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DEPARTMENT OF THE INTERIOR UNITED STATES GEOLOGICAL SURVEY

OPEN FILE REPORT 80-1225

DEPARTMENT OF INTERIOR U.S. GEOLOGICAL SURVEY LOW-FLOW CHARACTERISTICS OF KENTUCKY STREAMS, 1980

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INTRODUCTION

The U.S. Geological Survey has been gathering low-flow data on streams throughout Kentucky for many years. This report presents low-flow characteristics at 137 partial record stations where the flow is not significantly regulated. Data on available stream flow during low-flow periods are used for the design of plants that dispose of waste using dilution procedures, to estimate available industrial and municipal water supplies, to estimate irrigation supplies, and in the design of recreational facilities.

LOW-FLOW CHARACTERISTICS

Continuous-record Gaging Stations

The data required for a low-flow frequency study are the minimum average flow for selected lengths of time. Annual low flows at continuous record stations (Index Stations) were analyzed for 1, 5 and 7 consecutive days. The climatic year (April 1 to March 31) was used as the basis for annual events to allow the low-water season to be considered as a unit. Analyses and computations in this report were completed by digital processing of records in the U.S. Geological Survey Water Resources Division Files in Reston, Va. The frequency data were fitted mathematically by curves corresponding to the Log-Pearson Type III distribution. Ordinarily, the fitted Log-Pearson Type III frequency curve was used to determine the value in the Index Station Table. A preferential record was plotted and that curve was used when the computed data failed to fit the frequency data.

Partial-Record Gaging Stations

Stream sites at which partial measurements are made are called partial-record stations. These measurements are made during periods of no snow runoff (base flow conditions). The relation between concurrent events can be used with a frequency curve from an Index Station to approximate the minimum flow at the partial-record site. Flow data observed at 137 low-flow partial-record gaging stations were examined and processed by flow correlation with continuous-record "Index" gaging stations to produce the low-flow frequency tabulations included in this report.

UNITS AND NOTATION

Comparison of the low-flow values and the drainage area presented on the map may indicate regions that might be used in limited regions to estimate values at ungaged sites. (See figure 1975). The drainage area and low-flow data are shown in the table and may be used to determine runoff in cubic feet per second per square mile. The runoff per square mile figures may be plotted on the map and used to develop possible regional trends. Flow at ungaged sites. However, the transfer of flow characteristics to sites without discharge measurements is unreliable in areas where karst formations, (secondary permeability due to solution of the limestone) are highly developed near or at the land surface.

Physiographic and karst areas in Kentucky are shown on figures 1 and 2. Karst areas are primarily confined to the Mississippi Plateau and to parts of the Inner Blue Grass Basin. Within these areas the flow characteristics cannot be transferred reliably even a mile or so upstream or downstream from a site.

This report is an interim report of a continuing low-flow investigation program in Kentucky. The final report will be published when data is available for the partial-record network of 130 stations that are currently being operated.

FACTORS FOR CONVERTING ENGLISH UNITS TO METRIC UNITS

Table with 2 columns: Multiply English units by, To obtain Metric Units. Includes conversions for square miles to square kilometers, cubic feet per second to cubic meters per second, and discharge in cubic feet per second to discharge in cubic meters per second.

Swisher, R. V. Jr., 1974, Low-flow characteristics of Kentucky streams: U.S. Geological Survey Open-File Report 1, p.

Rigg, H. C., 1973, Low-flow investigations: Techniques of water-resources investigations of the U.S. Geological Survey, book 4, chap. 81, p. 18.

Additional copies of this report can be obtained from: U.S. Geological Survey, Water Resources Division, Room 577 Federal Building, Louisville, Kentucky 40202

or Kentucky Geological Survey, 507 Mineral Industries Building, University of Kentucky, Lexington, Kentucky 40506

Figure 1 -- Physiographic areas of Kentucky.

Figure 2 -- Map of Kentucky showing approximate areas of karst geology.

Figure 3 -- Physiographic areas of Kentucky.

Figure 4 -- Physiographic areas of Kentucky.

Figure 5 -- Physiographic areas of Kentucky.

Figure 6 -- Physiographic areas of Kentucky.

Figure 7 -- Physiographic areas of Kentucky.

Figure 8 -- Physiographic areas of Kentucky.

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Figure 31 -- Physiographic areas of Kentucky.

Figure 32 -- Physiographic areas of Kentucky.

Figure 33 -- Physiographic areas of Kentucky.

Figure 34 -- Physiographic areas of Kentucky.

Figure 35 -- Physiographic areas of Kentucky.

Figure 36 -- Physiographic areas of Kentucky.

Figure 37 -- Physiographic areas of Kentucky.

Figure 38 -- Physiographic areas of Kentucky.

Table with columns: Station number, Station name, Latitude, Longitude, and discharge data for 1, 5, and 7 consecutive days at 137 Index Stations.

Table with columns: Station number, Station name, Latitude, Longitude, and discharge data for 1, 5, and 7 consecutive days at 137 Partial Record Stations.

Table with columns: Station number, Station name, Latitude, Longitude, and discharge data for 1, 5, and 7 consecutive days at 137 Partial Record Stations (Continued).

EXPLANATION: 1. Index station. 2. Partial record station, not previously published. 3. Partial record station, previously published. 4. Gaging station, less than ten years record. Upper number is station number. Lower left number is 7 day 10-year discharge, in cubic feet per second. Lower right number is drainage area, in square miles.



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