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Analysis of the Streamflow-Gaging Station Network in Ohio for Effectiveness in Providing Regional Streamflow Information

Water-Resources Investigations Report 98-4043

In cooperation with the Ohio Department of Natural Resources Division of Water

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

U.S. Department of the Interior
U.S. Geological Survey

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By David E. Straub

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U.S. DEPARTMENT OF THE INTERIOR
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CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
	Length	
inch	2.54	centimeter
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer
	Area	
square mile (mi^2)	2.590	square kilometer
	Volume	
cubic foot (ft^3)	0.02832	cubic meter
	Flow rate	
cubic foot per second (ft^3/s)	0.02832	cubic meter per second

Sea level: In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)—a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

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ABSTRACT

The streamflow-gaging station network in Ohio was evaluated for its effectiveness in providing regional streamflow information. The analysis involved application of the principles of generalized least squares regression between streamflow and climatic and basin characteristics. Regression equations were developed for three flow characteristics: (1) the instantaneous peak flow with a 100-year recurrence interval (P_{100}), (2) the mean annual flow (Q_a), and (3) the 7-day, 10-year low flow ($7Q_{10}$). All active and discontinued gaging stations with 5 or more years of unregulated-streamflow data with respect to each flow characteristic were used to develop the regression equations. The gaging-station network was evaluated for the current (1996) condition of the network and estimated conditions of various network strategies if an additional 5 and 20 years of streamflow data were collected. Any active or discontinued gaging station with (1) less than 5 years of unregulated-streamflow record, (2) previously defined basin and climatic characteristics, and (3) the potential for collection of more unregulated-streamflow record were included in the network strategies involving the additional 5 and 20 years of data. The network analysis involved use of the regression equations, in combination with location, period of record, and cost of operation, to determine the contribution of the data for each gaging station to regional streamflow information. The contribution of each gaging station was based on a cost-weighted reduction of the mean square error (average sampling-error variance) associated with each regional estimating equation. All gaging stations included in the network analysis were then ranked according to their contribution to the regional information for each flow characteristic.

The predictive ability of the regression equations developed from the gaging station network could be improved for all three flow characteristics with the collection of additional streamflow data. The addition of new gaging stations to the network would result in an even greater improvement of the accuracy of the regional regression equations. Typically, continued data collection at stations with unregulated streamflow for all flow conditions that had less than 11 years of record with drainage areas smaller than 200 square miles contributed the largest cost-weighted reduction to the average sampling-error variance of the regional estimating equations. The results of the network analyses can be used to prioritize the continued operation of active gaging stations or the reactivation of discontinued gaging stations if the objective is to maximize the regional information content in the streamflow-gaging station network.

INTRODUCTION

The U.S. Geological Survey (USGS) has operated continuous-record streamflow-gaging stations in Ohio since 1898. Over the years, data collected at these gaging stations have provided water-resources personnel with current streamflow or stage conditions. Flood forecasters rely, in part, on streamflow or stage data to issue flood watches and warnings. Water managers use streamflow data to assist in the operation of hydraulic

structures, to conduct specific short-term projects, or to perform long-term trend analyses. The streamflow at some of these gaging stations is regulated to control floods or to augment low flow during dry periods. At other gaging stations, where human influence on the streams is negligible, the streamflow is considered to be unregulated. Data from gaging stations on unregulated streams can be used to estimate the probability of occurrence of selected streamflow characteristics in any given year. These estimates can be used to aid in the design of hydraulic structures such as culverts, bridges, dams, reservoirs, and water-supply and waste-disposal facilities.

Streamflow data are usually not available at sites where these facilities or structures need to be constructed. Therefore, estimating techniques, usually based on regional regression equations (referred to as regionalization) of selected basin and streamflow characteristics of gaging stations with unregulated streamflow, are frequently used to estimate the needed streamflow characteristics. Accurate estimates of the desired streamflow characteristics reduce the cost of over-designing hydraulic structures while providing reasonable factors of safety.

Streamflow-gaging stations have been operated in Ohio for various reasons and for various periods of record. They are rarely established to exclusively collect streamflow data for the sole purpose of providing regional information. Generally, a specific need for the streamflow data is required to warrant the installation and operation of a gaging station. If the streamflow is unregulated, however, data from the station can be used for regional regression information. Given recent trends of declining funds for water-data collection networks, it has become increasingly important to determine the most cost-effective manner to collect streamflow data for specific needs and still provide effective regional streamflow coverage. An effective regional network would include streamflow data from gaging stations that spatially cover the region of interest, have an adequate period of record, and provide a range of basin and streamflow characteristics. Therefore, understanding the relative contribution of each gaging station in the network in providing regional information is important for the continued operation of an effective streamflow network. Water managers can use this information to maximize the data-collection efforts during times of static or declining budgets. For these reasons, the USGS, in cooperation with the Ohio Department of Natural Resources, Division of Water, analyzed the streamflow-gaging station network in Ohio with respect to regional information and cost of operation.

Purpose and Scope

This report presents the results of the analysis of the streamflow-gaging station network in Ohio for providing regional streamflow information. The network analysis provides a quantitative measure of the importance of each active and discontinued streamflow-gaging station in providing regional information. The streamflow-gaging station network was analyzed for the current (1996) conditions as well as for a short-term and a long-term planning horizon. Each gaging station was analyzed and then ranked according to the potential cost-weighted reduction of the mean square error of the regional regression equations developed for a high-flow, a mean-flow, and a low-flow characteristic. A combined rank based on an average of the individual ranks of the three flow characteristics also was computed. Only unregulated streamflow data from gaging stations within the state of Ohio were used in the network analysis.

Previous Studies

The network-analysis method was previously applied in Kansas (Medina, 1987) and Kentucky (Ruhl, 1993) to evaluate the effectiveness of the streamflow-gaging station network in those states in providing regional information. The investigators used data from existing stations plus combinations of hypothetical new stations to evaluate current and potentially new networks on the basis of budgetary requirements for various planning horizons.

Acknowledgments

The streamflow data collected at Ohio gaging stations over the years have been made available largely through the cooperation of the USGS with many other agencies. The USGS wishes to acknowledge all the Federal, state, and local cooperators who assist or have assisted in funding the streamflow-gaging station network.

NETWORK-ANALYSIS METHOD

The network-analysis method is a set of techniques used either to maximize the regional information for a given set of budgetary and time constraints or to provide insight into the potential effect of an increase or reduction in budget. The need for a network analysis was first highlighted by a national study of the USGS streamflow data-collection program by Benson and Carter (1973). The Network Analysis for Regional Information (NARI) method described by Moss and others (1982) was developed to fulfill the need for a quantitative network-analysis framework. NARI, based on the regional regression approach by Benson and Matalas (1967), is an evaluation of the likelihood of improving the regression relation between streamflow and basin characteristics by the collection of additional streamflow data. The NARI method, in which ordinary least squares (OLS) is used to calibrate the regression model, is based on the result of the simulations by means of stochastic hydrology. According to Stedinger and Tasker (1985, 1986) and Tasker (1987), generalized least squares (GLS) regression analysis provides better estimates than OLS does because GLS allows adjustments to be made for the cross correlation in the concurrent streamflow records at the various gaging stations and for their variety of record lengths. Therefore, Network Analysis Using Generalized Least Square (NAUGLS) was developed to replace NARI. A comparison of the two methods by Moss and Tasker (1990) indicates that the NAUGLS method conveys more information than the NARI method to the network designer interested in maximizing regional information subject to budget constraints. Eventually, the network-analysis method was refined to the model used in this study, called Generalized Least Squares NETwork (GLSNET).

Description of the Method

GLSNET uses a GLS regression to provide a reliable estimate of the prediction mean square error at each station for selected flow characteristics. The prediction mean square error for a given site consists of two parts: the model error, which can be improved by selecting a better model, and the sampling error, which can be improved by collecting additional streamflow data. For a given regression model and planning horizon, the network-analysis method can be used to improve the regional information by minimizing the average sampling-error variance of the gaging-station network subject to budgetary constraints. The average sampling-error variance is computed by averaging the sampling-error variances for each site in the network. The continued operation of an active gaging station is likely to improve the accuracy of the regression model for predicting streamflow characteristics by reducing the sampling error at that gaging station. The accuracy of the regression model is also likely to be improved by the addition of new stations or reestablishing discontinued stations. In either case, the additional streamflow data collected would increase the reliability of the estimated regression coefficients by reducing the average sampling-error variance of the regression equations. The cost-weighted contribution of each gaging station to the reduction in average sampling-error variance can therefore be used to address the problem of whether to spend the limited resources available to collect additional data for specific planning horizons at active gaging stations, reestablished discontinued stations, or newly established stations.

Tasker (1986) and Tasker and Stedinger (1989) present the mathematical formulation of the network analysis method used for this study. The method makes use of the following: (1) GLS regression models based on selected basin, climatic, and streamflow characteristics, (2) the location of the gaging stations in relation to each other, (3) the number of years of unregulated streamflow record collected at each gaging station, and (4) the cost involved with the operation and maintenance of each station. GLSNET is used to determine the relative contribution of each gaging station in providing the regional streamflow information if additional streamflow data are collected for a specified number of years. A step-backward algorithm is used to determine which gaging station provides the smallest cost-weighted reduction in the average sampling-error variance. Each gaging station is then incrementally removed from the network until no stations remain. Therefore, the last gaging station to be removed from the network contributes the largest cost-weighted reduction in average sampling-error variance. Consequently, the order in which these stations are dropped from the network can be used to rank each station by its relative contribution to the regression information for each flow characteristic and each planning horizon.

Application of the Method to Ohio's Streamflow-Gaging Network

All gaging stations in Ohio with unregulated streamflow with respect to each flow characteristic were included in the network analysis. A high flow, mean flow and low flow were chosen to represent a broad range in flow characteristics to evaluate the network. The characteristics chosen were the instantaneous peak flow with a 100-year recurrence interval (P_{100}), the mean annual flow (Q_a), and the 7-day, 10-year low flow ($7Q_{10}$). Separate regression models were developed for each of the three flow characteristics by regressing them on a combination of basin and (or) climatic characteristics. Drainage area (square miles), main-channel slope (feet per mile), percent storage, and mean annual precipitation (inches) were used as explanatory variables in the regression for P_{100}; drainage area and longitude of the gaging station were used in the regression for Q_a; and drainage area, main-channel slope, average basin elevation (feet above sea level, NGVD 1929), and mean annual precipitation were used in the regression for $7Q_{10}$. The P_{100} and $7Q_{10}$ regression models were similar in form to those previously published in Koltun and Roberts (1990) and Koltun and Schwartz (1987). The form of regression models used in this study differs from that of the previously published regression models primarily in that Ohio was not subdivided through use of indicator variables or through separate analyses of data from isolated regions in the State. Instead, data from all of the Ohio network stations were analyzed in aggregate to facilitate a statewide ranking process (to be discussed later); consequently, the terms "region" or "regional" used in this report refer to the entire state of Ohio.

As previously mentioned, the average sampling-error variance for a regression model developed for a streamflow network is expected to decrease over time as additional data are collected. At a given station, the reduction in sampling-error variance resulting from the collection of additional data will, in part, be a function of how many years of data have already been collected at the station and the number of additional years of data that will be collected. The length of time over which additional data are to be collected is referred to as the "planning horizon." The reduction in average sampling-error variance is the estimated condition of the network after that many additional years of data are collected for each planning horizon. In general, with the collection of additional data the largest relative decrease in sampling-error variance tends to correspond to the stations with the fewest years of record. Three planning horizons were considered in this study: 0 years (no additional data collection) to represent current conditions, 5 years to represent the short term, and 20 years to represent the long term.

All streamflow-gaging stations used in this analysis were selected from previously established gaging stations. Any active and discontinued gaging stations with 5 or more years of continuous, unregulated streamflow record were used to develop the regression models. If the streamflow at a gaging station were subject to regulation, the data gathered after regulation began were not used in the network analysis. Some streamflow-gaging stations can be considered to be regulated for one flow characteristic and not for others. For example, a flood-control reservoir is designed to attenuate flood peaks. Stations downstream from these reservoirs, although regulated with respect to high flow, may not be regulated with respect to mean or low flow. Consequently, some stations may not have been used in the GLSNET analysis for some flow characteristics but were included in others. Any active or discontinued gaging station with less than 5 years of unregulated record that was anticipated to have unregulated streamflow for the entire planning horizon was classified as a "new" site in the network analysis. This was done because even though insufficient data had been collected to compute streamflow characteristics, these stations would provide data for the subsequent planning horizon. In all, 270 gaging stations with 5 or more years of unregulated streamflow data were used to develop the regression model for the mean-flow characteristic. Of these 270 gaging stations, 188 were used for the high-flow and 157 were used for the low-flow regression models. A total of 42, 28, and 27 gaging stations were classified as new stations in the network analysis for the high-, mean-, and low-flow characteristic, respectively. Selected information about all the stations used in this study is listed in table 1 (at the back of this report). The locations of all the currently active gaging stations are shown in figure 1, and the discontinued stations are shown in figure 2.

The GLSNET analysis requires that a cost be assigned to all gaging stations in the network. The assigned cost for a particular station might vary depending on the streamflow characteristic and planning horizon being considered. The costs assigned to the streamflow-gaging stations for the 0-year planning horizon consisted of two categories: active or discontinued. Most of the streamflow-gaging stations within Ohio have nearly equal standard operation and mainte-

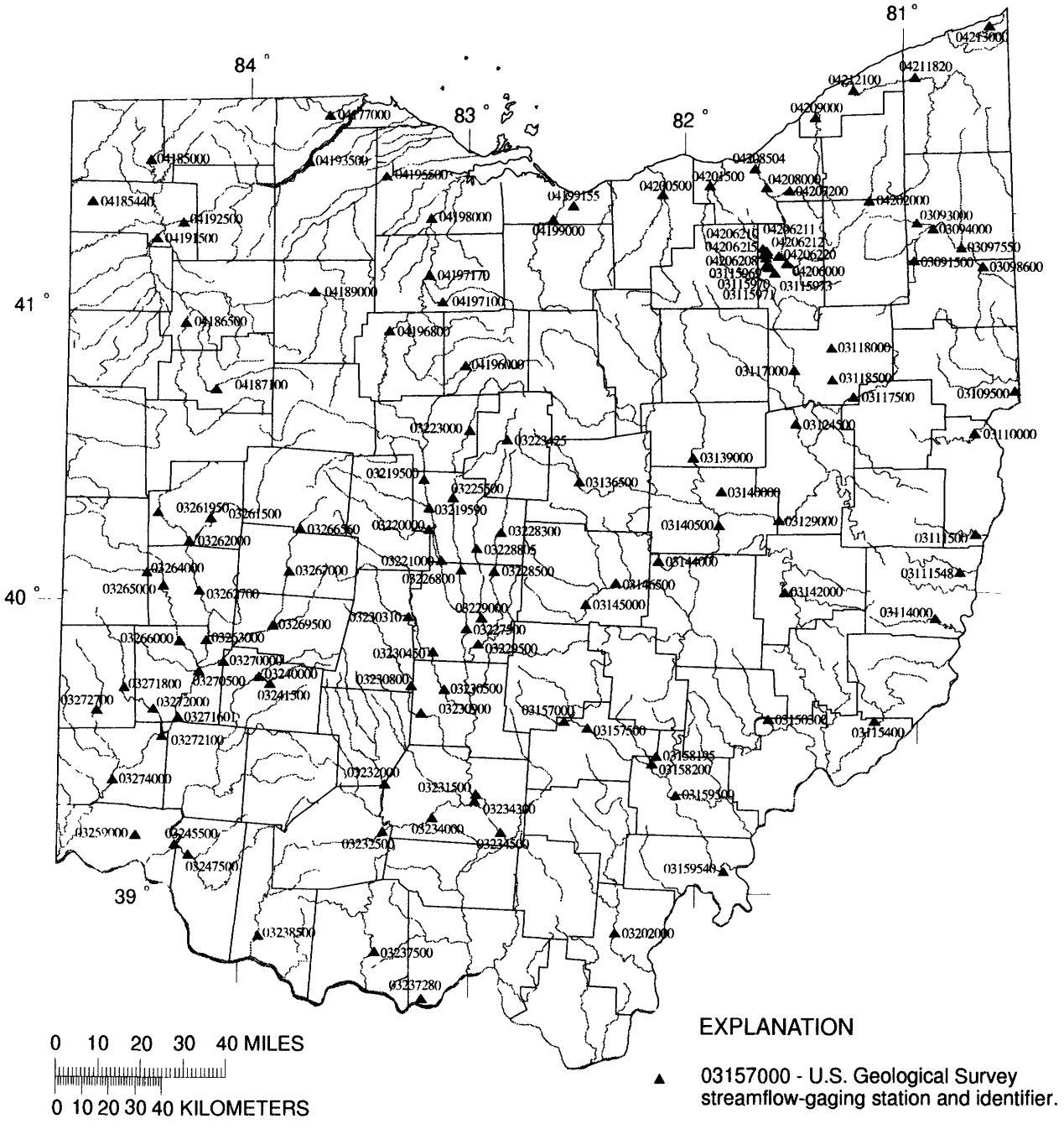

Figure 1. Locations of active continuous-record streamflow-gaging stations used in the Ohio network analysis (active as of 1996).

Figure 2. Locations of discontinued continuous-record streamflow-gaging stations used in the Ohio network analysis (discontinued on or before 1996).

nance cost. Therefore, the active gaging stations were assigned an identical cost in GLSNET. The discontinued gaging stations were assigned a cost that was significantly higher than the cost of any active streamflow-gaging station, effectively making these stations inconsequential in the network analysis. This cost structure made the cost-weighted sampling-error variance associated with discontinued stations very small, thereby forcing them to be removed from the network prior to the removal of any active stations. Therefore, the analysis with the 0-year planning horizon can be used to indicate which currently active gaging station provided the largest contribution to the regional information. The analysis for the 0-year planning horizon also provides an indication of the average sampling-error variance of the current streamflow-gaging station network in Ohio.

The reader must exercise caution in interpretation of the results of the 0-year planning horizon analysis because flow at some of the active gaging stations is currently regulated. These stations could not be omitted from the GLSNET analysis because the streamflow data from these stations collected prior to regulation was influential to the development of the regression equations. Although the current regulation prevents these stations from contributing any additional regional information on the flow characteristic(s) for which they are regulated, it does not affect the analysis for the 0-year planning horizon because no additional data will be collected. However, data from these stations would influence the analyses for the 5- and 20-year planning horizons and therefore must not be included in these analyses.

The costs assigned to the streamflow-gaging stations for the 5- and 20-year planning horizons consisted of three categories: active, discontinued, and regulated. Similar to the approach for the 0-year planning horizon, the active gaging stations were assigned an identical cost in GLSNET. The discontinued streamflow-gaging stations that could provide unregulated streamflow record if reestablished were assigned a cost equal to the active streamflow-gaging stations plus the cost to reactivate the gage, which was amortized over the planning horizon. A significantly higher cost was assigned to gaging stations that historically provided unregulated streamflow record but were known to be or expected to become regulated with respect to one or more flow characteristics during the 5- and 20-year planning horizons. Consequently, this cost structure would remove regulated streamflow-gaging stations from the network prior to removal of any unregulated stations.

New streamflow-gaging stations (previously established stations with less than 5 years of record) were included in some of the network-analysis strategies for the 5- and 20-year planning horizon. New stations were not considered for the 0-year planning horizon because additional data collection does not influence the results of the analysis. Most of the new stations were in either the active or discontinued cost categories. A few of the new streamflow-gaging stations required a cost that was proportionally higher than that of a standard active streamflow-gaging station. These new gaging stations use recently developed instrumentation that can monitor streamflow at sites where flow was previously unable to be gaged using standard streamflow-gaging methods.

For each planning horizon and flow characteristic, unregulated stations were ranked in reverse order from the order in which the GLSNET model removed them from the network. Therefore, the station that was assigned a rank of 1 was the station that provided the largest cost-weighted reduction in average sampling-error variance. Stations that were regulated with respect to the flow characteristic of interest were all assigned a rank equal to N+1, where N equals the number of unregulated stations in the analysis for the given flow characteristic and planning horizon.

A composite rank also was determined for each planning horizon by summing the individual ranks for the high-, mean-, and low-flow characteristics for each station (total rank) and reranking the stations in ascending order. Consequently, the station with the lowest total rank for the three flow characteristics was assigned a composite rank of 1. The station with a composite rank of 1 should therefore represent the station that (on average) contributes the most to the cost-weighted reduction in average sampling-error variance for the three flow characteristics. One outcome of this approach is that stations that are regulated with respect to one or more flow characteristic tend to have high composite ranks because of the influence of the high rank assigned for the regulated flow characteristic(s). This outcome is consistent with the intent of the composite rank because regulation for one or more flow characteristics makes these stations, in general, less useful as providers of regional streamflow information. However, the reader is advised not to place too much weight on the composite ranking because a station with a relatively high composite rank could provide impor-

tant regional information with respect to one or two individual flow characteristics.

Results of the Network Analysis

GLSNET was used to determine the average sampling-error variance of the flow-characteristic regression equations developed from the current (1996) network. GLSNET was also used to determined estimates of the average sampling-error variances of various network strategies if additional streamflow data were collected at gaging stations in the network. The average sampling-error variances computed for the three flow characteristics considered in this study, as well as the estimated average sampling-error variances for the 5- and 20-year planning horizons with and without the addition of new gaging stations, are listed in table 2. The average sampling-error variances listed in table 2 are the results of the network analyses in which all available gaging stations with unregulated streamflow (active and discontinued) contribute to the regional information. A reduction in average sampling-error variances was expected with continued operation of the network. An even greater reduction was expected if the network was expanded through the addition of new stations. An illustration of the concepts summarized in table 2 is presented in figure 3 (for high flow only). However, the progression in average sampling-error variances for each network strategy as a function of the number of stations being operated is also presented. As is evident in figure 3, the average sampling-error variances for a given planning horizon are expected to be reduced by addition of new sites to the network. The curves associated with each strategy, including or excluding new gaging stations, have different starting points (zero stations operated) because the average sampling-error variances are computed over different gaging station networks. Also apparent from figure 3, is that the operation of the first 40 stations (stations ranked 1–40) accounts for the largest percentage of the total reduction in average sampling-error variance. What figure 3 does not show is that the composition of the first 40 stations changes as a function of the planning horizon and network strategy. The mean-flow and low-flow characteristics are illustrated in figures 4 and 5, respectively.

Information on the rank order of all gaging stations is given in tables 3 and 4 (at back of report). Table 3 lists stations in downstream order, along with the individual rank for each flow characteristic and the composite ranks for the 0-, 5-, and 20-year planning horizons; the ranks for the 5- and 20-year planning horizons are those for the network strategy with the addition of new stations. Table 4 lists the same information, except that the table is organized by rank order instead of downstream order.

APPLICATION AND LIMITATIONS OF THE ANALYSIS

As evident from the preceding discussion, the greater the number of gaging stations in operation for each planning horizon, the greater the reduction to the average sampling error of the network (fig. 3). Because of budgetary constraints, the simultaneous operation of all active and discontinued streamflow-gaging stations with the ability to contribute to the regional information is highly unlikely. Therefore, the results of the GLSNET analyses can be used to prioritize the operation of active and (or) reactivation and operation of discontinued gaging stations (on a cost-weighted basis) if the objective is to maximize the information content in the streamflow network with respect to reducing the error associated with equations used to predict regional streamflow characteristics at stream sites where little or no information is available. For the purposes of these analyses, maximization of the available information is assumed to be equivalent to minimization of the average sampling-error variance in generalized least-squared regression equations developed for high-, mean-, and low-flow characteristics.

Information contained in tables 3 and 4 can be used to guide the selection of gaging stations to be added or removed from the network (if, for example, budgetary conditions should precipitate a change). Gaging stations that are ranked closest to 1 would likely be given first consideration for addition to the network or continued operation. Conversely, gaging stations that have high rank numbers would likely be given low consideration for addition to the network or high consideration for removal. The preceding assumptions apply strictly within the context of providing information on equations to estimate regional streamflow characteristics.

A number of other factors need to be considered prior to making modifications to the gaging network. Data from a streamflow gaging network are used for a variety of purposes in addition to providing information with which to derive equations for estimating

Table 2. Average sampling-error variance for selected network strategies used in the analysis of the streamflow-gaging station network in Ohio

Flow characteristic	Average mean-square error in log units (top number), number of stations (middle number), and percentage reduction from 0-year planning horizon (bottom number)				
	0-year	5-year		20-year	
		Excluding new stations	Including new stations	Excluding new stations	Including new stations
High flow	0.00136	0.00121	0.00100	0.00100	0.00077
	188	142	184	142	184
	0	11.0	26.5	26.5	43.4
Mean flow	0.00026	0.00018	0.00014	0.00011	0.00009
	270	270	298	270	298
	0	30.8	46.2	57.7	65.4
Low flow	0.01335	0.01275	0.01100	0.01223	0.01042
	157	125	152	125	152
	0	4.49	17.6	8.39	21.9

regional streamflow characteristics. Examples of other potential uses of gaging-station data include (1) flood forecasting, (2) providing operational information for water-resource facilities, (3) assessing trends in flow and (or) chemical loading characteristics, (4) providing information on impending drought conditions, and (5) evaluating surface- and ground-water interactions. Of the gaging stations operated nationwide during 1983–88, Thomas and Wahl (1993) found that about 80 percent had more than one category of use and about 50 percent had three or more uses. By design, the evaluation using the GLSNET model is that of prioritizing stations that provide regional streamflow information. Consequently, due consideration would need to be given to other uses of streamflow information obtained from a gaging station before making changes to the network. Wahl and Crippen (1984) outlined a number of pragmatic factors that might be considered before making network changes. Those factors include, but are not limited to, site characteristics, existing and potential beneficial uses of the water, magnitude of water-resource problems, data uses for planning and water-resource management, and economic considerations.

Composite ranks determined from results of GLSNET analyses on high-, mean-, and low-flow characteristics provide a useful indicator of the overall contribution of a gaging station to the regional streamflow information, but some caution in their interpretation is warranted. A gaging station that provides important regional information on one or two flow characteristics may place low in the composite ranking if it is regulated with respect to the remaining flow characteristic(s). Although this result is consistent with the intent of the composite rank, it points out the need for review of all information about the use or potential uses of data from a gaging station prior to making any changes to the network.

Although the GLSNET analysis facilitates the evaluation of existing or proposed networks, it does not directly identify station characteristics or geographic areas that should be targeted for inclusion in the network. Even so, locating an accessible site for a gaging station in a desired geographical area, with the desired basin and (or) climatic characteristics, with adequate hydraulic conditions, and with negligible human influences on the streamflow can be difficult. However, further analysis of GLSNET results indicates that the most important stations for providing regional streamflow information were typically stations without any form of streamflow regulation whose length of record was less than 11 years and whose drainage areas were less than 200 square miles.

Some insight into potential geographic locations for new gaging stations can be gained by examining the areal distribution of gaging stations used in the network analysis. A map of all the gaging stations used in the network analysis with a 5-mile circular buffer zone drawn around each station is shown in figure 6. In areas

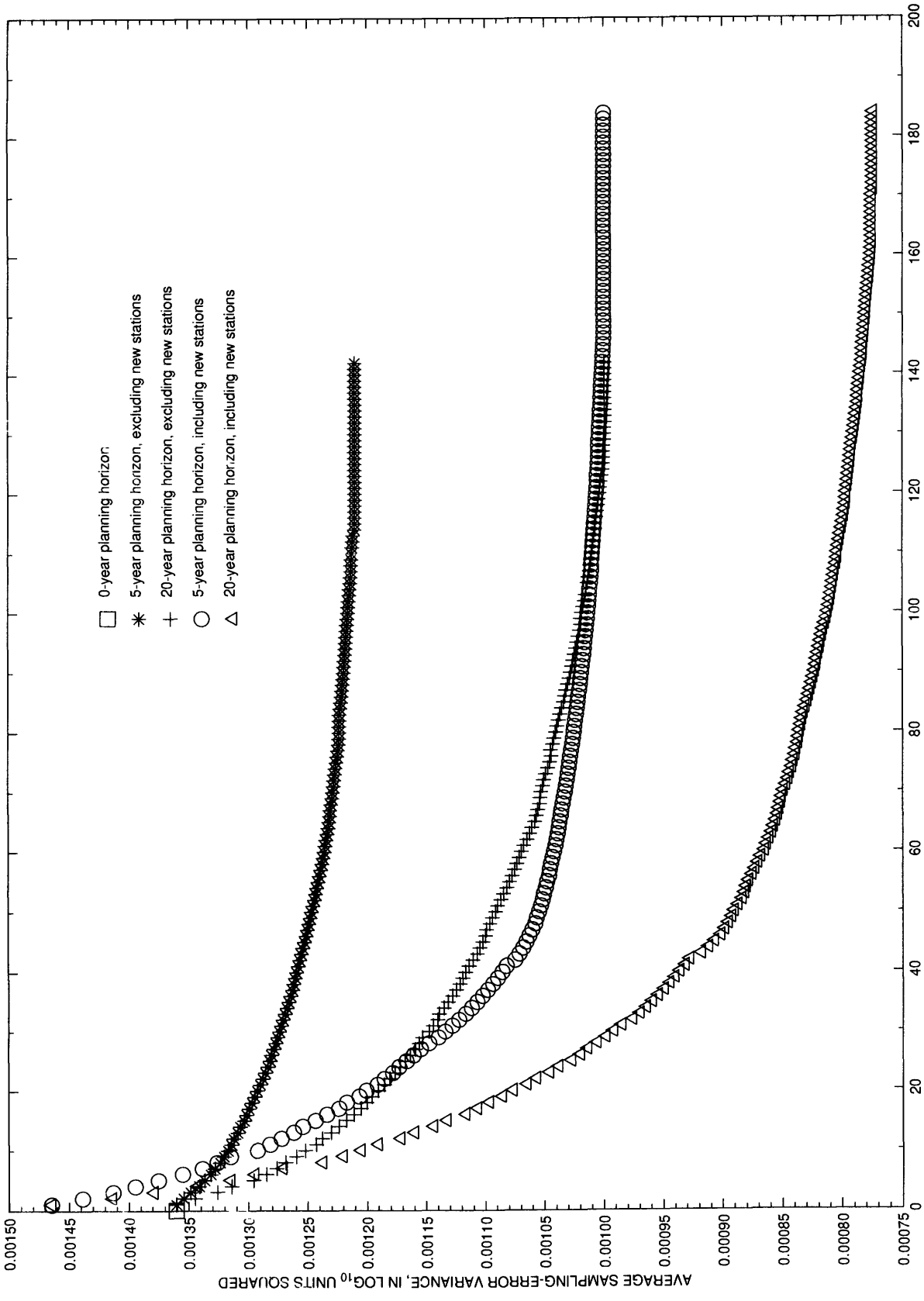

Figure 3. Average sampling-error variance for the high-flow characteristic as a function of the number of stations operated (or rank) for selected strategies in the analysis of the streamflow-gaging station network in Ohio.

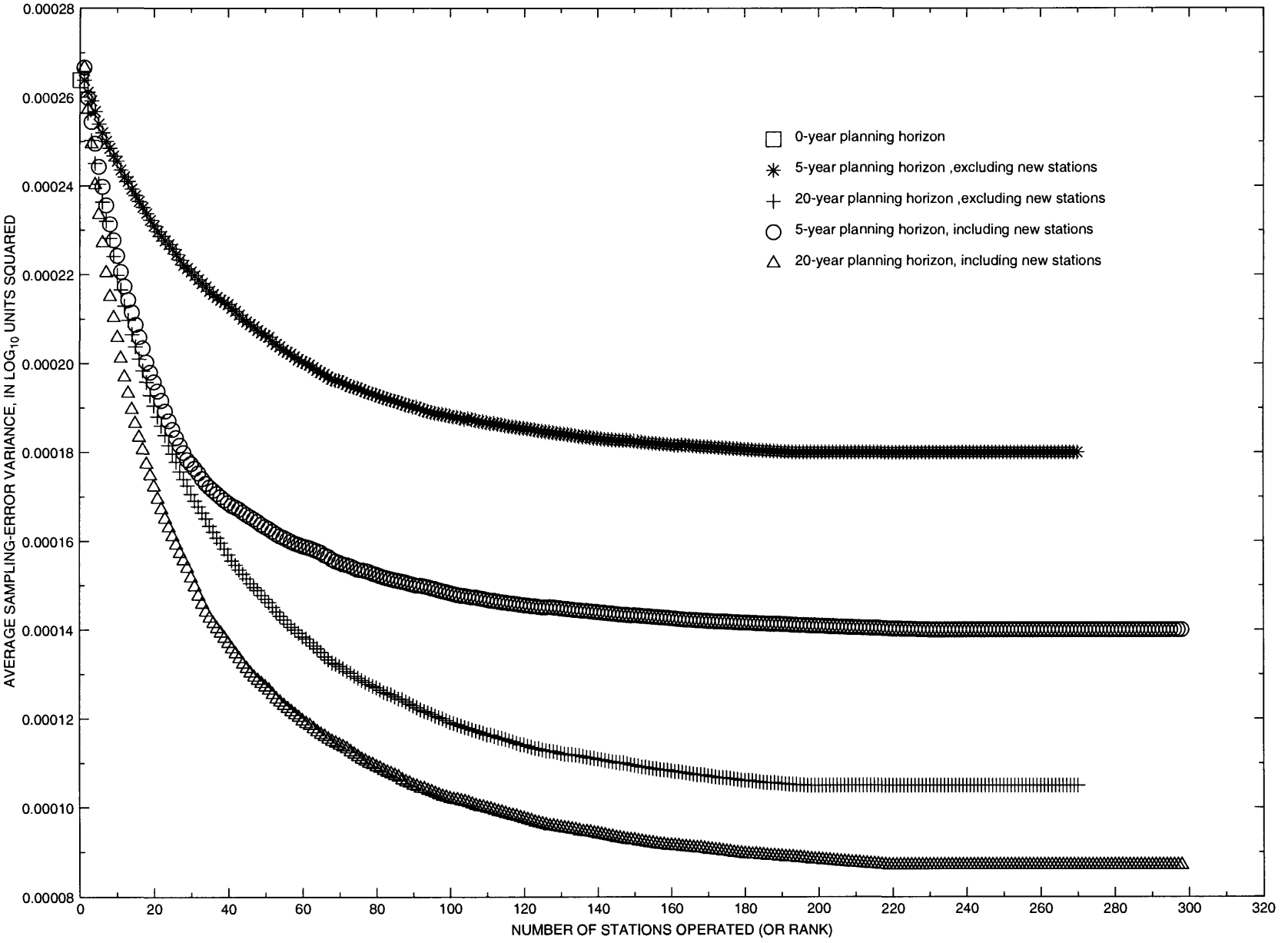

Figure 4. Average sampling-error variance for the mean-flow characteristic as a function of the number of stations operated (or rank) for selected strategies in the analysis of the streamflow-gaging station network in Ohio.

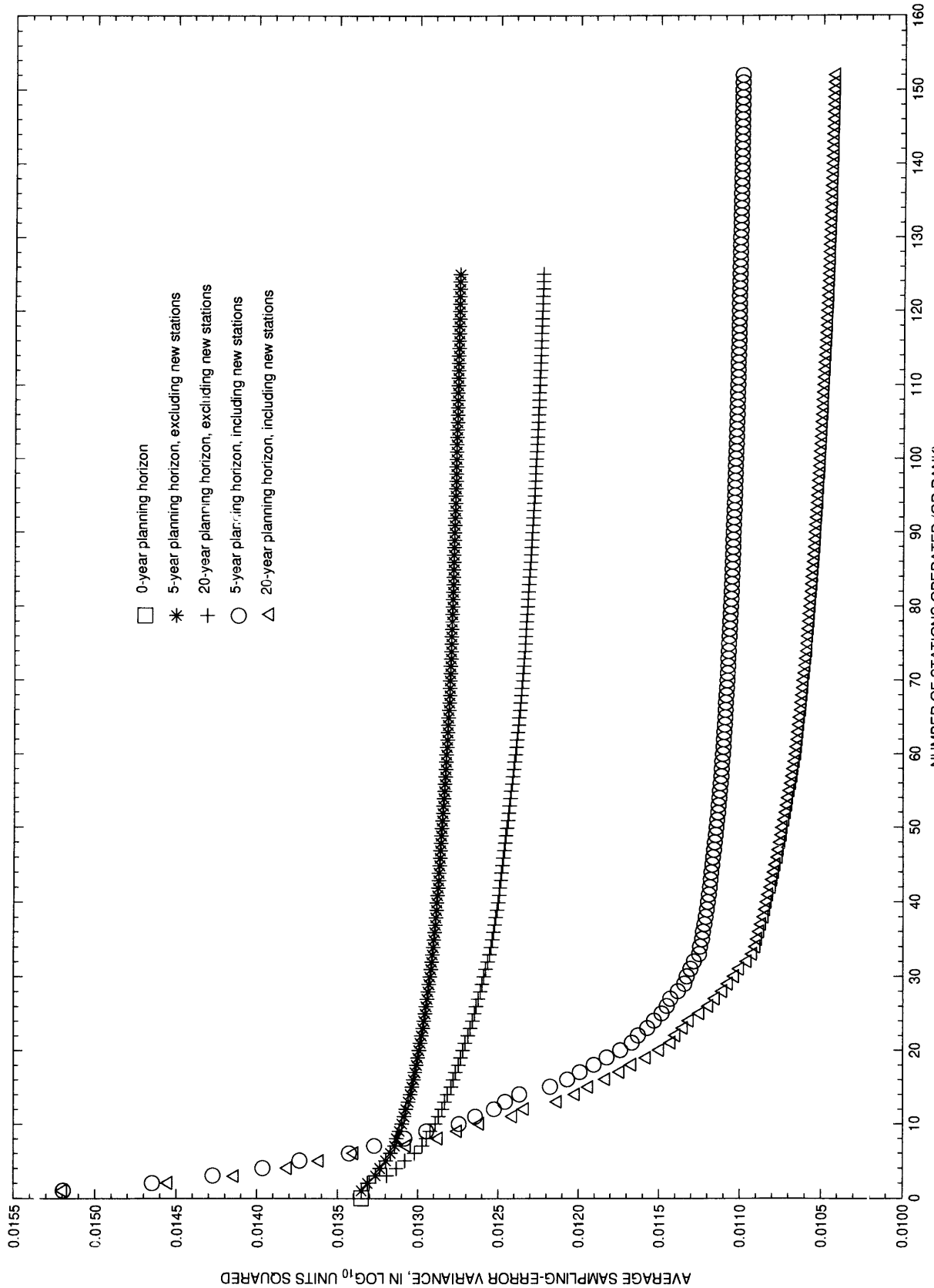

Figure 5. Average sampling-error variance for the low-flow characteristic as a function of the number of stations operated (or rank) for selected strategies in the analysis of the streamflow-gaging station network in Ohio.

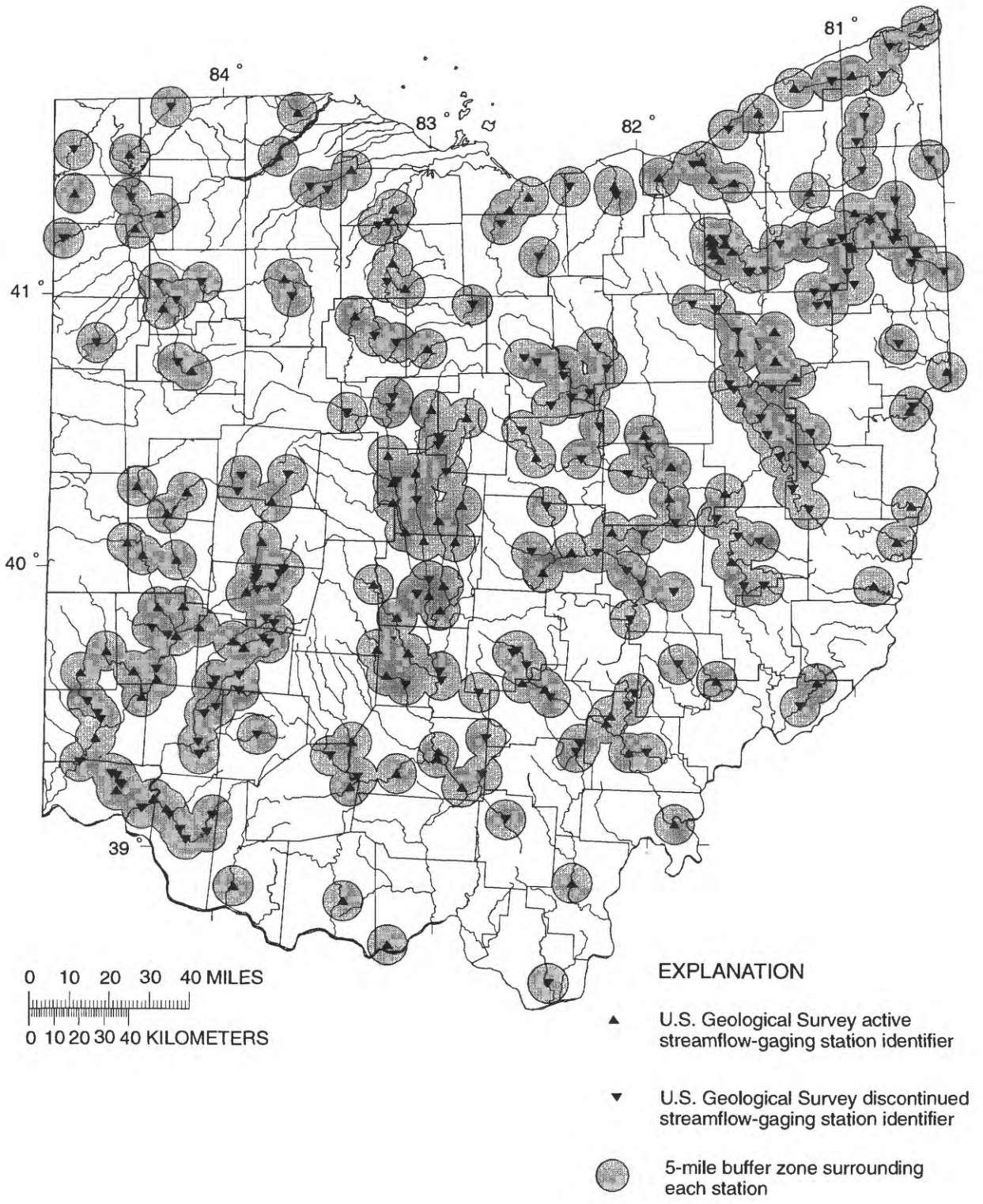

Figure 6. Locations of active and discontinued streamflow-gaging stations in Ohio, including a five-mile buffer zone surrounding each station.

where gaging stations are closely spaced, the buffer zones overlap to form an irregular, filled space. Areas on the map that are not filled are areas where the distance to any streamflow-gaging station is greater than 5 miles. Consequently, large unfilled areas, such as those in the south-central part of the State, represent areas that are lacking in measured daily streamflow data. The network could potentially benefit from installation and operation of new streamflow-gaging stations in these areas.

SUMMARY AND CONCLUSIONS

Continued operation of gaging stations in Ohio increases the accuracy of the regional regression equations for predicting streamflow characteristics. The addition of new stations to the existing streamflow-gaging station network would provide even greater accuracy in the regional information. This information is used to estimate values of selected streamflow characteristics at sites where little or no information is available. Estimates of the streamflow characteristics are used to aid in the design of hydraulic structures, flood-plain management, and permitting for waste load allocation and water supply. Accurate streamflow estimates help reduce the cost of over-designing hydraulic structures while providing reasonable factors of safety. The network analysis method used in this study, called Generalized Least Squares Network (GLSNET) is a technique that can be used to either optimize the regional information obtained from a gaging network for a given set of budgetary and time constraints or to provide information necessary to make network management decisions related to an increase or reduction in network funding. Given recent trends of declining funds for water-data networks, it has become increasingly important to determine the most cost-effective approach to managing streamflow data collection networks both for specific needs and for providing effective regional streamflow coverage.

The network-analysis method makes use of (1) generalized least squares regression equations, (2) the location of each gaging stations, (3) the number of years of unregulated streamflow record, and (4) the cost associated with each station to determine a cost-weighted reduction to the sampling-error variance of each regression equation. Data from gaging stations with 5 or more years of unregulated streamflow record were used to develop regression equations for the 100-year instantaneous peak flow (P_{100}), the mean annual flow (Q_a), and the 7-day, 10-year low flow ($7Q_{10}$). The streamflow-gaging station network was analyzed using these equations for current (1996) conditions and for hypothetical periods of data collection of 5 and 20 years and for the network strategies including and excluding new stations. Generally, gaging stations with unregulated streamflow for all three flow characteristics tested, drainage areas less than 200 square miles, and (or) less than 11 years of streamflow record produced the greatest cost-weighted reduction in the average sampling-error variance of the regression equations. The relative contribution to the reduction of the average sampling-error variance of the regression equations was used to rank the gaging stations.

Results of the network-analysis method can be used to continually review the streamflow-gaging station network in Ohio. The ranking can be used effectively to assist in determining whether to continue operation of existing stations, reestablish discontinued stations, or add new stations. The rank of each station, however, is based solely on its contribution to regional streamflow information and would not be the only consideration in the decisions concerning gaging-station operations. Gaging stations are rarely operated for the sole purpose of collecting streamflow data for regional information. Generally, the active gaging stations provide streamflow data necessary for flood forecasting, short-term projects, long-term trend analysis, correlation with partial record stations, and operation of water-resource facilities. The use of the streamflow data for these other purposes increases the value of the gaging station and would give greater weight for continuation of the gaging station than might be indicated by the network analysis alone. Before an active station is discontinued because it contributes little regional information, the other uses of the streamflow data need to be considered. Conversely, before a new station is established or a discontinued station is reestablished, others uses of the streamflow data also need to be considered.

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Table 1. Selected information on streamflow-gaging stations used in the Ohio network analysis

[Stations are in downstream order. Abbreviation: nr, near; bl, below; D, discontinued; A, active; high, instantaneous peak flow with 100-year recurrence interval; mean, mean annual flow; low, 7-day 10-year low flow; wy, water year (the period Oct. 1–Sept. 30, designated by the calendar year in which it ends); yrs, total years of record; cy, climatic year (the period April 1–Mar. 31, designated by the calendar year in which it ends; new, stations used in network with less than 5 years of streamflow data; --, station not used for specific flow characteristic]

Station number	Station name	Status	Period of continuous gage operation wy	Period and years of record used in the analysis						Drainage area (square miles)
				High		Mean		Low		
				yrs	wy	yrs	wy	yrs	cy	
03086500	Mahoning R at Alliance	D	1941-93	52	1942-93	52	1942-93	0	--	89.2
03087000	Beech C nr Bolton	D	1944-51	11	1944-54	8	1944-51	7	1945-51	17.4
03088000	Deer C at Limaville	D	1942-51	15	1942-55, 1959	10	1942-51	9	1943-51	33.2
03088500	Mahoning R nr Deerfield	D	1924-31	0	--	8	1924-31	0	--	175
03089500	Mill C nr Berlin Center	D	1942-72	36	1942-77	30	1942-71	29	1943-71	19.1
03090500	Mahoning R bl Berlin Dam nr Berlin Center	D	1931-92	12	1931-42	61	1931-91	0	--	248
03091500	Mahoning R at Pricetown	A	1929-	0	--	66	1930-95	0	--	273
03092000	Kale C nr Pricetown	D	1941-93	52	1942-93	48	1942-89	47	1943-89	21.9
03092090	W B Mahoning R nr Ravenna	D	1966-93	28	1966-93	28	1966-93	27	1968-93	21.8
03092460	W B Mahoning R at Wayland	D	1969-92	0	--	23	1969-91	0	--	81.7
03092500	W B Mahoning R nr Newton Falls	D	1927-82	40	1927-66	55	1927-81	39	1928-66	96.3
03093000	Eagle C at Phalanx Station	A	1926-34, 1938-	66	1927-34, 1938-95	66	1927-34, 1938-95	65	1928-34, 1939-96	97.6
03093500	Duck C at Leavittsburg	D	1941-48	0	new	6	1942-47	6	1943-48	32.3
03094000	Mahoning R at Leavittsburg	A	1941-	0	--	54	1942-95	0	--	575
03094500	Mahoning R at Warren	D	1925-35	0	--	11	1925-35	0	--	594
03095500	Mosquito C bl Mosquito C Dam nr Cortland	D	1926-29, 1943-92	0	--	51	1927-29, 1944-91	0	--	97.5
03096000	Mosquito C at Niles	D	1929-51	14	1930-43	22	1930-51	13	1931-43	138
03097500	Meander C at Mineral Ridge	D	1929-51	0	--	22	1930-51	0	--	84.3
03097550	Mahoning R at Ohio Edison Power Plant at Niles	A	1988-	0	--	8	1988-95	0	--	854
03098000	Mahoning R at Youngstown	D	1922-82	29	1910-16, 1922-43	61	1922-82	0	--	898
03098500	Mill C at Youngstown	D	1944-71	35	1913, 1944-77	28	1944-71	8	1945-52	66.3
03098600	Mahoning R bl West Ave at Youngstown	A	1988-	0	--	7	1988, 1990-95	0	--	978

Table 1. Selected information on streamflow-gaging stations used in the Ohio network analysis—Continued

[Stations are in downstream order. Abbreviation: nr, near; bl, below; D, discontinued; A, active; high, instantaneous peak flow with 100-year recurrence interval; mean, mean annual flow; low, 7-day 10-year low flow; wy, water year (the period Oct.1–Sept. 30, designated by the calendar year in which it ends); yrs, total years of record; cy, climatic year (the period April 1–Mar. 31, designated by the calendar year in which it ends; new, stations used in network with less than 5 years of streamflow data; --, station not used for specific flow characteristic]

Station number	Station name	Status	Period of continuous gage operation wy	Period and years of record used in the analysis						Drainage area (square miles)
				High		Mean		Low		
				yrs	wy	yrs	wy	yrs	cy	
03099500	Mahoning R at Lowellville	D	1943-71, 1973-92	0	--	47	1944-71, 1973-91	0	--	1073
03102950	Pymatuning C at Kinsman	D	1966-94	29	1966-94	29	1966-94	28	1967-94	96.7
03109000	Lisbon C at Lisbon	D	1947-62	35	1947-81	16	1947-62	15	1948-62	6.19
03109500	L Beaver C nr East Liverpool	A	1916-	80	1916-95	80	1916-95	80	1917-96	496
03110000	Yellow C nr Hammondsville	A	1941-	55	1941-95	54	1942-95	54	1942-95	147
03110500	Yellow C at Hammondsville	D	1915-35	20	1916-35	20	1916-35	19	1917-35	164
03111500	Short C nr Dillonvale	A	1942-	54	1942-95	54	1942-95	54	1943-96	123
03111548	Wheeling C bl Blaine	A	1983-87, 1989-	12	1983-87, 1989-95	11	1984-87, 1989-95	11	1984-87, 1990-96	97.7
03114000	Captina C at Armstrongs Mills	A	1927-35, 1959-	46	1927-35, 1959-95	46	1927-35, 1959-95	45	1928-35 1960-96	134
03115400	L Muskingum R at Bloomfield	A	1959-81, 1996-	23	1959-81	23	1959-81	22	1960-81	210
03115500	L Muskingum R at Fay	D	1915-18, 1926-35	20	1916-35	13	1916-18, 1926-35	11	1917-18, 1927-35	258
03115969	Montrose Rn at Montrose	A	1993-	0	new	0	new	0	new	0.26
03115970	Schocalog Rn at Montrose	A	1994-	0	new	0	new	0	new	1.59
03115971	Schocalog Rn at Fairlawn	A	1992-	0	new	0	new	0	new	2.13
03115973	Schocalog Rn at Copley Junction	A	1992-	0	new	0	new	0	new	3.65
03116000	Tuscarawas R at Clinton	D	1926-79	52	1927-78	52	1927-78	0	--	174
03116200	Chippewa C at Easton	D	1961-82	23	1959-81	21	1961-81	0	--	146
03116500	Tuscarawas R at Crystal Springs	D	1922-29	0	--	8	1922-29	0	--	435
03117000	Tuscarawas R at Massillon	A	1938-	57	1939-95	57	1939-95	0	--	518
03117500	Sandy C at Waynesburg	A	1939-	57	1939-95	56	1940-95	56	1940-95	253
03118000	M B Nimishillen Creek at Canton	A	1942-	54	1942-95	53	1942-93, 1995	0	--	43.1
03118500	Nimishillen C at North Industry	A	1922-	74	1922-95	74	1922-95	0	--	175
03119000	Sandy C at Sandyville	D	1924-47	24	1924-47	24	1924-47	23	1925-47	481

Table 1. Selected information on streamflow-gaging stations used in the Ohio network analysis—Continued

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Station number	Station name	Status	Period of continuous gage operation wy	Period and years of record used in the analysis						Drainage area (square miles)
				High		Mean		Low		
				yrs	wy	yrs	wy	yrs	cy	
03120500	Mcguire C nr Leesville	D	1939-90, 1992	0	--	52	1939-90	0	--	48.3
03121500	Indian F bl Atwood Dam nr Cumberland	D	1961-75	0	--	15	1961-75	0	--	70.0
03122500	Tuscarawas R bl Dover Dam nr Dover	D	1924-92	13	1913, 1924-35	68	1924-91	12	1925-36	1405
03123000	Sugar C ab Beach City Dam at Beach City	D	1945-75	0	new	30	1946-75	30	1946-75	160
03124000	Sugar C bl Beach City Dam nr Beach City	D	1939-91	0	--	53	1939-91	0	--	300
03124500	Sugar C at Strasburg	A	1932, 1936-38, 1962-	0	--	38	1932, 1936-38, 1962-95	0	--	311
03125000	Home C nr New Philadelphia	D	1937-80	43	1937-79	42	1938-79	43	1938-79	1.64
03126000	Stillwater C at Piedmont	D	1939-93	0	--	53	1940-92	0	--	122
03127000	Stillwater C at Tippecanoe	D	1939-93	0	--	53	1940-92	0	--	282
03127500	Stillwater C at Uhrichsville	D	1922-93	14	1923-36	69	1923-92	13	1924-36	367
03128500	L Stillwater C bl Tappan Dam at Tappan	D	1939-93	0	--	54	1939-92	0	--	71.1
03129000	Tuscarawas R at Newcomerstown	A	1922-	15	1913, 1922-35	74	1922-95	14	1923-36	2443
03130000	Black F bl Charles Mill Dam nr Mifflin	D	1939-93	0	--	53	1940-92	0	--	217
03130500	Touby Rn at Mansfield	D	1947-78	33	1947-78, 1987	32	1947-78	31	1948-78	5.44
03131000	Rocky F nr Mansfield	D	1925-32	0	new	7	1926-32	6	1927-32	39.0
03131300	Black F at Melco	D		0	--	0	new	0	--	301
03131500	Black F at Loudonville	D	1931-93	5	1932-36	59	1932-92	0	--	349
03132000	Clear F at Butler	D	1945-75	0	--	30	1946-75	0	--	136
03133500	Clear F bl Pleasant Hill Dam nr Perrysville	D	1939-86, 1988-93	0	--	51	1940-86, 1988-91	0	--	198
03134000	Jerome F at Jeromeville	D	1926-49	30	1926-49 1959, 1962-64, 1966, 1969	24	1926-49	23	1927-49	120

Table 1. Selected information on streamflow-gaging stations used in the Ohio network analysis—Continued

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Station number	Station name	Status	Period of continuous gage operation wy	Period and years of record used in the analysis						Drainage area (square miles)
				High		Mean		Low		
				yrs	wy	yrs	wy	yrs	cy	
03135000	Lake Fork bl Mohicanville Dam nr Mohicanville	D	1939-93	0	--	55	1939-93	54	1940-93	271
03136000	Mohican R at Greer	D	1922-82	15	1913, 1922-35	60	1922-81	14	1923-36	948
03136400	N B Kokosing R nr Fredericktown	D	1973-78	0	--	5	1974-78	0	--	46.0
03136500	Kokosing R at Mount Vernon	A	1954-	42	1954-95	42	1954-95	42	1954-95	202
03137000	Kokosing R at Millwood	D	1922-74	54	1913, 1922-74	53	1922-74	52	1923-74	455
03138500	Walhonding R bl Mohawk Dam at Nellie	D	1922-92	15	1913, 1922-35	70	1922-91	14	1923-36	1505
03139000	Killbuck C at Killbuck	A	1931-	65	1931-95	65	1931-95	64	1932-95	464
03139500	Killbuck C at Layland	D	1924-30	0	new	7	1924-30	0	--	503
03140000	Mill C nr Coshocton	A	1937-	59	1937-95	58	1938-95	58	1938-95	27.2
03140500	Muskingum R nr Coshocton	A	1937-	0	--	59	1937-95	0	--	4859
03141500	Seneca F bl Senecaville Dam nr Senecaville	D	1938-93	0	--	53	1939-92	0	--	118
03141700	Wills C at Derwent	D		0	--	0	new	0	--	275
03142000	Wills C at Cambridge	A	1927-28, 1938-	0	--	60	1927-28, 1938-95	0	--	406
03142200	Salt F nr Cambridge	D	1956-68	11	1957-67	11	1957-67	10	1958-67	55.6
03142295	Salt F bl Salt F Dam nr Cambridge	D	1971-82	0	--	9	1971-79	0	--	159
03142500	Wills C at Birds Run	D	1928-39	12	1913, 1929-39	10	1929-38	7	1930-36	730
03143500	Wills C Bl Wills C Dam at Wills Creek	D	1939-92	0	--	54	1939-92	0	--	842
03144000	Wakatomika C nr Frazeysburg	A	1937-	60	1937-96	59	1937-95	58	1938-95	140
03144500	Muskingum R at Dresden	D	1922-85	15	1913, 1922-35	63	1922-84	14	1923-36	5993
03145000	S F Licking R nr Hebron	A	1940-48, 1969-	0	--	36	1940-48, 1969-95	0	--	133
03145500	Raccoon C at Granville	D	1940-48	10	1940-48, 1959	8	1940-47	8	1941-48	82.7

Table 1. Selected information on streamflow-gaging stations used in the Ohio network analysis—Continued

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Station number	Station name	Status	Period of continuous gage operation wy	Period and years of record used in the analysis						Drainage area (square miles)
				High		Mean		Low		
				yrs	wy	yrs	wy	yrs	cy	
03146000	N F Licking R at Utica	D	1940-48, 1970-83	22	1940-48, 1970-82	22	1940-48, 1970-82	20	1941-48, 1971-82	116
03146500	Licking R nr Newark	A	1940-	56	1940-95	56	1940-95	55	1941-95	537
03147000	Licking R at Toboso	D	1903-06, 1922-61	45	1903-06, 1913, 1922-61	41	1905, 1922-61	41	1905-06, 1923-61	672
03147500	Licking R bl Dillon Dam nr Dillon Falls	D	1940-92	20	1913, 1940-58	53	1940-92	19	1941-59	742
03148000	Muskingum R at Zanesville	D	1978	0	--	0	new	0	--	6850
03148300	Moxahala C at Roseville	D		0	new	0	new	0	new	80.6
03149500	Salt C nr Chandlersville	D	1936-47	13	1935-47	12	1936-47	11	1937-47	75.7
03150000	Muskingum R at Mcconnelsville	D	1922-93	15	1913, 1922-35	71	1922-92	13	1923-35	7422
03150300	Muskingum R at Beverly	A	1994-	0	--	0	new	0	--	7627
03156000	Hunters Rn at Lancaster	D	1956-80	0	--	23	1957-79	23	1957-79	10.0
03156400	Hocking R at Lancaster	D	1956-75	0	--	18	1957-74	17	1958-74	48.2
03156500	Hocking R nr Lancaster	D	1924-32	0	--	9	1924-32	8	1925-32	90.3
03157000	Clear C nr Rockbridge	A	1940-	56	1940-95	56	1940-95	55	1941-95	89.0
03157500	Hocking R at Enterprise	A	1931-	65	1907, 1932-95	64	1932-95	63	1933-95	459
03158000	Clear F nr Logan	D	1942-47	0	--	5	1943-47	0	--	14.8
03158195	Snow F Monday C at Buchtel	A	1997-	0	new	0	new	0	new	24.4
03158200	Monday C at Doanville	A	1997-	0	new	0	new	0	new	114
03158510	Sunday C at Bur Oak	D		0	--	0	new	0	--	57.5
03159000	Sunday C at Glouster	D	1952-81	0	--	27	1952-78	0	--	104
03159500	Hocking R at Athens	A	1916-	65	1907, 1916-76, 1993-95	63	1916-76, 1994-95	36	1917-52	943
03159510	Hocking R bl Athens	D	1977-93	17	1977-93	16	1977-92	0	--	957
03159540	Shade R nr Chester	A	1966-	30	1966-95	29	1966-95	28	1967-84, 1986-95	156

Table 1. Selected information on streamflow-gaging stations used in the Ohio network analysis—Continued

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Station number	Station name	Status	Period of continuous gage operation wy	Period and years of record used in the analysis						Drainage area (square miles)
				High		Mean		Low		
				yrs	wy	yrs	wy	yrs	cy	
03201600	Sandy Rn ab Big Four Hollow C nr Lake Hope	D	1971-82	11	1971-81	11	1971-81	10	1972-81	0.98
03201700	Big Four Hollow C nr Lake Hope	D	1971-83	13	1971-83	12	1971-82	12	1972-83	1.01
03201800	Sandy Rn nr Lake Hope	D	1958-79	0	--	21	1958-78	20	1959-78	4.99
03202000	Raccoon C at Adamsville	A	1916-35, 1939-85, 1992-	72	1916-35, 1937, 1939-85 1992-95	71	1916-35, 1939-86, 1992, 1994-95	66	1917-35, 1940-85, 1995	585
03205500	Symmes C at Getaway	D	1938-47	0	new	9	1939-47	9	1939-47	335
03217500	Scioto R at Larue	D	1927-35, 1939-51	24	1927-35, 1938-51, 1959	22	1927-35, 1939-51	20	1928-35, 1940-51	257
03218000	L Scioto R ab Marion	D	1939-72	38	1939-76	33	1939-71	32	1940-71	72.4
03218500	L Scioto R at Stp nr Marion	D	1925-36, 1938-39	0	new	10	1926-35	10	1927-35, 1939	85.8
03219500	Scioto R nr Prospect	A	1926-32, 1940-	82	1913, 1915-95	63	1926-32, 1940-95	62	1927-32, 1941-96	567
03219590	Bokes C nr Warrensburg	A	1983-	14	1982-95	13	1983-95	13	1984-96	83.2
03219600	Eagon Rn nr Warrensburg	D	1950-62	27	1950-76	12	1950-52, 1954-62	0	1951-52, 1955-62	0.12
03220000	Mill C nr Bellepoint	A	1943-	53	1943-95	52	1944-95	52	1945-96	178
03221000	Scioto R bl O'shaughnessy Dam nr Dublin	A	1922-	0	--	74	1922-95	0	--	980
03223000	Olentangy R at Claridon	A	1947-	49	1947-95	49	1947-95	49	1948-96	157
03223425	Whetstone C at Mt Gilead	A	1996-	0	new	0	new	0	new	37.9
03223500	Whetstone C nr Shawtown	D	1947-55	0	new	9	1947-55	8	1948-55	61.8
03224000	Shaw C at Shawtown	D	1947-55	10	1947-55, 1959	9	1947-55	8	1948-55	25.4
03224500	Whetstone C nr Ashley	D	1955-74	20	1955-74	20	1955-74	19	1956-74	98.7
03225500	Olentangy R nr Delaware	A	1924-34, 1939-	35	1911-35, 1938-47	67	1925-34, 1939-95	20	1926-34, 1940-50	393
03226500	Olentangy R at Stratford	D	1934-36, 1938-58	10	1935, 1939-47	21	1935, 1939-58	12	1939-50	445

Table 1. Selected information on streamflow-gaging stations used in the Ohio network analysis—Continued

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Station number	Station name	Status	Period of continuous gage operation wy	Period and years of record used in the analysis						Drainage area (square miles)
				High		Mean		Low		
				yrs	wy	yrs	wy	yrs	cy	
03226800	Olentangy R nr Worthington	A	1956-85, 1992, 1996-	0	--	29	1956-84	0	--	497
03227200	Scioto R at B St Columbus	D	1989	0	--	0	new	0	--	1613
03227500	Scioto R at Columbus	A	1921-	0	--	74	1922-95	0	--	1629
03228000	Scioto Big Rn at Briggsdale	D	1947-58	33	1947-79	12	1947-58	0	1947-58	11.0
03228300	Big Walnut C at Sunbury	A	1989-	7	1989-95	7	1989-95	6	1990-95	101
03228500	Big Walnut C at Central College	A	1939-	15	1939-53	57	1939-95	14	1940-53	190
03228750	Alum C nr Kilbourne	D	1974-83	0	new	7	1975-81	7	1975-81	64.9
03228805	Alum C at Africa	A	1964-	11	1963-73	32	1964-95	9	1965-73	122
03229000	Alum C at Columbus	A	1924-35, 1939-	49	1924-36, 1938-73	69	1924-35, 1939-95	45	1925-35, 1940-73	189
03229500	Big Walnut C at Rees	A	1922-35, 1939-	30	1922-36, 1939-53	70	1922-35, 1940-95	27	1923-35, 1940-53	544
03230000	Scioto R nr Circleville	D	1939-56	9	1939-47	17	1940-56	0	--	2638
03230310	L Darby C at West Jefferson	A	1993-	0	new	0	new	0	new	162
03230450	Hellbranch Rn nr Harrisburg	A	1993-	0	new	0	new	0	new	37.0
03230500	Big Darby C at Darbyville	A	1922-35, 1939-	73	1922-36, 1938-95	71	1922-35, 1939-95	70	1923-35, 1940-96	534
03230700	Scioto R at Circleville	D	1974-79, 1990	0	--	6	1974-79	0	--	3217
03230800	Deer C at Mount Sterling	A	1967-81, 1996-	15	1967-81	15	1967-81	14	1968-81	228
03230900	Deer C nr Pancoastburg	A	1967-	8	1964-71	29	1967-95	0	--	277
03231000	Deer C at Williamsport	D	1927-35, 1939-56, 1962-92	36	1927-35, 1938-56, 1959, 1961-67	56	1927-35, 1939-56, 1963-91	33	1928-35, 1940-56, 1964-71	333
03231500	Scioto R at Chillicothe	A	1921-	60	1908-67	75	1921-95	0	--	3849

Table 1. Selected information on streamflow-gaging stations used in the Ohio network analysis—Continued

[Stations are in downstream order. Abbreviation: nr, near; bl, below; D, discontinued; A, active; high, instantaneous peak flow with 100-year recurrence interval; mean, mean annual flow; low, 7-day 10-year low flow; wy, water year (the period Oct.1–Sept. 30, designated by the calendar year in which it ends); yrs, total years of record; cy, climatic year (the period April 1–Mar. 31, designated by the calendar year in which it ends; new, stations used in network with less than 5 years of streamflow data; --, station not used for specific flow characteristic]

Station number	Station name	Status	Period of continuous gage operation wy	Period and years of record used in the analysis						Drainage area (square miles)
				High		Mean		Low		
				yrs	wy	yrs	wy	yrs	cy	
03232000	Paint C nr Greenfield	A	1927-35, 1940-56, 1967-81, 1996-	50	1926-35, 1940-56, 1959-81	41	1927-35, 1940-56, 1967-81	38	1928-35, 1941-56, 1968-81	249
03232300	Rattlesnake C at Centerfield	D	1971-82	10	1972-81	10	1972-81	9	1973-81	209
03232470	Paint C nr Bainbridge	D	1968-92	8	1963-70	24	1968-91	5	1969-73	570
03232500	Rocky F nr Barretts Mills	A	1940-	12	1940-51	55	1940-95	12	1941-52	140
03234000	Paint C nr Bourneville	A	1922-36, 1939-	49	1922-70	69	1924-36, 1940-95	24	1925-36, 1941-52	807
03234300	Paint C at Chillicothe	A	1986-	0	--	10	1986-95	0	--	1136
03234500	Scioto R at Higby	A	1931-	42	1931-72	65	1931-95	0	--	5131
03235000	Salt C at Tarlton	D	1947-61	31	1947-77	15	1947-61	14	1948-61	11.5
03235500	Tar Hollow C at Tar Hollow State Park	D	1947-79	32	1947-78	32	1947-78	0	1948-78	1.35
03236000	Salt C nr Londonderry	D	1939-50	13	1938-50	12	1939-50	11	1940-50	286
03236500	L Salt C nr Jackson	D	1925-32	0	new	7	1926-32	6	1927-32	76.1
03237280	Upper Twin C at Mcgaw	A	1964-	33	1960, 1964-95	32	1964-95	31	1965-95	12.2
03237500	Ohio Brush C nr West Union	A	1927-35, 1941-	64	1927-35, 1941-95	64	1927-35, 1941-95	62	1928-35, 1942-95	387
03238500	Whiteoak C nr Georgetown	A	1924-35, 1940-	68	1924-35, 1940-95	67	1925-35, 1940-95	65	1926-35, 1941-95	218
03239000	L Miami R nr Selma	D	1952-58	25	1953-77	6	1953-58	5	1954-58	48.9
03239500	N F L Miami R nr Pitchin	D	1951-58	25	1953-77	6	1953-58	5	1954-58	28.9
03240000	L Miami R nr Oldtown	A	1953-	43	1953-95	43	1953-95	43	1954-96	129
03240500	N F Massie C at Cedarville	D	1954-68	14	1955-68	14	1955-68	13	1956-68	28.9
03241000	S F Massie C nr Cedarville	D	1954-68	14	1955-68	14	1955-68	13	1956-68	17.1
03241500	Massies C at Wilberforce	A	1953-	43	1953-95	43	1953-95	42	1954-95	63.2
03242000	L Miami R at Spring Valley	D	1926-35, 1940-51	0	--	22	1926-35, 1940-51	20	1927-35, 1941-51	361

Table 1. Selected information on streamflow-gaging stations used in the Ohio network analysis—Continued

[Stations are in downstream order. Abbreviation: nr, near; bl, below; D, discontinued; A, active; high, instantaneous peak flow with 100-year recurrence interval; mean, mean annual flow; low, 7-day 10-year low flow; wy, water year (the period Oct.1–Sept. 30, designated by the calendar year in which it ends); yrs, total years of record; cy, climatic year (the period April 1–Mar. 31, designated by the calendar year in which it ends; new, stations used in network with less than 5 years of streamflow data; --, station not used for specific flow characteristic]

Station number	Station name	Status	Period of continuous gage operation wy	Period and years of record used in the analysis						Drainage area (square miles)
				High		Mean		Low		
				yrs	wy	yrs	wy	yrs	cy	
03242050	L Miami R nr Spring Valley	D	1968-85	41	1926-35, 1940-52, 1959, 1963-64, 1969-83	15	1969-84	15	1970-84	366
03242150	Caesar C nr Xenia	D	1900, 1968-84	15	1969-83	15	1969-83	0	--	71.4
03242200	Anderson F nr New Burlington Oh	D	1968-84	15	1969-83	15	1969-83	14	1970-83	77.8
03242300	Caesar C at Harveysburg	D	1961-75	16	1959, 1961-75	14	1961-74	14	1962-75	209
03242350	Caesar C nr Wellman	D	1965-74	10	1959, 1966-74	8	1966-73	7	1967-73	239
03242500	L Miami R nr Ft Ancient	D	1940-51	17	1939-52, 1959, 1963-64	12	1940-51	11	1941-51	680
03243500	Cowan C nr Wilmington	D	1943-50	0	new	6	1943-45, 1946-49	0	1944-50	32.0
03244000	Todd F nr Roachester	D	1952-75	22	1953-74	22	1953-74	0	--	219
03245500	L Miami R at Milford	A	1916-17, 1926-36, 1939-	51	1916-17, 1926-74	70	1916-17, 1926-36, 1939-95	47	1917, 1926-36, 1940-74	1203
03246200	E F L Miami R nr Marathon	D	1968-84	15	1969-83	15	1969-83	14	1970-83	195
03246500	E F L Miami R at Williamsburg	D	1949-53, 1961-74	20	1950-53, 1959, 1961-75	18	1950-53, 1961-74	17	1950-53, 1962-74	237
03247041	E F L Miami R bl Harsha Dam	D		0	--	0	new	0	--	342
03247050	E F L Miami R nr Batavia	D	1965-94	13	1964-76	29	1966-94	10	1967-76	352
03247400	Shayler Rn nr Perintown	D	1968-73	0	new	5	1969-73	0		11.8
03247500	E F L Miami R at Perintown	A	1916-17, 1926-	55	1916-20, 1925-74	72	1916-17, 1926-95	25	1917, 1926-49	476
03248000	L Miami R at Plainville	D	1965-71	14	1964, 1966-78	6	1966-71	0	--	1713

Table 1. Selected information on streamflow-gaging stations used in the Ohio network analysis—Continued

[Stations are in downstream order. Abbreviation: nr, near; bl, below; D, discontinued; A, active; high, instantaneous peak flow with 100-year recurrence interval; mean, mean annual flow; low, 7-day 10-year low flow; wy, water year (the period Oct.1–Sept. 30, designated by the calendar year in which it ends); yrs, total years of record; cy, climatic year (the period April 1–Mar. 31, designated by the calendar year in which it ends; new, stations used in network with less than 5 years of streamflow data; --, station not used for specific flow characteristic]

Station number	Station name	Status	Period of continuous gage operation wy	Period and years of record used in the analysis						Drainage area (square miles)
				High		Mean		Low		
				yrs	wy	yrs	wy	yrs	cy	
03255500	Mill C at Reading	D	1939-93	53	1939-91	53	1940-91, 1993-94	0	--	73.0
03257000	W F Mill C nr Greenhills	D	1945-53	0	--	8	1946-53	6	1947-52	39.9
03257500	W F Mill C at Woodlawn	D	1953-86	0	--	28	1956-83	0	--	32.2
03258000	W F Mill C at Lockland	D	1939-57	14	1939-52	17	1940-41, 1943-57	0	--	35.6
03259000	Mill C at Carthage	A	1948-	6	1947-52	48	1948-95	0	--	115
03260700	Bokengehalas C nr De Graff	D	1958-96	35	1958-92	34	1958-91	33	1959-91	36.3
03260800	Stony C nr De Graff	D	1958-76	18	1958-75	18	1958-75	17	1959-75	59.1
03261500	G Miami R at Sidney	A	1915-	83	1913-95	81	1915-95	0	--	541
03261950	Loramie C nr Newport	A	1965-	31	1965-95	31	1965-95	0	--	152
03262000	Loramie C at Lockington	A	1916-	7	1913, 1916-21	79	1916-18, 1920-95	0	--	257
03262700	G Miami R at Troy	A	1963-	0	--	33	1963-95	0	--	926
03263000	G Miami R at Taylorsville	A	1915-17, 1922-	0	--	73	1923-95	0	--	1149
03264000	Greenville C nr Bradford	A	1931-	63	1913, 1932-54, 1956, 1958-95	64	1932-95	64	1932-95	193
03265000	Stillwater R at Pleasant Hill	A	1917-28, 1935-	80	1913, 1917-95	72	1917-28, 1936-95	71	1918-28, 1936-95	503
03266000	Stillwater R at Englewood	A	1926-	0	--	69	1927-95	69	1927-95	650
03266500	Mad R at Zanesfield	D	1947-78	33	1947-79	33	1947-79	32	1948-79	7.31
03266560	Mad R at West Liberty	A	1994-	0	new	0	new	0	new	36.6
03267000	Mad R nr Urbana	A	1926-31, 1940-	62	1926-31, 1940-95	62	1926-31, 1940-95	60	1927-31, 1941-95	162
03267500	Mad R at Tremont City	D	1931-33, 1966-75	0	new	10	1932, 1966-74	9	1933, 1967-74	264
03267700	Moore Rn nr Eagle City	D	1966-72	0	new	7	1966-72	0	--	18.2
03267800	Mad R at Eagle City	D	1966-71	0	new	6	1966-71	0	--	307

Table 1. Selected information on streamflow-gaging stations used in the Ohio network analysis—Continued

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Station number	Station name	Status	Period of continuous gage operation wy	Period and years of record used in the analysis						Drainage area (square miles)
				High		Mean		Low		
				yrs	wy	yrs	wy	yrs	cy	
03267900	Mad R at St Paris Pike at Eagle City	D	1965-95	31	1959, 1966-95	30	1966-95	0	--	310
03267950	Buck C nr New Moorefield	D	1967-77	9	1968-76	9	1968-76	9	1968-76	30.5
03267960	E F Buck C nr New Moorefield	D	1967-77	9	1968-76	9	1968-76	9	1968-76	28.7
03268000	Buck C at New Moorefield	D	1943-58, 1973-76	17	1943-59	16	1943-58	15	1944-58, 1974-76	65.3
03268500	Beaver C nr Springfield	D	1943-58, 1973-76	21	1943-59, 1973-76	19	1943-58, 1974-76	18	1944-58, 1974-76	39.2
03269000	Buck C at Springfield	D	1915-21, 1925-49, 1973-74	55	1913, 1915-21, 1924-56, 1959-72	33	1915-21, 1925-49, 1974	0	--	139
03269500	Mad R nr Springfield	A	1905-06, 1915-	62	1904-05, 1913-72	82	1905, 1915-95	0	--	490
03270000	Mad R nr Dayton	A	1915-	7	1913, 1915-20	77	1916-21, 1925-95	0	--	635
03270500	G Miami R at Dayton	A	1914-	28	1893-20	82	1914-95	0	--	2511
03270800	Wolf C at Trotwood	D	1963-86	25	1959, 1963-86	24	1963-86	23	1964-86	22.7
03271000	Wolf C at Dayton	D	1939-50, 1987-96	22	1939-50, 1959, 1987-95	21	1939-50, 1987-95	19	1940-50, 1988-95	68.7
03271500	G Miami R at Miamisburg	D	1916-20, 1924-35, 1952-95	0	--	57	1917, 1919-20, 1925-35, 1953-95	0	--	2711
03271601	G Miami R bl Miamisburg	A	1992-	0	--	0	new	0	--	2715
03271800	Twin C nr Ingomar	A	1963-	34	1959, 1963-95	33	1963-95	32	1964-95	197
03272000	Twin C nr Germantown	A	1915-23, 1927-	8	1913, 1915-21	77	1915-23, 1928-95	76	1916-23, 1928-95	275
03272100	G Miami R at Middletown	A	1995-	0	--	0	new	0	--	3134
03272700	Sevenmile C at Camden	A	1972-	25	1971-95	24	1972-95	24	1972-95	69.0

Table 1. Selected information on streamflow-gaging stations used in the Ohio network analysis—Continued

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Station number	Station name	Status	Period of continuous gage operation wy	Period and years of record used in the analysis						Drainage area (square miles)
				High		Mean		Low		
				yrs	wy	yrs	wy	yrs	cy	
03272800	Sevenmile C at Collinsville	D	1960-72	17	1959, 1961-76	12	1961-72	11	1962-72	120
03273000	Sevenmile C at Sevenmile	D	1915-20	0	new	5	1916-20	5	1916-20	135
03273500	Four Mile C nr Hamilton	D	1938-60	18	1938-55	23	1938-60	17	1939-55	307
03274000	G Miami R at Hamilton	A	1911-18, 1928-	14	1907-20	68	1928-95	0	--	3630
03274500	G Miami R at Venice	D	1915-27, 1932-33	6	1913, 1916-20	12	1916-27	0	--	3789
04177000	Ottawa R at Toledo	A	1946-48, 1977-	27	1943, 1945-50, 1959, 1977-95	21	1946-48, 1977-86, 1988-95	19	1946-48, 1978-86, 1989-95	150
04177500	St Joseph R nr Blakeslee	D	1926-32	0	--	6	1927-32	5	1928-32	394
04183500	Maumee R at Antwerp	D	1922-35, 1939-82	71	1912-82	56	1922-35, 1940-81	0	--	2129
04184500	Bean C at Powers	D	1941-81	42	1941-82	41	1941-81	40	1942-81	206
04185000	Tiffin R at Stryker	A	1922-28, 1941-	64	1913, 1922-28, 1937, 1941-95	62	1922-28, 1941-95	0	--	410
04185440	Unnamed Trib To Lost C nr Farmers	A	1986-	10	1986-95	10	1986-95	10	1987-96	4.23
04185500	Tiffin R nr Brunersburg	D	1928-36	0	--	7	1929-35	0	--	736
04186500	Auglaize R nr Fort Jennings	A	1922-35, 1941-	45	1922-36, 1941-70	69	1922-35, 1941-95	0	--	332
04187100	Ottawa R at Lima	A	1989-	8	1988-95	7	1989-95	0	--	128
04187500	Ottawa R at Allentown	D	1924-36, 1943-82	52	1924-35, 1939, 1943-81	50	1924-35, 1944-81	0	--	160
04188000	Ottawa R at Kalida	D	1930-36	0	--	5	1931-35	0	--	309
04188500	Eagle C nr Findlay	D	1947-57	13	1947-57, 1959, 1981	9	1948-56	10	1948-57	55.0

Table 1. Selected information on streamflow-gaging stations used in the Ohio network analysis—Continued

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Station number	Station name	Status	Period of continuous gage operation wy	Period and years of record used in the analysis						Drainage area (square miles)
				High		Mean		Low		
				yrs	wy	yrs	wy	yrs	cy	
04189000	Blanchard R nr Findlay	A	1924-35, 1941-	69	1913, 1924-36, 1941-95	67	1924-35, 1941-95	65	1925-35, 1942-95	346
04189500	Blanchard R at Glandorf	D	1921-28, 1947-52	13	1922-28, 1947-51, 1959	10	1922-27, 1948-51	10	1923-27, 1948-52	644
04190000	Blanchard R nr Dupont	D	1928-35	0	new	7	1929-35	6	1930-35	756
04191000	Town C nr Van Wert	D	1945-53	0	new	8	1946-53	0	1947-53	21.2
04191500	Auglaize R nr Defiance	A	1916-	82	1913, 1915-95	79	1916-95	0	--	2318
04192500	Maumee R nr Defiance	A	1925-35, 1940-74, 1979-	66	1925-36, 1939-75, 1979-95	62	1926-35, 1940-74, 1979-95	0	--	5545
04193500	Maumee R at Waterville	A	1899-01, 1922-35, 1940-	75	1900-01, 1913, 1922-36, 1939-95	72	1900-01, 1922-35, 1940-95	0	--	6330
04194500	Portage R nr Pemberville	D	1930-35	0	new	5	1931-35	0	--	337
04195000	N B Portage R nr Bowling Green	D	1924-32	0	new	8	1925-32	8	1925-32	45.1
04195500	Portage R at Woodville	A	1929-35, 1940-	64	1913, 1929-35, 1940-95	63	1929-35, 1940-95	17	1930-35, 1941-51	428
04196000	Sandusky R nr Bucyrus	A	1926-35, 1939-51, 1965-81, 1996-	43	1926-35, 1939-51, 1959, 1964-81, 1987	40	1926-35, 1939-51, 1965-81	38	1927-35, 1940-51, 1965-81	88.8
04196200	Broken Sword C at Nevada	D	1976-82	0	new	5	1977-81	0	1977-81	83.8
04196500	Sandusky R nr Upper Sandusky	D	1922-35, 1938-82	60	1922-36, 1938-81, 1989	57	1922-35, 1939-81	56	1923-35, 1939-81	298
04196800	Tymochtee C at Crawford	A	1965-	35	1961-95	31	1965-95	7	1966-72	229

Table 1. Selected information on streamflow-gaging stations used in the Ohio network analysis—Continued

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Station number	Station name	Status	Period of continuous gage operation wy	Period and years of record used in the analysis						Drainage area (square miles)
				High		Mean		Low		
				yrs	wy	yrs	wy	yrs	cy	
04197000	Sandusky R nr Mexico	D	1923-36, 1938-83	60	1922-37, 1939-82	56	1924-35, 1939-82	55	1924-35, 1940-82	774
04197020	Honey C nr New Washington	D	1976-90	8	1982-89	10	1980-89	9	1981-89	17.0
04197100	Honey C at Melmore	A	1977-	35	1961-95	19	1977-95	19	1977-95	149
04197170	Rock C at Tiffin	A	1984-	12	1983-86, 1988-95	12	1984-95	11	1985-95	34.6
04197300	Wolf C at Bettsville	D	1976-82	21	1961-81	5	1977-81	5	1977-81	66.2
04197450	E B Wolf C nr Bettsville	D	1976-82	0	new	5	1977-81	0	1977-81	82.4
04198000	Sandusky R nr Fremont	A	1899-01, 1924-35 1939-	70	1924-36, 1939-95	69	1924-35, 1939-95	67	1925-35, 1940-95	1251
04198500	E B Huron R nr Norwalk	D	1924-35	13	1924-35, 1969	11	1925-35	11	1925-35	85.5
04199000	Huron R at Milan	A	1951-80, 1988-	40	1950-81, 1988-95	39	1951-81, 1988-95	38	1951-81, 1989-95	371
04199155	Old Womans C at Berlin Rd Nr Huron	A	1988-94, 1996-	7	1988-94	8	1988-95	0	1989-95	22.1
04199287	Vermilion R nr Fitchville	D	1978-89, 1991-93	6	1987-89, 1991-93	5	1988-93	0	--	112
04199500	Vermilion R nr Vermilion	D	1950-81	32	1950-81	31	1951-81	31	1951-81	262
04200000	E B Black R at Elyria	D	1922-36	14	1923-35, 1969	13	1923-35	12	1925-36	217
04200500	Black R at Elyria	A	1945-	51	1945-95	51	1945-95	0	--	396
04201500	Rocky R nr Berea	A	1924-35, 1944-	64	1924-35, 1944-95	63	1925-35, 1944-95	0	--	267
04202000	Cuyahoga R at Hiram Rapids	A	1928-35, 1945-	8	1928-35	59	1928-35, 1945-95	7	1929-35	151
04203000	Breakneck C nr Kent	D	1927-35	0	--	8	1928-35	0	--	77.6
04204000	L Cuyahoga R at Mogadore	D	1946-79	0	--	32	1947-78	0	--	17.3
04204500	L Cuyahoga R at Massillon Rd Akron	D	1946-74	0	--	28	1947-74	0	--	31.6

Table 1. Selected information on streamflow-gaging stations used in the Ohio network analysis—Continued

[Stations are in downstream order. Abbreviation: nr, near; bl, below; D, discontinued; A, active; high, instantaneous peak flow with 100-year recurrence interval; mean, mean annual flow; low, 7-day 10-year low flow; wy, water year (the period Oct.1–Sept. 30, designated by the calendar year in which it ends); yrs, total years of record; cy, climatic year (the period April 1–Mar. 31, designated by the calendar year in which it ends; new, stations used in network with less than 5 years of streamflow data; --, station not used for specific flow characteristic]

Station number	Station name	Status	Period of continuous gage operation wy	Period and years of record used in the analysis						Drainage area (square miles)
				High		Mean		Low		
				yrs	wy	yrs	wy	yrs	cy	
04205000	Springfield Lake Outlet at Akron	D	1946-49, 1961-74	0	--	17	1947-49, 1961-74	0	--	9.72
04205500	L Cuyahoga R at Akron	D	1920, 1928-34	0	--	6	1928-33	0	--	44.4
04206000	Cuyahoga R at Old Portage	A	1922-35, 1940-	0	--	70	1922-35, 1940-95	0	--	404
04206208	Yellow C at Ghent	A	1992-	0	new	0	new	0	new	12.7
04206210	North F at Bath	A	1992	0	new	0	new	0	new	2.81
04206211	Park C at Bath Center	A	1992	0	new	0	new	0	new	0.83
04206212	North F at Bath Center	A	1992	0	new	0	new	0	new	5.58
04206215	Bath C at Bath Center	A	1992	0	new	0	new	0	new	3.52
04206220	Yellow C at Botzum	A	1992	0	new	0	new	0	new	30.7
04206250	Cuyahoga R at Ira	D	1973-80	0	--	6	1974-79	0	--	478
04207200	Tinkers C at Bedford	A	1963-	33	1963-95	32	1964-95	32	1964-95	83.9
04208000	Cuyahoga R at Independence	A	1922-23, 1928-35, 1941-	67	1922-23, 1928-36, 1940-95	64	1922, 1928-35, 1941-95	0	--	707
04208502	Big C at Cleveland	D	1973-86	0	--	14	1973-86	0	--	35.3
04208504	Cuyahoga R at LTV Cleveland	A	1992-	0	new		new	0	--	788
04208690	Euclid C nr Euclid	D	1977-80, 1983-86	0	--	5	1978-80, 1984-85	0	--	22.6
04209000	Chagrin R at Willoughby	A	1926-35, 1940-84, 1989-94, 1996-	63	1913, 1926-35, 1940-84, 1988-95	61	1926-35, 1940-84, 1989-94	7	1989-95	246
04209500	Grand R nr North Bristol	D	1942-47	0	new	5	1943-47	5	1943-47	85.4
04210000	Phelps C nr Windsor	D	1942-59	18	1942-59	16	1943-58	16	1944-59	25.6
04210500	Grand R nr Rome	D	1942-47	0	new	5	1943-47	0	1943-47	251
04211000	Rock C nr Rock Creek	D	1942-66	25	1942-66	24	1943-66	24	1943-66	69.2
04211500	Mill C nr Jefferson	D	1942-75	33	1942-74	32	1943-74	0	--	82.0
04211820	Grand R at Harpersfield	A	1996-	0	new	0	new	0	new	552

Table 1. Selected information on streamflow-gaging stations used in the Ohio network analysis—Continued

[Stations are in downstream order. Abbreviation: nr, near; bl, below; D, discontinued; A, active; high, instantaneous peak flow with 100-year recurrence interval; mean, mean annual flow; low, 7-day 10-year low flow; wy, water year (the period Oct.1–Sept. 30, designated by the calendar year in which it ends); yrs, total years of record; cy, climatic year (the period April 1–Mar. 31, designated by the calendar year in which it ends; new, stations used in network with less than 5 years of streamflow data; --, station not used for specific flow characteristic]

Station number	Station name	Status	Period of continuous gage operation wy	Period and years of record used in the analysis						Drainage area (square miles)
				High		Mean		Low		
				yrs	wy	yrs	wy	yrs	cy	
04212000	Grand R nr Madison	D	1923-35, 1938-74	51	1923-36, 1938-74	49	1923-35, 1939-74	48	1924-35, 1939-74	581
04212100	Grand R nr Painesville	A	1975-	21	1975-95	21	1975-95	20	1976-95	685
04212500	Ashtabula R nr Ashtabula	D	1924-36, 1939-48, 1950-80	51	1925-36, 1939-47, 1950-79	48	1925-35, 1940-47, 1951-79	47	1926-35, 1940-47, 1951-79	121
04213000	Conneaut C at Conneaut	A	1923-35, 1951-	60	1923-36, 1950-95	58	1923-35, 1951-95	57	1924-35, 1951-95	175

Table 3. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in downstream order

[Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow; Comp, rank from all flow rankings combined; reg, regulated streamflow; nd, no data available; na, not applicable]

Station number	Station name	Rank for 0-year planning horizon				Rank for 5-year planning horizon				Rank for 20-year planning horizon			
		High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
03086500	Mahoning R at Alliance	187	233	reg	253	174	263	reg	263	162	243	reg	238
03087000	Beech C nr Bolton	92	213	70	120	55	86	53	41	56	71	52	38
03088000	Deer C at Limaville	154	195	66	140	145	103	reg	111	118	88	reg	103
03088500	Mahoning R nr Deerfield	reg	130	reg	181	reg	81	reg	179	reg	74	reg	166
03089500	Mill C nr Berlin Center	142	187	118	157	120	194	105	115	127	172	108	117
03090500	Mahoning R bl Berlin Dam nr Berlin Center	88	231	reg	182	reg	239	reg	256	reg	231	reg	249
03091500	Mahoning R at Pricetown	reg	64	reg	138	reg	216	reg	267	reg	228	reg	275
03092000	Kale C nr Pricetown	173	211	129	212	179	268	136	237	178	257	126	218
03092090	W B Mahoning R nr Ravenna	118	180	149	158	99	233	151	168	105	189	149	130
03092460	W B Mahoning R at Wayland	reg	184	reg	229	reg	159	reg	234	reg	152	reg	221
03092500	W B Mahoning R nr Newton Falls	152	219	147	219	reg	255	reg	279	reg	246	reg	278
03093000	Eagle C at Phalanx Station	51	56	39	34	153	242	150	211	175	265	152	241
03093500	Duck C at Leavittsburg	nd	140	67	132	34	62	52	30	33	55	53	30
03094000	Mahoning R at Leavittsburg	reg	72	reg	142	reg	183	reg	248	reg	188	reg	251
03094500	Mahoning R at Warren	reg	157	reg	206	reg	98	reg	197	reg	91	reg	183
03095500	Mosquito C bl Mosquito C Dam nr Cortland	reg	218	reg	244	reg	236	reg	278	reg	210	reg	265
03096000	Mosquito C at Niles	95	153	100	100	reg	140	reg	194	reg	134	reg	190
03097500	Meander C at Mineral Ridge	reg	150	reg	203	reg	148	reg	223	reg	141	reg	216
03097550	Mahoning R at Ohio Edison Power Plant at Niles	reg	8	reg	109	reg	57	reg	157	reg	63	reg	161
03098000	Mahoning R at Youngstown	93	228	reg	185	reg	218	reg	241	reg	197	reg	225
03098500	Mill C at Youngstown	169	192	74	151	166	161	reg	175	163	155	reg	162
03098600	Mahoning R bl West Ave at Youngstown	reg	6	reg	104	reg	46	reg	148	reg	59	reg	158
03099500	Mahoning R at Lowellville	reg	243	reg	259	reg	191	reg	255	reg	173	reg	237
03102950	Pymatuning C at Kinsman	138	177	135	161	102	166	129	106	107	158	121	108
03109000	Lisbon C at Lisbon	119	133	81	95	82	123	67	78	98	123	61	82
03109500	L Beaver C nr East Liverpool	67	60	48	46	138	208	152	180	150	230	151	199

Table 3. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in downstream order—Continued

[Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow; Comp, rank from all flow rankings combined; reg, regulated streamflow; nd, no data available; na, not applicable]

Station number	Station name	Rank for 0-year planning horizon				Rank for 5-year planning horizon				Rank for 20-year planning horizon			
		High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
03110000	Yellow C nr Hammondsville	54	53	34	33	147	202	134	169	159	204	139	176
03110500	Yellow C at Hammondsville	114	132	138	126	83	137	101	91	94	147	92	97
03111500	Short C nr Dillonvale	29	49	38	20	106	206	144	143	140	208	147	170
03111548	Wheeling C bl Blaine	3	4	15	3	49	79	92	53	55	95	103	67
03114000	Captina C at Armstrongs Mills	25	37	32	17	88	199	127	113	111	201	135	135
03115400	L Muskingum R at Bloomfield	17	21	8	8	66	129	66	71	93	143	77	92
03115500	L Muskingum R at Fay	117	125	112	106	79	110	77	75	77	112	76	74
03115969	Montrose Rn at Montrose	na	na	na	na	1	1	5	1	1	3	6	1
03115970	Schocalog Rn at Montrose	na	na	na	na	2	7	2	2	3	10	2	2
03115971	Schocalog Rn at Fairlawn	na	na	na	na	6	10	4	4	6	11	7	4
03115973	Schocalog Rn at Copley Junction	na	na	na	na	5	14	3	5	11	16	3	5
03116000	Tuscarawas R at Clinton	172	237	reg	245	156	271	reg	261	153	254	reg	242
03116200	Chippewa C at Easton Oh	143	239	reg	233	169	157	reg	195	119	145	reg	139
03116500	Tuscarawas R at Crystal Springs	reg	109	reg	165	reg	74	reg	176	reg	79	reg	171
03117000	Tuscarawas R at Massillon	79	93	reg	94	161	220	reg	224	147	213	reg	210
03117500	Sandy C at Waynesburg Oh	81	81	43	55	172	225	142	208	166	219	138	195
03118000	Middle Branch Nimishillen Creek at Canton	77	57	reg	86	178	286	reg	276	182	283	reg	279
03118500	Nimishillen C at North Industry	65	68	reg	84	150	259	reg	244	168	279	reg	270
03119000	Sandy C at Sandyville	147	175	151	179	94	151	113	99	89	138	104	96
03120500	Mcguire C nr Leesville	reg	222	reg	248	reg	270	reg	291	reg	267	reg	290
03121500	Indian F bl Atwood Dam nr Cumberland	reg	188	reg	230	reg	119	reg	205	reg	119	reg	204
03122500	Tuscarawas R bl Dover Dam nr Dover	151	259	115	223	reg	245	reg	266	reg	225	reg	256
03123000	Sugar C ab Beach City Dam at Beach City	nd	252	139	254	40	196	111	96	38	163	105	89
03124000	Sugar C bl Beach City Dam nr Beach City	reg	253	reg	264	reg	254	reg	286	reg	235	reg	280
03124500	Sugar C at Strasburg	reg	43	reg	129	reg	165	reg	236	reg	175	reg	240
03125000	Home C nr New Philadelphia	101	185	78	115	104	277	79	147	149	286	80	192
03126000	Stillwater C at Piedmont	reg	236	reg	255	reg	258	reg	288	reg	247	reg	284
03127000	Stillwater C at Tippecanoe	reg	248	reg	260	reg	246	reg	283	reg	223	reg	274

Table 3. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in downstream order—Continued

[Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow; Comp, rank from all flow rankings combined; reg, regulated streamflow; nd, no data available; na, not applicable]

Station number	Station name	Rank for 0-year planning horizon				Rank for 5-year planning horizon				Rank for 20-year planning horizon			
		High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
03127500	Stillwater C at Uhrichsville	145	247	136	225	reg	266	reg	280	reg	263	reg	281
03128500	L Stillwater C bl Tappan Dam at Tappan	reg	226	reg	251	reg	274	reg	293	reg	270	reg	293
03129000	Tuscarawas R at Newcomerstown	35	96	92	64	reg	214	reg	245	reg	214	reg	239
03130000	Black F bl Charles Mill Dam nr Mifflin	reg	257	reg	265	reg	285	reg	294	reg	280	reg	296
03130500	Touby Rn at Mansfield	111	198	131	155	105	279	133	199	125	291	127	208
03131000	Rocky F nr Mansfield	nd	245	128	241	26	75	121	54	19	68	63	33
03131300	Black F at Melco	na	na	na	na	reg	24	reg	130	reg	21	reg	128
03131500	Black F at Loudonville	161	249	reg	246	reg	272	reg	273	reg	271	reg	276
03132000	Clear F at Butler	reg	265	reg	268	reg	222	reg	270	reg	180	reg	245
03133500	Clear F bl Pleasant Hill Dam nr Perrysville	reg	261	reg	266	reg	289	reg	296	reg	278	reg	295
03134000	Jerome F at Jeromeville	184	169	114	174	181	197	76	142	161	164	72	112
03135000	Lake Fork bl Mohicanville Dam nr Mohicanville	reg	256	154	262	reg	280	137	275	reg	274	119	263
03136000	Mohican R at Greer	149	254	91	199	reg	261	reg	271	reg	242	reg	267
03136400	N B Kokosing R nr Fredericktown	reg	221	reg	247	reg	47	reg	149	reg	48	reg	148
03136500	Kokosing R at Mount Vernon	66	87	37	50	103	228	132	150	81	209	131	121
03137000	Kokosing R at Millwood	186	241	157	256	164	247	148	218	145	233	128	181
03138500	Walhonding R bl Mohawk Dam at Nellie	136	260	93	193	reg	256	reg	269	reg	248	reg	268
03139000	Killbuck C At Killbuck	27	90	33	36	127	250	117	178	176	264	123	219
03139500	Killbuck C at Layland	nd	144	reg	195	42	68	reg	88	40	66	reg	85
03140000	Mill C nr Coshocton	58	55	19	25	171	284	131	240	184	287	141	258
03140500	Muskingum R nr Coshocton	reg	101	reg	159	reg	185	reg	249	reg	185	reg	247
03141500	Seneca F bl Senecaville Dam nr Senecaville	reg	227	reg	252	reg	264	reg	289	reg	260	reg	287
03141700	Wills C at Derwent	na	na	na	na	reg	27	reg	135	reg	27	reg	131
03142000	Wills C at Cambridge	reg	82	reg	149	reg	231	reg	274	reg	241	reg	283
03142200	Salt F nr Cambridge	104	142	60	88	63	96	46	49	60	105	49	51
03142295	Salt F bl Salt F Dam nr Cambridge	reg	264	reg	267	reg	93	reg	193	reg	85	reg	175
03142500	Wills C at Birds Run	170	117	reg	156	reg	88	reg	162	reg	89	reg	159
03143500	Wills C bl Wills C Dam at Wills Creek	reg	267	reg	269	reg	249	reg	284	reg	217	reg	271

Table 3. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in downstream order—Continued

[Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow; Comp, rank from all flow rankings combined; reg, regulated streamflow; nd, no data available; na, not applicable]

Station number	Station name	Rank for 0-year planning horizon				Rank for 5-year planning horizon				Rank for 20-year planning horizon			
		High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
03144000	Wakatomika C nr Frazeysburg	48	75	30	38	136	282	128	213	152	289	134	228
03144500	Muskingum R at Dresden	141	268	96	207	reg	227	reg	252	reg	195	reg	222
03145000	S F Licking R nr Hebron	reg	74	reg	144	reg	291	reg	297	reg	222	reg	273
03145500	Raccoon C at Granville	103	164	102	118	76	84	63	55	85	80	60	55
03146000	N F Licking R at Utica	185	263	141	258	110	298	107	198	82	159	98	98
03146500	Licking R nr Newark	76	99	47	63	131	262	118	196	130	255	120	179
03147000	Licking R at Toboso	158	203	156	217	119	192	130	131	108	181	113	115
03147500	Licking R bl Dillon Dam nr Dillon Falls	168	269	134	250	reg	265	reg	282	reg	232	reg	264
03148000	Muskingum R at Zanesville	na	na	na	na	reg	23	reg	129	reg	20	reg	127
03148300	Moxahala C at Roseville	na	na	na	na	31	26	28	21	30	25	26	21
03149500	Salt C nr Chandlersville	133	114	121	116	100	107	91	89	78	116	89	83
03150000	Muskingum R at Mcconnelsville	139	262	110	209	reg	229	reg	257	reg	205	reg	236
03150300	Muskingum R at Beverly	na	na	na	na	reg	15	reg	121	reg	17	reg	126
03156000	Hunters Rn at Lancaster	reg	191	104	190	reg	241	94	225	reg	182	97	189
03156400	Hocking R at Lancaster	reg	207	119	215	reg	135	90	144	reg	140	86	141
03156500	Hocking R nr Lancaster	reg	127	reg	180	reg	92	reg	191	reg	90	reg	182
03157000	Clear C nr Rockbridge	70	69	22	41	158	290	122	227	181	293	130	252
03157500	Hocking R at Enterprise	85	73	45	54	148	238	135	200	132	269	132	201
03158000	Clear F nr Logan	reg	208	reg	236	reg	54	reg	153	reg	47	reg	146
03158195	Snow F Monday C at Buchtel	na	na	na	na	12	13	12	9	18	14	11	9
03158200	Monday C at Doanville	na	na	na	na	21	18	21	17	35	18	23	20
03158510	Sunday C at Bur Oak	na	na	na	na	reg	25	reg	132	reg	24	reg	129
03159000	Sunday C at Glouster	reg	210	reg	240	reg	175	reg	242	reg	165	reg	231
03159500	Hocking R at Athens	62	42	152	73	133	190	reg	187	134	216	reg	200
03159510	Hocking R bl Athens	178	176	reg	211	159	115	reg	145	157	118	reg	145
03159540	Shade R nr Chester	36	20	7	10	122	156	73	98	116	166	84	104
03201600	Sandy Rn ab Big Four Hollow C nr Lake Hope	89	128	54	77	46	114	40	45	45	98	47	42
03201700	Big Four Hollow C nr Lake Hope	90	123	53	76	51	149	37	58	47	127	37	49

Table 3. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in downstream order—Continued

[Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow, Comp, rank from all flow rankings combined; reg, regulated streamflow; nd, no data available; na, not applicable]

Station number	Station name	Rank for 0-year planning horizon				Rank for 5-year planning horizon				Rank for 20-year planning horizon			
		High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
03201800	Sandy Rn nr Lake Hope	reg	152	52	131	reg	180	34	137	reg	167	33	125
03202000	Raccoon C at Adamsville	63	38	29	24	149	205	123	159	160	251	129	205
03205500	Symmes C at Getaway	nd	108	85	123	27	78	58	33	22	87	59	36
03217500	Scioto R at Larue	150	204	68	146	123	172	49	95	115	148	45	90
03218000	L Scioto R ab Marion	188	206	75	177	175	210	56	133	183	191	55	123
03218500	L Scioto R at Stp Nr Marion	nd	165	65	143	37	106	47	39	37	92	51	39
03219500	Scioto R nr Prospect	74	100	11	48	170	297	84	215	173	282	91	212
03219590	Bokes C nr Warrensburg	12	12	3	5	61	85	33	37	74	107	34	52
03219600	Eagon Rn nr Warrensburg	86	107	nd	103	47	97	1	29	46	94	1	31
03220000	Mill C nr Bellepoint	84	97	28	59	182	288	140	258	177	298	143	259
03221000	Scioto R bl O'shaughnessy Dam nr Dublin	reg	88	reg	152	reg	244	reg	281	reg	266	reg	289
03223000	Olentangy R at Claridon	46	92	20	39	167	295	110	231	180	272	124	230
03223425	Whetstone C at Mt Gilead	na	na	na	na	19	9	17	12	26	9	18	11
03223500	Whetstone C nr Shawtown	nd	266	73	226	29	87	reg	79	23	83	reg	75
03224000	Shaw C at Shawtown	107	232	58	133	80	82	39	46	88	82	38	47
03224500	Whetstone C nr Ashley	127	235	117	186	183	138	83	108	79	144	81	88
03225500	Olentangy R nr Delaware	40	98	97	70	reg	293	reg	292	reg	295	reg	294
03226500	Olentangy R at Stratford	166	234	90	194	reg	141	reg	192	reg	135	reg	172
03226800	Olentangy R nr Worthington	reg	102	reg	160	reg	146	reg	222	reg	156	reg	226
03227200	Scioto R at B St Columbus	na	na	na	na	reg	22	reg	128	reg	13	reg	124
03227500	Scioto R at Columbus	reg	91	reg	154	reg	234	reg	277	reg	252	reg	285
03228000	Scioto Big Rn at Briggsdale	176	194	nd	227	154	111	19	83	143	100	16	72
03228300	Big Walnut C at Sunbury	9	13	5	6	48	41	61	31	49	58	74	40
03228500	Big Walnut C at Central College	21	95	108	65	reg	294	reg	287	reg	297	reg	286
03228750	Alum C nr Kilbourne	nd	225	69	188	38	71	43	32	36	61	40	28
03228805	Alum C at Africa	11	70	84	44	reg	269	reg	268	reg	187	reg	214
03229000	Alum C at Columbus	80	89	155	92	reg	287	reg	295	reg	292	reg	298
03229500	Big Walnut C at Rees	23	94	146	74	reg	283	reg	290	reg	284	reg	291

Table 3. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in downstream order—Continued

[Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow; Comp, rank from all flow rankings combined; reg, regulated streamflow; nd, no data available; na, not applicable]

Station number	Station name	Rank for 0-year planning horizon				Rank for 5-year planning horizon				Rank for 20-year planning horizon			
		High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
03230000	Scioto R nr Circleville	183	258	reg	263	reg	121	reg	188	reg	114	reg	168
03230310	L Darby C at West Jefferson	na	na	na	na	23	8	22	14	39	8	25	17
03230450	Hellbranch Rn nr Harrisburg	na	na	na	na	17	6	16	10	34	7	17	13
03230500	Big Darby C at Darbyville	82	84	44	60	184	275	146	253	174	281	146	248
03230700	Scioto R at Circleville	reg	136	reg	189	reg	56	reg	156	reg	54	reg	154
03230800	Deer C at Mount Sterling	39	63	16	21	64	126	72	72	65	108	67	62
03230900	Deer C nr Pancoastburg	14	59	reg	67	reg	173	reg	212	reg	160	reg	198
03231000	Deer C at Williamsport	182	250	153	257	reg	296	reg	298	reg	285	reg	297
03231500	Scioto R at Chillicothe	49	80	reg	83	reg	200	reg	259	reg	212	reg	262
03232000	Paint C nr Greenfield	47	66	23	29	137	278	112	202	137	227	122	163
03232300	Rattlesnake C at Centerfield	105	255	122	187	62	83	59	47	58	84	48	43
03232470	Paint C nr Bainbridge	140	216	reg	214	reg	147	reg	206	reg	139	reg	197
03232500	Rocky F nr Barretts Mills	5	47	82	26	reg	253	reg	250	reg	276	reg	269
03234000	Paint C nr Bourneville	26	71	120	61	reg	237	reg	265	reg	261	reg	277
03234300	Paint C at Chillicothe	reg	10	reg	112	reg	59	reg	158	reg	77	reg	169
03234500	Scioto R at Higby	19	86	reg	75	reg	179	reg	221	reg	196	reg	232
03235000	Salt C at Tarlton	132	155	62	102	89	128	45	73	91	130	42	73
03235500	Tar Hollow C at Tar Hollow State Park	98	167	nd	147	67	267	14	97	69	288	12	106
03236000	Salt C nr Londonderry	116	151	89	110	59	100	50	51	51	99	43	45
03236500	L Salt C nr Jackson	nd	115	reg	172	30	66	reg	82	27	69	reg	81
03237280	Upper Twin C at Mcgaw	7	11	4	4	60	187	42	86	83	238	58	107
03237500	Ohio Brush C nr West Union	45	36	24	19	108	211	102	118	121	249	116	164
03238500	Whiteoak C nr Georgetown	41	25	18	13	118	204	99	119	141	256	111	184
03239000	L Miami R nr Selma	146	137	63	99	116	44	44	48	104	41	46	44
03239500	N F L Miami R nr Pitchin	180	126	56	113	168	38	36	61	165	40	35	63
03240000	L Miami R nr Oldtown	59	44	35	30	126	221	139	172	124	199	136	143
03240500	N F Massie C at Cedarville	110	143	95	101	72	94	86	64	72	106	93	77
03241000	S F Massie C nr Cedarville	121	135	71	93	85	99	68	65	76	109	70	69

Table 3. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in downstream order—Continued

[Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow; Comp, rank from all flow rankings combined; reg, regulated streamflow; nd, no data available; na, not applicable]

Station number	Station name	Rank for 0-year planning horizon				Rank for 5-year planning horizon				Rank for 20-year planning horizon			
		High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
03241500	Massies C at Wilberforce	34	35	26	18	113	251	138	183	135	229	144	185
03242000	L Miami R at Spring Valley	reg	172	144	208	reg	139	97	151	reg	129	85	133
03242050	L Miami R nr Spring Valley	165	240	150	237	134	104	104	94	112	96	90	87
03242150	Caesar C nr Xenia	144	199	reg	205	75	122	reg	103	63	103	reg	100
03242200	Anderson F nr New Burlington	113	197	80	130	71	116	55	62	66	102	56	54
03242300	Caesar C at Harveysburg	162	212	103	183	93	102	64	69	75	93	65	57
03242350	Caesar C nr Wellman	108	224	77	137	reg	61	reg	114	reg	56	reg	113
03242500	L Miami R nr Ft Ancient	123	161	94	122	reg	80	reg	140	reg	81	reg	140
03243500	Cowan C nr Wilmington	nd	170	nd	218	16	40	7	18	13	39	5	12
03244000	Todd F nr Roachester	156	179	reg	197	84	130	reg	107	73	128	reg	109
03245500	L Miami R at Milford	32	34	133	53	reg	170	reg	228	reg	200	reg	246
03246200	E F L Miami R nr Marathon	122	159	106	127	74	101	74	63	64	97	73	58
03246500	E F L Miami R at Williamsburg	129	160	79	117	77	113	51	60	70	115	50	60
03247041	E F L Miami R bl Harsha Dam	na	na	na	na	reg	17	reg	123	reg	5	reg	122
03247050	E F L Miami R nr Batavia	115	163	99	121	reg	143	reg	190	reg	146	reg	188
03247400	Shayler Rn nr Perintown	nd	131	reg	184	15	30	reg	57	8	29	reg	53
03247500	E F L Miami R at Perintown	30	28	109	45	reg	177	reg	232	reg	220	reg	260
03248000	L Miami R at Plainville	179	182	reg	221	reg	34	reg	117	reg	32	reg	118
03255500	Mill C at Reading	160	181	reg	204	162	223	reg	229	170	218	reg	227
03257000	W F Mill C nr Greenhills	reg	121	reg	176	reg	52	reg	152	reg	52	reg	151
03257500	W F Mill C at Woodlawn	reg	146	reg	198	reg	144	reg	219	reg	154	reg	223
03258000	W F Mill C at Lockland	106	119	reg	124	reg	105	reg	185	reg	111	reg	191
03259000	Mill C at Carthage	16	17	reg	51	reg	155	reg	204	reg	183	reg	220
03260700	Bokengehalas C nr De Graff	126	193	132	162	91	212	108	112	99	192	109	114
03260800	Stony C nr De Graff	130	174	107	139	65	118	75	68	62	120	71	68
03261500	G Miami R at Sidney	83	33	reg	79	180	193	reg	216	179	240	reg	253
03261950	Loramie C nr Newport	18	16	reg	52	57	134	reg	102	57	153	reg	111
03262000	Loramie C at Lockington	20	29	reg	57	reg	207	reg	239	reg	259	reg	272

Table 3. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in downstream order—Continued

[Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow; Comp, rank from all flow rankings combined; reg, regulated streamflow; nd, no data available; na, not applicable]

Station number	Station name	Rank for 0-year planning horizon				Rank for 5-year planning horizon				Rank for 20-year planning horizon			
		High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
03262700	G Miami R at Troy	reg	50	reg	134	reg	132	reg	214	reg	142	reg	217
03263000	G Miami R at Taylorsville	reg	54	reg	136	reg	195	reg	260	reg	211	reg	266
03264000	Greenville C nr Bradford	61	24	36	22	155	184	147	173	169	224	148	207
03265000	Stillwater R at Pleasant Hill	72	27	41	32	163	169	145	160	171	206	145	194
03266000	Stillwater R at Englewood	reg	45	40	80	reg	198	141	230	reg	215	140	234
03266500	Mad R at Zanesfield	148	196	123	175	109	273	100	166	109	294	100	177
03266560	Mad R at West Liberty	na	na	na	na	13	2	18	7	16	1	19	8
03267000	Mad R nr Urbana	57	79	42	47	139	292	143	233	156	296	142	244
03267500	Mad R at Tremont City	nd	189	113	196	33	91	54	36	25	70	44	29
03267700	Moore Rn nr Eagle City	nd	217	reg	242	25	58	reg	76	21	49	reg	70
03267800	Mad R at Eagle City	nd	209	reg	238	35	45	reg	74	29	38	reg	66
03267900	Mad R at St Paris Pike at Eagle City	177	229	reg	243	160	215	reg	220	106	157	reg	138
03267950	Buck C nr New Moorefield	157	242	86	191	52	72	60	38	48	64	57	37
03267960	E F Buck C nr New Moorefield	96	238	87	145	58	76	71	50	54	65	68	41
03268000	Buck C at New Moorefield	94	244	127	173	176	136	93	110	68	117	88	78
03268500	Beaver C nr Springfield	120	220	111	163	87	188	88	100	90	136	83	91
03269000	Buck C at Springfield	163	138	reg	169	146	154	reg	170	146	174	reg	180
03269500	Mad R nr Springfield	56	40	reg	72	reg	213	reg	264	reg	262	reg	288
03270000	Mad R nr Dayton	13	48	reg	62	reg	209	reg	238	reg	245	reg	261
03270500	G Miami R at Dayton	33	41	reg	69	reg	171	reg	235	reg	203	reg	257
03270800	Wolf C at Trotwood	109	154	124	128	96	164	114	101	102	149	112	102
03271000	Wolf C at Dayton	135	145	137	141	90	131	109	93	86	133	99	95
03271500	G Miami R at Miamisburg	reg	223	reg	249	reg	189	reg	254	reg	176	reg	243
03271601	G Miami R bl Miamisburg	na	na	na	na	reg	5	reg	120	reg	4	reg	120
03271800	Twin C nr Ingomar	181	14	31	66	152	127	125	109	126	151	125	116
03272000	Twin C nr Germantown	6	22	46	12	reg	181	149	201	reg	237	150	233
03272100	G Miami R at Middletown	na	na	na	na	reg	3	reg	116	reg	2	reg	119
03272700	Sevenmile C at Camden	24	7	12	7	78	95	87	70	95	125	96	94

Table 3. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in downstream order—Continued

[Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow; Comp, rank from all flow rankings combined; reg, regulated streamflow; nd, no data available; na, not applicable]

Station number	Station name	Rank for 0-year planning horizon				Rank for 5-year planning horizon				Rank for 20-year planning horizon			
		High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
03272800	Sevenmile C at Collinsville	137	120	126	125	70	73	81	56	61	75	75	50
03273000	Sevenmile C at Sevenmile	nd	103	145	153	24	32	115	35	17	33	107	35
03273500	Four Mile C nr Hamilton	100	129	125	107	reg	109	reg	177	reg	122	reg	186
03274000	G Miami R at Hamilton	15	32	reg	56	reg	152	reg	209	reg	179	reg	224
03274500	G Miami R at Venice	91	104	reg	105	reg	67	reg	127	reg	86	reg	142
04177000	Ottawa R at Toledo	8	9	2	2	53	108	35	43	59	132	41	56
04177500	St Joseph R nr Blakeslee	reg	106	reg	164	reg	33	reg	139	reg	31	reg	136
04183500	Maumee R at Antwerp	175	178	reg	210	151	162	reg	181	155	168	reg	187
04184500	Bean C at Powers	124	158	116	135	86	160	80	92	97	177	79	101
04185000	Tiffin R at Stryker	31	19	reg	58	95	153	reg	124	114	198	reg	173
04185440	Unnamed Trib To Lost C nr Farmers	1	1	1	1	45	35	26	24	50	62	30	32
04185500	Tiffin R nr Brunersburg	reg	110	reg	166	reg	43	reg	146	reg	43	reg	144
04186500	Auglaize R nr Fort Jennings	42	31	reg	68	reg	201	reg	262	reg	244	reg	282
04187100	Ottawa R at Lima	28	2	reg	49	56	29	reg	77	53	42	reg	80
04187500	Ottawa R at Allentown	164	205	reg	224	157	260	reg	251	164	226	reg	229
04188000	Ottawa R at Kalida	reg	112	reg	170	reg	31	reg	138	reg	30	reg	134
04188500	Eagle C nr Findlay	112	139	64	91	92	70	29	40	103	73	21	46
04189000	Blanchard R nr Findlay	53	58	13	23	143	248	96	174	158	275	110	209
04189500	Blanchard R at Glandorf	128	105	72	87	81	65	48	42	84	72	54	48
04190000	Blanchard R nr Dupont	nd	124	50	114	28	50	30	25	31	44	29	25
04191000	Town C nr Van Wert	nd	113	nd	171	20	48	6	19	20	51	4	19
04191500	Auglaize R nr Defiance	60	26	reg	71	128	158	reg	154	142	193	reg	193
04192500	Maumee R nr Defiance	68	46	reg	78	117	150	reg	141	117	169	reg	156
04193500	Maumee R at Waterville	73	51	reg	81	129	163	reg	161	128	190	reg	178
04194500	Portage R nr Pemberville	nd	122	reg	178	18	36	reg	59	15	34	reg	59
04195000	N B Portage R nr Bowling Green	nd	118	49	111	9	69	25	22	7	67	24	22
04195500	Portage R at Woodville	38	52	61	37	101	226	reg	167	120	258	reg	202
04196000	Sandusky R nr Bucyrus	71	67	10	35	177	240	85	184	172	290	94	215

Table 3. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in downstream order—Continued

[Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow; Comp, rank from all flow rankings combined; reg, regulated streamflow; nd, no data available; na, not applicable]

Station number	Station name	Rank for 0-year planning horizon				Rank for 5-year planning horizon				Rank for 20-year planning horizon			
		High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
04196200	Broken Sword C at Nevada	nd	270	nd	270	39	42	23	23	41	37	22	24
04196500	Sandusky R nr Upper Sandusky	159	230	148	231	141	281	116	207	138	273	115	196
04196800	Tymochtee C at Crawford	44	39	55	31	124	167	reg	136	129	161	reg	132
04197000	Sandusky R nr Mexico	167	246	143	239	140	257	106	186	131	234	102	150
04197020	Honey C nr New Washington	87	116	88	85	50	90	78	52	52	113	78	65
04197100	Honey C at Melmore	43	18	6	11	114	120	70	90	123	131	87	99
04197170	Rock C at Tiffin	4	5	76	14	54	77	65	44	67	104	69	64
04197300	Wolf C at Bettsville	131	156	51	96	97	37	31	34	92	35	28	34
04197450	E B Wolf C nr Bettsville	nd	166	nd	213	32	39	10	20	28	36	8	18
04198000	Sandusky R nr Fremont	55	77	27	40	115	224	103	134	133	239	114	165
04198500	E B Huron R nr Norwalk	102	147	105	108	68	125	62	67	71	101	66	61
04199000	Huron R at Milan	78	62	21	42	107	182	95	104	101	184	106	110
04199155	Old Womans C at Berlin Rd nr Huron	2	3	nd	43	43	60	8	26	44	78	9	27
04199287	Vermilion R nr Fitchville	99	168	reg	148	44	49	reg	81	43	50	reg	79
04199500	Vermilion R nr Vermilion	171	214	130	216	121	176	98	105	100	171	95	105
04200000	E B Black R at Elyria	134	134	101	119	98	117	69	84	96	110	64	76
04200500	Black R at Elyria	75	76	reg	89	165	217	reg	226	139	221	reg	211
04201500	Rocky R nr Berea	50	78	reg	82	130	276	reg	243	148	277	reg	254
04202000	Cuyahoga R at Hiram Rapids	10	65	59	27	reg	243	reg	247	reg	253	reg	250
04203000	Breakneck C nr Kent	reg	148	reg	200	reg	89	reg	189	reg	76	reg	167
04204000	L Cuyahoga R at Mogadore	reg	200	reg	234	reg	230	reg	272	reg	194	reg	255
04204500	L Cuyahoga R at Massillon Rd Akron	reg	202	reg	235	reg	178	reg	246	reg	170	reg	235
04205000	Springfield Lake Outlet at Akron	reg	171	reg	220	reg	142	reg	217	reg	137	reg	213
04205500	L Cuyahoga R at Akron	reg	173	reg	222	reg	64	reg	164	reg	60	reg	160
04206000	Cuyahoga R at Old Portage	reg	83	reg	150	reg	252	reg	285	reg	268	reg	292
04206208	Yellow C at Ghent	na	na	na	na	11	19	24	15	12	22	27	14
04206210	North F at Bath	na	na	na	na	7	11	15	8	5	12	15	6
04206211	Park C at Bath Center	na	na	na	na	3	4	9	3	2	6	10	3

Table 3. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in downstream order—Continued

[Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow; Comp, rank from all flow rankings combined; reg, regulated streamflow; nd, no data available; na, not applicable]

Station number	Station name	Rank for 0-year planning horizon				Rank for 5-year planning horizon				Rank for 20-year planning horizon			
		High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
04206212	North F at Bath Center	na	na	na	na	8	16	20	11	9	19	20	10
04206215	Bath C at Bath Center	na	na	na	na	4	12	13	6	4	15	14	7
04206220	Yellow C at Botzum	na	na	na	na	10	20	27	16	10	23	31	16
04206250	Cuyahoga R at Ira	reg	251	reg	261	reg	63	reg	163	reg	57	reg	157
04207200	Tinkers C at Bedford	52	23	17	15	142	174	119	125	136	178	133	137
04208000	Cuyahoga R at Independence	69	85	reg	90	112	232	reg	203	113	236	reg	203
04208502	Big C at Cleveland	reg	141	reg	192	reg	124	reg	210	reg	124	reg	206
04208504	Cuyahoga R at LTV Cleveland	na	na	na	na	41	28	reg	66	42	28	reg	71
04208690	Euclid C nr Euclid	reg	111	reg	167	reg	55	reg	155	reg	53	reg	152
04209000	Chagrin R at Willoughby	64	61	9	28	144	235	57	126	151	250	62	147
04209500	Grand R nr North Bristol	nd	186	83	168	22	51	41	27	14	45	39	23
04210000	Phelps C nr Windsor	97	149	98	97	69	133	82	85	80	121	82	84
04210500	Grand R nr Rome	reg	190	reg	232	36	53	32	28	32	46	32	26
04211000	Rock C nr Rock Creek	125	162	57	98	111	145	38	87	110	150	36	86
04211500	Mill C nr Jefferson	155	183	reg	201	132	168	reg	171	122	162	reg	153
04211820	Grand R at Harpersfield	na	na	na	na	14	21	11	13	24	26	13	15
04212000	Grand R nr Madison	174	215	140	228	173	203	124	182	167	186	117	155
04212100	Grand R nr Painesville	22	15	14	9	73	112	89	80	87	126	101	93
04212500	Ashtabula R nr Ashtabula	153	201	142	202	135	219	126	165	144	202	118	149
04213000	Conneaut C at Conneaut	37	30	25	16	125	186	120	122	154	207	137	174

Table 4. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in rank order

[Leading zero of station number has been omitted. Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow; Comp, rank based from all flow rankings combined]

Rank	Station number for 0-year planning horizon				Station number for 5-year planning horizon				Station number for 20-year planning horizon			
	High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
1	4185440	4185440	4185440	4185440	3115969	3115969	3219600	3115969	3115969	3266560	3219600	3115969
2	4199155	4187100	4177000	4177000	3115970	3266560	3115970	3115970	4206211	3272100	3115970	3115970
3	3111548	4199155	3219590	3111548	4206211	3272100	3115973	4206211	3115970	3115969	3115973	4206211
4	4197170	3111548	3237280	3237280	4206215	4206211	3115971	3115971	4206215	3271601	4191000	3115971
5	3232500	4197170	3228300	3219590	3115973	3271601	3115969	3115973	4206210	3247041	3243500	3115973
6	3272000	3098600	4197100	3228300	3115971	3230450	4191000	4206215	3115971	4206211	3115969	4206210
7	3237280	3272700	3159540	3272700	4206210	3115970	3243500	3266560	4195000	3230450	3115971	4206215
8	4177000	3097550	3115400	3115400	4206212	3230310	4199155	4206210	3247400	3230310	4197450	3266560
9	3228300	4177000	4209000	4212100	4195000	3223425	4206211	3158195	4206212	3223425	4199155	3158195
10	4202000	3234300	4196000	3159540	4206220	3115971	4197450	3230450	4206220	3115970	4206211	4206212
11	3228805	3237280	3219500	4197100	4206208	4206210	4211820	4206212	3115973	3115971	3158195	3223425
12	3219590	3219590	3272700	3272000	3158195	4206215	3158195	3223425	4206208	4206210	3235500	3243500
13	3270000	3228300	4189000	3238500	3266560	3158195	4206215	4211820	3243500	3227200	4211820	3230450
14	3230900	3271800	4212100	4197170	4211820	3115973	3235500	3230310	4209500	3158195	4206215	4206208
15	3274000	4212100	3111548	4207200	3247400	3150300	4206210	4206208	4194500	4206215	4206210	4211820
16	3259000	3261950	3230800	4213000	3243500	4206212	3230450	4206220	3266560	3115973	3228000	4206220
17	3115400	3259000	4207200	3114000	3230450	3247041	3223425	3158200	3273000	3150300	3230450	3230310
18	3261950	4197100	3238500	3241500	4194500	3158200	3266560	3243500	3158195	3158200	3223425	4197450
19	3234500	4185000	3140000	3237500	3223425	4206208	3228000	4191000	3131000	4206212	3266560	4191000
20	3262000	3159540	3223000	3111500	4191000	4206220	4206212	4197450	4191000	3148000	4206212	3158200
21	3228500	3115400	4199000	3230800	3158200	4211820	3158200	3148300	3267700	3131300	4188500	3148300
22	4212100	3272000	3157000	3264000	4209500	3227200	3230310	4195000	3205500	4206208	4196200	4195000
23	3229500	4207200	3232000	4189000	3230310	3148000	4196200	4196200	3223500	4206220	3158200	4209500
24	3272700	3264000	3237500	3202000	3273000	3131300	4206208	4185440	4211820	3158510	4195000	4196200
25	3114000	3238500	4213000	3140000	3267700	3158510	4195000	4190000	3267500	3148300	3230310	4190000
26	3234000	4191500	3241500	3232500	3131000	3148300	4185440	4199155	3223425	4211820	3148300	4210500
27	3139000	3265000	4198000	4202000	3205500	3141700	4206220	4209500	3236500	3141700	4206208	4199155

Table 4. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in rank order—Continued

[Leading zero of station number has been omitted. Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow; Comp, rank based from all flow rankings combined]

Rank	Station number for 0-year planning horizon				Station number for 5-year planning horizon				Station number for 20-year planning horizon			
	High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
28	4187100	3247500	3220000	4209000	4190000	4208504	3148300	4210500	4197450	4208504	4197300	3228750
29	3111500	3262000	3202000	3232000	3223500	4187100	4188500	3219600	3267800	3247400	4190000	3267500
30	3247500	4213000	3144000	3240000	3236500	3247400	4190000	3093500	3148300	4188000	4185440	3093500
31	4185000	4186500	3271800	4196800	3148300	4188000	4197300	3228300	4190000	4177500	4206220	3219600
32	3245500	3274000	3114000	3265000	4197450	3273000	4210500	3228750	4210500	3248000	4210500	4185440
33	3270500	3261500	3139000	3110000	3267500	4177500	3219590	3205500	3093500	3273000	3201800	3131000
34	3241500	3245500	3110000	3093000	3093500	3248000	3201800	4197300	3230450	4194500	3219590	4197300
35	3129000	3241500	3240000	4196000	3267800	4185440	4177000	3273000	3158200	4197300	3239500	3273000
36	3159540	3237500	3264000	3139000	4210500	4194500	3239500	3267500	3228750	4197450	4211000	3205500
37	4213000	3114000	3136500	4195500	3218500	4197300	3201700	3219590	3218500	4196200	3201700	3267950
38	4195500	3202000	3111500	3144000	3228750	3239500	4211000	3267950	3123000	3267800	3224000	3087000
39	3230800	4196800	3093000	3223000	4196200	4197450	3224000	3218500	3230310	3243500	4209500	3218500
40	3225500	3269500	3266000	4198000	3123000	3243500	3201600	4188500	3139500	3239500	3228750	3228300
41	3238500	3270500	3265000	3157000	4208504	3228300	4209500	3087000	4196200	3239000	4177000	3267960
42	4186500	3159500	3267000	4199000	3139500	4196200	3237280	4189500	4208504	4187100	3235000	3201600
43	4197100	3124500	3117500	4199155	4199155	4185500	3228750	4177000	4199287	4185500	3236000	3232300
44	4196800	3240000	3230500	3228805	4199287	3239000	3239000	4197170	4199155	4190000	3267500	3239000
45	3237500	3266000	3157500	3247500	4185440	3267800	3235000	3201600	3201600	4209500	3217500	3236000
46	3223000	4192500	3272000	3109500	3201600	3098600	3142200	3224000	3219600	4210500	3239000	4188500
47	3232000	3232500	3146500	3267000	3219600	3136400	3218500	3232300	3201700	3158000	3201600	3224000
48	3144000	3270000	3109500	3219500	3228300	4191000	4189500	3239000	3267950	3136400	3232300	4189500
49	3231500	3111500	4195000	4187100	3111548	4199287	3217500	3142200	3228300	3267700	3142200	3201700
50	4201500	3262700	4190000	3136500	4197020	4190000	3236000	3267960	4185440	4199287	3246500	3272800
51	3093000	4193500	4197300	3259000	3201700	4209500	3246500	3236000	3236000	4191000	3218500	3142200
52	4207200	4195500	3201800	3261950	3267950	3257000	3093500	4197020	4197020	3257000	3087000	3219590
53	4189000	3110000	3201700	3245500	4177000	4210500	3087000	3111548	4187100	4208690	3093500	3247400
54	3110000	3263000	3201600	3157500	4197170	3158000	3267500	3131000	3267960	3230700	4189500	3242200
55	4198000	3140000	4196800	3117500	3087000	4208690	3242200	3145500	3111548	3093500	3218000	3145500
56	3269500	3093000	3239500	3274000	4187100	3230700	3218000	3272800	3087000	3242350	3242200	4177000

Table 4. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in rank order—Continued

[Leading zero of station number has been omitted. Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow; Comp, rank based from all flow rankings combined]

Rank	Station number for 0-year planning horizon				Station number for 5-year planning horizon				Station number for 20-year planning horizon			
	High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
57	3267000	3118000	4211000	3262000	3261950	3097550	4209000	3247400	3261950	4206250	3267950	3242300
58	3140000	4189000	3224000	4185000	3267960	3267700	3205500	3201700	3232300	3228300	3237280	3246200
59	3240000	3230900	4202000	3220000	3236000	3234300	3232300	4194500	4177000	3098600	3205500	4194500
60	4191500	3109500	3142200	3230500	3237280	4199155	3267950	3246500	3142200	4205500	3145500	3246500
61	3264000	4209000	4195500	3234000	3219590	3242350	3228300	3239500	3272800	3228750	3109000	4198500
62	3159500	4199000	3235000	3270000	3232300	3093500	4198500	3242200	3260800	4185440	4209000	3230800
63	3202000	3230800	3239000	3146500	3142200	4206250	3145500	3246200	3242150	3097550	3131000	3239500
64	4209000	3091500	4188500	3129000	3230800	4205500	3242300	3240500	3246200	3267950	4200000	4197170
65	3118500	4202000	3218500	3228500	3260800	4189500	4197170	3241000	3230800	3267960	3242300	4197020
66	3136500	3232000	3088000	3271800	3115400	3236500	3115400	4208504	3242200	3139500	4198500	3267800
67	3109500	4196000	3093500	3230900	3235500	3274500	3109000	4198500	4197170	4195000	3230800	3111548
68	4192500	3118500	3217500	4186500	4198500	3139500	3241000	3260800	3268000	3131000	3267960	3260800
69	4208000	3157000	3228750	3270500	4210000	4195000	4200000	3242300	3235500	3236500	4197170	3241000
70	3157000	3228805	3087000	3225500	3272800	4188500	4197100	3272700	3246500	3267500	3241000	3267700
71	4196000	3234000	3241000	4191500	3242200	3228750	3267960	3115400	4198500	3087000	3260800	4208504
72	3265000	3094000	4189500	3269500	3240500	3267950	3230800	3230800	3240500	4189500	3134000	3228000
73	4193500	3157500	3223500	3159500	4212100	3272800	3159540	3235000	3244000	4188500	3246200	3235000
74	3219500	3145000	3098500	3229500	3246200	3116500	3246200	3267800	3219590	3088500	3228300	3115500
75	4200500	3144000	3218000	3234500	3242150	3131000	3260800	3115500	3242300	3272800	3272800	3223500
76	3146500	4200500	4197170	3201700	3145500	3267960	3134000	3267700	3241000	4203000	3115500	4200000
77	3118000	4198000	3242350	3201600	3246500	4197170	3115500	4187100	3115500	3234300	3115400	3240500
78	4199000	4201500	3125000	4192500	3272700	3205500	4197020	3109000	3149500	4199155	4197020	3268000
79	3117000	3267000	3246500	3261500	3115500	3111548	3125000	3223500	3224500	3116500	4184500	4199287
80	3229000	3231500	3242200	3266000	3224000	3242500	4184500	4212100	4210000	3145500	3125000	4187100
81	3117500	3117500	3109000	4193500	4189500	3088500	3272800	4199287	3136500	3242500	3224500	3236500
82	3230500	3142000	3232500	4201500	3109000	3224000	4210000	3236500	3146000	3224000	4210000	3109000
83	3261500	4206000	4209500	3231500	3110500	3232300	3224500	3228000	3237280	3223500	3268500	3149500
84	3220000	3230500	3228805	3118500	3244000	3145500	3219500	4200000	4189500	3232300	3159540	4210000
85	3157500	4208000	3205500	4197020	3241000	3219590	4196000	4210000	3145500	3142295	3242000	3139500

Table 4. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in rank order—Continued

[Leading zero of station number has been omitted. Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow; Comp, rank based from all flow rankings combined]

Rank	Station number for 0-year planning horizon				Station number for 5-year planning horizon				Station number for 20-year planning horizon			
	High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
86	3219600	3234500	3267950	3118000	4184500	3087000	3240500	3237280	3271000	3274500	3156400	4211000
87	4197020	3136500	3267960	4189500	3268500	3223500	3272700	4211000	4212100	3205500	4197100	3242050
88	3090500	3221000	4197020	3142200	3114000	3142500	3268500	3139500	3224000	3088000	3268000	3224500
89	3201600	3229000	3236000	4200500	3235000	4203000	4212100	3149500	3119000	3142500	3149500	3123000
90	3201700	3139000	3226500	4208000	3271000	4197020	3156400	4197100	3268500	3156500	3242050	3217500
91	3274500	3227500	3136000	4188500	3260700	3267500	3149500	3110500	3235000	3094500	3219500	3268500
92	3087000	3223000	3129000	3229000	4188500	3156500	3111548	4184500	4197300	3218500	3110500	3115400
93	3098000	3117000	3138500	3241000	3242300	3142295	3268000	3271000	3115400	3242300	3240500	4212100
94	3268000	3229500	3242500	3117000	3119000	3240500	3156000	3242050	3110500	3219600	4196000	3272700
95	3096000	3228500	3240500	3109000	4185000	3272700	4199000	3217500	3272700	3111548	4199500	3271000
96	3267960	3129000	3144500	4197300	3270800	3142200	4189000	3123000	4200000	3242050	3272700	3119000
97	4210000	3220000	3225500	4210000	4197300	3219600	3242000	3235500	4184500	3246200	3156000	3110500
98	3235500	3225500	4210000	4211000	4200000	3094500	4199500	3159540	3109000	3201600	3146000	3146000
99	4199287	3146500	3247050	3239000	3092090	3241000	3238500	3119000	3260700	3236000	3271000	4197100
100	3273500	3219500	3096000	3096000	3149500	3236000	3266500	3268500	4199500	3228000	3266500	3242150
101	3125000	3140500	4200000	3240500	4195500	3246200	3110500	3270800	4199000	4198500	4212100	4184500
102	4198500	3226800	3145500	3235000	3102950	3242300	3237500	3261950	3270800	3242200	4197000	3270800
103	3145500	3273000	3242300	3219600	3136500	3088000	4198000	3242150	4188500	3242150	3111548	3088000
104	3142200	3274500	3156000	3098600	3125000	3242050	3242050	4199000	3239000	4197170	3119000	3159540
105	3232300	4189500	4198500	3274500	3130500	3258000	3089500	4199500	3092090	3142200	3123000	4199500
106	3258000	4177500	3246200	3115500	3111500	3218500	4197000	3102950	3267900	3240500	4199000	3235500
107	3224000	3219600	3260800	3273500	4199000	3149500	3146000	3244000	3102950	3219590	3273000	3237280
108	3242350	3205500	3228500	4198500	3237500	4177000	3260700	3224500	3147000	3230800	3089500	3102950
109	3270800	3116500	3247500	3097550	3266500	3273500	3271000	3271800	3266500	3241000	3260700	3244000
110	3240500	4185500	3150000	3236000	3146000	3115500	3223000	3268000	4211000	4200000	4189000	4199000
111	3130500	4208690	3268500	4195000	4211000	3228000	3123000	3088000	3114000	3258000	3238500	3261950
112	4188500	4188000	3115500	3234300	4208000	4212100	3232000	3260700	3242050	3115500	3270800	3134000
113	3242200	4191000	3267500	3239500	3241500	3246500	3119000	3114000	4208000	4197020	3147000	3242350
114	3110500	3149500	3134000	4190000	4197100	3201600	3270800	3242350	4185000	3230000	4198000	3260700

Table 4. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in rank order—Continued

[Leading zero of station number has been omitted. Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow; Comp, rank based from all flow rankings combined]

Rank	Station number for 0-year planning horizon				Station number for 5-year planning horizon				Station number for 20-year planning horizon			
	High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
115	3247050	3236500	3122500	3125000	4198000	3159510	3273000	3089500	3217500	3246500	4196500	3147000
116	3236000	4197020	4184500	3149500	3239000	3242200	4196500	3272100	3159540	3149500	3237500	3271800
117	3115500	3142500	3224500	3246500	4192500	4200000	3139000	3248000	4192500	3268000	4212000	3089500
118	3092090	4195000	3089500	3145500	3238500	3260800	3146500	3237500	3088000	3159510	4212500	3248000
119	3109000	3258000	3156400	4200000	3147000	3121500	4207200	3238500	3116200	3121500	3135000	3272100
120	3268500	3272800	3234000	3087000	3089500	4197100	4213000	3271601	4195500	3260800	3146500	3271601
121	3241000	3257000	3149500	3247050	4199500	3230000	3131000	3150300	3237500	4210000	3102950	3136500
122	3246200	4194500	3232300	3242500	3159540	3242150	3157000	4213000	4211500	3273500	3232000	3247041
123	3242500	3201700	3266500	3205500	3217500	3109000	3202000	3247041	4197100	3109000	3139000	3218000
124	4184500	4190000	3270800	3258000	4196800	4208502	4212000	4185000	3240000	4208502	3223000	3227200
125	4211000	3115500	3273500	3272800	4213000	4198500	3271800	4207200	3130500	3272700	3271800	3201800
126	3260700	3239500	3272800	3110500	3240000	3230800	4212500	4209000	3271800	4212100	3092000	3150300
127	3224500	3156500	3268000	3246200	3139000	3271800	3114000	3274500	3089500	3201700	3130500	3148000
128	4189500	3201600	3131000	3270800	4191500	3235000	3144000	3227200	4193500	3244000	3137000	3131300
129	3246500	3273500	3092000	3124500	4193500	3115400	3102950	3148000	4196800	3242000	3202000	3158510
130	3260800	3088500	4199500	3242200	4201500	3244000	3147000	3131300	3146500	3235000	3157000	3092090
131	4197300	3247400	3130500	3201800	3146500	3271000	3140000	3147000	4197000	4197100	3136500	3141700
132	3235000	3110500	3260700	3093500	4211500	3262700	3136500	3158510	3157500	4177000	3157500	4196800
133	3149500	3109000	3245500	3224000	3159500	4210000	3130500	3218000	4198000	3271000	4207200	3242000
134	4200000	4200000	3147500	3262700	3242050	3261950	3110000	4198000	3159500	3096000	3144000	4188000
135	3271000	3241000	3102950	4184500	4212500	3156400	3157500	3141700	3241500	3226500	3114000	3114000
136	3138500	3230700	3127500	3263000	3144000	3268000	3092000	4196800	4207200	3268500	3240000	4177500
137	3272800	3239000	3271000	3242350	3232000	3110500	3135000	3201800	3232000	4205000	4213000	4207200
138	3102950	3269000	3110500	3091500	3109500	3224500	3241500	4188000	4196500	3119000	3117500	3267900
139	3150000	4188500	3123000	3260800	3267000	3242000	3240000	4177500	4200500	3232470	3110000	3116200
140	3232470	3093500	4212000	3088000	4197000	3096000	3220000	3242500	3111500	3156400	3266000	3242500
141	3144500	4208502	3146000	3271000	4196500	3226500	3266000	4192500	3238500	3097500	3140000	3156400
142	3089500	3142200	4212500	3094000	4207200	4205000	3117500	3134000	4191500	3262700	3267000	3274500
143	3116200	3240500	4197000	3218500	4189000	3247050	3267000	3111500	3228000	3115400	3220000	3240000

Table 4. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in rank order—Continued

[Leading zero of station number has been omitted. Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow; Comp, rank based from all flow rankings combined]

Rank	Station number for 0-year planning horizon				Station number for 5-year planning horizon				Station number for 20-year planning horizon			
	High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
144	3242150	3139500	3242000	3145000	4209000	3257500	3111500	3156400	4212500	3224500	3241500	4185500
145	3127500	3271000	3273000	3267960	3088000	4211000	3265000	3159510	3137000	3116200	3265000	3159510
146	3239000	3257500	3229500	3217500	3269000	3226800	3230500	4185500	3269000	3247050	3230500	3158000
147	3119000	4198500	3092500	3235500	3110000	3232470	3264000	3125000	3117000	3110500	3111500	4209000
148	3266500	4203000	4196500	4199287	3157500	3097500	3137000	3098600	4201500	3217500	3264000	3136400
149	3136000	4210000	3092090	3142000	3202000	3201700	3272000	3136400	3125000	3270800	3092090	4212500
150	3217500	3097500	3242050	4206000	3118500	4192500	3093000	3136500	3109500	4211000	3272000	4197000
151	3122500	3236000	3119000	3098500	4183500	3119000	3092090	3242000	4209000	3271800	3109500	3257000
152	3092500	3201800	3159500	3221000	3271800	3274000	3109500	3257000	3144000	3092460	3093000	4208690
153	4212500	3096000	3231000	3273000	3093000	4185000		3158000	3116000	3261950		4211500
154	3088000	3270800	3135000	3227500	3228000	3269000		4191500	4213000	3257500		3230700
155	4211500	3235000	3229000	3130500	3264000	3259000		4208690	4183500	3098500		4212000
156	3244000	4197300	3147000	3142500	3116000	3159540		3230700	3267000	3226800		4192500
157	3267950	3094500	3137000	3089500	4187500	3116200		3097550	3159510	3267900		4206250
158	3147000	4184500	3086500	3092090	3157000	4191500		3234300	4189000	3102950		3098600
159	4196500	3246200	3088500	3140500	3159510	3092460		3202000	3110000	3146000		3142500
160	3255500	3246500	3090500	3226800	3267900	4184500		3265000	3202000	3230900		4205500
161	3131500	3242500	3091500	3102950	3117000	3098500		4193500	3134000	4196800		3097550
162	3242300	4211000	3092460	3260700	3255500	4183500		3142500	3086500	4211500		3098500
163	3269000	3247050	3094000	3268500	3265000	4193500		4206250	3098500	3123000		3232000
164	4187500	3145500	3094500	4177500	3137000	3270800		4205500	4187500	3134000		3237500
165	3242050	3218500	3095500	3116500	4200500	3124500		4212500	3239500	3159000		4198000
166	3226500	4197450	3097500	4185500	3098500	3102950		3266500	3117500	3159540		3088500
167	4197000	3235500	3097550	4208690	3223000	4196800		4195500	4212000	3201800		4203000
168	3147500	4199287	3098000	4209500	3239500	4211500		3092090	3118500	4183500		3230000
169	3098500	3134000	3098600	3269000	3116200	3265000		3110000	3264000	4192500		3234300
170	3142500	3243500	3099500	4188000	3219500	3245500		3269000	3255500	4204500		3111500
171	4199500	4205000	3116000	4191000	3140000	3270500		4211500	3265000	4199500		3116500
172	3116000	3242000	3116200	3236500	3117500	3217500		3240000	4196000	3089500		3226500

Table 4. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in rank order—Continued

[Leading zero of station number has been omitted. Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow; Comp, rank based from all flow rankings combined]

Rank	Station number for 0-year planning horizon				Station number for 5-year planning horizon				Station number for 20-year planning horizon			
	High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
173	3092000	4205500	3116500	3268000	4212000	3230900		3264000	3219500	3099500		4185000
174	4212000	3260800	3117000	3134000	3086500	4207200		4189000	3230500	3269000		4213000
175	4183500	3119000	3118000	3266500	3218000	3159000		3098500	3093000	3124500		3142295
176	3228000	3159510	3118500	3257000	3268000	4199500		3116500	3139000	3271500		3110000
177	3267900	3102950	3120500	3218000	4196000	3247500		3273500	3220000	4184500		3266500
178	3159510	4183500	3121500	4194500	3118000	4204500		3139000	3092000	4207200		4193500
179	3248000	3244000	3124000	3119000	3092000	3234500		3088500	3261500	3274000		3146500
180	3239500	3092090	3124500	3156500	3261500	3201800		3109500	3223000	3132000		3269000
181	3271800	3255500	3126000	3088500	3134000	3272000		4183500	3157000	3147000		3137000
182	3231000	3248000	3127000	3090500	3220000	4199000		4212000	3118000	3156000		3156500
183	3230000	4211500	3128500	3242300	3224500	3094000		3241500	3218000	3259000		3094500
184	3134000	3092460	3130000	3247400	3230500	3264000		4196000	3140000	4199000		3238500
185	3146000	3125000	3131500	3098000		3140500		3258000		3140500		3241500
186	3137000	4209500	3132000	3224500		4213000		4197000		4212000		3273500
187	3086500	3089500	3133500	3232300		3237280		3159500		3228805		4183500
188	3218000	3121500	3136400	3228750		3268500		3230000		3094000		3247050
189	3088500	3267500	3139500	3230700		3271500		4203000		3092090		3156000
190	3091500	4210500	3140500	3156000		3159500		3247050		4193500		3096000
191	3092460	3156000	3141500	3267950		3099500		3156500		3218000		3258000
192	3093500	3098500	3142000	4208502		3147000		3226500		3260700		3125000
193	3094000	3260700	3142295	3138500		3261500		3142295		4191500		4191500
194	3094500	3228000	3142500	3226500		3089500		3096000		4204000		3265000
195	3095500	3088000	3143500	3139500		3263000		3116200		3144500		3117500
196	3097500	3266500	3145000	3267500		3123000		3146500		3234500		4196500
197	3097550	3242200	3156500	3244000		3134000		3094500		3098000		3232470
198	3098600	3130500	3158000	3257500		3266000		3146000		4185000		3230900
199	3099500	3242150	3159000	3136000		3114000		3130500		3240000		3109500
200	3116500	4204000	3159510	4203000		3231500		3157500		3245500		3159500
201	3120500	4212500	3219600	4211500		4186500		3272000		3114000		3157500

Table 4. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in rank order—Continued

[Leading zero of station number has been omitted. Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow; Comp, rank based from all flow rankings combined]

Rank	Station number for 0-year planning horizon				Station number for 5-year planning horizon				Station number for 20-year planning horizon			
	High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
202	3121500	4204500	3221000	4212500		3110000		3232000		4212500		4195500
203	3123000	3147000	3226800	3097500		4212000		4208000		3270500		4208000
204	3124000	3217500	3227500	3255500		3238500		3259000		3110000		3121500
205	3124500	4187500	3228000	3242150		3202000		3121500		3150000		3202000
206	3126000	3218000	3230000	3094500		3111500		3232470		3265000		4208502
207	3127000	3156400	3230700	3144500		3262000		4196500		4213000		3264000
208	3128500	3158000	3230900	3242000		3109500		3117500		3111500		3130500
209	3130000	3267800	3231500	3150000		3270000		3274000		3136500		4189000
210	3131000	3159000	3232470	4183500		3218000		4208502		3095500		3117000
211	3132000	3092000	3234300	3159510		3237500		3093000		3263000		4200500
212	3133500	3242300	3234500	3092000		3260700		3230900		3231500		3219500
213	3135000	3087000	3235500	4197450		3269500		3144000		3117000		4205000
214	3136400	4199500	3236500	3232470		3129000		3262700		3129000		3228805
215	3139500	4212000	3242150	3156400		3267900		3219500		3266000		4196000
216	3140500	3232470	3243500	4199500		3091500		3261500		3159500		3097500
217	3141500	3267700	3244000	3147000		4200500		4205000		3143500		3262700
218	3142000	3095500	3247400	3243500		3098000		3137000		3255500		3092000
219	3142295	3092500	3248000	3092500		4212500		3257500		3117500		3139000
220	3143500	3268500	3255500	4205000		3117000		3267900		3247500		3259000
221	3145000	3136400	3257000	3248000		3240000		3234500		4200500		3092460
222	3156000	3120500	3257500	4205500		3132000		3226800		3145000		3144500
223	3156400	3271500	3258000	3122500		3255500		3097500		3127000		3257500
224	3156500	3242350	3259000	4187500		4198000		3117000		3264000		3274000
225	3158000	3228750	3261500	3127500		3117500		3156000		3122500		3098000
226	3159000	3128500	3261950	3223500		4195500		4200500		4187500		3226800
227	3201800	3141500	3262000	3228000		3144500		3157000		3232000		3255500
228	3205500	3098000	3262700	4212000		3136500		3245500		3091500		3144000
229	3218500	3267900	3263000	3092460		3150000		3255500		3241500		4187500
230	3221000	4196500	3267700	3121500		4204000		3266000		3109500		3223000

Table 4. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in rank order—Continued

[Leading zero of station number has been omitted. Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow; Comp, rank based from all flow rankings combined]

Rank	Station number for 0-year planning horizon				Station number for 5-year planning horizon				Station number for 20-year planning horizon			
	High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
231	3223500	3090500	3267800	4196500		3142000		3223000		3090500		3159000
232	3226800	3224000	3267900	4210500		4208000		3247500		3147500		3234500
233	3227500	3086500	3269000	3116200		3092090		3267000		3137000		3272000
234	3228750	3226500	3269500	4204000		3227500		3092460		4197000		3266000
235	3230700	3224500	3270000	4204500		4209000		3270500		3124000		4204500
236	3234300	3126000	3270500	3158000		3095500		3124500		4208000		3150000
237	3236500	3116000	3271500	3242050		3234000		3092000		3272000		3099500
238	3242000	3267960	3274000	3267800		3157500		3270000		3237280		3086500
239	3243500	3116200	3274500	4197000		3090500		3262000		4198000		3129000
240	3247400	3242050	4177500	3159000		4196000		3140000		3261500		3124500
241	3257000	3137000	4183500	3131000		3156000		3098000		3142000		3093000
242	3257500	3267950	4185000	3267700		3093000		3159000		3136000		3116000
243	3262700	3099500	4185500	3267900		4202000		4201500		3086500		3271500
244	3263000	3268000	4186500	3095500		3221000		3118500		4186500		3267000
245	3266000	3131000	4187100	3116000		3122500		3129000		3270000		3132000
246	3267500	4197000	4187500	3131500		3127000		4204500		3092500		3245500
247	3267700	3127500	4188000	3136400		3137000		4202000		3126000		3140500
248	3267800	3127000	4191000	3120500		4189000		3094000		3138500		3230500
249	3271500	3131500	4191500	3271500		3143500		3140500		3237500		3090500
250	3273000	3231000	4192500	3147500		3139000		3232500		4209000		4202000
251	4177500	4206250	4193500	3128500		3241500		4187500		3202000		3094000
252	4185500	3123000	4194500	3141500		4206000		3144500		3227500		3157000
253	4188000	3124000	4196200	3086500		3232500		3230500		4202000		3261500
254	4190000	3136000	4197450	3123000		3124000		3271500		3116000		4201500
255	4191000	3232300	4199155	3126000		3092500		3099500		3146500		4204000
256	4194500	3135000	4199287	3137000		3138500		3090500		3238500		3122500
257	4195000	3130000	4200500	3231000		4197000		3150000		3092000		3270500
258	4196200	3230000	4201500	3146000		3126000		3220000		4195500		3140000
259	4197450	3122500	4203000	3099500		3118500		3231500		3262000		3220000

Table 4. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in rank order—Continued

[Leading zero of station number has been omitted. Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow; Comp, rank based from all flow rankings combined]

Rank	Station number for 0-year planning horizon				Station number for 5-year planning horizon				Station number for 20-year planning horizon			
	High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
260	4203000	3138500	4204000	3127000		4187500		3263000		3141500		3247500
261	4204000	3133500	4204500	4206250		3136000		3116000		3234000		3270000
262	4204500	3150000	4205000	3135000		3146500		4186500		3269500		3231500
263	4205000	3146000	4205500	3230000		3086500		3086500		3127500		3135000
264	4205500	3142295	4206000	3124000		3141500		3269500		3139000		3147500
265	4206000	3132000	4206250	3130000		3147500		3234000		3093000		3095500
266	4206250	3223500	4208000	3133500		3127500		3122500		3221000		3263000
267	4208502	3143500	4208502	3142295		3235500		3091500		3120500		3136000
268	4208690	3144500	4208690	3132000		3092000		3228805		4206000		3138500
269	4209500	3147500	4210500	3143500		3228805		3138500		3157500		3232500
270	4210500	4196200	4211500	4196200		3120500		3132000		3128500		3118500
271						3116000		3136000		3131500		3143500
272						3131500		4204000		3223000		3262000
273						3266500		3131500		4196500		3145000
274						3128500		3142000		3135000		3127000
275						3230500		3135000		4189000		3091500
276						4201500		3118000		3232500		3131500
277						3125000		3227500		4201500		3234000
278						3232000		3095500		3133500		3092500
279						3130500		3092500		3118500		3118000
280						3135000		3127500		3130000		3124000
281						4196500		3221000		3230500		3127500
282						3144000		3147500		3219500		4186500
283						3229500		3127000		3118000		3142000
284						3140000		3143500		3229500		3126000
285						3130000		4206000		3231000		3227500
286						3118000		3124000		3125000		3228500
287						3229000		3228500		3140000		3141500
288						3220000		3126000		3235500		3269500

Table 4. Station ranking in order of importance for providing regional streamflow information for selected high-flow, mean-flow, and low-flow characteristics and planning horizons in Ohio; stations listed in rank order—Continued

[Leading zero of station number has been omitted. Abbreviations: High, instantaneous peak flow with 100-year recurrence interval; Mean, mean annual flow; Low, 7-day 10-year low flow; Comp, rank based from all flow rankings combined]

Rank	Station number for 0-year planning horizon				Station number for 5-year planning horizon				Station number for 20-year planning horizon			
	High	Mean	Low	Comp	High	Mean	Low	Comp	High	Mean	Low	Comp
289						3133500		3141500		3144000		3221000
290						3157000		3229500		4196000		3120500
291						3145000		3120500		3130500		3229500
292						3267000		3225500		3229000		4206000
293						3225500		3128500		3157000		3128500
294						3228500		3130000		3266500		3225500
295						3223000		3229000		3225500		3133500
296						3231000		3133500		3267000		3130000
297						3219500		3145000		3228500		3231000
298						3146000		3231000		3220000		3229000