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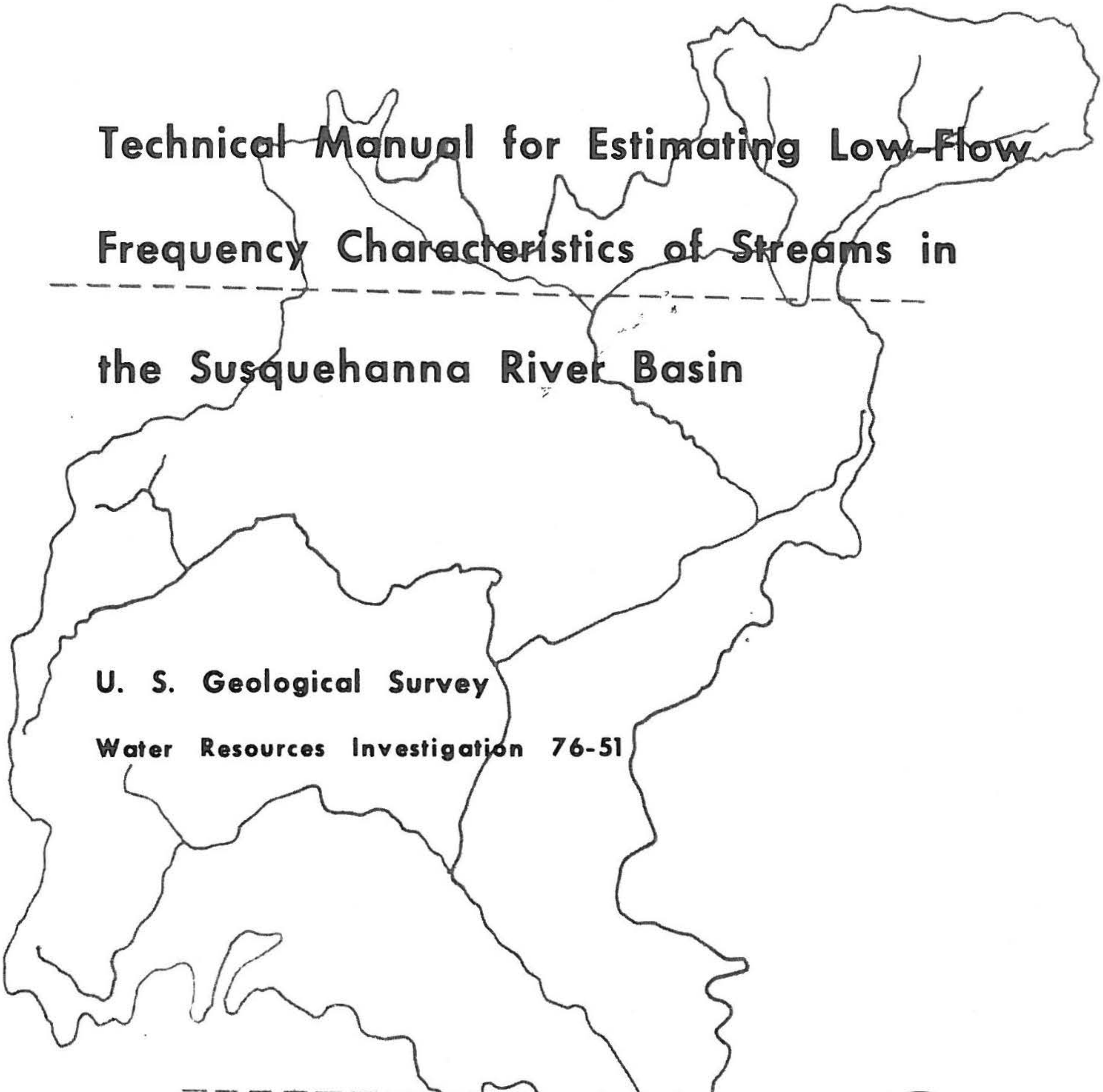
Technical Manual for Estimating Low-Flow Frequency Characteristics of Streams in the Susquehanna River Basin



U. S. Geological Survey

Water Resources Investigation 76-51

Prepared in cooperation the

Susquehanna River Basin Commission

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TECHNICAL MANUAL FOR ESTIMATING LOW-FLOW FREQUENCY CHARACTERISTICS OF STREAMS IN THE SUSQUEHANNA RIVER BASIN

By Jeffrey T. Armbruster

U. S. GEOLOGICAL SURVEY

Water Resources Investigations 76-51

Prepared in cooperation with the
Susquehanna River Basin Commission

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TABLE OF CONTENTS

List of Illustrations

List of Tables

List of Tables (cont')

List of Tables (cont')

List of Tables (cont')

FACTORS FOR CONVERTING ENGLISH UNITS TO INTERNATIONAL SYSTEM (SI) UNITS

The following factors may be used to convert the English units published herein to the International System of Units (SI).

Multiply English units	By	To obtain SI units
	Length	
inches (in)	25.4	millimetres (mm)
feet	.3048	metres (m)
	Area	
square miles (mi^2)	2.590	square kilometres (km^2)
	Flow	
cubic feet per second (ft^3/s)	.02832	cubic metres per second (m^3/s)

TECHNICAL MANUAL FOR ESTIMATING LOW-FLOW FREQUENCY CHARACTERISTICS OF STREAMS IN THE SUSQUEHANNA RIVER BASIN

By Jeffrey T. Armbruster

ABSTRACT

This report presents procedures for estimating low-flow frequency characteristics for streams in the Susquehanna River basin. The techniques can be used at ungaged sites as well as sites where insufficient data are available to make a reliable estimate.

Streams have been divided into two types--major and minor. Major streams are the Susquehanna, West Branch Susquehanna, Juniata, and Chemung Rivers. Points on these streams with drainage areas of more than 2,000 mi^2 (5,180 km^2) are included in this category. Points on these streams with drainage areas of less than 2,000 mi^2 fall into the minor stream category. Generally minor streams are herein defined as those draining less than 2,000 mi^2 (5,180 km^2).

Multiple-regression techniques have been used to develop relations for estimating the 1-, 3-, 7-, 30-, and 183-day duration low flows at recurrence intervals of 10, 20, 50 and 100 years for annual series data and the 1-, 3-, 7-, and 30-day duration low flows, at the same recurrence intervals, for six individual months, May through October, inclusive.

INTRODUCTION

Low-flow characteristics of streams have become increasingly important in recent years. The major reasons for this stimulated interest are related to water supply for municipal, industrial, and agricultural uses, to protection of aquatic species, and in many areas of this country to legal indices for maintaining water-quality standards. Currently the low-flow characteristics of streams within the Susquehanna River basin are inadequately defined.

Three previous studies, Busch and Shaw (1966), Hunt (1967), and Page (1970) provide low-flow information in the basin. The first two are compilations of low-flow frequency and flow-duration data at gaging stations and correlated estimates at partial-record sites. The third is an evaluation of present data-collection programs in Pennsylvania using multiple-regression techniques. Equations were derived for estimating the lowest average 7-day flows at recurrence intervals of 2, 10, and 20 years. Page's study was much broader in scope than the current investigation, and the low-flow characteristics were only a minor part of his study. The accuracy of his estimates of the derived low-flow regression equations as judged by the computed standard error of estimate of each relation (62, 94, and 108 percent, respectively), was considered inadequate for most uses.

This investigation is the result of a cooperative program between the U.S. Geological Survey and the Susquehanna River Basin Commission, begun in 1974, to improve and expand the definition of low-flow characteristics for ungaged sites within the basin.

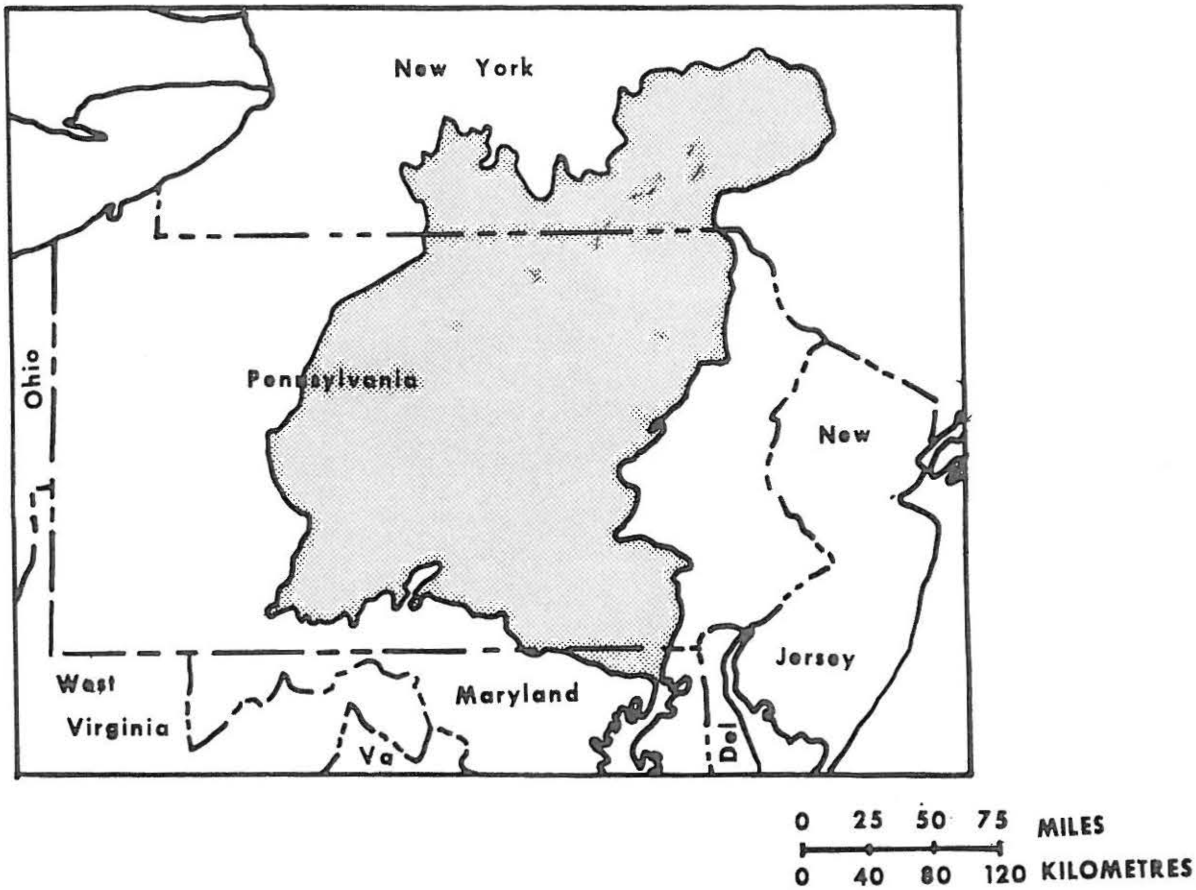

Figure 1.--Map showing location of the Susquehanna River Basin.

DATA

In this report streams will be classified as major or minor streams. Major streams are herein defined as those whose drainage area is generally larger than 2,000 mi^2 (5,180 km^2) and in one of the following river reaches: the Chemung River between its mouth and the mouth of Tioga River; the Susquehanna River from Marietta, Pa. to the mouth of the Chenango River; the Juniata River from its mouth to the mouth of Raystown Branch Juniata River; and the West Branch Susquehanna River from its mouth to Renovo, Pa. Minor streams are defined as all streams in the basin with drainage areas less than 2,000 mi^2 (5,180 km^2) and not on one of the major streams.

The primary reason for making a distinction between major and minor streams is that large streams are an aggregate of numerous smaller streams and, as such, factors affecting low flows on the larger streams tend to be integrated in the flow values. Thus, it is unlikely that all variables in each group will be the same. In regression analyses the very large streams also have a tendency to bias the model parameters when combined in the same regressions with small streams.

Flow Characteristics

Low-flow records at 115 regular gaging stations in the Susquehanna River basin were examined at the outset of the project. Fifteen of these were on major streams and all 15 were used in the major stream analyses. Of the 100 minor stream stations, 11 were dropped from consideration either because of insufficient length of record or because of regulation during times of low flow.

The average length of record for the 15 major stream stations was 55 years; the shortest record was 29 years. For the 89 minor stream stations used, the average length of record was 35 years. Only three of the records were shorter than 15 years, and 26 stations had records longer than 40 years. All stations had records longer than 10 years.

Low-flow characteristics commonly used are the discharges at selected recurrence intervals on a frequency curve of annual, seasonal, or monthly minimum flows of specified durations. For example, annual minimums are defined as the lowest average flow, for various numbers of consecutive days each year.

Frequency curves are prepared by: (1) a graphical procedure described by Riggs (1968, 1972), or (2) fitting data to a theoretical probability distribution (often the log-Pearson Type III distribution). Care must be exercised in using theoretical probability distributions for low-flow frequency curves (Riggs, 1971; Matalas, 1963). The graphical procedure is generally the base method of deriving low-flow frequency curves.

An effort was made to fit the log-Pearson Type III distribution to the annual and monthly minimum flows for various durations for all gaging stations using the method of moments. At some stations and for certain durations, however, it was necessary to use the graphical procedure because of poor fit by the theoretical distribution. A variety of causes of poor fit are discussed by Riggs (1968).

More specific information on the flow characteristics examined will be presented in subsequent sections of this report.

Basin Characteristics

Basin characteristics include physical, climatic, soil, and geologic features of a drainage basin. In regression analyses, to be described in a subsequent section of this manual, low-flow characteristics are related to basin characteristics.

Three basin characteristics were found to be statistically significant, generally at the 5-percent level, in a majority of regression equations. They were drainage area, mean annual precipitation, and an index of relative infiltration. These characteristics as well as basin surface storage, which was found to be significant in several regression relations, are described below.

Drainage Area (A).--Area of a watershed, in square miles, as planimetered from best available Geological Survey topographic maps.

Mean Annual Precipitation (P).--Average depth, in inches, of precipitation on a watershed in an average year, as determined from a National Weather Service map showing lines of equal annual precipitation.

Basin Surface Storage (St).--Percentage of a watershed covered by lakes and ponds, as planimetered from best available Geological Survey topographic maps.

Index of Relative Infiltration (I).--Relative capability of soils to accept and release water. This dimensionless index was described in detail by Armbruster (1976), and only a brief discussion will be given here.

The index was based on a hydrologic soil grouping map (fig. 2, in pocket) prepared for the Susquehanna River Basin Study Coordinating Committee (1970) by the U.S. Soil Conservation Service. The percentage of each basin covered by each soil group was estimated using a grid overlay. These partial areas (pa) were multiplied by a weighting factor (wf) given in table 1. The partial products for each basin were then summed; that is

$$I = \frac{\Sigma\ (pa).(wf)}{100\%}$$

The numerical value of the index has no physical significance; rather, it is simply a gross means of accounting for varying soil characteristics.

Except for values of (I) for each basin, most of the data were available from Page (1970), Darmer (1970), and Forrest and Walker (1970).

Table 1.--*Weighting factors for determining index of relative infiltration.*

Soil Group	Weighting Factor
A	10.0
B	5.0
_/ C	1.0
_/ D	1.0

_/ Combined into one group because of a nearly insignificant amount of D present in the basin.

ANALYTICAL METHODS

Regionalization

Regionalization is the technique or set of techniques used to extend streamflow records areally. Since only a relatively small sample of streams or points on streams are gaged, data are not available at many sites where information is needed. Regionalization provides a means to transfer data from a gaged site to an ungaged one. Improved estimates of flow characteristics at gaged sites may also result from a regional analysis (Riggs, 1967).

Thomas and Benson (1969) conducted a survey of known transfer methods and concluded that "***the method showing the most promise is one relating specific streamflow characteristics to topographic and climatic characteristics of the drainage basin by multiple regression***."

Multiple-regression analysis provides a means to determine the mathematical relationship between basin and flow characteristics. For each relation, a measure of accuracy, the standard error of estimate of the flow characteristics, can be determined, as well as a measure of usefulness of each basin characteristic. Usefulness here is based on two factors: first, the statistical significance of the basin characteristics; and second, the reduction in standard error resulting from including the variable. A basin characteristic was included in a regression relation if it was significant at about the 5 percent level.

Previous attempts to generalize low flows for large areas, using multiple-regression techniques, have been essentially unsuccessful, because the standard errors were too high to justify use of the derived equations at ungaged sites. Riggs (1972) reported that one of the better regression applications to low-flow characteristics was derived by Thomas and Cervione (1970) in Connecticut. They related the 7-day 10-year low flow to drainage area, mean basin elevation, and percentage of basin covered by stratified drift. The standard error of their relation was 68 percent.

Regression Model

The form of the regression model used in this study is

$$\log Y = \log c + b_1 \log X_1 + b_2 \log X_2 + \ldots$$
$$+ b_{n-1} \log X_{n-1} + b_n X_n \quad (1)$$

where Y is a low-flow characteristic (for example, the annual 7-day 10-year low flow), X_1 to X_n are basin characteristics (X_n is the index of relative infiltration), c is a regression constant, and b_1 to b_n are regression coefficients. This model can also be written as

$$Y = cX_1^{b1}\, X_2^{b2} \ldots X_{n-1}^{b-1}\, 10^{b_n X_n} \quad (2)$$

where all variables are the same as in (1). When using the regression equations to estimate low-flow characteristics, either form may be used--it depends only on the preference of the individual making the calculations. Note that model (1) is simply the logarithmic form of model (2).

ESTIMATING LOW-FLOW CHARACTERISTICS

This section of the report has been subdivided into two parts--one is a discussion of techniques and results from the annual series low-flow analyses and the other is a similar discussion of the monthly series low-flow regression analyses. Each of these parts has been further divided into two parts--one for major streams and the other for minor streams. The subdivisions were necessitated by slight variations in the methods used for analyzing each type of data.

Examples showing the use of regression equations, will be presented in a subsequent section of the report.

Annual Series Data

The annual low-flow characteristics described in this report are the 1-, 3-, 7-, 30-, and 183-day discharges at 10, 20, 50, and 100-year recurrence intervals. By definition, the annual 7-day 10-year low flow, for example, is the discharge at the 10-year recurrence interval, taken from a frequency curve of annual values of the lowest mean discharge for 7 consecutive days (the 7-day low flow). Stated in a slightly different way, the 7-day low flow will be less than the 7-day 10-year low flow at intervals averaging 10 years in length.

For low-flow studies, the climatic year, beginning April 1 and ending March 31, is used. The year is designated by the calendar year in which it begins. For example, the 1973 climatic year runs from April 1, 1973, to March 31, 1974. All data were retrieved and analyzed using the climatic year.

It was recognized at the outset of this project that regression estimates of 183-day duration low flows were far from ideal. However, the rules and regulations of the Susquehanna River Basin Commission for review of water related projects require evaluation of potential effects on the 183-day low flows. Future flow simulation studies should provide more reliable estimates of long duration low flows. Thus, until simulation studies have been completed, the regression relations for the 183-day low flows will serve as an interim computational tool for project review.

Major Streams

Major streams were defined in a previous section of this report and the definition will not be repeated here.

Regression model (1) was calibrated using flow characteristics from 15 major stream gaging stations. Drainage areas for streams in this analysis ranged from 2,030 mi^2 (5,158 km^2) to 25,990 mi^2 (67,314 km^2). The regression relations thus derived were used to compute flows for the stations used. Computed flow values were plotted against corresponding values obtained from station frequency curves. If the derived regression equations were perfect, the points should plot on a 45° line; since, however, most regressions are not perfect, some points will plot on either side of this 45° line. Stations on the West Branch Susquehanna, Juniata, and Chemung Rivers, each with a different but distinct pattern, however, plotted significantly to the left or right of the constructed line. This scatter indicates that the low flows for these streams were not affected in the same way by statistically significant basin characteristics, as was the Susquehanna River. Recognizing this, the residuals (departure from 45° line) for each of these streams were plotted against their respective channel lengths on semilog paper. (Channel length is expressed in miles and is measured along the channel from the point of interest to the upstream basin divide.) These plots of residuals versus the log of channel length were consistently straight lines. Similar plots were made for each stream for each low-flow duration (i.e., 1-, 3-, 7-, 30-, and 183-days). Thus, for the West Branch Susquehanna, Juniata, and Chemung Rivers, curves were derived for use in correcting low flow estimates. The corrections were based on channel length.

Another set of regression analyses was made with corrections made for the streams above. The revised equations and standard errors are listed in table 2. When estimating low-flow characteristics for points on any of the major streams, the regression equations shown in table 2 should be used. For the West Branch Susquehanna, Juniata, and Chemung Rivers, the correction factor shown by the appropriate curve in figures 3-5 should be added algebraically to the equation shown in table 2 before taking the antilogarithm. The standard error of estimate of the flow characteristic, corrected when appropriate, is the standard error for the equation used in the initial computation. This is true because the reported equations were derived using the adjusted data.

Minor Streams

Regression equations for estimating low-flow characteristics of streams in this category were derived using regression model (1). The model was calibrated using data from all 89 minor stream gaging station records. Subsequent to model calibration, residuals (the difference between observed data and flows computed using the derived regression equation) were plotted on a map. Examination of the plotted data indicated that areal bias existed between several regions of the Susquehanna River basin. The bias is caused by flow variations not explainable with the basin parameters used. It was, therefore, necessary to subdivide the basin into five subareas which had similar residuals within themselves. (See fig. 6.) New sets of regression equations were then derived using gaging stations within each subarea. Thus, a set of relations was necessary for each subarea. (See tables 3a-3e.) An explanation of subareas 3 and 3a can be found in Armbruster (1976).

Note on figure 6 that several subarea boundaries cross streams. Although efforts were made to avoid this, it was necessary to make crossings at the locations shown. For use in estimating low-flow characteristics on such streams, the equation provided for the subarea in which the point of interest lies should be used.

One-day low flows can be determined using the 3-day low flows at any recurrence interval by use of the following relation,

$$(\text{1-day low flow}) = 0.93(\text{3-day low flow})$$

The 3-day low flows are, of course, estimated using the procedure described above.

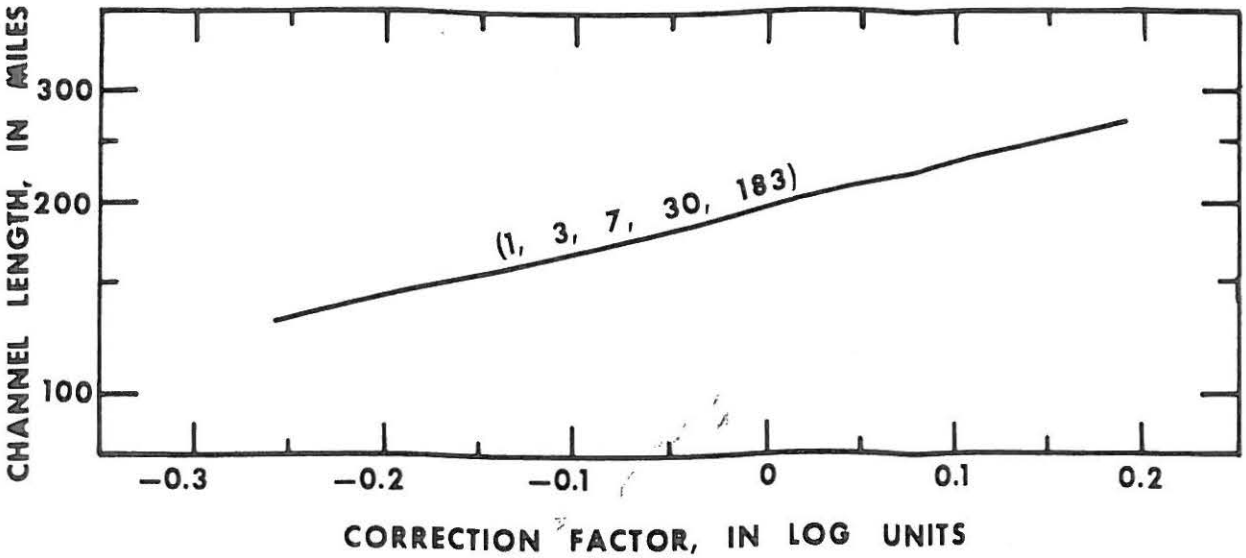

Figure 3.--Correction factors for annual series low flows of the West Branch Susquehanna River, at the 10-, 20-, 50- and 100-year recurrence intervals. Numbers in parenthesis are the duration of the low flows.

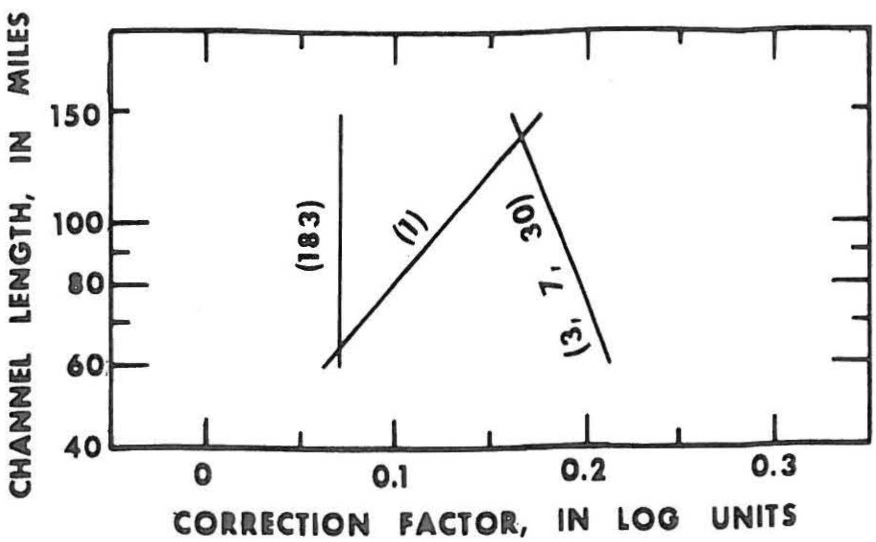

Figure 4.--Correction factors for annual series low flows of the Juniata River, at the 10-, 20-, 50- and 100-year recurrence intervals. Numbers in parenthesis are the duration of the low flows.

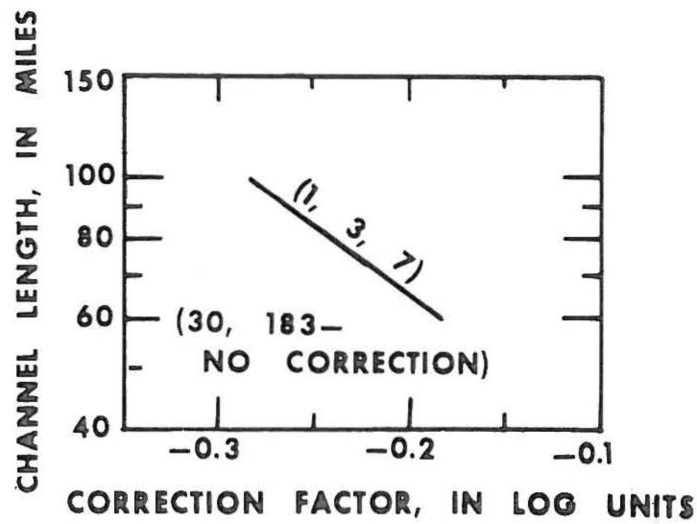

Figure 5.--Correction factors for annual series low flows of the Chemung River, at the 10-, 20-, 50- and 100-year recurrence intervals. Numbers in parenthesis are the duration of the low flows.

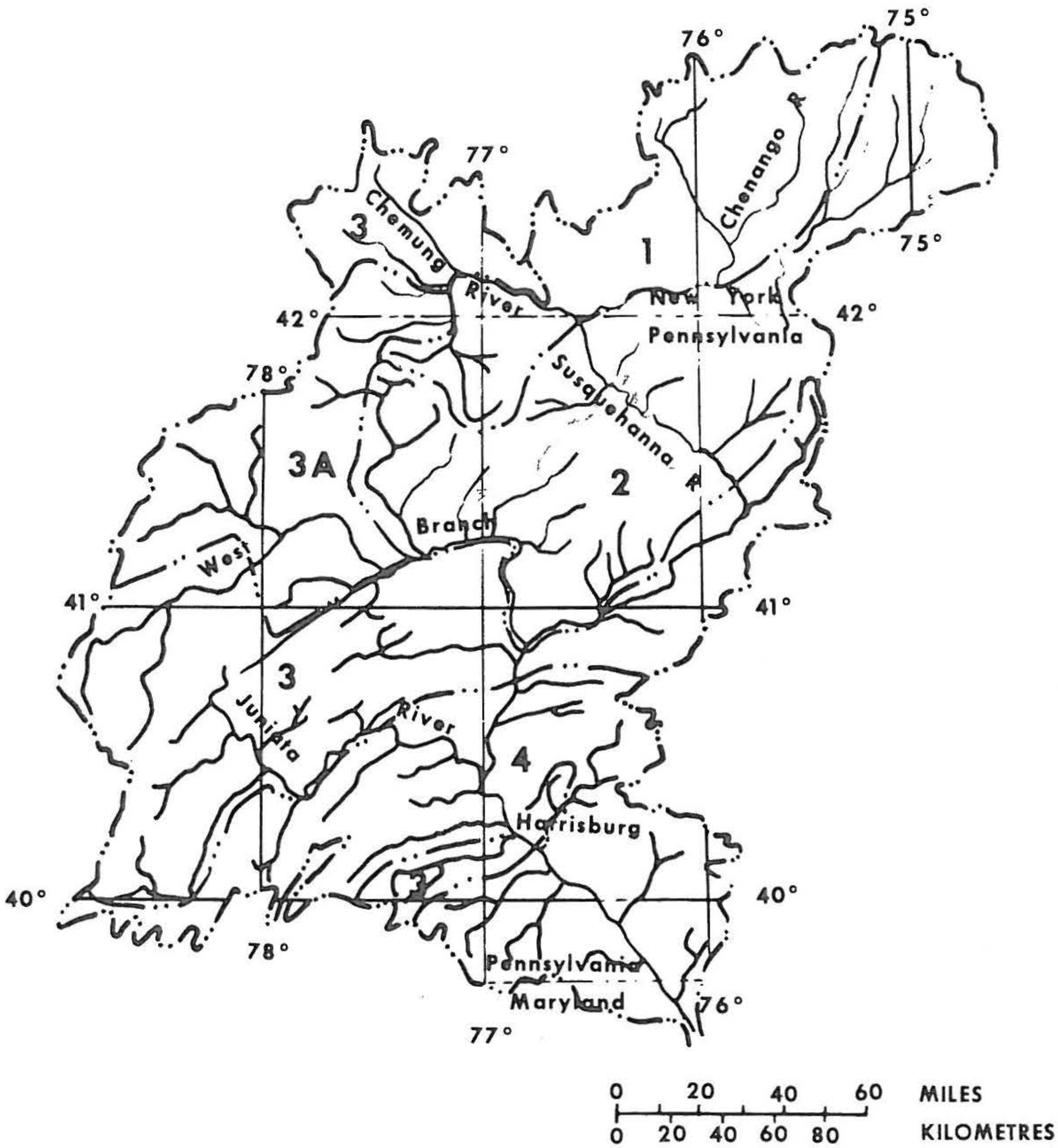

Figure 6.--Map of the Susquehanna River Basin showing subarea boundaries for annual, September, and October low flows.

Monthly Series Data

In addition to annual low-flow characteristics, monthly low-flow characteristics were analyzed for 6 separate months, May through October, inclusive. Specifically, the 1-, 3-, 7-, and 30-day low flows at recurrence intervals of 10, 20, 50, and 100 years for each of the 6 months were examined. By definition the 7-day 10-year May low flow, for example, is the discharge below which the lowest average 7 consecutive days of flow during May can be expected to fall at intervals averaging 10 years.

Major Streams

Initial regression analyses for each month indicated that adjustments similar in nature to those used in the annual data analyses for major streams were necessary.

Plots of computed versus observed low flows showed that the West Branch Susquehanna River, the Chemung River, and the Juniata River each behaved differently than the Susquehanna River. This behavior was expected since each of these streams drain different physical and geologic regions. The Susquehanna River is, of course, an aggregate of the entire basin. The computed flows for the Susquehanna River were in close agreement to observed flows.

A correction based on basin length was again found to be useful for the streams listed above. Residuals for each month from the regression analyses, for all streams except the Susquehanna River, were plotted against channel length. It was found that curves for individual months varied somewhat, depending on the month. Curves for these monthly series low flows were not noticeably affected by the number of days (1-, 3-, 7-, and 30-) or recurrence interval (10, 20, 50, and 100). Rather, the curves seemed to vary only with the month being analyzed. Thus, corrections are applied to all estimated flow characteristics for the West Branch Susquehanna, Chemung, and Juniata Rivers, based on the month desired. The procedure for applying this correction factor is the same as described in the section, Annual Series Major Streams.

All monthly-series major-stream regression relations are found in Tables 4-9. Correction factor curves are found in Figures 7-9.

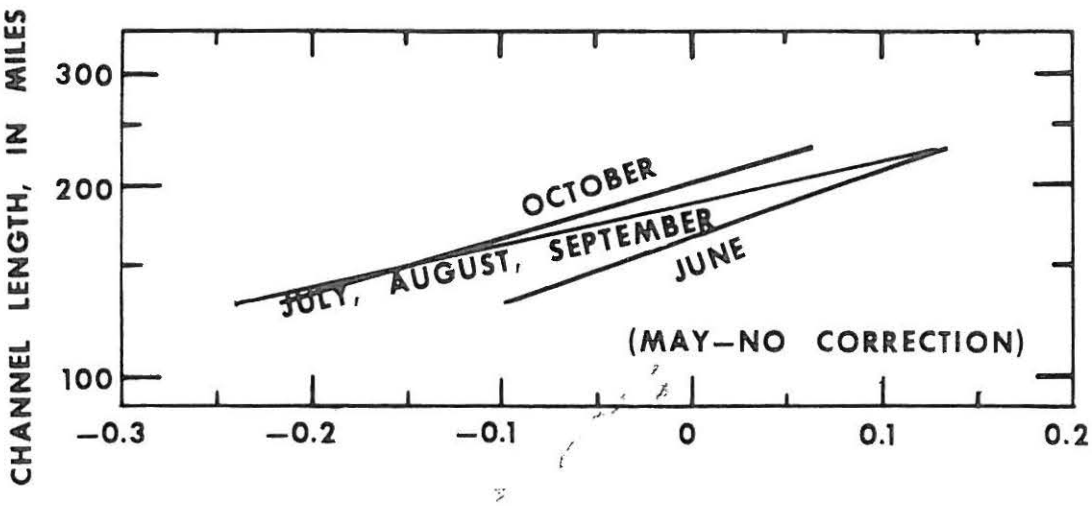

Figure 7.--Correction factors for monthly series low flows of the West Branch Susquehanna River.

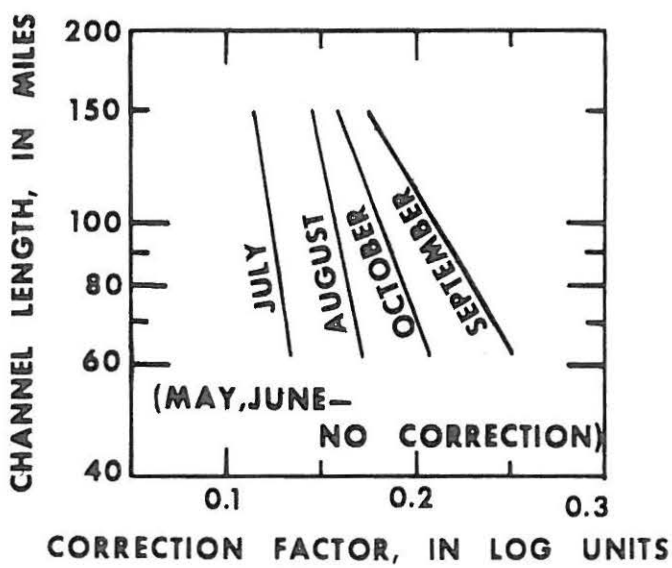

Figure 8.--Correction factors for monthly series low flows of the Juniata River.

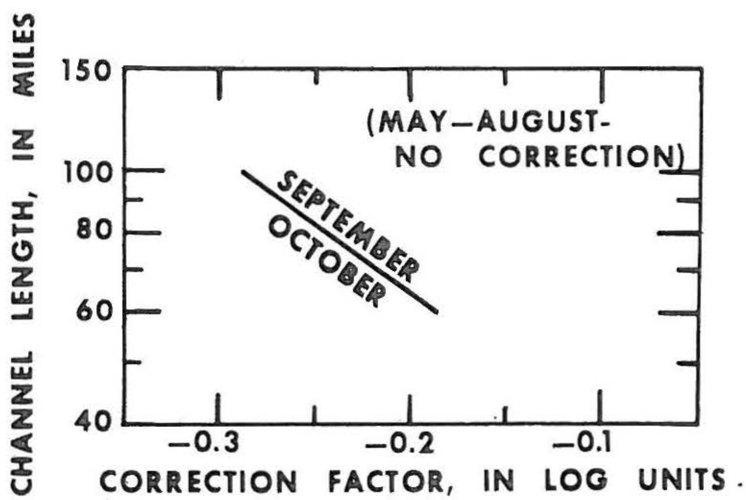

Figure 9.--Correction factors for monthly series low flows of the Chemung River.

Minor Streams

For this part of the investigation it was necessary to develop regression equations for each flow characteristic for each of 6 individual months.

Experience gained with the minor streams annual data analyses plus an initial regression analysis for each month being studied, showed that the basin would have to be subdivided into several subareas. Because the magnitude of flows for each month varies, it was hypothesized that subareas for each month might vary slightly with each other and with the annual analysis subareas. Studies of plotted residuals indicated that the hypothesis was correct. Figures 6 and 10-12 show the subarea subdivisions for each month. Note that low flows for the month of September are usually the lowest of the monthly data, and the subareas for September low flows are the same as for the annual series low flows, as expected. Explanation of subareas 3 and 3a, can be found in Armbruster (1976). For the months, June through August, it was also necessary to separate subarea 1, as indicated in Figures 11 and 12. Adjustments similar to those used for subarea 3a were used for subarea 1a. The magnitude of the adjustment varied slightly with flow and hence the month. After adjustments were made to the flow characteristics in subarea 1a, subareas 1 and 1a were combined for the regression analyses.

An equal and opposite adjustment was required in the final results for streams in subarea 1a; thus, subareas 1 and 1a appear as 2 subareas, each having a separate set of regression equations. The equations, however, differ only in the regression constant, which is the same constant used previously to adjust the flow characteristics of streams in subarea 1a.

APPLICATION

When low-flow estimates are needed for a particular point on a stream, a hierachy of methods is used to obtain the desired estimate. If a regular gaging station record is available at or near the point of interest, the low-flow frequency curve for that station and duration should be used. The second possible source of data is low-flow partial-record measurements at the desired site correlated to concurrent base flows at a suitable index station. The relation line, thus defined, can be extended to provide a low-flow estimate at the low-flow partial record site (for example, of the 20-year low flow). If neither of these two sources of basic data are available, then and only then should estimates be based on the regression equations. It is emphasized that low-flow estimates based on data collected at a point are almost always more reliable than low-flow estimates based on regional analyses.

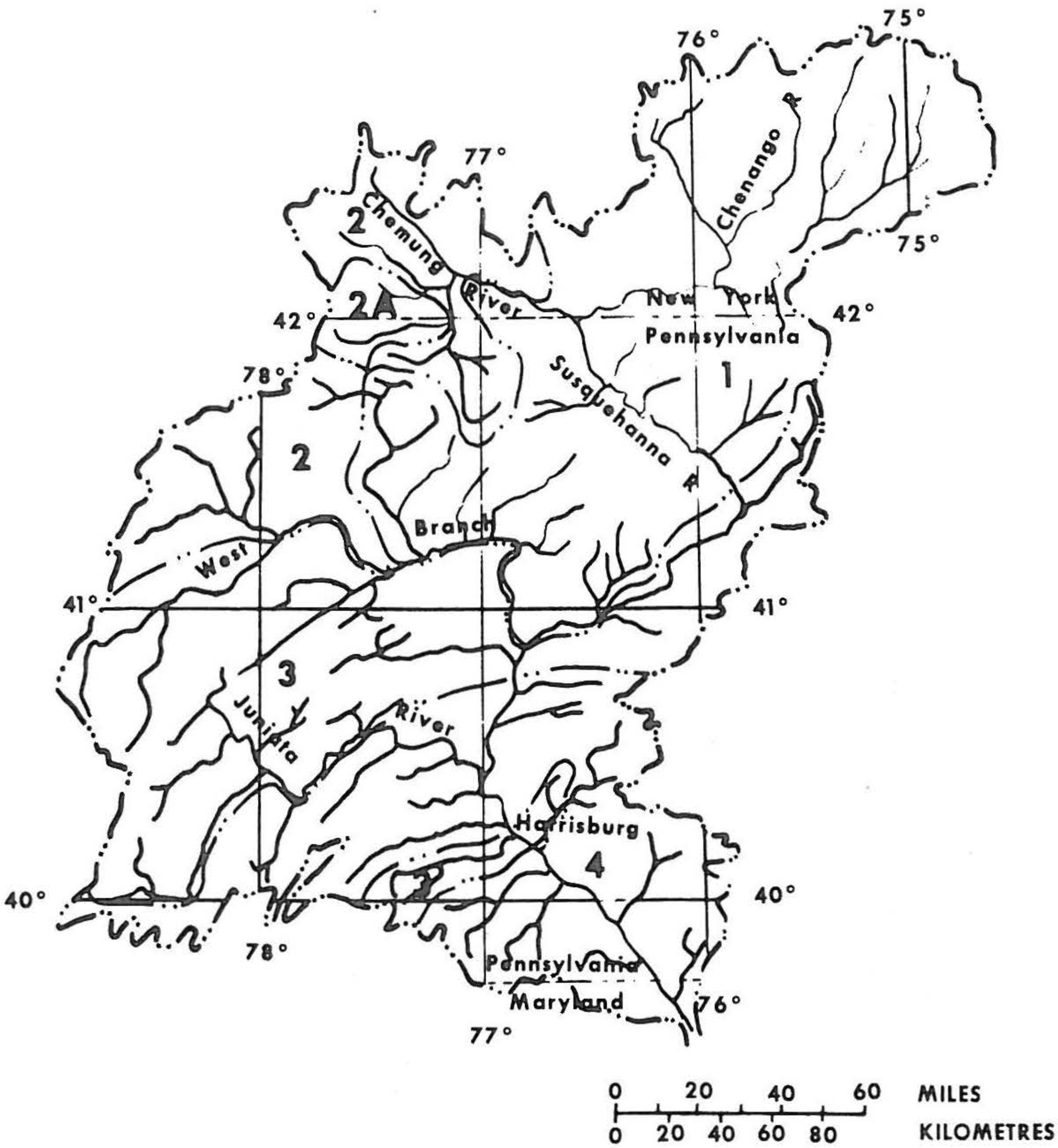

Figure 10.--Map of Susquehanna River Basin showing subarea boundaries for May low flows.

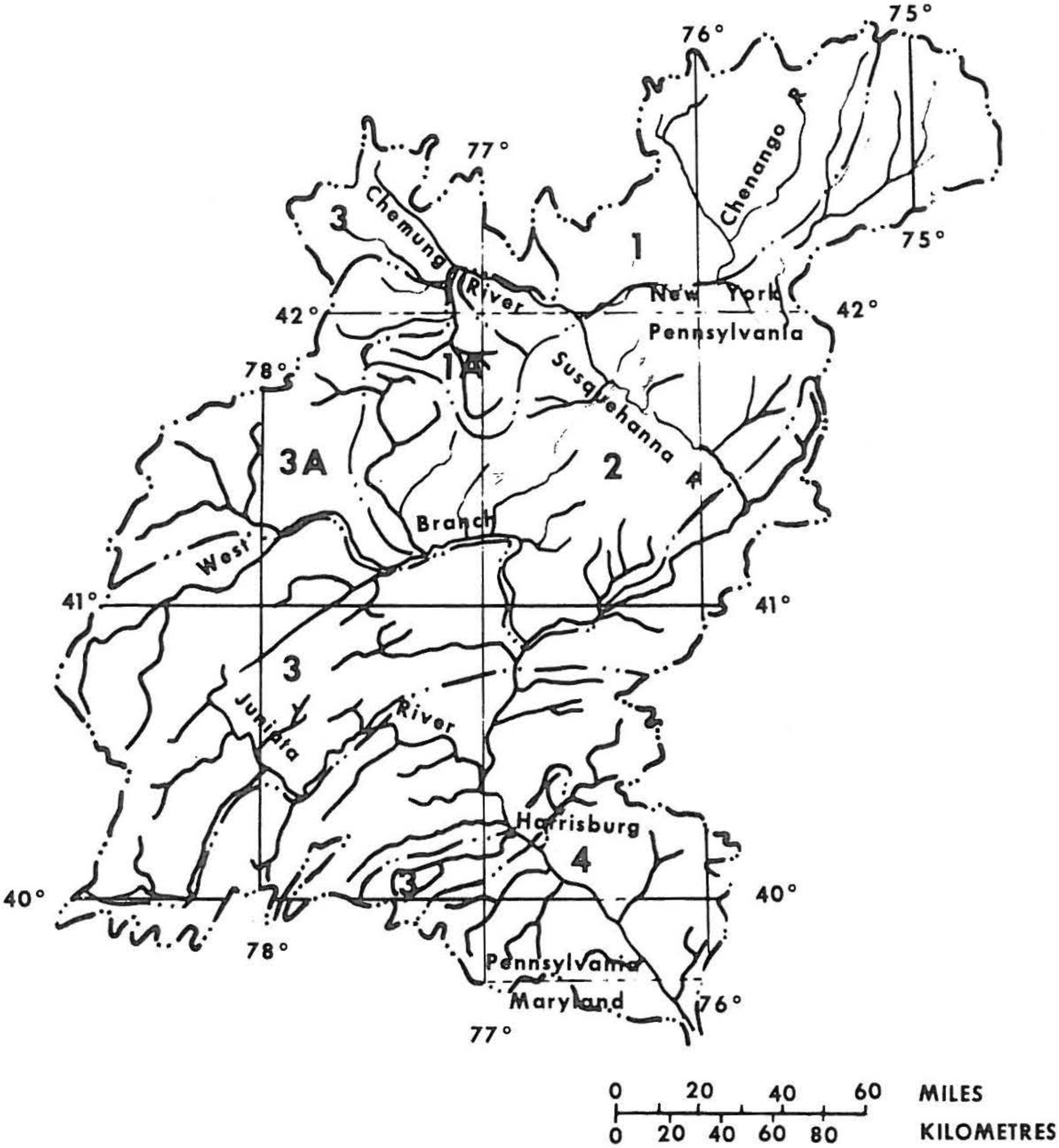

Figure 11.--Map of Susquehanna River Basin showing subarea boundaries for June low flows.

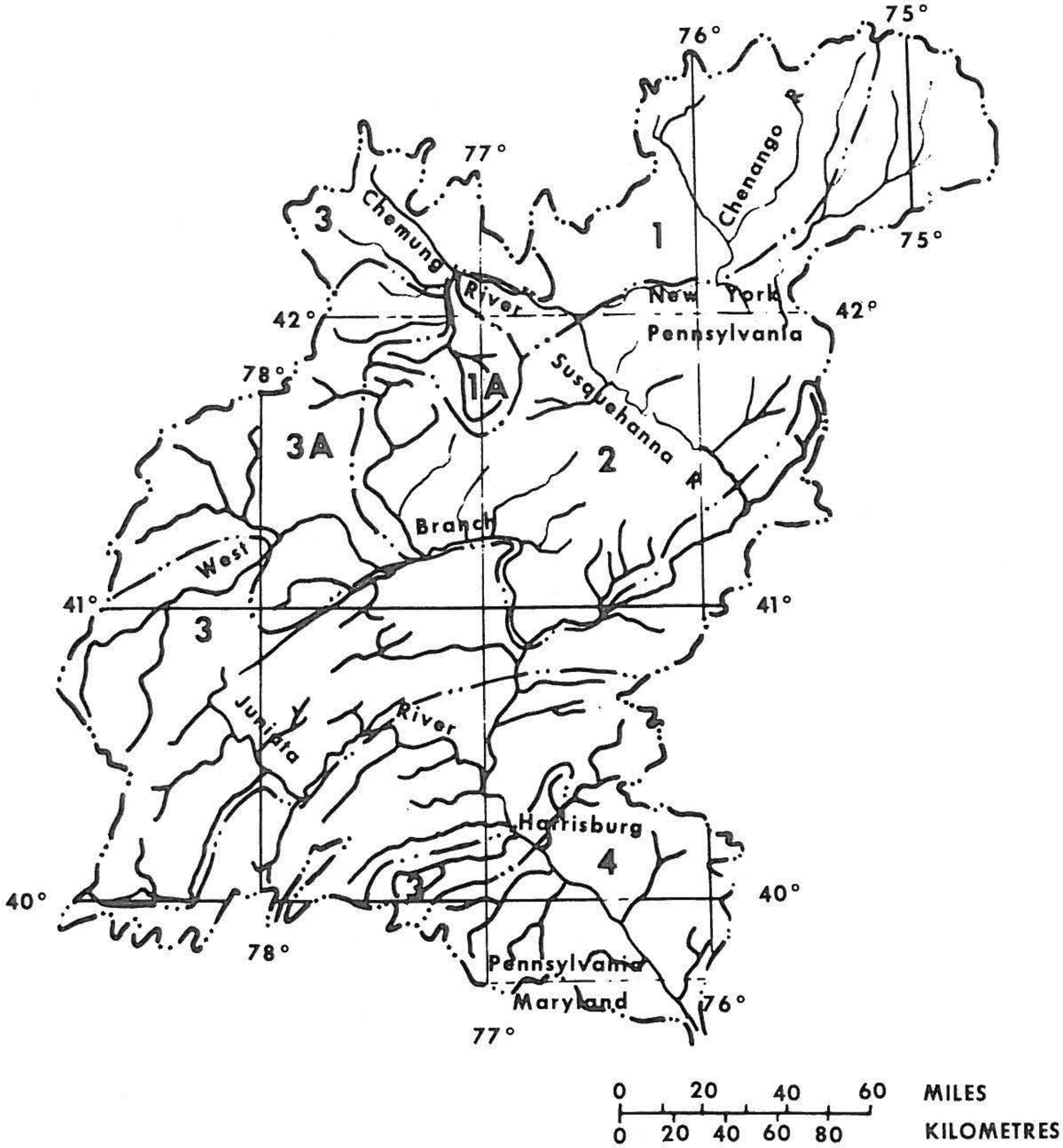

Figure 12.--Map of Susquehanna River Basin showing subarea boundaries for July and August low flows.

Regression equations for specific categories of streams, subareas, monthly or annual series, and flow characteristics are applicable only to the category for which they were derived. Also, the equations are applicable only to watersheds within the Susquehanna River basin and should not be used outside the basin.

Estimation of the low flows using the regression equations presented in this report is relatively simple. An outline of the computation procedure follows:

1. Determine whether annual or monthly low-flow frequency characteristics are needed.

2. Determine the subarea for the site being investigated.

3. Measure the basin characteristics required as input for the appropriate regression equation to be used.

4. Make the indicated calculations.

5. If the point of interest is in any of the major stream reaches except the Susquehanna River reach, determine the appropriate correction factor and apply the correction to the estimate calculated in step (5) above before taking the antilogarithm.

Illustrative Examples

Each of the following examples will show the procedure used to estimate low-flow characteristics. Estimates will be made for gaged sites. Although it is better to use station records to determine low flows at gaged sites, these examples simply serve to illustrate the techniques used for estimating at ungaged sites. By using gaged sites the reader will be able to compare the computed results and the low flows obtained from the station frequency curve.

Example 1.--Estimate the annual 7-day 10-year low flow of Conodoguinet Creek at the Hogestown gaging station. (Station number 01570000).

1. From figure 6, the site is located in subarea 4.

2. From table 3e, the basin characteristics needed are drainage area, mean annual precipitation, and index of relative infiltration.

3. From topographic maps, drainage area is 470.0 mi^2

4. From a National Weather Service map showing lines of equal annual precipitation, mean annual precipitation is 42.5 inches.

5. From figure 2 and table 1, index of relative infiltration is

Soil Group x Weighting Factor

%A = 40 x 10.0 = 400
%B = 25 x 5.0 = 125
%C = 35 x 1.0 = 35
%D = 0 x 1.0 = 0

$$I = 560/100 = 5.60$$

6. From table 3e the regression equation is

$$\log Y = -4.658 + 1.068 \log A + 2.183 \log (P-30) + 0.218\ I$$

7. Substituting

$$\log Y = -4.658 + 1.068(2.672) + 2.183(1.097) + 0.218(5.6)$$

$$\log Y = 1.811$$

$$Y = 65\ ft^3/s\ (1.79\ m^3/s)$$

where Y is the estimated 7-day 10-year low flow. The 7-day 10-year low flow from the station frequency curve is 64 ft^3/s (1.79 m^3/s).

Example 2.--Estimate the annual 7-day 20-year low flow of the Susquehanna River at the Wilkes-Barre, Pa. gage. (Station number 01536500).

1. Because the site is on a major stream there is no need to determine a subarea number.

2. From table 2, the only basin characteristic that is needed is drainage area.

3. From topographic maps, the drainage area is 9,960 mi^2.

4. From table 2, the appropriate regression equation is

   $\log Y = -1.481 + 1.086 \log A$

5. Substituting

   $\log Y = -1.481 + 1.086(3.998)$

   $\log Y = 2.861$

   $Y = 726\ ft^3/s\ (20.56\ m^3/s)$

   where Y is the estimated 7-day 20-year low flow. The 7-day 20-year low flow from the station frequency curve is 692 ft^3/s (19.60 m^3/s).

Example 3.--Estimate the 7-day 20-year August low flow for the West Branch Susquehanna River at Renovo, Pa. (Station number 01545500).

1. Because the site is on a major stream, there is no need to determine a subarea number.

2. From table 7, the basin characteristics needed are drainage area and mean annual precipitation.

3. From topographic maps, drainage area is 2,975 mi^2.

4. From a National Weather Service map showing lines of equal annual precipitation, the mean annual precipitation is 44 inches.

5. From table 7, the appropriate regression equation is

   $\log Y = -2.029 + 1.052 \log A + 0.753 \log(P-30) + CF,$

   where CF is the appropriate correction factor.

6. From topographic maps, the channel length is 136.8 mi.

7. From figure 7, the correction factor is -0.210.

8. Substituting

$$\log Y = -2.029 + 1.052(3.474) + 0.753(1.146) - .210$$

$$\log Y = 2.278$$

$$Y = 190 \text{ ft}^3/\text{s} \ (5.38 \text{ m}^3/\text{s}),$$

where Y is the estimated 7-day 20-year August low flow. The 7-day 20-year low flow taken from the station frequency curve is 180 ft^3/s (5.10 m^3/s).

CONCLUSIONS

Estimates of low-flow characteristics of streams in the Susquehanna River basin can be determined by using the regression equations presented in this report. The accuracy of estimates can be evaluated by the standard error of estimate computed for each relation.

Computationally, low flow estimates are not difficult to make. Determination of the appropriate basin characteristics is probably the most time consuming part of the computation.

The procedures presented here are not intended to replace sound hydrologic judgment or other computational techniques at sites where sufficient data are available to permit more reliable estimates. Rather, the techniques illustrated here are intended to provide a tool for estimating low flows at sites where little or no data are available.

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REGRESSION EQUATIONS

TABLE 2.--SUMMARY OF REGRESSION EQUATIONS FOR ANNUAL LOW FLOWS OF MAJOR STREAMS.

$$\text{LOG } Y = \text{LOG } C + B1 \text{ LOG } A + B2 \text{ LOG}(ST+1) + B3 \text{ LOG}(P-30)$$

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
_/ M1,10	-1.569	1.114	---	---	7.6
M1,20	-1.651	1.120	---	---	7.5
M1,50	-1.754	1.129	---	---	8.9
M1,100	-1.855	1.143	---	---	10.5
M3,10	-1.522	1.106	---	---	7.1
M3,20	-1.595	1.110	---	---	7.0
M3,50	1.695	1.120	---	---	8.6
M3,100	-1.752	1.124	---	---	10.2
M7,10	-1.414	1.084	---	---	7.5
M7,20	-1.481	1.086	---	---	7.7
M7,50	-1.501	1.075	---	---	9.6
M7,100	-1.605	1.091	---	---	11.3
M30,10	-1.782	1.022	---	.655	8.7
M30,20	-1.862	1.022	---	.672	7.6
M30,50	-1.946	1.022	---	.689	9.9
M30,100	-2.018	1.017	---	.739	7.5
M183,10	-1.709	1.033	.568	.895	7.0
M183,20	-1.812	1.038	.462	.889	6.6
M183,50	-1.716	1.039	.302	.876	10.0
M183,100	-1.860	1.043	.202	.867	12.7

_/ M1,10 IS THE 1-DAY 10-YEAR ANNUAL LOW FLOW.

TABLE 3A.--SUMMARY OF REGRESSION EQUATIONS FOR ANNUAL LOW FLOWS OF MINOR STREAMS IN SUBAREA 1.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M3,10	-3.968	1.354	1.461	.181	44
M3,20	-4.042	1.358	1.370	.214	52
M3,50	-4.172	1.372	1.256	.263	63
M3,100	-4.263	1.383	1.170	.300	74
M7,10	-3.944	1.346	1.525	.166	38
M7,20	-4.044	1.346	1.491	.192	43
M7,50	-4.115	1.347	1.392	.226	51
M7,100	-4.110	1.351	1.255	.252	58
M30,10	-3.848	1.342	1.628	.124	34
M30,20	-3.954	1.343	1.584	.156	38
M30,50	-4.080	1.350	1.521	.196	45
M30,100	-4.127	1.349	1.458	.217	51
M183,10	-3.527	1.375	1.950	---	39
M183,20	-3.576	1.349	1.944	---	35
M183,50	-3.596	1.320	1.893	---	32
M183,100	-3.601	1.298	1.846	---	33

TABLE 3B.--SUMMARY OF REGRESSION EQUATIONS FOR ANNUAL LOW FLOWS OF MINOR STREAMS IN SUBAREA 2.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M3,10	-4.078	1.378	1.426	.134	29
M3,20	-4.487	1.444	1.539	.148	36
M3,50	-4.945	1.510	1.685	.165	43
M3,100	-5.401	1.598	1.829	.173	53
M7,10	-3.876	1.332	1.394	.128	29
M7,20	-4.313	1.385	1.569	.142	35
M7,50	-4.906	1.449	1.835	.169	42
M7,100	-5.316	1.501	2.014	.180	48
M30,10	-3.172	1.222	1.153	.103	26
M30,20	-3.517	1.255	1.309	.111	30
M30,50	-3.912	1.287	1.509	.120	39
M30,100	-4.191	1.314	1.637	.125	45.
M183,10	-1.987	1.105	.930	.050	13
M183,20	-2.147	1.118	.926	.054	14
M183,50	-2.299	1.136	.888	.056	17
M183,100	-2.419	1.145	.867	.061	20

TABLE 3C.--SUMMARY OF REGRESSION EQUATIONS FOR ANNUAL LOW FLOWS OF MINOR STREAMS IN SUBAREA 3.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M3,10	-2.040	1.040	.633	.102	51
M3,20	-2.267	1.076	.690	.105	61
M3,50	-2.557	1.124	.770	.108	78
M3,100	-2.788	1.170	.814	.112	98
M7,10	-1.957	1.031	.623	.099	48
M7,20	-2.177	1.065	.689	.101	55
M7,50	-2.416	1.107	.748	.102	66
M7,100	-2.616	1.146	.790	.106	75
M30,10	-1.812	.991	.698	.094	42
M30,20	-1.981	1.017	.732	.098	43
M30,50	-2.175	1.042	.787	.103	46
M30,100	-2.314	1.064	.818	.107	50
M183,10	-1.380	.955	.761	.048	28
M183,20	-1.546	.952	.817	.056	32
M183,50	-1.752	.952	.896	.066	39
M183,100	-1.884	.950	.941	.072	44

TABLE 3D.--SUMMARY OF REGRESSION EQUATIONS FOR ANNUAL LOW FLOWS OF MINOR STREAMS IN SUBAREA 3A.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M3,10	-3.040	1.040	.633	.102	51
M3,20	-3.267	1.076	.690	.105	61
M3,50	-3.557	1.124	.770	.108	78
M3,100	-3.788	1.170	.814	.112	98
M7,10	-2.957	1.031	.623	.099	48
M7,20	-3.177	1.065	.689	.101	55
M7,50	-3.416	1.107	.748	.102	66
M7,100	-3.616	1.146	.790	.106	75
M30,10	-2.812	.991	.698	.094	42
M30,20	-2.981	1.017	.732	.098	43
M30,50	-3.175	1.042	.787	.103	46
M30,100	-3.314	1.064	.818	.107	50
M183,10	-2.380	.955	.761	.048	28
M183,20	-2.546	.952	.817	.056	32
M183,50	-2.752	.952	.896	.066	39
M183,100	-2.884	.950	.941	.072	44

TABLE 3E.--SUMMARY OF REGRESSION EQUATIONS FOR ANNUAL LOW FLOWS OF MINOR STREAMS IN SUBAREA 4.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M3,10	-4.722	1.030	2.252	.219	43
M3,20	-4.834	.959	2.388	.221	46
M3,50	-4.938	.895	2.507	.217	55
M3,100	-5.022	.831	2.626	.218	61
M7,10	-4.658	1.068	2.183	.218	40
M7,20	-4.753	.989	2.309	.224	41
M7,50	-4.820	.903	2.407	.233	44
M7,100	-4.960	.845	2.574	.233	51
M30,10	-3.428	.907	1.809	.135	31
M30,20	-3.608	.858	1.970	.141	35
M30,50	-3.870	.813	2.168	.152	43
M30,100	-4.080	.775	2.344	.160	48
M183,10	-2.183	1.015	1.129	.054	17
M183,20	-2.561	.974	1.412	.066	20
M183,50	-3.023	.924	1.773	.079	26
M183,100	-3.352	.885	2.038	.087	31

TABLE 4.--SUMMARY OF REGRESSION EQUATIONS FOR MAY LOW FLOWS OF MAJOR STREAMS.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30)

FLOW CHARACTERISTICS Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS B1	B2	STANDARD ERROR OF ESTIMATE, PERCENT
M1,10	-1.048	1.018	.563	8.6
M1,20	-1.129	1.019	.570	8.9
M1,50	-1.222	1.014	.600	11.2
M1,100	-1.303	1.015	.623	12.9
M3,10	-.970	1.001	.570	7.4
M3,20	-1.067	1.005	.576	8.8
M3,50	-1.179	1.012	.578	12.0
M3,100	-1.257	1.017	.585	13.9
M7,10	-.890	.994	.557	8.3
M7,20	-1.015	1.000	.581	10.3
M7,50	-1.137	1.002	.606	13.6
M7,100	-1.228	1.008	.618	16.6
M30,10	-.610	1.009	.477	9.1
M30,20	-.734	1.023	.439	9.8
M30,50	-.883	1.044	.384	15.8
M30,100	-.772	.995	.381	20.9

TABLE 5.--SUMMARY OF REGRESSION EQUATIONS FOR JUNE LOW FLOWS OF MAJOR STREAMS.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30)

FLOW CHARACTERISTICS Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS B1	B2	STANDARD ERROR OF ESTIMATE, PERCENT
M1,10	-1.551	1.003	.827	7.8
M1,20	-1.689	1.019	.833	7.0
M1,50	-1.805	1.030	.827	7.5
M1,100	-1.896	1.044	.818	10.7
M3,10	-1.487	.985	.854	8.2
M3,20	-1.614	.995	.875	7.8
M3,50	-1.754	1.010	.885	7.5
M3,100	-1.838	1.021	.881	8.6
M7,10	-1.410	.967	.888	9.8
M7,20	-1.547	.979	.913	9.2
M7,50	-1.704	.998	.927	8.8
M7,100	-1.794	1.008	.935	9.3
M30,10	-1.121	.925	.965	10.7
M30,20	-1.294	.937	1.013	12.0
M30,50	-1.517	.967	1.039	13.0
M30,100	-1.651	.984	1.052	15.3

TABLE 6.--SUMMARY OF REGRESSION EQUATIONS FOR JULY LOW FLOWS OF MAJOR STREAMS.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30)

FLOW CHARACTERISTICS Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS B1	B2	STANDARD ERROR OF ESTIMATE, PERCENT
M1,10	-1.825	1.032	.755	8.3
M1,20	-1.932	1.042	.743	8.8
M1,50	-2.053	1.059	.713	10.7
M1,100	-2.118	1.068	.685	13.0
M3,10	-1.745	1.008	.789	7.6
M3,20	-1.817	1.009	.779	7.3
M3,50	-1.910	1.019	.747	8.9
M3,100	-1.964	1.024	.726	10.6
M7,10	-1.631	.975	.830	9.2
M7,20	-1.702	.974	.831	9.4
M7,50	-1.797	.979	.820	11.8
M7,100	-1.843	.979	.813	14.4
M30,10	-1.473	.931	.981	14.1
M30,20	-1.569	.917	1.042	15.0
M30,50	-1.660	.898	1.110	17.4
M30,100	-1.710	.885	1.146	19.7

TABLE 7.--SUMMARY OF REGRESSION EQUATIONS FOR AUGUST LOW FLOWS OF MAJOR STREAMS

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30)

FLOW CHARACTERISTICS Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS B1	B2	STANDARD ERROR OF ESTIMATE, PERCENT
M1,10	-2.114	1.113	.619	10.0
M1,20	-2.271	1.142	.596	10.2
M1,50	-2.451	1.179	.565	11.5
M1,100	-2.575	1.207	.538	13.4
M3,10	-1.985	1.063	.704	8.8
M3,20	-2.125	1.084	.698	8.1
M3,50	-2.267	1.106	.687	8.0
M3,100	-2.367	1.125	.674	8.9
M7,10	-1.899	1.031	.769	8.7
M7,20	-2.029	1.052	.753	7.5
M7,50	-2.193	1.089	.708	7.3
M7,100	-2.272	1.102	.689	8.8
M30,10	-1.719	1.012	.790	8.4
M30,20	-1.856	1.040	.735	6.9
M30,50	-2.018	1.076	.664	8.3
M30,100	-2.135	1.108	.598	11.0

TABLE 8.--SUMMARY OF REGRESSION EQUATIONS FOR SEPTEMBER LOW FLOWS OF MAJOR STREAMS.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30)

FLOW CHARACTERISTICS Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS		STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	
M1,10	-1.734	1.162	---	13.5
M1,20	-1.847	1.171	---	14.3
M1,50	-1.959	1.179	---	16.0
M1,100	-2.043	1.187	---	18.0
M3,10	-1.578	1.127	---	7.8
M3,20	-1.644	1.125	---	7.5
M3,50	-1.702	1.120	---	10.0
M3,100	-1.742	1.118	---	12.8
M7,10	-1.470	1.106	---	7.6
M7,20	-1.522	1.100	---	7.3
M7,50	-1.583	1.096	---	9.5
M7,100	-1.608	1.090	---	12.0
M30,10	-1.333	1.101	---	11.1
M30,20	-1.376	1.088	---	11.0
M30,50	-1.384	1.065	---	12.0
M30,100	-1.397	1.052	---	13.4

TABLE 9.--SUMMARY OF REGRESSION EQUATIONS FOR OCTOBER LOW FLOWS OF MAJOR STREAMS.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30)

FLOW CHARACTERISTICS Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS		STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	
M1,10	-1.707	1.164	---	7.8
M1,20	-1.578	1.118	---	8.5
M1,50	-1.596	1.104	---	9.2
M1,100	-1.588	1.089	---	11.0
M3,10	-1.440	1.106	---	7.0
M3,20	-1.486	1.100	---	5.7
M3,50	-1.537	1.094	---	6.2
M3,100	-1.544	1.084	---	8.0
M7,10	-1.332	1.086	---	7.8
M7,20	-1.328	1.066	---	7.7
M7,50	-1.436	1.074	---	7.6
M7,100	-1.494	1.078	---	9.2
M30,10	-1.163	1.067	---	10.6
M30,20	-1.314	1.078	---	11.1
M30,50	-1.397	1.076	---	11.8
M30,100	-1.487	1.084	---	15.8

TABLE 10A.--SUMMARY OF REGRESSION EQUATIONS FOR MAY LOW FLOWS OF MINOR STREAMS IN SUBAREA 1.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-1.030	1.167	---	.057	27
M1,20	-1.175	1.190	---	.060	29
M1,50	-1.346	1.218	---	.064	30
M1,100	-1.459	1.237	---	.067	32
M3,10	-.975	1.156	---	.058	27
M3,20	-1.113	1.176	---	.061	28
M3,50	-1.275	1.202	---	.065	31
M3,100	-1.382	1.219	---	.068	32
M7,10	-.872	1.143	---	.053	24
M7,20	-1.022	1.164	---	.058	26
M7,50	-1.188	1.188	---	.064	28
M7,100	-1.292	1.205	---	.065	29
M30,10	-.358	1.058	---	.051	19
M30,20	-.583	1.090	---	.068	24
M30,50	-.816	1.122	---	.082	30
M30,100	-.995	1.149	---	.094	35

TABLE 10B.--SUMMARY OF REGRESSION EQUATIONS FOR MAY LOW FLOWS OF MINOR STREAMS IN SUBAREA 2.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-1.164	1.115	---	.084	30
M1,20	-1.327	1.130	---	.091	35
M1,50	-1.471	1.129	---	.098	41
M1,100	-1.586	1.135	---	.102	46
M3,10	-1.164	1.128	---	.087	30
M3,20	-1.313	1.137	---	.094	34
M3,50	-1.489	1.148	---	.103	40
M3,100	-1.615	1.154	---	.112	46
M7,10	-1.071	1.115	---	.085	29
M7,20	-1.253	1.137	---	.093	33
M7,50	-1.475	1.164	---	.106	39
M7,100	-1.623	1.182	---	.113	44
M30,10	-.442	1.024	---	.060	31
M30,20	-.545	.997	---	.068	29
M30,50	-.664	.967	---	.077	30
M30,100	-.738	.944	---	.081	33

TABLE 10C.--SUMMARY OF REGRESSION EQUATIONS FOR MAY LOW FLOWS OF MINOR STREAMS IN SUBAREA 2A.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-1.641	1.115	---	.084	30
M1,20	-1.804	1.130	---	.091	35
M1,50	-1.948	1.129	---	.098	41
M1,100	-2.063	1.135	---	.102	46
M3,10	-1.641	1.128	---	.087	30
M3,20	-1.790	1.137	---	.094	34
M3,50	-1.966	1.148	---	.103	40
M3,100	-2.092	1.154	---	.112	46
M7,10	-1.548	1.115	---	.085	29
M7,20	-1.730	1.137	---	.093	33
M7,50	-1.952	1.164	---	.106	39
M7,100	-2.100	1.182	---	.113	44
M30,10	-.919	1.024	---	.060	31
M30,20	-1.022	.997	---	.068	29
M30,50	-1.142	.967	---	.077	30
M30,100	-1.215	.944	---	.081	33

TABLE 10D.--SUMMARY OF REGRESSION EQUATIONS FOR MAY LOW FLOWS OF MINOR STREAMS IN SUBAREA 3.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-1.773	1.024	1.096	.062	26
M1,20	-1.843	1.019	1.089	.067	27
M1,50	-1.953	1.022	1.100	.071	30
M1,100	-2.002	1.022	1.089	.073	33
M3,10	-1.702	1.020	1.065	.060	25
M3,20	-1.808	1.016	1.087	.065	27
M3,50	-1.956	1.018	1.132	.070	30
M3,100	-2.032	1.017	1.141	.074	33
M7,10	-1.572	1.002	1.030	.057	23
M7,20	-1.639	.995	1.018	.062	24
M7,50	-1.707	.983	1.009	.068	27
M7,100	-1.745	.980	.986	.072	29
M30,10	-.828	.992	.650	.027	21
M30,20	-.947	.973	.664	.039	24
M30,50	-1.077	.949	.672	.054	28
M30,100	-1.187	.931	.698	.065	31

TABLE 10E.--SUMMARY OF REGRESSION EQUATIONS FOR MAY LOW FLOWS OF MINOR STREAMS IN SUBAREA 4.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTERISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-1.199	1.035	.336	.054	20
M1,20	-1.396	1.043	.412	.057	21
M1,50	-1.652	1.057	.509	.067	22
M1,100	-1.852	1.068	.599	.074	24
M3,10	-1.159	1.045	.302	.051	20
M3,20	-1.368	1.056	.384	.057	21
M3,50	-1.628	1.068	.489	.066	22
M3,100	-1.847	1.078	.598	.073	23
M7,10	-1.013	1.035	.266	.041	20
M7,20	-1.214	1.043	.348	.047	20
M7,50	-1.469	1.050	.469	.054	20
M7,100	-1.662	1.056	.566	.060	20
M30,10	-.456	1.038	---	.026	23
M30,20	-.641	1.050	---	.038	23
M30,50	-.843	1.063	---	.049	24
M30,100	-.990	1.073	---	.059	26

TABLE 11A.--SUMMARY OF REGRESSION EQUATIONS FOR JUNE LOW FLOWS OF MINOR STREAMS IN SUBAREA 1.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-1.932	1.389	---	.061	29
M1,20	-2.088	1.396	---	.090	29
M1,50	-2.258	1.403	---	.120	31
M1,100	-2.359	1.406	---	.137	33
M3,10	-1.882	1.384	---	.053	30
M3,20	-2.047	1.393	---	.084	29
M3,50	-2.232	1.405	---	.116	29
M3,100	-2.363	1.415	---	.140	30
M7,10	-1.800	1.382	---	.040	30
M7,20	-1.951	1.387	---	.067	28
M7,50	-2.140	1.398	---	.101	28
M7,100	-2.245	1.401	---	.121	28
M30,10	-1.466	1.372	---	---	37
M30,20	-1.524	1.354	---	---	32
M30,50	-1.581	1.332	---	---	30
M30,100	-1.619	1.319	---	---	29

TABLE 11B.--SUMMARY OF REGRESSION EQUATIONS FOR JUNE LOW FLOWS OF MINOR STREAMS IN SUBAREA 1A.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-2.233	1.389	---	.061	29
M1,20	-2.389	1.396	---	.090	29
M1,50	-2.559	1.403	---	.120	31
M1,100	-2.660	1.406	---	.137	33
M3,10	-2.183	1.384	---	.053	30
M3,20	-2.348	1.393	---	.084	29
M3,50	-2.533	1.405	---	.116	29
M3,100	-2.664	1.415	---	.140	30
M7,10	-2.101	1.382	---	.040	30
M7,20	-2.252	1.387	---	.067	28
M7,50	-2.441	1.398	---	.101	28
M7,100	-2.546	1.401	---	.121	28
M30,10	-1.767	1.372	---	---	37
M30,20	-1.825	1.354	---	---	32
M30,50	-1.882	1.332	---	---	29
M30,100	-1.920	1.319	---	---	28

TABLE 11C.--SUMMARY OF REGRESSION EQUATIONS FOR JUNE LOW FLOWS OF MINOR STREAMS IN SUBAREA 2.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTERISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-2.454	1.196	.767	.123	28
M1,20	-2.567	1.212	.737	.129	33
M1,50	-2.684	1.234	.689	.135	41
M1,100	-2.764	1.239	.691	.137	43
M3,10	-2.344	1.178	.773	.112	20
M3,20	-2.466	1.196	.767	.111	21
M3,50	-2.594	1.210	.759	.115	24
M3,100	-2.636	1.214	.714	.119	27
M7,10	-2.258	1.164	.816	.097	17
M7,20	-2.394	1.178	.829	.099	19
M7,50	-2.520	1.196	.818	.099	22
M7,100	-2.606	1.208	.814	.099	24
M30,10	-1.569	1.092	.667	.054	18
M30,20	-1.719	1.098	.681	.060	23
M30,50	-1.990	1.134	.768	.054	28
M30,100	-2.116	1.153	.778	.054	33

TABLE 11D.--SUMMARY OF REGRESSION EQUATIONS FOR JUNE LOW FLOWS OF MINOR STREAMS IN SUBAREA 3.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTERISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-1.922	1.040	.908	.080	43
M1,20	-2.110	1.067	.956	.082	50
M1,50	-2.305	1.085	1.017	.086	57
M1,100	-2.452	1.107	1.054	.088	64
M3,10	-1.901	1.036	.933	.079	41
M3,20	-2.116	1.067	.944	.081	48
M3,50	-2.337	1.090	1.074	.084	55
M3,100	-2.508	1.113	1.133	.086	62
M7,10	-1.824	1.026	.940	.076	38
M7,20	-2.028	1.044	1.009	.081	43
M7,50	-2.251	1.072	1.083	.084	49
M7,100	-2.418	1.089	1.150	.087	55
M30,10	-1.468	1.032	.852	.052	28
M30,20	-1.612	1.026	.890	.062	29
M30,50	-1.848	1.037	.973	.074	32
M30,100	-1.978	1.041	1.007	.083	35

TABLE 11E.--SUMMARY OF REGRESSION EQUATIONS FOR JUNE LOW FLOWS OF MINOR STREAMS IN SUBAREA 3A.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-2.399	1.040	.908	.080	43
M1,20	-2.587	1.067	.956	.082	50
M1,50	-2.782	1.085	1.017	.086	57
M1,100	-2.929	1.107	1.054	.088	64
M3,10	-2.378	1.036	.933	.079	41
M3,20	-2.593	1.067	.994	.081	48
M3,50	-2.814	1.090	1.074	.084	55
M3,100	-2.985	1.113	1.133	.086	62
M7,10	-2.301	1.026	.940	.076	38
M7,20	-2.505	1.044	1.009	.081	43
M7,50	-2.728	1.072	1.083	.084	49
M7,100	-2.895	1.089	1.150	.087	55
M30,10	-1.945	1.032	.852	.052	28
M30,20	-2.089	1.026	.890	.062	29
M30,50	-2.325	1.037	.973	.074	32
M30,100	-2.455	1.041	1.007	.083	35

TABLE 11F.--SUMMARY OF REGRESSION EQUATIONS FOR JUNE LOW FLOWS OF MINOR STREAMS IN SUBAREA 4.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-2.244	1.036	.869	.096	22
M1,20	-2.453	1.035	.954	.105	30
M1,50	-2.651	1.030	1.034	.112	41
M1,100	-2.782	1.026	1.085	.117	49
M3,10	-2.095	1.012	.838	.097	22
M3,20	-2.233	.988	.922	.095	28
M3,50	-2.331	.965	.963	.098	37
M3,100	-2.407	.948	1.004	.100	43
M7,10	-1.881	1.027	.695	.084	18
M7,20	-1.984	1.010	.735	.088	25
M7,50	-2.100	.991	.776	.094	34
M7,100	-2.194	.937	.833	.096	42
M30,10	-1.262	1.040	.442	.045	15
M30,20	-1.486	1.020	.579	.053	21
M30,50	-1.644	1.018	.635	.058	25
M30,100	-1.763	1.013	.699	.060	30

TABLE 12A.--SUMMARY OF REGRESSION EQUATIONS FOR JULY LOW FLOWS OF MINOR STREAMS IN SUBAREA 1.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-2.263	1.364	---	.129	39
M1,20	-2.477	1.380	---	.172	43
M1,50	-2.769	1.404	---	.232	51
M1,100	-2.935	1.414	---	.266	57
M3,10	-2.191	1.358	---	.113	32
M3,20	-2.371	1.366	---	.150	35
M3,50	-2.599	1.377	---	.196	41
M3,100	-2.755	1.386	---	.228	46
M7,10	-3.722	1.380	1.530	.118	32
M7,20	-3.904	1.386	1.530	.155	36
M7,50	-4.060	1.391	1.481	.197	40
M7,100	-4.860	1.487	1.804	.290	59
M30,10	-3.404	1.358	1.562	.048	33
M30,20	-3.630	1.386	1.457	.111	30
M30,50	-3.886	1.411	1.393	.175	37
M30,100	-4.028	1.428	1.321	.216	43

TABLE 12B.--SUMMARY OF REGRESSION EQUATIONS FOR JULY LOW FLOWS MINOR STREAMS IN SUBAREA 1A.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-2.564	1.364	---	.129	39
M1,20	-2.778	1.380	---	.172	43
M1,50	-3.070	1.404	---	.232	51
M1,100	-3.236	1.414	---	.266	57
M3,10	-2.492	1.358	---	.113	32
M3,20	-2.672	1.366	---	.150	35
M3,50	-2.900	1.377	---	.196	41
M3,100	-3.056	1.386	---	.228	46
M7,10	-3.722	1.380	1.530	.118	32
M7,20	-3.904	1.386	1.530	.155	36
M7,50	-4.060	1.391	1.481	.197	40
M7,100	-4.860	1.487	1.804	.290	59
M30,10	-3.404	1.358	1.562	.048	33
M30,20	-3.630	1.386	1.457	.111	30
M30,50	-3.886	1.411	1.393	.175	37
M30,100	-4.028	1.428	1.321	.216	43

TABLE 12C.--SUMMARY OF REGRESSION EQUATIONS FOR JULY LOW FLOWS OF MINOR STREAMS IN SUBAREA 2.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-3.221	1.225	1.208	.117	23
M1,20	-3.513	1.244	1.340	.122	27
M1,50	-3.880	1.263	1.532	.128	32
M1,100	-4.153	1.277	1.684	.133	37
M3,10	-3.132	1.202	1.185	.125	21
M3,20	-3.435	1.218	1.330	.135	24
M3,50	-3.826	1.238	1.540	.144	28
M3,100	-4.105	1.247	1.701	.154	32
M7,10	-3.003	1.184	1.149	.125	21
M7,20	-3.287	1.197	1.275	.137	23
M7,50	-3.610	1.209	1.424	.150	27
M7,100	-3.846	1.217	1.544	.161	31
M30,10	-2.512	1.157	.975	.098	19
M30,20	-2.721	1.166	1.010	.111	21
M30,50	-2.966	1.177	1.068	.125	24
M30,100	-3.121	1.183	1.100	.134	26

TABLE 12D.--SUMMARY OF REGRESSION EQUATIONS FOR JULY LOW FLOWS OF MINOR STREAMS IN SUBAREA 3.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-2.170	1.046	.961	.097	49
M1,20	-2.363	1.068	1.007	.099	59
M1,50	-2.571	1.084	1.066	.104	61
M1,100	-2.707	1.093	1.105	.107	68
M3,10	-2.163	1.047	.986	.095	49
M3,20	-2.351	1.067	1.035	.097	52
M3,50	-2.568	1.094	1.084	.101	58
M3,100	-2.712	1.104	1.131	.104	64
M7,10	-2.074	1.029	.987	.092	48
M7,20	-2.245	1.044	1.034	.094	49
M7,50	-2.439	1.057	1.086	.098	54
M7,100	-2.580	1.072	1.121	.100	60
M30,10	-1.864	1.036	.970	.075	44
M30,20	-2.057	1.051	1.031	.079	42
M30,50	-2.266	1.062	1.113	.082	41
M30,100	-2.423	1.077	1.173	.084	42

TABLE 12E.--SUMMARY OF REGRESSION EQUATIONS FOR JULY LOW FLOWS OF MINOR STREAMS IN SUBAREA 3A.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTERISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-3.170	1.046	.961	.097	49
M1,20	-3.363	1.068	1.007	.099	59
M1,50	-3.571	1.084	1.066	.104	61
M1,100	-3.707	1.093	1.105	.107	68
M3,10	-3.163	1.047	.986	.095	49
M3,20	-3.351	1.067	1.035	.097	52
M3,50	-3.568	1.094	1.084	.101	58
M3,100	-3.712	1.104	1.131	.104	64
M7,10	-3.074	1.029	.987	.092	48
M7,20	-3.245	1.044	1.034	.094	49
M7,50	-3.439	1.057	1.086	.098	54
M7,100	-3.580	1.072	1.121	.100	60
M30,10	-2.864	1.036	.970	.075	44
M30,20	-3.057	1.051	1.031	.079	42
M30,50	-3.266	1.062	1.113	.082	41
M30,100	-3.423	1.077	1.173	.084	42

TABLE 12F.--SUMMARY OF REGRESSION EQUATIONS FOR JULY LOW FLOWS OF MINOR STREAMS IN SUBAREA 4.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTERISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-3.173	.946	1.535	.128	30
M1,20	-3.431	.929	1.674	.135	36
M1,50	-3.617	.880	1.819	.135	47
M1,100	-3.772	.854	1.919	.138	55
M3,10	-3.092	.967	1.468	.125	28
M3,20	-3.325	.938	1.627	.131	35
M3,50	-3.547	.918	1.747	.133	45
M3,100	-3.684	.897	1.830	.135	54
M7,10	-3.023	.975	1.439	.125	26
M7,20	-3.274	.944	1.625	.129	31
M7,50	-3.586	.916	1.816	.140	39
M7,100	-3.744	.886	1.932	.143	46
M30,10	-2.203	1.043	.860	.093	18
M30,20	-2.289	1.026	.841	.102	23
M30,50	-2.346	.991	.823	.111	32
M30,100	-2.394	.974	.803	.118	39

TABLE 13A.--SUMMARY OF REGRESSION EQUATIONS FOR AUGUST LOW FLOWS OF MINOR STREAMS IN SUBAREA 1.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-3.007	1.530	---	.265	58
M1,20	-3.057	1.508	---	.279	58
M1,50	-3.124	1.484	---	.296	62
M1,100	-3.177	1.468	---	.310	65
M3,10	-2.982	1.536	---	.261	56
M3,20	-3.040	1.516	---	.277	54
M3,50	-3.109	1.494	---	.295	56
M3,100	-3.168	1.482	---	.310	60
M7,10	-2.951	1.546	---	.252	57
M7,20	-3.000	1.524	---	.266	54
M7,50	-3.057	1.499	---	.283	54
M7,100	-3.107	1.488	---	.296	55
M30,10	-2.152	1.419	---	.088	46
M30,20	-2.448	1.452	---	.149	52
M30,50	-2.640	1.457	---	.187	46
M30,100	-2.826	1.475	---	.226	46

TABLE 13B.--SUMMARY OF REGRESSION EQUATIONS FOR AUGUST LOW FLOWS OF MINOR STREAMS IN SUBAREA 1A.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-3.609	1.530	---	.265	58
M1,20	-3.659	1.508	---	.279	58
M1,50	-3.726	1.484	---	.296	62
M1,100	-3.779	1.468	---	.310	65
M3,10	-3.584	1.536	---	.261	56
M3,20	-3.642	1.516	---	.277	54
M3,50	-3.711	1.494	---	.295	56
M3,100	-3.770	1.482	---	.310	60
M7,10	-3.553	1.546	---	.252	57
M7,20	-3.602	1.524	---	.266	54
M7,50	-3.659	1.499	---	.283	54
M7,100	-3.709	1.488	---	.296	55
M30,10	-2.754	1.419	---	.088	46
M30,20	-3.050	1.452	---	.149	52
M30,50	-3.242	1.457	---	.187	46
M30,100	-3.428	1.475	---	.226	46

TABLE 13C.--SUMMARY OF REGRESSION EQUATIONS FOR AUGUST LOW FLOWS OF MINOR STREAMS IN SUBAREA 2.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTERISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-3.858	1.312	1.470	.123	24
M1,20	-4.413	1.382	1.720	.134	29
M1,50	-5.174	1.480	2.082	.149	40
M1,100	-5.797	1.553	2.417	.159	55
M3,10	-3.746	1.282	1.436	.135	24
M3,20	-4.345	1.338	1.740	.156	30
M3,50	-4.981	1.409	2.023	.182	37
M3,100	-5.317	1.447	2.172	.182	41
M7,10	-3.599	1.246	1.426	.134	22
M7,20	-4.069	1.290	1.647	.151	27
M7,50	-4.648	1.344	1.933	.172	35
M7,100	-5.076	1.386	2.147	.187	40
M30,10	-2.834	1.152	1.175	.099	19
M30,20	-3.042	1.169	1.178	.116	19
M30,50	-3.250	1.183	1.186	.131	22
M30,100	-3.377	1.193	1.176	.141	26

TABLE 13D.--SUMMARY OF REGRESSION EQUATIONS FOR AUGUST LOW FLOWS OF MINOR STREAMS IN SUBAREA 3.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTERISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-2.388	1.025	1.064	.105	52
M1,20	-2.572	1.049	1.110	.105	58
M1,50	-2.797	1.080	1.169	.106	70
M1,100	-2.965	1.105	1.218	.107	81
M3,10	-2.355	1.026	1.074	.102	51
M3,20	-2.547	1.057	1.120	.102	56
M3,50	-2.774	1.091	1.176	.104	62
M3,100	-2.933	1.121	1.218	.103	75
M7,10	-2.336	1.016	1.127	.099	48
M7,20	-2.539	1.054	1.163	.101	53
M7,50	-2.778	1.086	1.240	.104	61
M7,100	-2.682	1.053	1.210	.099	70
M30,10	-2.051	.996	1.092	.087	47
M30,20	-2.200	.995	1.143	.092	47
M30,50	-2.352	.991	1.201	.098	50
M30,100	-2.460	.991	1.245	.100	53

TABLE 13E.--SUMMARY OF REGRESSION EQUATIONS FOR AUGUST LOW FLOWS OF MINOR STREAMS IN SUBAREA 3A.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-3.388	1.025	1.064	.105	52
M1,20	-3.572	1.049	1.110	.105	58
M1,50	-3.797	1.080	1.169	.106	70
M1,100	-3.965	1.105	1.218	.107	81
M3,10	-3.355	1.026	1.074	.102	51
M3,20	-3.547	1.057	1.120	.102	56
M3,50	-3.774	1.091	1.176	.104	62
M3,100	-3.933	1.121	1.218	.103	75
M7,10	-3.336	1.016	1.127	.099	48
M7,20	-3.539	1.054	1.163	.101	53
M7,50	-3.778	1.086	1.240	.104	61
M7,100	-3.682	1.053	1.210	.099	70
M30,10	-3.051	.996	1.092	.087	47
M30,20	-3.200	.995	1.143	.092	47
M30,50	-3.352	.991	1.201	.098	50
M30,100	-3.460	.991	1.245	.100	53

TABLE 13F.--SUMMARY OF REGRESSION EQUATIONS FOR AUGUST LOW FLOWS OF MINOR STREAMS IN SUBAREA 4.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-4.118	.924	2.126	.176	33
M1,20	-4.677	.903	2.466	.204	39
M1,50	-5.300	.863	2.882	.233	48
M1,100	-5.521	.780	3.143	.238	58
M3,10	-4.060	.952	2.064	.178	31
M3,20	-4.588	.928	2.365	.212	34
M3,50	-5.132	.897	2.688	.245	44
M3,100	-5.304	.817	2.891	.255	50
M7,10	-3.901	.948	2.025	.168	28
M7,20	-4.342	.921	2.286	.196	33
M7,50	-3.098	.941	2.670	.239	43
M7,100	-5.301	.868	2.902	.249	49
M30,10	-3.071	.951	1.613	.120	22
M30,20	-3.430	.889	1.907	.135	28
M30,50	-3.831	.825	2.261	.146	36
M30,100	-4.157	.789	2.517	.158	41

TABLE 14A.--SUMMARY OF REGRESSION EQUATIONS FOR SEPTEMBER LOW FLOWS OF MINOR STREAMS IN SUBAREA 1.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-3.862	1.354	1.340	.186	43
M1,20	-3.911	1.344	1.268	.210	48
M1,50	-3.937	1.335	1.151	.238	55
M1,100	-3.978	1.334	1.076	.262	61
M3,10	-3.841	1.347	1.402	.171	39
M3,20	-3.889	1.337	1.331	.195	44
M3,50	-3.923	1.327	1.229	.221	50
M3,100	-3.954	1.321	1.171	.240	54
M7,10	-3.709	1.339	1.360	.151	35
M7,20	-3.741	1.329	1.271	.175	40
M7,50	-3.750	1.320	1.138	.205	45
M7,100	-3.740	1.311	1.044	.221	49
M30,10	-3.563	1.331	1.496	.094	30
M30,20	-3.687	1.325	1.461	.125	35
M30,50	-3.841	1.319	1.432	.162	42
M30,100	-3.932	1.316	1.403	.188	49

TABLE 14B.--SUMMARY OF REGRESSION EQUATIONS FOR SEPTEMBER LOW FLOWS OF MINOR STREAMS IN SUBAREA 2.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-3.808	1.296	1.437	.114	30
M1,20	-4.374	1.370	1.661	.131	38
M1,50	-5.085	1.472	1.952	.146	50
M1,100	-5.630	1.560	2.174	.151	62
M3,10	-3.642	1.274	1.347	.119	28
M3,20	-4.131	1.340	1.527	.133	37
M3,50	-4.648	1.421	1.702	.141	46
M3,100	-5.050	1.508	1.840	.126	55
M7,10	-3.416	1.239	1.264	.117	26
M7,20	-3.723	1.294	1.311	.124	30
M7,50	-4.130	1.366	1.400	.132	37
M7,100	-4.404	1.414	1.456	.140	43
M30,10	-2.861	1.178	1.148	.075	25
M30,20	-3.139	1.213	1.191	.083	34
M30,50	-3.449	1.256	1.236	.092	46
M30,100	-3.699	1.293	1.294	.092	57

TABLE 14C.--SUMMARY OF REGRESSION EQUATIONS FOR SEPTEMBER LOW FLOWS OF MINOR STREAMS IN SUBAREA 3.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-2.391	1.050	.932	.108	58
M1,20	-2.566	1.078	.948	.110	68
M1,50	-2.758	1.110	.958	.113	85
M1,100	-2.891	1.132	.970	.115	99
M3,10	-2.384	1.044	.975	.107	56
M3,20	-2.582	1.079	1.001	.110	66
M3,50	-2.804	1.119	1.038	.112	81
M3,100	-2.927	1.143	1.052	.111	94
M7,10	-2.277	1.030	.970	.101	55
M7,20	-2.455	1.056	1.008	.104	59
M7,50	-2.662	1.097	1.041	.105	67
M7,100	-2.787	1.121	1.064	.104	74
M30,10	-2.122	1.005	1.048	.094	55
M30,20	-2.285	1.024	1.070	.100	54
M30,50	-2.481	1.049	1.113	.106	57
M30,100	-2.592	1.066	1.126	.108	62

TABLE 14D.--SUMMARY OF REGRESSION EQUATIONS FOR SEPTEMBER LOW FLOWS OF MINOR STREAMS IN SUBAREA 3A.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-3.391	1.050	.932	.108	58
M1,20	-3.566	1.078	.948	.110	68
M1,50	-3.758	1.110	.958	.113	85
M1,100	-3.891	1.132	.970	.115	99
M3,10	-3.384	1.044	.975	.107	56
M3,20	-3.582	1.079	1.001	.110	66
M3,50	-3.804	1.119	1.038	.112	81
M3,100	-3.927	1.143	1.052	.111	94
M7,10	-3.277	1.030	.970	.101	55
M7,20	-3.455	1.056	1.008	.104	59
M7,50	-3.662	1.097	1.041	.105	67
M7,100	-3.787	1.121	1.064	.104	74
M30,10	-3.122	1.005	1.048	.094	55
M30,20	-3.285	1.024	1.070	.100	54
M30,50	-3.481	1.049	1.113	.106	57
M30,100	-3.592	1.066	1.126	.108	62

TABLE 14E.--SUMMARY OF REGRESSION EQUATIONS FOR SEPTEMBER LOW FLOWS OF MINOR STREAMS IN SUBAREA 4.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-3.757	.805	2.100	.140	51
M1,20	-4.033	.771	2.296	.145	62
M1,50	-4.321	.718	2.539	.146	79
M1,100	-4.547	.688	2.721	.147	91
M3,10	-3.787	.818	2.161	.142	44
M3,20	-4.079	.779	2.377	.151	52
M3,50	-4.396	.715	2.669	.156	66
M3,100	-4.629	.680	2.860	.161	75
M7,10	-3.702	.848	2.064	.145	39
M7,20	-3.986	.812	2.266	.155	48
M7,50	-4.238	.759	2.475	.161	60
M7,100	-4.480	.727	2.670	.167	70
M30,10	-3.066	.888	1.747	.099	38
M30,20	-3.290	.836	1.928	.107	47
M30,50	-3.526	.775	2.138	.115	54
M30,100	-3.671	.733	2.271	.120	60

TABLE 15A.--SUMMARY OF REGRESSION EQUATIONS FOR OCTOBER LOW FLOWS OF MINOR STREAMS IN SUBAREA 1.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-3.468	1.320	1.284	.108	31
M1,20	-3.662	1.331	1.285	.144	38
M1,50	-3.871	1.340	1.291	.181	49
M1,100	-4.064	1.352	1.331	.209	59
M3,10	-3.480	1.324	1.317	.108	30
M3,20	-3.675	1.326	1.355	.136	34
M3,50	-3.822	1.330	1.330	.166	45
M3,100	-3.986	1.339	1.363	.190	53
M7,10	-3.507	1.339	1.357	.107	31
M7,20	-3.644	1.337	1.343	.134	35
M7,50	-3.734	1.333	1.285	.158	46
M7,100	-3.870	1.339	1.296	.179	54
M30,10	-3.449	1.338	1.491	.073	27
M30,20	-3.579	1.335	1.419	.108	29
M30,50	-3.649	1.339	1.263	.145	42
M30,100	-3.736	1.346	1.183	.150	54

TABLE 15B.--SUMMARY OF REGRESSION EQUATIONS FOR OCTOBER LOW FLOWS OF MINOR STREAMS IN SUBAREA 2.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-2.805	1.209	.904	.062	23
M1,20	-2.986	1.265	.867	.051	25
M1,50	-3.181	1.315	.837	.044	28
M1,100	-3.278	1.364	.764	.034	32
M3,10	-2.817	1.218	.884	.078	21
M3,20	-2.982	1.264	.838	.075	24
M3,50	-3.172	1.327	.769	.070	29
M3,100	-3.324	1.365	.743	.073	31
M7,10	-2.607	1.182	.797	.085	19
M7,20	-2.754	1.222	.746	.081	19
M7,50	-2.948	1.273	.704	.078	21
M7,100	-3.065	1.309	.665	.075	25
M30,10	-2.036	1.140	.581	.046	19
M30,20	-2.233	1.131	.662	.045	22
M30,50	-2.242	1.130	.513	.044	29
M30,100	-2.254	1.133	.422	.041	33

TABLE 15C.--SUMMARY OF REGRESSION EQUATIONS FOR OCTOBER LOW FLOWS OF MINOR STREAMS IN SUBAREA 3.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-2.313	1.043	.939	.111	60
M1,20	-2.491	1.057	.981	.120	63
M1,50	-2.687	1.074	1.022	.131	69
M1,100	-2.825	1.079	1.071	.139	74
M3,10	-2.261	1.036	.953	.107	59
M3,20	-2.436	1.047	1.000	.116	60
M3,50	-2.621	1.064	1.038	.126	65
M3,100	-2.746	1.072	1.067	.135	69
M7,10	-2.201	1.026	.964	.104	57
M7,20	-2.356	1.037	.998	.112	58
M7,50	-2.532	1.051	1.040	.122	61
M7,100	-2.644	1.058	1.064	.130	64
M30,10	-2.068	1.000	1.039	.089	57
M30,20	-2.163	1.004	1.022	.096	56
M30,50	-2.248	1.010	.990	.102	57
M30,100	-2.304	1.015	.971	.106	59

TABLE 15D.--SUMMARY OF REGRESSION EQUATIONS FOR OCTOBER LOW FLOWS OF MINOR STREAMS IN SUBAREA 3A.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-3.313	1.043	.939	.111	60
M1,20	-3.491	1.057	.981	.120	63
M1,50	-3.687	1.074	1.022	.131	69
M1,100	-3.825	1.079	1.071	.139	74
M3,10	-3.261	1.036	.953	.107	59
M3,20	-3.436	1.047	1.000	.116	60
M3,50	-3.621	1.064	1.038	.126	65
M3,100	-3.747	1.072	1.067	.135	69
M7,10	-3.201	1.026	.964	.104	57
M7,20	-3.356	1.037	.998	.112	58
M7,50	-3.532	1.051	1.040	.122	61
M7,100	-3.644	1.058	1.064	.130	64
M30,10	-3.068	1.000	1.039	.089	57
M30,20	-3.163	1.004	1.022	.096	56
M30,50	-3.248	1.010	.990	.102	57
M30,100	-3.304	1.015	.971	.106	59

TABLE 15E.--SUMMARY OF REGRESSION EQUATIONS FOR OCTOBER LOW FLOWS OF MINOR STREAMS IN SUBAREA 4.

LOG Y = LOG C + B1 LOG A + B2 LOG(P-30) + B3 I

FLOW CHARACTER-ISTICS, Y	REGRESSION CONSTANT, LOG C	REGRESSION COEFFICIENTS			STANDARD ERROR OF ESTIMATE, PERCENT
		B1	B2	B3	
M1,10	-3.356	.869	1.750	.122	44
M1,20	-3.534	.849	1.800	.133	53
M1,50	-3.693	.824	1.829	.145	66
M1,100	-3.804	.801	1.861	.154	77
M3,10	-3.350	.880	1.785	.124	37
M3,20	-3.595	.852	1.918	.139	42
M3,50	-3.858	.837	2.012	.160	47
M3,100	-4.005	.814	2.079	.172	53
M7,10	-3.246	.917	1.690	.123	30
M7,20	-3.512	.893	1.846	.136	35
M7,50	-3.816	.859	2.044	.149	44
M7,100	-4.097	.852	2.202	.162	48
M30,10	-2.991	.967	1.542	.104	25
M30,20	-3.269	.934	1.690	.121	29
M30,50	-3.558	.892	1.847	.141	34
M30,100	-3.794	.868	1.987	.154	38