115	3702099000	EAST FORK DEEP R NEAR HIGH POINT, N. C.	4A	14.70	3100.0	36 04	79 58	200	7.54	2.36	186	6.40	55.13	0.1	1863.8	1800.0	5783.0	8150.0	6300.0
116	3702115500	FORBUSH CREEK NEAR YADKINVILLE, N. C.	4A	21.70	2173.0	36 11	80 36	195	7.11	2.25	255	11.99	30.75	0.2	1274.1	1220.3	2787.4	2936.2	2840.0
117	3702152420	BIG KNOB CREEK NEAR FALLSTON, N. C.	4A	10.40	2404.1	35 29	81 32	150	7.30	2.32	405	7.76	33.78	0.0	1254.6	1053.9	4767.5	5457.5	3400.0
118	4502154500	NORTH PACOLET R AT FINGERVILLE S.C.	4A	116.0	8836.1	35 07	81 59	200	7.32	2.31	2495	26.80	120.00	0.05	3695.2	3362.6	10790.0	12378.9	12500.0
119	4502157000	NORTH TYGER RIVER NEAR FAIRMONT, S.C.	4A	44.00	2966.4	34 56	82 03	225	7.36	2.32	308	3.33	7.25	0.0	1629.9	1695.1	4563.7	5085.3	3610.0
120	4502164000	REEDY RIVER NEAR GREENVILLE, S.C.	4A	40.60	3354.2	34 48	82 22	246	7.42	2.34	300	16.07	40.70	0.0	2806.4	2096.4	4465.3	4905.6	4050.0
121	5101655500	CEDAR RUN NEAR WARRENTON, VA.	4A	13.80	3090.0	38 44	77 47	145	7.47	2.34	620	4.54	9.32	0.0	1818.8	1090.8	9990.0	12869.7	14500.0
122	5101656200	BROAD RUN NEAR WARRENTON, VA.	4A	2.94	166.9	38 48	77 49	156	7.42	2.30	200	1.50	6.43	0.0	183.0	183.0	231.8	261.6	280.0
123	5101658500	SOUTH F QUANTICO C NR INDEPENDENT HILL, VA.	4A	7.60	927.6	38 36	77 26	170	6.16	2.80	140	10.35	22.97	0.0	542.6	542.6	1313.1	1427.0	1040.0
124	5101671500	HUDSON CREEK NEAR BOSWELLS TAVERN, VA.	4A	4.10	649.2	38 02	78 11	155	7.55	2.33	125	4.20	8.58	0.0	371.8	259.7	1855.8	2218.6	2750.0
125	5101673500	TOTOPOTOMONY CREEK NEAR ATLEE, VA.	4A	6.80	316.7	37 40	77 23	200	8.34	2.62	81	4.78	12.13	0.0	150.8	128.6	618.3	754.0	748.0
126	5102029400	S B N F HARDWARE R NR NORTH GARDEN, VA.	4A	8.50	3895.3	37 57	78 39	180	7.10	2.24	810	3.41	13.35	0.0	1146.4	682.5	6144.7	7451.6	6200.0
127	5102031500	NORTH FORK MOORMANS RIVER NR WHITEHALL, VA.	4A	11.40	2755.0	38 08	78 45	155	8.97	2.19	1700	8.07	20.37	0.0	1028.7	714.5	6481.4	7910.4	7620.0
128	5102036500	FINE CREEK AT FINE CREEK MILLS, VA.	4A	23.00	1608.9	37 36	77 49	260	8.02	2.50	180	9.60	51.67	0.0	618.5	482.2	3496.2	4269.7	3840.0
129	5102056500	NORTH MEHERRIN RIVER NEAR KEYSVILLE, VA.	4A	9.20	1465.6	37 03	78 25	210	7.86	2.63	176	3.94	8.37	0.0	858.7	858.7	2679.1	3177.2	2400.0
130	5102061300	NININGER CREEK NEAR BEDFORD, VA.	4A	4.77	1411.2	37 16	79 29	140	7.87	2.23	240	3.76	7.49	0.0	705.6	578.6	2469.6	2921.2	2200.0
131	5102076500	GEORGES CREEK NEAR GRETNA, VA.	4A	9.20	1151.4	36 56	79 18	155	7.33	2.32	425	6.92	21.42	0.0	508.6	408.5	1702.0	1977.4	1440.0
132	1001476000	CHRISTINA RIVER AT COOCHS BRIDGE, DEL.	4B	20.50	2228.7	39 41	75 47	165	6.13	2.25	370	12.50	37.31	0.1	1579.2	1484.4	3853.2	4769.2	3320.0
133	2401641000	HUNTING CREEK AT JIMTOWN MD.	4B	18.40	1197.0	39 36	77 24	145	7.15	2.27	1250	9.92	32.75	0.0	767.3	936.1	1386.0	1465.5	1330.0
134	3401390500	SADDLE RIVER AT RIDGEWOOD, N.J.	4B	21.60	2276.7	40 59	74 05	125	8.81	2.66	435	10.00	36.46	2.0	1040.5	936.4	3943.5	4601.4	2920.0
135	3401391000	HOHOKUS BROOK AT HOHOKUS, N.J.	4B	16.40	2140.6	40 00	74 07	125	8.08	2.66	359	22.30	24.17	0.0	1009.7	856.2	2930.2	3261.3	2350.0
136	3401394000	WEST BRANCH RAHWAY RIVER AT MILLBURN, N.J.	4B	7.10	1111.2	40 44	74 18	130	8.00	2.18	231	4.99	6.62	0.0	550.1	470.6	1309.2	1397.2	1090.0
137	4201473100	ZACHARIAS CREEK NR SHIPPACK, PA.	4B	7.07	3205.3	40 12	75 22	140	8.00	6.45	210	3.00	8.20	0.0	2867.9	2109.3	3929.0	4135.8	3680.0
138	5101654000	ACCOTINK CREEK NEAR ANNANDALE, VA.	4B	23.60	8290.1	38 52	77 16	160	8.20	2.61	210	0.60	70.46	0.1	2204.2	1603.2	10130.3	12343.6	7670.0
139	0401637000	LITTLE CATOCTIN CREEK AT HARMONY, MD.	5A	8.63	3122.0	39 20	77 30	145	7.31	2.37	836	3.07	10.10	0.0	982.0	470.0	6616.4	8073.0	5400.0
140	2401640500	OWENS CREEK AT LANTZ, MD.	5A	5.83	1405.5	39 41	77 20	147	8.04	2.10	701	3.70	5.24	0.0	882.2	364.2	2285.7	2678.5	3270.0
141	4201614000	CONOCOCHEAGUE CREEK NR FAYETTEVILLE, PA.	5A	5.05	380.0	39 56	77 26	125	8.40	2.04	777	3.05	8.43	0.0	114.3	66.9	408.6	514.4	392.0
142	5101630210	HAPPY CREEK AT FRONT ROYAL, VA.	5A	13.00	1809.0	38 54	78 11	140	8.31	2.61	1605	6.60	36.00	0.0	849.7	713.6	3220.4	3818.2	2490.0
143	5101662500	RUSH RIVER AT WASHINGTON, VA.	5A	15.20	1307.3	38 43	78 09	145	7.07	2.19	1095	5.40	30.54	0.0	610.4	486.3	2001.1	3540.3	2580.0
144	5102003300	SOUTH RIVER NEAR STEELS TAVERN VA.	5A	15.70	2725.4	37 58	79 10	140	8.94	2.16	1540	7.01	34.91	0.0	1073.0	858.4	5740.6	6953.0	4700.0
145	5102020200	NORTH FORK HARDWARE R AT RED HILL VA.	5A	11.00	3900.2	37 50	78 37	120	7.20	2.24	250	3.41	29.70	0.0	900.7	355.8	10042.1	14041.5	7300.0
146	3703440000	CATHEYS CREEK NEAR BREVARD, N. C.	5B	11.70	1254.3	35 12	82 47	190	7.44	2.34	1032	5.37	25.34	0.0	849.0	805.4	1722.2	1923.7	1260.0
147	3703441000	DAVIDSON RIVER NEAR BREVARD, N. C.	5B	40.40	5003.3	35 18	82 42	190	7.42	2.34	3105	11.00	47.00	0.0	3020.0	2725.9	8329.2	8400.1	8400.0
148	3703442000	CRAB CREEK NEAR PENROSE, N. C.	5B	10.00	2773.0	35 15	82 34	150	7.43	2.34	1000	4.20	31.72	0.1	1356.9	832.1	8047.0	12402.1	11500.0
149	3703444000	BOYLSTON CREEK NEAR HORSESHOE, N. C.	5B	14.00	754.1	35 21	82 38	145	7.30	2.33	920	11.40	309.20	0.3	498.1	578.5	957.5	1066.0	685.0
150	3703444500	SOUTH FORK MILLS R AT THE PINK BEDS, N. C.	5B	9.00	1095.0	35 22	82 46	150	7.30	2.33	1051	4.60	7.39	0.0	738.5	635.0	2790.0	3957.0	2220.0

Table 10. Continued.

1			2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SEQ	STATION	STATION NAME	SECT	AREA	Q10	LAT	LONG	R	P10	P50	DH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
		Zone 04																	
151	3703450000	BEETREE CREEK NEAR SWANNANOA, N. C.	5B	5.46	842.0	35 39	82 24	149	7.25	2.28	1828	3.34	6.47	0.0	286.8	243.8	929.2	1889.0	1370.0
152	3703457500	ALLENCREEK NEAR HAZELWOOD, N. C.	5B	14.40	1323.2	35 29	83 00	150	7.37	2.32	2340	4.79	41.03	0.0	686.0	666.8	1896.0	2121.9	1470.0
153	3703500500	CULLASAJA RIVER AT HIGHLANDS, N. C.	5B	14.90	2146.4	35 04	83 14	275	7.61	2.36	720	6.70	14.71	0.0	1169.6	970.8	3742.7	4421.1	5100.0
154	3703513000	NOLAND CREEK NEAR BRYSON CITY, N. C.	5B	13.90	1450.0	35 31	83 24	165	7.34	2.31	3920	8.30	53.82	0.0	1019.3	1000.0	2270.0	2556.5	2310.0
155	4703465000	NORTH INDIAN CREEK NEAR UNICOU, TENN.	5B	15.90	570.3	36 11	82 18	147	6.91	2.18	1520	8.68	65.69	0.0	383.0	383.0	784.7	760.0	650.0
156	4703556000	TURTLETOWN CREEK AT TURTLETOWN, TENN.	5B	20.80	1044.5	35 08	84 21	276	7.40	2.34	180	8.88	25.37	0.0	665.3	665.3	1357.2	1417.1	1260.0
157	4703560000	DAVIS MILL CREEK AT COPPERHILL, TENN.	5B	8.16	2750.1	35 00	84 23	250	7.45	2.37	322	4.36	11.85	0.0	1842.5	1842.5	4336.2	4976.0	3900.0
158	51AR0 13.2	BLACKSBURG VA WATERSHED W-3	5B	0.030	22.0	37 12	80 27	135	6.93	2.10	65	0.24	8.39	0.0	7.0	3.9	58.8	79.8	37.0
159	5103473000	STALEY CREEK NEAR MARION, VA.	5B	8.33	382.5	36 49	81 28	140	6.87	2.17	730	4.94	14.64	0.0	228.0	228.0	403.4	844.0	410.0
		Zone 05																	
160	0102457000	FIVEMILE CREEK AT KETONA, ALA.	6A	28.80	4114.0	33 37	86 45	350	6.16	2.56	450	9.11	28.50	0.0	2887.8	1923.1	7362.1	9385.1	4970.0
161	4703496000	FIRST CR, MIN. SPRS. AVE., KNOXVILLE, TENN.	6A	18.70	1228.0	36 01	83 55	175	7.61	2.19	190	7.29	28.97	0.0	874.7	866.0	1646.3	1821.7	1310.0
162	4703528400	WHITE CREEK NEAR SHARPS CHAPEL, TENN.	6A	2.60	261.9	36 21	83 54	178	6.84	2.14	460	2.35	3.80	0.0	153.2	142.3	482.7	548.6	805.0
163	4703534500	BUFFALO CREEK AT NORRIS, TENN.	6A	8.48	1228.4	36 11	84 04	178	6.93	2.17	242	6.96	24.85	0.0	697.4	697.4	1736.5	1952.7	1450.0
164	5101620500	NORTH RIVER NEAR STOKESVILLE, VA.	6A	17.30	1736.7	38 23	79 17	136	6.76	2.12	1876	9.58	104.35	0.0	1153.8	887.7	6249.8	6345.9	11100.0
165	5101624800	BELL CREEK AT FRANKSMILL, STAUNTON, VA.	6A	0.50	1050.0	38 11	79 00	140	6.87	2.16	400	6.18	31.88	0.2	389.1	186.0	1360.0	1640.0	912.0
166	5102015000	COWPASTURE RIVER NEAR HEADWATERS, VA.	6A	11.30	1075.8	38 19	79 28	123	6.74	2.12	375	5.40	13.42	0.0	669.3	365.6	3716.7	4569.0	6650.0
167	5102020200	CALFPASTURE RIVER NEAR WEST AUGUSTA, VA.	6A	12.80	1070.0	38 16	79 18	125	6.77	2.14	860	5.60	21.40	0.0	790.4	665.9	3912.5	4726.0	4600.0
168	5103473500	MIDDLE FORK HOLSTON R AT GROSECLOSE, VA.	6A	7.30	570.6	36 53	81 21	145	6.66	2.16	80	3.12	31.32	0.0	267.7	227.6	1057.4	1263.5	813.0
169	5103477000	BEAVER CREEK NEAR WALLACE, VA.	6A	13.70	320.7	36 41	82 05	147	6.66	2.16	386	7.66	87.48	0.2	285.8	226.2	448.0	493.4	383.0
170	5103489000	COVE CREEK NEAR SHELLEYS, VA.	6A	17.30	1423.0	36 39	82 21	148	6.84	2.15	865	9.82	64.57	0.0	827.6	766.4	2403.4	2938.7	2500.0
171	2401609500	SAWPIT RUN NEAR OLDTOWN, MD.	6B	5.00	530.0	39 34	78 33	124	6.32	1.99	386	5.58	21.44	0.03	280.6	261.2	763.5	864.9	770.0
172	2401612500	LITTLE TONOLOWAY CR NEAR HANCOCK, MD.	6B	16.90	1268.2	39 43	78 15	115	6.33	1.99	1127	6.00	71.60	0.04	644.1	592.6	1556.7	1706.9	1470.0
173	4201567000	BIXLER RUN NEAR LOYSVILLE, PA.	6B	15.00	2760.1	40 22	77 24	95	6.29	1.97	390	6.99	31.18	0.0	1226.7	760.6	6746.9	8586.9	8700.0
174	4201571000	PAXTON CREEK NEAR PENBROOK, PA.	6B	11.20	1864.6	40 20	76 50	105	6.44	2.02	920	5.56	22.10	0.0	1263.1	1443.7	2486.2	2622.0	1900.0
175	4201573500	MANADA CREEK AT MANADA GAP, PA.	6B	13.50	2241.7	40 26	76 42	96	6.42	2.00	570	4.71	13.91	0.0	655.6	547.6	3396.7	3761.0	2650.0
176	5101621200	WAR BRANCH NEAR HINTON, VA.	6B	9.40	1753.7	38 26	78 59	125	6.75	2.13	1100	5.58	15.36	0.0	738.7	813.6	3783.1	4581.1	2600.0
177	5401617600	TUSCARORA CREEK ABOVE MARTINSBURG, W. VA.	6B	11.30	254.0	39 28	77 58	128	6.64	2.09	600	6.52	13.00	0.0	154.3	177.4	356.4	416.8	300.0
178	5004279400	POULTNEY RIVER TRIB. AT EAST POULTNEY, VT.	7A	1.13	86.0	43 32	73 16	92	5.21	1.64	400	1.66	3.21	0.0	57.0	60.1	139.9	161.7	98.0
179	5004282300	BRANDY BROOK AT BREAD LOAF, VT.	7A	2.24	241.2	43 57	73 00	86	4.83	1.60	1692	2.78	4.24	0.0	128.6	128.6	361.8	417.3	236.0
180	5004282550	BEAVER BROOK AT CORNWALL, VT.	7A	1.11	73.3	43 57	73 13	86	4.96	4.52	288	2.40	4.90	0.0	60.1	62.5	81.1	86.3	73.0
181	5004282600	LITTLE OTTER CREEK TRIB. NR BRISTOL, VT.	7A	1.48	63.0	44 09	73 07	84	4.48	1.56	716	2.05	4.05	0.0	32.3	32.3	98.4	101.8	64.0
182	5004282700	LEWIS CREEK TRIB. AT STARKSBORO, VT.	7A	8.31	734.0	44 13	73 03	84	4.46	1.55	1850	4.00	15.00	0.0	314.0	379.5	1243.4	1444.4	721.0
183	5004282750	LEWIS CREEK TRIB. NO. 2 NR ROCKVILLE, VT.	7A	1.67	66.1	44 18	73 04	88	4.45	1.54	950	2.00	4.00	0.0	40.9	45.0	67.5	70.8	56.0
184	5004284300	STEVENS BRANCH TRIB. AT SOUTH BARRE, VT.	7A	0.30	56.3	44 11	72 31	64	4.52	1.57	200	6.03	1.25	0.0	26.3	23.7	96.8	113.1	62.0
185	5004292700	STONE BRIDGE BROOK NR GEORGIA PLAINS, VT.	7A	8.40	246.4	44 42	73 11	79	4.35	1.40	372	5.23	21.79	1.71	142.4	148.1	341.8	384.5	264.0
186	3004265900	TROUT BROOK AT STOCKHOLM CENTER N. Y.	7B	44.90	1321.3	44 40	74 49	75	4.66	1.45	325	20.40	71.50	0.0	850.0	832.3	1844.7	2078.4	1360.0
187	3004269050	ALLEN BROOK NR BRASHER N. Y.	7B	18.00	820.2	44 48	74 44	75	4.84	1.44	870	7.60	15.10	0.0	438.2	400.1	1709.8	2061.4	1100.0
188	3004269100	LAWRENCE BROOK NR MOIRA N. Y.	7B	20.00	1375.0	44 50	74 36	75	4.63	1.44	690	6.00	24.50	0.0	724.1	753.1	2200.5	2565.0	1470.0
189	3004269500	DEER RIVER AT BRASHER IRON WORKS, N. Y.	7B	100.0	8790.1	44 54	74 41	77	4.60	1.43	2435	37.20	125.00	0.0	3780.9	3300.9	16764.2	20324.0	11500.0
190	3004270100	WEST BRANCH DEER CREEK AT FT. COVINGTON CENTER N.	7B	31.40	1567.2	44 57	74 29	77	4.59	1.43	810	11.20	34.50	0.0	872.1	872.1	2537.0	2921.5	1950.0
191	3004270150	EAST BRANCH DEER CREEK AT FT. COVINGTON CENTER N.	7B	23.10	650.5	44 57	74 29	77	4.59	1.43	810	11.00	31.00	0.0	404.6	404.8	930.6	1060.0	725.0
192	3004270200	LITTLE SALMON RIVER AT BOMBAY, N. Y.	7B	30.60	2070.1	44 55	74 33	75	4.50	1.43	1720	23.00	120.00	0.0	1584.7	1743.2	3803.3	4357.9	2700.0
193	3004270700	TROUT RIVER AT TROUT RIVER N. Y.	7B	107.0	4745.8	44 59	74 18	76	4.59	1.43	2490	21.00	123.00	0.0	2607.6	2605.8	7275.2	8344.3	8300.0
194	3004270800	ENGLISH RIVER NR MOOERS FORKS, N. Y.	7B	40.00	1633.8	44 58	73 40	75	4.60	1.43	850	13.00	44.50	0.0	997.5	989.2	2341.4	2031.8	1750.0
		Zone 06																	
195	3001323000	KENNTETTO CREEK NEAR BROADALBIN N. Y.	6C	28.30	1010.0	43 04	73 10	85	5.43	1.72	1100	14.40	73.00	0.0	941.5	656.2	2221.9	2405.0	1040.0
196	3001330000	BOND CREEK AT DUNHAM BASIN, N. Y.	6C	14.70	1100.0	43 04	73 10	100	5.20	1.64	240	0.10	42.94	0.1	747.4	747.4	1621.0	1800.7	1370.0
197	3001359750	MOORDENER KILL AT CASTLETON-ON-HUDSON, N. Y.	6C	32.00	1202.4	42 32	73 44	99	5.00	1.70	501	0.00	60.00	0.0	725.5	701.0	1596.1	1734.0	1350.0
198	3001368500	QUAKER CREEK AT FLORIDA, N. Y.	6C	9.74	703.2	41 19	74 21	103	6.35	1.99	320	6.52	30.00	5.3	435.1	387.2	1060.0	1102.2	1050.0

Table 10. Continued.

1			2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SEQ	STATION	STATION NAME	SECT	AREA	Q10	LAT	LONG	R	P10	P50	DH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
Zone 06																			
199	3601372040	CRUM ELBOW CREEK AT HYDE PARK N. Y.	0C	17.30	302.1	41 47	73 56	115	6.00	1.93	400	11.00	30.55	0.0	229.3	252.2	525.1	587.0	373.0
200	3601372100	E BR WAPPINGER CR NR CLINTON CORNERS, N. Y.	0C	33.00	1870.1	41 40	73 46	115	6.00	1.93	994	10.00	40.00	0.01	862.9	983.7	2268.6	2554.2	1340.0
201	3601372300	LITTLE WAPPINGER CREEK AT SALT POINT, N. Y.	0C	30.80	960.5	41 40	73 46	115	6.00	1.93	515	10.40	32.00	0.03	533.3	533.3	1375.9	1557.2	1200.0
202	3601330000	GLOWEGEE CREEK AT WEST MILTON, N. Y.	0A	30.20	1334.0	42 10	74 10	90	5.75	1.82	743	11.20	43.80	0.02	784.0	800.5	1860.0	2887.6	1670.0
203	3601349000	OTSQUAGO CREEK AT FORT PLAIN, N. Y.	0A	59.20	8360.0	42 56	74 38	93	6.37	1.64	1461	14.40	101.00	0.0	4911.7	4911.7	10658.4	11680.9	9830.0
204	3601354200	SANDSEA KILL AT PATTERSONVILLE, N. Y.	0A	0.50	2387.0	42 53	74 04	92	5.47	1.80	900	4.80	14.25	0.0	589.6	417.7	4422.0	5365.4	2230.0
205	3601354300	PLOTTER KILL AT RYNEX CORNERS, N. Y.	0A	3.70	484.0	42 40	74 04	93	5.94	1.70	210	2.40	4.95	0.0	272.2	272.2	637.0	713.2	468.0
206	3604245040	SCRIBA CREEK NR CONSTANTIA, N. Y.	0A	30.40	1384.3	43 10	76 00	75	5.00	1.80	215	0.55	59.50	0.0	725.7	660.4	2053.7	2351.3	1200.0
207	3604249050	CATFISH CREEK AT NEW HAVEN, N. Y.	0A	31.70	922.0	43 28	76 20	73	4.09	1.55	100	10.00	44.50	10.0	475.7	447.2	1464.2	1717.3	950.0
208	3604253500	MIDDLE BRANCH MOOSE RIVER AT OLD FORGE, N. Y.	0A	52.10	735.0	43 43	74 58	80	5.02	1.65	2930	00.00	300.00	72.0	427.6	418.7	655.6	911.2	862.0
209	3604256000	INDEPENCE RIVER AT DONNATTSBURG, N. Y.	0A	81.70	3337.5	43 45	75 28	77	4.09	1.55	1427	23.00	119.00	0.0	2016.6	2016.6	3576.9	3699.5	3450.0
Zone 07																			
210	3601349700	EAST KILL NR JEWETT CENTER, N. Y.	0B	30.20	12400.0	42 10	74 10	95	5.70	1.82	1900	12.60	27.70	0.0	5600.6	5907.2	20164.0	29300.8	9920.0
211	3601349850	BATAVIA KILL AT HENSONVILLE, N. Y.	0B	13.00	6240.0	42 22	74 13	96	5.70	1.80	1050	8.00	12.65	0.0	2272.8	2362.9	10867.7	11723.5	5600.0
212	3601361900	SHINGLE KILL AT CAIRO, N. Y.	0B	13.00	2031.4	42 18	74 00	97	5.77	1.83	3350	7.80	34.80	0.0	698.4	467.5	3738.3	4425.6	2170.0
213	3601365000	RONDOUT CREEK NEAR LOWES CORNERS, N. Y.	0B	38.50	5790.3	41 52	74 29	103	5.93	1.80	2320	11.00	45.00	0.0	2666.5	2493.9	9430.8	11007.4	7600.0
214	3601365500	CHESTNUT CREEK AT GRAHAMSVILLE, N. Y.	0B	20.80	3620.8	41 51	74 32	100	5.94	1.60	840	5.50	19.47	0.0	1512.8	1028.2	4687.2	5140.8	3900.0
215	3601414500	MILL BROOK AT ARENA, N. Y.	0B	20.00	3232.8	42 05	74 39	97	5.70	1.83	2420	10.90	59.25	0.02	1747.8	1572.3	4804.2	5468.1	4500.0
216	3601415500	TERRY CLOVE KILL NEAR PEPACTON, N. Y.	0B	14.10	1549.8	42 10	74 55	93	5.60	1.79	730	5.20	32.29	0.0	911.2	729.0	2824.7	3280.3	4010.0
217	3601419500	WILLOWEMOC CREEK NEAR LIVINGSTON MANOR, N. Y.	0B	63.00	7791.2	41 54	74 29	100	5.83	1.85	1784	15.00	58.30	0.0	3895.6	3506.0	15037.0	18231.4	15700.0
218	3601423500	DRYDEN CREEK NEAR GRANTON, N. Y.	0B	8.88	596.5	42 07	75 14	87	5.62	1.76	760	5.15	9.49	0.0	357.2	407.2	750.1	814.4	633.0
219	3401397500	WALNUT BROOK NEAR FLEMINGTON, N.J.	0C	2.24	725.8	41 32	74 53	100	6.02	1.91	420	2.73	4.24	0.0	387.4	264.4	1438.6	1936.6	1570.0
220	3601424000	TROUT CREEK NEAR ROCK ROYAL, N. Y.	0C	20.40	1621.2	42 10	75 16	80	5.61	1.76	620	7.24	18.54	0.0	970.8	970.8	2252.3	2543.5	1920.0
221	3601425500	COLD SPRING BROOK AT CHINA, N. Y.	0C	1.01	110.8	42 10	75 24	85	5.60	1.74	420	1.49	1.49	0.0	93.2	69.5	183.3	214.9	335.0
222	3601501700	SAGE BROOK NEAR SOUTH NEW BERLIN, N. Y.	0C	0.78	100.1	42 32	75 26	85	5.44	1.67	280	0.96	1.70	0.0	45.5	34.6	192.9	236.6	287.0
223	3601508000	SHACKHAM BROOK NEAR TRUXTON, N. Y.	0C	2.08	335.6	42 47	76 01	77	5.20	1.61	467	2.23	5.93	0.03	197.4	197.4	480.0	530.0	467.0
224	3601508500	ALBRIGHT CREEK AT EAST HOMER, N. Y.	0C	6.70	604.5	42 42	76 07	80	5.22	1.62	520	5.34	14.30	0.1	420.9	479.8	841.8	896.5	787.0
225	3903089500	MILL CREEK NEAR BERLIN CENTER, OHIO	0C	10.10	1630.4	40 58	80 58	115	5.49	1.73	80	7.80	57.67	0.5	1010.1	1010.1	2232.3	2424.2	1900.0
226	3903092000	03092000 KALE CREEK NEAR PRICETOWN, OHIO	0C	21.90	2652.7	41 05	81 03	103	5.40	1.73	190	12.35	100.22	0.7	1353.4	1339.9	4789.8	5413.8	3860.0
227	3903092100	03092100 HINKLEY CREEK NEAR CHARLESTOWN, OHIO	0C	10.60	790.1	41 12	81 09	99	5.43	1.72	190	9.60	27.45	0.3	451.5	397.3	1625.4	1985.6	2400.0
228	3903094000	03094000 WALNUT CREEK AT COTLAND, OHIO	0C	6.48	1138.9	41 21	80 42	102	5.38	1.70	90	5.60	32.30	0.4	598.3*	715.6	1753.1	2009.5	1470.0
229	3903102000	03102000 CLEAR CREEK AT DILWORTH, OHIO	0C	9.01	283.5	41 27	80 41	93	5.33	1.60	60	1.50	2.32	0.4	114.3	77.7	598.9	736.1	749.0
230	3903118100	03118100 LITTLE CHIPPEWA CREEK NEAR SMITHVILLE, OH	0C	10.40	1827.5	40 52	81 47	140	5.82	1.75	71	8.80	60.52	0.01	924.7	869.2	2552.2	3060.0	3930.0
231	3904210100	04210100 HOSKINS CREEK AT HARTSGROVE, OHIO	0C	8.11	889.8	41 36	81 00	95	5.34	1.60	315	8.80	20.74	1.3	275.3	209.2	1192.8	1475.6	1060.0
232	4201448500	01448500 DILLDOWN CREEK NEAR LONG POND, PA.	0C	2.30	361.9	41 02	75 32	110	5.24	1.90	242	2.81	3.80	1.0	166.0	149.4	615.9	737.8	630.0
233	4203101000	03101000 SUGAR RUN AT PYMATUNING DAM, PA.	0C	8.34	1779.0	41 29	80 30	80	5.32	1.60	270	8.90	31.40	0.0	676.7	605.6	3596.0	4358.0	2800.0
234	2401597000	01597000 CRABTREE CREEK NEAR SWANTON, MD.	0D	16.70	1046.8	39 30	79 10	120	6.20	1.90	1020	9.86	24.49	0.0	654.1	549.4	1772.6	2893.1	3260.0
235	2403076600	03076600 BEAR CREEK AT FRIENDSVILLE, MD.	0D	48.90	2653.5	39 39	79 24	190	5.02	1.90	1370	12.40	101.50	0.0	1055.6	1725.7	3674.1	4663.5	4650.0
236	4201516500	01516500 COREY CREEK NEAR MAINESBURG, PA.	0D	12.00	1656.8	41 47	77 01	84	5.51	1.74	457	5.10	20.30	0.0	777.9	788.1	3033.8	3681.7	2219.0
237	4001517000	01517000 ELK RUN NEAR MAINESBURG, PA.	0D	10.20	1080.8	41 40	76 58	85	5.51	1.74	323	8.59	13.40	0.0	591.9	574.1	1680.2	1911.6	1240.0
238	4201552500	01552500 MUNCY CREEK NEAR SONESTOWN, PA.	0D	23.80	5614.0	41 21	76 30	92	5.80	1.84	1280	10.05	53.07	0.3	2245.9	1682.0	11903.3	14553.4	10000.0
239	4203078500	03078500 BIG PINEY RUN NEAR SALISBURY, PA.	0D	24.50	8865.0	39 44	79 03	115	6.14	1.92	392	9.72	30.41	0.0	1402.9	1122.3	5331.0	6313.0	5050.0
240	4203083000	03083000 GREEN LICK RUN AT GREEN LICK RESERVOIR, P	0D	3.07	876.0	40 03	79 30	110	5.92	1.85	750	2.22	22.01	0.0	397.7	261.6	1210.5	1446.2	1400.0
241	5403052500	03052500 SAND RUN NEAR BUCKHANNON, W. VA.	0D	14.00	1843.0	38 50	80 00	123	5.40	2.00	505	6.20	25.50	0.0	985.2	821.0	2630.2	3045.5	2500.0
242	5403062400	03062400 COBUN CREEK AT MORGANTOWN, W. VA.	0D	10.20	1002.4	39 30	79 57	120	5.80	1.80	1222	7.80	43.00	0.0	505.0	540.4	1543.0	1748.3	803.0
Zone 08																			
243	2103203000	03203000 STILLWATER CREEK AT STILLWATER KY.	0E	24.00	5000.4	37 45	83 29	150	5.84	2.07	210	7.13	70.21	1.0	2093.2	2093.2	10170.9	11015.0	7300.0
244	3903100200	03100500 LISBON CREEK AT LISBON, OHIO	0E	0.10	902.0	40 40	80 41	120	5.01	1.74	200	5.40	26.07	0.4	406.1	442.0	1009.5	2150.0	1500.0
245	3903115000	03115000 BARNES RUN NEAR SUMMERFIELD, OHIO	0E	3.40	1040.4	39 47	81 21	151	5.02	1.84	400	3.50	10.10	0.0	817.0	821.0	2707.2	3022.5	2350.0
246	3903110000	03110000 JEFFERSON CREEK NEAR JEWETT, OHIO	0E	2.04	211.0	40 24	80 57	145	5.03	1.70	200	2.30	7.05	0.0	100.0	107.0	204.4	323.9	387.0

Table 10. Continued.

Zone 08

1 SEQ	STATION	STATION NAME	2 SECT	3 AREA	4 Q10	5 LAT	6 LONG	7 R	8 P10	9 P60	10 DH	11 L	12 LL	13 STRG	14 QMEAN	15 Q2	16 Q50	17 Q100	18 QPEAK
247	3903119700	03119700 CONOTTON CREEK AT JEWETT, OHIO	8E	14.30	991.9	40 22	80 00	140	5.60	1.70	1401	8.30	80.63	0.5	845.0	465.0	1313.4	1430.0	1170.0
248	3903147900	03147900 TIMER RUN NEAR ZANESVILLE, OHIO	8E	10.80	1586.0	39 57	82 06	155	5.75	1.82	360	5.60	35.62	0.2	857.3	683.0	2640.5	3043.4	2070.0
249	3903150100	03150100 BELL CREEK AT MC CONNELSVILLE, OHIO	8E	1.07	777.9	39 39	81 50	160	5.87	1.86	355	1.70	3.02	0.0	329.6	329.6	1450.2	1713.9	1190.0
250	3903230600	03230600 HOMINY CREEK AT CIRCLEVILLE, OHIO	8E	0.66	1890.0	39 36	82 53	140	5.97	1.69	332	5.70	26.87	0.1	910.1	720.0	3240.0	3870.0	3820.0
251	3903236100	03236100 SOUTH BRANCH LITTLE SALT CAT JACKSON, OH:	8E	3.70	1025.0	39 01	82 39	155	6.10	1.94	200	3.70	11.69	0.1	674.9	681.6	1464.5	1835.7	1400.0
252	39AR826.27	AR826.27 COSHOCTON OHIO WATERSHED NO 469	8E	0.046	59.3	40 22	81 40	150	5.64	1.70	145	0.25	0.41	0.0	20.8	15.6	104.0	123.0	75.7
253	39AR826.28	AR326.28 COSHOCTON OHIO WATERSHED NO 177	8E	0.120	186.3	40 22	81 40	150	5.64	1.70	240	0.50	1.45	0.0	40.9	28.6	286.3	364.0	240.0
254	39AR326.29	AR326.29 COSHOCTON OHIO WATERSHED NO 183	8E	0.120	133.3	40 22	81 47	150	5.64	1.70	225	0.59	0.95	1.0	46.3	33.3	246.3	292.6	192.5
255	39AR326.30	AR326.30 COSHOCTON OHIO WATERSHED NO 196	8E	0.470	445.5	40 22	81 40	150	5.64	1.70	250	0.75	4.79	1.50	174.4	153.5	1046.4	1276.6	1136.5
256	39AR326.31	AR826.31 COSHOCTON OHIO WATERSHED NO 10	8E	0.190	149.1	40 24	81 40	150	5.63	1.70	200	0.65	2.42	0.0	46.6	33.6	240.5	372.6	215.5
257	39AR326.32	AR826.32 COSHOCTON OHIO WATERSHED NO 5	8E	0.54	236.1	40 25	81 40	152	5.63	1.70	220	0.47	5.33	0.0	90.2	66.6	506.7	623.3	383.6
258	39AR826.33	AR326.33 COSHOCTON OHIO WATERSHED NO 92	8E	1.44	462.9	40 25	81 40	152	5.64	1.70	300	0.79	12.00	0.0	194.5	175.0	797.4	937.5	575.2
259	39AR326.34	AR826.34 COSHOCTON OHIO WATERSHED NO 94	8E	2.37	864.3	40 24	81 40	150	5.64	1.70	320	2.50	25.34	0.0	384.8	384.0	1462.2	1704.7	1410.0
260	39AR326.35	AR826.35 COSHOCTON OHIO WATERSHED NO 95	8E	4.01	1138.0	40 25	81 40	153	5.63	1.70	360	3.39	40.84	0.0	526.3	515.0	1736.0	1999.9	1880.0
261	39AR326.36	AR826.36 COSHOCTON OHIO WATERSHED NO 97	8E	7.16	2829.0	40 25	81 40	145	5.64	1.70	410	5.00	60.01	0.0	905.6	905.8	3478.3	4894.2	3325.1
262	4203026500	03026500 SEVENMILE RUN NEAR RASSELAS, PA.	8E	7.64	1365.0	41 38	83 29	78	6.41	1.71	470	5.00	9.70	0.0	564.6	485.6	2484.2	2992.4	1620.0
263	5103207400	03207400 FRATER CREEK AT VANSANT, VA.	8E	19.00	3238.1	37 13	82 06	150	6.74	2.13	40	6.20	15.00	0.0	1199.3	1079.4	6596.2	8896.3	4550.0
264	5403057500	03057500 SKIN CREEK NEAR BROWNSVILLE, W. VA.	8E	25.70	2887.7	38 58	80 27	140	6.37	1.99	400	8.22	55.20	0.0	1404.0	1474.2	2471.0	2881.6	2280.0
265	5403066500	03066500 SALEM FORK AT SALEM, W. VA.	8E	8.32	1929.0	39 17	80 32	140	6.14	1.93	190	3.54	16.57	0.0	927.8	1020.6	2597.0	2876.2	2280.0
266	5403213500	03213500 PANTHER CREEK NEAR PANTHER, W. VA.	8E	30.00	3923.1	37 13	82 06	150	6.75	2.11	1066	9.42	41.67	0.0	1869.4	1469.1	6176.8	7895.0	4600.0
267	0102462600	02462600 DAVIS CREEK BELOW ABERNANT, ALA.	8F	40.20	4380.0	33 19	37 13	300	6.31	2.80	190	14.00	46.00	0.0	2469.9	2660.0	6250.0	7020.0	5600.0
268	2103406000	03406000 WOOD CREEK NEAR LONDON, KY.	8F	38.80	528.7	37 10	84 07	177	6.09	2.11	129	2.58	10.49	0.0	309.0	343.9	636.2	697.1	824.0
269	2103407100	03407100 CANE BRANCH NEAR PARKERS LAKE KY.	8F	0.67	211.8	36 52	84 27	180	6.70	2.13	320	0.95	1.90	0.0	90.9	99.9	312.5	354.1	236.0
270	4703561000	03561000 COPPER BASIN, AREA 3 NEAR DUCKTOWN, TENN	8F	0.016	14.4	34 55	84 29	255	7.36	2.33	25	0.05	0.14	0.0	6.6	4.2	26.4	33.7	20.0
271	4703565040	CHESTUEE CREEK ABOVE ENGLEWOOD, TENN.	8F	14.00	2790.0	35 25	84 36	285	7.20	2.27	164	0.10	17.60	0.0	1420.7	1363.9	4546.2	5313.4	4110.0
272	4703565060	MIDDLE C BELOW ST HWY 39 NR ENGLEWOOD, TENN.	8F	32.70	3336.0	35 25	84 30	283	7.20	2.27	724	9.60	39.00	0.0	1660.1	1477.5	4913.9	5544.7	3520.0
273	4703565300	SOUTH CHESTUEE CR NR BENTON, TENN.	8F	31.00	3960.0	35 24	80 23	250	7.30	2.33	320	7.20	47.00	0.0	2347.9	2347.9	5306.2	5916.7	4140.0
274	4703570600	LITTLE BRUSH CREEK NR DUNLAP, TENN.	8F	10.40	3016.3	35 24	85 23	265	7.27	2.27	1552	7.55	20.30	0.0	1946.0	1868.2	3930.9	4359.0	3130.0
275	2103400500	POOR FORK AT CUMBERLAND, KY.	8G	82.30	6180.0	36 58	83 00	160	6.77	2.14	1060	10.60	98.50	0.0	5958.9	4370.0	12490.0	14370.0	11800.0
276	2103401500	YELLOW CREEK BY PASS AT MIDDLESBORO, KY.	8G	35.30	8804.9	36 30	83 44	175	6.80	2.15	2050	8.40	56.20	0.0	3640.1	3646.1	10105.2	11450.0	10900.0
277	2103407200	WEST FORK CANE BR NEAR PARKERS LAKE KY.	8G	0.86	79.0	36 52	84 27	170	6.70	2.13	150	0.50	0.96	0.0	39.9	34.7	122.5	141.6	139.0
278	4703460000	WHITE OAK CREEK AT SUNBRIGHT, TENN.	8G	13.50	3354.0	36 15	84 40	160	6.00	2.15	1000	4.35	14.10	0.0	2136.7	2051.2	4593.9	5126.1	4900.0
279	4703491000	BIG CREEK NEAR ROGERSVILLE, TENN.	8G	47.30	4015.0	36 26	82 57	145	6.00	2.14	815	13.00	55.60	0.0	2677.2	2677.2	6023.7	6653.6	5760.0
280	4703534000	COAL CR AT LAKE CITY TENN.	8G	24.50	5501.3	36 13	84 09	170	6.01	2.15	1330	8.84	50.48	0.0	3039.4	3089.0	7700.9	8723.1	8480.0
281	4703538300	ROCK CR NR SUNBRIGHT TENN.	8G	5.54	1403.5	36 12	84 40	185	6.02	2.16	800	3.20	10.50	0.0	808.0	750.2	1035.0	2161.7	1560.0

Zone 09

1 SEQ	STATION	STATION NAME	2 SECT	3 AREA	4 Q10	5 LAT	6 LONG	7 R	8 P10	9 P60	10 DH	11 L	12 LL	13 STRG	14 QMEAN	15 Q2	16 Q50	17 Q100	18 QPEAK
282	2301037430	GOOSE RIVER AT ROCKPORT, ME.	9A	8.32	613.3	44 11	69 05	80	4.90	1.50	750	5.29	8.28	0.0	403.5	484.2	746.5	867.0	624.0
283	2501101000	PARKER RIVER AT BYFIELD, MASS.	9A	21.80	406.0	42 45	70 57	87	5.44	1.72	180	0.75	19.07	7.0	229.7	229.7	567.4	652.4	489.0
284	2501102500	ABERJONA RIVER AT WINCHESTER, MASS.	9A	23.30	518.3	42 27	71 08	90	5.87	1.78	175	4.08	11.21	7.0	332.4	309.1	1047.1	1236.5	835.0
285	2501105500	EAST BRANCH NEPONSET RIVER AT CANTON, MASS.	9A	27.00	1150.7	40 00	71 09	110	5.91	1.87	150	7.07	33.57	23.0	535.2	401.4	2376.3	2997.1	1790.0
286	2501108500	WADING RIVER AT WEST MANFIELD, MASS.	9A	19.00	587.7	42 00	71 10	110	5.85	1.82	170	0.40	31.60	5.0	236.3	177.2	1020.0	1238.2	747.0
287	3301073000	OYSTER RIVER NEAR DURHAM, N.H.	9A	10.10	407.0	43 08	70 58	84	4.77	1.73	160	4.00	11.26	0.5	310.2	350.5	651.4	722.0	862.0
288	4401106000	ADAMSVILLE BROOK AT ADAMSVILLE, R.I	9A	8.00	320.6	41 33	71 08	121	8.85	2.02	220	5.03	0.00	40.0	193.3	187.5	460.0	618.0	1060.0
289	4401117000	POTOWOMUT RIVER NEAR EAST GREENWICH, R.I.	9A	83.00	681.9	41 30	71 27	120	0.30	1.99	365	7.65	28.47	0.0	420.0	336.5	1043.1	1207.0	2400.0
290	0901120500	STAFFORD BROOK NEAR WOODSTOCK VALLEY, CONN.	9B	4.06	640.7	41 55	72 07	120	6.10	1.03	830	2.75	8.61	4.0	360.6	357.5	1170.8	1474.4	1000.0
291	0901121000	MOUNT HOPE RIVER NR WARRENVILLE, CONN.	9B	27.00	3124.4	41 51	72 10	115	0.20	1.05	650	6.00	30.70	4.0	1837.9	819.0	7075.0	9005.7	8400.0
292	0901188000	BURLINGTON BROOK NEAR BURLINGTON, CONN.	9B	4.10	836.9	41 47	72 50	125	6.00	1.98	237	3.25	10.53	0.0	306.0	297.6	883.6	1076.0	1690.0
293	0901191000	NORTH BRCH PARK RIVER AT HARTFORD, CONN.	9B	80.30	8674.8	41 47	72 43	123	6.20	1.95	86	706	25.50	0.0	1882.7	1322.4	5935.7	8340.0	10000.0
294	0901194000	EIGHTMILE RIVER AT NORTH PLAIN, CONN.	9B	10.00	1562.0	41 28	72 20	123	6.60	0.05	233	0.34	22.06	2.0	940.9	923.4	2079.6	3735.2	2350.0
295	0901194500	EAST BR. EIGHTMILE R NR NORTH LYME, CONN.	9B	80.90	950.0	41 26	72 20	120	6.02	2.05	400	11.01	56.00	0.6	710.5	661.0	1287.9	1403.0	2950.0
296	0901195000	MENUNKETESUCK RIVER NEAR CLINTON, CONN.	9B	11.90	813.2	41 18	72 31	125	6.09	2.07	530	10.00	32.35	1.0	481.2	433.1	1212.5	1406.3	1500.0
297	0901206500	LEADMINE BROOK NEAR THOMASTON, CONN.	9B	24.00	5500.0	41 42	73 03	120	6.27	1.07	745	11.01	80.05	1.0	2374.7	1690.0	13400.3	16503.9	10400.0

Table 10. Continued.

Zone 09

1			2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SEQ	STATION	STATION NAME	SECT	AREA	Q10	LAT	LONG	R	P10	P60	OH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
298	2301014700	FACTORY BROOK NEAR MADAWASKA, ME.	9B	5.03	248.1	47 21	68 18	61	3.62	1.18	300	4.25	9.64	0.0	150.6	150.8	316.0	339.7	253.0
299	2301015700	HOULTON BROOK NEAR OXBOW, ME.	9B	5.98	217.2	46 26	68 24	74	3.00	1.28	150	3.54	5.53	13.0	123.4	125.9	302.3	343.1	236.0
300	2301017300	NICHOIS BROOK NEAR CARIBOU, ME.	9B	3.04	260.6	46 51	67 56	66	3.70	1.23	100	3.42	8.39	0.0	116.9	110.9	394.8	434.0	261.0
301	2301030400	GULLIVER BROOK NEAR MONARDA, ME.	9B	11.00	447.7	45 43	00 19	76	4.10	1.32	200	8.70	18.00	21.0	261.5	231.4	660.0	787.1	562.0
302	2301034000	COFFIN BROOK NEAR LEE, ME.	9B	9.21	130.2	45 20	68 22	60	4.32	1.35	200	2.24	5.60	21.0	72.9	72.9	205.6	233.3	143.0
303	2301055300	BOG BROOK NEAR BUCKFIELD, ME.	9B	10.50	203.8	44 16	70 19	67	4.07	1.56	100	6.60	20.32	0.0	104.8	203.3	389.6	406.6	259.0
304	2501161500	TARBELL BROOK NEAR WINCHENDON, MASS.	9B	10.20	841.9	42 43	72 06	100	6.46	1.78	200	6.90	24.60	4.0	327.9	256.9	1898.7	2151.0	2630.0
305	2501162500	PRIEST BROOK NEAR WINCHENDON, MASS.	9B	18.40	887.6	42 41	72 07	100	6.40	1.72	490	12.44	39.72	0.0	464.6	390.3	2508.0	3391.8	3000.0
306	2501174000	HOP BROOK NEAR NEW SALEM, MASS.	9B	3.30	244.8	42 29	72 20	110	6.58	1.75	462	2.80	8.04	0.0	140.2	140.2	352.7	408.1	289.0
307	2501180000	SYKES BROOK AT KNIGHTVILLE, MASS.	9B	1.04	169.3	42 17	72 52	120	6.70	1.81	435	3.52	3.52	0.0	89.1	87.7	445.5	543.5	680.0
308	3301083000	NUBANUSIT BROOK NEAR PETERBORO, N. H.	9B	6.30	864.9	42 53	71 58	97	4.91	1.75	800	9.38	35.50	2.0	818.7	810.7	1348.8	1557.3	1130.0
309	3301150500	OTTER BROOK NEAR KEENE, N. H.	9B	7.07	3218.6	42 50	72 14	90	4.70	1.74	1063	7.97	30.85	2.0	1490.1	1341.1	6139.2	7525.0	6130.0
310	3301160000	S BR ASHUELOT R AT WEBB, NEAR MARLBORO, N. H.	9B	7.80	2067.7	42 52	72 13	101	4.81	1.78	800	7.80	66.48	1.0	1230.0	984.6	4815.5	5661.7	5900.0
311	3401384500	RINGWOOD CREEK NEAR WANAQUE, N.J.	9B	19.10	920.5	41 06	74 16	170	6.75	2.04	600	10.02	24.32	0.0	537.3	537.3	1182.1	1284.2	1150.0
312	3401388000	WEST BROOK NEAR WANAQUE, N.J.	9B	11.80	1104.4	41 04	74 19	170	6.78	2.05	800	4.81	22.02	3.0	627.5	596.1	1894.2	1945.2	1900.0
313	3601300000	BLIND BROOK AT RYE, N. Y.	9B	9.20	1297.2	40 59	73 41	125	6.78	2.11	935	7.26	12.36	0.0	781.2	652.1	2054.5	2383.0	2320.0
314	4401111300	NEPHUC R NR HARRISVILLE R.I	9B	10.00	985.4	41 59	71 41	106	6.06	1.92	410	6.80	21.78	0.0	492.7	561.9	1552.0	1798.4	1820.0
315	4401114500	WOONASQUATUCKET RIVER AT CENTERDALE, R.I.	9B	38.30	1945.8	41 52	71 29	118	6.18	1.94	400	8.19	20.65	4.0	587.5	552.2	1360.6	1562.8	1440.0
316	5001130000	EAST ORANGE BRANCH AT EAST ORANGE, VT.	9B	8.06	443.8	44 05	72 20	85	4.66	1.00	800	9.01	7.00	0.0	277.4	291.3	524.3	554.0	465.0
317	5001142500	AYERS BROOK AT RANDOLPH, VT.	9B	30.50	3130.6	43 56	72 39	86	4.67	1.61	1100	10.20	57.90	0.0	1808.0	984.0	7959.6	9989.0	20000.0
318	5004291000	GREEN RIVER AT GARFIELD, VT.	9B	18.90	979.3	44 36	72 32	80	4.40	1.52	920	9.60	24.14	7.0	528.4	475.6	1743.7	2081.9	2800.0
319	2301041000	MOUNTAIN BROOK NEAR LAKE PARLIN, ME.	9C	3.01	572.4	46 28	70 04	89	4.34	1.38	1200	2.20	4.45	0.0	276.5	235.8	1106.2	1345.0	918.0
320	2301046000	SO. BR. CARRABASSETT RIVER AT BIGELOW, ME.	9C	14.20	1854.5	45 03	69 53	82	4.86	1.45	1600	7.20	11.30	0.0	1140.2	1320.4	1814.2	1894.5	1820.0
321	2301049300	NORTH BR. TANNING BROOK NR MANCHESTER, ME.	9C	0.03	178.8	44 21	69 51	85	4.93	1.53	350	0.90	1.03	0.0	82.3	72.4	195.1	223.9	195.0
322	2301059000	FOUR PONDS BROOK NEAR HOUGHTON, ME.	9C	3.41	220.0	44 50	70 42	84	4.72	1.40	500	1.60	6.25	14.0	120.2	120.2	392.0	465.2	349.0
323	2301062700	PATTE BROOK NEAR BETHEL, ME.	9C	5.30	635.7	44 21	70 48	86	4.02	1.54	1200	3.00	12.00	0.0	277.0	286.5	957.7	1096.5	664.0
324	3301064300	ELLIS R NR JACKSON N. H.	9C	10.90	4403.4	44 13	71 15	84	4.53	1.56	4700	2.60	12.40	0.0	1700.0	1933.2	5907.8	6533.5	4500.0
325	3301072050	MOHAWK BROOK NR CENTER STAFFORD N. H.	9C	8.87	632.6	43 18	71 06	92	4.74	1.71	730	4.00	19.80	10.1	251.1	301.3	909.8	1034.5	800.0
326	3301127000	BIG BROOK NR PITTSBURG, N. H.	9C	8.30	430.1	45 08	71 12	80	1.43	8.00	1487	2.00	4.10	0.03	279.3	307.2	609.5	678.3	441.0
327	4401115030	NOOSENECK R AT NOOSENECK R.I.	9C	8.23	322.1	41 38	71 30	108	6.40	2.00	448	5.80	16.05	1.5	200.5	227.2	423.3	505.9	318.0
328	5004290300	PHERRINS RIVER TRIB. NR ISLAND POND, VT.	9C	1.05	148.6	44 38	71 54	84	4.44	1.53	1100	1.00	3.20	0.0	67.2	50.5	190.2	219.1	140.0
329	5001150600	KENT BROOK NR SHERBURNE, VT.	9D	3.31	1213.4	43 40	72 40	90	4.01	1.63	2170	3.20	6.75	0.0	379.2	285.4	2502.7	3109.4	1015.0
330	5001155200	SACKETTS BROOK NR PUTNEY, VT.	9D	10.00	872.1	43 00	72 32	97	4.77	1.74	1260	6.80	10.65	0.0	354.5	301.3	1503.4	1843.4	903.0
331	5001155300	FLOOD BROOK NR LONDONDERRY, VT.	9D	9.26	1807.6	43 14	72 51	95	4.71	1.89	2894	6.00	20.45	0.0	613.6	498.9	3436.2	3806.4	1800.0
332	5001167000	BEAVER BROOK AT WILMINGTON, VT.	9D	6.30	1845.7	42 52	72 51	97	4.81	1.76	787	5.75	12.90	0.0	507.6	451.0	1401.9	1609.1	1140.0
333	5004284000	JAIL BRANCH AT EAST BARRE, VT.	9D	40.40	1147.2	44 10	72 27	85	4.53	1.58	1334	8.60	33.80	8.03	567.9	425.9	2300.0	2026.1	1820.0
334	5004292100	STONY BROOK NR EDEN, VT.	9D	4.21	755.2	44 42	72 35	86	4.36	1.49	1400	3.20	6.70	0.0	359.9	352.7	1439.6	1727.5	898.0
335	5004292150	GIHON RIVER TRIB. NR JOHNSON VT.	9D	0.31	86.1	44 40	72 38	60	4.38	1.58	700	1.20	2.40	0.0	49.5	44.6	145.8	186.6	112.0

Zone 10

SEQ	STATION	STATION NAME	SECT	AREA	Q10	LAT	LONG	R	P10	P60	OH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
336	2501197300	MARSH BROOK AT LENNOX, MISS.	9E	2.10	148.0	42 21	73 10	105	6.00	1.79	503	2.93	3.84	19.0	69.3	92.0	207.2	234.0	150.0
337	2501331400	DRY BROOK NR ADAMS, MISS.	9E	7.53	862.3	42 35	73 07	110	5.62	1.73	1027	4.47	9.10	6.0	594.0	823.7	1217.7	1386.8	984.0
338	2501331500	HOOSIC RIVER AT ADAMS, MASS.	9E	40.30	2503.2	42 37	73 00	116	5.40	1.73	1100	14.10	84.84	11.0	1207.6	1193.8	4956.8	5943.9	5000.0
339	2501332000	NORTH BRANCH HOOSIC R AT NORTH ADAMS, MASS.	9E	39.00	0779.5	42 40	73 00	120	6.71	1.03	2260	4.30	15.73	0.0	2726.2	2290.0	11095.6	13440.2	9000.0
340	2501333000	GREEN RIVER AT WILLIAMSTOWN, MASS.	9E	42.06	2486.1	42 43	73 12	105	5.40	1.70	2072	11.67	43.12	6.0	1390.7	1326.9	3058.8	3268.2	2730.0
341	5001333000	SOUTH STREAM NR BENNINGTON, VT.	9E	7.76	141.8	42 50	73 10	90	4.61	1.76	1900	4.00	14.60	0.0	77.9	74.0	237.6	289.4	160.0
342	5004200200	METAWEE RIVER TRIB. NO. 2 AT EAST RUPERT, VT.	9E	1.50	130.5	43 16	73 07	93	4.79	1.79	1100	2.00	4.10	0.0	76.3	00.0	161.6	176.3	130.0
343	3001319000	WEST BRANCH SACANDAGA RIVER AT ARIETTA, N. Y.	10	20.00	1840.5	43 18	74 31	85	5.22	1.60	2700	9.00	63.60	0.0	1195.3	1374.6	2402.6	2653.6	1660.0
344	3001319050	SAND LAKE OUTLET NR RISECO, N. Y.	10	7.10	280.4	43 22	74 33	84	5.10	1.56	300	4.00	11.50	1.0	284.5	226.9	366.1	400.0	207.0
345	3004204200	LITTLE BUCKER BROOK AT WADDINGTON, N. Y.	10	10.00	3412.0	44 50	76 11	75	4.63	1.44	120	7.00	15.30	0.0	1110.7	671.2	6024.1	8334.3	4450.0
346	3004200000	EAST BRANCH ST. REGIS RIVER NR MECHAM LAKE, N. Y.	10	40.40	530.3	44 33	74 10	77	4.74	1.40	1750	14.22	60.50	2.2	333.5	333.5	1017.2	1193.0	762.0
347	3004274000	BLACK BROOK AT BLACK BROOK, N. Y.	10	40.40	810.7	44 27	73 45	80	4.80	1.50	2512	10.40	60.50	0.0	502.0	502.0	1131.5	1287.4	1050.0
348	3004276200	BOUQUET RIVER AT NEW RUSSIA, N. Y.	10	37.00	3823.3	44 10	73 37	83	4.03	1.00	2362	12.40	03.20	0.0	1003.0	1043.1	5700.3	6707.0	4400.0
349	3004270300	NORTHWEST BAY BROOK NR BOLTON LANDING, N. Y.	10	23.45	1024.7	43 40	73 38	87	5.13	1.50	1200	5.40	54.00	0.0	972.0	1140.0	1924.7	1731.8	1800.0

Table 10. Continued.

Zone 11

1			2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SEQ	STATION	STATION NAME	SECT	AREA	Q10	LAT	LONG	R	P10	P60	OH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
350	2103304500	MCGILLS CREEK NEAR MCKINNEY, KY.	11A	2.14	1136.9	37 27	84 42	175	6.00	2.00	55	1.83	4.75	0.0	505.3	505.3	2611.1	2425.4	1460.0
351	2103305000	GREEN RIVER NEAR MCKINNEY, KY.	11A	22.40	10235.4	37 26	84 43	180	6.01	2.09	365	0.46	53.01	0.0	4226.5	3840.0	19587.2	23431.4	13700.0
352	2103306500	GREEN RIVER NEAR MOUNT SALEM, KY.	11A	36.30	11601.4	37 26	84 45	170	6.00	2.09	725	0.40	62.50	0.0	5349.5	5082.0	18418.7	22735.4	13700.0
353	2103307500	SOUTH FORK LITTLE BARREN R AT EDMONTON, KY.	11A	10.30	2301.5	36 56	85 34	180	6.77	2.12	281	9.45	39.32	0.02	1663.0	1653.0	3076.1	3324.1	2970.0
354	2103309500	MCDOUGAL CREEK NEAR HODGEN VILLE, KY.	11A	6.34	2316.9	37 32	85 46	185	6.62	2.00	122	4.96	7.49	0.0	1116.0	1141.2	-3536.4	3936.2	2890.0
355	2103310000	NORTH FORK NOLIN RIVER AT HODGENVILLE, KY.	11A	30.40	6408.4	37 35	85 44	175	6.87	2.00	286	6.40	61.50	0.0	4897.4	4979.2	10944.9	12166.3	9380.0
356	2103312000	BEAR CREEK NEAR LEITCHFIELD, KY.	11A	30.80	6919.0	37 26	86 17	180	6.60	2.10	210	5.40	26.50	0.0	4739.6	4739.6	9783.6	11898.7	6870.0
357	2103313500	WEST BAYS FORK AT SCOTTSVILLE, KY.	11A	7.47	2033.2	36 46	86 12	201	6.03	2.14	200	4.63	11.96	0.0	1839.7	1598.5	2839.9	2869.6	7850.0
358	4703600500	BIG BIGBY CREEK AT SANDY HOOD, TENN.	11A	17.50	2492.6	35 29	87 29	285	7.26	2.38	381	6.76	16.01	0.0	1597.0	1533.9	3131.7	3387.4	2680.0
359	2103286500	CAVE CREEK NEAR FORT SPRING, KY.	11B	2.63	288.7	38 01	84 38	165	6.40	2.03	187	2.65	4.90	0.0	127.0	123.2	472.4	553.7	486.0
360	2103289000	SOUTH ELKHORN CREEK AT FORT SPRING, KY.	11B	24.00	1728.0	38 03	84 38	163	6.40	2.03	178	10.13	43.96	0.0	972.2	972.2	2566.6	2697.2	1690.0
361	2103290000	FLAT CREEK NEAR FRANK FORT, KY.	11B	5.83	3835.6	38 18	84 57	182	6.30	2.01	242	3.80	6.15	0.0	2363.1	2211.9	6471.0	7412.3	7160.0
362	2103291000	BIG EAGLE CREEK AT SADIEVILLE, KY.	11B	42.90	7514.4	38 23	84 33	160	6.37	2.00	263	0.00	53.20	0.0	4687.3	4268.0	10314.7	11526.2	9870.0
363	2103292500	SOUTH FORK BEARGRASS CREEK AT LOUISVILLE, KY.	11B	17.19	2914.5	38 12	85 39	165	6.40	2.03	210	0.00	35.60	0.1	1361.9	1212.1	6455.4	7817.3	4940.0
364	2103293000	M F BEARGRASS C, CANNONS LA, LOUISVILLE, KY.	11B	18.00	4981.5	38 14	85 35	170	6.40	2.03	250	9.93	51.21	0.1	1805.2	1413.9	10639.9	14139.0	10500.0
365	2103295000	SALT RIVER NEAR HARRODSBURG, KY.	11B	41.40	4920.0	37 45	84 52	170	6.46	2.00	210	12.10	47.66	0.0	3288.5	3938.6	6581.6	7282.7	7820.0
366	2103296000	PLUM CREEK SUBWATERSHED NO4 NEAR SIMPSONVILLE KY.	11B	1.88	183.2	38 10	85 22	165	6.39	2.03	98	1.68	4.28	0.0	143.2	143.2	184.7	193.3	183.0
367	2103296500	PLUM CREEK NEAR WILSONVILLE, KY.	11B	10.10	4302.0	38 00	85 26	165	6.37	2.00	229	0.00	10.50	0.01	2981.5	3169.4	5515.0	6983.4	8160.0
368	4703426500	SPRING CREEK NEAR LEBANON, TENN.	11C	35.30	8183.0	36 11	86 14	185	6.61	2.14	1000	10.00	51.00	0.0	6339.4	6339.4	12367.4	13682.4	9330.0
369	4703425700	SPENCER CREEK NEAR LEBANON, TENN.	11C	3.32	2000.1	36 14	86 24	180	6.80	2.14	350	2.40	5.00	0.0	1056.9	1163.7	2790.2	3148.6	1840.0
370	4703426000	CEDAR C TRIBUTARY AT GREEN HILL, TENN.	11C	0.80	318.6	36 14	86 32	190	6.06	2.14	470	0.60	71.00	0.0	163.2	163.2	414.5	453.7	331.0
371	4703428000	DRAKES CREEK ABOVE HENDERSONVILLE, TENN.	11C	19.20	3384.7	36 22	86 37	210	6.79	2.13	280	0.50	41.06	0.0	2261.7	2940.2	3731.0	3898.1	3370.0
372	4703427000	BRADLEY CREEK AT LASCASSAS, TENN.	11C	37.00	13784.7	35 56	86 17	200	7.00	2.17	759	0.00	83.00	0.0	8896.9	8683.7	17732.2	19999.3	14700.0
373	4703597000	WARTRACE CREEK AT BELL BUCKLE, TENN.	11C	10.30	6510.1	35 35	86 20	245	7.19	2.23	470	0.00	15.30	0.0	4404.1	4824.3	8632.0	9512.0	8240.0
374	4703690200	WEAKLEY CREEK NEAR ROVER, TENN.	11C	9.40	1805.3	35 36	86 33	245	7.16	2.22	310	0.20	11.36	0.0	960.0	867.1	3142.1	3673.0	2330.0
375	0103569266	POND CREEK NR WILSON DAM, ALA. GAGE NO. 1	11D	13.70	631.7	34 46	87 30	350	7.52	2.41	50	6.56	12.73	1.0	314.5	317.6	745.6	843.1	636.0
376	0103500266	POND CREEK NR WILSON DAM, ALA. GAGE NO. 2	11D	21.00	792.5	34 47	87 38	350	7.61	2.36	40	2.56	4.81	0.0	516.7	578.0	1621.0	1115.2	864.0
377	2103317500	NORTH FORK ROUGH RIVER NEAR WEST VIEW, KY	11D	40.00	3079.0	37 42	86 24	180	6.63	2.09	249	0.00	32.00	0.0	2100.0	2265.6	4599.0	5103.0	3600.0
378	2103318200	ROCK LICK CREEK NEAR GLEN DEAN, KY.	11D	20.10	8880.0	37 39	86 31	180	6.60	2.10	327	6.60	32.40	0.0	3425.3	3366.0	10549.0	12194.1	8720.0
379	2103304000	ROSE CREEK AT NEBO, KY.	11D	2.10	1106.0	37 23	87 38	185	6.00	2.16	150	1.01	6.00	0.0	870.5	663.9	1549.1	1710.0	1240.0
380	2103437600	SOUTH FORK LITTLE RIVER AT HOPKINSVILLE, KY.	11D	40.50	5430.7	36 50	87 20	200	6.00	2.17	303	11.00	40.00	0.0	2035.5	2700.7	8560.7	11331.0	8320.0
381	2107023500	OBION CREEK AT PRYORSBURG, KY.	11D	30.30	5210.2	36 41	88 44	245	7.00	2.32	140	7.00	40.00	0.0	3476.6	3800.6	6664.4	6466.0	5330.0

Zone 12

SEQ	STATION	STATION NAME	SECT	AREA	Q10	LAT	LONG	R	P10	P60	OH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
382	1705636000	TINLEY CREEK NEAR PALOS PARK, ILL.	12A	11.30	871.7	41 38	87 46	123	6.20	1.84	178	7.56	10.64	0.0	511.4	498.9	1534.2	1789.0	1270.0
383	1705637500	LONG RUN NEAR LEMONT, ILL.	12A	20.00	1937.3	41 39	88 00	124	6.33	1.98	71	0.60	36.90	0.0	745.0	569.4	3545.5	4381.0	3160.0
384	1705540000	BOONE CREEK NEAR MCHENRY, ILL.	12A	10.30	243.0	42 19	88 19	110	6.33	1.95	110	7.60	15.00	0.0	136.5	183.4	313.0	347.6	276.0
385	2004040000	BLACK RIVER NEAR GARNET, MICH.	12A	20.00	622.7	46 07	85 22	65	4.55	1.45	200	0.36	10.14	30.0	306.0	246.7	1037.0	1206.2	900.0
386	2004111500	DEER CREEK NEAR DANSVILLE, MICH.	12A	16.30	617.3	42 36	84 18	60	5.65	1.92	61	6.03	20.26	0.0	296.0	298.0	1089.1	1187.2	840.0
387	2004112000	SLOAN CREEK NEAR WILLIAMSTON, MICH.	12A	6.34	624.7	42 41	84 22	60	5.04	1.92	56	4.00	5.71	0.0	271.6	255.3	1053.0	1243.9	773.0
388	2004117000	QUAKER BROOK NEAR NASHVILLE, MICH.	12A	7.00	237.5	42 34	85 05	95	5.77	1.00	103	3.60	8.93	13.0	128.4	136.1	342.0	367.0	294.0
389	2004130700	BIXBY CREEK NEAR ROSE CITY, MICH.	12A	3.20	246.3	44 26	84 07	67	5.85	1.61	25	2.40	3.80	0.0	113.0	101.7	472.3	576.6	423.0
390	2004130900	WILKINS CREEK NEAR ROSE CITY, MICH.	12A	8.22	240.0	44 24	84 07	65	5.66	1.61	1250	6.60	9.37	0.0	166.4	146.4	675.0	832.0	740.0
391	2004140000	PRIOR CREEK NEAR SELKIRK, MICH.	12A	10.00	383.4	44 20	84 04	65	5.04	1.60	356	0.00	35.03	0.0	212.0	201.9	863.5	761.2	564.0
392	2004141000	S BR SHEPARDS CREEK NEAR SELKIRK, MICH.	12A	1.20	140.7	44 19	84 05	66	5.04	1.60	140	2.26	3.65	0.0	73.0	67.2	211.7	266.4	161.0
393	3004216500	LITTLE TONAWANDA CREEK AT LINDEN, N. Y.	12A	22.10	2601.2	42 53	78 16	60	4.00	1.60	200	0.35	53.42	1.3	1145.1	1145.1	3503.6	4000.7	2700.0
394	5505426500	WHITEWATER CREEK NEAR WHITEWATER WIS.	12A	7.20	22.4	42 46	88 41	105	0.38	1.90	22	3.12	4.74	0.0	11.2	11.2	36.2	45.4	25.0
395	5505427000	WHITEWATER CREEK AT WHITEWATER, WIS.	12A	16.70	466.6	42 49	88 42	110	6.30	1.98	65	6.62	15.06	0.0	233.3	233.3	759.9	874.9	451.0
396	2705090000	NORTH BRANCH TWO RIVERS, NR LANCASTER, MINN.	12B	32.00	410.0	48 53	96 46	54	5.10	1.64	33	7.14	16.64	14.0	155.4	155.4	783.2	1013.2	912.0
397	2705241000	RABBIT RIVER NEAR CROSBY, MINN.	12B	8.30	65.3	46 04	97 57	80	8.10	1.04	135	8.51	7.14	0.0	27.2	23.1	113.2	133.0	94.0
398	2706003000	LITTLE SIOUX RIVER NEAR LAKEFIELD, MINN.	12B	17.10	1000.1	43 37	96 16	95	7.24	2.28	40	9.60	15.10	2.0	265.3	132.6	2525.7	3183.6	2550.0
399	2706003500	JACKSON COUNTY DITCH 11 NEAR LAKEFIELD, MINN.	12B	7.00	869.5	43 36	95 15	95	7.24	2.28	7	6.86	9.37	3.0	165.3	82.6	1653.0	2016.7	1150.0

Table 10. Continued.

Zone 12

SEQ STATION (1)	STATION NAME (1)	SECT (2)	AREA (3)	Q10 (4)	LAT (5)	LONG (6)	R (7)	P10 (8)	P50 (9)	DH (10)	L (11)	LL (12)	STRG (13)	QMEAN (14)	Q2 (15)	Q50 (16)	Q100 (17)	QPEAK (18)
400 3005059050	SWAN CREEK TRIBUTARY NEAR AYR, N. DAK.	10B	9.00	101.0	46 58	97 21	105	5.93	1.60	29	2.70	6.00	0.0	34.5	22.4	158.7	182.8	120.0
401 3005059950	SWAN CREEK TRIBUTARY NEAR CASSELTON, N. DAK.	10B	2.50	816.0	46 50	97 22	60	0.00	1.60	17	3.21	3.58	0.0	72.2	54.2	397.1	476.5	225.0
402 3005082060	ENGLISH COULEE TRIB. NR GRAND FORKS, N. DAK.	12B	4.60	130.0	47 55	97 10	57	5.50	1.76	20	4.10	4.95	0.0	66.6	66.6	199.6	223.1	164.0
403 3005082600	SALTWATER COULEE TRIB. NR EMERADO, N. DAK.	12B	60.00	270.0	47 53	97 20	56	5.56	1.76	165	0.40	13.73	0.0	150.2	150.2	396.0	453.7	290.0
404 3005069000	CART CREEK TRIBUTARY NEAR CRYSTAL, N. DAK.	10B	3.77	209.0	48 34	97 41	53	5.20	1.67	30	5.07	5.07	0.0	103.1	76.0	597.4	751.0	660.0
405 3005103500	EGG CREEK NEAR GLENBURN, N. DAK.	10B	20.00	105.3	48 29	101 24	45	5.15	1.83	45	7.00	7.00	0.0	55.8	27.9	421.3	530.1	303.0
406 3006123500	EGG CREEK TRIBUTARY NEAR DEERING, N. DAK.	12B	4.06	22.1	48 22	101 09	45	5.10	1.64	23	4.12	5.10	0.0	8.3	5.8	41.0	49.3	28.0
407 3006460600	MINNEAPOLIS FLATS CR TRI NEAR ELDRIDGE, N. DAK.	12B	0.01	92.0	46 54	98 53	67	5.73	1.62	280	9.47	16.04	0.0	30.1	30.1	116.3	146.0	90.0
408 4006473050	SHAEFER CREEK TRIBUTARY NEAR ORIENT, S. DAK.	12B	0.98	410.0	44 44	98 55	65	6.42	1.90	56	3.30	3.30	5.0	110.0	36.5	1100.0	1375.0	730.0
409 55AR6 31.1	FENNIMORE WISC. WATERSHED W-1	12B	.018	339.0	42 39	90 39	130	6.92	2.15	135	0.51	7.14	0.0	123.5	75.3	560.6	623.7	562.3
410 55AR6 31.3	FENNIMORE WISC. WATERSHED W-3	12B	0.003	58.4	42 39	90 39	130	6.00	2.00	150	0.43	0.64	0.0	23.2	11.6	97.4	107.0	85.3
411 55AR6 31.4	FENNIMORE WISC. WATERSHED W-4	12B	0.287	224.1	42 39	90 39	130	6.92	2.15	100	0.67	1.40	0.0	72.3	43.4	321.7	366.7	303.5
412 4006390700	PINE CREEK NEAR ARDMORE, S. DAK.	13C	6.47	1066.7	43 06	103 40	60	5.01	1.74	250	4.00	20.44	0.0	619.3	901.2	2253.1	2621.6	1550.0
413 4006403000	BATTLE CREEK TRIB. NR KEYSTONE, S. DAK.	13C	0.00	16.0	43 43	103 20	47	5.55	1.75	420	0.96	1.43	0.0	62.0	3.0	550.0	712.0	1330.0
414 4006403900	TEEPEE GULCH TRIB. NR KEYSTONE, S. DAK.	13C	2.30	2.1	43 57	103 27	62	5.53	1.75	102	0.07	1.01	0.0	1.3	0.0	4.1	4.9	2.6
415 4006405750	SUNDAY GULCH NEAR HILL CITY, S. DAK.	13C	5.72	97.0	43 53	103 35	50	5.50	1.74	405	0.53	12.27	0.0	27.0	14.0	213.4	259.5	170.0
416 4006405900	PALMER CREEK NR HILL CITY, S. DAK.	13C	0.24	304.7	43 55	103 26	52	5.54	1.75	1010	7.84	33.07	0.0	290.2	50.0	1020.3	2321.6	4370.0
417 4006432800	POLO CREEK NR WHITEWOOD, S. DAK.	13C	10.00	1050.2	44 20	103 43	54	5.52	1.72	1400	6.31	21.69	0.0	520.0	200.4	2440.2	2964.0	1700.0
418 4006432250	POLO CREEK TRIB. NR WHITEWOOD, S. DAK.	13C	0.061	106.4	44 29	103 43	53	5.52	1.72	470	0.44	0.65	0.0	51.9	49.3	207.1	246.1	137.0
419 4006437100	BOULDER CREEK NEAR DEADWOOD, S. DAK.	13C	1.60	213.7	44 23	103 39	53	5.47	1.73	546	2.39	2.39	0.0	84.6	62.0	292.6	366.2	210.0

Zone 13

SEQ STATION (1)	STATION NAME (1)	SECT (2)	AREA (3)	Q10 (4)	LAT (5)	LONG (6)	R (7)	P10 (8)	P50 (9)	DH (10)	L (11)	LL (12)	STRG (13)	QMEAN (14)	Q2 (15)	Q50 (16)	Q100 (17)	QPEAK (18)
420 1705415500	EAST FORK GALENA RIVER AT COUNCIL HILL, ILL.	12C	20.10	6500.3	42 29	90 17	166	6.65	2.09	580	9.50	62.61	0.0	3023.4	2479.2	12063.4	14026.0	16600.0
421 1905414450	N FK L MAQUOKETA R NR RICKARDSVILLE, IOWA	12C	23.00	4064.1	42 35	90 51	160	6.60	2.10	410	12.24	53.04	0.0	2001.0	1441.3	7206.5	8327.5	7100.0
422 1905414600	L MAQUOKETA R TRIBUTARY AT DUBUQUE, IOWA	12C	1.51	2301.9	42 33	90 42	160	6.64	2.11	201	2.26	4.69	0.0	540.1	821.7	3638.9	4502.9	2550.0
423 2705379000	GILMORE CREEK AT WINONA, MINN.	12C	6.95	2415.4	44 03	91 41	135	6.00	2.00	540	4.81	12.09	0.0	754.6	377.4	5283.5	6430.9	5360.0
424 4006432230	MILLER CREEK NEAR WHITEWOOD S. DAK.	12C	0.72	355.2	44 36	103 44	84	5.44	1.71	1435	7.12	13.22	0.0	142.0	78.1	610.6	738.4	330.0
425 55AR3 29.1	COLBY WATERSHED NO. W-1 WISCONSIN	12C	0.530	134.1	44 50	90 20	124	6.06	1.92	70	1.270	1.270	0.0	44.7	43.6	200.6	362.1	121.0
426 5505400500	KNAPP CREEK NEAR BLOOMINGDALE, WIS.	12C	0.47	4000.0	43 40	90 47	150	6.60	2.07	267	5.60	9.31	0.0	1591.0	735.0	10476.0	13200.0	14000.0
427 5505436000	MOUNT VERNON CREEK NEAR MOUNT VERNON, WIS.	12C	16.10	954.0	44 50	90 20	124	6.60	1.92	70	1.270	1.270	0.0	411.2	411.2	1760.2	2007.1	940.0
428 1703344500	RANGE CREEK NEAR CASEY, ILL.	12D	7.50	2842.0	39 20	88 02	170	6.66	2.00	62	4.59	12.43	0.0	1165.1	780.6	3661.3	4590.5	3500.0
429 1705435000	CEDAR CREEK NEAR WINSLOW, ILL.	12D	1.29	117.0	42 28	89 50	140	6.59	2.00	90	2.10	3.04	0.0	58.9	63.6	159.0	162.6	132.0
430 1705526500	TERRY CREEK NEAR CUSTER PARK, ILL.	12D	12.00	439.2	41 14	88 06	127	6.36	1.98	75	6.65	7.01	0.0	224.1	130.9	988.3	1219.1	1710.0
431 1705559000	GIMLET CREEK AT SPARLAND, ILL.	12D	5.42	2020.9	41 02	89 26	140	6.67	2.08	240	4.38	9.97	0.0	1030.9	1070.1	2649.2	2929.7	2050.0
432 1705565000	HICKORY CREEK ABOVE LAKE BLOOMINGTON, ILL.	12D	10.10	1354.0	40 37	88 57	140	6.63	2.07	80	6.50	22.02	0.0	530.2	693.2	2130.1	2445.2	1690.0
433 1705566000	EAST BRANCH PANTHER CREEK NEAR GRIDLEY, ILL.	12D	6.30	644.1	40 46	88 54	140	6.62	2.00	24	2.40	11.35	0.0	234.2	163.9	1171.0	1463.0	1470.0
434 1705574000	S FK SANGAMON RIVER NEAR NOKOMIS, ILL.	12D	10.00	4899.6	39 21	89 15	160	6.69	2.17	88	5.45	12.06	0.0	1633.2	1306.6	9962.5	12249.0	8600.0
435 1705586500	HURRICANE CREEK NEAR ROODHOUSE, ILL.	12D	2.33	856.0	39 29	90 25	175	7.15	2.25	55	2.35	3.45	0.0	266.9	242.0	1371.4	1653.7	1760.0
436 1705589500	CANTEEN CREEK AT CASEYVILLE, ILL.	12D	62.50	5423.9	38 39	90 01	165	7.19	2.27	163	10.40	95.02	0.0	2502.8	2195.4	9814.6	11751.7	10200.0
437 1705590000	KASKASKIA RIVER AT BONDVILLE, ILL.	12D	12.30	986.3	40 07	88 21	145	6.59	2.06	110	6.00	23.07	0.0	446.3	425.9	1721.5	2017.4	1490.0
438 1705591500	ASA CREEK AT SULLIVAN, ILL.	12D	7.03	933.6	39 37	88 36	100	6.27	2.10	14	2.80	3.04	0.0	369.0	408.4	1072.7	2001.2	1120.0
439 1705595500	MARYS RIVER NEAR SPARTA, ILL.	12D	17.00	6639.0	38 06	89 39	190	7.26	2.27	101	6.41	44.40	0.0	1991.7	1394.2	9241.5	11073.6	7760.0
440 17AR6 17.4	EDWARDSVILLE ILL WATERSHED W-4	12D	0.453	630.0	38 02	89 46	185	7.38	2.38	261	1.023	3.957	12.1	289.0	254.3	1156.0	1358.3	824.0
441 1603363000	BRUSH CREEK NEAR NEBRASKA, IND.	12D	11.76	3121.0	39 04	85 20	170	6.39	1.99	107	7.26	20.07	0.0	2083.3	2053.3	4147.7	4550.3	3440.0
442 16AR6 19.1	LAFAYETTE INDIANA WATERSHED W-1	12D	.0040	6.04	40 54	87 10	125	6.39	1.99	21	0.102	0.38	0.0	2.1	1.6	11.9	14.0	9.3
443 16AR6 19.2	LAFAYETTE INDIANA WATERSHED W-2	12D	.0030	6.37	40 54	87 10	130	6.39	1.99	11	0.080	0.080	0.0	2.4	2.3	9.9	10.9	6.0
444 16AR6 19.4	LAFAYETTE INDIANA WATERSHED W-5	12D	.0046	11.03	40 54	87 10	130	6.39	1.99	9	0.12	0.12	0.0	4.4	4.6	22.0	26.0	14.2
445 16AR6 19.5	LAFAYETTE INDIANA WATERSHED W-6	12D	.0044	6.00	40 54	57 10	130	6.39	1.99	10.5	0.102	0.12	0.0	2.5	2.0	16.4	20.0	11.0
446 16AR6 19.6	LAFAYETTE INDIANA WATERSHED W-7	10D	.0031	13.45	40 54	87 10	130	6.39	1.99	17	0.070	0.06	0.0	3.5	3.5	28.9	35.4	16.0
447 16AR619.10	LAFAYETTE INDIANA WATERSHED W-12	12D	.0003	10.25	40 54	87 10	130	6.38	1.99	12.7	0.123	0.124	0.0	4.2	3.2	16.7	19.3	11.6
448 16AR619.11	LAFAYETTE INDIANA WATERSHED W-13	10D	.0047	6.58	40 54	87 10	130	5.38	1.99	5.2	0.10	0.101	0.0	1.9	1.4	12.7	15.6	7.1
449 16AR619.16	LAFAYETTE INDIANA WATERSHED W-09	10D	.0041	6.23	40 54	87 10	130	6.39	1.99	30	0.123	0.125	0.0	3.4	2.1	11.3	12.6	6.9
450 3603130500	TOUBY RUN AT MANSFIELD, OHIO	12D	0.44	600.0	40 45	82 34	95	5.62	1.00	102	4.60	15.02	0.5	463.4	406.1	1107.9	1310.4	665.0

Table 10. Continued.

Zone 13

1			2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SEQ	STATION	STATION NAME	SECT	AREA	Q10	LAT	LONG	R	P10	P60	DH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
451	3903145000	OTTER FORK NEAR CENTERBURG, OHIO	12D	3.17	319.3	40 19	82 43	115	5.60	1.83	85	3.30	7.77	1.7	153.0	132.0	554.1	846.2	445.0
452	3903220000	SCIOTO BIG RUN AT GRIGGSDALE, OHIO	12D	11.00	2378.0	39 58	83 07	125	5.08	1.87	172	0.76	16.150	0.2	1281.1	1260.3	3601.1	4103.5	2920.0
453	3903231600	EAST FORK PAINT CREEK NEAR SEDALIA, OHIO	12D	3.02	420.8	39 42	83 29	140	0.00	1.91	30	2.80	5.31	0.0	210.0	224.7	703.5	821.1	515.0
454	3903234100	INDIAN CREEK AT MASSIEVILLE, OHIO	12D	9.68	4310.0	39 14	82 59	140	6.00	1.92	440	5.40	40.61	0.2	1726.4	1200.5	6985.6	7986.9	5640.0
455	3903235000	SALT CREEK AT TARLTON, OHIO	12D	11.50	4441.0	39 36	82 47	149	5.06	1.89	215	7.46	34.50	0.02	1776.7	1243.7	9594.2	11726.2	10280.0
456	3903241000	SHAWNEE CREEK AT XENIA, OHIO	12D	4.21	894.1	39 40	83 53	140	6.05	1.92	120	4.60	0.04	0.1	510.0	532.3	1106.0	1317.0	1020.0
457	3903247100	PATERSON RUN NR OWENSVILLE OHIO	12D	3.34	846.0	39 07	84 07	145	6.22	1.95	98	4.30	7.00	0.2	590.9	596.9	1034.1	1134.5	852.0
458	3903263700	BRIDGE CREEK NEAR GREENVILLE, OHIO	12D	4.83	860.0	40 03	84 38	150	6.00	1.92	87	3.50	3.07	0.04	488.4	475.0	825.0	918.0	764.0
459	3903266500	MAD RIVER AT ZANESFIELD, OHIO	12D	7.31	1063.1	40 22	83 41	100	5.80	1.87	270	4.70	24.29	0.1	528.3	505.2	1089.4	1963.1	1380.0
460	3903274100	BLAKE RUN NEAR REILY, OHIO	12D	0.29	173.2	39 28	84 40	150	6.10	1.95	100	1.00	1.50	0.2	88.0	84.0	317.0	377.8	387.0
461	3904109100	TIDERISHI CREEK NEAR JENERA, OHIO	12D	4.05	341.5	40 55	83 42	100	5.00	1.85	45	4.30	11.11	0.02	208.9	217.0	542.4	528.5	480.0
462	3904190000	ROLLER CREEK AT OHIO CITY, OHIO	12D	5.14	371.0	40 46	84 39	150	5.94	1.89	40	3.50	12.34	0.3	231.9	222.6	837.7	753.7	890.0
463	3904190100	NORWALK CREEK NEAR NORWALK, OHIO	12D	4.92	972.6	39 55	83 07	92	5.57	1.78	75	4.40	12.60	0.0	442.1	405.7	2310.6	2020.5	1880.0
464	3904200100	PLUM CREEK AT OBERLIN, OHIO	12D	4.83	884.1	41 15	82 15	98	5.51	1.76	88	4.78	11.784	1.1	384.4	322.9	1652.9	1979.7	1560.0
465	1906453800	RAPID CREEK BELOW MORSE, IOWA	12E	8.12	2844.7	41 41	91 26	160	7.01	2.21	81	4.55	17.02	0.0	798.7	758.6	3706.2	4488.0	2808.0
466	1906453700	RAPID CR TRI NO. 4 NR OASIS, IOWA	12E	1.95	691.9	41 43	91 25	160	7.00	2.21	60	1.27	4.60	0.0	279.6	279.0	1283.4	1534.5	950.0
467	1905453750	RAPID CREEK SOUTHWEST OF MORSE, IOWA	12E	15.20	3835.0	41 43	91 26	160	7.00	2.21	100	0.20	32.60	0.0	1370.9	1360.0	5440.0	8400.0	4300.0
468	1905453850	RAPID CREEK TRIBUTARY NO. 3 NW OASIS, IOWA	12E	1.82	3081.7	41 42	91 27	160	7.01	2.21	80	1.82	3.34	0.0	994.1	895.9	5040.1	6080.5	5000.0
469	1905454000	RAPID CREEK NEAR IOWA CITY, IOWA	12E	25.30	4480.0	41 41	91 29	160	7.82	2.22	143	10.00	56.50	0.0	2120.0	2140.3	8554.2	7958.7	6100.0
470	1905455000	RALSTON CREEK AT IOWA CITY, IOWA	12E	3.01	1202.1	41 40	91 29	160	7.82	2.22	116	3.94	7.40	0.0	846.4	502.7	1890.5	2155.6	1940.0
471	1905455200	S FK ENGLISH R TRIB NR BARNES CITY, IOWA	12E	2.01	815.3	41 33	92 26	160	7.22	2.29	85	2.25	9.69	0.0	438.6	430.0	994.1	1081.3	900.0
472	1906610500	INDIAN CREEK AT COUNCIL BLUFFS, IOWA	12E	7.00	2506.5	41 18	95 50	160	7.60	2.48	237	9.15	10.96	0.0	994.6	994.0	3631.0	4828.9	2250.0
473	1906806000	MULE CREEK NEAR MALVERN, IOWA	12E	10.00	1932.0	40 56	95 36	155	7.92	2.49	196	6.30	19.09	0.0	966.3	978.6	2995.5	3382.1	2870.0
474	2005690000	LITTLE DELAWARE RIVER NEAR HORTON, KANS.	12E	19.00	1142.1	39 41	95 33	60	6.07	2.55	170	11.20	40.30	0.0	856.4	669.5	1864.2	2363.0	1250.0
475	2005503000	DOUGLAS CREEK NEAR EMDEN, MO.	12E	2.60	1200.0	39 45	91 55	180	7.42	2.34	62	4.70	42.08	0.0	793.4	748.0	1528.0	1828.0	1740.0
476	2006010000	MILL CREEK AT OREGON, MO.	12E	4.90	2646.0	39 59	95 00	177	8.11	2.55	145	2.09	7.41	0.0	1082.5	751.9	5644.1	6917.2	4280.0
477	2006020000	WHITE CLOUD CREEK NEAR MARYVILLE, MO.	12E	0.06	2568.1	40 23	94 55	170	7.00	2.52	165	4.87	0.02	0.0	1094.7	897.6	5692.4	6951.4	4180.0
478	2006026300	BIG SLOUGH NEAR WILCOX, MO.	12E	1.30	1013.6	40 23	94 56	170	7.00	2.52	52	1.60	1.80	0.0	527.9	527.9	1073.4	1983.0	1450.0
479	2006094500	E FK FISHING R AT EXCELSIOR SPRINGS, MO.	12E	20.00	7313.0	39 20	94 13	190	6.00	2.53	290	11.01	50.57	0.0	3324.1	2792.2	16853.2	20110.0	12000.0
480	2006934600	RUMBO BRANCH AT DANVILLE, MO.	12E	1.40	640.0	38 55	91 32	205	7.44	2.35	85	2.04	2.04	0.0	278.1	209.0	1230.9	1457.0	1090.0
481	3106000600	SOUTH OMAHA CR TRIBUTARY NEAR WALTHILL, NEBR.	12E	2.64	1160.4	42 06	96 29	130	7.73	2.43	171	2.36	0.53	0.0	522.9	475.0	1751.7	2813.2	1410.0
482	3106000700	SOUTH OMAHA CREEK NEAR WALTHILL, NEBR.	12E	15.10	7931.0	42 07	96 29	130	7.73	2.43	222	6.16	33.09	0.0	2476.7	1239.4	13038.0	15491.9	10100.0
483	3106007700	SOUTH BR TEKAMAH CR NR CRAIG, NEBR.	12E	2.04	1728.6	41 50	96 26	150	7.78	2.45	104	2.33	11.84	0.0	822.2	750.4	3099.9	4439.9	2880.0
484	3106007800	S OMAHA CR TRIBUTARY NO. 2 NR WALTHILL, NEBR.	12E	4.00	2553.9	41 50	96 20	150	7.78	2.45	197	4.05	21.11	0.0	912.1	884.7	4332.0	5199.0	5000.0
485	3106007900	SOUTH BRANCH TEKAMAH CR NEAR TEKAMAH, NEBR.	12E	9.73	3524.1	41 50	96 20	150	7.80	2.45	200	5.45	44.20	0.0	1819.0	1278.0	5787.4	8898.0	4560.0
486	3106008000	TEKAMAH CREEK AT TEKAMAH, NEBR.	12E	23.00	4783.0	41 46	96 13	155	7.00	2.46	320	11.32	120.07	0.0	2391.9	2487.6	6930.5	7773.7	8100.0
487	3106008700	NEW YORK CREEK TRIBUTARY NEAR SPIKER, NEBR.	12E	1.65	982.5	41 40	96 17	155	7.81	2.46	137	2.31	0.32	0.0	441.1	432.3	1565.9	1764.4	1560.0
488	3106008800	NEW YORK CREEK NORTH OF SPIKER, NEBR.	12E	8.50	4035.0	41 40	96 17	155	7.81	2.46	180	4.22	31.70	0.0	1391.0	1113.3	7853.0	9393.3	3820.0
489	3106008900	NEW YORK CREEK EAST OF SPIKER, NEBR.	12E	13.00	6671.2	41 40	96 17	155	7.81	2.46	230	6.60	60.40	0.0	1745.0	1134.2	11517.0	14847.2	9250.0
490	3106006440	STOVE CREEK AT ELMWOOD, NEBR.	12E	10.30	6322.5	40 45	96 15	150	7.00	2.51	111	5.85	21.02	0.0	2187.5	1475.2	11802.0	14436.4	9800.0
491	3106010100	HOOPER CREEK TRIBUTARY NEAR PALMYRA, NEBR.	12E	8.00	2390.5	40 40	96 22	153	7.00	2.51	105	6.70	42.30	0.0	1825.1	922.6	5330.5	8885.7	4210.0
492	3106010400	LITTLE NEMAHA R TRIB NR SYRACUSE, NEBR.	12E	0.71	790.1	40 30	96 10	150	0.02	2.52	116	1.05	1.05	0.0	329.0	277.0	1404.1	1780.9	1200.0
493	4606476000	SADDLEROCK CREEK NEAR CANTON, S. DAK.	12E	14.00	734.2	43 12	96 44	80	6.42	1.00	195	10.82	45.27	0.0	222.5	80.0	1045.0	1157.0	945.0
494	4606476020	SADDLEROCK CREEK TRI NEAR BERESFORD, S. DAK.	12E	2.32	62.5	43 13	96 46	90	7.40	2.34	164	3.70	0.03	0.0	30.0	9.3	92.7	108.2	87.0
495	4606482670	LITTLE BEAVER CR TRI NEAR CANTON, S. DAK.	12E	0.22	74.0	43 15	96 30	80	7.41	2.32	142	0.07	0.07	0.0	31.2	25.0	124.0	144.0	104.0
496	2066050000	MOLL CREEK NEAR GREEN, KANS.	12F	3.00	000.0	39 23	97 00	135	8.17	2.57	180	3.57	7.17	0.0	534.4	539.7	2207.0	2725.4	1700.0
497	2066087000	E BR S FK BLACKWATER R NR ELM, MO.	12F	10.60	8717.7	38 48	94 02	100	0.02	2.54	830	0.10	40.03	0.0	2722.7	2396.0	8712.0	10819.0	7600.0
498	2066000500	SHILOH BRANCH NEAR MARSHALL, MO.	12F	2.67	966.3	39 07	93 06	200	7.70	2.47	92	2.00	7.70	0.0	663.0	646.0	1201.0	1376.7	1100.0
499	4007103000	COUNCIL CREEK NEAR STILLWATER OKLA.	12F	31.00	12000.0	36 00	96 64	401	0.02	2.76	240	9.00	108.19	0.01	4091.0	2450.0	27750.0	35005.0	25000.0
500	4007322500	EAST BRANCH SANDSTONE CR NR ELK CITY, OKLA.	12F	23.00	1084.0	35 31	99 30	157	8.24	2.00	271	10.00	63.310	1.0	522.2	543.1	1321.0	1467.4	1130.0
501	40ARS 35.1	GUTHRIE OKLAHOMA WATERSHED NO W-1	12F	0.062	04.0	35 47	97 26	210	0.50	2.71	25	0.600	0.000	0.0	40.2	40.2	135.0	154.7	107.0
502	40ARS 35.3	GUTHRIE OKLAHOMA WATERSHED NO W-3	12F	.0040	0.0	35 47	97 20	210	0.50	2.71	32	0.227	0.700	0.0	3.0	3.0	11.0	12.0	6.0
503	40ARS 35.4	GUTHRIE OKLAHOMA WATERSHED 00 W-4	12F	.0000	6.0	35 47	97 20	210	0.50	2.71	40	0.010	1.01	0.0	1.0	0.0	17.2	21.7	12.0
504	40ARS 37.2	STILLWATER OKLAHOMA WATERSHED NO 3	12F	0.144	415.0	38 23	97 14	210	0.00	2.71	74	0.073	1.004	21.0	110.0	00.1	010.7	000.1	430.7

Table 10. Continued.

Zone 13

1			2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SEQ	STATION	STATION NAME	SECT	AREA	Q10	LAT	LONG	R	P10	P50	DH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
505	40ARS 37.3	STILLWATER OKLAHOMA WATERSHED NO 4	12F	0.01	302.1	36 23	97 14	210	0.50	2.71	250	0.47	10.34	1.4	100.7	160.7	697.4	694.5	496.4
506	3006210300	WEST BUCKEYE CREEK NEAR BILLINGS, MONT.	130	1.04	460.4	45 30	100 24	52	3.24	1.03	300	2.53	3.05	0.0	143.0	107.2	672.1	000.0	924.0
507	3006300200	BASIN CREEK TRI NEAR VOLBORG, MONT.	130	0.14	177.5	45 53	105 40	25	3.46	1.11	100	1.30	2.10	0.0	63.0	21.5	403.5	500.3	300.0
508	3006300300	BASIN CREEK NEAR VOLBORG, MONT.	130	10.00	963.1	45 53	105 30	30	3.46	1.11	300	5.43	10.79	0.0	350.7	214.0	1177.1	1230.0	090.0
509	3006330100	SHEEP CR TRI NEAR MEDORA, N. DAK.	130	0.20	07.5	46 54	103 27	31	6.30	1.67	300	0.60	2.30	0.0	35.7	20.6	164.2	197.6	147.0
510	3006330200	SHEEP CR TRI 2 NEAR MEDORA, N. DAK.	130	0.42	165.7	46 56	103 20	31	5.20	1.67	115	1.10	1.16	0.0	74.1	50.3	209.0	334.2	210.0
511	3006344200	HEART RIVER TRI NEAR DICKINSON, N. DAK.	130	1.72	75.9	46 50	102 47	30	5.30	1.70	00	2.70	6.30	0.0	29.2	21.0	120.5	159.1	90.0
512	4006446400	CAIN CREEK TRIBUTARY AT IMLAY, S. DAK.	130	14.00	2300.5	43 43	102 22	50	5.02	1.84	103	11.31	30.41	0.0	1012.5	1012.5	3047.5	4455.0	3300.0
513	4006446550	WITE RIVER TRI NEAR INTERIOR, S. DAK.	130	0.14	476.2	43 45	101 57	54	5.01	1.67	220	0.40	0.40	0.0	212.0	102.0	744.1	666.9	556.0
514	0006640200	PRAIRIE DOG CR TRIB NR NORTON KANS.	13E	1.00	400.2	30 51	00 53	95	7.73	2.43	100	2.42	3.70	0.0	243.0	214.6	712.2	607.3	620.0
515	0006663400	BIG CREEK TRIBUTARY NEAR OGALLAH, KANS.	13E	4.01	2003.0	38 56	104 54	60	4.71	1.70	140	4.40	13.00	0.0	697.1	303.4	5576.6	6622.4	3006.0
516	0006664700	SPRING CREEK NEAR KANOPOLIS, KANS.	13E	6.04	2286.4	38 40	00 10	126	0.10	2.65	200	6.00	14.73	0.0	994.1	994.1	3976.4	4671.1	3000.0
517	0006674500	EAST LIMESTONE CREEK NEAR IONIA, KANS.	13E	25.00	1971.4	30 42	08 20	116	7.00	2.51	300	0.26	26.70	0.0	076.4	652.0	4134.4	4917.0	3920.0
518	0007142100	RATTLESNAKE CREEK TRIB NR MULLINVILLE, KANS.	13E	10.30	8451.6	37 35	99 25	115	7.07	2.51	215	6.00	13.00	0.0	1105.1	651.0	0006.0	10400.1	7000.0
519	0007142500	SPRING CREEK NEAR DILLWYN, KANS.	13E	14.30	3106.1	37 57	00 50	120	0.07	0.54	100	6.42	9.96	0.0	739.3	332.7	4065.5	5944.0	3700.0
520	0007143100	CHEYENNE CREEK TRIB NEAR CLAFLIN, KANS.	13E	1.40	240.0	38 27	98 32	115	0.07	2.54	76	1.45	2.90	0.0	130.2	174.1	373.1	420.4	290.0
521	31ARS 44.1	HASTINGS NEBRASKA WATERSHED W-3	13E	0.75	700.5	40 21	00 24	05	7.72	2.43	02	1.60	3.02	0.0	313.3	253.0	1203.1	1376.6	070.0
522	0007101000	LION CREEK NEAR HALFWAY, COLO.	13F	0.00	0.4	38 40	103 00	05	4.71	1.71	000	1.42	1.42	0.0	3.3	3.0	11.9	13.1	12.0
523	0007101500	SHEEP CREEK NEAR HALFWAY, COLO.	13F	0.73	6.6	38 40	105 00	70	4.54	1.67	000	1.53	1.53	0.0	2.0	2.1	12.0	16.6	13.0
524	0007103000	WEST MONUMENT CREEK NEAR PIKEVIEW, COLO.	13F	10.40	07.5	38 56	104 54	72	4.70	1.70	2300	7.32	46.75	2.00	41.3	20.5	204.5	252.0	400.0
525	0007104500	TEMPLETON GAP FLOODWAY AT COLORADO SPRINGS, COLO.	13F	0.40	930.0	38 53	104 40	73	4.71	1.72	611	6.40	13.70	0.10	372.0	316.2	1000.0	2230.0	1000.0
526	00ARS 46.1	COLORADO SPRINGS ARS WATERSHED NO. W-1	13F	0.017	43.5	38 50	104 49	73	4.70	1.70	65.3	0.241	0.241	0.0	25.9	32.6	53.0	50.3	44.0
527	00ARS 46.2	COLORADO SPRINGS ARS WATERSHED NO. W-2	13F	0.002	44.6	38 50	104 40	73	4.70	1.70	146.0	0.464	0.464	0.0	16.5	4.2	71.4	61.4	44.6
528	00ARS 46.3	COLORADO SPRINGS ARS WATERSHED NO. W-3	13F	0.000	45.6	38 50	104 49	73	4.70	1.76	133.7	0.452	0.070	0.0	17.5	9.3	07.9	101.6	47.1
529	00ARS 46.4	COLORADO SPRINGS ARS WATERSHED NO. W-4	13F	0.000	01.7	38 50	104 49	73	4.70	1.70	101.1	0.431	1.214	0.0	21.5	12.9	159.1	193.5	63.0
530	0007125100	FRIJOLE CREEK NR ALFALFA, COLO.	13G	00.00	9110.0	37 12	104 12	75	4.03	1.00	4100	10.60	07.00	0.0	2703.5	2109.0	17302.4	01007.3	10000.0
531	3507001000	RATON CR AT RATON N. MEX.	13G	14.40	2400.2	36 54	104 26	00	4.07	1.01	160	7.41	20.30	0.0	700.4	469.3	4000.0	5000.9	4140.0
532	3507205000	SIX MILE CREEK NEAR EAGLE NEST, N. MEX.	13G	11.00	103.2	36 31	105 16	53	3.66	1.14	4032	6.73	23.04	0.0	41.3	33.9	186.9	101.7	120.0
533	3507206400	CLEAR CREEK NR UTE PARK, N. MEX.	13G	7.44	100.6	36 32	105 10	70	4.07	1.01	3051	4.00	0.71	0.0	40.2	33.7	303.7	361.6	162.0
534	3507213700	CANADIAN RIVER TRIB NR MILLS, N. MEX.	13G	4.20	1300.4	38 10	104 16	00	4.60	1.62	1100	0.21	32.74	0.0	411.3	156.3	2550.1	3002.5	1200.0
535	3507217000	COYOTE CREEK BELOW BLACK LAKE N. MEX.	13G	40.00	405.5	36 16	105 15	70	4.20	1.43	1672	0.95	53.97	3.13	117.6	70.5	022.5	953.5	013.0
536	3507220000	DOG CREEK NEAR SHOEMAKER, N. MEX.	13G	10.40	3030.5	35 50	104 53	73	4.66	1.02	1160	0.21	32.74	0.0	1599.0	1567.0	7109.1	0470.9	6100.0
537	3507227050	PLAZA LARGA CR TRIB NR RAGLAND, N. MEX.	13G	0.50	552.5	34 50	103 45	00	5.10	2.01	304	1.00	2.66	0.0	276.3	276.3	1044.4	1257.2	1170.0
538	3508370600	PECOS RIVER TRIB. NR DILIA, N. MEX.	13H	0.10	140.4	35 13	105 04	66	4.23	1.45	30	0.25	0.29	0.0	49.0	34.9	254.0	303.0	175.0
539	3508383370	PECOS RIVER TRIB. NR PUERTO DE LUNA, N. MEX.	13H	0.37	705.6	34 53	104 30	70	4.42	1.56	290	0.91	0.91	0.0	236.2	96.0	1759.0	1926.0	1450.0
540	3508385600	BONITA CANYON TRIB. NR CORONA, N. MEX.	13H	0.00	02.1	34 14	105 37	40	4.10	1.30	150	2.36	4.05	0.0	41.1	23.0	109.3	129.5	112.0
541	3508385900	SALT CREEK TRIB. NR ROSEWALL, N. MEX.	13H	0.04	172.0	33 33	104 31	70	4.60	1.62	00	0.25	0.26	0.0	70.6	24.5	226.0	392.0	520.0
542	3508405050	LAST CHANGE CANYON TRIB. NR CARLSBAD CAVERNS, N.	13H	0.20	360.6	32 17	104 36	00	4.56	1.62	110	0.42	0.02	0.0	169.6	142.6	716.6	923.4	003.0
543	3508405100	MOSLEY CANYON NR WHITE CITY, N. MEX.	13H	14.00	7020.7	32 16	104 26	71	4.50	1.62	050	3.60	7.55	0.0	3071.7	2578.2	20749.1	25781.9	16400.0
544	3508436000	SAN SIMON SWALE TRIB. NR JAL, N. MEX.	13H	23.00	306.5	32 09	103 22	00	4.02	1.57	330	0.60	70.40	0.0	77.3	0.2	566.0	702.0	415.0
545	4080123760	BULL CREEK TRIB. NR FORSON, TEX.	13I	0.40	310.1	32 00	101 11	65	7.40	2.34	75	0.53	1.30	0.0	111.0	112.7	535.7	613.0	257.0
546	4080133300	QUARRY CREEK NR STERLING CITY, TEX.	13I	3.20	1310.7	31 51	101 00	100	7.40	2.35	800	2.00	5.00	0.0	400.4	306.3	3125.0	3050.0	2120.0
547	4080134300	NOLKE STATION CREEK NR SAN ANGELO, TEX.	13I	0.50	303.0	31 32	100 34	120	7.04	2.42	125	2.00	4.05	0.0	66.0	43.4	451.4	520.0	300.0
548	4080134400	GRAVEL PITT CREEK NR SAN ANGELO, TEX.	13I	0.10	01.5	31 20	100 31	120	7.07	2.46	65	0.51	0.61	0.0	22.0	10.3	112.1	132.0	62.0
549	4080140500	DRY PRONG DEEP CREEK NEAR MERCURY, TEX.	13I	0.31	1001.0	31 23	00 00	100	0.00	2.71	311	4.05	0.30	0.01	564.0	420.1	3094.0	3520.0	2000.0
550	4080153100	SALT BRANCH AT STONEWALL, TEX.	13I	1.37	277.0	30 14	00 30	210	0.17	2.01	210	1.00	3.20	0.0	92.0	50.0	379.7	420.0	275.0
551	4080195000	EAST ELM CREEK NR SABINAL, TEX.	13I	0.72	0022.2	29 10	00 24	150	0.11	2.00	260	5.00	12.00	0.0	926.5	376.0	10505.2	10093.2	0000.0
552	4080000000	BONE CREEK NR HONDO, TEX.	13I	0.10	306.2	29 33	99 05	105	0.17	2.00	400	0.43	0.04	0.0	141.5	92.0	703.3	792.4	375.0
553	4080084000	GREEN CREEK SUBWTRSHED NO 1 NR DUBLIN TEX.	13K	3.10	0140.9	32 10	00 21	210	0.03	2.75	110	2.92	0.05	0.0	1701.7	712.7	11501.0	13097.3	0910.0
554	4080100100	EDISON CREEK NR HAMILTON, TEX.	13K	2.01	005.9	31 46	00 07	225	0.00	2.70	400	1.72	3.50	0.0	373.3	200.0	1260.2	1460.0	900.0
555	4080100400	BERMUDA BRANCH NR GATESVILLE, TEX.	13K	0.00	013.7	31 33	97 40	240	0.20	2.00	150	0.70	1.20	0.0	00.0	53.0	260.4	290.3	213.0
556	4080100000	HOFFMAN BRANCH NR HAMILTON, TEX.	13K	5.50	2001.4	31 35	00 12	220	0.00	2.70	300	4.00	10.30	0.0	093.0	346.9	3434.3	4093.4	2050.0
557	4080130000	DEEP CREEK SWS NO. 3 NEAR PLACID, TEX.	13K	3.40	1790.0	31 17	00 00	175	0.00	2.73	210	2.50	2.03	0.0	779.0	300.0	5936.0	6225.0	7422.0
558	4080130500	DEEP CREEK NEAR MERCURY, TEX.	13K	43.00	0379.5	31 24	00 07	100	0.04	2.71	474	12.00	20.50	0.0	3700.0	2437.0	10020.0	23020.0	33600.0

Table 10. Continued.

1			2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SEQ	STATION	STATION NAME	SECT	AREA	Q10	LAT	LONG	R	P10	P60	DH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
		Zone 13																	
559	4808140000	DEEP CR SUBWTRSHD NO 8 NR MERCURY, TEX.	13K	4.30	3071.0	31 10	99 00	165	8.84	2.71	200	8.00	10.50	0.01	992.1	496.0	6036.0	10020.2	5660.0
560	2906920000	COYLE BRANCH AT HOUSTON, MO.	14A	1.10	483.7	37 19	91 57	240	7.76	2.45	100	1.52	2.26	0.0	254.6	259.9	1018.4	1206.8	1030.0
561	2907011500	LITTLE BERGER CR TRIB NR HERMANN, MO.	14A	0.60	705.0	37 55	91 44	200	7.57	2.39	94	1.13	1.13	0.0	375.0	333.8	1288.2	1522.5	1900.0
562	2907012000	BEHMKE BRANCH NEAR ROLLA, MO.	14A	1.05	967.0	37 55	91 48	200	7.67	2.39	100	2.21	8.94	0.3	456.1	405.9	1532.5	1824.4	1190.0
563	2907015000	BOURBEUSE RIVER NEAR ST.JAMES, MO.	14A	21.30	8072.7	38 00	91 40	200	7.58	2.38	191	6.05	44.95	0.6	3353.1	3420.2	9388.7	10729.9	8250.0
564	2907015700	LANES FORK NR VACHY, MO.	14A	24.10	7300.0	38 00	91 43	200	7.56	2.38	253	9.65	53.84	0.0	3374.8	3678.5	11474.3	13338.5	9400.0
565	2907185500	STAHL CREEK NEAR MILLER, MO.	14A	3.00	1428.2	37 12	93 51	210	8.36	2.62	100	2.64	5.20	0.0	759.7	873.7	1960.0	2225.9	1460.0
566	0507047975	DOG BRANCH AT ST. PAUL, ARK.	14B	1.20	881.0	35 50	93 46	245	8.48	2.66	800	1.50	3.65	0.0	286.3	314.9	1517.4	1589.6	956.0
567	0507047990	WEST FORK WHITE RIVER TRIB. NR GREEN WOOD, ARK.	14B	0.78	1070.0	35 55	94 10	240	8.01	2.67	500	1.00	2.00	0.0	311.3	180.0	2000.0	2375.0	1360.0
568	0507048900	WHITENER BRANCH TRIB. NR SPRING VALLEY, ARK.	14B	1.00	760.0	36 10	93 55	235	8.47	2.60	150	1.60	3.23	0.0	276.6	139.3	1610.0	1960.0	1530.0
569	0507048940	WAR EAGLE CREEK NR WITTER ARK.	14B	22.00	9732.4	35 54	93 42	245	8.47	2.56	600	3.00	10.30	0.0	4195.0	4237.0	15689.3	17828.8	12300.0
570	0507050200	MAXWELL CREEK AT KINGSTON, ARK.	14B	2.00	3704.0	36 03	93 31	246	8.42	2.64	650	2.00	4.05	0.0	1139.7	911.8	6610.3	8205.8	4270.0
571	0507050400	OSAGE CREEK TRIB. AT BERRYVILLE ARK.	14B	1.00	378.3	36 22	93 34	225	8.39	2.63	500	1.00	2.00	0.0	194.0	174.6	545.1	611.1	406.0
572	0507249500	COVE CREEK NEAR LEE CREEK ARK.	14B	35.3	18052.7	35 43	94 24	250	8.58	2.59	600	13.00	29.37	0.0	7012.3	4768.4	37866.4	46000.7	33620.0
573	0507252200	N. FORK WHITE OAK CREEK TRIB. NR WATAULA, ARK.	15A	0.27	500.9	35 36	93 51	250	8.52	2.67	100	0.50	0.90	0.0	209.6	167.7	892.9	1060.0	729.3
574	0507252500	SIX MILE CREEK SUBWATERSHED NO. 8 NR CHISMVILLE,	15A	3.91	1780.0	35 12	93 53	265	8.58	2.70	100	4.50	6.58	0.0	983.4	1071.9	2271.6	2517.5	1930.0
575	0507253000	SIX MILE CREEK AT CHISMVILLE, ARK.	15A	24.10	2078.1	35 13	93 56	265	8.57	2.70	273	9.30	29.56	0.0	1331.4	1571.0	3568.2	3967.6	2610.0
576	0507253500	SIX MILE CREEK NEAR BRANCH, ARK.	15A	36.70	4520.6	35 15	93 56	260	8.50	2.70	150	12.00	45.50	0.0	2515.9	3844.2	6038.2	6692.3	4540.0
577	0507254000	SIX MILE CR SUBWATERSHED NO.5 NR CHISMVILLE	15A	2.76	898.9	35 14	93 55	260	8.57	2.70	235	3.87	3.87	0.0	445.0	458.4	1312.6	1346.4	1070.0
578	0507254500	SIX MILE CR SUBWATERSHED NO.2 NR CAULKSVILLE	15A	5.01	1820.2	35 10	93 50	265	8.56	2.69	257	5.08	11.10	0.0	901.1	901.1	2739.3	3559.4	2470.0
579	0507255100	SIX MILE CR SUBWATERSHED NO.23 NR BRANCH, ARK.	15A	4.49	2100.6	35 21	93 59	255	8.57	2.70	50	2.88	15.94	0.0	987.3	889.9	3494.9	3876.9	2523.0
580	0507255500	HURRICANE CREEK NEAR BRANCH, ARK.	15A	17.20	2360.2	35 21	93 56	260	8.56	2.69	400	9.00	60.11	0.0	940.5	795.1	4316.0	5414.2	2840.0
581	0507356500	SOUTH FORK OUACHITA R AT MOUNT IDA, ARK.	15B	64.00	18309.3	34 34	93 36	300	8.64	2.73	585	15.00	42.00	0.0	8322.4	6241.8	21555.0	22720.2	20000.0
582	4007333330	CHICKASAW CREEK TRIB. NR STRINGTOWN, OKLA.	15B	3.19	8066.5	34 30	95 57	290	9.06	2.85	400	2.00	4.10	0.0	1676.6	1726.5	8144.4	9383.0	4930.0
583	4007333500	CHICKASAW CREEK NEAR STRINGTOWN, OKLA.	15B	32.70	14633.7	34 28	96 02	295	9.10	2.86	460	9.40	32.30	0.0	6380.6	9386.3	25058.0	29248.3	18800.0
584	4007333800	MCGEE CREEK NEAR STRINGTOWN, OKLA.	15B	80.60	9467.3	34 28	95 52	290	9.08	2.85	477	19.20	87.80	0.8	6667.1	7267.1	11867.4	12800.8	10280.0
585	4007335700	KIAMICHI RIVER TRIB. NR ALBION, OKLA.	15B	1.50	1133.4	34 37	95 02	285	8.91	2.68	650	2.00	4.10	0.0	365.6	237.6	1462.4	1606.6	1070.0
586	4007337220	BIG BRANCH NR RINGOLD, OKLA.	15B	1.90	1307.0	34 10	95 05	300	8.99	2.82	220	1.00	3.20	0.0	544.6	490.1	2287.3	2723.0	1460.0
587	4007338700	MOUNTAIN FORK TRIB. NR SMITHVILLE, OKLA.	15B	0.98	529.0	34 30	94 40	200	8.85	2.78	300	2.00	4.10	0.0	220.4	233.6	793.4	908.1	500.0
		Zone 14																	
588	2906931000	BEAVER CREEK NEAR ROLLA, MO.	13A	14.00	3692.0	37 51	91 46	205	7.59	2.39	310	6.90	46.16	0.1	2147.0	2254.4	5754.0	6546.4	5000.0
589	2906931500	LITTLE BEAVER CREEK NEAR ROLLA, MO.	13A	6.41	5959.0	37 57	91 49	200	7.69	2.41	122	2.50	13.57	0.3	1976.3	3930.0	7376.0	7870.0	7420.0
590	3006155100	BLACK COULEE NEAR MALTA, MONT.	13A	6.64	236.2	48 13	107 48	29	3.55	1.14	362	2.48	10.70	0.0	129.8	171.3	283.0	298.5	240.0
591	3006102200	MARIAS RIVER TRIBUTARY AT LOMA, MONT.	13A	1.62	170.2	47 57	110 30	28	3.28	1.63	460	2.57	4.37	0.0	53.2	29.3	346.5	412.3	300.0
592	3006102300	MARIAS R TRIBUTARY NO. 2 AT LOMA, MONT.	13A	0.25	39.7	47 44	112 15	25	3.15	1.00	239	1.24	1.24	0.0	9.9	5.9	50.1	66.3	42.0
593	3006136000	SPRING COULEE NEAR HAVRE, MONT.	13A	17.00	325.4	48 25	109 52	21	3.42	1.09	1145	8.00	30.90	0.0	122.8	62.6	583.5	577.2	345.0
594	3006342100	SQUARE BUTTE C TRI NO. 2 NR CENTER, N. DAK.	13A	13.00	1214.7	47 07	101 15	43	5.42	1.73	400	4.00	6.437	0.0	404.9	222.7	2631.6	3320.2	2500.0
595	3006467600	JAMES RIVER TRI NO. 3 NEAR MANFRED, N. DAK.	13A	21.30	181.5	47 39	99 46	65	5.40	1.73	39	5.26	16.92	0.0	35.6	16.2	213.6	267.0	150.0
596	4006441650	MUSH CREEK NEAR PIERRE, S. DAK.	13A	14.66	4818.4	44 28	100 18	56	6.23	1.95	360	5.94	10.61	0.0	1382.9	1521.2	8297.4	9956.9	5800.0
597	4006473800	MATTER CREEK TRI NEAR ORIENT, S. DAK.	13A	5.41	337.8	44 46	99 04	61	6.36	1.97	66	3.92	4.11	0.0	95.9	28.6	700.1	834.3	410.0
598	2806644800	SOUTH FORK SAPPA CREEK TRIB NR GOODLAND, KANS.	13D	4.90	2800.0	39 15	101 58	180	6.98	2.18	120	3.80	8.75	7.0	410.5	100.8	4790.0	5850.0	2600.0
599	2806646200	BEAVER CREEK TRIBUTARY NR LUDELL, KANS.	13D	18.20	849.4	39 15	100 56	125	7.30	2.36	130	4.82	7.41	0.0	537.6	494.6	930.0	978.4	850.0
600	2806647500	PRAIRIE DOG CREEK TRIBUTARY AT COLBY KANS.	13D	7.53	841.3	39 23	101 03	127	7.31	2.30	65	4.73	15.32	0.0	200.4	160.3	1142.3	1392.8	682.0
601	3106768100	EAST BUFFALO CREEK NEAR BUFFALO, NEBR.	13D	5.21	132.5	41 01	99 56	98	7.08	2.48	195	6.29	16.36	0.0	57.6	57.6	253.4	296.0	208.0
602	3106766400	WEST BUFFALO CREEK NEAR BUFFALO, NEBR.	13D	17.10	354.0	40 59	99 52	93	7.85	2.40	252	10.37	18.73	0.0	94.4	56.6	613.6	726.9	479.0
603	3106769100	ELM CREEK TRIBUTARY NEAR OVERTON, NEBR.	13D	0.66	138.1	40 53	99 43	98	7.60	2.41	30	0.94	0.94	0.0	75.9	75.9	207.2	236.0	148.0
604	3106769200	ELM CREEK NEAR SUMNER, NEBR.	13D	14.90	424.0	40 52	99 37	85	7.71	2.24	160	9.64	21.76	0.0	169.9	88.4	917.5	1146.8	1660.0
605	3106769300	ELM CREEK TRIBUTARY NO. 2 NEAR OVERTON, NEBR.	13D	6.60	426.1	40 56	99 32	98	7.71	2.24	62	4.10	12.02	0.0	193.7	193.7	755.4	891.0	679.0
606	3106779000	WOOD RIVER TRIBUTARY NEAR LODI, NEBR.	13D	2.82	91.6	41 12	99 56	85	7.64	2.39	102	3.13	4.90	0.0	44.9	24.7	193.1	233.5	163.0
607	3106770700	WOOD RIVER NEAR LODI, NEBR	13D	12.90	142.0	41 10	99 46	85	7.66	2.40	225	10.24	26.13	0.0	50.1	16.5	315.6	383.3	189.0
608	3106777600	LILLIAN CR TRIBUTARY NR BROKEN BOW, NEBR.	13D	2.92	11.7	41 31	99 39	85	7.66	2.36	145	2.24	8.53	0.0	5.4	4.8	22.2	26.8	16.0
609	3106777700	LILLIAN CREEK NEAR BROKEN BOW, NEBR.	13D	4.77	616.4	41 31	99 39	85	7.65	2.36	156	3.72	12.28	0.0	261.5	211.1	1546.2	1601.6	930.0

Table 10. Continued.

Zone 14

1			2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SEQ	STATION	STATION NAME	SECT	AREA	S10	LAT	LONG	R	P10	P60	DH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
610	3106777600	LILLIAN CREEK TRIBUTARY NEAR WALWORTH, NEBR.	130	0.04	306.2	41 37	99 34	86	7.80	2.38	206	3.03	6.22	0.0	122.3	30.6	941.7	1180.2	585.0
611	3106782000	S BR MUD CR TRIB NR BROKEN BOW, NEBR.	130	0.43	231.0	41 20	99 43	86	7.04	2.37	87	1.24	1.24	0.0	87.2	40.3	497.3	598.1	218.0
612	3106782900	MUD CR TRIBUTARY NR BROKEN BOW, NEBR.	130	9.00	1179.0	41 22	99 36	86	7.00	2.40	218	6.07	19.11	0.0	287.7	143.8	2157.0	2589.3	1503.0
613	3106769200	DAVIS CR TRIB NO. 2 NR NORTH LOUP, NEBR.	130	6.70	886.7	41 26	98 54	88	7.74	2.43	175	6.65	14.00	0.0	379.1	379.1	1421.8	1611.2	2360.0
614	3106790600	E BR SPRING, CR TRIB NR WOLBACH, NEBR.	130	1.92	828.0	41 27	98 20	95	7.78	2.44	118	2.45	5.19	0.0	238.0	115.0	1817.0	2231.0	1340.0
615	3106790700	WEST BRANCH SPRING CREEK AT BRAYTON, NEBR.	130	10.50	3840.2	41 27	98 26	95	7.78	2.44	240	12.80	54.93	0.0	1576.1	1576.1	11832.7	13239.2	12800.0
616	3106839600	FRAZIER CREEK NEAR MAYWOOD, NEBR.	130	11.30	8809.5	40 38	100 38	100	7.35	2.30	232	5.01	25.84	0.0	1885.0	560.0	16593.3	21118.7	11200.0
617	3106839950	CUT CANYON NEAR CURTIS, NEBR.	130	28.60	947.0	40 44	100 32	100	7.34	2.31	488	15.72	57.65	0.0	464.2	346.1	1810.4	2088.9	1562.0
618	3106840500	DRY CREEK NEAR CURTIS, NEBR.	130	81.70	3937.2	40 38	100 25	100	7.48	2.33	400	11.64	42.60	0.0	2540.1	1295.4	12319.5	14986.6	25900.0

Zone 15

SEQ	STATION	STATION NAME	SECT	AREA	S10	LAT	LONG	R	P10	P60	DH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
619	0606615000	NORTH FORK MICHIGAN RIVER NEAR GOULD, COLO.	16	25.20	276.0	40 33	106 01	17	2.07	0.98	1730	7.39	40.60	0.0	192.1	215.2	332.3	359.2	290.0
620	0606722500	SOUTH ST. VRAIN CREEK NEAR WARD, COLO.	16	14.40	373.2	40 05	105 31	38	3.83	1.24	2580	7.98	18.51	3.0	243.9	243.9	519.5	582.9	462.0
621	0606732000	GLACIER CREEK NEAR ESTES PARK, COLO.	16	24.40	342.4	39 45	106 06	28	3.92	1.05	3040	9.50	39.71	2.0	244.0	251.9	393.8	415.8	352.0
622	0607003000	HALFMOON CREEK NEAR MALTA, COLO.	16	23.60	384.8	39 10	106 23	28	3.01	0.95	2900	9.47	48.22	0.0	272.8	311.0	477.4	512.9	450.0
623	0607020500	SACKETT CREEK NEAR PIKES PEAK, COLO.	16	0.00	8.1	38 56	104 58	78	4.79	1.76	400	1.17	1.17	0.0	3.1	3.0	10.0	11.7	7.0
624	0607120500	SOUTH CASCADE CREEK AT CASCADE COLO.	16	3.41	23.0	38 58	104 58	78	4.79	1.76	2490	4.05	6.63	0.0	10.7	18.4	38.9	42.4	28.0
625	0609033000	MEADOW CREEK NEAR TABERNASH, COLO.	16	8.93	273.2	40 03	105 47	36	3.60	0.98	1230	5.63	8.15	0.0	192.4	192.4	361.7	392.5	316.0
626	0609053000	SLATE CREEK NEAR DILLION, COLO.	16	16.50	274.4	39 47	106 10	26	3.01	0.95	3975	9.42	17.50	0.0	182.6	195.0	351.0	382.1	288.0
627	0609056500	PINEY R BLW PINEY LAKE, NEAR MINTURN, COLO.	16	13.00	259.0	39 43	106 28	26	3.29	1.05	2570	6.27	14.98	0.0	257.1	262.2	455.1	496.2	396.0
628	0609065500	GORE CR AT UPPER STA NR MINTURN COLO.	16	14.40	512.0	39 38	106 16	26	3.29	1.05	3695	5.60	16.45	0.0	326.2	328.2	689.2	750.0	558.0
629	0609066000	BLACK GORE CREEK NEAR MINTURN, COLO.	16	11.60	366.0	39 38	106 16	26	3.29	1.05	1265	5.00	13.13	0.0	210.4	225.0	378.0	406.0	365.0
630	3508253000	CASIAS CREEK NR COSTILLA, N. MEX.	16	10.00	123.0	36 54	105 16	60	4.47	1.07	2840	7.82	36.81	0.0	78.4	73.9	167.0	186.0	181.0
631	3508253500	SANTISTEVAN CREEK NR COSTILLA, N. MEX.	16	2.16	15.9	36 53	105 17	60	4.47	1.57	2370	2.77	4.57	0.0	9.3	10.0	22.2	23.1	18.0
632	3508263000	LATIR CREEK NEAR CERRO, N. MEX.	16	16.00	180.4	36 50	105 33	31	3.54	1.14	3560	6.62	19.53	0.0	55.4	58.5	149.0	166.8	126.0
633	3508264000	RED RIVER NEAR RED RIVER, N. MEX.	16	19.20	210.0	36 37	105 23	53	4.00	1.33	2877	6.33	28.58	0.0	120.0	120.0	290.4	322.8	264.0
634	3508382500	TESUQUE CR AB DIVERSIONS NR SANTA FE N. MEX.	16	11.70	318.1	35 50	105 05	38	3.08	1.14	4400	8.57	24.43	0.0	157.0	117.8	785.0	918.4	532.0
635	5606754500	MIDDLE CROW CREEK NEAR HECLA, WYO.	16	25.00	198.2	41 16	106 15	38	3.08	1.27	1895	9.01	13.40	0.0	81.9	65.5	368.8	442.3	495.0
636	5606755000	SOUTH CROW CREEK NEAR HECLA, WYO.	16	13.90	68.4	41 07	105 11	38	3.08	1.27	770	13.26	26.33	0.0	26.3	19.7	143.1	173.6	110.0
637	5606255200	DEAD MAN GULCH NEAR MONETA, WYO.	17	4.46	1247.1	43 11	107 47	25	2.33	0.76	510	3.94	9.22	0.0	488.5	325.5	2088.2	2475.9	1330.0
638	5606276300	SHELL CR AB SHELL CR RESERVOIR, WYO.	17	23.10	1392.6	44 30	107 24	22	3.67	1.19	2200	0.10	20.14	0.0	826.9	779.2	2382.4	2768.5	1870.0
639	5606296500	N FK TONGUE RIVER NEAR DAYTON, WYO.	17	32.40	584.2	44 45	107 37	20	4.20	1.43	1899	9.28	48.73	0.0	283.6	268.9	898.2	1032.3	568.0
640	5606298500	LITTLE TONGUE RIVER NEAR DAYTON, WYO.	17	26.10	356.0	44 49	107 17	22	3.68	1.27	4201	6.02	17.20	0.0	189.9	135.9	611.6	717.0	850.0
641	5606299500	WOLF CREEK AT WOLF, WYO.	17	37.00	789.2	44 40	107 14	22	3.00	1.29	5570	7.91	14.31	0.0	375.8	319.4	1514.5	1841.4	1130.0
642	5609214000	LITTLE SANDY CREEK NEAR ELKHORN, WYO.	17	20.90	291.2	42 32	109 12	20	2.85	0.90	5110	46.32	27.19	10.0	289.5	289.5	393.9	435.8	425.0
643	5609226500	MIDDLE FORK BEAVER CR NR LONETREE, WYO.	17	20.00	498.4	41 00	110 11	17	2.72	0.88	2800	7.90	17.30	0.0	354.0	364.0	873.7	734.0	775.0
644	5609258000	WILLOW CREEK NEAR DIXON, WYO.	17	10.30	246.2	41 00	107 31	23	2.66	0.98	3500	11.64	14.75	1.0	144.3	151.5	334.0	372.3	267.0
645	1610069000	GEORGE TOWN CREEK NEAR GEORGE TOWN, IDAHO	18	22.20	137.40	42 30	111 19	16	3.01	0.95	2800	9.14	3.01	0.0	87.0	55.5	221.6	257.3	162.0
646	4910141500	HOLMES CREEK NEAR KAYSVILLE, UTAH	18	2.49	33.9	41 03	111 53	28	4.00	1.33	3360	2.98	6.25	0.0	19.7	21.7	42.9	44.9	36.0
647	4910165500	DRY CREEK NEAR ALPINE, UTAH	18	9.02	317.0	40 29	111 46	26	3.05	1.14	4720	4.07	23.00	0.0	217.1	191.0	518.9	586.2	597.0
648	4910170000	MILL CREEK NEAR SALT LAKE CITY, UTAH	18	21.70	113.4	40 41	111 47	26	3.70	1.24	4020	11.30	49.58	0.0	94.8	68.5	165.4	189.0	1433.0
649	5606311000	N FK POWDER RIVER NEAR HAZELTON, WYO.	18	24.00	537.4	44 02	107 05	26	3.88	1.14	1300	13.40	50.00	0.0	346.7	385.3	849.4	1345.2	886.0
650	5609208000	LA BARGE C N LA BARGE MEADOWS RNGR STA WYO.	18	6.30	180.1	42 38	110 40	28	11.42	3.42	1800	17.30	11.42	0.0	136.3	136.3	269.9	218.1	198.0
651	0613025000	SWIFT CREEK NEAR AFTON, WYO.	18	27.40	739.0	42 44	110 54	16	2.60	0.65	3000	0.32	23.13	0.0	517.2	537.0	861.8	938.0	775.0
652	1612320500	LONG CANYON CREEK NEAR PORTHILL, IDAHO	19	28.00	800.0	48 57	116 32	28	1.92	0.78	3400	12.00	28.01	0.0	636.4	682.9	1448.9	1837.3	1300.0
653	1613252500	EAST FORK WEISER RIVER, IDAHO	19	2.00	78.7	44 46	116 31	28	3.01	0.95	900	2.35	2.35	0.0	56.2	58.2	102.3	112.4	77.0
654	1613315500	MUD CREEK NEAR TAMARACK, IDAHO	19	10.10	408.5	45 00	116 21	26	3.20	1.05	2800	10.70	33.70	0.0	291.8	284.3	2130.1	2720.3	2240.0
655	3805014000	GRINNELL CREEK NEAR MANY GLACIER, MONT.	19	3.47	313.2	48 46	113 42	31	3.65	1.10	800	5.19	31.06	0.0	186.7	175.8	530.2	617.0	536.0
656	3805014500	SWIFTCURRENT CREEK AT MANY GLACIER, MONT.	19	31.40	1487.0	48 48	113 39	31	3.70	1.20	1727	6.00	41.20	0.0	1114.6	1047.7	1858.2	2151.2	6700.0
657	3806026000	BIRCH CREEK NEAR GLEN, MONT.	19	30.00	328.4	45 23	112 48	12	2.51	0.88	3140	11.00	72.59	0.1	289.2	228.6	435.1	485.3	362.0
658	3806036500	BOULDER R AB ROCK CREEK NR BASIN, MONT.	19	10.40	539.6	46 15	112 38	12	2.00	0.85	1020	5.52	47.24	0.0	891.0	136.7	912.5	1085.4	582.0
659	3806076000	NEWLAND CR NR WHITE SULPHUR SPRINGS, MONT.	19	6.74	77.0	46 44	110 50	26	3.01	0.95	1720	4.57	3.01	0.0	29.6	14.8	164.3	198.3	241.0

Table 10. Continued.

Zone 16

1			2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SEQ	STATION	STATION NAME	SECT	AREA	Q10	LAT	LONG	R	P10	P68	OH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
660	5313343000	SMITH GULCH TRI NEAR PATAHA WASH.	20A	1.05	320.0	46 20	117 27	05	0.00	0.00	240	1.01	4.41	0.0	112.7	70.0	710.0	870.1	050.0
661	5313340400	MISSOURI FLAT CREEK TRI NR PULLMAN WASH.	20A	0.00	152.0	46 40	117 10	55	2.03	0.04	150	1.53	2.43	0.0	55.0	30.0	305.0	350.3	234.0
662	5313340500	MISSOURI FLAT CREEK AT PULLMAN, WASH.	20A	27.10	1170.2	46 44	117 11	10	2.01	0.03	1372	14.14	72.40	0.0	567.0	436.0	1075.0	2164.0	1500.0
663	5313349300	PALOUSE RIVER TRI AT COLFAX WASH.	20A	2.10	121.4	46 53	117 23	10	2.00	0.01	400	2.05	4.00	0.0	46.0	46.0	244.7	295.3	163.0
664	5313340350	HARDMAN DRAW TRI AT PLAZA WASH.	20A	1.04	107.5	47 19	117 14	50	2.00	0.03	200	2.00	2.00	0.0	134.0	46.0	1074.5	1033.5	1700.0
665	5313352200	COW CREEK TRI NEAR RITZVILLE WASH.	20A	1.51	110.3	47 11	118 12	20	1.00	0.60	150	2.24	3.04	0.0	42.6	29.0	245.0	289.7	290.0
666	5314013500	BLUE CREEK NR WALLA WALLA, WASH.	20A	17.00	710.2	46 03	118 00	45	3.05	1.04	2460	0.00	34.03	0.0	300.0	300.0	1104.0	1250.0	1320.0
667	4113320400	LITTLE CR AT HIGH VALLEY NR UNION, OREG.	20B	15.00	207.3	45 13	117 47	30	2.00	0.05	3300	0.00	20.02	0.0	135.0	135.0	309.2	445.5	330.0
668	4113321300	LADD CANYON NR HOT LAKE, OREG.	20B	15.50	177.5	45 12	118 01	9	0.10	0.73	1372	7.60	27.55	0.0	103.0	114.2	234.6	259.5	102.0
669	4113323000	INDIAN CREEK IMBLER, OREG.	20B	22.00	700.0	45 20	117 49	20	3.05	0.05	3270	0.40	30.00	0.0	553.5	447.0	1110.0	1250.0	010.0
670	4113325000	EAST FORK WALLOWA RIVER NR JOSEPH, OREG.	20B	10.30	000.0	44 40	117 12	10	3.70	1.33	3300	0.00	7.31	0.0	115.6	115.6	306.0	384.9	450.0
671	4113320500	HURRICANE CREEK NEAR JOSEPH, OREG.	20B	00.00	000.9	45 20	117 10	21	2.60	0.05	6900	10.60	40.70	0.0	564.2	564.2	1156.6	1292.0	1110.0
672	4114037500	STRAWBERRY CR AB SLIDE CR NR PRAIRIE CTY, OREG.	20B	7.00	153.2	45 21	118 20	23	3.45	1.05	2110	4.01	7.01	0.0	93.4	93.4	168.7	204.6	172.0
673	5313335200	CRITCHFIELD DRAW NEAR CLARKSTON WASH.	20B	1.00	440.2	46 27	117 05	150	2.60	0.04	743	2.20	2.25	0.0	07.4	39.0	1110.4	1363.6	705.0
674	5312097700	CYCLONE CREEK NEAR ENUMCLAW, WASH.	23A	2.35	1022.0	47 10	121 47	140	4.30	1.52	1590	1.92	1.92	0.0	017.0	392.4	0404.2	11055.2	15000.0
675	5312103500	SNOW CREEK NEAR LESTER, WASH.	23A	11.50	1709.0	47 15	121 21	70	4.50	1.62	2520	4.57	24.73	0.0	1055.5	1055.5	3019.3	3770.7	3400.0
676	5312104000	FRIDAY CREEK NEAR LESTER, WASH.	23A	4.07	513.4	47 13	121 27	70	4.50	1.62	2100	3.43	0.21	0.0	327.0	261.0	092.7	1023.5	1370.0
677	5312114000	SOUTH FORK CEDAR RIVER NEAR LESTER, WASH.	23A	0.00	001.5	47 19	121 31	70	4.07	1.61	1840	3.00	10.40	0.0	371.5	502.0	2194.0	2051.0	2340.0
678	5312115500	REX RIVER NEAR CEDAR FALLS, WASH.	23A	13.40	3040.0	47 21	121 40	00	4.07	1.61	2100	5.70	14.15	0.0	1000.0	1046.4	4452.0	5000.4	4200.0
679	5312110100	CANYON CREEK NEAR CEDAR FALLS, WASH.	23A	0.10	03.0	47 25	121 40	150	4.00	1.02	72	0.10	0.10	0.0	55.5	61.5	121.0	132.1	102.0
680	5312143700	BOXLEY CREEK NR CEDAR FALLS WASH.	23A	1.07	171.0	47 00	121 45	70	4.00	1.02	120	0.43	0.43	0.0	97.1	107.0	210.5	240.0	192.0

Zone 17

SEQ	STATION	STATION NAME	SECT	AREA	Q10	LAT	LONG	R	P10	P68	OH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
681	1013150500	BENNETT CREEK NEAR BENNETT, IDAHO	20C	21.30	020.3	43 14	115 32	12	2.70	0.07	1000	0.00	17.50	0.0	00.7	00.7	368.4	434.6	204.0
682	1013170100	SUGAR CREEK TRIB, NR GRASMERE, IDAHO	20C	4.50	07.0	42 34	115 04	13	2.41	0.70	242	1.00	1.00	0.0	30.0	23.0	141.7	101.0	105.0
683	1013172000	LITTLE SQUAW CR TRIB NR MARSING IDA.	20C	1.01	07.0	43 22	116 50	13	2.51	0.01	071	3.05	3.05	0.0	24.5	9.0	153.1	107.4	93.0
684	1013105500	COTTONWOOD CREEK AT ARROWROCK RESERVOIR, IDAHO	20C	21.40	002.2	43 50	115 40	30	3.07	1.10	4350	0.00	15.00	0.0	112.0	100.5	448.3	500.0	339.0
685	1013180500	BANNOCK CREEK NEAR IDAHO CITY, IDAHO	20C	5.70	30.3	43 40	115 40	30	3.30	1.00	0010	2.00	5.03	0.0	16.0	14.0	40.4	53.0	46.0
686	1013200000	ROBIE CREEK NEAR ARROW ROCK, IDAHO	20C	10.02	100.0	43 30	116 00	10	3.01	0.95	2700	7.40	21.70	0.0	70.0	74.1	301.0	356.5	274.0
687	1013207000	SPRING VALLEY CREEK NEAR EAGLE, IDAHO	20C	20.00	221.4	43 44	116 10	10	3.01	0.05	2005	10.70	31.00	0.0	02.0	00.7	352.0	410.0	244.0
688	3210243240	BAKER C AT NARROWS, NR BAKER NEV.	20C	10.40	105.2	40 00	115 20	10	2.00	0.05	3400	5.00	15.57	0.0	94.4	00.0	336.1	409.3	400.0
689	3213175000	REED CR NR OWYHEE NEVADA	20C	6.50	00.3	41 54	116 04	10	2.00	0.70	1000	0.00	7.00	0.0	30.0	33.0	96.0	106.5	60.0
690	1013043000	BUFFALO RIVER NR ISLAND PARK, IDAHO	20D	30.70	020.0	44 25	111 03	14	3.01	0.05	000	10.00	41.00	0.0	407.7	416.2	013.0	992.7	630.0
691	1013047000	BIRCH CREEK NEAR DOWNEY, IDAHO	20D	2.40	101.0	44 03	111 01	14	0.00	0.05	170	2.50	3.50	0.0	145.3	150.9	220.0	240.5	104.0
692	1013063500	NORTH FORK SQUIRREL CREEK NEAR SQUIRREL, IDAHO	20D	30.00	200.0	42 55	111 32	10	2.00	0.05	1021	0.40	37.15	0.01	154.4	154.4	300.4	440.2	202.0
693	1013074000	LITTLE SACKFOOT RIVER AT HENRY, IDAHO	20D	0.50	50.2	40 21	112 10	30	3.01	0.00	1250	4.75	10.70	0.0	20.1	25.0	00.0	132.1	05.0
694	1013075700	SOUTH FORK POCATELLO CREEK NEAR POCATELLO, IDAHO	20D	4.30	7.0	42 53	112 03	10	0.07	0.00	1060	3.71	5.10	0.0	3.6	2.7	13.0	15.2	0.0
695	1013083000	TRAPPER CREEK NEAR OAKLEY, IDAHO	20D	53.70	112.0	42 10	113 50	15	2.02	0.03	4020	17.01	245.33	0.0	70.7	40.0	227.5	275.0	270.0
696	1013002000	ROCK CREEK NEAR ROCK CREEK, IDAHO	20D	00.00	433.0	40 21	114 10	10	2.00	0.04	3030	17.01	245.33	5.0	242.3	242.3	553.0	000.0	461.0
697	4110300000	SILVER CREEK NEAR SILVER LAKE, OREG.	20E	180.0	033.4	43 07	121 04	5	2.33	0.70	2014	20.00	202.00	1.01	203.0	205.0	1240.3	1477.0	1050.0
698	4110302000	CROWSFOOT CREEK NEAR BURNS, OREG.	20E	0.50	00.0	43 54	118 30	10	0.00	0.05	000	4.70	0.00	0.0	40.1	47.0	120.0	141.4	74.0
699	4110303000	DEVINE CANYON NEAR BURNS, OREG.	20E	4.00	00.0	43 40	118 00	0	2.00	0.05	350	3.00	3.20	0.0	12.7	12.7	40.0	46.7	31.0
700	4110305200	SAGE HEN CREEK NR BURNS, OREGON	20E	10.47	47.5	43 32	119 15	5	0.13	0.71	1205	10.00	27.30	0.00	21.0	15.1	170.6	203.0	02.0
701	4110300000	DONNER UND BLITZEN NEAR FRENCHGLEN, OREG.	20E	200.0	2075.0	42 47	118 52	11	1.00	0.00	3340	20.00	100.02	0.0	1403.0	1400.3	3227.4	3460.0	2030.0
702	4110307000	BRIDGE CREEK NEAR FRENCHGLEN, OREG.	20E	30.00	231.3	42 50	118 51	0	1.02	0.00	3100	14.20	40.01	0.0	113.4	117.0	301.5	410.5	301.0
703	4110400000	MCCOY CREEK NR DIAMOND, OREGON	20E	46.02	370.0	42 50	118 43	10	1.00	0.50	4040	25.30	71.03	0.0	219.4	206.2	530.7	007.7	305.0
704	4110403000	SILVER NR RILEY, OREGON	20E	220.2	1374.1	43 41	119 30	11	0.03	0.74	1070	25.20	300.00	0.0	700.3	700.3	2011.0	2200.7	1010.0
705	4900310000	GOOSEBERRY CREEK NEAR SCOFIELD, UTAH	21A	10.40	301.0	39 43	111 10	27	3.00	1.14	1100	7.20	21.10	1.0	032.0	267.5	436.2	460.3	414.0
706	4900336000	EAST FORK BOULDER CR NEAR BOULDER, UTAH	21A	21.40	303.0	38 03	111 27	20	4.00	1.30	1020	0.04	30.03	2.0	217.6	220.5	572.3	052.0	403.0
707	4910105000	ANTIMONY CREEK ANTIMONY, UTAH	21A	57.00	500.2	38 00	111 53	20	3.20	1.05	3200	11.00	70.52	0.0	301.1	320.2	054.5	1111.1	600.0
708	4910205070	COTTONWOOD CREEK NR SALINA, UTAH	21A	7.00	100.1	38 50	111 42	20	3.20	1.05	3700	7.00	20.00	0.0	41.0	20.5	320.0	307.7	165.0
709	4910210000	PLEASANT CREEK NEAR MOUNT PLEASANT, UTAH	21A	10.00	017.0	39 33	111 23	30	3.01	0.05	3170	4.77	00.07	0.0	001.0	145.0	1007.5	2334.4	2000.0
710	4910211000	TWIN CREEK NEAR MOUNT PLEASANT, UTAH	21A	5.00	270.0	39 32	111 23	30	3.01	0.95	3500	5.27	20.30	0.0	101.3	03.0	012.0	750.0	400.0
711	4910234000	THREE CREEK NEAR BEAVER, UTAH	21A	10.50	235.0	38 10	112 20	00	3.00	1.20	2103	7.00	37.00	0.0	93.0	71.1	300.4	450.6	200.0

Table 10. Continued.

Zone 17

SEQ	STATION	STATION NAME	SECT	AREA	Q10	LAT	LONG	R	P10	P00	OH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
1			2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
712	0909095000	BEAVER CREEK NEAR RIFLE COLO.	210	7.00	75.7	39 00	107 50	20	3.10	0.85	3000	0.65	17.70	0.0	45.0	42.9	166.7	127.7	65.0
713	0909092600	BATTLEMENT CREEK NR GRAND VALLEY, COLO.	210	20.00	101.0	39 20	107 50	10	3.14	1.00	3000	0.37	03.03	0.0	61.2	61.2	145.7	164.0	102.0
714	0909096000	PLATEOU C AT UPPER STA. NR COLLBRAN, COLO.	210	04.00	441.0	39 13	107 40	00	3.20	1.05	2010	17.10	40.00	0.0	225.4	225.4	637.9	710.0	450.0
715	0909097500	BRUSH CREEK NEAR COLLBRAN COLO.	210	0.57	204.0	39 00	107 51	20	3.00	1.14	2120	4.00	43.43	0.0	100.0	92.0	420.0	497.5	317.0
716	4909232000	SHEEP CREEK NEAR MANILA, UTAH	210	40.00	700.3	40 53	100 54	00	3.10	0.00	3020	01.30	122.15	1.4	262.7	109.1	1452.7	1765.0	1020.0
717	4909264000	ASHLEY C BELOW TROUT C NR VERNAL, UTAH	210	07.00	045.0	40 44	100 41	00	3.15	1.00	1000	10.24	04.04	0.22	430.1	494.0	757.0	004.3	030.0
718	5609220500	WEST FORK OF SMITH FORK NR ROBERTSON, WYO.	210	37.20	070.0	41 01	110 20	10	0.00	0.85	2500	11.41	30.02	0.0	515.3	450.6	1033.5	1091.2	2100.0
719	0909137000	DIRTY GEORGE CREEK NR GRAND MESA COLO.	21C	0.57	00.3	39 52	100 02	20	3.50	1.10	3120	0.04	10.16	0.0	40.4	50.3	96.0	194.5	66.0
720	0909139200	WARD CREEK NEAR GRAND MESA, COLO.	21C	14.30	113.0	39 50	107 50	00	3.47	1.21	5130	14.15	57.79	1.03	67.0	66.4	157.3	217.0	150.0
721	0909140200	KISER CREEK NEAR GRAND MESA, COLO.	21C	0.00	70.2	39 00	107 57	20	3.47	1.21	2005	0.20	9.70	21.0	50.1	40.6	117.2	132.0	53.0
722	0909140700	COTTON WOOD CREEK NEAR GRAND MESA, COLO.	21C	2.05	40.7	39 50	107 57	20	3.47	1.21	2400	4.07	0.50	0.0	24.5	25.0	54.6	60.5	36.0
723	0909143000	SURFACE CREEK NEAR CEDAREDGE COLO.	21C	20.70	520.0	39 50	107 51	20	3.03	1.00	3420	7.70	54.00	0.0	309.5	303.3	000.0	756.3	524.0
724	0909309500	MIDDLE MANCOS NEAR MANCOS, COLO.	21C	13.70	201.7	37 22	100 14	00	3.20	1.05	4245	0.77	31.37	3.0	130.4	136.4	320.0	521.0	297.0
725	4909180000	CASTLE C AB DIVERSIONS NR MOAB, UTAH	21C	7.00	20.0	38 35	100 10	10	0.00	1.05	3520	4.01	10.20	0.0	11.5	10.6	31.0	34.6	27.0
726	0910255010	BORREGO PALM CREEK NEAR BORREGO SPRINGS, CALIF.	22A	01.00	305.4	30 17	115 20	10	0.33	0.70	4320	10.00	47.30	0.0	110.0	40.9	2055.7	2744.6	2000.0
727	0910260700	SILVER CANYON CREEK NEAR LAWS, CALIF.	22A	01.00	6.4	37 24	110 10	24	3.20	1.05	5700	11.47	21.50	0.0	2.6	2.6	10.2	12.2	9.6
728	0910281000	INDEPENDENCE CREEK BL PINYON CR NR INDEPENDENCE	22A	10.10	105.1	30 47	110 16	20	3.70	1.24	0240	0.70	19.22	0.0	60.4	60.4	164.9	100.4	109.0
729	1010093000	CUB RIVER NEAR PRESTON, IDAHO	00A	10.40	742.0	42 00	111 41	41	3.55	1.14	2100	5.42	15.37	0.0	579.7	579.7	017.4	009.6	603.0
730	1010122500	DEVIL C AB CAMPBELL C NR MALD C IDAHO	22A	13.00	152.7	42 14	112 10	30	3.20	1.05	2041	6.60	53.37	0.0	77.0	77.9	243.6	263.6	194.0
731	1013070000	CLEAR CREEK NEAR NAF, IDAHO	22A	26.20	255.0	41 50	113 17	14	3.01	0.95	360	7.74	27.05	0.0	134.7	122.6	400.1	459.3	366.0
732	3210310500	CLEAR CREEK NEAR CARSON CITY, NEV.	22A	10.00	110.0	39 00	110 00	12	1.00	0.72	3720	7.50	10.07	0.0	51.3	35.9	174.4	229.6	178.0
733	3210316500	LAMOILLE CREEK NEAR LAMOILLE, NEV.	22A	20.00	051.0	40 41	116 20	10	0.00	0.07	3340	12.10	37.07	0.0	425.5	412.7	659.5	940.9	794.0
734	3210347500	HUNTER CREEK NEAR RENO, NEV.	22A	11.00	050.0	39 00	119 54	32	2.30	0.00	3000	5.90	11.40	0.0	155.0	50.0	1530.6	1940.0	966.0
735	3210340000	GALENA CREEK NEAR STEAMBOAT, NEV.	22A	0.00	1001.0	39 21	110 40	200	0.45	0.93	5100	5.05	0.30	0.0	454.0	227.4	4252.4	4825.3	3670.0
736	4910147500	PAYSON C AB DIVERSION, NR PAYSON, UTAH	22A	10.00	307.2	30 00	111 41	00	3.00	1.05	2700	5.44	30.51	0.0	177.3	195.0	511.7	769.2	465.0
737	4910172500	CITY CREEK NEAR SALT LAKE CITY, UTAH	22A	10.00	110.0	40 47	111 53	20	3.00	1.05	3500	11.73	20.13	0.0	87.0	70.0	150.7	160.4	163.0

Zone 18

SEQ	STATION	STATION NAME	SECT	AREA	Q10	LAT	LONG	R	P10	P00	OH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
738	0909343500	RITO BLANCO NEAR PAGOSA SPRINGS, COLO.	210	03.30	497.7	37 12	100 54	53	3.50	1.12	3000	11.47	30.05	0.0	219.2	241.1	590.4	072.9	475.0
739	0909345000	LITTLE NAVAJO RIVER AT CHROMO, COLO.	210	21.00	370.1	37 02	100 51	30	3.50	1.14	4737	10.00	23.75	0.0	174.7	145.0	534.0	601.0	390.0
740	0909369000	EAST MANCOS RIVER NEAR MANCOS, COLO.	210	11.10	077.4	37 22	100 14	20	3.20	1.05	4380	10.00	00.30	0.0	130.0	235.2	1517.0	1040.0	642.0
741	3509357200	GALLEGOS CANYON TRIBUTARY N NAGEEZI N. MEX.	210	0.00	307.0	36 20	100 00	17	2.05	0.00	100	1.05	1.02	0.0	105.0	132.6	732.5	076.7	500.0
742	3509307000	CHUSCA WASH NEAR MEXICAN SPRINGS N. MEX.	210	0.70	4357.0	35 40	100 51	45	3.15	1.00	1040	0.01	12.03	0.0	1715.7	1372.6	0405.0	10191.3	6400.0
743	3509307000	CATRON WASH NR MEXICAN SPRINGS, N. MEX.	210	20.00	4012.7	35 40	100 50	32	3.01	0.05	1320	0.00	13.30	0.0	2135.5	1943.3	7303.4	0430.2	4750.0
744	3509305000	PUERCO RIVER TRIBUTARY NR GAMERCO, N. MEX.	210	0.40	200.0	35 30	100 50	30	3.01	0.05	100	0.01	0.01	0.0	116.0	93.5	537.7	525.4	437.0
745	0409303000	HOUSE WASH ROCK TRIB. NR MARBLE CANYON, ARIZ.	21E	3.04	1704.0	36 41	111 50	30	3.51	1.37	500	3.20	0.70	0.0	327.7	50.0	2000.0	2175.0	1700.0
746	0409309250	JACKS CANYON TRIB. NO. 0 NR WINSLOW, ARIZ.	21E	31.72	3750.0	34 40	111 01	53	3.00	1.40	700	11.00	57.00	0.0	2405.0	0.0	11220.0	14400.0	9330.0
747	0409403750	SAGE BRUSH DRAW NR FREDONIA, ARIZ.	21E	0.00	01.0	36 54	112 03	30	3.65	1.35	00	0.00	0.01	0.0	46.0	4.0	172.0	209.0	150.0
748	0409403500	BITTER SEEDS WASH NR FRENDONIA, ARIZ.	21E	0.00	1400.1	36 51	112 40	42	3.00	1.30	1307	2.00	2.00	0.0	476.4	143.5	2001.4	2444.0	1950.0
749	0409403930	WEST CATARACT CREEK NR WILLIAMS, ARIZ.	21E	3.10	140.0	35 18	112 13	70	4.02	1.75	2493	4.00	4.35	0.0	55.2	42.5	253.0	292.5	151.0
750	0409404070	LITTLE RED HORSE WASH NR GRAND CANYON, ARIZ.	21E	01.00	45.5	35 51	112 00	40	3.75	1.35	1070	5.00	20.30	0.0	19.0	0.0	121.6	171.0	02.0
751	0409504000	OAK CREEK TRIB. NR CORNVILLE, ARIZ.	21E	0.040	40.0	34 43	111 53	60	4.40	1.50	1100	3.70	3.70	0.0	17.0	12.5	00.1	117.5	53.0

Zone 19

SEQ	STATION	STATION NAME	SECT	AREA	Q10	LAT	LONG	R	P10	P00	OH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
752	0409304200	LYMAN RESEVOIR TRIB. NR ST. JOHNS, ARIZ.	21F	0.00	04.0	34 21	100 20	40	3.45	1.35	100	0.50	0.07	0.0	42.4	40.0	133.0	150.5	101.0
753	0409305000	LITYLE COLORADO RIVER TRIB. NR ST. JOHNS, ARIZ.	21F	0.30	315.0	34 27	100 15	20	3.50	1.20	150	1.00	1.00	0.0	105.3	57.0	541.2	063.4	325.0
754	3500341300	BLUEWATER CR AB BLUEWATER DAM BLUEWATER N. MEX.	21F	70.00	510.0	35 15	100 07	25	3.20	1.05	1700	15.40	50.01	0.0	340.0	242.2	1503.0	1900.5	3570.0
755	3500340500	ENCINAL CREEK NR CASA BLANCA, N. MEX.	21F	0.10	1145.0	36 00	107 20	20	3.40	1.00	2000	5.02	14.71	0.0	407.3	200.0	2055.5	3750.0	4330.0
756	3500353000	LA JENCIA CREEK NR MAGDALENA, N. MEX.	21F	0.07	1077.1	34 00	107 13	50	3.55	1.14	2062	5.00	15.50	0.0	400.6	342.7	3102.4	3721.0	2010.0
757	3500307050	GALESTENA CANYON TRIB. NR BLACK ROCK, N. MEX.	21F	10.02	505.7	34 50	100 40	23	3.15	1.00	700	6.40	26.50	0.0	240.2	216.2	956.6	1002.9	600.0
758	3500305400	PUERCO R TRIBUTARY NEAR FORT WINGATE, N. MEX.	21F	14.00	365.0	35 25	100 34	20	3.15	1.00	000	5.75	40.77	0.0	201.0	04.0	1230.0	1520.0	1300.0
759	3500442050	ROMERO CREEK N N MEX-ARIZ ST LINE LUNA N. MEX.	21F	10.00	450.2	33 57	100 53	25	3.00	1.27	2555	6.70	14.00	0.1	130.0	82.5	077.0	1066.5	400.0

Table 10. Continued.

1			2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SEQ	STATION	STATION NAME	SECT	AREA	Q10	LAT	LONG	R	P10	F00	OH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
Zone 19																			
760	3500442050	TROUT CREEK NEAR LUNA, N. MEX.	21F	31.00	1500.0	33 57	108 53	85	4.00	1.33	3000	12.83	47.74	0.0	487.2	253.0	2091.1	3420.0	2100.0
761	0400478200	DURHAM WASH NR FLORENCE, ARIZ.	22B	10.00	3193.2	32 43	111 27	80	5.00	1.75	2002	0.00	10.00	0.0	1004.4	713.2	5322.0	8857.1	3500.0
762	0400478600	QUEEN CREEK TRIB. NO. 3 AT WHITLOW DAM, ARIZ.	220	0.37	473.0	33 20	111 16	70	4.75	1.65	290	1.10	1.52	0.0	101.4	101.0	763.6	807.0	500.0
763	0400478200	QUEEN CREEK TRIB. AT APACHE JUNCTION, ARIZ.	220	0.01	210.1	33 24	111 30	30	4.25	1.50	70	0.40	0.40	0.0	89.5	76.0	306.1	459.0	202.0
764	0400481700	CALABASA CANYON NR NOGALES, ARIZ.	220	10.32	880.7	31 27	110 59	70	6.12	1.00	2340	25.92	125.82	0.0	376.1	293.4	1643.6	1000.5	1000.0
765	0400483000	TUCSON ARROYO VINE AVE. TUCSON ARIZ.	220	8.00	3400.0	32 05	110 00	70	6.00	1.65	425	12.20	35.02	0.0	1456.5	1220.6	5389.0	6215.1	5000.0
766	0400484000	SABINO CREEK NEAR TUCSON, ARIZ.	220	35.5	3407.0	32 20	110 50	80	5.00	1.85	5370	7.00	16.10	0.0	1498.5	1371.3	8796.7	8257.4	8400.0
767	0400488000	RINCON CREEK NEAR TUCSON, ARIZ.	220	44.80	7485.0	32 08	110 36	50	6.00	1.75	5344	7.70	40.15	0.0	2204.9	2856.4	15423.1	19421.8	9000.0
768	3250410830	TELEPHONE CANYON NR CHARLESTON PARK NEVADA	220	7.20	909.0	30 16	115 33	30	3.00	1.00	4760	0.06	0.50	0.0	237.7	5.0	2075.0	3580.0	2000.0
769	0400520400	LIGURTA WASH AT LIGURTA, ARIZ.	22C	1.00	1000.0	32 41	114 10	30	4.05	1.00	1301	2.07	0.03	0.0	447.3	193.0	2162.0	2378.0	1500.0
770	0010200000	SNOW CREEK NR WHITE WATER, CALIF.	22C	10.00	8010.2	33 52	110 41	100	3.70	1.24	8300	3.00	7.45	0.0	1857.1	820.5	23190.1	29027.4	13095.0
771	0010257000	LONG CREEK NR DESERT HOT SPRINGS, CALIF.	22C	10.40	6400.0	33 50	110 07	80	3.04	1.14	3002	0.30	27.10	0.0	1174.3	11.7	10903.1	24300.7	9270.0
772	0010200000	TAHQUITZ CREEK NEAR PALM SPRINGS, CALIF.	22C	15.00	1150.0	34 40	110 34	10	0.33	0.70	7400	9.10	23.25	0.0	434.7	217.4	4564.4	6005.5	2000.0
773	0010250100	PALM CANYON TRIB. NR ANZA, CALIF.	22C	0.47	20.0	33 34	116 31	80	4.00	1.43	1040	1.50	1.50	0.0	11.0	6.6	49.5	59.4	20.0
774	0210250200	DEER CREEK NR PALM DESERT, CALIF.	22C	30.00	1301.0	33 30	110 03	10	3.20	1.06	6300	7.70	40.07	0.0	383.6	102.2	2041.3	3275.0	1300.0
775	0010050005	COTTONWOOD WASH NR COTTON WOOD SPRINGS, CALIF.	22C	5.71	31.0	33 45	116 40	10	3.00	1.05	800	1.45	1.45	0.0	10.5	1.0	60.0	73.0	34.0
776	0400461000	AGRICUL RESRCH SERV SAFFORD WTRSHED W-I ARIZ.	22D	2.51	805.0	32 51	109 30	53	3.05	1.45	250	0.72	4.287	0.0	180.0	125.0	537.5	636.0	434.0
777	0400480000	AGRICUL RESRCH SRV SAFFORD WTRSHED W-V ARIZ.	220	1.12	374.4	32 26	109 42	80	4.00	1.59	330	3.57	11.07	0.0	141.3	168.0	710.7	897.3	871.0
778	0400496020	AGRICUL RESCH SER SAFFORD WTRSHED W-IV ARIZ.	22D	1.10	290.7	32 30	109 30	45	3.00	1.40	300	3.25	23.00	0.0	105.2	66.3	538.2	845.9	500.0
779	0400461100	AGRICUL RESCH SER TOMBSTONE WTRSHED W-V ARIZ.	220	0.01	1950.0	31 40	110 00	60	4.05	1.70	070	4.06	24.04	0.01	770.0	715.0	8550.0	6095.0	3424.0
780	0400461170	AGRICUL RESCH SER TOMBSTONE WTRSHD W-III ARIZ.	220	3.47	2020.0	31 47	110 03	80	4.05	1.70	650	4.02	16.00	0.0	404.2	765.5	3425.0	4100.0	2050.0
781	0400461100	AGRICUL RESCH SER TOMBSTONE WTRSHD W-IV ARIZ.	22D	0.00	600.0	31 47	110 03	50	4.00	1.70	105	1.03	4.33	0.0	215.7	107.0	1341.5	1020.0	1271.0
782	0400402200	AGRICUL RESCH SER SAFFORD WTRSHD W-II ARIZ.	22D	5.00	835.4	30 47	110 00	60	4.00	1.50	1100	2.00	0.040	0.0	490.4	402.7	1105.3	1310.5	897.0
783	3500313100	CANADA ANCHA TRI NEAR SANTA FE N. MEX.	22D	1.03	233.0	35 44	109 07	42	3.45	1.11	105	1.30	1.00	0.0	72.0	25.5	416.0	500.3	200.0
784	3500481100	TULAROSA BASIN TRI NR THREE RIVERS N. MEX.	22D	13.00	2001.0	30 20	109 00	40	3.40	1.11	2070	11.00	53.27	0.0	701.0	787.3	3045.4	3034.0	2340.0
785	3500310000	SANTA FE RIVER NR SANTA FE N. MEX.	22E	10.20	201.0	35 41	109 00	30	4.30	1.03	4300	0.70	20.50	0.0	80.4	59.6	806.0	605.1	1000.0
786	3500317700	JASPE ARROYO TRI NEAR GALISTEO, N. MEX.	22E	2.15	1005.0	35 22	106 51	70	3.00	1.30	646	3.53	9.70	0.0	820.4	407.0	2030.1	3335.1	2440.0
787	3500317000	CANADA DE LAS MINOS TRIB. NR SANTE FE, NEW MEX.	22E	0.00	341.0	35 30	106 50	40	4.00	1.33	1000	1.75	1.75	0.0	60.1	53.5	917.7	1150.3	882.0
788	3500303200	PINTADA CREEK TR NR CLINES CORNER N. MEX.	22E	20.20	200.1	34 51	105 30	40	4.00	1.35	510	7.00	32.00	0.0	203.0	124.4	1427.3	1712.8	2100.0
789	3000323810	PINTADA ARROYO TRIB. NR ENCINO, N. MEX.	22E	1.00	80.7	34 40	105 34	42	4.00	1.37	820	1.00	3.50	0.0	11.4	23.0	141.4	166.3	25.0
790	3500409000	OBIYA DRAW NR CLINES CORNERS, N. MEX.	22E	10.00	1510.0	35 00	105 40	31	3.05	1.30	410	4.40	0.40	0.0	400.0	343.0	3307.5	4067.0	8000.0
791	3500492000	CANON DE TORREON AT TORREON, N. MEX.	22E	10.50	8000.7	32 31	105 21	70	4.00	1.02	800	0.00	17.53	0.0	1510.3	1003.9	8047.0	11304.0	8000.0
Zone 20																			
792	4114050500	CULTUS R AB CULTUS CR, NR LA PINE, OREG.	23B	10.50	100.0	43 40	121 40	0	3.15	1.00	000	0.15	12.17	0.0	93.5	93.5	153.2	165.3	170.0
793	4114052000	DEER CR AB CRANE PRAIRIE RES NR LA PINE, OREG.	23B	21.50	185.0	43 48	121 50	0	3.15	1.00	1610	0.50	13.40	4.0	55.4	55.4	210.7	240.4	280.0
794	4114053000	CHARLTON CR AB CRANE PRA RES NR LA PINE, OREG.	23B	15.00	30.4	43 47	121 58	4	3.15	1.00	1040	0.02	20.30	3.0	23.9	23.9	274.6	315.7	34.0
795	4114054500	BROWN CREEK NEAR LA PINE, OREG.	23B	10.70	88.0	43 43	121 48	8	0.83	0.02	1270	0.40	10.03	0.0	54.8	54.8	110.3	122.3	104.0
796	4114088000	LAKE CREEK NEAR SISTERS, OREG.	23B	22.20	289.0	44 23	121 44	0	2.00	0.05	1440	7.00	15.77	4.0	170.5	103.7	395.0	430.9	300.0
797	4114134000	SALMON RIVER NEAR GOVERNMENT CAMP, OREG.	23B	8.70	580.0	45 15	121 43	70	4.30	1.52	2760	8.00	10.71	0.0	321.3	314.9	704.7	887.8	1380.0
798	4114141000	LITTLE SANDY RIVER NEAR BULL RUN, OREG.	23B	22.30	4080.0	45 25	122 10	70	4.00	1.02	2700	13.72	20.05	0.0	2452.7	2452.7	8320.0	7280.8	5320.0
799	4114184000	SHEEP CREEK NEAR CASCADIA, OREG.	23B	0.00	109.7	44 23	122 30	70	4.00	1.33	1100	1.34	1.34	0.0	50.2	57.4	124.3	160.1	116.0
800	5312147000	GRIFFIN CREEK NEAR CARNATION, WASH.	23B	17.10	800.3	47 37	121 34	70	4.07	1.01	042	10.40	20.00	0.1	430.2	305.0	1170.0	1332.1	1000.0
801	5314143200	CANYON CREEK NEAR WASHOUGAL, WASH.	23B	2.74	250.3	45 30	122 12	40	4.10	1.30	1100	3.50	3.50	0.0	141.4	137.2	325.2	350.2	261.0
802	5314231100	MILL CREEK AT RANDLE WASH.	23B	2.20	117.2	46 30	121 55	70	4.23	1.43	8040	2.00	8.40	0.0	53.7	53.7	144.0	150.5	133.0
803	5314235300	TILTON RIVER NEAR MINERAL, WASH.	23B	0.70	127.2	42 40	122 10	80	4.07	1.01	1040	1.41	1.41	0.0	85.2	85.2	155.5	172.0	142.0
804	5314237000	KLICKITAT CREEK AT MOSSYROCK, WASH.	23B	3.20	180.0	46 31	122 20	66	4.20	1.43	10	0.35	0.30	0.0	108.0	110.0	195.7	216.0	176.0
805	6010265200	CONVICT CREEK NEAR MAMMOTH LAKES, CALIF.	23D	16.20	211.2	37 30	118 51	70	4.07	1.01	3500	0.00	21.01	4.0	115.4	113.1	312.7	350.0	280.0
806	6010304500	SILVER C BE PENN C, NR MARKLEEVILLE, CALIF.	23D	10.00	1001.3	38 30	110 40	10	0.15	0.01	0030	0.13	20.00	1.0	815.3	430.7	2042.7	3364.2	2220.0
807	6010343500	SAGEHEN CREEK NEAR TRUCKEE, CALIF.	23D	10.00	550.4	39 20	120 14	40	4.00	1.02	1920	3.00	14.00	0.0	190.7	100.0	903.5	1172.3	765.0
808	6011200000	DEER CREEK AT CALIFORNIA HOT SPRINGS, CALIF.	23D	16.00	307.3	35 53	118 42	70	4.00	1.02	4000	7.30	15.07	0.0	123.2	90.5	610.7	730.2	490.0
809	6011237500	PITMAN CREEK BELOW TAMARACK CREEK, CALIF.	23D	22.00	1437.2	37 12	119 13	140	4.07	1.01	1700	7.42	20.07	0.0	710.0	574.0	4024.2	5030.2	3070.0
810	6011300000	COSGROVE CREEK NEAR VALLEY SPRINGS, CALIF.	23D	20.00	2020.1	30 00	122 30	30	4.20	1.43	000	0.73	00.50	0.0	1211.0	1211.0	3440.9	3700.2	3240.0

Table 10. Continued.

1			2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SEQ	STATION	STATION NAME	SECT	AREA	Q10	LAT	LONG	R	P10	P60	OH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
		Zone 20																	
011	0611315000	COLE CREEK NEAR SALT SPRINGS DAM, CALIF.	230	20.40	3980.1	38 31	120 12	90	5.10	2.01	2160	9.75	16.00	0.0	1533.9	1643.1	7362.7	8898.5	5140.0
012	0611412000	ROCK CREEK AT GOODYEARS BAR, CALIF.	230	8.00	790.3	39 32	120 53	30	5.41	2.20	2650	5.07	10.94	0.0	385.6	354.7	1003.7	2050.9	1600.0
013	0611412500	GOODYEARS CREEK AT GOODYEARS BAR, CALIF.	230	12.90	1475.2	39 33	120 53	30	5.60	2.39	3345	5.07	20.95	0.0	562.1	461.7	2715.5	3263.2	1900.0
014	0611440000	ALDER CREEK NEAR WHITE HALL, CALIF.	230	22.10	1079.4	38 45	120 22	90	4.07	1.01	2900	11.51	43.05	0.0	642.3	609.6	5096.1	7496.5	5500.0
015	4114211000	SALTZMAN CREEK AT PORTLAND, OREG.	24A	1.40	239.5	45 34	122 45	110	3.65	1.14	730	1.49	3.50	0.0	119.9	119.9	360.9	411.3	306.0
016	5312053400	DOSEWALLIPS R TRIBUTARY NEAR BRINNON, WASH.	24A	0.02	56.3	47 43	122 56	114	5.10	2.01	2200	1.37	2.27	0.0	38.6	36.6	72.5	78.4	66.0
017	5312065500	GOLD CREEK NEAR BREMERTON, WASH.	24A	1.01	197.6	47 33	122 49	112	4.71	1.71	58	1.20	1.07	0.0	127.6	146.0	257.6	279.4	242.0
018	5312070000	DOGFISH CREEK NEAR POULSBO, WASH.	24A	5.01	215.4	47 45	122 39	55	3.76	1.24	140	3.20	5.07	0.0	141.7	131.0	346.1	365.4	333.0
019	5312073500	HUGE CREEK NEAR WAUNA, WASH.	24A	6.47	384.1	47 23	122 42	70	4.20	1.43	215	3.72	3.72	0.0	165.3	136.7	531.1	618.1	391.0
020	5312093000	KAPOWSIN CREEK NEAR KAPOWSIN, WASH.	24A	25.90	600.5	47 00	122 12	31	3.70	1.21	1360	11.55	21.49	5.0	365.5	372.9	691.0	731.2	661.0
021	5312102200	SWAN CREEK NEAR TACOMA, WASH.	24A	2.15	101.6	47 11	122 24	30	3.29	1.05	40	2.95	2.95	0.0	93.5	87.9	237.5	274.0	176.0
022	5312106000	SHAY CREEK NEAR LESTER, WASH.	24A	6.56	920.0	47 16	121 34	70	4.77	1.75	1020	4.76	15.73	0.0	570.0	560.0	1520.0	1760.0	2350.0
023	5312107200	DEEP CREEK AT CUMBERLAND, WASH.	24A	2.17	166.7	47 17	121 55	45	4.90	1.33	1700	3.56	4.47	0.0	60.4	66.4	138.0	151.2	120.0
024	5312113200	MILL CREEK NEAR AUBURN, WASH.	24A	3.14	62.7	47 15	122 15	25	3.29	1.05	205	2.25	2.02	0.0	47.5	52.2	109.2	124.4	112.0
025	5312123300	EVANS CREEK TRIBUTARY NEAR REDMOND, WASH.	24A	2.45	54.6	47 40	122 13	17	2.85	0.98	210	1.10	1.10	0.0	31.2	26.1	124.6	151.0	154.0
026	5312120000	NORTH CREEK NEAR BOTHELL, WASH.	24A	24.60	440.0	47 48	122 12	10	2.60	0.91	365	10.01	18.95	0.0	324.0	320.0	550.0	590.0	600.0
027	5312135500	OLNEY CREEK NEAR GOLD BAR, WASH.	24A	8.31	3014.0	47 45	121 45	155	4.36	1.52	2520	5.36	9.18	0.0	1205.9	1025.0	5595.4	6013.3	4020.0
028	5312156400	MUNSON CREEK NEAR MARYSVILLE, WASH.	24A	0.97	41.9	47 55	122 10	35	3.01	0.95	215	1.47	1.47	0.0	26.2	26.2	56.2	65.5	56.0
029	5312157000	QUILCEDA CREEK NEAR MARYSVILLE, WASH.	24A	10.40	232.6	48 06	122 09	20	3.15	1.06	400	5.35	23.11	0.2	169.6	169.6	324.3	361.7	300.5
030	5312196000	ALDER CREEK NEAR HAMILTON, WASH.	24A	10.70	665.7	48 32	121 57	31	3.70	1.24	1150	5.55	16.10	0.0	344.9	344.9	741.5	772.6	714.0
031	5312200700	CARPENTER CREEK NEAR MOUNT VERNON, WASH.	24A	2.50	65.7	46 25	122 20	25	3.15	1.06	80	2.47	5.09	0.0	36.5	36.5	93.1	105.1	66.0
032	5312200000	SKOOKUM CREEK NEAR WICKERSHAM, WASH.	24A	23.10	2069.4	48 40	122 08	40	4.20	1.43	3450	9.16	20.20	6.0	1293.4	1164.1	3427.5	3978.7	3850.0
033	5314211900	BURNTBRIDGE CREEK AT VANCOUVER, WASH.	24A	21.00	143.2	45 39	122 40	9	3.30	1.11	140	9.93	12.19	0.0	82.0	66.1	216.1	245.9	176.0
034	5314212000	SALMON CREEK NEAR BATTLE GROUND, WASH.	24A	18.30	1420.6	45 46	122 27	40	4.30	1.52	1600	4.12	20.73	0.0	904.2	913.2	1806.4	1971.2	1580.0
035	5314223500	COLUMBIA RIVER TRIBURARY AT CARROIS WASH.	24A	1.06	65.7	46 06	122 50	105	4.20	1.43	900	1.04	3.54	0.0	55.3	55.3	120.1	142.7	112.0
036	5314230100	NORTH FK LACAMAS CREEK NR ETHEL, WASH.	24A	0.38	33.5	46 10	122 55	50	4.10	1.38	130	1.15	1.16	0.0	24.3	26.5	36.9	38.0	34.0
037	5314242600	TOUTLE RIVER TRIB NR CASTLE ROCK, WASH.	24A	0.84	90.7	46 10	122 55	50	4.10	1.36	155	0.82	0.82	0.0	44.9	41.0	132.0	151.0	99.0
		Zone 21																	
038	5312016000	LANE CREEK NEAR NASELLE, WASH.	240	2.15	211.3	46 22	123 47	105	5.41	2.20	1275	3.49	15.14	0.0	177.6	164.7	250.4	280.2	249.0
039	5312011100	NORTH NEMAH R TRIBUTARY NR SOUTH BEND, WASH.	240	0.40	70.1	46 30	123 50	100	5.10	2.01	70	1.05	1.00	0.0	51.2	54.3	91.1	90.6	101.0
040	5312012000	FORK CREEK NEAR LEBAM WASH.	240	60.40	3034.7	46 33	123 35	145	5.30	2.10	1295	0.60	24.20	0.0	2530.6	2402.4	6127.6	5060.9	4400.0
041	5312012200	GREEN CREEK NEAR LEBAM, WASH.	240	1.70	221.4	46 38	123 35	140	5.03	2.30	240	1.91	2.53	0.0	135.0	126.9	291.0	324.0	233.0
042	5312010700	JOE CREEK NEAR COSMOPOLIS, WASH.	240	2.05	249.6	46 50	123 43	90	4.70	1.61	190	1.54	3.00	0.0	153.3	100.0	340.2	363.0	329.0
043	5312019000	WATER MILL CREEK NEAR PE ELL, WASH.	240	1.00	143.6	46 34	123 10	100	4.06	1.43	140	2.30	2.30	0.0	93.0	93.0	172.5	187.6	147.0
044	5312039050	BIG CREEK NEAR HOQUIAM, WASH.	240	0.56	116.5	47 08	123 53	60	4.07	1.01	70	0.01	0.01	0.0	66.4	72.4	147.4	164.0	123.0
045	5312030600	ROCK CREEK AT CEDARVILLE, WASH.	240	24.00	1461.5	46 52	123 10	70	4.20	1.49	900	18.90	32.69	0.0	1142.0	1210.5	1713.0	1027.2	1040.0
046	5312039100	BIG CREEK TRIBUTARY NEAR HOQUIAM, WASH.	240	0.15	23.2	46 55	123 50	60	4.61	1.61	90	0.53	0.53	0.0	16.7	19.9	26.4	27.9	24.0
047	5312042700	MAY CREEK NEAR FORKS, WASH.	240	2.03	710.1	47 55	124 15	160	6.00	2.50	350	1.00	1.00	0.0	499.4	499.4	860.0	943.9	759.0
048	5312042900	GRADER CREEK NEAR FORKS, WASH.	240	1.07	610.7	47 56	124 24	140	6.41	2.20	330	2.25	2.25	0.0	339.7	339.7	625.0	602.4	597.0
049	5312047100	LEES CREEK AT PORT ANGELES, WASH.	240	4.77	316.2	48 05	123 23	40	3.60	1.14	1770	4.02	7.01	0.0	120.3	90.5	624.5	661.5	330.0
050	5312049400	DEAN CREEK AT BLYN, WASH.	240	2.00	40.1	48 01	123 01	20	3.20	1.02	2120	3.60	4.43	0.0	32.5	32.5	73.6	81.9	100.0
051	5312050500	SNOW CREEK NEAR MAYNARD, WASH.	240	11.20	470.5	47 56	122 53	60	3.70	1.24	2020	6.62	22.33	0.0	260.4	242.4	771.4	867.0	733.0
052	5312052400	PENNY CREEK NEAR QUILCENE, WASH.	240	0.70	445.3	47 48	123 00	114	5.24	2.07	600	4.50	7.72	.0	239.4	239.4	640.0	732.5	607.0
053	5312056300	ANNAS BAY TRIBUTARY NEAR PORLATCH, WASH.	240	0.82	140.5	47 21	123 10	160	6.33	2.14	415	1.20	1.26	0.0	66.3	65.0	270.5	320.9	220.0
054	5312058000	DEAR MEADOW CREEK NEAR HOODSPORT, WASH.	240	1.03	312.7	47 26	123 14	160	6.60	2.39	600	2.17	2.91	0.0	141.5	141.5	640.5	630.6	445.0
055	5312070000	SCHNEIDER CREEK TRIBUTARY NR SHELTON, WASH.	240	1.12	96.3	47 15	123 10	140	5.16	2.01	220	0.72	2.72	0.0	59.1	61.5	120.4	143.0	105.0
056	5314246100	RISK CR NR SKAMOKAWA WASH.	240	1.13	137.2	46 18	123 30	114	4.07	1.01	330	1.42	2.11	0.0	89.1	101.5	162.2	172.0	181.0
057	5314250500	WEST BRANCH GRAYS RIVER NR GRAYS RIVER, WASH.	240	15.20	3500.3	46 23	123 33	140	6.03	2.30	1465	6.05	22.00	0.0	2459.5	2459.5	5263.3	5952.0	4770.0
058	4114361300	JONES CREEK NR GRANTS PASS, OREG.	240	7.41	747.1	42 20	123 17	30	4.20	1.43	1500	3.57	7.63	0.0	375.4	330.4	1205.0	1411.5	1350.0
059	4114369000	BUTCHERKNIFE CREEK NR WONDER, OREG.	240	3.07	390.1	42 12	123 19	75	4.20	1.43	1010	2.78	2.78	0.0	248.0	266.1	579.7	659.3	432.0
060	4114370200	ROUND PRAIRIE CREEK NR WILDERVILLE, OREG.	240	3.10	326.7	42 13	123 14	75	4.10	1.38	1000	2.66	4.06	0.0	200.4	236.6	365.3	412.5	375.0
061	4114371500	GRAVE CREEK NR PEAS BROS NR PLACER, OREG.	240	22.10	3741.7	42 38	123 13	85	4.20	1.43	2030	10.37	13.20	0.0	1910.0	1910.5	6063.4	7061.2	5240.0

Table 10. Continued.

1		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SEQ STATION	STATION NAME	SECT	AREA	DIS	LAT	LONG	R	P10	P80	DH	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
	Zone 21																	
862 4114372500	EAST FK ILLINOIS RIVER NR TAKILMA, OREG.	040	42.30	8107.0	42 00	123 30	220	5.41	2.20	4300	9.25	40.75	0.0	4061.0	4061.0	12213.4	13984.0	15700.0
863 4114376600	HARRIS CREEK NR BROOKINGS, OREG.	040	1.00	401.1	40 01	124 10	240	5.47	0.20	1140	0.37	2.37	0.0	194.7	171.3	656.1	763.2	430.0
864 4114376900	RANSOM CREEK NR BROOKINGS, OREG.	040	0.74	300.0	42 04	124 10	225	5.41	2.20	1000	2.50	2.60	0.0	143.4	119.0	460.1	567.0	378.0
865 0611280200	BEAR CREEK NEAR CATHEYS VALLEY, CALIF.	24E	24.00	4300.0	37 20	120 07	30	4.00	1.43	2083	7.07	20.02	0.0	2076.5	1027.3	9219.6	11213.1	7720.0
866 0611372050	CHURN CREEK NR REDDING, CALIF.	24E	0.34	0644.0	40 30	122 23	70	0.10	0.81	1135	0.00	10.25	0.0	1479.4	1479.4	3772.5	4142.3	3160.0
867 0611373200	OAK RUN CREEK NEAR OAK RUN, CALIF.	24E	11.00	1000.0	40 41	122 03	140	4107	1.00	2470	9.20	12.75	0.1	1051.0	1000.5	2580.9	2902.4	2160.0
868 0611390200	GOLD RUN TRIBUTARY NEAR NELSON, CALIF.	24E	1.31	064.0	38 35	121 41	30	4.20	1.43	1410	5.20	7.70	0.0	139.0	141.3	356.1	465.7	253.0
869 0611396000	LOST CREEK NEAR CLIPPER MILLS, CALIF.	24E	00.10	3307.7	38 34	121 00	90	0.23	2.07	2700	13.50	41.30	0.03	1013.2	1013.2	5430.5	6194.7	5000.0
870 0611407500	SOUTH HONCUT CREEK NEAR BANGOR, CALIF.	24E	30.00	0101.2	38 20	121 20	70	4.50	1.00	2020	10.93	00.01	0.0	3735.2	2000.2	17704.0	21064.2	17000.0
871 0611420000	DRY CREEK NEAR BROWNSVILLE, CALIF.	24E	20.40	1751.3	38 10	120 32	00	5.41	2.20	1102	4.40	30.00	0.0	903.9	903.9	2526.0	2833.0	1890.0
872 0611147000	JACK CREEK NEAR TEMPLETON, CALIF.	24F	20.30	0250.4	38 34	120 40	70	6.00	2.30	1310	7.30	41.30	0.0	2300.3	1790.0	7933.7	9100.0	8150.0
873 0611153000	LLAGAS CREEK NEAR MORGAN HILL, CALIF.	24F	16.00	0660.9	37 04	121 20	30	4.00	1.02	0600	12.35	30.00	0.0	675.5	270.2	4063.6	5944.4	3190.0
874 0611161500	BRANCIFORTE CREEK AT SANTA CRUZ, CALIF.	24F	17.30	4903.1	36 00	122 01	70	5141	2.20	070	9.10	33.25	0.9	2150.5	2150.5	0940.1	10752.5	8190.0
876 0611163500	LOS TRANCOS CR AT STANFORD UNIVERSITY, CALIF.	24F	7.50	690.0	37 14	120 07	253	5.00	0.50	1737	0.30	15.30	0.0	287.5	293.2	1070.1	1250.6	047.0
876 0611169500	SARATOGA CREEK AT SARATOGA, CALIF.	24F	9.00	1016.5	37 10	120 02	253	5.41	0.20	1760	5.10	25.27	0.0	593.4	534.1	2096.7	3021.5	2730.0
877 0611182100	PINOLE CREEK AT PINOLE, CALIF.	24F	10.00	920.2	37 50	122 15	30	4.50	1.00	700	6.00	25.72	0.0	464.1	560.9	1971.2	2130.0	1680.0
878 0611182500	SAN RAMON CREEK AT SAN RAMON, CALIF.	24F	5.00	1336.2	37 20	121 35	30	3.00	1.71	1300	0.50	15.10	0.0	443.4	354.7	3015.1	3600.2	1600.0
879 0611253310	CANTUA CREEK NEAR CANTUA CREEK, CALIF.	24F	40.40	2034.0	36 24	120 26	10	2.00	0.00	3757	10.73	54.60	0.0	542.0	434.1	3255.0	3790.2	1920.0
880 0611459500	NOVATO CREEK NEAR NOVATO, CALIF.	24F	17.00	1200.1	38 06	120 34	30	4.71	1.71	970	11.00	20.10	1.0	744.2	744.2	2063.0	2420.1	2030.0
881 0610259000	ANDREAS CREEK NEAR PALM SPRINGS, CALIF.	240	0.01	1143.0	33 40	116 33	20	3.30	1.14	7040	7.37	12.94	0.0	254.0	127.0	2007.0	3352.0	1900.0
882 0610263500	BIG ROCK CREEK NEAR VALYERMO, CALIF.	240	20.00	1200.5	34 25	117 00	70	0.10	2.01	2300	0.53	30.00	0.0	017.3	300.6	7531.1	9957.1	0300.0
883 0611047500	ALISO CREEK AT EL TORO, CALIF.	240	7.97	1444.2	33 37	117 41	40	3.20	1.65	1140	0.00	10.13	0.0	451.3	270.0	2040.1	3114.0	2500.0
884 0611055500	MILL CREEK NEAR MENTONE, CALIF.	24G	17.10	2039.2	34 07	117 00	00	4.30	1.53	4730	0.02	40.91	0.0	075.6	012.9	6460.0	8537.1	5340.0
886 0611055050	PLUNGE CREEK NEAR EAST HIGHLANDS, CALIF.	24G	10.50	0004.7	34 09	117 11	20	4.50	1.02	3700	0.59	49.65	0.0	913.2	039.2	0049.0	9207.2	7000.0
886 0611056500	LITTLE SAN GORGONIO CR NR BEAUMONT, CALIF.	240	3.23	1103.0	34 01	116 57	70	5.14	2.00	3355	3.04	3.04	0.0	551.5	137.9	1544.2	2095.7	11000.0
887 0611058600	WATERMAN CANYON CR NR ARROWHEAD SPRINGS, CALIF.	240	4.65	653.4	34 12	117 10	70	3.55	1.15	2355	2.00	6.70	0.0	237.6	142.6	1734.5	2364.7	2350.0
888 0611063500	LONE PINE CREEK NEAR KEENBROOK, CALIF.	240	10.10	609.7	34 16	117 20	70	5.10	2.01	4300	11.77	32.63	0.0	470.3	265.0	5056.5	7230.0	6100.0
889 0611063600	DEVIL CANYON CR NR SAN BERNARDINO, CALIF.	24G	5.01	014.9	34 12	117 20	70	5.10	2.01	2730	4.10	14.04	0.0	273.3	191.3	3075.9	4919.4	3720.0
890 0611067000	DAY CREEK NEAR ETIWANDA, CALIF.	240	4.50	1361.5	34 11	117 32	70	6.96	2.60	4925	4.22	11.69	0.0	544.6	217.0	7733.3	10461.0	9450.0
891 0611073000	SAN ANTONIO CREEK NEAR CLAREMONT, CALIF.	240	10.50	1300.0	34 13	117 40	09	0.26	2.70	4070	0.52	33.56	0.0	931.2	106.2	14666.1	20466.4	21400.0
892 0611073470	CUCAMONGA CREEK NEAR UPLAND, CALIF.	240	10.10	1603.0	34 10	117 30	70	5.41	2.20	6725	0.75	24.59	0.0	690.9	445.4	0971.4	13007.1	14100.0
893 0611084600	ROGERS CREEK NEAR AZUSA, CALIF.	24G	6.54	1356.0	30 10	117 54	70	5.00	2.30	3060	0.32	10.41	0.0	437.7	393.9	2713.7	3414.1	2400.0
894 0611084500	FISH CREEK NEAR DUARTE, CALIF.	240	6.36	1987.4	34 10	117 65	70	5.05	2.39	3070	5.00	22.53	0.0	724.9	507.4	4059.4	5074.3	13000.0
895 0611086000	DALTON CREEK NEAR GLENDORA, CALIF.	240	7.24	607.0	34 10	117 50	70	5.41	2.20	1130	5.52	10.02	0.0	202.4	105.2	2420.6	3230.4	3040.0
896 0611068500	LITTLE DALTON CREEK NEAR GLENDORA, CALIF.	240	0.72	693.0	34 10	117 50	70	5.41	2.20	2020	3.71	0.41	0.0	190.0	110.6	1970.1	2370.0	1700.0
897 0611096500	LITTLE TUJUNGA CREEK NEAR SAN FERNANDO, CALIF.	24G	21.10	2510.1	34 10	110 22	70	4.93	1.00	3090	10.20	05.77	0.0	945.9	540.0	0134.7	10066.7	0500.0
898 0611098000	ARROYO SECO NEAR PASADENA, CALIF.	24G	16.00	3306.4	34 13	110 11	00	5.72	2.46	3065	11.67	42.90	0.0	1340.0	004.5	10450.2	13070.2	0020.0
899 0611099500	SAWPIT CREEK NEAR MONROVIA, CALIF.	240	5.21	406.2	34 10	117 59	65	6.41	2.20	3070	4.45	10.02	0.0	194.0	97.3	1550.0	2004.4	1000.0
900 0611100000	SANTA ANITA CR NR SIERRA MADRE, CALIF.	240	0.71	1743.5	34 12	110 00	70	5.00	2.00	3125	4.71	20.46	0.0	007.4	397.5	6704.0	0707.2	0500.0
901 0611100000	LITTLE SANTA ANITA CR NR SIERRA MADRE, CLIF.	240	1.94	120.0	34 11	110 02	70	5.05	2.30	1000	1.95	3.04	0.0	66.3	53.0	551.6	720.0	530.0
902 0611104000	TOPANGA CREEK NEAR TOPANGA BEACH, CALIF.	240	10.00	4077.0	34 04	110 35	00	5.41	2.20	1175	6.03	45.25	0.0	1040.7	1472.0	12572.0	15009.1	12200.0
903 0611107000	HONDA BARRANCA NEAR BONIS, CALIF.	240	2.57	414.0	34 16	110 02	05	4.06	1.00	1320	4.97	0.53	0.0	115.0	115.0	025.7	1000.5	459.9
904 0611116000	N FK MATILIJA CR AT MATILIJA HOT SPRS, CALIF.	240	15.00	3400.5	34 30	110 10	140	5.06	2.50	2500	7.20	53.32	0.0	1307.0	915.5	10201.6	13070.0	8440.0
905 0611120500	SAN JOSE CREEK NEAR GOLETA, CALIF.	240	5.51	1704.0	34 00	110 40	140	5.06	2.00	2000	7.10	14.01	0.0	505.2	460.2	2202.3	2457.0	2000.0
	Zone 22																	
906 0611304550	WILLOW CREEK NEAR ROUND MOUNTAIN, CALIF.	23C	2.01	042.4	40 40	121 59	140	0.41	2.20	1134	3.40	3.40	0.0	401.4	442.9	1030.0	1116.0	024.0
907 0611374000	SHINGLE CREEK NEAR SHINGLETOWN, CALIF.	23C	3.25	345.4	40 30	121 50	45	4.50	1.02	1110	4.75	4.70	0.0	107.7	100.0	497.4	572.0	600.0
908 0611378400	SOUTH FORK BATTLE CREEK NEAR MINERAL CALIF.	23C	33.00	1704.2	40 03	121 30	30	4.30	1.02	2720	10.50	44.00	0.0	052.1	703.0	2500.0	2060.4	2050.0
909 0611300045	LITTLE CHICO CREEK TRIBUTARY AT FOREST RANCH,	23C	0.05	04.5	38 53	121 40	70	5.00	2.30	020	1.70	1.70	0.0	32.5	31.0	134.0	157.3	90.0
910 0611400500	ANTELOPE CREEK NEAR TENNANT, CALIF.	23C	10.60	007.0	41 33	121 50	20	3.26	1.00	1700	0.50	20.05	5.0	340.4	340.4	1410.5	1593.1	1170.0
911 4111501300	CRYSTAL CREEK NEAR CHILOQUIN, OREG.	23C	5.77	05.7	42 34	121 00	10	2.00	0.00	1220	3.05	3.05	0.0	25.5	20.0	100.0	203.0	05.0
912 0611512000	FALL CREEK AT COPCO, CALIF.	23C	14.60	300.7	41 50	122 22	10	0.50	0.05	2047	11.20	20.35	0.0	101.5	170.2	727.7	773.7	075.0

Table 10. Continued.

1			2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SEQ	STATION	STATION NAME	SECT	AREA	010	LAT	LONG	R	P10	P50	ON	L	LL	STRG	QMEAN	Q2	Q50	Q100	QPEAK
		Zone 22																	
013	4111514000	KEENE CREEK NEAR ASHLAND, OREG.	23C	11.00	323.1	41 50	122 22	20	4.20	1.43	1487	5.30	0.00	0.0	137.5	85.2	643.5	775.5	751.0
014	4114192100	GLENN CREEK NEAR SALEM, OREG.	24C	2.72	150.2	44 57	123 00	40	3.00	1.14	300	1.00	1.90	0.0	81.1	79.5	211.7	237.6	172.0
015	4114195000	HASKINS CREEK NEAR MCMINNVILLE, OREG.	24C	0.76	531.2	45 00	123 25	70	4.00	1.33	1500	4.40	4.40	0.0	319.5	256.7	569.7	726.2	516.0
016	4114203000	BEAVER CREEK NEAR GLENWOOD, OREG.	24C	4.31	370.0	45 20	123 15	65	4.50	1.62	320	2.00	4.00	0.0	227.7	246.2	553.3	526.2	472.0
017	4114204100	BAYEMEN CREEK NEAR GLENWOOD, OREG.	24C	1.27	120.0	45 37	123 10	00	4.20	1.43	000	1.70	1.70	0.0	66.3	86.3	169.1	191.6	145.0
018	4114209500	ASBURY CREEK NR CANNON BEACH, OREG.	24C	1.07	003.0	45 40	123 50	70	6.10	2.01	2320	2.20	3.77	0.0	218.0	211.0	337.0	350.0	314.0
019	4114312100	PARROTT CREEK AT ROSEBURG, OREG.	24C	2.46	240.0	43 12	123 21	45	4.00	1.33	410	2.10	0.10	0.00	157.0	169.6	298.4	385.2	298.0
020	4114326600	GETTYS CREEK NR FORT ORFORD, OREG.	24C	1.48	220.2	43 00	124 13	140	5.02	1.91	200	1.45	1.45	0.0	147.1	158.9	266.0	314.6	245.0
021	0611015000	SWEETWATER RIVER NEAR DESCANSO, CALIF.	25	40.00	1412.1	32 50	116 37	40	4.07	1.81	2175	14.30	40.05	0.0	1129.7	451.9	11410.0	14347.2	11200.0
022	0611027000	GUEJITO CREEK NEAR SAN PASQUAL, CALIF.	25	22.00	1033.4	33 07	116 57	50	4.50	1.02	2400	10.00	44.00	0.0	439.4	219.7	3515.2	4218.2	2920.0
023	0611033000	W FK SAN LUIS REY R NR WARNER SPS, CALIF.	25	25.52	3520.2	33 10	116 40	100	4.07	1.81	2500	11.00	40.45	0.0	949.8	332.4	7123.5	9730.2	4260.0
024	0611044000	DE LUZ CREEK NEAR FALLBROOK, CALIF.	25	47.50	2455.7	33 22	117 19	85	5.70	1.84	1800	14.11	87.47	0.0	946.0	381.1	4310.7	4911.4	2600.0
025	0611046100	LAS FLORES CREEK NEAR OCEANSIDE, CALIF.	25	26.60	797.5	33 18	117 27	15	3.00	1.33	2285	10.20	55.00	0.0	275.0	247.5	1402.5	1677.5	950.0
026	0611046200	SAN ONOFRE CREEK NEAR SAN ONOFRE, CALIF.	25	34.00	6001.3	33 23	117 31	40	4.30	1.52	2020	9.13	79.32	0.0	792.0	651.4	3726.2	4439.7	2600.0
027	0611046350	CHISTIANITOS CREEK NEAR SAN CLEMENTE, CALIF.	25	29.00	1759.5	33 27	117 34	00	4.30	1.83	2330	0.32	40.19	0.0	500.5	293.3	3196.4	3812.2	1000.0
028	0611047000	ARROYO TRABUCO NR SAN JUAN CAPISTRANO, CALIF.	25	35.75	2524.1	33 32	117 40	65	4.30	1.52	4330	10.00	59.00	0.0	970.0	360.3	9780.0	13591.2	9240.0
		Zone 23																	
029	0215012000	WINSTANLEY CREEK NR KETCHIKAN, ALASKA	ALSK	15.50	6131.2	55 25	130 52	100	2.35	0.92	2050	7.57	10.40	10.0	1323.7	1217.6	2978.3	3375.4	4120.0
030	0215020000	CASCADE CREEK NR PETERSBURG, ALASKA	ALSK	23.00	2586.6	57 01	132 47	120	1.90	0.65	4000	10.07	15.73	1.0	1761.9	1761.9	3216.6	3565.9	3280.0
031	0215040000	DOROTHY CREEK NR JUNEAU, ALASKA	ALSK	15.20	1504.2	58 14	134 02	25	1.90	0.84	4501	7.14	10.54	14.0	916.1	558.0	1641.4	1960.4	1750.0
032	0215045000	SHEEP CREEK NR JUNEAU, ALASKA	ALSK	4.57	749.6	58 18	134 19	77	1.05	0.61	3210	3.36	5.25	0.0	489.9	489.9	925.0	994.5	840.0
033	0215050000	GOLD CREEK AT JUNEAU, ALASKA	ALSK	9.76	6152.9	58 18	134 24	70	1.05	0.62	4000	5.13	0.61	0.0	1362.6	1306.1	3335.4	3856.2	2650.0
034	0215060000	PERSEVERANCE CREEK NR WACKER, ALASKA	ALSK	2.01	606.2	55 25	131 40	165	2.30	0.69	2404	3.50	5.47	0.0	437.2	467.0	766.7	838.7	662.0
035	0215085100	OLD TOM CREEK NR KASAAN, ALASKA	ALSK	5.90	762.2	55 24	132 24	100	1.50	0.00	1574	3.10	0.10	10.0	564.6	590.5	897.7	969.6	883.0
036	0215098000	BARANOF RIVER AT BARANOF, ALASKA	ALSK	38.02	4030.6	57 05	134 50	77	2.45	0.99	5102	7.57	37.56	2.0	2864.3	2797.6	4759.1	5847.5	4170.0
037	0216216000	POWER CREEK NR CORDOVA, ALASKA	ALSK	22.55	4990.6	60 35	145 37	170	1.00	0.75	3965	10.50	97.00	3.0	2973.2	2973.2	6578.0	7264.5	5540.0
		Zone 24																	
038	1610010000	KAWAIKOI STREAM NR WAIMEA, HAWAII	HA	[illegible]	6655.3	22 08	159 37	2150	10.00	3.90	1100	2.00	4.34	50.0	4070.0	4159.6	11926.2	13987.5	11360.0
039	1610036000	MAKAWELI RIVER NR WAIMEA, HAWAII	HA	26.02	13300.0	21 57	159 40	570	0.00	2.63	5000	17.50	104.75	17.0	6916.7	11138.4	16217.5	17197.6	15900.0
040	1610049000	HANAPEPE R BELOW KEKAHA DTCH INTAKE NR WAIMEA, H.	HA	18.50	12016.0	21 57	159 33	600	9.13	3.60	3900	7.90	23.86	0.0	8718.4	8718.0	24236.3	27966.0	39600.0
041	1610060000	S F WAILUA RIVER NR LIHUE, HAWAII	HA	22.42	34835.0	22 07	159 23	900	10.04	3.90	4900	10.03	53.65	0.0	17955.2	17650.4	50357.6	68592.7	87300.0
042	1610068000	E BRCH N F WAILUA RIVER NR LIHUE, HAWAII	HA	6.26	6164.0	22 04	159 25	900	11.50	4.46	2505	3.50	10.20	0.0	3353.0	3186.1	7814.4	8767.0	10400.0
043	1620200000	N F KAUKONAHUA STRM AB RGT BR NR WAHIAWA, HAWAII	HA	1.30	4335.1	21 31	157 57	900	11.10	4.31	900	2.57	4.02	0.0	2761.2	3064.9	5412.0	5561.4	5490.0
044	1622600000	NORTH HALAWA STREAM NEAR AIEA, HAWAII	HA	3.45	6960.4	21 24	157 54	530	6.82	2.78	2200	3.70	5.82	0.0	2267.2	1600.9	9976.5	11941.0	6650.0
045	1622800000	MOANALUA STREAM NR HONOLULU, HAWAII	HA	2.73	2194.0	21 23	157 52	570	7.30	2.85	2300	3.52	5.50	0.0	1466.9	1519.4	4277.0	5036.7	4580.0
046	1623200000	NUUANU STRM, BLW RES 2 WSTWY NR HONOLULU, HAWAII	HA	3.30	2365.9	21 21	157 50	415	8.70	3.26	1200	2.54	3.07	0.0	1125.9	1013.3	4681.2	5584.5	6990.0
047	4350028000	RIO TANAMA NR UTUADO PUERTO RICO	PTR	18.40	6600.2	18 20	66 45	400	11.05	3.65	1002	0.20	22.02	0.0	5675.0	5440.0	10006.0	12007.0	6950.0
048	4350031000	RIO BANA MUERTO NR OROCOVIS PUERTO RICO	PTR	3.60	10020.2	18 10	66 25	530	10.15	3.75	401	3.94	7.51	0.0	8725.0	7906.5	12552.2	13740.0	9000.0
049	4350043000	RIO DE LA PLATA AT PROYECTO LA PLATA PUERTO RICO	PTR	54.00	57044.2	18 10	66 14	530	10.52	3.30	2000	10.55	110.20	0.0	21127.5	14789.2	100385.0	107327.7	60000.0
050	4350045700	RIO LAJAS AT YAO ALTA PUERTO RICO	PTR	6.46	5133.2	18 23	66 15	300	10.45	3.15	542	4.10	12.62	0.0	2421.3	1743.3	7772.4	8910.4	5700.0
051	4350071000	RIO FAJARDO NR FAJARDO PUERTO RICO	PTR	14.00	14847.5	18 18	65 42	020	12.50	3.00	3205	7.00	37.55	0.0	6050.0	8950.0	20050.0	23630.0	14500.0
052	4350100000	RIO DESCALABRADO NR LOS LLANOS, PUERTO RICO	PTR	10.00	10405.0	18 03	66 20	410	8.70	2.00	1010	11.20	15.40	0.0	4757.1	4757.1	15400.0	17006.7	10300.0
053	4350114000	RIO CERRILLOS NR PONCE, PUERTO RICO	PTR	17.90	8023.5	18 04	66 35	420	0.00	2.90	4107	11.50	24.00	0.0	3011.2	3620.0	14402.6	16059.0	9140.0
054	4350114400	RIO BUCANA NR PONCE, PUERTO RICO	PTR	20.00	11007.0	18 02	66 35	425	8.50	3.00	4130	25.20	51.00	0.0	8887.1	8887.1	15000.5	17249.2	12000.0
055	4350115000	RIO PORTUGUES NR PONCE, PUERTO RICO	PTR	8.82	5000.0	18 05	66 38	500	0.00	3.20	1020	0.10	11.40	0.0	2200.0	1051.2	10700.7	13045.0	9790.0
056	4350115900	RICO PORTUGUES AT HIGHWAY 14 AT PONCE, PUERTO RIC	PTR	10.00	8700.1	18 01	66 38	320	8.46	3.10	3203	13.30	24.00	0.0	3164.2	3417.3	8900.0	11350.5	8800.0
057	4350121000	RIO TALLABOA AT PENUELAS PUERTO RICO	PTR	24.00	13264.6	18 03	66 44	500	12.40	3.07	1340	10.00	42.57	0.0	6002.3	5612.0	18000.0	21457.5	14800.0
058	4350124000	RIO GUAYANILLA NR GUAYANILLA PUERTO RICO	PTR	18.50	4510.0	18 03	66 40	500	12.70	4.90	3384	0.97	24.73	0.0	2403.3	2334.3	8585.0	7449.9	5600.0

Table 10. Continued. Explanation of column headings for Table 10.

1. Station. This column has three types of numbers. The first two designate what state the number applies to. The balance of the numbers fall into two categories--the first would be the USGS designation. For example the first station is 2704015500. The 27 says Minnesota. The 04 says the station drains into the Great Lakes basins while the balance of the numbers designate a particular watershed. The second category of numbers are the ARS numbers. For example the last station of Zone 01 is 12 ARS 8.3. The 12 says the state is Florida and the ARS says this is an ARS watershed and the 8.3 says it is watershed No. 3 at Ft. Lauderdale.
2. Sect. This is the physiographic section from the Fenneman and Johnson map.
3. Area. This is the watershed area in square miles.
4. Q10. This is the 10-year runoff peak in cfs.
5. Lat. Latitude in degrees and minutes.
6. Long. Longitude in degrees and minutes.
7. R. This is the mean annual rainfall erosivity index explained in the text.
8. P10. The 10-year 10-minute rainfall intensity in inches per hour.
9. P60. The 10-year 1-hour rainfall in inches.
10. DH. The difference in elevation between the intercept of the main drainage channel with the watershed boundary and the culvert site. Feet.
11. L. This is the length of the principal drainage channel from the culvert site to the watershed rim. Miles.
12. LL. The total lengths of all drainage channels on a watershed. Miles.
13. STRG. The percentage of the watershed covered by lakes, swamps, playas, etc.
14. QMEAN. The arithmetic mean of the annual runoff peaks in cfs.
15. Q_2. The 2-year or median runoff peak in cfs.
16. Q_{50}. The 50-year runoff peak in cfs.
17. Q_{100}. The 100-year runoff peak in cfs.
18. Q_{PEAK}. The maximum runoff of record in cfs.

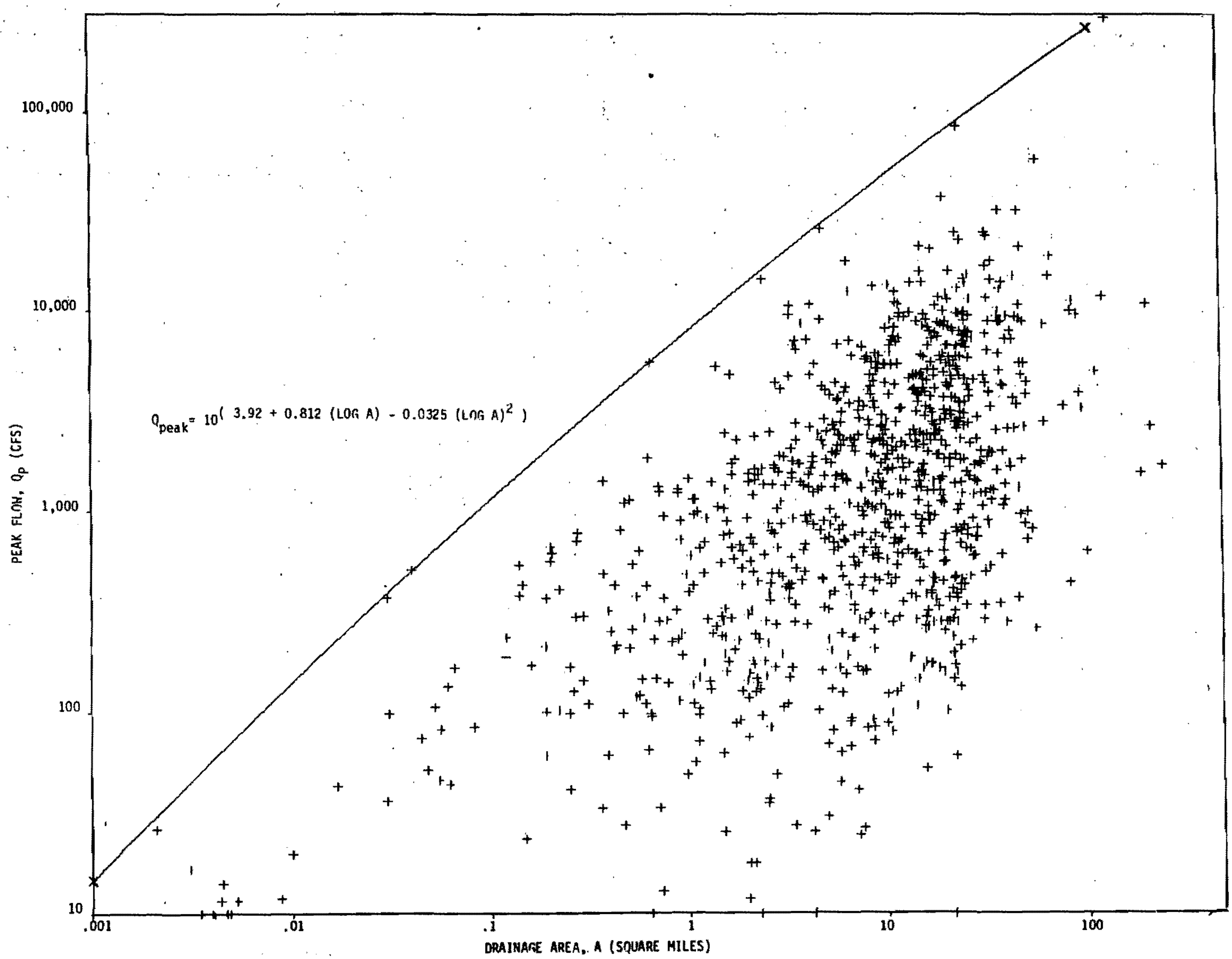

Figure 39. The probable maximum runoff peaks and envelope curve for different sized areas in the United States and Puerto Rico.

In its $\log_{10}$ linear form, it has a multiple correlation coefficient, r, of 0.854 with 894 degrees of freedom and a standard error, PS_e, of 13 percent of $\log_{10} (\bar{q}_{10})$. This amounts to a standard error of a point estimate, PS_{EE}, of 119 percent of $\bar{q}_{10}$.

A nomograph for the solution of the equation was constructed and is shown in Appendix H-00. The curve for the relationship between the measured and estimated values of q_{10} with the 95 percent confidence intervals about the estimate for the standard error and the standard deviation of a point estimate are shown in Appendix G-00.

The second set of regressions used the same three parameters but a separate equation was computed for each of the 24 hydrophysiographic zones. These 24 3-parameter zoned regression equations are shown in Appendix H as Table H-1 along with the standard error of the estimate of $\hat{q}_{10(ARDH)}$ as a percent of the measured $\bar{q}_{10}$ for the data used in its development. Nomographs for each equation were constructed and are shown in Appendix H-1 through H-24.

The third regression was a 5-parameter all zone equation. This equation is

$$\hat{q}_{10} = 1.5102\ A^{0.4707}\ R^{0.8386}\ DH^{0.1718}\ L^{0.1764}\ P_{60}^{\ 0.3476}$$

In its $\log_{10}$ linear form, it has an r of 0.856 with 892 degrees of freedom and a percent standard error, PS_e, of 12 percent of $\log_{10} (\bar{q}_{10})$. This translates into a percent standard error of a point estimate, PS_{EE}, of 116 percent of $\bar{q}_{10}$.

The fourth set of regressions are the equations obtained by zoning and then determining the individual zone regressions using 5 parameters for each of the 24 hydrophysiographic zones. These equations are given in Appendix H as Table H-2 with their respective percent standard errors of estimate and numbers of watersheds used in their development.

The fifth regression involved the 7 parameters A, R, DH, L, LL, P_{10}, and P_{60} and is called the 7-parameter all zone equation. This equation is

$$\hat{q}_{10} = 1.8816\ A^{0.3877}\ R^{0.8322}\ DH^{0.1461}\ L^{-0.0236}\ LL^{0.2613}\ P_{10}^{\ -0.1891}\ P_{60}^{\ 0.4668}$$

This equation has an r of 0.860 in its $\log_{10}$ linear form with a PS_e of 12 percent with 890 degrees of freedom. This yields a PS_{EE} of 116 percent of $\bar{q}_{10}$.

The sixth set of regressions are the equations obtained when the individual zone data are regressed using the same 7 parameters. The different zone equations are shown with the respective errors of estimate as percentages of the measured $\bar{q}_{10}$ in Appendix H, Table H-3.

An effort to improve the predicting ability of the 3-parameter all zone equation analogous to that used in the original Potter method was made by

Appendices A is in Volume III
Appendices B, C, D, E, F, G, and H are in Volume II

regressing $\log_{10}$ of the observed 10-year runoff peaks, q_{10}, for each zone against $\log_{10}$ of the estimated 10-year peaks given by the 3-parameter all zone equation, $\hat{q}_{10(3AZ)}$. The correction equations thus derived are given in Appendix H, Table H-4. In addition, a scatter diagram and a plot of the correction curve derived for each zone along with the 95 percent confidence intervals for a mean and for a point estimate are given in Appendix H as Appendixes H-25 through H-48 for zones 1 through 24 respectively. The percent standard error of estimate, PS_{EE}, was reduced for most zones with the average reducing from 91.5 percent for the uncorrected estimates to 87.1 for the corrected estimates. Although this reduction is not very appreciable, a major reason for using the correction equation and curves with the 3-parameter all zone equation is to reduce the bias that it may have when used in a particular zone.

A summary of the respective prediction errors expected from the various regression equations derived above is tabulated in Table 11 (p. 95). The 3-parameter all zone equation appears to be nearly as good as the other two all zone equations, with the PS_{EE} being reduced only 3 percent by including more than the three independent variables included in the 3-parameter equations and the r increasing only from 0.854 to 0.860 with a corresponding decrease of only 1 percent in PS_e. The same observation is generally true for the individual zone equations. In those zones where significant improvement appears, e.g., zone 6, the number of observations is small; for zone 6 there are only 12 so the degrees of freedom are reduced as the number of variables increases (for zone 6 the degree of freedom goes from 8 for the 3-parameter equations to only four for the 7-parameter equations) and the improvement is not as statistically significant as it may appear from Table 11 (p. 95). Therefore, the three parameter equations, either the all zone or the individual zone equations are preferred for practical use. As mentioned previously all of the equations have been tabulated in Appendix H and nomographs for graphically solving the 3-parameter equations have been prepared and are also included there. In addition, the 95 percent confidence limits for a mean and for an individual point estimate as well as the point scatter are shown in Appendix G for all of the 3-parameter equations derived from the 898 watersheds having negligible storage.

Methods test

Fifty-one watersheds, one from each State and Puerto Rico, were selected at random from the watersheds not used in the regressions except where data for the SCS method were unavailable. Here a second choice was made. For these watersheds the measured q_{10}, and q_{10} estimates using the SCS method, the 3-parameter all zone and zoned and the 7-parameter all zone and zoned were calculated and are shown in Table 12 (p. 96). The standard errors of estimate for each of the 5 procedures are shown at the bottom of Table 12 (p. 96). The mean error is the algebraic sum of the percentages of the estimate divided by 51. The average error is the average of the magnitudes of the errors. The percent standard error of the estimate is a percentage of the mean value of the measured ten year peaks, $\bar{q}_{10}$.

Summary and Conclusions

A curve was developed which the writers call the probable maximum runoff peak. It has the equation

Table 11. Summary of the prediction errors associated with estimating 10-year peak runoff from the various regression equations given in Appendix H.

Zone	$\bar{q}_{10}$ cfs	n	3-Parameter Equations PS_{EE} %	3-Parameter Equations PS_e %	3-Parameter Equations r	5-Parameter Equations PS_{EE} %	5-Parameter Equations PS_e %	5-Parameter Equations r	7-Parameter Equations PS_{EE} %	7-Parameter Equations PS_e %	7-Parameter Equations r	Un-corrected PS_{EE} %	3-Parameter All Zone Eq. Corrected by Zone PS_{EE} %	3-Parameter All Zone Eq. Corrected by Zone PS_e %	3-Parameter All Zone Eq. Corrected by Zone r
All Zone	1922	898	119	13	0.854	116	13	0.856	116	12	0.860	119	119	13	0.854
1	1058	42	84	13	0.774	76	11	0.844	67	11	0.876	97	92	16	0.595
2	4747	28	60	7	0.798	59	7	0.818	59	7	0.831	68	67	8	0.754
3	2295	14	108	9	0.925	110	10	0.930	97	11	0.934	105	105	9	0.912
4	1979	62	56	9	0.795	54	9	0.809	53	9	0.809	63	60	9	0.770
5	1472	35	44	8	0.927	51	8	0.931	45	8	0.942	58	75	8	0.912
6	2014	12	88	7	0.840	32	4	0.970	33	5	0.971	92	92	10	0.622
7	2306	33	76	7	0.918	76	7	0.919	79	7	0.929	103	88	7	0.893
8	2079	39	51	7	0.952	47	6	0.964	44	6	0.968	57	62	7	0.944
9	1170	37	85	8	0.850	87	8	0.865	83	8	0.879	88	88	9	0.800
10	1986	10	67	12	0.882	68	13	0.905	47	17	0.914	76	83	14	0.745
11	4320	32	43	7	0.902	42	6	0.921	39	6	0.923	81	61	9	0.764
12	461	34	115	21	0.672	115	20	0.749	89	19	0.793	106	107	23	0.587
13	2260	166	83	12	0.897	82	12	0.899	85	12	0.901	108	91	13	0.887
14	1304	30	132	17	0.762	134	17	0.789	133	18	0.796	133	121	18	0.704
15	356	37	91	14	0.795	91	14	0.800	97	14	0.808	118	101	21	0.375
16	624	21	95	8	0.897	73	7	0.940	72	7	0.941	88	73	8	0.893
17	368	56	89	15	0.784	71	14	0.809	76	14	0.825	107	98	18	0.622
18	1311	14	107	23	0.643	88	24	0.708	117	20	0.857	143	124	23	0.520
19	1586	40	83	13	0.833	82	13	0.833	82	13	0.838	125	84	13	0.807
20	759	42	103	10	0.926	104	9	0.936	106	10	0.937	103	131	12	0.883
21	1625	68	67	8	0.924	68	7	0.931	69	8	0.931	94	138	11	0.836
22	1013	22	36	5	0.974	34	4	0.979	30	4	0.986	45	38	5	0.966
23	2519	6	35	5	0.961	-	-	-	-	-	-	47	40	6	0.886
24	12277	18	56	5	0.882	42	4	0.917	34	4	0.924	92	72	6	0.772
Average error of estimate			77.3%			73.3%			71.2%			91.5%	87.1%		

Notes explaining the column headings:

$\bar{q}_{10}$ is the mean ten year peak flow calculated from the observed ten year peak flows for each zone.

n is the number of watersheds used in deriving the equation.

PS_{EE} is the standard error of estimate expressed as a percent of the zone $\bar{q}_{10}$. It is calculated by the equation:

$$PS_{EE} = \frac{100}{\bar{q}_{10}} \sqrt{\frac{\Sigma(q_{10} - \hat{q}_{10(K)})^2}{n - 2}}$$

PS_e is the standard error of the $\log_{10}$ linear equation expressed as a percent of $\log_{10}\bar{q}_{10}$. It is calculated by the equation:

$$PS_e = \frac{100}{\log_{10} \bar{q}_{10}} \sqrt{\frac{\Sigma(\log_{10}q_{10} - \log_{10}\hat{q}_{10(K)})^2}{n - 2}}$$

r is the correlation coefficient between q_{10} and $\hat{q}_{10}$. It is calculated by the equation:

$$r = \frac{\Sigma(x - \bar{x})\ (y - \bar{y})}{\sqrt{\Sigma(x - \bar{x})^2\ (y - \bar{y})^2}}$$

where x and y are any two independent and dependent variables respectively.

Table 12. Comparison of 10-year peak flow estimates by the SCS method and four USU methods.

State	Measured q_{10}	SCS Method q_{10}		USU (3-Parameter All Zone)		USU (7-Parameter All Zone)		USU (3-Parameter Zoned)		USU (7-Parameter Zoned)	
		q_{10} Estimate	% Error 1[a]	q_{10} Estimate	% Error 2	q_{10} Estimate	% Error 3	q_{10} Estimate	% Error 4	q_{10} Estimate	% Error 5
Alabama	2,070	650	-219	2,162	+ 4	1,461	- 42	1,363	- 52	1,441	- 44
Alaska	2,131	350	-509	2,457	+ 13	1,366	- 56	3,025	+ 30	2,104	- 1
Arizona	265	900	+ 71	124	-112	139	- 90	347	+ 24	329	+ 19
Arkansas	1,790	1,200	- 49	1,289	- 39	1,121	- 59	2,145	+ 17	1,693	- 6
California	385	1,200	+ 68	454	+ 15	369	- 4	214	- 80	322	- 19
Colorado	271	165	- 64	353	+ 23	421	+ 36	666	+ 59	851	+ 68
Connecticut	1,562	350	-346	1,556	+0.3	1,379	- 13	1,172	- 33	925	- 69
Delaware	3,489	150	-2226	1,485	-135	1,470	-137	1,266	-175	1,119	-211
Florida	2,064	3,500	+ 41	3,495	+ 41	2,959	+ 30	1,162	- 77	2,117	+ 2
Georgia	667	70	-853	682	+ 2	569	- 17	425	- 56	405	- 65
Hawaii	6,655	5,200	- 28	6,473	- 3	10,395	+ 36	6,408	- 4	5,465	- 22
Idaho	153	700	+ 78	485	+ 68	639	+ 76	248	+ 39	313	+ 51
Illinois	630	290	-117	249	-100	342	- 84	358	- 76	380	- 65
Indiana	6	10	+ 40	8.8	+ 3	40	+ 84	10	+ 41	19	+ 69
Iowa	1,202	950	- 27	632	- 90	593	-103	1,143	- 5	933	- 29
Kansas	1,142	1,200	+ 5	875	- 31	1,186	+ 4	1,858	+ 39	2,612	+ 56
Kentucky	2,382	380	-527	2,279	- 4	2,213	- 8	4,238	+ 44	3,633	+ 34
Louisiana	6,457	2,000	-223	6,824	- 5	5,035	- 28	4,016	- 61	4,558	- 42
Maine	248	500	+ 50	446	+ 44	368	+ 33	345	+ 28	285	+ 12
Maryland	530	2,400	+ 78	825	+ 36	934	+ 43	430	- 23	421	- 26
Massachusetts	245	350	+ 29	606	+ 60	581	+ 58	436	+ 44	364	+ 33
Michigan	617	1,000	+ 38	872	+ 29	910	+ 32	516	- 20	772	+ 20
Minnesota	2,415	1,000	-142	1,303	- 84	1,116	-116	2,053	- 18	1,900	- 27
Mississippi	4,961	2,200	-126	5,523	+ 10	4,821	- 3	4,294	- 15	4,611	- 8
Missouri	908	1,200	+ 24	460	- 99	572	- 59	681	- 33	640	- 42
Montana	531	300	- 77	244	-118	311	- 71	857	+ 38	893	+ 41
Nebraska	790	390	-103	403	- 96	196	-303	279	-183	353	-124
Nevada	550	2,800	+ 80	551	0	241	-128	189	-191	336	- 64
New Hampshire	487	375	- 30	902	+ 38	762	+ 36	614	+ 21	517	+ 6
New Jersey	726	1,400	+ 48	432	- 68	378	- 92	368	- 97	458	- 58
New Mexico	923	2,000	+ 54	849	- 9	925	0	1,133	+ 18	833	- 11
New York	1,181	300	-294	1,142	- 3	1,221	+ 3	701	- 68	1,177	0
North Carolina	1,596	440	-263	1,881	+ 15	1,362	- 17	1,332	- 4	1,592	0
North Dakota	102	820	+ 88	386	+ 73	276	+ 63	197	+ 48	326	+ 68
Ohio	845	800	- 6	596	- 41	519	- 63	1,124	+ 25	822	- 3
Oklahoma	12,250	28,000	+ 56	12,244	0	8,060	- 52	14,962	+ 18	11,657	- 5
Oregon	200	900	+ 78	232	+ 14	246	+ 19	232	+ 14	313	+ 36
Pennsylvania	1,770	300	-490	1,784	+ 1	888	- 99	1,249	- 42	1,324	- 33
Puerto Rico	8,569	8,900	+ 5	6,567	- 30	6,426	- 33	10,553	+ 19	9,484	+ 10
Rhode Island	652	300	-117	1,869	+ 65	1,698	+ 62	1,593	+ 59	1,076	+ 39
South Carolina	3,354	500	-571	5,382	- 38	4,049	+ 17	4,560	+ 26	3,989	+ 16
South Dakota	98	1,600	+ 94	387	+ 76	406	+ 76	208	- 53	393	+ 75
Tennessee	3,325	610	-445	2,704	- 23	2,994	- 11	3,925	+ 15	4,111	+ 19
Texas	75.2	30	-150	83	+ 10	63	- 19	83.9	+ 10	88.2	+ 15
Utah	25	510	+ 95	230	+ 89	273	+ 91	79	+ 68	36	+ 27
Vermont	972	345	-182	1,218	+ 20	985	+ 1	1,336	+ 27	1,133	+ 14
Virginia	22.8	70	+ 67	35.9	+ 32	41	+ 44	30.7	+ 26	28.1	+ 19
Washington	211	800	+ 74	533	+ 60	723	+ 71	382	+ 45	420	+ 49
West Virginia	1,644	220	-647	1,485	+ 10	1,581	- 4	1,921	+ 14	1,961	+ 16
Wisconsin	68.4	240	+ 72	72	+ 5	76	+ 10	104	+ 34	84	+ 18
Wyoming	537	1,500	+ 65	596	+ 10	650	+ 17	594	+ 9	690	+ 22
	Mean error		-145.75		-3.14		-15.08		-8.08		-1.12
	Average error		200.57		40.32		51.24		44.41		37.08
Percent Standard Error of Estimate			160		39		62		50		38

[a]Errors 1, 2, 3, 4, and 5 are a percent of the estimate. The standard error of the estimate values are percent of measured q_{10}.

$$q_{P(max)} = 10^{[3.92 + 0.812 (\log A) - 0.0325 (\log A)^2]}$$

Besides standard procedures used for sizing of culverts and using rating curves and other factors, the above curve can be used to determine the maximum safe watershed area that can be used with each size of culvert installation. In those States that administratively use a certain minimum culvert size this would give the maximum size watershed which did not require a $\hat{q}_{10}$ estimate of runoff peak.

For practical field use, it appears that a 3-parameter all zone regression may be used to forecast runoff peaks with a mean standard error of the estimate of about 119 percent. Additional parameters up to seven did not appreciably improve these estimates. If zoning is introduced the standard errors of the estimate range between 35 percent and 132 percent with an average value of 77 percent. An appreciable portion of the error comes from zones 3, 12, 14, 18, and 20. It is felt that the map of R might be the source of at least a portion of the errors in these zones.

Nomographs have been constructed for the solution of all of the 3-parameter equations (see Appendix H).

All of the pertinent parameters may be measured from 7½ or 15 minute quadrangle maps. When these maps are not available the 3-parameters can be reliably measured from the 1:250,000 scale maps but the remaining parameters require use of correction curves.

The writers suggest calling these procedures the FHWA method and suggest that it not presently be used on areas larger than 100 square miles.

PHASE III

Field Visits and Evaluation

Contacts were made with at least one person from each State. As a general rule, the personnel of the States were very cooperative and candid. Always, they went to great lengths to supply the information requested.

Questions

The questions asked in the interviews always embodied some form of the following:

1. Have you or do you use Potter's method? If so, what do you like about it and what do you dislike about it?
2. What methods do you use for the hydrologic design of culverts for small watersheds? What do you like and dislike about each?
3. Do you utilize the storage provided by fills or borrow areas to decrease peak flows? Do you include such storage in your design?
4. In what form would you prefer to have a design method presented?
5. Have the methods you use given you the kind of results you had hoped for?

6. Do you consider a certain percentage of failures as a normal part of the risk?

7. When there are failures do you or members of your staff have an opportunity to see and study the failure or are failures buried by repairs before you are aware of them?

Results

The answers to the questions may be summarized as follows:

1. Only three of the specialists queried had ever used Potter's method. Two or three others said they thought the method had been tried in their State prior to the time of the interview. A common academic reaction was that the T factor was too difficult to keep straight whether the upper 0.3 or the lower 0.7 was the division point of the slope, thus introducing blunders. Universally, personnel liked the general format of the Potter method. Generally separate groups were preferred. They liked cycle graphs, alignments charts, or other mechanical procedures or aides.

2. The most common and universally used method was some form of the Rational method. Most States used the Rational method for areas smaller than 200 acres, but one State used the Rational method on all drainages regardless of size even to large rivers. Incidentally, this State reported no knowledge of failures since adopting the Rational method. From personal observations in that State, it appeared their designs approached sizes accommodating floods approaching the magnitude of the maximum probable flood. Another observation in connection with the use of the Rational method was the general failure to observe the lower limit on the time of concentration or lag time whichever was in use.

By far the most widely used forecast methods were those proposed by the local U.S. Geological Survey units for States who had progressed this far in the small watersheds program such as Texas (Schroeder, ref. 15). In general, the States have faith in these methods but would much prefer more computational aids such as those of Schroeder, enabling project engineers to make field checks if questions arise. In Texas, these aids were furnished. In one or two others, States had constructed their own aids.

Two States were using some of the old sewerage formulas for watersheds of all sizes. In contrast to this, 15 States have multiple methods which they use to duplicate each flood design estimate. They adopt the result which seems most logical from engineering judgment.

No State was completely happy with the method or methods they were using and most personnel expressed a desire for improvement. With such a desirable attitude, improved methods should be forthcoming and will be rapidly adopted.

3. Only five States were using fill or borrow storage to reduce the magnitudes of flows and thus to reduce culvert size. The distinct impression was gained, however, that an appreciable number of States were contemplating moves to include storage as a part of the design procedure. In these States, a

complete flood peak hydrograph of the flow becomes desirable or necessary. Only one State was beginning to accumulate hydrograph data at the time of the visit, however.

4. The preferred format in nearly all States was some type of graphical or alignment chart suitable for the use of project engineers in the field. Nearly a dozen States expressed a need to incorporate maximum versatility in any new method.

5. No State was completely satisfied with its present method. Each State felt its method either over or under designed or was too complex. The writers believe the real problem here lies in their concept of a risk factor. Thus it is also involved in question No. 6.

6. The great majority of interviewees felt that some failures should occur, but the same people also felt strongly that failures should only result from unusual events or circumstances. Use of risk factors needs to be formulated in a better way for convenient field use. If a culvert is designed to accommodate a 50-year storm with a 5 percent chance of failure, the structure must actually accommodate a 1000-year flood event. The impression was gained that personnel were not commonly familiar with this concept.

7. Nearly all States had the problem of feedback to the designer. If failures occur on small culverts, the damage is nearly always repaired by maintenance crews before the design people are aware that any damage occurred. Naturally, this is not true of crossings on larger streams or where bridges are involved. It would certainly appear to be beneficial to design people to be informed of any kind of failure in time to examine each incident prior to repair, particularly failures from small area floods.

PHASE IV

Evaluation and Analysis

A. Conclusions from a study of flood damage. As a direct consequence of the study of flood damage and the literature, the writers feel that flood damage can best be expressed by the stage. This is illustrated by Figure 40 (p. 100) which is computed from the data of Grigg and Helweg (ref. 8a) and fit to a log-extremal distribution. The maximum stage as used here to reduce the data to a common base is the maximum for each group of data and the maximum damage is the damage resulting from this maximum head. The data show considerable scatter depending upon the location but all seem to linearize with the transforms used.

It seems clear that the single most important flood parameter is stage. The peak flows are exponentially related to stage. Thus the advantages of using fills to reduce culvert sizes must be carefully weighed against the increased flood hazard as a result of increasing the stage.

B. Frequency problems. The details of the frequency problems have been discussed in earlier sections so the relative risk involved only, will be

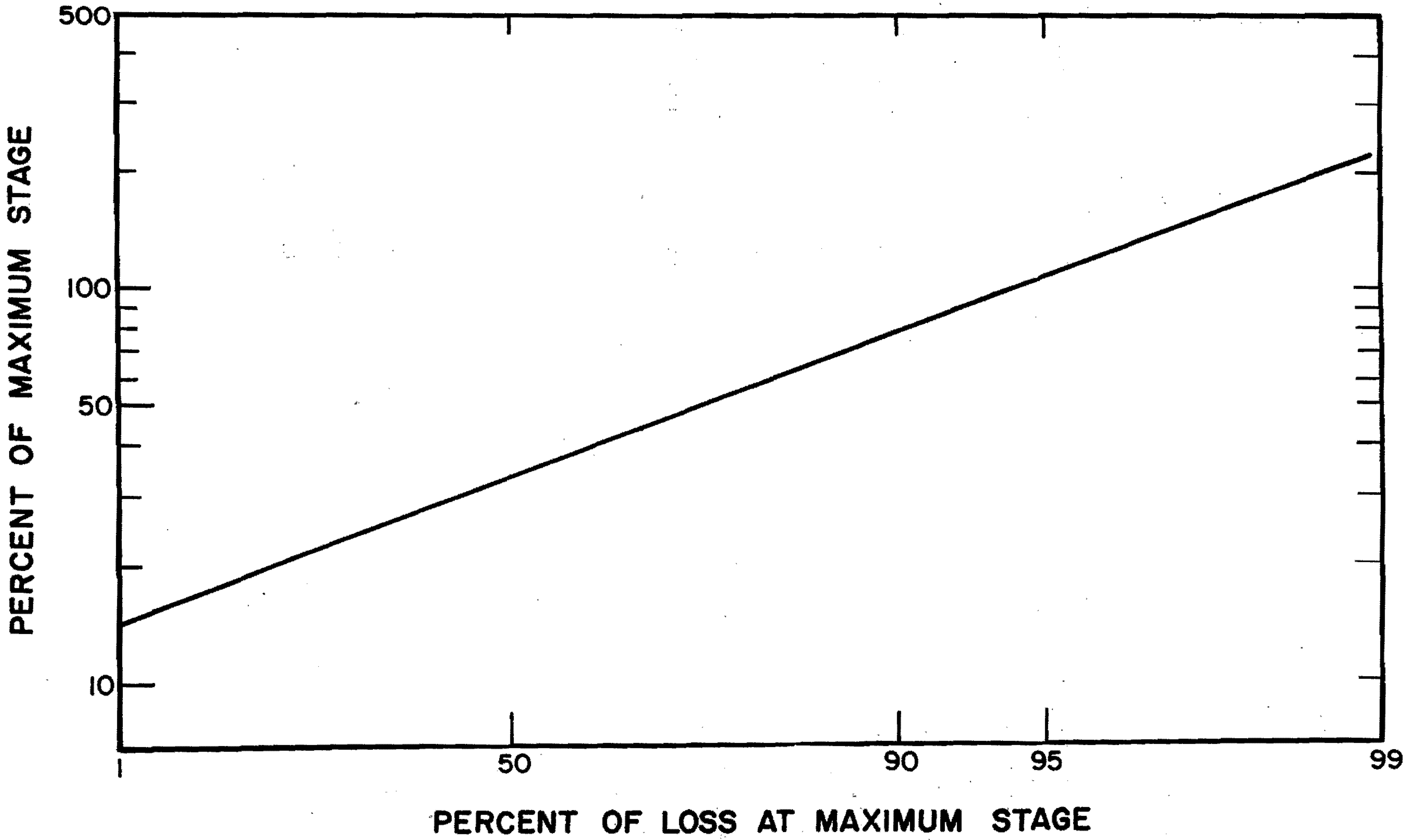

Figure 40. The relationship of percent of maximum stage to the percent of damage at maximum stage.

discussed here. Figure 41 (p. 102) shows the percent chance of having floods in the size for the different return periods occur in different time periods from one year to 100 years. The randomly generated frequency curves do not generally coincide with the curves from actual data. For example, Figure 42 (p. 103) shows a generated set of data compared to the measured data for the USGS watershed numbered 06658500, Laramie River near Jelm, Wyoming.

C. Conclusions from entire study. The validity of Potter's approach was verified and updated equations and graphs were produced using current and corrected data for the 96 watersheds originally selected by Potter for deriving his method.

When 25 watersheds were chosen at random from the same States from which Potter chose his watersheds, the standard errors of estimate were as follows: $q_{10(ATPK)}$ = 127 percent, zoned into Potter zones 157 percent and $q_{10(ATPC)}$ (using Potter's published curves) = 197 percent of the measured values.

The parameters used by Potter were simplified into their measured components and one additional parameter, R, introduced. Furthermore, the zoning used by Potter was extended and simplified through the use of the physiographic sections of the United States. Through use of the measured 10-year peak runoff per unit area and the statistical t test, these zones were grouped until 24 covered all of the United States and Puerto Rico. The parameters measured on a large sample of watersheds representing these 24 zones were area (A), 10-year peak runoff (q_{10}), location (Latitude and Longitude), iso-erodent value (R), 10-year 10-minute precipitation (P_{10}), 10-year 60-minute precipitation (P_{60}), difference in elevation between the watershed rim at the extension of the principal drainage and the culvert site (DH), the length of the principal drainage (L), the total lengths of all drainages on each watershed and the storage (S).

Regressions between q_{10} and these parameters were made using various transforms and each parameter weight evaluated with the statistical F test. These regressions were made both on an all sample basis and by the above hydrophysiographic zones.

It was shown that most of the variation in q_{10} could be accounted for by area, A, R, and elevation difference DH. The standard error of estimate for the three parameters, when $\hat{q}_{10}$ estimated was compared to q_{10} measured as a percentage of the measured for about 900 watersheds, was 119 percent and with seven parameters it was 116 percent. After zoning the same errors as means became 77.3 percent for the three parameters and 71.2 percent for the seven parameters.

When the q_{10} for each zone's watersheds were estimated with the 3-parameter all zone equation uncorrected for zone and then corrected for zoning, the mean standard errors were 91.5 percent and 87.1 percent respectively.

A 51 watershed sample (one from each State and Puerto Rico), correcting the estimates for storage, and comparing the SCS method on the same watersheds gave the following percent standard errors of estimate; SCS, 160; all zone

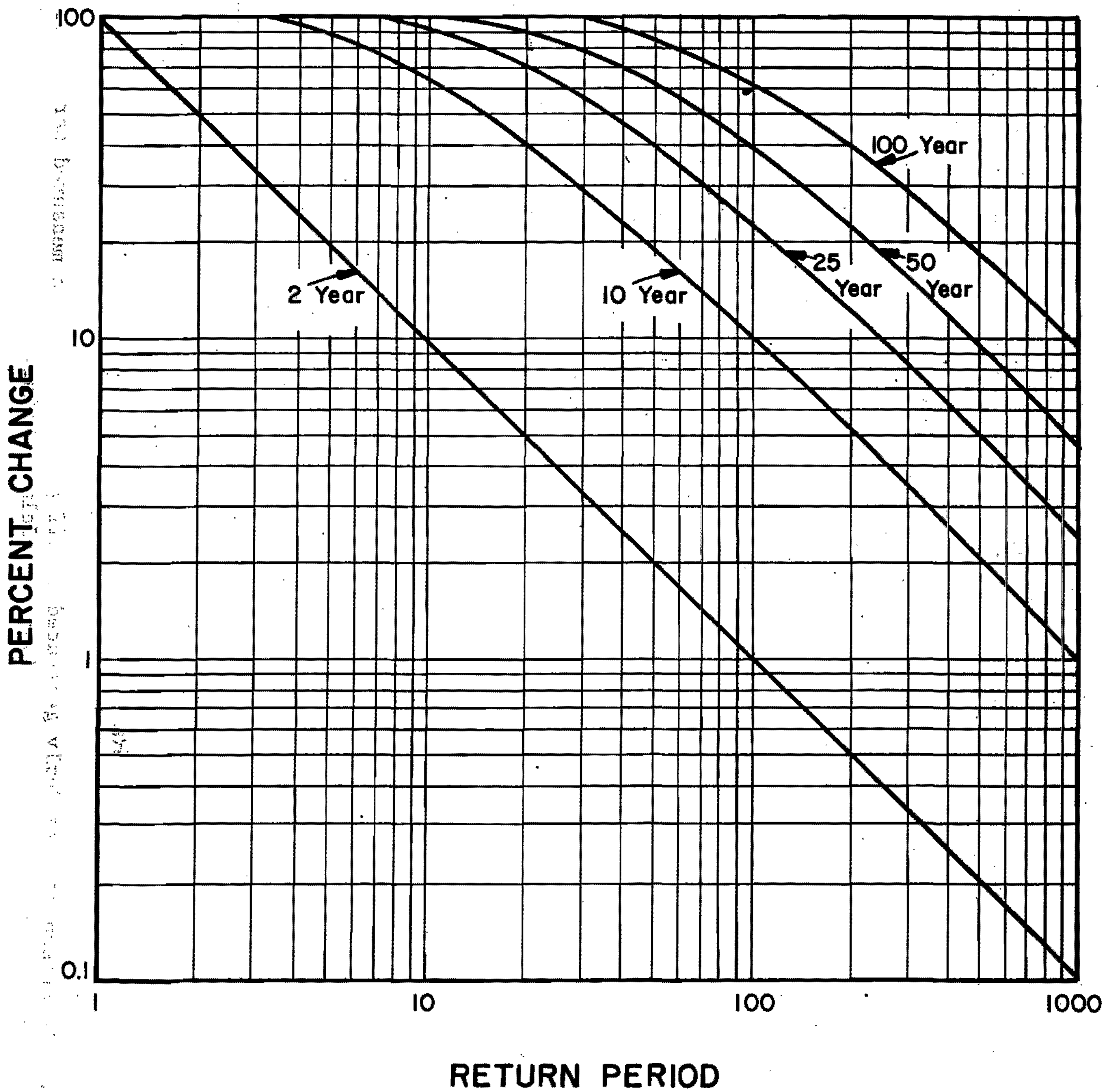

Figure 41. The chance of equaling or exceeding a flood peak for a given return period in periods of 2, 10, 25, 50, and 100 years.

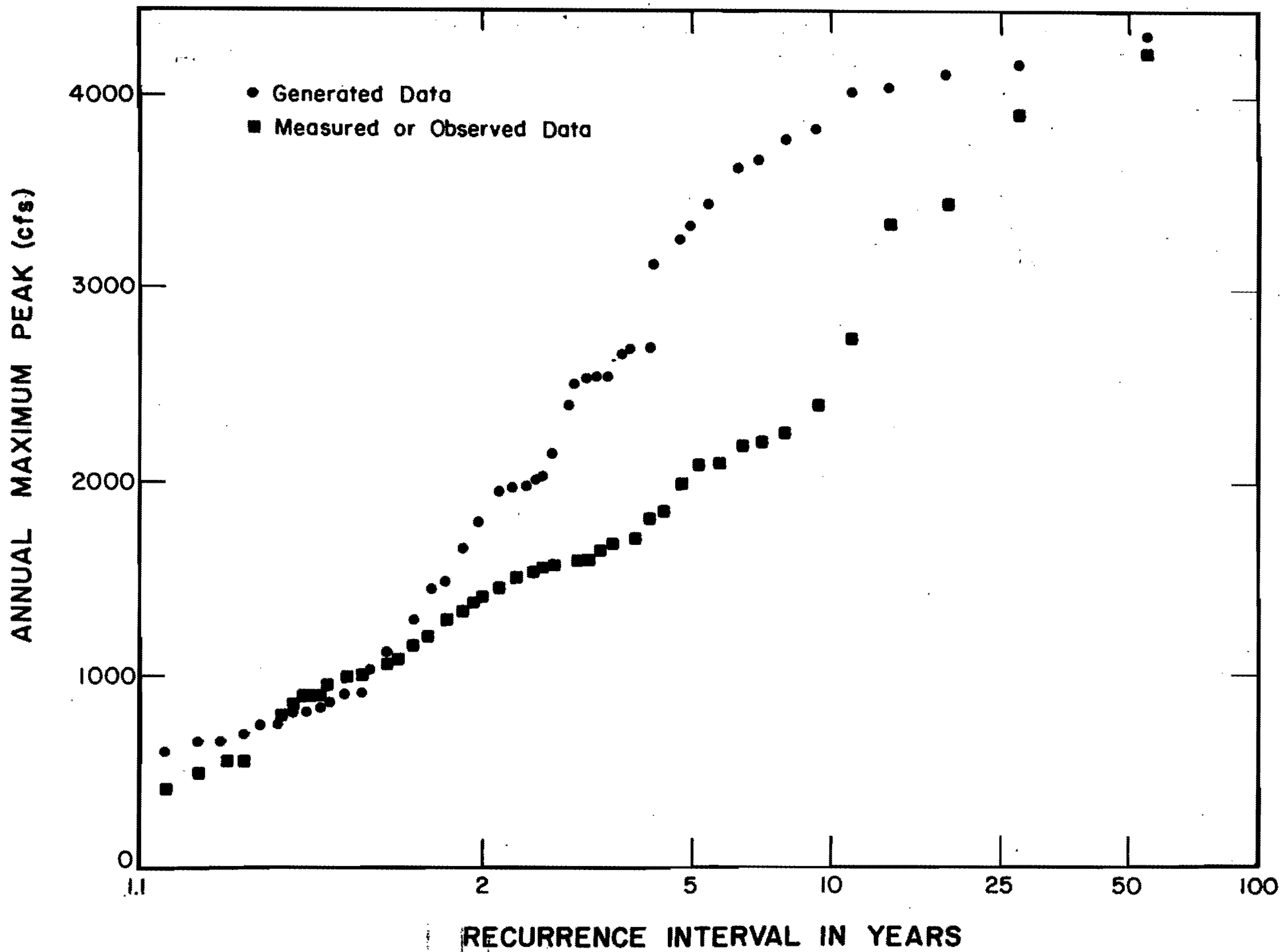

Figure 42. Comparison of a randomly generated runoff peak series and a measured series for USGS watershed 06658500, Laramie River near Jelm, Wyoming.

3-parameter, 39; all zone 7-parameter, 143; 3-parameter zoned, 50 and 7-parameter zoned, 38 as percentages of the measured values. None of these watersheds were used in development of the equations.

Flood risk is related to the flood stage as well as frequencies so must be considered except where using maximum likely flood peaks for the entire USA.

No single distribution will fit all flood peak frequency data but some are more likely to fit than others. The writers recommend that measured points be plotted along with the fitted distributions for extrapolation.

A greatly improved method for forecasting runoff peaks at known recurrence intervals is simple and more reliable than previously existing methods.

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CROSS REFERENCES TO APPENDICES

FHWA decided to print Appendix A separately from the other appendices to facilitate a plan to selectively distribute Appendix A in its entirety or in parts applicable to a given State.

APPENDIX A

Appendix A consists of approximately 220 pages of flood frequency curves and data that were used in the study. This appendix is printed in Vol. III which is report No. FHWA-RD-77-160. Appendix A as a whole will be of interest to researchers who wish to develop new equations and to scientists who wish to validate the equations that have been developed. Otherewise only portions of Appendix A will be of interest to a given State.

In the first printing we will keep Appendix A intact but will make very limited distribution. In subsequent printings, we plan to separate Appendix A by States if it is needed to enhance design procedures promoted by FHWA.

APPENDIX B

Appendix B consists of a detailed Hydrophysiographic zone map for each State. Appendix B is included in Vol II which is Report No. FHWA-RD-77-159.

APPENDIX C

Appendix C consists of a detailed Iso-erodent map for each State. Appendix C is included in Volume II.

APPENDIX D

Appendix D consists of a detailed 10-year, 60-minute precipitation, P60, map for each State. These maps are necessary to use the 5-parameter prediction equations. Appendix D is included in Vol II.

APPENDIX E

Appendix E consists of a detailed 10-year, 10-minute precipitation, P10, map for each State. These maps are necessary to use the 7-parameter prediction equations. Appendix E is included in Vol II.

APPENDIX F

Appendix F contains the 10-year, April 1 snow water equivalent maps for each of the Western United States including Alaska. Appendix F is also included in Vol II.

APPENDIX G

Appendix G contains scatter diagrams for the relationship between the measured and estimated 10-year peak flows with 95 percent confidence intervals for the mean as single samples for each of the 24 hydrophysiographic zones using 3-parameter lumped and zone equations. Appendix G is included in Vol III which is report No. FHWA-RD-77-160.

APPENDIX H

Appendix H contains the equation and nomographs. The 3-parameter, 5-parameter, and 7-parameter equations are listed for the "all zone" situation in which all the data were lumped together and for each of the 24 zones separately. Nomographs are included for all the 3-parameter equations. Appendix H also contains scatter diagrams and correction curves for the 3-parameter all zone equation with 95% confidence limits for a mean and a point estimate. Appendix H is included in Vol II.

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U. S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

SUBJECT Transmittal of Research Report Nos. FHWA-RD-77-158 and FHWA-RD-77-159, "Runoff Estimates for Small Rural Watersheds and Development of a Sound Design Method," Volumes I & II	FHWA BULLETIN September 6, 1978

This bulletin covers the distribution of the subject reports which describe a new method for predicting runoff from small rural watersheds. These reports will be of interest to engineers concerned with highway drainage.

Volume I is the research report which describes the analyses made to develop the method. Volume II describes how to use the method for design but it leaves the designer with several options that appear to have approximately the same reliability. For example, options include using 7-parameter, 5-parameter, or 3-parameter equations, all of which have approximately the same standard error of estimate. To simplify use of this research report, the 3-parameter equations will be extracted and presented in a summary guide in the future.

The Water Resources Council (WRC) is planning to check the validity of this method along with other selected methods for estimating runoff.

Sufficient copies of the reports are being distributed to provide a minimum of one copy to each Regional office, one copy to each Division office, and one copy to each State highway agency. Direct distribution is being made to the Division offices. Additional copies for official use may be requested from Mr. David Solomon, Chief, Environmental Design and Control Division, FHWA, HRS-42, Washington, D.C. 20590. See the attached Report Request Form. These requests will be filled while the supply lasts. Additional copies for the public are available from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161. A small charge will be imposed for each copy ordered from NTIS.

For / G. D. Love
Associate Administrator for
Research and Development

Attachments

DISTRIBUTION: Headquarters
Special: Regions
Divisions

OPI: HRS-42

Reports FHWA-RD-77-158 & FHWA-RD-77-159
"Runoff Estimates for Small Rural Watersheds and
Development of a Sound Design Method"

Frequency analyses of more than 1,000 small watersheds in the United States and Puerto Rico were used to develop the estimation method for design of peak flow for ungaged watersheds. This method, called the Federal Highway Administration (FHWA) method, is conceptually similar to the Bureau of Public Roads (BPR) method developed by W. D. Potter. The FHWA method relates the runoff peak to easily determined hydro-physiographic parameters and is intended for use on watersheds smaller than 50 square miles. The concept of risk is incorporated into the recommended design procedure. The risk is the probability that one or more events will exceed a specified peak flow within the usable lifetime of the drainage structure. The return period of the design flood peak can then be modified according to the risk the designer is willing to take. Another concept dealing with the probable maximum runoff peak derived as a function of watershed area is included. The flow obtained from this relationship is considered to be the upper limit of the design flow that may realistically be expected to ever occur. As such it may be appropriate to use in situations where the consequences of failure are extremely great.

To obtain additional copies of these reports, please send in the request form below.

- -

REPORT REQUEST FORM

"Runoff Estimates for Small Rural Watersheds and
Development of a Sound Design Method"

Please send ______ copies of FHWA-RD-77-158, Volume I "Research Report" and/or ______ copies of FHWA-RD-77-159, Volume II "Recommendations for Preparing Design Manuals; and Appendices B, C, D, E, F, G, & H"

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FEDERALLY COORDINATED PROGRAM OF HIGHWAY RESEARCH AND DEVELOPMENT (FCP)

The Offices of Research and Development of the Federal Highway Administration are responsible for a broad program of research with resources including its own staff, contract programs, and a Federal-Aid program which is conducted by or through the State highway departments and which also finances the National Cooperative Highway Research Program managed by the Transportation Research Board. The Federally Coordinated Program of Highway Research and Development (FCP) is a carefully selected group of projects aimed at urgent, national problems, which concentrates these resources on these problems to obtain timely solutions. Virtually all of the available funds and staff resources are a part of the FCP, together with as much of the Federal-aid research funds of the States and the NCHRP resources as the States agree to devote to these projects.*

FCP Category Descriptions

1. Improved Highway Design and Operation for Safety

Safety R&D addresses problems connected with the responsibilities of the Federal Highway Administration under the Highway Safety Act and includes investigation of appropriate design standards, roadside hardware, signing, and physical and scientific data for the formulation of improved safety regulations.

2. Reduction of Traffic Congestion and Improved Operational Efficiency

Traffic R&D is concerned with increasing the operational efficiency of existing highways by advancing technology, by improving designs for existing as well as new facilities, and by keeping the demand-capacity relationship in better balance through traffic management techniques such as bus and carpool preferential treatment, motorist information, and rerouting of traffic.

3. Environmental Considerations in Highway Design, Location, Construction, and Operation

Environmental R&D is directed toward identifying and evaluating highway elements which affect the quality of the human environment. The ultimate goals are reduction of adverse highway and traffic impacts, and protection and enhancement of the environment.

4. Improved Materials Utilization and Durability

Materials R&D is concerned with expanding the knowledge of materials properties and technology to fully utilize available naturally occurring materials, to develop extender or substitute materials for materials in short supply, and to devise procedures for converting industrial and other wastes into useful highway products. These activities are all directed toward the common goals of lowering the cost of highway construction and extending the period of maintenance-free operation.

5. Improved Design to Reduce Costs, Extend Life Expectancy, and Insure Structural Safety

Structural R&D is concerned with furthering the latest technological advances in structural designs, fabrication processes, and construction techniques, to provide safe, efficient highways at reasonable cost.

6. Prototype Development and Implementation of Research

This category is concerned with developing and transferring research and technology into practice, or, as it has been commonly identified, "technology transfer."

7. Improved Technology for Highway Maintenance

Maintenance R&D objectives include the development and application of new technology to improve management, to augment the utilization of resources, and to increase operational efficiency and safety in the maintenance of highway facilities.

* The complete 7-volume official statement of the FCP is available from the National Technical Information Service (NTIS), Springfield, Virginia 22161 (Order No. PB 242057, price $45 postpaid). Single copies of the introductory volume are obtainable without charge from Program Analysis (HRD-2), Offices of Research and Development, Federal Highway Administration, Washington, D.C. 20590.

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