GAZETTEER OF HYDROLOGIC CHARACTERISTICS OF STREAMS IN MASSACHUSETTS--HUDSON RIVER BASIN

By S. William Wandle, Jr.

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CONVERSION FACTORS

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

Multiply inch-pound units	By	To obtain SI Units
	Length	
inch (in)	25.4*	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Area	
square mile (mi^2)	2.590	square kilometer (km^2)
	Flow	
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
cubic foot per second per square mile [$(ft^3/s)/mi^2$]	0.01093	cubic meter per second per square kilometer [$(m^3/s)/km^2$]
	Slope	
foot per mile (ft/mi)	0.1894	meter per kilometer (m/km)
	Temperature	

Temperature in degrees Fahrenheit (^oF) can be converted to degrees Celsius (^oC) as follows:

$$^oC = 5/9\ (^oF-32).$$

*Exact.

GAZETTEER OF HYDROLOGIC CHARACTERISTICS OF STREAMS

IN MASSACHUSETTS--HUDSON RIVER BASIN

By S. William Wandle, Jr.

ABSTRACT

The Hudson River basin includes streams draining the Hoosic River (205 square miles), Kinderhook Creek (20.9 square miles), and Roeliff Jansen Kill (13.3 square miles) basins in western Massachusetts, eastern New York, and southern Vermont. Drainage areas, using the latest available 1:24,000 scale topographic maps, were computed for the first time for ungaged streams draining more than 3 square miles and were re-computed for data-collection sites.

Streamflow characteristics at five gaging stations were calculated using a new data base with daily flow records through 1979. These characteristics include annual and monthly flow statistics, duration of daily flow values, and the annual 7-day mean low flow at the 2-year and 10-year recurrence intervals. Seven-day low-flow statistics are presented for 21 partial-record sites, and procedures used to determine the hydrologic characteristics of a basin are summarized. Basin characteristics representing 14 commonly used indices to estimate various streamflows are provided for five gaged streams. This gazetteer will aid in the planning and siting of water-resources related activities and will provide a common data base for governmental agencies and the engineering and planning communities.

INTRODUCTION

Information on hydrologic characteristics, including drainage areas, frequency of low flows, and duration of daily flows, is necessary to plan and manage water-resources related activities. Governmental agencies and the engineering and planning community need streamflow and basin characteristics to satisfy requirements relative to waste assimilation, fisheries management, hydropower, land-use planning, stream-systems analysis, and water-resource development and management. No current hydrologic data base containing a comprehensive list

of drainage areas, monthly flows, low-flow frequencies, and duration of daily flows is available for most of the Massachusetts stream systems. Drainage areas are available for selected sites where streamflow data are collected. Streamflow characteristics are presented in various reports, but these data, to be current, need to be re-analyzed using the latest available daily flow records.

In response to this need, a study was begun in 1980, in cooperation with the Massachusetts Division of Water Pollution Control, to analyze available streamflow and river-basin characteristics, and to compute subbasin drainage areas. This report is part of a series of gazetteers on the hydrologic characteristics of the major river basins in the State. Gazetteers are also available for the coastal river basins of the North Shore and Massachusetts Bay (Wandle, 1984a), Connecticut River basin (Wandle, 1984b), Merrimack River basin (Wandle and Fontaine, 1984), Taunton and Ten Mile River basins (Wandle and Keezer, 1984), Thames River basin (Wandle and LeBlanc, 1984), Housatonic River basin (Wandle and Lippert, 1984), Blackstone River basin (Wandle and Phipps, 1984), and coastal river basins of the South Shore and Buzzards Bay (Wandle and Morgan, 1984). This report provides the first detailed listing of drainage areas and streamflow characteristics derived from daily flow records in the Hudson River basin. The streamflow characteristics presented are an expansion and an update of those given in Hansen and others (1973).

The Hudson River basin in Massachusetts (fig. 1) includes the Hoosic River and Kinderhook Creek basins in northwestern Massachusetts and the Roeliff Jansen Kill (Bash Bish Brook) basin in southwestern Massachusetts. The study area includes all or part of the following communities: Adams, Cheshire, Clarksburg, Dalton, Egremont, Florida, Hancock, Lanesborough, Mount Washington, New Ashford, North Adams, Richmond, Savoy, Williamstown, and Windsor.

Streamflow characteristics presented for the five continuously gaged streams are based upon a new sample of daily flow records in comparison to flow records used in Hansen and others (1973), Higgins (1967), Knox and Soule (1949), and Male and Ogawa (1982). Streamflow records through the 1979 water year were available for this analysis. Records were selected for each site to represent a flow regime influenced by fairly constant river basin conditions (Wandle, 1983).

Drainage areas were computed for the first time for ungaged streams draining more than 3 mi^2 and were re-computed for data-collection sites. Drainage divides, as delineated on the latest available 1:24,000 scale topographic quadrangle maps (Wandle, 1981; Gadoury and Wandle, 1982) were used to calculate drainage areas. Drainage areas for most of the long-term gaging stations in earlier reports were computed using the drainage divides as outlined on 1:31,680 or 1:62,500 scale topographic quadrangle maps.

Streamflow data used in this study are a part of the historic streamflow data collected under agreements with State and Federal agencies and the U.S. Geological Survey. Most of the low-flow discharge measurements used in determining low-flow estimates at partial-record sites were collected during the water-resources investigation of the Hoosic River basin (Hansen and others, 1973). The file of basin characteristics was created during an evaluation of available streamflow data in central New England (Johnson, 1970). This file is an expansion of the characteristics abstracted by Langbein and others (1947), and by Benson (1962). Basin characteristics were updated and additional characteristics were entered as part of a study to define floodflow characteristics of small streams (Johnson and Tasker, 1974; Wandle, 1982). The hierarchical stream list was compiled by the Massachusetts Division of Water Pollution Control and the Massachusetts Division of Fisheries and Wildlife (Halliwell and others, 1982).

Data tabulated include drainage areas, basin and streamflow characteristics for gaging stations, including annual and monthly flow statistics, duration of daily flow values, and the annual 7-day mean low flow at the 2-year and 10-year recurrence intervals. Seven-day low-flow statistics for partial-record sites are also presented. An explanation of each procedure to determine the streamflow and basin characteristics is provided.

The author thanks the many persons who have kindly given time, information, and guidance during this study. Particular thanks are given to persons in the Geological Survey who assisted in the data collection and in the preparation of this report.

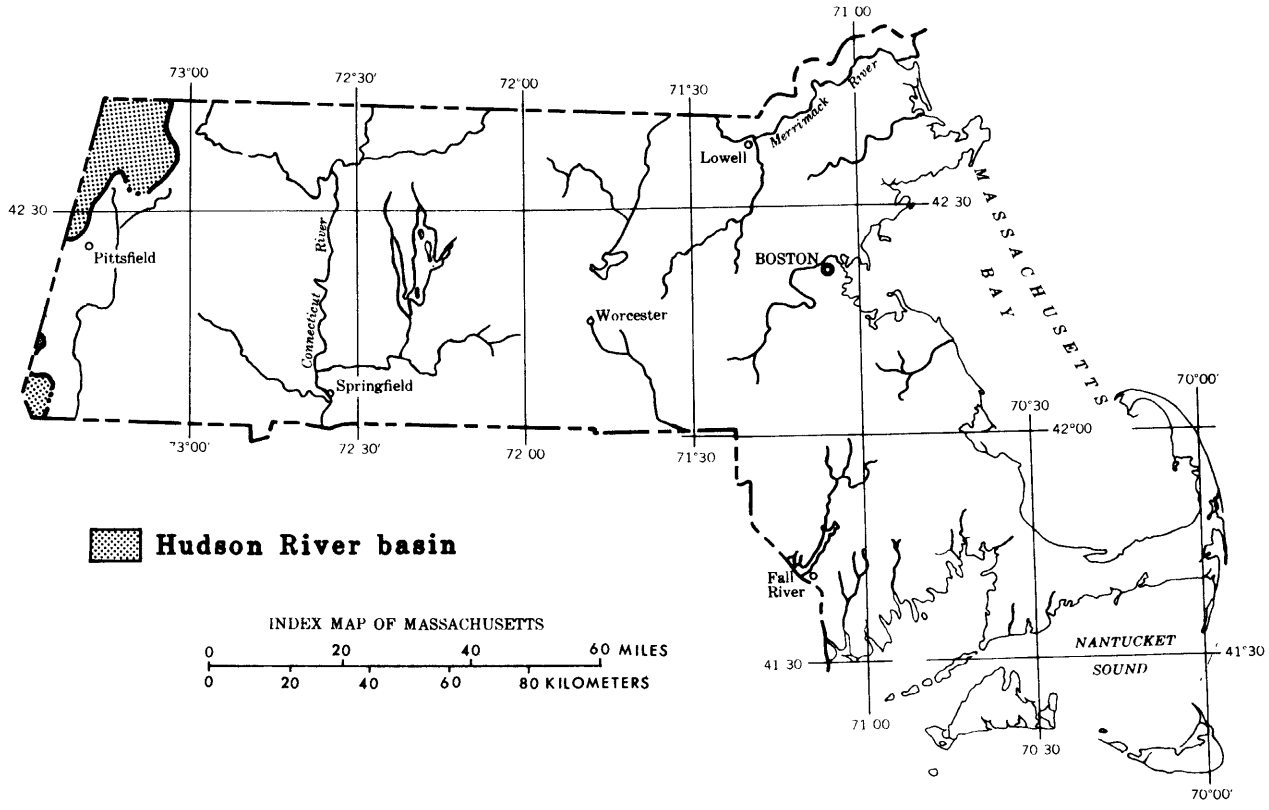

Figure 1.--Location of the Hudson River basin

HYDROLOGIC DATA

Hydrologic characteristics are represented by various physical, climatic, and streamflow indices of a river basin. These characteristics can be determined either from available maps by following standardized procedures or from historic streamflow records.

Basin characteristics are indices of the physiography of the basin or of the climate prevailing over the basin and are measured on topographic quadrangle or climatic maps. Streamflow characteristics are computed from continuous records of daily flow or from a set of measurements during the occurrence of a specific event. Streamflow and basin characteristics are used in modeling stream quality, assessing water-resources conditions, analyzing impact of man's activities, and defining relationships to estimate flows or stream-quality parameters at ungaged sites.

Basin Characteristics

Drainage area is one of the most important variables in any hydrologic investigation or in the design of riverine structures. Drainage area is the most significant variable in the northeast that influences all streamflow except perhaps low flow in some regions. The physical boundary for many water-related studies corresponds to the limits for the drainage area upstream from the site.

For this study, drainage areas listed in table 1 (at the end of the report) were determined for the following sites:

1. Survey data-collection sites shown in figure 2. These sites include continuous-record gaging stations given in table 2 (at the end of the report), low-flow partial-record stations, miscellaneous sites, and water-quality stations.

2. Locations where the drainage area is greater than 3 mi^2.

3. Successive sites along a stream where the area between sites is at least 6 mi^2 on tributary streams and 10 mi^2 on the Hoosic River.

The drainage basin divides for these sites were delineated on the latest available 1:24,000 scale topographic quadrangle maps. Subbasin drainage divides are shown in the series of statewide reports, "Drainage Divides, Massachusetts." The Hudson River basin is covered by two reports in this series—Hudson River basin (Wandle, 1981) and Housatonic River basin (Gadoury and Wandle, 1982).

The subbasin drainage areas given in table 1 are indexed to the Massachusetts stream inventory prepared by the Massachusetts Division of Water Pollution Control and the Massachusetts Division of Fisheries and Wildlife (Halliwell and others, 1982) with some modification. Drainage areas were computed for sites meeting one of the three criteria mentioned above. The entire stream listing is included as a reference for stream order. This hierarchical listing begins at the mouth of a major stream and proceeds upstream with tributary streams indented under the main-stem stream. This order is followed to list all named streams. Unnamed tributaries are included to maintain the hierarchy. The reader is referred to the inventory of rivers and streams report by Halliwell and others (1982) for a more detailed explanation.

The basin characteristics listed below are included because they represent indices that would remain reasonably stable over a planning period. They are useful in predictive surface-water models to assess impacts of proposed developments. The usefulness of these characteristics to explain the variability of various streamflow events has been demonstrated in hydrologic analyses (Thomas and Benson, 1970) and they can be measured readily from available maps. The 14 basin indices given in table 3 (at the end of the report) were computed according to the procedures described below. The indices for elevation, storage, lake area, and forest can be computed by the grid method which is explained after all the procedures are described.

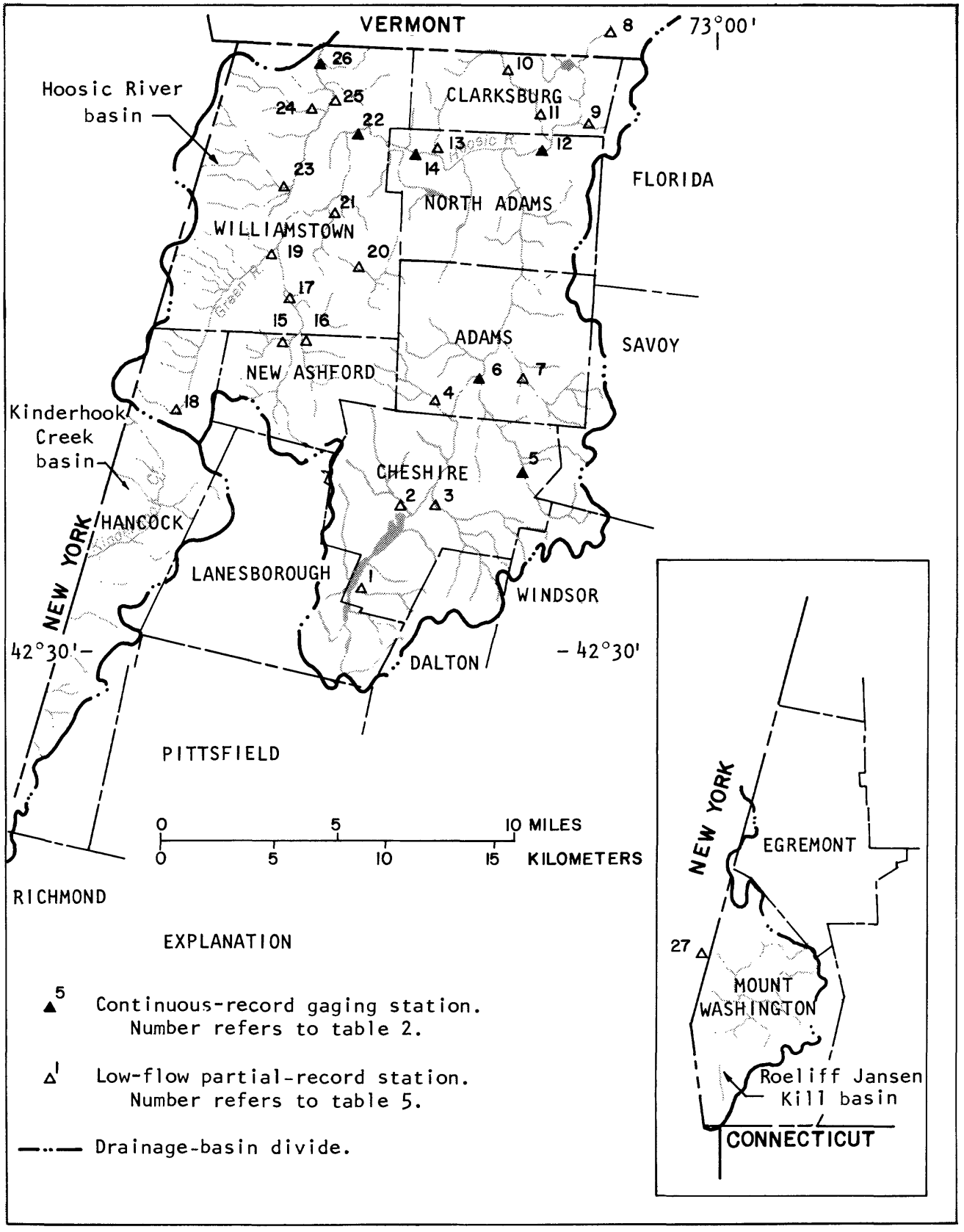

Figure 2.--Location of gaging stations and low-flow partial-record stations in the Hudson River basin

1. Drainage area—Area, in square miles, as measured on the most recent 1:24,000 scale topographic quadrangle maps. Drainage area, as defined in the "National Handbook of Recommended Methods for Water-Data Acquisition" (U.S. Geological Survey, 1977), is "...the area of a river basin, measured in a horizontal plane, that is enclosed by a topographic divide such that direct surface runoff from precipitation normally would drain by gravity into the river basin.". Drainage area boundary lines are traced on topographic maps along divides indicated by contour elevations, starting at the point on the stream for which the drainage area is desired. These lines are drawn to cross a contour at right angles. Interpolation between contours may be indicated by reference to trails, old roads, or firebreaks in forested areas, all of which frequently follow drainage divides. Detailed information may also be obtained from highway or street profiles, from examination of aerial photographs, and from ground reconnaissance. Subareas within each quadrangle map were computed with a planimeter using the procedures of the U.S. Federal Inter-Agency River Basin Committee (1951) as a guide. The coefficients to compute square miles from planimeter units were calculated using the known area of each 7.5-minute quadrangle or of the appropriate 2.5-minute quadrilaterals. Drainage areas for the subbasins were computed by summing the contributing areas.
2. Slope—Main-channel slope, in feet per mile, determined from elevations at points 10 percent and 85 percent of the distance along the main channel from the gaging station to the basin divide.
3. Length—Main-channel length, in miles, from the gaging station to the basin divide, as measured with dividers set to 0.1 mile or with a map measurer.
4. Elevation—Mean basin elevation, in feet above sea level, measured on topographic maps by laying a grid over the map.
5. Storage—Area of lakes, ponds, and marshes, in percent of total drainage area, measured by planimetering or by using a transparent grid. The marsh area includes the area of wooded marshes and marshes as defined by the appropriate topographic quadrangle map symbol. Storage area is the total area of all the lakes, ponds, and marshes expressed as a percentage of the total drainage area.
6. Lake area—Area of lakes and ponds, in percent of the drainage area, determined by the grid method.
7. Forest—Area of forest, in percentage of the drainage area, determined from the forest cover as shown on the topographic map with the green woodland overprint using the grid method.
8. Soil—Soil index, in inches, represents the value of potential maximum infiltration, during an annual flood, under average soil-moisture conditions. This characteristic, provided by the U.S. Soil Conservation Service (Dr. Benjamin Isgur, written commun., 1970), is a function of the soil and cover conditions in the basin. The index was computed from the runoff curve number following procedures in U.S. Department of Agriculture (1972).
9. Latitude—Latitude of stream-gaging station, in decimal degrees, determined by manual measurement.
10. Longitude—Longitude of stream-gaging station, in decimal degrees, determined by manual measurement.
11. Precipitation—Mean-annual precipitation, in inches, determined from the isohyetal map in Knox and Nordenson (1955). The variation in mean-annual precipitation is shown in more detail in this map than in more recent sources.
12. Precipitation intensity—Maximum 24-hour rainfall, in inches, having a recurrence interval of 2 years. This characteristic was determined from U.S. Weather Bureau (1959b).
13. Snowfall—Average total seasonal snowfall, in inches, from an isohyetal map in Lautzenheiser (1969).
14. January temperature—Minimum January temperature, in degrees Fahrenheit, determined from U.S. Weather Bureau (1959a).

Several basin characteristics were measured following the grid method by using transparent grids to compute area or an average contour value. Storage area is determined by randomly placing the grid over the water and marsh area and counting squares. If the water and marsh area is large enough (about 30 squares), the number of grid intersections within the storage area are counted. The storage area then is computed as the product of the square size and the number of grid intersections. To measure a contour value such as elevation, the grid spacing is selected to give at least 25 intersections within the basin boundary. The elevation at each grid intersection is determined and an average is computed. The percentage of a variable that is extensive in a drainage basin, such as forest cover, can be easily measured by counting the number of grid intersections occurring over the forested area, multiplying by 100, and dividing by the number of grid intersections within the basin.

Streamflow Characteristics

Historic daily flow records available in the Hoosic River basin were used to compute daily, monthly, and annual flow characteristics. A summary of these records is given in table 2 and the location of streamflow sites is shown in figure 2. These flow data were collected as part of the Survey's nationwide data-collection network through agreements with State and Federal agencies. Records of daily flow are available from the Survey's National Water Data Storage and Retrieval System (WATSTORE). This water-data computer processing system consists of several files containing data grouped by common characteristic and data-collection frequency.

The WATSTORE system includes site identification, daily values files, and computer programs that produce streamflow statistics. Hydrologic-data files are maintained for (1) parameters measured on a daily or continuous basis, such as streamflow values, river stages, water temperatures, specific-conductance values, and ground-water levels; (2) annual peak values for streamflow and stage; (3) chemical analyses for surface- and ground-water sites; and (4) ground-water site inventory, including location, identification and geohydrologic characteristics. The data-processing, storage, retrieval, and analysis capabilities of WATSTORE are described in the system user's guide compiled by Hutchison (1975). Information on the availability of data analyses may be obtained from: U.S. Geological Survey, 150 Causeway Street, Suite 1309, Boston, MA 02114.

A brief description of the streamflow statistics computed using the WATSTORE system is included below. Streamflow characteristics representing annual, monthly, and daily flow statistics were selected for this analysis because they are useful in planning and design studies in this region. The streamflow statistics computed following the procedures given below are listed in table 4 (at the end of the report).

Annual and monthly flow characteristics (means and standard deviations) for five gaging stations were computed with the "Daily Values Monthly and Annual Statistics" computer program W4422 (Price and Meeks, 1977) using observed daily flow records. The maximum and minimum, monthly means (fig. 3 and table 4) were obtained from output provided by this program. The monthly hydrograph for North Branch Hoosic River at North Adams is shown in figure 3.

Characteristics of the flow-duration curve (the daily flow exceeded 99, 95, 90, 75, 70, 50, 25, and 10 percent of the time) were computed for four gaging stations by means of computer program A969, "Daily Values Statistics" (Meeks, 1977). Examples of flow-duration curves are given in figure 4. Low-flow characteristics (annual 7-day mean low flows at the 2-year and 10-year recurrence intervals 7Q2 and 7Q10, respectively) were also calculated for three gaging stations by program A969. In this program, a log-Pearson Type III distribution is fitted to a set of observed annual 7-day mean low flows to obtain coordinates of the computed low-flow frequency curve. If the log-Pearson Type III curve did not adequately fit a plot of the observed data, especially in the low end, then a graphical curve was drawn. The graphical frequency curve was used to interpret the observed data when necessary because a graphical curve is the basic curve to use in analyzing the frequency of annual low flows according to Riggs (1971, 1972). The frequency curve for Green River at Williamstown is shown in figure 5.

Additional flow data, including flood-frequency analyses, are available from WATSTORE. Peak discharges for selected recurrence intervals for 82 sites in Massachusetts are given in Wandle (1982).

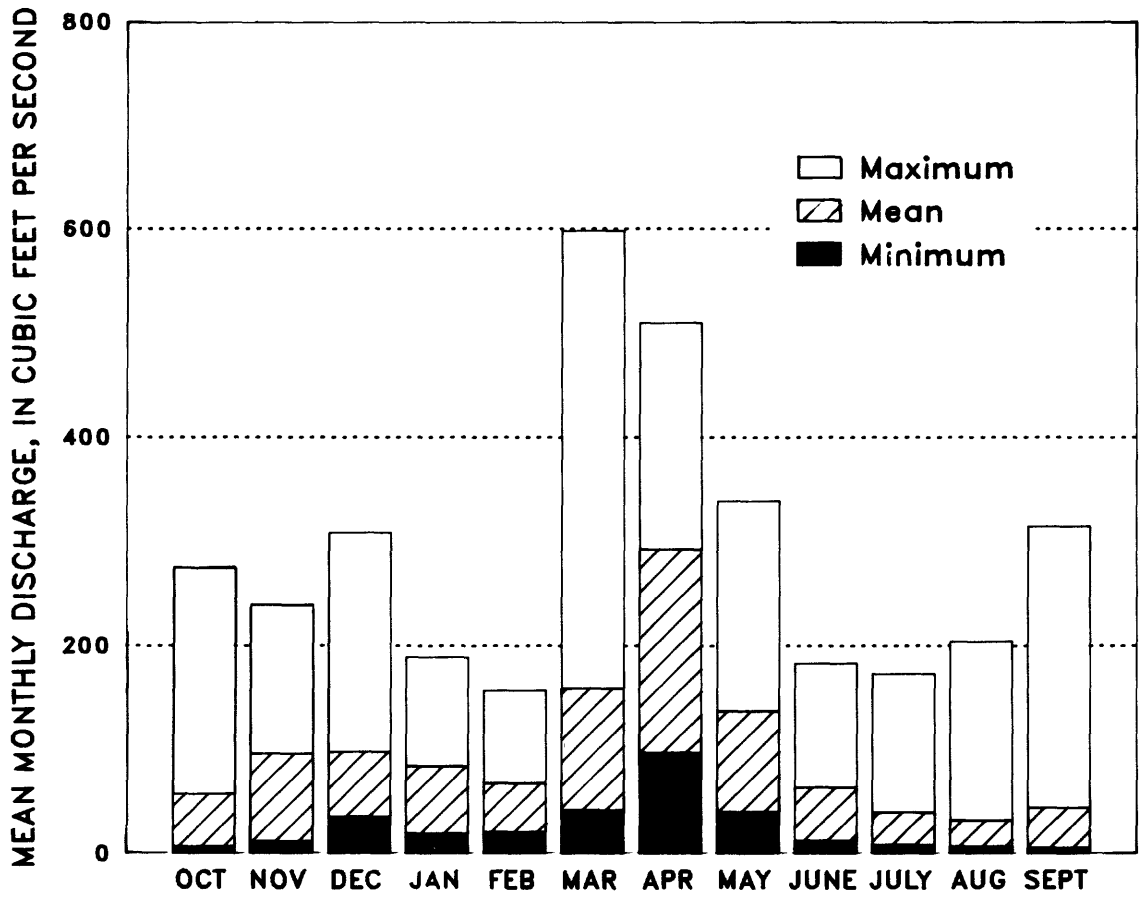

Figure 3.--Monthly discharges and extremes for North Branch Hoosic River at North Adams, Mass. (site 12), during 1932-79

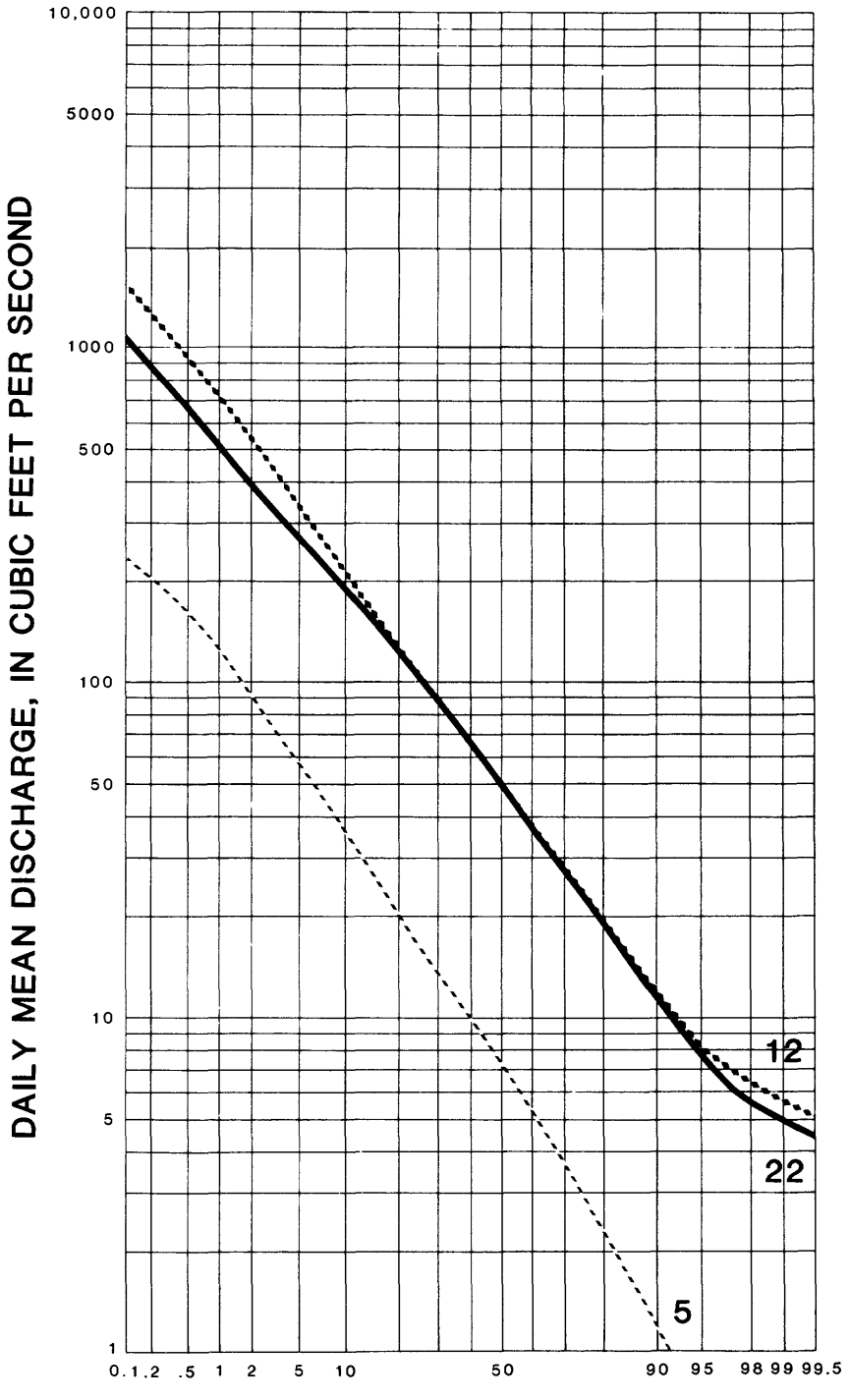

Figure 4.--Flow-duration curves for Dry Brook near North Adams, Mass. (site 5), during 1963-74, North Branch Hoosic River at North Adams, Mass. (site 12),during 1932-79, and Green River at Williamstown, Mass. (site 22), during 1950-79

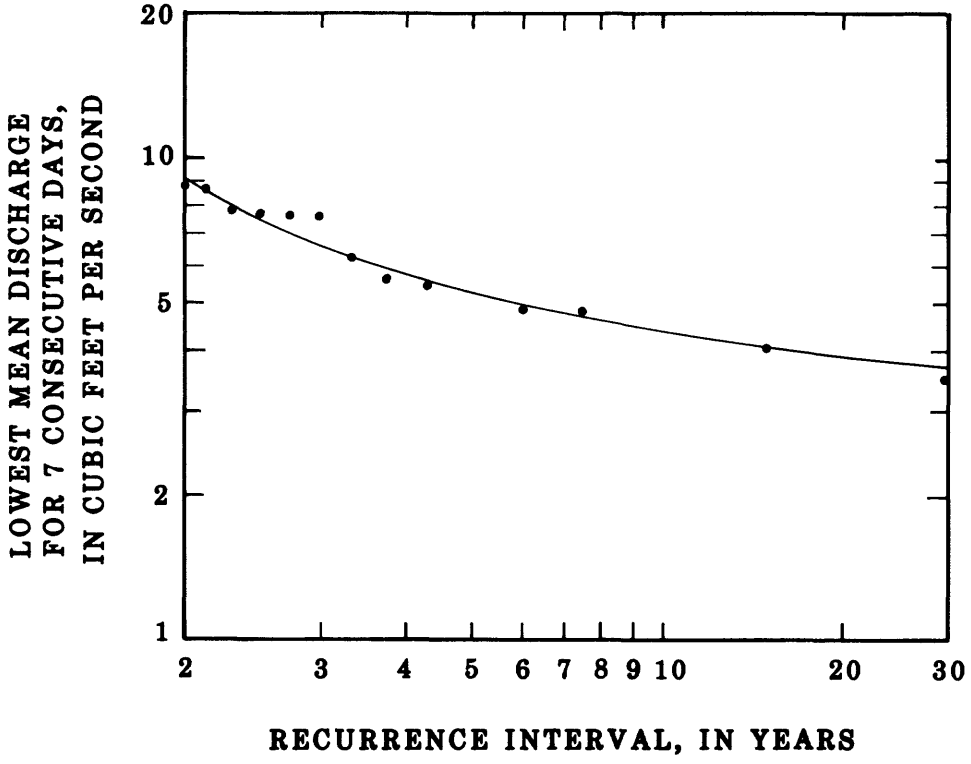

Figure 5.—Low-flow frequency curve for Green River at Williamstown, Mass. (site 22), during 1951-79

Characteristics of low flow were also determined at low-flow partial-record stations where measurements of discharge, rather than a continuous daily flow record, were available. This estimating technique is briefly described in the section on Streamflow Analysis. The 7-day low-flow statistics were developed from discharge measurements made during periods of base runoff. Base runoff is defined (Langbein and Iseri, 1960) as "the sustained or fair weather runoff. In most streams, base runoff is composed largely of ground-water effluent." Base runoff usually occurs in most Massachusetts streams during the summer or early fall after 5 to 7 consecutive days without rainfall.

STREAMFLOW ANALYSIS

Streamflow Data Base

Systematic records of daily streamflow have been collected since at least 1932 in the Hoosic River basin. The location and period of record for these gaging stations are given in table 2. Streams within the Roeliff Jansen Kill and Kinderhook Creek basins are not monitored in Massachusetts. Streamflow records are available for these basins at sites in New York from the U.S. Geological Survey office in Albany, New York.

Discharge measurements were made at 19 low-flow partial-record sites during the water-resources investigation of the Hoosic River basin (Hansen and others, 1973). Measurements were also collected as part of the Massachusetts low-flow network at two sites from 1978 to 1981 and at eight sites during 1965 in the Hoosic Basin. Data are available as part of the New York water-resources program in the Kinderhook Creek and Roeliff Jansen Kill basins, just west of the state line. Discharge measurements were made for Bash Bish Brook at Copake Falls, New York, and for Kinderhook Creek at Stephentown, New York (Eissler, 1978).

Flow characteristics are useful in resource management and design studies if these variables represent a particular regulated flow sequence or the natural flow regime that is expected to occur in the future. A valid streamflow analysis is based upon flow records during a period of relatively constant river-basin conditions.

Daily Flow Statistics

Systematic daily flow records available for five sites in the Hoosic River basin were reviewed to select a data base for statistical analysis. Impacts of reservoirs, diversions, regulation, and withdrawals for public supplies on streamflows were assessed using information on stream regulation found in the series of water-resources data reports issued annually (see U.S. Geological Survey, 1980, for an example) and in Knox and Soule (1949). Streamflow records were selected that represent a flow regime influenced by fairly constant river-basin conditions (Wandle, 1983). The record length used in this analysis is given in table 4. Low flow, monthly flow, and flow-duration characteristics given in table 4 were derived from the observed streamflow records at each station and were not adjusted for regulation or diversion. These daily streamflow characteristics were computed following procedures summarized in the section on streamflow characteristics.

Low-Flow Statistics

Continuous streamflow records are not necessary to estimate low-flow characteristics at sites. According to Riggs (1972) selected base-flow measurements rather than a continuous daily flow record can define the low-flow characteristics at a site.

Low-flow partial-record stations are operated to collect discharge measurements when streamflow is composed largely of ground-water runoff. These low-flow sites are selected on streams where flow is expected to occur during a significant dry spell and where the flow is not affected by artificial regulation. Base-flow measurements to define a relation with concurrent gaged flows are obtained over several low-flow periods.

A relation is developed with the base-flow measurements and the concurrent daily mean flows at a nearby long-record gaging station (index station). The 7-day low-flow statistics (7Q2 and 7Q10) for the site are determined from this relation using the appropriate low-flow statistics for the gaged stream. This estimating technique is explained in more detail by Riggs (1972).

Low-flow statistics for 21 sites in the Hudson River basin are summarized in table 5 (at the end of the report). The low-flow statistics are representative of the hydrologic regime during the data-collection period. Seven-day, 2-year, and 10-year low flows ranged from 0.04 to 0.19 and from 0.01 to 0.12 $(ft^3/s)/mi^2$, respectively, at these sites. Green River at Williamstown and North Branch Hoosic River at North Adams were used as index stations. These values were computed following the procedures mentioned above.

SUMMARY

Drainage areas were re-computed for data-collection sites and were computed for the first time for ungaged streams draining greater than 3 mi^2. Basin characteristics for drainage area, slope, length, elevation, storage, lake area, forest, soil, latitude, longitude, precipitation, precipitation intensity, snowfall, and January minimum temperature are provided for the five gaged sites in the Hoosic River basin. Computer programs A969 and W4422 were used to determine daily flow statistics including annual and monthly flows, duration of daily flows, and 7-day low-flow values. Seven-day, 2-year, and 10-year low flows ranged from 0.04 to 0.19 and from 0.01 to 0.12 $(ft^3/s)/mi^2$, respectively, at the 21 partial-record stations.

Techniques used to compute basin and streamflow characteristics of a river basin are summarized. This gazetteer contains a comprehensive listing of hydrologic characteristics that should prove useful to those concerned with water-resources activities.

Table 1.—Stream-order listing, selected drainage areas, and locations of subbasins within the Roeliff Jansen Kill, Kinderhook Creek, and Hoosic River basins

[Sites with streamflow information listed in tables 2, 4, or 5 are marked with an asterisk. The hierarchical listing is modified from Halliwell and others, 1982. Drainage areas are shown for sites as explained in the section on basin characteristics. These areas are not adjusted for manmade changes in the flow system. Streams entirely in adjacent states are underlined and are included in the list where necessary to maintain the stream order.]

Stream name	Location	Drainage area, in square miles
	ROELIFF JANSEN KILL BASIN	
Bash Bish Brook	Massachusetts-New York State line	13.3
Cedar Brook		
Wright Brook	Mouth	3.16
City Brook	Mouth	3.85
Guilder Brook		
Ashley Hill Brook	Upstream from City Brook	5.06
Lee Pond Brook		
	KINDERHOOK CREEK BASIN	
Kinderhook Creek		
Wyomanock Creek (N.Y.)		
Unnamed tributary	State Route 22 (New York)	2.48
Berry Pond Creek	Goodrich Hollow Road	2.24
Red Oak Brook		
Unnamed tributary	Knapp Road	1.37
Kinderhook Creek	Osgood Road	14.8
Bently Brook	Mouth	3.00
Whitman Brook	State Route 43	1.87
Kinderhook Creek	Brodie Mountain Road	4.93
Jones Brook		
Rathburn Brook		
	HOOSIC RIVER BASIN	
Hoosic River	Massachusetts-New York State line	205
Hoosic River	0.3 mile upstream from the Massachusetts-New York State line	*204
Broad Brook		
Hemlock Brook	Buckley Street	*13.1
Buxton Brook	Petersburg Road	*2.86
Birch Brook		
Sweet Brook		
Hemlock Brook	U.S. Route 7	*5.25
Green River	0.1 mile upstream from State Route 2	*42.6
Hopper Brook	350 feet upstream from mouth	*6.70

Table 1.--Stream-order listing, selected drainage areas, and locations of subbasins within the Roeliff Jansen Kill, Kinderhook Creek, and Hoosic River basins (Continued)

Stream name	Location	Drainage area, in square miles
	HOOSIC RIVER BASIN (Continued)	
Hoosic River (Continued)		
Green River (Continued)		
Hopper Brook	100 feet downstream from State Reservation	*3.59
Money Brook		
West Branch Green River	U.S. Route 7	*14.8
West Branch Green River	Downstream from Mills Hollow	10.6
West Branch Green River	Downstream from Bently Hollow	5.73
West Branch Green River	State Route 43	*1.39
Green River	U.S. Route 7	*14.0
Roaring Brook		
East Banch Green River	150 feet upstream from mouth	*3.93
East Branch Green River	0.2 mile upstream from mouth	3.90
Mitchell Brook		
Thompson Brook	U.S. Route 7	*1.60
Hoosic River	1.0 mile upstream from Green River	132
Unnamed tributary		
Paull Brook		
Hoosic River	0.3 mile downstream from Sherman Brook	*126
Sherman Brook	Massachusetts Avenue	*1.69
Notch Brook	Mouth	3.62
North Branch Hoosic River	Mouth	43.4
North Branch Hoosic River	0.4 mile downstream from Hudson Brook	*40.9
Hunterfield Brook		
Wheeler Brook		
Hudson Brook	150 feet upstream from mouth	7.58
Hudson Brook	Cross Road	*6.39
Bear Swamp Brook		
Cowan Brook	150 feet downstream from Klondike Road	*3.16
Canyon Brook	Culvert 100 feet upstream from mouth	*1.77
Unnamed tributary		
Beaver Creek		
North Branch Hoosic River	0.6 mile upstream from the Massachusetts-Vermont State line	*23.6a
Hoosic River	Upstream from confluence with North Branch	74.6
Phillips Creek		
Tunnel Brook		
Bowerman Creek		
Hoosic River	State Route 8A	67.4
Cheesbro Brook		
Southwick Brook		
Tophet Brook		
Miller Brook		
Tophet Brook	0.5 mile upstream from mouth	5.80
Reed Brook		

Table 1.—Stream-order listing, selected drainage areas, and locations of subbasins within the Roeliff Jansen Kill, Kinderhook Creek, and Hoosic River basins (Continued)

Stream name	Location	Drainage area, in square miles
	HOOSIC RIVER BASIN (Continued)	
Hoosic River (Continued)		
Tophet Brook	Bridge 1.2 miles upstream from mouth	*4.67
Patton Brook		
Hoxie Brook		
Unnamed tributary		
Pecks Brook		
Hoosic River	500 feet downstream from Dry Brook	*46.7
Dry Brook	Mouth	10.5
Dry Brook	State Route 116	*7.67
Dry Brook	Windsor Road	3.14
Unnamed tributary		
Bassett Brook	3,000 feet upstream from mouth	*2.82
Penniman Brook		
South Brook	Wells Road	7.07
South Brook	Windsor Notch Road	*7.02
McDonald Brook		
Kitchen Brook	State Route 8	*4.80
Thunder Brook		
Hoosic River	State Route 8 downstream from Cheshire Reservoir	15.0
Collins Brook		
Pettibone Brook	Mouth	2.18
Gore Brook	State Route 8	*1.40
Muddy Brook	Mouth	1.82

a Drainage basin is outside of Massachusetts.

Table 2.—Summary of daily flow records available in the Hoosic River basin

[Streams within the Kinderhook Creek and Roeliff Jansen Kill basins are not gaged within Massachusetts.]

Number in figure 2	Station number	Station name	Location	Period of record	Remarks
5	01331400	Dry Brook at Adams, Mass.	State Route 116	1963-74	Discontinued.
6	01331500	Hoosic River at Adams, Mass.	500 feet downstream from Dry Brook	1932-79	Regulated by Cheshire Reservoir. Diversion for municipal supply of Adams.
12	01332000	North Branch Hoosic River at North Adams, Mass.	0.4 mile downstream from Hudson Brook	1932-79	Diurnal fluctuation prior to 1948.
14	01332500	Hoosic River near Williamstown, Mass.	0.3 mile downstream from Sherman Brook	1941-79	Some regulation by Cheshire Reservoir.
22	01333000	Green River at Williamstown, Mass.	0.1 mile upstream from State Route 2	1950-79	Slight diurnal fluctuation at times.
26	01333300	Hoosic River below Williamstown, Mass.	0.3 mile upstream from Massachusetts-Vermont State line	1970-75 1978-79	Water-quality monitor.

Table 3.—Basin characteristics for stream-gaging stations in the Hoosic River basin

Basin characteristics	Station name and site number				
	Dry Brook at Adams, Mass. (5)	Hoosic River at Adams, Mass. (6)	North Branch Hoosic River at North Adams, Mass. (12)	Hoosic River near Williamstown, Mass. (14)	Green River at Williamstown, Mass. (22)
Area, in square miles	7.67	46.7	40.9	126	42.6
Slope, in feet per mile	188	12.6	77.4	19.2	33.0
Length, in miles	4.80	12.5	10.6	24.0	27.5
Elevation, in feet	1760	1580	1840	1660	1620
Storage, in percent	1.73	1.88	.22	1.33	.12
Lake area, in percent	.27	1.88	.22	.87	.09
Forest, in percent	60	71	82	67	78
Soils index, in inches	3.7	3.7	4.4	3.7	3.4
Latitude of gage, in decimal degrees	42.5889	42.6103	42.7000	42.7058	42.7089
Longitude of gage, in decimal degrees	73.1133	73.1256	73.0900	73.1806	73.1972
Precipitation, in inches	48.0	48.0	55.3	49.6	45.9
Precipitation intensity for 2-year recurrence interval, in inches	3.0	3.0	3.0	2.9	2.9
Snowfall, in inches	70	68	95	78	65
January minimum temperature, in degrees Fahrenheit	12	12	11	13	13

Table 4.--Streamflow characteristics, in cubic feet per second, at selected stream-gaging stations

Annual and monthly flow characteristics:
QA is the mean annual discharge
SDQA is the standard deviation of mean annual discharge
QM is the mean discharge for M calendar month, M = 1 for January where the top line is the maximum mean; the middle line is the mean; the bottom line is the minimum mean.
SDQM is the standard deviation of mean discharge for M calendar month

Low-flow characteristics:
7Q2 is the annual minimum 7-day mean discharge for 2-year recurrence interval
7Q10 is the annual minimum 7-day mean discharge for 10-year recurrence interval

Flow-duration characteristics:
DPT is the daily discharge, exceeded PT percent of the time, from the flow-duration curve

Years of record:
YRSDAY is the number of years of daily flow record for this analysis
YRSLOW is the number of years of low-flow record for this analysis

Flow	Station name and site number				
	Dry Brook at Adams, Mass. (5)	Hoosic River at Adams, Mass. (6)	North Branch Hoosic River at North Adams, Mass. (12)	Hoosic River near Williamstown, Mass. (14)	Green River at Williamstown, Mass. (22)
ANNUAL					
QA	14.8	90.5	97.4	277	84.4
SDQA	4.9	20.5	21.4	58.2	21.9
MONTHLY					
Q10	12.5 5.06 .52	217 49.4 14.1	275 57.5 6.28	584 161 41	222 42.7 5.33
SDQ10	3.78	42.6	52.1	128	44.8
Q11	32.8 13.2 1.13	213 76.5 13.3	239 96.1 11.3	544 253 46.5	171 75.1 6.71
SDQ11	8.67	44.0	53.8	134	50.5
Q12	42.0 17.7 4.49	190 85.9 35.4	308 97.9 34.8	552 278 118	259 97.7 24.8
SDQ12	10.9	37.3	52.3	130	52.6

Table 4.—Streamflow characteristics, in cubic feet per second, at stream-gaging stations (Continued)

Flow	Station name and site number				
	Dry Brook at Adams, Mass. (5)	Hoosic River at Adams, Mass. (6)	North Branch Hoosic River at North Adams, Mass. (12)	Hoosic River near Williamstown, Mass. (14)	Green River at Williamstown, Mass. (22)
MONTHLY (Continued)					
Q1	28.6	211	189	591	228
	10.5	89.5	83.8	257	86.2
	3.31	26.5	18.7	79.6	16.5
SDQ1	7.13	45.6	50.5	129	50.9
Q2	28.0	169	157	528	178
	10.4	78.7	67.7	231	76.2
	3.41	23.5	20.1	101	19.2
SDQ2	7.06	35.5	36.8	105	41.9
Q3	47.5	474	598	1038	404
	21.6	151	159	452	147
	8.46	54.9	41.2	139	33.6
SDQ3	11.6	86.0	115	228	81.9
Q4	92.0	523	510	1178	390
	47.5	225	292	702	217
	20.7	85.8	96.9	253	94.9
SDQ4	20.6	87.8	101	233	753
Q5	45.2	268	338	872	214
	21.0	120	137	387	114
	6.36	50.8	39.6	163	46.8
SDQ5	11.2	50.0	67.8	158	45.6
Q6	63.1	203	183	415	256
	15.3	69.7	63.8	219	65.2
	1.10	22.6	11.7	81	18.2
SDQ6	17.6	40.7	45.9	125	51.3
Q7	22.0	212	173	393	112
	7.59	51.2	39.3	137	32.6
	1.07	21.2	7.93	60.4	9.13
SDQ7	6.29	36.8	35.2	76.7	25.6

Table 4.--Streamflow characteristics, in cubic feet per second, at stream-gaging stations (Continued)

Flow	Station name and site number				
	Dry Brook at Adams, Mass. (5)	Hoosic River at Adams, Mass. (6)	North Branch Hoosic River at North Adams, Mass. (12)	Hoosic River near Williamstown, Mass. (14)	Green River at Williamstown, Mass. (22)
MONTHLY (Continued)					
Q8	12.6 4.54 .60	126 40.7 16.0	204 31.2 6.25	416 116 51.4	147 27.5 5.61
SDQ8	4.51	24.6	34.4	75.5	33.1
Q9	15.4 4.04 .11	286 49.4 14.8	314 44.0 5.1	454 127 44.8	158 32.0 4.09
SDQ9	4.19	44.2	52.1	81.4	33.1
LOW FLOW					
7Q2	.90	—	7.7	—	8.5
7Q10	.00	—	5.1	—	4.5
FLOW DURATION					
D99	.15	—	5.6	42.9	4.8
D95	.5	—	8.3	57.4	7.5
D90	1.2	—	12.0	68.6	11.0
D75	2.8	—	23.0	101	23.0
D70	3.5	—	28.0	112	27.0
D50	7.3	—	49.0	170	49.0
D25	16.0	—	110	322	110
D10	36.0	—	230	593	190
YEARS					
YRSDAY	12	48	48	39	30
YRSLOW	11	—	47	—	29

Table 5.—Summary of 7-day low-flow characteristics, drainage area, and period of record for low-flow partial-record stations

Number in figure 2	Station number	Station name	Location	Period of record	Drainage area, in square miles	Estimated annual minimum 7-day mean low flow, in cubic feet per second, at indicated recurrence interval	
						2-year	10-year
			HOOSIC RIVER BASIN				
1	01331350	Gore Brook near Cheshire, Mass.	State Route 8	1967-69	1.40	<0.1	<0.1
2	01331360	Kitchen Brook at Cheshire, Mass.	State Route 8	1965, 1967-69, 1978-81	[1]4.80	.0	.0
3	01331380	South Brook at Cheshire, Mass.	Windsor Notch Road	1965, 1967-69	7.02	.6	.3
4	01331390	Bassett Brook at Cheshire Harbor, Mass.	3000 feet upstream from mouth	1967-69	2.82	.7	.4
7	01331600	Tophet Brook near Adams, Mass.	Highway bridge	1967-69	4.67	.5	.3
8	01331860	North Branch Hoosic River at Stamford, Vt.	Bridge on road off State Route 8	1967-68	23.6	—	—
9	01331880	Canyon Brook at Briggsville, Mass.	At road 100 feet upstream from mouth	1968-69	1.77	.3	.2
10	01331900	Cowan Branch near Stamford, Vt.	150 feet downstream from Klondike Road	1967-69	3.16	.2	<.1
11	01331950	Hudson Brook at Clarksburg, Mass.	Cross Road	1967-69	6.39	.4	.2
13	01332200	Sherman Brook near North Adams, Mass.	Massachusetts Avenue	1967-69	1.69	.2	.1
15	01332550	Thompson Brook near New Ashford, Mass.	U.S. Route 7	1967-69	1.60	.1	<.1
16	01332600	East Branch Green River near New Ashford, Mass.	150 feet upstream from mouth	1965, 1967-69	3.93	.7	.2
17	01332650	Green River near South Williamstown, Mass.	U.S. Route 7	1968-69	14.0	2.2	1.0
18	01332700	West Branch Green River near Hancock, Mass.	State Route 43	1967-69	1.39	<.1	<.1

Table 5.—Summary of 7-day low-flow characteristics, drainage area, and period of record for low-flow partial-record stations (Continued)

Number in figure 2	Station number	Station name	Location	Period of record	Drainage area, in square miles	Estimated annual minimum 7-day mean low flow, in cubic feet per second, at indicated recurrence interval	
						2-year	10-year
			HOOSIC RIVER BASIN				
19	01332800	West Branch Green River at South Williamstown, Mass.	U.S. Route 7	1965, 1967-69	14.8	3.3	1.8
20	01332850	Hopper Brook near South Williamstown, Mass.	100 feet downstream from State Reservation	1964-65	3.59	—	—
21	01332900	Hopper Brook near South Williamstown, Mass.	Hopper Road, 350 feet upstream from mouth	1967-69	6.70	1.5	.8
23	01333100	Hemlock Brook near Williamstown, Mass.	U.S. Route 7	1967-69, 1978-81	5.25	.2	.1
24	01333150	Buxton Brook near Williamstown, Mass.	Main Street	1967-68	2.86	.2	.1
25	01333200	Hemlock Brook at Williamstown, Mass.	Buckley Street	1965, 1967-69	13.1	2.2	1.5
			KINDERHOOK CREEK BASIN (from Eisler, 1978)				
—	—	Kinderhook Creek at Stephentown, N.Y.	—	1949-50	16.7	—	—
			ROELIFF JANSEN KILL BASIN (from Eisler, 1978)				
27	01362150	Bash Bish Brook at Copake Falls, N.Y.	Bridge off State Route 344	1956-61, 1964-65	15.8	1.7	.8

[1]Includes 2.52 mi^2 from which flow is diverted for municipal supply of Cheshire, Mass.

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