Water-Supply and Irrigation Paper No. 205 Series P, Hy ,raphic Progress Reports, 59

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
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SURFACE WATER SUPPLY

OF

OHIO AND LOWER EASTERN MISSISSIPPI RIVER DRAINAGES, 1906

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DISTRICT HYDROGRAPHERS.

WASHINGTON
GOVERNMENT PRINTING OFFICE
1907

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SURFACE WATER SUPPLY OF THE OHIO AND LOWER EASTERN MISSISSIPPI RIVER DRAINAGES, 1906.[a]

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INTRODUCTION.

SCOPE OF WORK.

The water supply of the United States is of more importance to the life and pursuits of the people than is any other natural resource. In the arid States the limit of agricultural development is determined by the amount of water available for irrigation, while in all parts of the country the increase in the population of cities and towns makes necessary additional water supplies for domestic and industrial uses, in procuring which both the quantity and the quality of the water that may be obtained must be considered. The location of manufacturing plants may depend largely on the water-power facilities and on the character of the water. The notable advances made in the electric transmission of power have led to the utilization of water powers for the operation of manufacturing establishments, railroads, and municipal lighting plants, many of which are at some distance from the places at which the power is developed.

The intelligent establishment and maintenance of enterprises or industries that depend on the use of water demands a thorough knowledge of the flow of the streams and an understanding of the conditions affecting that flow. This knowledge should be based on data showing both the total flow and the distribution of the flow throughout the year, in order that normal fluctuations may be provided for. As the flow of a stream is variable from year to year, estimates of future flow can be made only from a study of observations covering several years. The rapid increase in the development

[a] This report contains information similar to that published in previous years under the title "Report on Progress of Stream Measurements."

[b] The data presented in this paper have been collected as follows: Tennessee River drainage and lower eastern Mississippi River drainage by M. R. Hall, district hydrographer, assisted by W. E. Hall, O. P. Hall, and F. A. Murray; Ohio River drainage from the north by A. H. Horton, district hydrographer, assisted by M. S. Brennan and E. F. Kriegsman; Ohio River drainage from the south by N. C. Grover, district hydrographer.

The data have been prepared for publication under the direction of John C. Hoyt, by R. H. Bolster, Robert Follansbee, F. F. Henshaw, J. E. Stewart, and H. D. Padgett.

of the water resources of the United States has caused a great demand by engineers for information in regard to the flow of streams, as it is now generally realized that the failure of many large power, irrigation, and other projects has been due to the fact that the plans were made without sufficient trustworthy information in respect to the water supply.

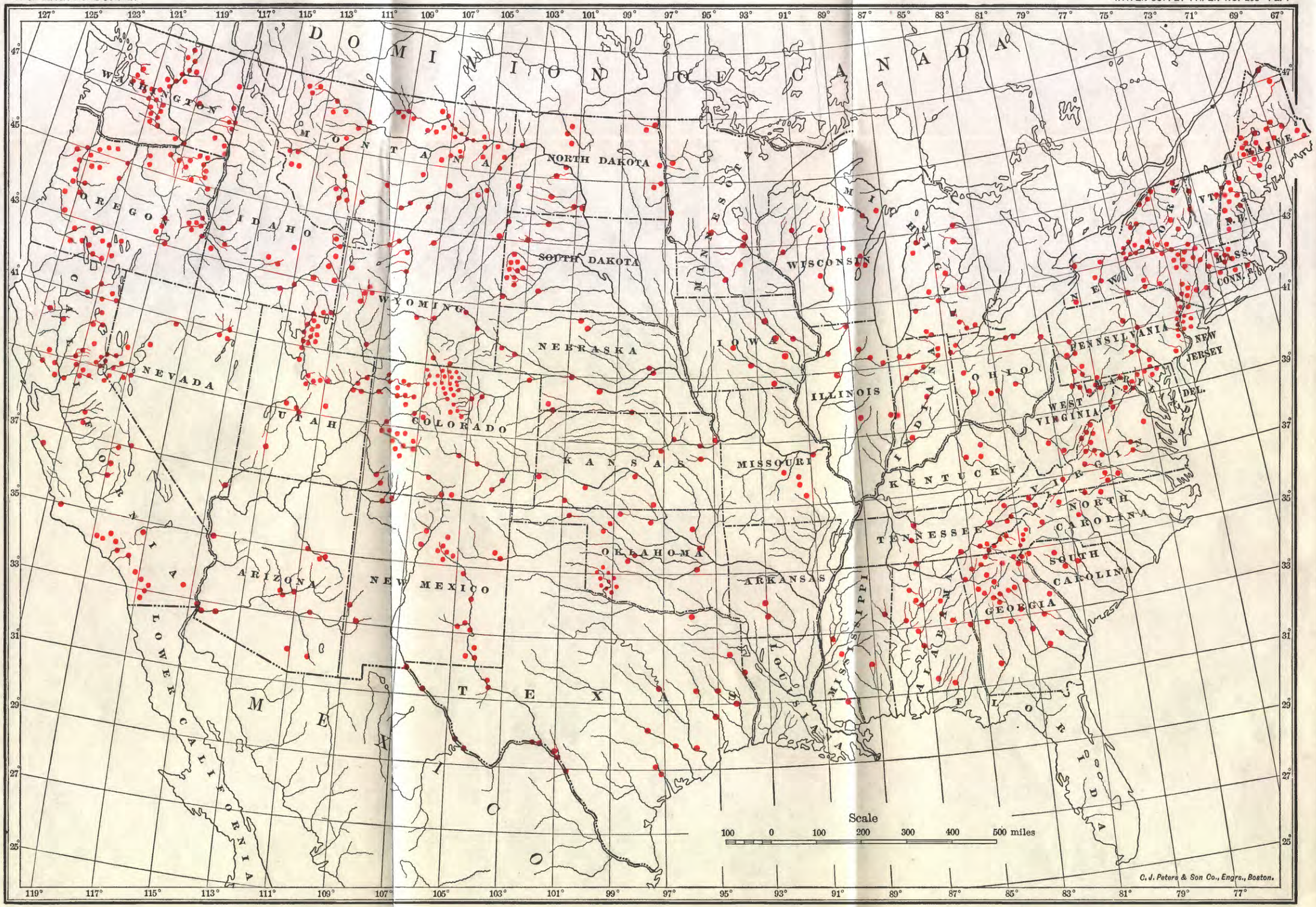
Owing to the broad scope of these hydrographic investigations and the length of time they should cover in order that the records may be of greatest value, it is, in general, impossible for private individuals to collect the necessary data, and as many of the streams traverse more than one State this work does not properly fall within the province of the State authorities. The United States Geological Survey has therefore, by means of specific appropriations by Congress, for several years systematically made records of stream flow, with the view to ultimately determining all the important features governing the flow of the principal streams of the country. In carrying out this plan stations are established on the streams and maintained for a period long enough to show their regimen or general behavior. When a record that is sufficient for this purpose has been obtained for any stream, the work on that stream is discontinued. The order in which the streams are measured is determined by the degree of their importance.

During 1906 the regimen of flow was studied at about 700 stations distributed along the various rivers throughout the United States, as shown on Pl. I. In addition to these records, data in regard to precipitation, evaporation, water power, and river profiles were obtained in many sections of the country.

These data have been assembled by drainage areas and are published in a series of fourteen Water-Supply and Irrigation Papers, Nos. 201 to 214, inclusive, each of which pertains to the surface-water resources of a group of adjacent areas. In these papers are embodied not only the data collected in the field, but also the results of computations based on these data, and other information that has a direct bearing on the subject, such as descriptions of basins and the streams draining them, utility of the water resources, etc. The list follows:

Water-Supply and Irrigation Papers on Surface Water Supply, 1906.

201. Surface water supply of New England, 1906. (Atlantic coast of New England drainage.)
202. Surface water supply of the Hudson, Passaic, Raritan, and Delaware river drainages, 1906.
203. Surface water supply of the Middle Atlantic States, 1906. (Susquehanna, Gunpowder, Patapsco, Potomac, James, Roanoke, and Yadkin river drainages.)
204. Surface water supply of the Southern Atlantic and Eastern Gulf States, 1906. (Santee, Savannah, Ogeechee, and Altamaha rivers, and eastern Gulf of Mexico drainages.)



MAP OF UNITED STATES SHOWING LOCATION OF PRINCIPAL RIVER STATIONS MAINTAINED DURING 1906.

205. Surface water supply of the Ohio and lower eastern Mississippi river drainages, 1906.
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210. Surface water supply of the western Gulf of Mexico and Rio Grande drainages, 1906.
211. Surface water supply of the Colorado River drainage above Yuma, 1906.
212. Surface water supply of the Great Basin drainage, 1906.
213. Surface water supply of California, 1906. (The Great Basin and Pacific Ocean drainages in California, and Colorado River drainage below Yuma.)
214. Surface water supply of the North Pacific Coast drainage, 1906.

The records at most of the stations discussed in these reports extend over a series of years. An index of the reports containing such records up to and including 1903 has been published in Water-Supply Paper No. 119. The following table gives, by years and primary drainage basins, the numbers of the papers on surface water supply, published from 1901 to 1906.

Numbers of Water-Supply Papers containing results of stream measurements, 1901–1906.[a]

	1901.	1902.	1903.	1904.	1905.	1906.
	No.	No.	No.	No.	No.	No.
Atlantic Coast of New England drainage	65, 75	82	97	124	165	201
Hudson, Passaic, Raritan, and Delaware river drainages	65, 75	82	97	125	166	202
Susquehanna, Gunpowder, Patapsco, Potomac, James, Roanoke, and Yadkin river drainages	65, 75	82, 83	97, 98	126	167	203
Santee, Savannah, Ogeechee, and Altamaha rivers, and eastern Gulf of Mexico drainages	65, 75	83	98	127	168	204
Ohio and lower eastern Mississippi river drainages	65, 75	83	98	128	169	205
Great Lakes and St. Lawrence River drainages	65	83	97	129	170	206
Hudson Bay and upper eastern and western Mississippi River drainages	65, 66, 75	83, 84, 85	98, 99, 100	128, 130	171	207
Missouri River drainage	66, 75	84	99	130, 131	172	208
Meramec, Arkansas, Red, and lower western Mississippi river drainages	66, 75	84	99	131	173	209
Western Gulf of Mexico and Rio Grande drainages	66, 75	84	99	132	174	210
Colorado River drainage above Yuma	66, 75	85	100	133	175	211
The Great Basin drainage	66, 75	85	100	133	176	212
The Great Basin and Pacific Ocean drainages in California, and Colorado River drainage below Yuma	66, 75	85	100	134	177	213
North Pacific Coast drainage	66, 75	85	100	135	178	214

[a] Reports containing data for years prior to 1901 are noted in the series list at the end of this paper.

DEFINITIONS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups: (1) Those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and run-off in second-feet per

square mile, and (2) those which represent the actual quantity of water, as run-off in depth in inches and acre-feet. They may be defined as follows:

"Second-foot" is an abbrevation for cubic foot per second and is the quantity of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed.

"Gallons per minute" is generally used in connection with pumping and city water supply.

The "miner's inch" is the quantity of water that passes through an orifice 1 inch square under a head which varies locally. It has been commonly used by miners and irrigators throughout the West and is defined by statute in each State in which it is used.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in inches" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

"Acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. It is commonly used in connection with storage for irrigation work. There is a convenient relation between the second-foot and the acre-foot: One second-foot flowing for twenty-four hours will deliver 86,400 cubic feet, or approximately 2 acre-feet.

EXPLANATION AND USE OF TABLES.

For each regular gaging station are given, as far as available, the following data:

1. Description of station.
2. List of discharge measurements.
3. Gage-height table.
4. Rating table.
5. Table of monthly and yearly discharges and run-off.
6. Tables showing discharge and horsepower and the number of days during the year when the same are available.

The descriptions of stations give such general information about the locality and equipment as would enable the reader to find and use the station, and they also give, as far as possible, a complete history of all the changes that have occurred since the establishment of the station that would be factors in using the data collected.

The discharge-measurement table gives the results of the discharge measurements made during the year, including the date, name of the hydrographer, width and area of cross section, gage height, and discharge in second-feet.

The table of daily gage heights gives the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. At most stations the gage is read in the morning and in the evening.

The discharge measurements and gage heights are the base data from which the other tables are computed. In cases of extensive development it is expected that engineers will use these original data in making their calculations, as the computations made by the Survey are based on the data available at the time they are made and should be reviewed and, if necessary, revised when additional data are available.

The rating table gives the discharge in second-feet corresponding to various stages of the river as given by the gage heights. It is published to enable engineers to determine the daily discharge in case this information is desired.

In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest, and it is the flow as given in the rating table for that mean gage height. As the gage height is the mean for the day, there might have been short periods when the water was higher and the corresponding discharge larger than given in this column. Likewise in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow for each second during the month. Upon this the computations for the remaining columns, which are defined on page 10, are based.

The values in the table of monthly discharge are intended to give only a general idea of the conditions of flow at the station, and it is not expected that they will be used for other than preliminary estimates.

In most work where data in regard to flow are used the regimen of flow is of primary importance. Therefore for the principal stations tables have been prepared showing the horsepower that can be developed at various rates of flow, and the length of time that these rates of flow and the corresponding horsepower are available. These tables have been prepared on a basis of 80 per cent efficiency on the turbines, and the horsepower per foot of fall is given in order that the reader can determine the horsepower for any fall.

In the computations, sufficient significent figures have been used so that the percentage of error in the tables will not in general exceed

1 per cent. Therefore, most of the values in the tables are given to only three significant figures. In making the various computations, Thatcher's slide rule, Crelle's tables, and computation machines have been generally used.

In order to give engineers an idea of the relative value of the various data, notes in regard to accuracy are given as far as possible. This accuracy depends on the general local conditions at the gaging stations and the amount of data collected. Every effort possible is made to so locate the stations that the data collected will give a high degree of accuracy. This is not always possible, but it is considered better to publish rough values with explanatory notes rather than no data.

In the accuracy notes the following terms have been used, indicating the probable accuracy, in per cent, of the mean monthly flow. As these values are mean values, the error in the value for the flow of any individual day may be much larger.

Excellent indicates that the mean monthly flow is probably accurate to within 5 per cent; good, to within 10 per cent; fair, to within 15 per cent; approximate, to within 25 per cent.

CONVENIENT EQUIVALENTS.

Following is a table of convenient equivalents for use in hydraulic computations:

1 second-foot equals 40 California miner's inches (law of March 23, 1901).
1 second-foot equals 38.4 Colorado miner's inches.
1 second-foot equals 40 Arizona miner's inches.
1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,272 gallons for one day.
1 second-foot equals 6.23 British imperial gallons per second.
1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.
1 second-foot for one year equals 31,536,000 cubic feet.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one day covers 1 square mile 0.03719 inch deep.
1 second-foot for one 28-day month covers 1 square mile 1.041 inches deep.
1 second-foot-for one 29-day month covers 1 square mile 1.079 inches deep.
1 second-foot for one 30-day month covers 1 square mile 1.116 inches deep.
1 second-foot for one 31-day month covers 1 square mile 1.153 inches deep.
1 second-foot for one day equals 1.983 acre-feet.
1 second-foot for one 28-day month equals 55.54 acre-feet.
1 second-foot for one 29-day month equals 57.52 acre-feet.
1 second-foot for one 30-day month equals 59.50 acre-feet.
1 second-foot for one 31-day month equals 61.49 acre-feet.
100 California miner's inches equal 18.7 United States gallons per second.
100 California miner's inches equal 96.0 Colorado miner's inches.
100 California miner's inches for one day equal 4.96 acre-feet.
100 Colorado miner's inches equal 2.60 second-feet.
100 Colorado miner's inches equal 19.5 United States gallons per second.
100 Colorado miner's inches equal 104 California miner's inches.
100 Colorado miner's inches for one day equal 5.17 acre-feet.
100 United States gallons per minute equal 0.223 second-foot.

100 United States gallons per minute for one day equal 0.442 acre-foot.
1,000,000 United States gallons per day equal 1.55 second-feet.
1,000,000 United States gallons equal 3.07 acre-feet.
1,000,000 cubic feet equal 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323.200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot equals 7.48 gallons.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
$1\frac{1}{3}$ horsepower equal about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$ = net horsepower on water wheel, realizing 80 per cent of theoretical power.

FIELD METHODS OF MEASURING STREAM FLOW.

The methods used in collecting these data and in preparing them for publication are given in detail in Water-Supply Papers No. 94 (Hydrographic Manual, U. S. Geological Survey) and No. 95 (Accuracy of Stream Measurements). In order that persons using this report may readily become acquainted with the general methods employed, the following brief descriptions are given:

Streams may be divided, with respect to their physical conditions, into three classes: (1) Those with permanent beds; (2) those with beds which change only during extreme low or high water; (3) those with constantly shifting beds. In determining the daily flow special methods are necessary for each class. The data upon which the determinations are based and the methods of collecting them are, however, in general the same.

There are three distinct methods of determining the flow of open-channel streams: (1) By measurements of slope and cross section and the use of Chezy's and Kutter's formulas; (2) by means of a weir; (3) by measurements of the velocity of the current and of the area of the cross section. The method chosen for any case depends upon the local physical conditions, the degree of accuracy desired, the funds available, and the length of time that the record is to be continued.

Slope method.—Much information has been collected relative to the coefficients to be used in the Chezy formula, $v=c\sqrt{Rs}$. This has been utilized by Kutter, both in developing his formula for c and in determining the values of the coefficient n which appears therein. The results obtained by the slope method are in general only roughly approximate, owing to the difficulty in obtaining accurate data and the uncertainty of the value for n to be used in Kutter's formula. The most common use of this method is in estimating the flood discharge of a stream when the only data available are the cross section, the slope as shown by marks along the bank, and a knowledge of the general conditions.

Weir method.—When funds are available and the conditions are such that sharp-crested weirs can be erected, these offer the best facilities for determining flow. If dams are suitably situated and constructed, they may be utilized for obtaining reliable measurements of flow. The conditions necessary to insure good results may be divided into two classes: (1) Those relating to the physical characteristics of the dam itself and (2) those relating to the diversion and use of water around and through the dam.

The physical requirements are as follows: (*a*) Sufficient height of dam, so that backwater will not interfere with free fall over it; (*b*) absence of leaks of appreciable magnitude; (*c*) topography or abutments which confine the flow over the dam at high stages; (*d*) level crests which are kept free from obstructions caused by floating logs or ice; (*e*) crests of a type for which the coefficients to be used in $Q=c\ b\ h^{\frac{3}{2}}$, or some similar standard weir formula, are known (see Water-Supply Papers Nos. 180 and 200[a]); (*f*) either no flash boards or exceptional care in reducing leakage through them and in recording their condition.

Preferably, there should be no diversion of water through or around the dam. Generally, however, a dam is built for purposes of power or navigation, and part or all of the water flowing past it is diverted for such uses. This water is measured and added to that passing over the dam. To insure accuracy in such determinations of flow the amount of water diverted should be reasonably constant. Furthermore, it should be so diverted that it can be measured either by a weir, a current meter, or a simple system of water wheels which are of standard make, or which have been rated as meters under working conditions and so installed that the gate openings, the heads under which they work, and their angular velocities may be accurately observed.

The combination of physical conditions and uses of the water should be such that the determinations of flow will not involve, for a critical stage of considerable duration, the use of a head on a broad-

[a] Water-Supply Paper No. 200 replaces No. 150, the edition of which has been exhausted.

crested dam of less than 6 inches. Moreover, when all other conditions are good, the cooperation of the owners or operators of the plant is still essential if reliable results are to be obtained.

A gaging station at a weir or dam has the general advantage of continuity of record through the period of ice and floods, and the disadvantages of uncertainty of coefficient to be used in the weir formula and of complications in the diversion and use of the water.

Velocity method.—The determination of the quantity of water flowing past a certain section of a stream at a given time is termed a discharge measurement. This quantity is the product of two factors—the mean velocity and the area of the cross section. The mean velocity is a function of surface slope, wetted perimeter, roughness of bed, and the channel conditions at, above, and below the gaging section. The area depends upon the contour of the bed and the fluctuations of the water surface. The two principal ways of measuring the velocity of a stream are by floats and current meters.

Great care is taken in the selection and equipment of gaging stations for determining discharge by velocity measurements in order that the data may have the required degree of accuracy. Their essential requirements are practically the same, whether the velocity is determined by meters or floats. They are located, as far as possible, where the channel is straight both above and below the gaging section; where there are no cross currents, backwater, or boils; where the bed of the stream is reasonably free from large projections of a permanent character, and where the banks are high and subject to overflow only at flood stages. The station must be so far removed from the effects of tributary streams and of dams or other artificial obstructions that the gage height shall be an index of the discharge.

Certain permanent or semipermanent structures, usually referred to as "equipment," are generally pertinent to a gaging station. These are a gage for determining the fluctuations of the water surface, bench marks to which the datum of the gage is referred, permanent marks on a bridge or a tagged line indicating the points of measurement, and, where the current is swift, some appliance (generally a secondary cable) to hold the meter in position in the water. As a rule, the stations are located at bridges if the channel conditions are satisfactory, as from them the observations can more readily be made and the cost of the equipment is small.

The floats in common use are the surface, subsurface, and tube or rod floats. A corked bottle with a flag in the top and weighted at the bottom makes one of the most satisfactory surface floats, as it is affected but little by wind. In case of flood measurements, good results can be obtained by observing the velocity of floating cakes of ice or débris. In case of all surface-float measurements coefficients must be used to reduce the observed velocity to the mean

velocity. The subsurface and tube or rod floats are intended to give directly the mean velocity in the vertical. Tubes give excellent results when the channel conditions are good, as in canals.

In measuring velocity by a float, observation is made of the time taken by the float to pass over the "run," a selected stretch of river from 50 to 200 feet long. In each discharge measurement a large number of velocity determinations are made at different points across the stream, and from these observations the mean velocity for the whole section is determined. This may be done by plotting the mean positions of the floats as indicated by the distances from the bank as ordinates and the corresponding times as abscissas. A curve through these points shows the mean time of run at any point across the stream, and the mean time for the whole stream is obtained by dividing the area bounded by this curve and its axis by the width. The length of the run divided by the mean time gives the mean velocity.

The area used in float measurements is the mean of the areas at the two ends of the run and at several intermediate sections.

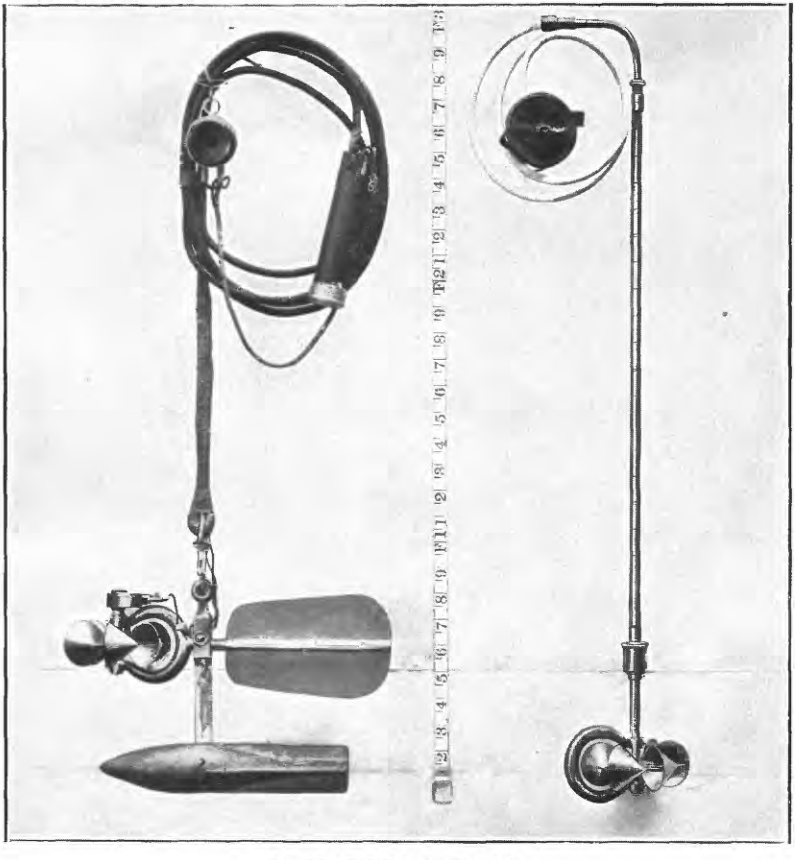
The essential parts of the current meters in use are a wheel of some type, so constructed that the impact of flowing water causes it to revolve, and a device for recording or indicating the number of revolutions. The relation between the velocity of the moving water and the revolutions of the wheel is determined for each meter. This rating is done by drawing the meter through still water for a given distance at different speeds, and noting the number of revolutions for each run. From these data a rating table is prepared which gives the velocity per second for any number of revolutions.

Many kinds of current meters have been constructed. They may, however, be classed in two general types—those in which the wheel is made up of a series of cups, as the Price, and those having a screw-propeller wheel, as the Haskell. Each meter has been developed for use under some special condition. In the case of the small Price meter, shown in Pl. II, *B*, which has been largely developed and extensively used by the United States Geological Survey, an attempt has been made to get an instrument which could be used under practically all conditions.

Current-meter measurements may be made from a bridge, cable, boat, or by wading, and gaging stations may be classified in accordance with such use. Fig. 1 shows a typical cable station.

In making the measurement an arbitrary number of points are laid off on a line perpendicular to the thread of the stream. The points at which the velocity and depth are observed are known as measuring points and are usually fixed at regular intervals, varying from 2 to 20 feet, depending on the size and condition of the stream. Perpendiculars dropped from the measuring points divide the gaging

A. CURRENT-METER RATING STATION AT LOS ANGELES, CAL.



B. PRICE CURRENT METERS.

section into strips. For each strip or pair of strips the mean velocity, area, and discharge are determined independently, so that conditions existing in one part of the stream may not be extended to parts where they do not apply.

Three classes of methods of measuring velocity with current meters are in general use—multiple-point, single-point, and integration.

The three principal multiple-point methods in general use are the vertical velocity-curve; 0.2 and 0.8 depth; and top, bottom, and mid depth.

In the vertical velocity-curve method a series of velocity determinations are made in each vertical at regular intervals, usually from 0.5 to 1 foot apart. By plotting these velocities as abscissas and their depths as ordinates, and drawing a smooth curve among the resulting points, the vertical velocity-curve is developed. This curve shows graphically the magnitude and changes in velocity from the surface to the bottom of the stream. The mean velocity in the ver-

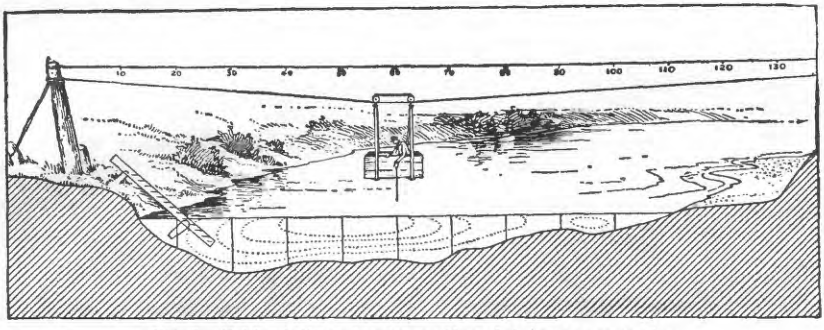


FIG. 1.—Cable station, showing section of river, car, gage, etc.

tical is then obtained by dividing the area bounded by this velocity curve and its axis by the depth. On account of the length of time required to make a complete measurement by this method, its use is limited to the determination of coefficients for purposes of comparison and to measurements under ice.

In the second multiple-point method the meter is held successively at 0.2 and 0.8 of the depth, and the mean of the velocities at these two points is taken as the mean velocity for that vertical. On the assumption that the vertical velocity-curve is a common parabola with horizontal axis, the mean of the velocities at 0.22 and 0.79 of the depth will give (closely) the mean velocity in the vertical. Actual observations under a wide range of conditions show that this second multiple-point method gives the mean velocity very closely for open-water conditions, and, moreover, the indications are that it holds nearly as well for ice-covered rivers.

In the third multiple-point method the meter is held at mid depth,

at 0.5 foot below the surface, and at 0.5 foot above the bottom, and the mean velocity is determined by dividing by 6 the sum of the top velocity, four times the mid-depth velocity, and the bottom velocity. This method may be modified by observing at 0.2, 0.6, and 0.8 depth.

The single-point method consists in holding the meter either at the depth of the thread of mean velocity, or at an arbitrary depth for which the coefficient for reducing to mean velocity has been determined.

Extensive experiments by vertical velocity-curves show that the thread of mean velocity generally occurs at from 0.5 to 0.7 of the total depth. In general practice the thread of mean velocity is considered to be at 0.6 depth, at which point the meter is held in the majority of measurements. A large number of vertical velocity-curve measurements, taken on many streams and under varying conditions, show that the average coefficient for reducing the velocity obtained at 0.6 depth to mean velocity is practically unity.

In the other principal single-point method the meter is held near the surface, usually 1 foot below, or low enough to be out of the effect of wind or other disturbing influences. This is known as the subsurface method. The coefficient for reducing the velocity taken at the subsurface to the mean has been found to be from 0.85 to 0.95, depending on the stage, velocity, and channel conditions. The higher the stage the larger the coefficient. This method is especially adapted for flood measurements or when the velocity is so great that the meter can not be kept at 0.6 depth.

The vertical integration method consists in moving the meter at a slow, uniform speed from the surface to the bottom and back again to the surface, and noting the number of revolutions and the time taken in the operation. This method has the advantage that the velocity at each point of the vertical is measured twice. It is useful as a check on the point methods.

The area, which is the other factor in the velocity method of determining the discharge of a stream, depends on the stage of the river, which is observed on the gage, and on the general contour of the bed of the stream, which is determined by soundings. The soundings are usually taken at each measuring point at the time of the discharge measurement, either by using the meter and cable, or by a special sounding line or rod. For streams with permanent beds standard cross sections are usually taken during low water. These sections serve to check the soundings which are taken at the time of the measurements, and from them any change which may have taken place in the bed of the stream can be detected. They are also of value in obtaining the area for use in computations of high-water measurements, as accurate soundings are hard to obtain at high stages.

In computing the discharge measurements from the observed velocities and depths at various points of measurement the measuring section is divided into elementary strips, as shown in fig. 1, and the mean velocity, area, and discharge are determined separately for either a single or a double strip. The total discharge and the area are the sums of those for the various strips, and the mean velocity is obtained by dividing the total discharge by the total area.

The determination of the flow of an ice-covered stream is difficult, owing to diversity and instability of conditions during the winter period and also to the lack of definite information in regard to the laws of flow of water under ice. The method now employed is to make frequent discharge measurements during the frozen periods by the 0.2 and 0.8, and vertical velocity-curve methods, and to keep an accurate record of the conditions, such as the gage height to the surface of the water as it rises in a hole cut in the ice, the thickness and character of the ice, etc.

From these data an approximate estimate of the daily flow can be made by constructing a rating curve (really a series of curves) similar to that used for open channels, but considering, in addition to gage heights and discharge, the varying thickness of ice.

For information in regard to flow under ice cover see Water-Supply Paper No. 187.

OFFICE METHODS OF COMPUTING RUN-OFF.

There are two principal methods of determining run-off, depending on whether or not the bed of the stream is permanent.

For stations on streams with permanent beds the first step in computing the run-off is the construction of the rating table, which shows the discharge corresponding to any stage of the stream. This rating table is applied to the record of stage to determine the amount of water flowing. The construction of the rating table depends on the method used in measuring flow.

For a station at a weir or dam the basis for the rating table is some standard weir formula. The coefficients to be used in its application depend on the type of dam and other conditions near its crest. After inserting in the weir formula the measured length of crest and assumed coefficient, the discharge is computed for various heads and the rating table constructed.

The data necessary for the construction of a rating table for a velocity-area station are the results of the discharge measurements, which include the record of stage of the river at the time of measurement, the area of the cross section, the mean velocity of the current, and the quantity of water flowing. A thorough knowledge of the conditions at and in the vicinity of the station is also necessary.

The construction of the rating table depends on the following laws of flow for open, permanent channels: (1) The discharge will remain constant so long as the conditions at or near the gaging station remain constant; (2) the discharge will be the same whenever the stream is at a given stage if the change of slope due to the rise and fall of the stream be neglected; (3) the discharge is a function of and increases gradually with the stage.

The plotting of the results of the various discharge measurements, using gage heights as ordinates, and discharge, mean velocity, and area as abscissas, will define curves which show the discharge, mean velocity, and area corresponding to any gage height. For the development of these curves there should be, therefore, a sufficient number of discharge measurements to cover the range of the stage of the stream. Fig. 2 shows a typical rating curve, with its corresponding mean-velocity and area curves.

As the discharge is the product of two factors, the area and the mean velocity, any change in either factor will produce a corresponding change in the discharge. Their curves are therefore constructed in order to study each independently of the other.

The area curve can be definitely determined from accurate soundings extending to the limits of high water. It is always concave toward the horizontal axis or on a stra ht line, unless the banks of the stream are overhanging.

The form of the mean-velocity curve depends chiefly upon the surface slope, the roughness of the bed, and the cross section of the stream. Of these the slope is the principal factor. In accordance with the relative change of these factors the curve may be either a straight line, convex or concave toward either axis, or a combination of the three. From a careful study of the conditions at any gaging station the form which the vertical velocity-curve will take can be predicted, and it may be extended with reasonable certainty to stages beyond the limits of actual measurements. Its principal use is in connection with the area curve in locating errors in discharge measurements and in constructing the rating table.

The discharge curve is defined primarily by the measurements of discharge, which are studied and weighted in accordance with the local conditions existing at the time of each measurement. The curve may, however, best be located between and beyond the measurements by means of curves of area and mean velocity. This curve under normal conditions is concave toward the horizontal axis and is generally parabolic in form.

In the preparation of the rating table the discharge for each tenth or half tenth on the gage is taken from the curve. The differences between successive discharges are then taken and adjusted according to the law that they shall either be constant or increasing.

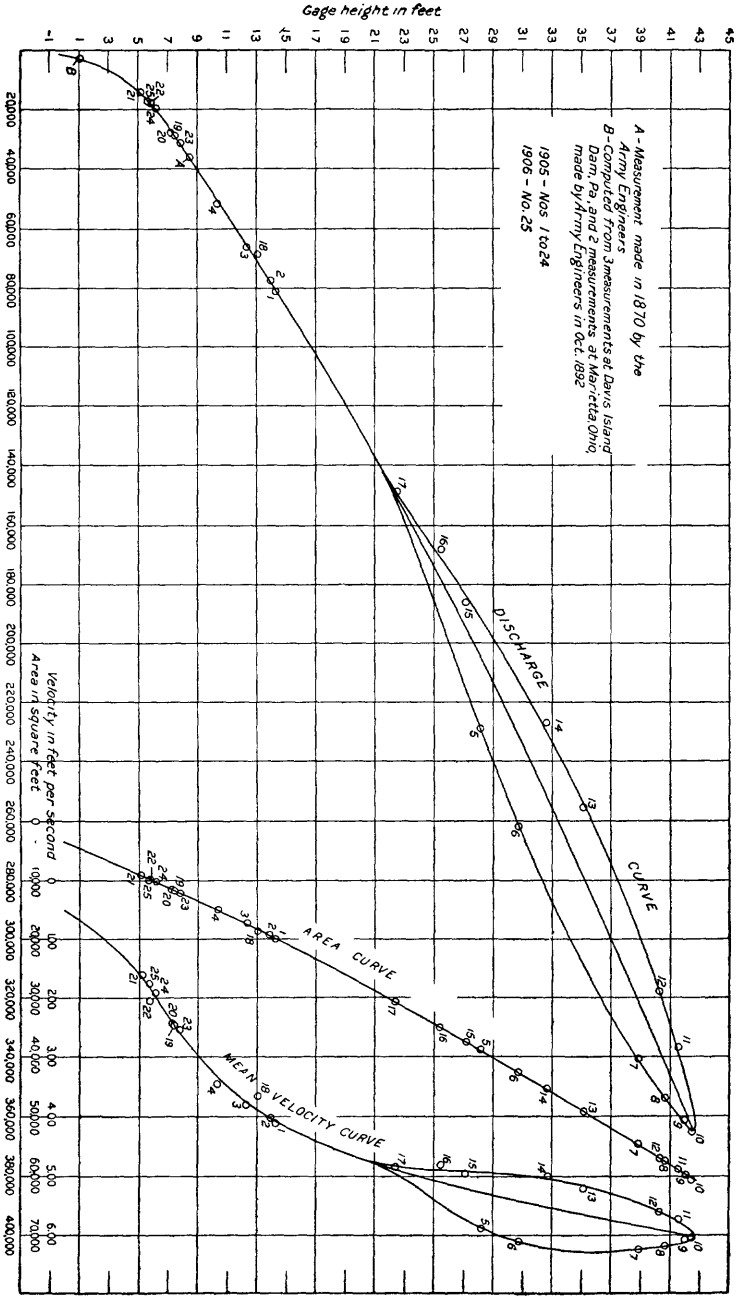


FIG. 2.—Rating, discharge, area, and mean-velocity curves for Ohio River at Wheeling, W. Va.

The determination of daily discharge of streams with changeable beds is a difficult problem. In case there is a weir or dam available, a condition which seldom exists on streams of this class, the discharge can be determined by its use. In case of velocity-area stations frequent discharge measurements must be made if the determinations of flow are to be other than rough approximations. For stations with beds which shift slowly, or are materially changed only during floods, rating tables can be prepared for periods between such changes and satisfactory results obtained with a limited number of measurements, provided that some of them are taken soon after the change occurs. For streams with continually shifting beds, such as the Colorado and Rio Grande, discharge measurements should be made every two or three days and the discharges for intervening days obtained either by interpolation modified by gage height or by Professor Stout's method, which has been described in full in the Nineteenth Annual Report United States Geological Survey, Part IV, page 323, and in the Engineering News of April 21, 1904. This method, or a graphical application of it, is also much used in determining the flow at stations where the bed shifts but slowly.

COOPERATION AND ACKNOWLEDGMENTS.

Assistance has been rendered or records furnished by the following, to whom special acknowledgment is due: Officers and employees of the United States Weather Bureau; officers and employees of the Corps of Engineers, United States Army; and the Illinois Central Railroad.

OHIO RIVER DRAINAGES.

OHIO RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Ohio River, which is formed by the junction of Allegheny and Monongahela rivers at Pittsburg, flows in a southwesterly direction, forming the boundaries between and draining the States of Ohio, Indiana, and Illinois on the north and West Virginia and Kentucky on the south. Its tributaries also drain portions of New York, Pennsylvania, Maryland, Virginia, North Carolina, Georgia, Alabama, and Mississippi.

The length of the stream, as surveyed by the United States Army engineers, from Pittsburg to Cairo is 967 miles.[a]

The river presents an interesting series of shoals and riffles, separated by pools in which the water is deeper and the fall very low. The summary of the profile made by the army engineers shows 187 pools with over 7 feet depth at low water. These occupy 632.5 miles and have an average length of 3.47 miles. Of these, 127 pools above Louisville, Ky., average 2.8 miles, with a total length of 363 miles; and 60 pools below Louisville, with a total length of 266 miles, have an average length of 4.4 miles.

On the borders of Ohio the riffles (103 in number) cover a combined length of 137 miles and have a total fall of 170 feet. The pools, with a combined length of 309 miles, have a fall of 64 feet, or but 2.5 inches per mile. The greatest fall noted for a single mile on the border of this State is at Letart Falls, Meigs County, where a descent of 3.2 feet is made. There are 11 riffles, with a descent exceeding 2 feet per mile. The least fall reported is in a pool 8 to 15 miles below Cincinnati. This pool, with a length of 7 miles, has a fall of but 3.5 inches. Another pool with about as low a fall is found 23 to 30 miles above Cincinnati. These are the most conspicuous pools in this section of the Ohio.

On the borders of Indiana there are 55 riffles aside from the Louisville rapids. These show a total fall of 80.28 feet in a combined distance of 134.5 miles. At the Louisville rapids there is a fall of 23.09 feet in 2.25 miles. There is left but 18.13 feet for the fall of the stream in about 215 miles embraced in the pools, or only 1 inch per mile.

[a] Ex. Doc. No. 72, House of Representatives, Forty-first Congress, third session, January, 1871, pp. 139–153.

In general the rock floor of the valley is 30 to 50 feet below the level of the stream at low water. It rarely reaches a lower level than 75 feet below the stream. Its level is 65 or 75 feet below the stream between Evansville, Ind., and Shawneetown, Ill. It is thought that no place occurs in the whole length of the valley where a rock barrier crosses its entire width at a level as high as the bed of the present stream. In several places rock shelves extend out part way across the river bed, leaving a channel deep enough for the passage of boats along the opposite bank. At Letart Falls the rock is stated to extend across the entire breadth of the stream, but it dips toward the east bank sufficiently to allow the passage of boats when the rock of the western part of the stream bed is above the water surface. Well data indicate that this descent continues eastward beneath the bottom lands to a level as low as in the neighboring parts of the channel. Near Ravenswood, W. Va., rocky reefs are exposed at low water fully halfway across the stream bed, but wells on the bottom lands near the village show the rock floor to be at least 25 feet below the stream at low water. At Louisville it is found by wells and bridge soundings that a channel 25 feet or more lower than the present surface at the head of the rapids leads southwestward from near the south end of the Jeffersonville bridge a short distance and then turns westward, passing through the midst of the city.[a] Thus at the side of each of the three most conspicuous rock reefs touched by the stream a buried channel apparently occurs.

Notwithstanding the great number of riffles and shoals, the Ohio is generally navigable throughout the entire season for small boats drawing less than 3 feet of water. It is navigable for vessels drawing 6 feet of water during a few months of the early part of the season, but there is usually little traffic with such boats after the month of July. The canal at Louisville affords opportunity for passing around the rapids during low water. During high-water stages the boats are able to pass over the rapids.

The valley of Ohio River along the southern boundary of Ohio and Indiana is very narrow except for a few miles near Louisville, where it has expanded itself in the Devonian shales, and for a similar widening in the southwestern portion of Indiana in the Coal Measures. Its narrowness has been a subject of remark from the early days of settlement. There are very few places between Pittsburg and Louisville where its width exceeds 2 miles, and usually it is scarcely more than 1 mile wide. In the vicinity of Louisville, where it crosses the low tract formed in the Devonian shales, it has a width of perhaps 4 miles, but on entering the Knobstone escarpment below the mouth of Salt River it narrows abruptly to a width of about 1 mile and remains narrow

[a] Data on this subject were furnished by Maj. William J. Davis, of the Louisville school board, and by Messrs. John Ryan and John C. Oestrich, of the Louisville Pump Works.

for nearly 100 miles in its passage through the hard beds of Lower Carboniferous age. It then enters the Coal Measures and soon attains a width of 6 or 8 miles, which it maintains for much of its course to Cairo. The only exception is found at the point where it passes the elevated ridge below Shawneetown, where its width is reduced to about 2½ miles. The depth of the valley ranges from about 600 feet down to scarcely 100 feet, being greatest on the border of the "panhandle" of West Virginia and least in the lower portion of its course. Its depth seldom falls below 300 feet in the portion above Louisville and probably averages 450 feet. The narrow portion below Louisville is about 300 feet deep. The broad portions at Louisville and in the lower parts of its course are but 100 to 150 feet in depth. The work done by the river in excavating a narrow valley through the elevated districts is apparently commensurate with that accomplished in eroding a wide valley in the low districts.

The entire work of the stream, however, is less than should have been accomplished by a drainage line of this size in the time since the beginning of development of drainage lines. It is far less in proportion to its size than the work accomplished by the small tributaries which enter it from southern Indiana. The explanation of this meager amount of work is found in the enlargement of the river in recent times. Investigations now in progress indicate that several independent drainage lines which formerly led northward from the Appalachian Mountains across southwestern New York, northwestern Pennsylvania, and Ohio into the Lake Erie basin have been united to form the present Ohio. The full extent of these changes is not yet determined, nor are all of the outlets for the old river systems satisfactorily traced; but enough is known to justify the statement that the small size of the valley of the Ohio is attributable to the recent union of the several independent drainage systems.

OHIO RIVER AT WHEELING, W. VA.

The United States Weather Bureau has made observations of the stage of Ohio River at Wheeling, W. Va., since 1882. In 1905 measurements of the flow were begun by the United States Geological Survey. Gage heights are furnished by the United States Weather Bureau. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 20.

The following discharge measurement was made May 22, 1906:

Width, 1,220 feet; area, 9,880 square feet; gage height, 5.70 feet; discharge, 17,400 second-feet.

Daily gage height, in feet, of Ohio River, at Wheeling, W. Va., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	14.9	8.6	7.2	26.6	8.9	5.9	4.9	4.3	4.7	2.9	8.0	6.3
2	13.0	8.3	6.8	26.3	7.6	5.7	4.4	4.0	4.0	3.9	8.2	6.3
3	11.3	7.8	6.1	21.8	7.5	5.3	4.0	3.9	3.9	4.1	8.0	6.0
4	12.0	6.9	6.5	21.3	7.8	5.3	3.4	3.3	3.9	4.5	7.5	6.0
5	15.6	6.3	8.0	14.7	8.1	7.2	3.9	2.8	3.9	5.0	6.9	6.5
6	19.3	5.6	10.9	13.0	9.0	7.0	3.6	3.4	4.0	5.1	6.4	6.3
7	16.1	5.4	10.9	13.9	9.6	6.4	3.1	3.1	4.1	5.0	5.9	9.0
8	13.3	5.1	9.9	15.7	9.0	6.6	3.1	3.5	4.1	6.0	5.7	14.8
9	11.0	4.8	8.9	14.1	8.6	16.4	3.4	6.3	3.6	7.0	5.5	17.4
10	9.4	4.2	8.6	13.5	7.9	12.0	3.5	10.5	3.3	8.3	5.1	15.2
11	8.2	4.3	8.3	16.3	7.5	9.0	2.9	13.7	2.9	8.8	4.9	14.0
12	7.0	4.5	8.0	19.3	7.3	7.7	2.5	15.3	2.8	8.3	4.5	18.7
13	7.0	4.8	7.8	18.0	7.2	6.6	2.4	13.0	2.7	7.9	4.8	22.9
14	7.1	4.7	7.7	15.9	6.9	6.1	2.3	9.9	2.9	7.9	4.6	18.9
15	8.2	4.7	7.8	14.0	6.6	5.4	2.1	7.9	3.0	7.8	4.8	14.9
16	10.0	4.8	7.8	13.7	6.4	4.9	2.5	6.9	3.0	7.2	5.3	13.5
17	12.3	4.8	13.3	17.0	6.1	4.6	3.2	6.3	3.1	7.0	5.9	14.3
18	11.9	4.8	13.7	16.4	6.3	4.5	5.2	5.6	3.2	6.9	5.9	16.5
19	11.9	4.9	10.8	13.6	6.2	4.5	6.6	5.6	3.0	6.3	7.1	19.3
20	11.9	4.9	9.8	11.8	5.9	4.6	5.9	5.6	2.9	6.2	9.3	19.8
21	11.9	5.1	12.3	10.4	5.9	4.1	4.6	9.1	3.2	7.2	12.9	15.3
22	11.1	5.3	14.3	9.3	5.8	4.4	3.9	12.6	4.5	7.9	18.0	12.3
23	11.4	5.6	11.9	8.9	5.2	5.8	4.2	10.0	4.0	9.0	16.6	10.9
24	16.2	6.9	9.9	8.5	4.9	7.6	5.8	9.6	5.7	8.2	13.9	10.1
25	24.3	8.0	8.4	8.3	4.4	7.8	4.2	8.1	3.2	7.3	11.6	9.2
26	21.3	8.6	7.9	8.3	4.7	6.5	4.5	7.6	3.4	6.9	9.9	7.8
27	16.9	8.3	10.0	8.3	4.3	5.6	4.2	6.9	3.1	6.3	8.6	7.0
28	13.5	8.1	17.6	16.3	4.5	5.1	3.9	5.9	3.0	6.9	7.9	6.9
29	12.3	.....	24.4	15.0	4.4	4.8	3.9	6.0	3.0	7.2	7.0	7.2
30	10.3	.....	25.6	10.9	5.1	5.0	5.5	5.4	2.9	7.1	6.9	10.8
31	9.9	.....	23.9	.....	5.9	.....	4.8	5.0	.....	7.6	.....	15.6

Rating table for Ohio River at Wheeling, W. Va., from 1882 to 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.10	4,980	4.10	10,560	6.20	19,990	11.00	55,100
2.20	5,200	4.20	10,900	6.40	21,230	12.00	62,800
2.30	5,430	4.30	11,250	6.60	22,520	13.00	70,600
2.40	5,660	4.40	11,600	6.80	23,850	14.00	78,500
2.50	5,900	4.50	11,960	7.00	25,220	15.00	86,500
2.60	6,150	4.60	12,330	7.20	26,630	16.00	94,600
2.70	6,400	4.70	12,710	7.40	28,080	17.00	102,830
2.80	6,660	4.80	13,100	7.60	29,540	18.00	111,200
2.90	6,930	4.90	13,500	7.80	31,020	19.00	119,700
3.00	7,200	5.00	13,900	8.00	32,500	20.00	128,330
3.10	7,480	5.10	14,310	8.20	34,000	21.00	137,100
3.20	7,760	5.20	14,740	8.40	35,500	22.00	146,040
3.30	8,050	5.30	15,190	8.60	37,000	23.00	155,140
3.40	8,340	5.40	15,660	8.80	38,500	24.00	164,440
3.50	8,640	5.50	16,150	9.00	40,000	25.00	173,900
3.60	8,940	5.60	16,650	9.20	41,500	26.00	183,530
3.70	9,250	5.70	17,170	9.40	43,000	27.00	193,300
3.80	9,570	5.80	17,700	9.60	44,500		
3.90	9,890	5.90	18,250	9.80	46,000		
4.00	10,220	6.00	18,810	10.00	47,500		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 24 discharge measurements made during 1905, one in 1906, one prior to 1893, and one low-water measurement computed from five measurements made by the United States Army engineers above and below Wheeling in 1892.

It is well defined above gage height 5 feet. Below 5 feet it is based on one measurement at 1.1 feet, computed from the army engineers' measurements, and the extension of the area and velocity curves, and can be considered accurate within a few per cent.

Monthly discharge of Ohio River at Wheeling, W. Va., for 1906.

[Drainage area, 23,800 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	167,000	25,200	68,300	2.87	3.31
February	37,000	10,900	19,800	.832	.87
March	180,000	19,400	39,000	1.66	1.91
April	189,000	34,800	85,500	3.59	4.00
May	44,500	11,200	23,900	1.00	1.15
June	97,900	10,600	23,100	.971	1.08
July	22,500	4,980	10,500	.441	.51
August	88,900	6,660	29,200	1.23	1.42
September	12,700	6,400	8,530	.358	.40
October	40,000	6,930	24,400	1.03	1.19
November	111,000	12,000	33,500	1.41	1.57
December	154,000	18,800	66,100	2.78	3.20
The year	189,000	4,980	36,000	1.51	20.61

NOTE.—Values for 1906 are excellent.

ALLEGHENY RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Allegheny River, which, with the Monongahela, forms the Ohio at Pittsburg, rises in northern Pennsylvania, flows north into the State of New York, then south through western Pennsylvania. The headwaters have an elevation of about 2,500 feet and join those of Genesee River on the north and of the Susquehanna on the east. The total length from the source to the mouth at Pittsburg is about 300 miles, 47 of which are in the State of New York. The principal facts concerning this river have been given in a report by George Lehman, assistant engineer, contained in House Document No. 72, Fifty-fifth Congress, third session. Although this river drains a large area, much of which is of an elevated and even mountainous character, yet it is of comparatively small value for water power. The total fall in 255 miles between Olean, N. Y., and the mouth is only 725 feet, or an average of less than 3 feet per mile. This descent is accomplished without abrupt pitches, and even with few rapids having a fall of much consequence. The drainage basin of Allegheny River above Redhouse is comparatively rugged and precipitous. It is mostly covered with brush and light forest. A considerable amount of snow accumulates in the winter and feeds the stream until late in spring. The basin is underlain by shales of the Chemung formation, and the depth of soil is usually small, excepting in stream valleys. There are no lakes and no artificial storage tributary to the stream. The Cuba reservoir, which feeds the Erie Canal through Genesee River, lies on the divide between the Allegheny and Genesee drainage basins. A part of the overflow from this reservoir passes into the Allegheny; the rest passes into Genesee River. During about half

of the year the river is navigable for small steamers to Franklin, 123 miles above Pittsburg.

The drainage areas of the river and its chief tributaries are given in the following table:

Drainage areas, in square miles, of Allegheny River and tributaries.

Stream.	Locality.	Drainage area.
Allegheny River	Mouth	11,100
Do	Kittanning	8,690
Do	Above mouth of French Creek	5,950
Do	Franklin	5,670
Do	Warren	3,050
Do	Salamanca	1,560
Do	Olean, below Olean Creek	1,100
Do	Port Allegheny	220
Conewango Creek	Mouth	935
Tionesta Creek	do	458
French Creek	do	1,180
Clarion River	do	1,180
Redbank Creek	do	526
Mahoning Creek	do	397
Kiskiminitas River	do	1,850
Do	Salina	1,770
Blacklick Creek	Blacklick	403

ALLEGHENY RIVER AT REDHOUSE, N. Y.

This station was established September 4, 1903. It is located at the Redhouse Bridge, near the stations of the Erie and Pennsylvania railroads and about 5 miles below Salamanca, N. Y., about 13 miles above the point where the river leaves New York State. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 25, where are given also references to publications that contain data for previous years.

The following discharge measurement was made April 16, 1906:

Width, 370 feet; area, 2,250 square feet; gage height, 6.59 feet; discharge, 7,820 second-feet.

Daily gage height, in feet, of Allegheny River at Redhouse, N. Y., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.2	4.55	3.6	7.15	4.25	4.75	3.0	3.0	3.0	4.1	5.25	4.2
2	5.8	4.35	3.6	6.8	4.3	4.45	3.0	2.95	3.0	3.75	4.95	4.3
3	5.25	4.15	3.65	6.25	5.5	4.25	3.1	2.9	3.05	3.5	4.9	4.2
4	5.7	4.2	4.75	6.1	5.25	4.05	3.1	2.9	3.4	3.5	4.9	4.0
5	6.05	4.0	4.75	6.65	5.35	3.85	3.05	3.55	3.45	3.5	4.8	4.05
6	5.5	3.9	4.25	6.75	5.3	4.15	3.1	3.3	3.3	4.0	4.7	5.6
7	5.2	3.85	4.2	6.7	4.85	4.1	3.1	3.3	3.05	6.0	4.45	8.6
8	4.8	3.8	4.1	6.25	4.75	3.95	3.0	3.6	3.0	5.85	4.25	7.25
9	4.55	3.85	4.0	5.95	4.6	3.8	2.9	3.6	2.9	5.5	4.15	6.45
10	4.3	3.8	3.85	6.65	4.8	3.7	2.9	3.7	2.8	5.25	4.0	6.15
11	4.55	3.75	3.8	7.1	4.8	3.65	2.9	3.8	2.8	5.1	4.1	6.9
12	4.35	3.8	3.8	6.4	4.7	3.55	2.9	4.0	2.7	5.0	4.2	6.4
13	4.3	3.65	3.7	6.6	4.55	3.4	2.85	3.75	2.8	5.0	4.35	6.55
14	4.2	3.7	3.6	6.45	4.65	3.3	2.8	3.5	3.0	5.4	4.2	6.65
15	4.15	3.75	3.6	6.3	4.75	3.3	2.8	3.4	3.0	5.15	4.1	8.8
16	4.55	3.75	3.6	6.45	4.5	3.3	2.8	3.3	3.0	4.85	4.0	8.8
17	4.75	3.65	3.5	6.35	5.45	3.3	2.8	3.15	2.9	4.55	4.05	6.2
18	4.7	3.5	3.5	6.0	5.35	3.3	2.8	3.0	2.8	4.3	4.75	6.65
19	4.6	3.5	3.4	5.55	4.9	3.6	2.8	3.1	2.8	4.2	5.75	6.65
20	4.6	3.5	3.2	5.35	4.6	3.45	2.85	3.1	2.8	5.0	5.5	6.45
21	6.5	3.6	3.2	5.5	4.25	3.4	2.9	3.9	3.0	5.1	6.25	6.45
22	7.7	3.9	3.2	5.1	4.05	3.3	2.85	4.05	4.0	4.75	6.55	6.45
23	8.1	3.8	3.1	4.7	3.95	3.3	2.8	3.8	3.75	4.65	5.8	6.45
24	8.25	3.8	3.0	5.3	4.0	3.35	2.8	3.6	3.45	4.5	5.35	6.1
25	7.6	3.7	3.3	5.2	4.85	3.2	2.8	3.55	3.3	4.8	5.0	.....
26	7.0	3.75	3.4	4.85	4.6	3.2	2.8	3.35	3.15	5.05	4.75	.....
27	6.5	3.6	5.25	4.8	4.7	3.2	2.7	3.2	3.1	4.7	4.5	.....
28	5.85	3.5	8.4	4.7	5.3	3.1	2.7	3.2	3.0	4.5	4.6	.....
29	5.3	.....	7.3	4.5	5.35	3.1	2.8	3.2	3.0	4.95	4.55	.....
30	4.95	.....	6.9	4.4	5.05	3.0	2.8	3.1	3.55	4.5	4.4	.....
31	4.85	.....	7.75	.....	5.2	.....	3.0	3.1	.....	5.2	.....	.....

NOTE.—Discharge affected slightly by ice conditions during February and March; the channel was not entirely closed.

Rating table for Allegheny River at Redhouse, N. Y., for 1903 to 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.70	195	4.00	1,471	5.30	3,820	7.20	9,400
2.80	260	4.10	1,605	5.40	4,065	7.40	10,080
2.90	328	4.20	1,745	5.50	4,315	7.60	10,790
3.00	400	4.30	1,891	5.60	4,570	7.80	11,530
3.10	478	4.40	2,043	5.70	4,830	8.00	12,300
3.20	564	4.50	2,200	5.80	5,100	8.20	13,120
3.30	658	4.60	2,365	5.90	5,375	8.40	13,960
3.40	759	4.70	2,540	6.00	5,660	8.60	14,800
3.50	866	4.80	2,725	6.20	6,245	8.80	15,660
3.60	978	4.90	2,920	6.40	6,845	9.00	16,540
3.70	1,095	5.00	3,130	6.60	7,460		
3.80	1,216	5.10	3,350	6.80	8,090		
3.90	1,341	5.20	3,580	7.00	8,740		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 20 discharge measurements made during 1903–1906. It is very well defined between gage heights 3.1 feet and 10 feet.

Monthly discharge of Allegheny River at Redhouse, N. Y., for 1906.

[Drainage area, 1,640 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	13,300	1,680	4,780	2.91	3.36
February [a]	2,280	866	1,240	.756	.79
March [a]	14,000	400	2,460	1.50	1.73
April	9,240	2,040	5,570	3.40	3.79
May	4,320	1,410	2,800	1.71	1.97
June	2,630	400	1,000	.610	.68
July	478	195	322	.196	.23
August	1,540	328	777	.474	.55
September	1,470	195	505	.308	.34
October	5,660	866	2,740	1.67	1.92
November	7,300	1,470	2,860	1.74	1.94
December [b]	15,700	1,470	5,930	3.62	4.17
The year	15,700	195	2,580	1.57	21.47

[a] No correction on account of ice conditions was made in values for February and March, and they may be a few per cent too high.

[b] Daily discharge, December 25–31, determined, approximately, by comparison of flow at this station with the flow at Kittanning, Pa.

NOTE.—Values for 1906 are excellent, except those for February, March, and July, which are good.

ALLEGHENY RIVER AT KITTANNING, PA.

This station, established August 18, 1904, is located at Market Street Bridge. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 28, where are given also references to publications that contain data for previous years.

The following discharge measurement was made May 23, 1906:

Width, 719 feet; area, 4,030 square feet; gage height, 4.40 feet; discharge, 6,700 second-feet.

Daily gage height, in feet, of Allegheny River at Kittanning, Pa., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.7	6.3	4.5	13.2	4.7	4.8	2.5	2.2	2.6	2.5	7.7	5.6
2	8.8	5.8	4.8	11.8	4.8	4.6	2.3	2.3	3.1	3.8	7.4	5.2
3	8.9	5.1	5.5	10.0	4.8	4.5	2.3	2.1	3.5	4.1	7.6	5.1
4	9.1	4.4	5.9	9.4	6.3	.....	2.4	2.1	3.4	4.2	6.2	5.0
5	10.2	4.5	6.2	8.6	6.7	3.9	2.4	2.0	3.5	3.8	5.8	5.3
6	9.8	4.4	6.9	9.5	6.7	3.7	2.4	2.0	3.6	3.2	5.6	5.8
7	8.6	4.3	6.2	10.2	7.1	9.3	2.4	2.1	3.2	3.4	5.4	13.8
8	7.3	4.2	5.9	9.5	5.6	7.35	2.4	3.7	2.9	6.0	5.1	13.0
9	6.7	4.1	5.7	8.8	5.7	5.6	2.4	4.9	2.6	7.2	4.8	11.6
10	5.4	4.0	5.5	11.2	5.6	5.1	2.3	4.1	2.4	6.9	4.6	7.9
11	6.0	3.9	5.4	13.2	5.4	4.7	2.3	5.5	2.2	6.9	4.5	10.5
12	5.7	3.9	5.3	12.2	5.4	4.1	2.3	5.2	2.4	7.2	4.5	11.5
13	6.4	3.9	5.1	10.3	5.4	3.8	2.2	4.8	2.5	6.9	4.6	10.1
14	5.7	4.0	4.8	9.5	5.3	3.6	2.1	3.9	2.4	6.8	5.1	8.9
15	5.7	4.0	4.7	9.9	5.4	3.3	2.0	3.5	2.9	6.8	5.2	8.3
16	5.5	4.1	4.6	9.7	5.4	3.1	1.9	3.2	2.3	6.9	5.2	12.0
17	6.1	4.1	4.4	9.3	5.3	3.0	2.2	2.9	2.1	6.1	5.1	11.9
18	7.3	4.1	4.3	8.8	5.4	3.3	2.4	2.5	2.1	6.7	5.4	11.9
19	7.7	4.1	4.1	7.9	5.3	3.2	2.4	8.0	2.0	5.1	8.6	9.2
20	7.5	4.1	3.8	7.2	5.3	3.2	2.4	7.0	2.4	5.7	9.4	8.2
21	8.0	4.2	4.0	6.9	.....	3.3	2.2	5.2	2.7	5.8	9.8	7.2
22	9.65	4.4	4.1	6.5	.....	3.4	2.1	4.8	3.0	6.1	10.1	6.8
23	12.2	4.6	4.0	6.3	4.4	3.3	2.4	4.2	3.0	6.7	9.5	6.3
24	13.0	4.7	4.0	6.0	.....	3.1	2.5	4.8	2.8	5.2	8.6	5.6
25	12.3	5.4	3.9	5.7	4.1	2.9	2.3	4.2	2.8	5.0	7.5	5.7
26	11.2	5.8	4.1	5.6	4.0	2.9	2.0	3.8	2.9	5.8	6.8	5.1
27	9.6	5.2	6.6	5.4	4.6	2.8	1.9	3.6	2.3	6.8	6.3	5.3
28	8.3	4.9	13.8	5.5	4.7	2.7	2.3	3.3	2.4	6.8	6.0	6.5
29	7.5	.....	14.0	5.3	4.8	2.8	2.2	3.1	2.5	6.9	5.2	5.9
30	6.0	.....	12.6	4.9	4.9	2.7	2.2	2.9	2.5	7.5	5.7	5.5
31	6.5	.....	13.6	.....	5.0	.....	2.1	2.7	.....	7.9	.....	7.4

NOTE.—Discharge probably unaffected by ice conditions.

Rating table for Allegheny River at Kittanning, Pa., for 1904 to 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.90	1,650	3.30	4,165	4.70	8,435	7.20	19,390
2.00	1,740	3.40	4,425	4.80	8,795	7.40	20,400
2.10	1,840	3.50	4,690	4.90	9,165	7.60	21,420
2.20	1,960	3.60	4,960	5.00	9,545	7.80	22,470
2.30	2,095	3.70	5,235	5.20	10,320	8.00	23,540
2.40	2,245	3.80	5,515	5.40	11,130	9.00	29,030
2.50	2,410	3.90	5,805	5.60	11,970	10.00	34,730
2.60	2,590	4.00	6,105	5.80	12,830	11.00	40,700
2.70	2,785	4.10	6,415	6.00	13,720	12.00	47,150
2.80	2,990	4.20	6,735	6.20	14,620	13.00	54,280
2.90	3,205	4.30	7,065	6.40	15,540	14.00	62,110
3.00	3,430	4.40	7,400	6.60	16,470		
3.10	3,665	4.50	7,740	6.80	17,430		
3.20	3,910	4.60	8,085	7.00	18,410		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 25 discharge measurements made during 1904–1906. It is well defined between gage heights 2.25 feet and 29 feet. At the higher stages the rating curve was drawn through measurements made on the falling stage of the river in the 1905 spring flood, and hence is not strictly applicable to the stationary or rising stages of flow, but since the maximum stage for 1906 was only 14 feet there is only very slight error in the monthly discharge from this cause.

Monthly discharge of Allegheny River at Kittanning, Pa., for 1906.

[Drainage area, 8,690 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	54,300	11,100	25,000	2.88	3.32
February	15,100	5,800	7,940	.914	.95
March	62,100	5,520	16,000	1.84	2.12
April	55,800	9,160	27,800	3.20	3.57
May[a]	18,900	6,100	10,600	1.22	1.41
June[a]	30,700	2,780	6,600	.760	.85
July	2,410	1,650	2,070	.238	.27
August	23,500	1,740	6,200	.713	.82
September	4,960	1,740	2,890	.333	.37
October	23,000	2,410	13,600	1.57	1.81
November	35,300	7,740	16,400	1.89	2.11
December	60,500	9,540	24,900	2.87	3.31
The year	62,100	1,650	13,300	1.54	20.91

[a] Discharge interpolated May 21, 22, and 24 and June 4.

NOTE.—Values for 1906 are excellent.

BLACKLICK CREEK AT BLACKLICK, PA.

This station was established August 16, 1904, and was discontinued July 15, 1906. It was located at the covered wooden highway bridge one-fourth mile from the railway station at Blacklick, Pa. During September, 1905, this bridge was torn down and replaced. The gage was read once each day by Mark Maynard until April 17, after which D. J. Walling was the observer. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 32, where are given also references to publications that contain data for previous years.

The following discharge measurement was made from the new bridge May 23, 1906:

Width, 210 feet; area, 373 square feet; gage height, 2.40 feet; discharge, 118 second-feet.

Daily gage height, in feet, of Blacklick Creek at Blacklick, Pa., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	4.1	3.3	3.3	6.2	2.2	2.0	17	3.8	2.1	3.3	3.7	2.4	2.05
2	3.8	.....	4.2	7.3	3.7	1.9	18	4.1	.....	3.2	3.6	2.3	1.98
3	4.0	.....	5.4	4.6	4.1	1.88	19	4.6	.....	3.3	3.4	2.1	2.02
4	6.2	.....	4.2	4.2	3.6	1.85	20	4.1	.....	3.1	3.2	2.0	2.0
5	5.0	.....	3.5	4.6	3.2	1.8	21	4.2	2.8	3.1	3.2	2.0	1.95
6	4.6	.....	3.1	5.4	3.0	2.15	22	4.3	3.7	3.0	3.1	2.0	1.82
7	4.0	.....	3.4	5.3	2.9	3.4	23	6.2	3.2	2.7	2.9	1.9	4.2
8	3.9	.....	3.3	6.2	2.7	2.8	24	5.3	3.1	2.7	2.8	1.9	3.5
9	3.5	.....	3.5	7.6	2.7	2.4	25	4.7	3.3	2.9	2.7	1.8	3.0
10	3.4	.....	3.4	.....	2.7	2.3	26	4.2	3.4	4.3	2.6	1.8	2.8
11	3.6	.....	3.3	.....	2.6	2.75	27	3.8	3.4	7.1	2.5	2.5	2.5
12	3.6	.....	3.2	4.2	2.5	2.4	28	3.7	3.3	7.2	2.5	2.8	2.3
13	3.8	.....	3.1	3.7	2.5	2.15	29	3.6	.....	5.1	2.4	2.5	2.15
14	3.4	4.3	3.3	4.6	2.5	2.08	30	3.4	.....	6.2	2.2	2.1	2.02
15	3.4	.....	3.2	4.7	2.5	2.1	31	3.4	.....	7.8	.....	2.0	.....
16	3.9	.....	3.2	4.5	2.4	2.0							

NOTE.—Creek frozen February 2 to 20; ice attained a thickness of about 0.5 foot; see footnote to monthly discharge table.

Rating table for Blacklick Creek at Blacklick, Pa., for 1904 to 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.80	21	3.00	354	4.20	1,327	5.80	3,310
1.90	35	3.10	403	4.30	1,432	6.00	3,590
2.00	51	3.20	460	4.40	1,540	6.20	3,870
2.10	69	3.30	525	4.50	1,650	6.40	4,160
2.20	89	3.40	597	4.60	1,765	6.60	4,450
2.30	112	3.50	676	4.70	1,880	6.80	4,740
2.40	138	3.60	759	4.80	2,000	7.00	5,040
2.50	167	3.70	846	4.90	2,120	7.20	5,340
2.60	199	3.80	936	5.00	2,245	7.40	5,650
2.70	233	3.90	1,029	5.20	2,500	7.60	5,970
2.80	270	4.00	1,125	5.40	2,765	7.80	6,290
2.90	310	4.10	1,224	5.60	3.035		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 11 discharge measurements made during 1904–6. It is fairly well defined between gage heights 1.8 feet and 5.0 feet. The table may be somewhat in excess of the true values, owing to a change in the conditions of flow during the erection of the new bridge in the latter part of 1905. Two measurements made at the new bridge give values that are nearly 15 per cent lower than the rating.

Monthly discharge of Blacklick Creek at Blacklick, Pa., for 1906.

[Drainage area, 403 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	3,870	597	1,310	3.25	3.75
February 21–28	846	270	528	1.31	.39
March	6,290	233	1,300	3.23	3.72
April	5,970	89	1,640	4.07	4.54
May	1,220	21	227	.563	.65
June	1,330	21	178	.442	.49

NOTE.—Values for January, February, and March, good; from February 2 to 20 the flow probably varied from about 200 to 400 sec.-ft.; values for April, May, and June are probably considerably too low, owing to inexperience of new observer, who was appointed April 12.

MONONGAHELA RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Monongahela River is formed near Fairmont, Marion County, in the northern part of West Virginia, by the union of its West Fork with Tygarts Valley River. The headwaters of the latter stream lie on the slopes and in the valleys of the Appalachian Mountains near the eastern boundary of West Virginia; thence they flow northward, draining a hilly and mountainous country. West Fork has its headwaters west of those of Tygarts Valley River, in the central part of West Virginia; thence they flow northward, draining a hilly country.

The principal tributaries of Monongahela River below Fairmont are Cheat and Youghiogheny rivers, both entering from the east. Cheat River drains a rugged, mountainous district in northern West Virginia and flows into Monongahela River near Point Marion, Pa. Youghiogheny River drains a mountainous district of Maryland and Pennsylvania and enters the Monongahela about 15 miles above

Pittsburg. The basins of all these tributary rivers have steep slopes and collect and discharge their waters quickly, with the result that the Monongahela is liable to the excessive freshets for which it is noted. The whole basin was once heavily timbered, but has been thoroughly cleared except about the upper waters of the principal streams. Little water power is used in the basin. Navigation extends to Fairmont.

YOUGHIOGHENY RIVER NEAR CONFLUENCE, PA.

This station was established September 15, 1904. It is located at the highway bridge about one-half mile from the railway station at Confluence, Pa. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 40, where are given also references to publications that contain data for previous years.

The following discharge measurement was made May 25, 1906:

Width, 188 feet; area, 163 square feet; gage height, 1.86 feet; discharge, 200 second-feet.

Daily gage height, in feet, of Youghiogheny River near Confluence, Pa., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.6	2.6	2.5	6.1	3.1	2.45	2.45	2.2	1.9	1.8	2.1	2.3
2	2.5	2.5	2.5	5.1	3.3	2.5	2.4	2.1	1.9	1.75	2.2	2.3
3	2.85	2.45	2.5	4.8	3.2	2.35	2.2	2.4	1.8	1.75	1.95	2.65
4	5.35	2.4	2.75	4.8	3.0	2.25	2.15	2.1	1.8	1.85	1.8	2.5
5	4.4	2.35	3.4	5.2	2.9	2.2	2.15	2.0	1.75	2.1	1.8	2.35
6	3.7	2.25	3.2	7.0	2.8	4.4	2.1	1.9	1.7	2.2	1.85	3.3
7	3.3	2.15	3.0	5.5	2.7	5.2	2.0	1.9	1.7	2.35	1.8	4.1
8	3.2	1.9	2.85	4.5	2.6	3.9	1.95	4.4	1.65	2.25	1.75	3.5
9	2.7	1.9	2.75	4.4	2.6	3.35	1.9	7.4	1.65	2.1	1.75	3.1
10	2.5	1.95	2.75	5.75	2.6	2.9	1.9	8.2	1.8	2.05	1.8	6.4
11	2.7	2.0	2.8	4.8	2.55	2.7	1.85	5.1	1.8	2.0	1.8	8.1
12	3.3	2.0	2.85	4.1	2.5	2.6	1.85	3.9	1.6	2.0	1.85	5.55
13	2.7	2.15	2.75	3.8	2.4	2.5	1.8	3.4	1.65	1.95	1.8	4.4
14	2.7	2.1	2.7	3.6	2.3	2.4	1.8	3.0	2.0	1.95	1.8	3.95
15	2.75	2.65	2.75	5.2	2.25	2.35	1.75	2.8	1.8	1.9	1.85	3.65
16	2.85	2.05	2.75	4.7	2.2	2.25	1.75	2.55	1.7	1.9	1.9	4.2
17	3.55	2.0	2.7	4.1	2.15	2.15	1.75	2.55	1.65	1.85	2.0	5.85
18	3.8	2.05	2.65	3.7	2.1	2.1	1.8	2.5	1.95	1.85	3.0	6.4
19	4.35	2.1	2.7	3.4	2.1	2.05	1.7	2.7	1.9	1.85	3.5	4.8
20	3.8	2.2	2.75	3.1	2.05	2.3	1.7	3.6	1.9	2.0	4.4	4.1
21	3.8	2.2	2.6	3.1	2.0	3.1	1.7	4.0	1.85	2.3	4.0	3.9
22	3.85	2.4	2.5	3.2	2.0	2.9	1.8	3.15	1.85	2.4	3.35	3.6
23	10.0	2.65	2.5	3.35	1.95	2.8	2.8	2.7	1.85	2.3	2.9	3.25
24	6.4	2.6	2.8	3.4	1.9	2.8	2.4	2.6	1.8	2.15	2.7	3.0
25	4.8	2.45	3.0	3.4	1.85	2.6	2.2	2.6	1.8	2.05	2.55	2.8
26	4.0	2.3	2.7	3.4	1.85	2.5	2.0	2.35	1.75	1.95	2.45	2.8
27	3.5	2.3	5.5	4.65	1.8	2.5	1.8	2.35	1.75	1.95	2.35	2.85
28	3.3	2.35	8.0	3.9	2.3	2.45	1.75	2.25	1.7	1.9	2.3	3.5
29	3.1	.....	6.4	3.5	2.35	2.75	1.7	2.15	1.7	1.95	2.25	4.9
30	2.9	.....	7.7	3.25	2.3	2.5	2.5	2.1	1.8	2.05	2.2	5.35
31	2.8	.....	8.6	.....	2.4	.....	2.3	2.0	.....	2.1	.....	7.5

NOTE.—Discharge probably unaffected by ice conditions.

Rating table for Youghiogheny River near Confluence, Pa., for 1904 to 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.60	118	2.90	896	4.20	2,125	6.00	4,460
1.70	156	3.00	974	4.30	2,237	6.20	4,760
1.80	199	3.10	1,055	4.40	2,351	6.40	5,070
1.90	247	3.20	1,139	4.50	2,467	6.60	5,390
2.00	299	3.30	1,226	4.60	2,585	6.80	5,710
2.10	354	3.40	1,316	4.70	2,605	7.00	6,040
2.20	412	3.50	1,407	4.80	2,727	7.20	6,375
2.30	473	3.60	1,501	4.90	2,851	7.40	6,715
2.40	537	3.70	1,598	5.00	3,077	7.60	7,065
2.50	604	3.80	1,698	5.20	3,337	7.80	7,420
2.60	674	3.90	1,801	5.40	3,604	8.00	7,780
2.70	746	4.00	1,907	5.60	3,880	9.00	9,620
2.80	820	4.10	2,015	5.80	4,166	10.00	11,510

NOTE.—The above table is applicable only for open-channel conditions. It is based on 12 discharge measurements made during 1904–1906. It is well defined between gage heights 1.3 feet and 7.0 feet. Above gage height 4.0 feet the discharge values in this table may occasionally be too great on account of backwater from Casselman River.

Monthly discharge of Youghiogheny River near Confluence, Pa., for 1906.

[Drainage area, 435 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	11,500	604	1,800	4.14	4.77
February	710	247	436	1.00	1.04
March	8,880	604	1,720	3.95	4.55
April	6,040	1,060	2,320	5.33	5.95
May	1,230	199	554	1.27	1.46
June	3,340	326	822	1.89	2.11
July	820	156	310	.713	.82
August	8,140	247	1,270	2.92	3.37
September	299	118	193	.444	.50
October	537	178	313	.720	.83
November	2,350	178	553	1.27	1.42
December	7,960	473	2,250	5.17	5.96
The year	11,500	118	1,050	2.40	32.78

NOTE.—Values for 1906 are excellent. Above gage height 4.0 feet there is occasionally backwater from Casselman River. With the data at hand it has been impossible to detect the time of occurrence of this condition, hence the rating for free flow has been used for all stages.

CASSELMAN RIVER AT CONFLUENCE, PA.

This station was established September 15, 1904. It is located at the highway bridge in Confluence, Pa., about 500 yards from the railroad station. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 43, where are given also references to publications that contain data for previous years.

The following discharge measurement was made May 25, 1906:

Width, 212 feet; area, 166 square feet; gage height, 1.87 feet; discharge, 175 second-feet.

Daily gage height, in feet, of Casselman River at Confluence, Pa., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.5	2.5	2.0	5.2	2.5	2.05	1.8	2.0	2.1	1.9	2.0	2.2
2	2.45	2.35	2.15	4.5	2.7	2.1	1.9	1.95	2.15	2.0	2.0	2.15
3	2.7	2.45	2.35	4.4	2.75	2.05	1.8	3.85	2.1	1.95	1.9	2.3
4	4.55	2.3	2.9	4.5	2.6	2.05	1.85	2.8	2.0	1.9	1.8	2.2
5	3.7	2.45	2.7	4.9	2.6	2.0	1.8	2.4	1.95	2.1	1.8	2.2
6	3.05	2.3	2.5	6.5	2.45	4.1	1.75	2.15	1.9	2.1	1.8	3.35
7	2.65	2.2	2.6	4.7	2.5	4.9	1.75	2.5	1.85	2.2	1.75	3.6
8	2.8	2.1	2.55	3.85	2.4	3.35	1.7	4.65	1.8	2.1	1.75	2.85
9	2.5	2.0	2.55	3.9	2.3	2.7	1.6	7.8	1.8	1.95	1.75	2.7
10	2.25	2.05	2.5	5.05	2.45	2.4	1.6	8.8	2.0	1.9	1.75	6.5
11	2.65	2.05	2.45	4.2	2.35	2.25	1.65	4.9	2.0	1.9	1.8	7.1
12	2.6	2.1	2.7	3.6	2.2	2.2	1.6	3.65	1.8	1.85	1.8	4.5
13	2.6	2.15	2.6	3.3	2.25	2.15	1.6	3.2	1.85	1.85	1.85	3.65
14	2.5	2.0	2.6	3.1	2.25	2.1	1.6	2.8	2.0	1.85	1.85	3.35
15	2.45	2.1	2.6	4.7	2.1	2.1	1.6	2.6	2.0	1.8	1.9	3.2
16	2.65	2.1	2.45	4.0	2.15	2.05	1.6	2.45	1.9	1.8	1.9	3.8
17	2.9	2.05	2.55	3.5	2.15	2.05	1.6	2.45	1.75	1.8	1.95	5.05
18	3.3	2.05	2.5	3.2	2.0	2.0	1.7	2.4	1.9	1.8	2.7	5.1
19	3.85	2.0	2.5	3.0	2.1	2.0	1.7	3.6	1.9	1.8	3.1	3.55
20	3.15	2.1	2.45	2.8	2.05	2.1	1.65	4.0	1.85	2.6	3.25	3.4
21	3.2	2.2	2.35	3.1	1.95	2.4	1.6	4.1	1.8	2.45	2.9	3.2
22	3.3	2.7	2.4	2.15	2.0	2.2	1.75	3.3	1.8	2.35	2.6	3.0
23	9.9	2.3	2.35	3.25	1.95	2.25	2.6	2.95	1.75	2.25	2.4	2.75
24	4.7	2.2	2.3	3.1	1.8	2.15	2.15	2.7	1.75	2.15	2.35	2.6
25	4.1	2.25	2.35	2.9	1.85	2.05	1.9	2.9	1.7	2.05	2.3	2.5
26	3.5	2.25	2.3	3.2	1.85	2.0	1.75	2.65	1.7	2.0	2.25	2.5
27	3.2	2.2	4.8	3.2	1.8	1.95	1.75	2.6	1.75	2.0	2.2	2.6
28	3.05	2.15	7.4	2.8	2.1	1.9	1.7	2.55	1.8	2.0	2.2	2.9
29	2.9	.....	5.6	2.85	2.15	1.9	1.7	2.4	1.7	2.05	2.15	4.0
30	2.65	.....	7.0	2.5	2.1	1.8	1.9	2.3	1.75	2.0	2.1	4.7
31	2.7	.....	7.7	.....	2.1	.....	2.0	2.2	.....	2.0	.....	7.5

NOTE.—Discharge probably unaffected by ice conditions during 1906.

Rating table for Casselman River at Confluence, Pa., for 1904 to 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.60	58	2.30	491	3.00	1,175	3.70	1,935
1.70	95	2.40	579	3.10	1,281	3.80	2,045
1.80	141	2.50	671	3.20	1,388	3.90	2,155
1.90	196	2.60	767	3.30	1,496	4.00	2,265
2.00	260	2.70	866	3.40	1,605		
2.10	331	2.80	967	3.50	1,715		
2.20	408	2.90	1,070	3.60	1,825		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 12 discharge measurements made during 1904–1906. It is well defined between gage heights 1.5 feet and 4 feet. Owing to frequent backwater from Youghiogheny River the discharge values for higher gage heights are liable to be in considerable error.

Monthly discharge of Casselman River at Confluence, Pa., for 1906.

[Drainage area, 450 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	10,000	450	1,510	3.36	3.87
February	866	260	417	.927	.97
March	6,500	260	1,270	2.82	3.25
April	5,200	370	1,970	4.38	4.89
May	916	141	435	.967	1.11
June	3,500	141	560	1.24	1.38
July	767	58	139	.309	.36
August	9,500	228	1,650	3.67	4.23
September	370	95	186	.413	.46
October	767	141	282	.627	.72
November	1,440	118	395	.878	.98
December	7,600	370	1,890	4.20	4.84
The year	10,000	58	892	1.98	27.06

NOTE.—Values are rated as follows: Monthly means, excellent; discharge above gage height 5.0 feet, fair.

Above gage height 4.0 feet there is frequently backwater at this station from the Youghiogheny River. No rating table has been used for these stages, and the daily discharge values are based on the study of the relative gage heights on Casselman and Youghiogheny rivers. This study shows that there is sometimes free flow at the Casselman station, but more often backwater.

LAUREL HILL CREEK AT CONFLUENCE, PA.

This station was established September 15, 1904. It is located at the highway bridge near the tannery, about one-fourth mile from the railroad station at Confluence, Pa. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 45, where are given also references to publications that contain data for previous years.

The following discharge measurement was made May 26, 1906:

Width, 82 feet; area, 116 square feet; gage height, 1.96 feet; discharge, 53 second-feet.

Daily gage height, in feet, of Laurel Hill Creek at Confluence, Pa., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.55	2.3	2.5	3.6	2.3	2.1	1.95	1.85	2.05	1.95	1.8	2.3
2	2.45	2.25	2.5	3.3	2.5	2.05	1.9	1.85	2.05	2.1	1.8	2.3
3	2.7	2.25	2.5	3.4	2.6	1.95	1.85	2.0	2.1	2.0	1.8	2.5
4	4.0	2.3	2.6	3.5	2.4	1.85	1.9	2.0	2.0	1.9	1.8	2.4
5	3.2	2.3	2.5	3.8	2.35	1.8	1.85	1.9	1.9	2.0	1.8	2.35
6	2.85	2.25	2.5	4.6	2.3	3.2	1.8	1.8	1.9	2.1	1.75	3.9
7	2.65	2.25	2.5	3.5	2.3	3.5	1.8	4.0	1.85	2.3	1.75	3.65
8	2.7	2.2	2.5	3.15	2.25	3.0	1.8	3.8	1.8	2.1	1.75	2.9
9	2.5	2.2	2.5	3.3	2.35	2.5	1.8	4.8	1.8	1.95	1.75	2.7
10	2.3	2.25	2.4	3.75	2.4	2.4	1.8	5.9	2.15	1.95	1.7	5.5
11	2.25	2.2	2.5	3.3	2.35	2.25	1.75	3.6	2.0	1.9	1.8	5.1
12	2.4	2.15	2.6	3.0	2.3	2.2	1.75	2.95	1.75	1.9	1.8	3.55
13	2.35	2.15	2.5	2.45	2.3	2.2	1.7	2.7	1.8	1.85	1.8	3.1
14	2.3	2.15	2.5	2.1	2.25	2.2	1.7	2.45	1.8	1.85	1.8	3.0
15	2.35	2.1	2.5	3.6	2.25	2.15	1.75	2.35	2.0	1.8	1.8	2.9
16	2.45	2.1	2.45	2.9	2.2	2.1	1.75	2.25	1.85	1.8	1.9	2.85
17	2.55	2.1	2.45	2.75	2.2	2.05	1.7	2.25	1.75	1.8	2.0	3.55
18	2.9	2.05	2.4	2.65	2.2	2.0	1.9	2.4	1.7	1.8	3.0	3.2
19	3.05	2.05	2.4	2.6	2.15	2.0	2.0	3.45	1.7	1.8	3.4	2.8
20	2.75	2.05	2.35	2.5	2.1	2.0	1.85	3.3	1.65	1.95	2.95	2.8
21	2.9	2.3	2.35	2.6	2.05	2.1	1.7	3.25	1.8	2.1	2.75	2.7
22	2.9	2.75	2.4	2.65	2.0	2.1	1.9	2.95	1.75	1.9	2.6	2.6
23	7.0	2.6	2.35	2.8	2.0	2.3	2.7	2.75	1.75	1.85	2.35	2.55
24	3.75	2.5	2.3	2.75	1.95	2.25	2.35	2.6	1.7	1.85	2.3	2.5
25	3.15	2.45	2.3	2.7	1.95	2.1	2.1	2.5	1.75	1.8	2.3	2.45
26	2.85	2.4	2.45	2.7	1.95	2.0	2.0	2.4	1.75	1.75	2.25	2.45
27	2.7	2.35	3.6	2.6	2.05	2.05	1.95	2.3	1.75	1.75	2.2	2.55
28	2.6	2.3	5.0	2.5	2.7	2.0	1.9	2.25	1.8	1.85	2.2	3.1
29	2.5	.....	3.8	2.4	2.35	2.0	1.9	2.2	1.75	1.85	2.15	3.05
30	2.45	.....	4.7	2.4	2.25	1.95	2.0	2.15	1.8	1.85	2.1	3.45
31	2.4	.....	5.4	.....	2.15	.....	1.9	2.1	.....	1.8	.....	5.6

NOTE.—Discharge probably unaffected by ice conditions during 1906.

Rating table for Laurel Hill Creek at Confluence, Pa., for 1904 to 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.60	7	2.10	93	2.50	266	2.90	503
1.70	13	2.20	128	2.60	321	3.00	568
1.80	24	2.30	169	2.70	379	3.10	634
1.90	41	2.40	215	2.80	440	3.20	701
2.00	64						

The above table is applicable only for open-channel conditions. It is based on 13 discharge measurements made during 1904–1906. It is well defined between gage heights 1.8 feet and 3.2 feet. Above gage height 3.2 feet the discharge values are usually more or less in error on account of backwater from Casselman and Youghiogheny rivers.

Monthly discharge of Laurel Hill Creek at Confluence, Pa., for 1906.

[Drainage area, 118 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	2,800	148	467	3.96	4.56
February	410	78	159	1.35	1.41
March	2,000	169	446	3.78	4.36
April	1,000	93	582	4.93	5.50
May	379	52	153	1.30	1.50
June	950	24	170	1.44	1.61
July	379	13	51.8	.439	.51
August	2,000	24	445	3.77	4.35
September	110	10	35.3	.299	.33
October	169	18	47.4	.402	.46
November	860	13	142	1.20	1.34
December	2,000	169	613	5.19	5.98
The year	2,800	10	276	2.34	31.91

NOTE.—Values are rated as follows: Monthly means, excellent; discharge above gage height 3.5 feet, fair. Above gage height 3.2 feet there is usually backwater at this station from Youghiogheny and Casselman rivers. No rating table has been used for these stages, the daily discharge values being based on the relative run-off from the Casselman and Youghiogheny river drainage basins for low stages.

BEAVER RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Beaver River is formed by the junction of Mahoning and Shenango rivers just below Newcastle, Pa. Mahoning River flows through a hilly and important territory. There are numerous water-power developments on it, and it forms an important adjunct in the water supply and sewage disposal of many towns along its course.

MAHONING RIVER AT YOUNGSTOWN, OHIO.

This station was established May 23, 1903, and was discontinued July 23, 1906. It is located about 2 miles below the center of the city of Youngstown, Ohio, at the highway bridge near the plant of the Hazleton Steel Company. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 48, where are given also references to publications that contain data for previous years.

Discharge measurements of Mahoning River at Youngstown, Ohio, in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 7	E. F. Kriegsman	160	655	2.67	1,400
May 14	do	153	391	1.19	298

Mean daily gage height, in feet, of Mahoning River near Youngstown, Ohio, for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	1.7	1.35	1.8	5.55	1.0	0.8	0.85
2	1.55	1.15	4.8	3.75	.95	.8	.8
3	1.7	1.2	4.2	2.65	.9	.75	.75
4	4.35	1.1	4.5	2.2	.95	.85	.7
5	5.55	1.05	4.8	1.85	3.75	.7	.85
6	3.4	1.0	4.2	2.2	3.95	.7	.8
7	2.05	.95	3.5	2.1	3.7	.75	.75
8	1.9	1.0	2.4	2.25	3.2	.7	.75
9	1.6	.9	2.35	2.4	2.05	1.0	.7
10	1.45	.8	2.0	3.15	1.9	.9	.8
11	1.25	.75	1.85	4.35	1.65	.95	.9
12	1.25	.7	1.35	3.35	1.45	.9	1.1
13	1.15	.8	1.75	2.85	1.4	.9	1.2
14	1.05	.85	1.7	2.35	1.15	.85	1.4
15	1.1	1.2	1.7	2.2	1.2	1.0	1.45
16	1.7	1.4	1.6	2.15	1.1	.95	1.25
17	2.05	1.35	1.45	2.05	1.1	.8	1.15
18	2.4	1.3	1.4	1.9	1.05	.75	1.05
19	2.95	1.2	1.55	1.8	1.0	.8	1.0
20	3.15	1.15	1.35	1.7	1.05	.95	.95
21	3.65	1.5	1.3	1.65	1.0	.85	.95
22	3.4	2.1	1.45	1.5	.95	.85	.9
23	3.15	2.5	1.35	1.3	.95	.8	.85
24	3.8	2.45	1.5	1.3	.9	.8	.....
25	2.5	2.65	1.65	1.25	.85	.75	.....
26	2.0	2.0	1.7	1.2	.8	.75	.....
27	1.7	1.75	9.2	1.2	.7	.8	.....
28	1.55	1.45	11.55	1.15	.7	.85	.....
29	1.45	.....	11.4	1.2	.75	.9	.....
30	1.3	.....	8.3	1.1	.8	.85	.....
31	1.25	.....	6.45	.....	.75	.....	.....

NOTE.—No ice conditions at this station.

Rating table for Mahoning River at Youngstown, Ohio, for 1905 and 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.70	113	2.10	938	3.50	2,110	5.80	4,630
.80	151	2.20	1,014	3.60	2,210	6.00	4,870
.90	195	2.30	1,091	3.70	2,310	6.20	5,130
1.00	244	2.40	1,170	3.80	2,410	6.40	5,390
1.10	296	2.50	1,250	3.90	2,510	6.60	5,650
1.20	350	2.60	1,330	4.00	2,610	6.80	5,910
1.30	406	2.70	1,410	4.20	2,810	7.00	6,180
1.40	464	2.80	1,490	4.40	3,030	8.00	7,580
1.50	524	2.90	1,575	4.60	3,250	9.00	9,080
1.60	586	3.00	1,660	4.80	3,470	10.00	10,600
1.70	651	3.10	1,745	5.00	3,690	11.00	12,200
1.80	719	3.20	1,830	5.20	3,910	12.00	13,900
1.90	790	3.30	1,920	5.40	4,150		
2.00	863	3.40	2,010	5.60	4,390		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 22 discharge measurements made during 1903–1906. It is fairly well defined between gage heights 0.9 foot and 2.5 feet. The table beyond these limits is based on 1 measurement at 7.8 and 1 at 10.8 feet, the latter being recomputed by the use of low-water soundings. Below 0.9 foot the curve is unsatisfactory, probably owing to the influence of the dam below, as at low stages the water may fall below the crest.

Monthly discharge of Mahoning River at Youngstown, Ohio, for 1906.

[Drainage area, 958 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	4,330	270	1,120	1.17	1.35
February	1,370	113	463	.483	.50
March	13,100	406	2,560	2.67	3.08
April	4,330	296	1,080	1.13	1.26
May	2,560	113	552	.576	.66
June	244	113	167	.174	.19
July 1-23	494	113	228	.238	.20

NOTE.—Values are rated as follows: January to May, good; June to July, fair.

MUSKINGUM RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Muskingum River is formed by the junction of Walhonding and Tuscarawas rivers in the east-central part of Ohio, flows southward, and enters Ohio River at Marietta, Ohio. The river is navigable below Zanesville, and the dams which were built as an aid to navigation are used for water power. There are good reservoir sites on some of the tributaries, and these could be used for storing water to augment the low-water flow. The records of the stations in this basin are of value accordingly.

MUSKINGUM RIVER AT ZANESVILLE, OHIO.

This station was established March 11, 1905. It is located at the Sixth Street Bridge, Zanesville, Ohio, 1,000 feet above the lowest lock which is maintained by the War Department, which furnishes the gage heights. It is about 3,000 feet below a dam and about the same distance below the entrance of Licking River, which also has a dam near its mouth. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 50.

Discharge measurements of Muskingum River at Zanesville, Ohio, in 1905 and 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1905.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 11	R. W. Pratt	531	6,270	16.85	25,800
March 16	do	510	2,840	9.75	6,410
March 16	E. C. Murphy	501	2,660	9.83	6,300
May 21	M. S. Brennan	472	2,920	10.50	8,420
June 13	S. K. Clapp	489	4,680	13.20	17,400
July 9	do		2,470	9.20	5,630
August 28	R. W. Pratt	475	2,280	8.70	3,640
October 30	do	495	2,180	8.60	2,930
November 14	do		2,280	8.75	3,500
1906.					
February 12[a]	Brennan and Kriegsman	469	1,810	8.35	2,310
March 5	E. F. Kriegsman	415	3,430	11.92	12,900
April 9	do	493	3,340	11.00	9,080
May 22	do	485	1,980	8.20	2,350
June 6	Murphy and Kriegsman	487	2,000	7.90	1,720

[a] Ice along shores at time of this measurement.

Daily gage height, in feet, of Muskingum River at Zanesville, Ohio, for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.8	9.0	9.0	21.2	9.5	8.0	8.2	8.5	8.1	8.4	8.5	9.0
2	9.3	8.9	8.8	19.0	9.2	8.0	8.0	8.2	8.0	8.6	8.4	8.8
3	9.5	8.5	9.3	16.95	9.1	8.0	7.9	8.0	8.1	9.0	8.4	8.9
4	13.1	8.4	11.8	14.8	9.1	7.9	8.0	7.9	8.1	8.6	8.3	8.8
5	14.25	8.7	11.85	13.0	9.0	7.8	8.1	7.8	8.8	8.8	8.3	8.6
6	14.2	8.55	11.1	12.35	8.8	7.8	8.1	7.7	8.7	8.5	8.2	9.3
7	13.4	8.3	11.1	12.0	8.9	7.8	8.0	7.7	8.3	8.8	8.1	12.05
8	11.2	8.4	9.9	11.87	8.9	8.1	8.0	8.4	8.0	9.0	8.1	13.1
9	9.9	8.4	9.8	11.1	8.8	8.1	8.3	10.2	7.8	9.5	8.1	12.25
10	9.2	8.5	9.7	10.9	8.7	8.0	8.2	9.9	7.9	9.5	8.2	11.6
11	9.4	8.2	9.5	10.9	8.6	7.9	8.1	10.1	7.9	9.2	8.1	11.8
12	9.6	8.3	9.4	10.8	8.6	7.8	8.1	9.7	7.8	9.3	8.1	11.9
13	9 4	8.5	9.4	10.3	8.5	7.7	7.9	9.2	7.8	9.1	8.1	11.8
14	10.1	8.5	9.2	10.1	8.5	7.7	7.9	8.7	7.8	8.7	8.1	11.2
15	11.0	8.4	9.2	10.4	8.5	7.7	7.8	8.4	7.6	8.6	8.1	11.2
16	12.9	8.5	9.1	10.6	8.5	7.7	8.1	8.3	7.6	8.4	8.3	14.8
17	13.3	8.6	9.1	10.5	8.4	7.6	8.8	8.0	7.6	8.4	8.3	14.35
18	12.85	8.8	9.0	10.0	8.3	7.8	8.9	8.7	7.8	8.3	8.5	13.45
19	12.2	8.6	9.1	9.7	8.2	7.8	9.3	10.1	7.8	8.5	9.5	12.4
20	11.7	8.5	9.5	9.5	8.1	8.1	9.5	10.5	7.9	9.1	10.4	11.6
21	11.2	8.5	9.8	9.3	8.2	8.2	9.3	10.4	8.0	9.5	11.1	11.0
22	10.9	8.2	10.3	9.1	8.1	8.2	9.5	10.1	8.1	9.7	14.3	10.7
23	10.8	10.0	10.5	9.0	8.0	8.3	9.0	10.1	8.3	9.2	12.4	10.5
24	10.5	10.1	10.1	8.9	8.0	8.6	8.7	10.5	8.1	8.9	12.0	10.0
25	10.2	10.0	9.7	8.9	8.0	8.7	8.5	10.1	8.0	8.7	11.0	9.7
26	9.9	9.9	10.1	9.4	8.0	8.4	8.2	9.6	7.9	8.6	10.4	9.1
27	9.6	9.7	17.55	10.4	7.8	8.1	8.1	9.2	7.8	8.5	9.9	9.1
28	9.3	9.2	23.95	11.2	8.4	8.4	7.9	8.9	7.8	8.4	9.5	10.1
29	9.2	.....	22.4	10.9	8.1	8.0	8.1	8.6	7.9	8.6	9.3	11.2
30	9.1	.....	22.25	10.1	8.0	8.0	8.2	8.4	7.9	8.6	9.1	12.6
31	9.1	.....	23.1	.....	8.0	.....	8.0	8.3	.....	8.6	.....	14.2

NOTE.—Flow slightly affected by ice conditions during February.

Rating table for Muskingum River at Zanesville, Ohio, for 1905 and 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
7.60	1,180	9.10	4,380	10.60	8,370	13.20	17,360
7.70	1,370	9.20	4,620	10.70	8,670	13.40	18,140
7.80	1,560	9.30	4,860	10.80	8,980	13.60	18,920
7.90	1,760	9.40	5,110	10.90	9,290	13.80	19,700
8.00	1,960	9.50	5,360	11.00	9,600	14.00	20,500
8.10	2,160	9.60	5,610	11.20	10,230	15.00	24,600
8.20	2,370	9.70	5,870	11.40	10,870	16.00	29,000
8.30	2,580	9.80	6,130	11.60	11,530	17.00	33,500
8.40	2,790	9.90	6,390	11.80	12,210	18.00	38,200
8.50	3,000	10.00	6,660	12.00	12,900	19.00	42,500
8.60	3,220	10.10	6,930	12.20	13,610	20.00	47,100
8.70	3,440	10.20	7,210	12.40	14,340	21.00	51,700
8.80	3,670	10.30	7,490	12.60	15,080	22.00	56,300
8.90	3,900	10.40	7,780	12.80	15,840	23.00	60,900
9.00	4,140	10.50	8,070	13.00	16,600	24.00	65,600

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1905 and 1906. It is well defined between gage heights 7.9 feet and 14.0 feet.

Monthly discharge of Muskingum River at Zanesville, Ohio, for 1905 and 1906.

[Drainage area, 5,830 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
1905.					
April 9-30	11,500	2,790	5,260	0.902	0.74
May	40,200	2,370	11,200	1.92	2.21
June	25,500	3,220	9,780	1.68	1.87
July	6,660	1,960	3,480	.597	.69
August	21,300	1,370	4,560	.782	.90
September	11,900	1,370	4,280	.734	.82
October	14,300	1,960	4,300	.738	.85
November	15,800	2,370	4,280	.734	.82
December	32,600	3,440	10,800	1.85	2.13
1906.					
January	21,500	4,380	9,590	1.64	1.89
February [a]	6,930	2,370	3,710	.636	.66
March	65,400	3,670	14,300	2.45	2.82
April	52,600	3,900	12,100	2.08	2.32
May	5,360	1,560	2,990	.513	.59
June	3,440	1,180	1,980	.340	.38
July	5,360	1,560	2,720	.467	.54
August	8,070	1,370	4,380	.751	.87
September	3,670	1,180	1,920	.329	.37
October	5,870	2,580	3,760	.645	.74
November	21,700	2,160	5,270	.904	1.01
December	23,800	3,220	10,600	1.82	2.10
The year	65,400	1,180	6,110	1.05	14.29

[a] Values for February, 1906, probably somewhat in excess of the true values, since no correction was made for the effect of ice conditions. The measurement made February 12, 1906, indicated that on that day the flow was 10 per cent less than the flow as given by the open-channel rating.

NOTE.—Values for 1905 and 1906 are excellent, except those for February, 1906, which is good.

LICKING RIVER AT PLEASANT VALLEY, OHIO.

This station was established November 14, 1902, and was discontinued July 21, 1906. It is located at the highway bridge 300 feet north of the railroad station at Pleasant Valley, Ohio, and 9 miles northwest of Zanesville, Ohio. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 52, where are given also references to publications that contain data for previous years. The records at this point are especially valuable because Licking River is a source of possible water supply for Zanesville.

Discharge measurements of Licking River at Pleasant Valley, Ohio, in 1905 and 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1905.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
January 13	R. W. Pratt	95	499	4.70	1,340
February 28	do	122	647	6.00	1,730
March 16	do	80	355	3.13	447
May 22	M. S. Brennan	79	337	2.86	502
June 19	S. K. Clapp	80	317	2.40	391
July 9	do	70	255	1.92	347
August 28	R. W. Pratt	65	242	1.58	114
October 30	do	67	241	2.33	241
November 14	do	69	284	2.32	318
1906.					
March 5	E. F. Kriegsman	79	405	4.03	906
April 9	do	97	452	3.63	919

Daily gage height, in feet, of Licking River at Pleasant Valley, Ohio, for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	2.8	2.6	2.3	9.0	2.5	2.1	2.2
2	2.5	2.6	2.3	6.8	2.5	2.6	2.0
3	2.6	2.5	2.5	5.2	2.7	2.3	1.9
4	10.8	2.5	6.5	4.6	2.6	2.1	3.5
5	8.8	2.5	4.6	4.1	2.5	2.0	2.8
6	6.7	3.3	3.4	4.5	2.4	2.1	2.4
7	4.9	2.7	3.2	4.2	2.3	2.0	2.1
8	4.0	2.6	3.1	3.8	2.3	2.0	2.0
9	3.6	2.6	3.1	3.6	2.6	1.9	1.9
10	3.3	2.6	3.0	3.8	2.4	1.9	1.8
11	3.1	.....	2.9	3.7	2.3	1.8	2.1
12	2.8	.....	2.8	3.4	2.2	1.8	1.9
13	2.6	.....	2.7	3.2	2.2	1.8	1.8
14	2.9	.....	2.7	3.1	2.1	1.9	1.8
15	4.4	.....	2.6	4.1	2.1	1.9	1.8
16	8.8	.....	2.6	3.8	2.1	1.8	1.8
17	5.9	.....	2.5	3.4	2.1	2.4	3.0
18	5.0	2.4	2.6	3.1	2.1	2.2	2.9
19	4.4	2.3	2.7	3.0	2.1	2.3	2.4
20	3.9	2.3	2.5	2.9	2.0	2.2	2.1
21	3.7	2.2	3.0	2.8	2.0	2.2	2.0
22	3.5	3.8	3.6	2.7	2.0	2.1	.....
23	3.6	3.3	3.1	2.6	1.9	2.3	.....
24	3.4	3.1	2.7	2.6	1.9	2.1	.....
25	3.1	3.0	2.8	2.5	1.9	1.9	.....
26	2.9	2.9	2.8	2.8	1.9	1.9	.....
27	2.8	2.9	10.3	3.1	1.9	1.8	.....
28	2.7	2.6	16.0	2.8	2.3	5.9	.....
29	2.7	.....	10.2	2.7	2.6	3.1	.....
30	2.6	.....	7.8	2.6	2.4	2.4	.....
31	2.6	.....	10.8	.....	2.2	.....	.....

NOTE.—Ice conditions February 5 to 20; ice attained a thickness of about 0.5 foot.

Rating tables for Licking River at Pleasant Valley, Ohio.

JANUARY 1, 1905, TO MAY 12, 1905.[a]

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.40	54	2.20	230	2.90	470	3.60	760
1.50	66	2.30	260	3.00	510	3.70	810
1.60	81	2.40	290	3.10	550	3.80	860
1.70	99	2.50	320	3.20	590	3.90	910
1.80	120	2.60	350	3.30	630	4.00	960
1.90	143	2.70	390	3.40	670	4.20	1,080
2.00	170	2.80	430	3.50	710	4.40	1,200
2.10	200						

[a] This table is applicable only for open-channel conditions. It is based on discharge measurements made during 1904 and 1905. It is not well defined. Above gage height 4.4 feet the following rating table should be used.

MAY 13, 1905, TO JULY 21, 1906.[a]

1.40	80	2.30	310	3.20	640	4.20	1,110
1.50	100	2.40	340	3.30	680	4.40	1,210
1.60	120	2.50	370	3.40	720	4.60	1,320
1.70	140	2.60	400	3.50	760	4.80	1,440
1.80	165	2.70	440	3.60	810	5.00	1,560
1.90	190	2.80	480	3.70	860	5.20	1,700
2.00	220	2.90	520	3.80	910	5.40	1,840
2.10	250	3.00	560	3.90	960		
2.20	280	3.10	600	4.00	1,010		

[a] This table is applicable only for open-channel conditions. It is based on discharge measurements made during 1905. Above gage height 5.0 feet the rating curve is a tangent, the difference being 70 per tenth. All determinations of discharge based on this and the preceding rating table are subject to large errors over periods varying from a few days to several months. This is due to changes in conditions of flow during both high and low stages.

Monthly discharge of Licking River at Pleasant Valley, Ohio, for 1905 and 1906.

[Drainage area, 696 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
1905.					
January [a]	1,440	50	368	0.529	0.61
February [a]	2,400	50	482	.693	.72
March [a]	5,410	320	1,200	1.72	1.98
April	1,910	170	370	.532	.59
May	5,550	170	987	1.42	1.64
June	2,540	165	595	.855	.95
July	720	80	168	.241	.28
August	2,890	80	357	.513	.59
September	1,770	80	285	.409	.46
October	3,800	120	600	.862	.99
November	2,330	190	549	.789	.88
December	5,200	310	1,020	1.47	1.70
The year	5,550	50	580	.836	11.39
1906.					
January	5,620	370	1,210	1.74	2.01
February	910	200	348	.500	.52
March	9,260	310	1,440	2.07	2.39
April	4,360	370	931	1.34	1.50
May	440	190	289	.415	.48
June	2,190	165	317	.455	.51
July 1–21	760	165	290	.417	.33

[a] Ice conditions January 4–March 2, 1905.

NOTE.—Values for 1905 and 1906 have been corrected for ice conditions during frozen periods. Values for 1905 and 1906 are fair. For relatively short periods the values are frequently only approximate owing to changing conditions of flow.

KANAWHA RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Kanawha River, which rises in Watauga, Ashe, and Alleghany counties, N. C., flows northwestward through Virginia and West Virginia and joins Ohio River at Point Pleasant, W. Va. In its upper course it is known as New River. The headwaters lie in the Appalachian Mountains, among the high ridges which form the divides between the drainage basin of this river and Yadkin River on the east and Holston River on the west. The upper tributaries drain narrow valleys of the mountainous region of North Carolina, and their slopes are generally steep and their beds rough. The main river cuts the Allegheny Front just below Pearisburg, Va.; thence the river's course is through a narrow valley of West Virginia over a rough bed with many falls and rapids. The basin is as beautiful and picturesque as any in the eastern part of the United States. The country on its lower courses, through which the Chesapeake and Ohio Railway passes, is noted for its scenic beauty. Below the junction with the Gauley the river is known as the Kanawha.

The principal tributaries of New River are Little River, which empties near Radford, Va., and Greenbrier River, which rises in the eastern part of West Virginia and joins New River at Hinton, W. Va.

NEW RIVER AT RADFORD, VA.

This station was established August 1, 1898, and was discontinued July 15, 1906. It is located at the highway bridge near the Norfolk and Western Railway station. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 54, where are given also references to publications that contain data for previous years. The length of the chain is now 86.95 feet. The following discharge measurement was made June 11, 1906:

Width, 568 feet; area, 1,690 square feet; gage height, 3.6 feet; discharge, 1,970 second-feet.

Daily gage height, in feet, of New River at Radford, Va., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	4.0	5.1	4.0	6.2	3.9	3.7	3.6
2	3.9	4.9	4.1	5.3	3.9	3.7	3.6
3	4.1	4.9	4.2	4.9	3.8	3.8	3.6
4	6.9	4.5	4.8	4.7	4.2	3.7	3.6
5	6.1	4.3	4.9	4.4	4.1	3.7	3.6
6	5.7	4.7	4.7	4.1	4.5	3.8	3.6
7	5.4	4.5	4.4	4.1	4.6	3.7	3.6
8	4.5	4.3	4.5	4.4	4.3	3.7	3.8
9	4.3	4.4	4.3	4.3	4.3	3.8	3.8
10	4.2	4.3	4.2	4.4	4.1	3.7	3.7
11	3.7	4.2	4.1	4.3	4.0	3.6	3.7
12	3.6	4.2	4.0	4.3	4.0	3.6	3.7
13	4.3	3.8	4.1	4.3	4.0	3.9	3.7
14	4.9	3.7	4.2	4.1	3.8	5.85	3.6
15	4.7	3.8	4.2	4.2	3.8	6.0	3.6
16	4.8	3.7	5.4	4.3	3.9	5.2	.....
17	4.7	3.7	5.6	5.2	3.7	5.0	.....
18	4.5	3.8	4.7	4.8	3.7	4.9	.....
19	4.5	3.7	4.4	4.6	3.8	4.8	.....
20	4.2	4.0	4.5	4.4	3.7	4.6	.....
21	4.2	4.1	5.0	4.3	3.7	4.9	.....
22	4.2	3.9	4.4	4.2	3.8	4.3	.....
23	8.2	4.2	4.5	4.1	3.7	4.0	.....
24	10.3	4.3	4.4	4.0	3.7	4.0	.....
25	7.1	4.1	4.4	4.1	3.8	4.0	.....
26	6.6	4.0	4.4	3.7	3.7	3.8	.....
27	5.9	4.1	4.4	3.9	3.7	3.8	.....
28	6.0	4.0	4.8	3.8	4.0	3.8	.....
29	5.5	.....	4.7	3.8	3.9	3.8	.....
30	5.4	.....	4.4	3.8	3.9	3.7	.....
31	5.2	.....	6.8	.....	3.8	.....	.....

NOTE.—Discharge not affected by ice conditions during 1906.

Rating table for New River at Radford, Va., for 1898 to 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
3.60	2,160	4.90	6,380	6.20	11,610	8.00	19,920
3.70	2,430	5.00	6,770	6.30	12,040	8.20	20,990
3.80	2,710	5.10	7,160	6.40	12,470	8.40	22,100
3.90	3,000	5.20	7,550	6.50	12,900	8.60	23,250
4.00	3,290	5.30	7,940	6.60	13,340	8.80	24,440
4.10	3,590	5.40	8,340	6.70	13,780	9.00	25,650
4.20	3,900	5.50	8,740	6.80	14,230	9.20	26,870
4.30	4,220	5.60	9,140	6.90	14,680	9.40	28,100
4.40	4,550	5.70	9,540	7.00	15,130	9.60	29,340
4.50	4,900	5.80	9,950	7.20	16,030	9.80	30,580
4.60	5,260	5.90	10,360	7.40	16,950	10.00	31,820
4.70	5,630	6.00	10,770	7.60	17,900	10.30	33,720
4.80	6,000	6.10	11,190	7.80	18,890		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 7 discharge measurements made June 27, 1900, August 8, 1901, and in 1904–5. It is well defined between gage heights 3 feet and 7.5 feet. Above gage height 7.5 feet the rating table is based on the extension of the area and velocity curves and is only approximate.

Monthly discharge of New River at Radford, Va., for 1906.

[Drainage area, 2,720 square miles.]

Month	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	33,700	2,160	8,070	2.97	3.42
February	7,160	2,430	3,930	1.44	1.50
March	14,200	3,290	5,230	1.92	2.21
April	11,600	2,430	4,550	1.67	1.86
May	5,260	2,430	3,100	1.14	1.31
June	10,800	2,160	3,970	1.46	1.63
July	2,710	2,160	2,310	.849	.47

NOTE.—Values for 1906 are excellent.

GREENBRIER RIVER AT ALDERSON, W. VA.

The gaging station was established August 1, 1895, and was discontinued July 15, 1906. It is located at the highway bridge one-half mile above the mouth of Muddy Creek, in the village of Alderson, W. Va., 21 miles above Hinton. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 57, where are given also references to publications that contain data for previous years.

The following discharge measurement was made June 13, 1906:

Width, 325 feet; area, 475 square feet; gage height, 2.30 feet; discharge, 602 second-feet.

Daily gage height, in feet, of Greenbrier River at Alderson, W. Va., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	2.9	3.2	2.3	5.1	2.9	2.6	17	3.8	2.1	5.5	4.9	2.7	2.5
2	2.8	3.0	2.25	4.8	2.8	2.6	18	3.6	2.0	4.22	3.7	2.8	2.55
3	4.45	2.8	2.25	4.2	2.75	2.55	19	3.45	2.0	3.7	3.55	2.8	2.6
4	7.5	2.65	4.15	3.7	3.0	2.55	20	3.3	2.1	4.1	3.4	2.75	2.75
5	6.5	2.55	4.8	3.5	3.35	2.55	21	3.15	2.15	4.2	3.2	2.7	3.5
6	4.8	2.6	3.8	3.5	3.3	2.55	22	3.0	2.25	4.0	3.1	2.7	3.25
7	3.9	2.55	3.3	3.2	3.2	2.55	23	9.3	2.85	4.1	3.05	2.65	3.0
8	3.5	2.45	3.1	4.0	3.2	3.0	24	8.8	2.7	4.05	2.9	2.65	2.75
9	3.3	2.4	3.05	3.8	3.2	3.0	25	5.5	2.6	4.0	2.8	2.6	2.5
10	3.05	2.45	3.0	3.1	3.1	2.6	26	4.5	2.5	4.5	2.75	2.5	2.5
11	2.65	2.4	2.6	4.6	3.0	2.55	27	3.8	2.45	5.1	2.75	2.5	2.3
12	3.0	2.35	2.6	4.1	2.9	2.55	28	3.9	2.4	7.0	3.8	2.5	2.2
13	2.9	2.3	2.55	3.7	2.7	2.5	29	3.9	.....	6.6	3.25	2.55	2.2
14	4.1	2.3	2.6	3.4	2.6	2.5	30	3.6	.....	6.0	3.05	2.55	2.1
15	4.1	2.3	4.9	5.32	2.5	2.5	31	3.4	.....	6.4	.....	2.6	.....
16	3.95	2.3	7.1	5.4	2.6	2.5							

Rating table for Greenbrier River at Alderson, W. Va., for 1905 and 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.00	340	3.30	2,468	4.60	5,595	6.80	12,425
2.10	431	3.40	2,680	4.70	5,861	7.00	13,140
2.20	537	3.50	2,897	4.80	6,130	7.20	13,860
2.30	659	3.60	3,119	4.90	6,403	7.40	14,600
2.40	798	3.70	3,346	5.00	6,680	7.60	15,350
2.50	954	3.80	3,579	5.20	7,243	7.80	16,120
2.60	1,124	3.90	3,818	5.40	7,818	8.00	16,910
2.70	1,301	4.00	4,062	5.60	8,412	8.20	17,710
2.80	1,483	4.10	4,310	5.80	9,031	8.40	18,510
2.90	1,670	4.20	4,561	6.00	9,675	8.60	19,330
3.00	1,862	4.3	4,815	6.20	10,340	8.80	20,170
3.10	2,059	4.40	5,072	6.40	11,025	9.00	21,030
3.20	2,261	4.50	5,332	6.60	11,725	9.30	22,350

NOTE.—The above table is applicable only for open-channel conditions. It is based on 10 discharge measurements made during 1903–1905 between gage heights 1.4 feet and 8 feet. It is well defined between these limits.

Monthly discharge of Greenbrier River at Alderson, W. Va., for 1906.

[Drainage area, 1,340 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	22,400	1,210	5,110	3.81	4.39
February	2,260	340	928	.693	.72
March	13,500	598	4,770	3.56	4.10
April	7,820	1,390	3,520	2.63	2.93
May	2,570	954	1,490	1.11	1.28
June	2,900	431	1,180	.881	.98

NOTE.—Values for 1906 are probably excellent.

SCIOTO RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Scioto River rises in the eastern part of Auglaize County, Ohio, flows eastward for about 40 miles and then almost due south, entering the Ohio at Portsmouth. Below Columbus, where it is joined by the Olentangy, it is one of the largest and most important streams in the State. The United States Geological Survey maintains stations on both Scioto and Olentangy rivers at Columbus for the purpose of studying the water supply and sewage disposal of that city. The river has considerable fall and flows through a hilly basin, forming numerous good locations for water-power developments.

SCIOTO RIVER NEAR COLUMBUS, OHIO.

This station was originally established for the Ohio State board of health to obtain data for the water-supply and sewage-disposal problems of Columbus. It was located on the Grand View Avenue Bridge, 3 miles northwest of Columbus post-office, and was reestablished on the same bridge for the United States Geological Survey on November 21, 1903. The station was discontinued July 21, 1906. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 60, where are given also references to publications that contain data for previous years.

Daily gage height, in feet, of Scioto River near Columbus, Ohio, for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	10.6	10.41	10.08	16.7	10.4	9.63	9.3
2	10.6	9.96	11.7	15.56	10.3	10.1	9.31
3	10.5	10.06	11.8	14.7	10.15	9.8	9.25
4	12.75	10.06	12.2	13.6	10.06	10.45	9.2
5	13.3	9.99	11.7	12.7	10.05	9.53	9.7
6	12.64	9.9	10.7	11.48	10.02	9.45	9.52
7	12.3	9.89	10.73	11.75	9.99	9.15	12.3
8	11.5	10.02	10.53	11.7	9.9	9.1	10.98
9	11.4	9.9	10.72	11.6	9.91	9.3	10.72
10	10.5	9.8	10.77	11.48	9.8	10.2	10.19
11	10.49	9.72	10.75	11.22	9.7	10.0	10.52
12	10.6	9.73	10.55	11.09	9.7	9.7	9.99
13	10.36	9.73	10.5	10.89	9.69	9.6	9.52
14	10.43	9.98	10.45	10.7	9.7	9.6	9.6
15	9.84	9.89	10.32	12.12	9.7	9.46	9.53
16	12.9	9.78	10.3	11.8	9.72	9.4	9.6
17	13.3	9.82	10.29	11.48	9.7	9.37	9.54
18	12.59	9.9	10.29	10.62	9.6	9.4	9.5
19	12.25	9.82	10.41	10.76	9.59	9.35	9.51
20	11.49	9.9	9.94	10.7	9.55	9.89	9.48
21	11.4	9.54	10.05	10.32	9.5	9.77	9.46
22	11.7	10.09	10.25	10.48	9.48	9.59	.....
23	12.78	10.3	10.09	10.3	9.98	9.6	.....
24	12.57	10.7	10.25	10.4	9.7	9.71	.....
25	11.65	10.0	10.31	10.19	9.5	9.82	.....
26	11.0	10.86	10.61	10.27	9.5	9.8	.....
27	10.9	10.7	21.1	10.51	9.48	9.7	.....
28	10.76	10.3	20.36	11.26	9.7	9.62	.....
29	10.76	.....	17.37	10.9	9.69	9.51	.....
30	10.53	.....	18.5	10.56	9.7	9.37	.....
31	10.5	.....	18.2	.....	9.64	.....	.....

Rating table for Scioto River near Columbus, Ohio, for 1904 to 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
9.10	43	10.40	475	11.70	1,340	14.00	3,595
9.20	61	10.50	530	11.80	1,420	14.20	3,825
9.30	81	10.60	585	11.90	1,500	14.40	4,065
9.40	103	10.70	645	12.00	1,585	14.60	4,305
9.50	128	10 80	705	12 20	1,755	14.80	4,555
9.60	156	10.90	765	12.40	1,935	15 00	4,805
9.70	186	11.00	830	12.60	2,120	16.00	6,160
9 80	218	11.10	895	12.80	2.310	17.00	7,640
9.90	253	11.20	965	13.00	2.5.0	18 00	9,200
10 00	291	11.30	1,0.5	13.20	2,715	19 00	10,850
10 10	332	11.40	1,110	13.40	2,925	20 00	12,600
10 20	376	11.50	1,185	13.60	3,145	21.00	14,450
10.30	424	11.60	1,260	13.80	3,365		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 17 discharge measurements made during 1904–5. It is well defined between gage heights 9 feet and 12 feet. The table above 12 feet is based on 4 measurements from 18 to 23 feet gage height.

Monthly discharge of Scioto River near Columbus, Ohio, for 1906.

[Drainage area, 1,050 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	2,820	232	1,240	1.18	1.36
February	741	139	317	.302	.31
March	14,600	268	2,330	2.22	2.56
April	7,190	372	1,450	1.38	1.54
May	475	123	218	.208	.24
June	502	43	176	.168	.19
July 1–21	1,840	61	302	.288	.22

NOTE.—Values for 1906 are probably excellent. This estimate of accuracy is dependent on continuance of the conditions of flow in 1905, as no measurements have been made in 1906. The value for February may also be slightly in error, due to ice conditions.

OLENTANGY RIVER NEAR COLUMBUS, OHIO.

This station was established October 7, 1903, in connection with the water-supply and sewage-disposal investigations of the city of Columbus, Ohio. It is located 4 miles north of the Columbus post-office and one-fourth mile west of North High street, at the Dodridge Street Bridge. This station was discontinued July 23, 1906. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 64, where are given also references to publications that contain data for previous years.

Gage heights for 1906 are considered very unreliable and hence are not published. The following discharge measurements were made during 1906:

Discharge measurements of Olentangy River near Columbus, Ohio, in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
February 13[a]	Brennan and Kriegsman	135	397	6.77	72
March 4	E. F. Kriegsman	151	832	8.84	1,340
April 7	do	142	658	7.84	598
May 16	do	138	493	6.86	190

[a] River entirely frozen over. Average thickness of ice, 0.6 foot; ice smooth underneath. Gage height is to water surface, which was about 0.05 foot below the ice surface.

LITTLE MIAMI RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Little Miami River rises in the southeastern part of Clark County, flows southwest through Greene and Warren counties, and enters Ohio River just above Cincinnati. The greater part of the drainage area lies to the east, as there is only a narrow piece of country between this and Miami River. The Little Miami is the best power river in the State of Ohio, and the data collected in this basin are of value in that connection and also in connection with sewage and other waste disposal at Springfield.

LITTLE MIAMI RIVER AT LOVELAND, OHIO.

This station was established May 19, 1906, and discontinued July 20, 1906. It is located at the Main Street Bridge in Loveland, Ohio, about 800 feet above the Baltimore and Ohio Railroad bridge in order to furnish data for water-power estimates and for study of methods of disposing of waste products.

The channel is practically straight for 900 feet above and below the station and bends sharply to the right about 900 feet below. Both banks are high and do not overflow. The bed is a rock ledge covered with a thin layer of sand. The velocity is medium. Measurements may be affected by the ruins of an old dam about 1,300 feet below the station.

Discharge measurements are made from the upstream side of the two-span highway bridge to which the gage is attached. The initial point for soundings is the face of the right abutment. A standard chain gage is fastened to the band rail of the bridge; length of chain, 29.00 feet. The gage was read by Stewart Williams. The gage is referred to a standard United States Geological Survey bench mark embedded in the top of the right abutment of the upstream side of the bridge, and stamped "584 Columbus datum," elevation 23.19, above the gage datum.

Discharge measurements of Little Miami River at Loveland, Ohio, in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 12	E. F. Kriegsman	291	942	4.30	995
May 21	do	282	672	3.40	344
June 8	do	276	661	3.37	324

Daily gage height, in feet, of Little Miami River at Loveland, Ohio.

Day.	May.	June.	July.	Day.	May.	June.	July.
1		3.32	2.85	17		3.0	4.18
2		3.12	2.9	18		3.28	3.6
3		2.95	2.9	19	3.3	3.2	3.3
4		3.18	3.35	20	3.15	3.12	4.9
5		3.4	3.58	21	3.25	3.05	
6		4.6	3.4	22	3.25	3.12	
7		3.6	3.3	23	3.88	3.0	
8		3.28	4.15	24	3.58	2.9	
9		3.12	3.92	25	3.45	3.32	
10		2.95	3.52	26	3.3	3.05	
11		3.15	3.42	27	3.28	3.18	
12		3.05	3.35	28	4.25	3.08	
13		3.02	3.3	29	3.52	3.15	
14		3.12	3.18	30	3.4	2.98	
15		3.28	2.98	31	3.42		
16		3.22	3.22				

MAD RIVER NEAR SPRINGFIELD, OHIO.

This station was established December 31, 1903, and discontinued March 31, 1906. It is located at the highway bridge 4 miles west of Springfield, Ohio, about 500 feet below the old Red Mill dam. The conditions at this station and the bench marks are decribed in Water-Supply Paper No. 169, page 67, where are given also references to publications that contain data for previous years.

Discharge measurements of Mad River near Springfield, Ohio, in 1904 and 1905.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1904.		*Feet.*	*Sq. feet.*	*Feet.*	*Sec.-ft.*
January 30	R. W. Pratt	55	224	6.40	334
February 27	do	60	292	6.60	547
March 25	do	99	701	10.20	2,560
April 9	do	63	337	6.90	820
June 25	do	65	239	5.82	262
July 30[a]	do	82	80	5.65	174
August 30[a]	do	97	92	5.56	138
September 23[a]	do	96	95	5.50	127
October 18[a]	do	95	99	5.59	145
November 17[a]	do	96	117	5.64	150
December 28[a]	do	130	939	6.50	407
1905.					
January 12[a]	R. W. Pratt	165	926	6.63	527
February 27[a]	do	125	935	6.97	750
March 23[a]	do	108	830	6.13	326
May 20	M. S. Brennan	117	430	6.64	818
June 18	Sidney K. Clapp	113	350	6.00	341
July 11	do	111	330	5.92	279
August 24[a]	R. W. Pratt	103	699	5.86	234
August 24	do	111	321	5.87	259
October 11[a]	do	105	744	6.18	351
November 11[a]	do	105	702	6.15	300
1906.					
March 3	E. F. Kriegsman	115	524	7.42	1,420

[a] Made at different sections.

Daily gage height, in feet, of Mad River near Springfield, Ohio, for 1906.

Day.	March.	Day.	March.
1	6.0	17	6.1
2	5.9	18	6.0
3	7.7	19	6.0
4	6.7	20	6.0
5	6.5	21	6.1
6	6.3	22	6.1
7	6.2	23	6.2
8	6.3	24	6.1
9	6.3	25	6.2
10	6.3	26	7.0
11	6.3	27	15.0
12	6.3	28	11.3
13	6.2	29	9.6
14	6.2	30	11.0
15	6.2	31	10.5
16	6.1		

Rating table for Mad River near Springfield, Ohio, applicable February 7 to March 27 and July 14 to October 31, 1904; January 13 to February 3, February 22 to May 12, and July 1 to October 16, 1905.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
5.20	35	6.10	345	7.00	740	8.80	1,710
5.30	60	6.20	385	7.20	840	9.00	1,830
5.40	90	6.30	425	7.40	940	10.00	2,440
5.50	123	6.40	465	7.60	1,040	11.00	3,090
5.60	157	6.50	505	7.80	1,145	12.00	3,790
5.70	192	6.60	550	8.00	1,255	13.00	4,515
5.80	228	6.70	595	8.20	1,365	14.00	5,265
5.90	266	6.80	640	8.40	1,475	15.00	6,015
6.00	305	6.90	690	8.60	1,590		

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1904 and 1905. It is based on an average curve, and is applied directly over the periods indicated above. During periods when discharge measurements do not plot fairly close to the curve it has been used as a basis for determining the daily discharge by the indirect method for shifting conditions of flow. Below gage height 5.4 feet the curve is only approximate.

Monthly discharge of Mad River near Springfield, Ohio, for 1904 to 1906.

[Drainage area, 290 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
1904.					
January	5,000	120	629	2.17	2.50
February	3,020	300	790	2.72	2.93
March	6,320	505	1,320	4.55	5.25
April	5,200	450	959	3.31	3.69
May	520	310	385	1.33	1.53
June	770	220	299	1.03	1.15
July	920	123	314	1.08	1.24
August	228	90	143	.493	.57
September	192	30	129	.445	.50
October	247	123	159	.548	.63
November	172	115	142	.490	.55
December	1,070	95	179	.617	.71
The year	6,320	30	454	1.57	21.25
1905.					
January	505	90	233	.803	.93
February	1,360	150	324	1.12	1.17
March	1,590	266	522	1.80	2.08
April	1,140	210	430	1.48	1.65
May	3,400	266	839	2.89	3.33
June	3,600	270	689	2.37	2.64
July	465	192	274	.945	1.09
August	690	157	301	1.04	1.20
September 1-23	2,000	192	531	1.83	1.57
October 1-16	940	266	431	1.49	.89
November 11-30	300	210	252	.869	.65
December 1-16	660	170	308	1.06	.63
1906.					
March	6,500	620	1,320	4.55	5.25

NOTE.—Ice conditions January 3 to 12, 1904, and February 4 to 21, 1905. Daily discharge estimated during ice period. Values are rated as follows: January, 1904, fair; February and March, 1904, excellent; April and May, 1904, good; June to October, 1904, excellent; November, 1904, good; December, 1904, fair; January, 1905, fair; February, 1905, approximate; March, 1905, excellent; April, 1905, fair; May, 1905, approximate; June, 1905, fair; July to October, 1905, excellent; November and December, 1905, fair; March, 1906, approximate.

MIAMI RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The Miami furnishes the main drainage system of southwestern Ohio. Exclusive of the Whitewater, it has a drainage area of nearly 4,000 square miles, or about one-tenth of the State of Ohio. Its headwaters are at the continental watershed, and it drains the greater part of the Cincinnati arch from that watershed south to Ohio River. One of the eastern tributaries, Mad River, heads in the elevated tract near Bellefontaine, at an elevation of fully 1,200 feet above tide. The other headwaters, except the Whitewater, have their sources at an elevation of about 1,000 feet. The Whitewater, as noted above, rises in the higher part of eastern Indiana, at an elevation of nearly 1,200 feet.

The valleys of the headwaters as far down as the vicinity of Dayton are narrow and comparatively shallow post-Glacial channels with courses independent of pre-Glacial drainage lines. Mad River, it is true, occupies a broad trough-like valley, but on its borders are moraines which cause most of the relief, the bluffs being generally

but 20 or 30 feet high. Below Dayton the Miami and some of its tributaries occupy pre-Glacial lines which are only partly filled with glacial deposits. The work of the present streams has been in the main a reexcavation of the valleys. In this work they have fallen far short of reaching the old rock floors that lie 100 to 200 feet below their beds. The depth of this reexcavation is but 50 to 100 feet, and the width is but a small fraction of that of the old valley, seldom so much as one-fourth as great. The contrast between the southern and the northern portion of this drainage basin, therefore, is not found in the work of the present streams, but is due to the less complete concealment of pre-Glacial drainage lines.

The fall of the Miami is rapid throughout its entire length, being seldom less than 3 feet and usually over 4 feet per mile. The streams in this drainage system seldom reach a very low stage in seasons of drought, for the valleys are usually filled with gravelly or sandy deposits which furnish strong springs. Even in the small tributaries water-bearing beds outcrop along the banks or bluffs.

This stream and several of its tributaries afford valuable water power, the utilization of which is discussed by Prof. Dwight Porter in the Tenth Census Report.[a] From this report it appears that a total of 9,431 horsepower was used in 1880 by 290 mills, manufactories, etc., on the Miami and its tributaries, including Whitewater River.

The following pages contain the results of stream measurement data collected by the United States Geological Survey in the drainage basin of Miami River:

MIAMI RIVER AT DAYTON, OHIO.

This station was established March 18, 1905. It is located at the Miami Street Bridge, Dayton, Ohio, about one-half mile below the mouth of Mad River. There is a dam 1 mile above the station which may divert water through a canal and discharge it 1,000 feet below the gaging section. There is also a dam on Mad River, 2½ miles above the station, where water is diverted into the Miami canal. Besides water power the data at this station are valuable for water supply and sewage disposal. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 69. The gage heights are furnished by the United States Weather Bureau.

[a] Tenth Census of United States, 1880, Vol. XVII, pp. 478–487.

Discharge measurements of Miami River at Dayton, Ohio, in 1905 and 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1905.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 18	R. W. Pratt	406	1,600	2.15	1,530
May 19	M. S. Brennan	443	1,880	3.53	4,450
June 17	Sidney K. Clapp	373	1,090	1.60	967
July 11	do	359	897	1.10	618
August 25	R. W. Pratt	382	1,630	2.45	1,710
October 12	do	377	1,260	1.55	713
November 18	do	385	1,200	1.48	665
1906.					
March 3	E. F. Kriegsman	377	1,540	2.35	1,790
April 6	do	348	1,880	3.70	4,630
April 11	do	382	1,550	3.07	3,280
June 4	Murphy and Kriegsman	219	1,600	1.25	670

Daily gage height, in feet, of Miami River at Dayton, Ohio, for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.3	2.2	1 5	7.8	1.8	1.2	1.0	1.4	1.1
2	2.1	2.2	1.5	6.8	1.7	1.2	1.0	1.3	1.0
3	3.3	2.2	2.2	5.5	1.7	1.2	1.3	1.1	1.0
4	5.2	2.3	2.5	8.5	1.6	1.1	1.1	1.0	1.0
5	5.1	2.5	2.4	3.7	1.6	1.1	1.0	1.0	0.9
6	3.9	.....	2.3	3.7	1.6	1.2	0.9	0.9	.7
7	3.0	.....	1.5	3.5	1.5	1.2	1.0	.7	.9
8	2.8	.....	1.9	3.2	1.5	1.0	3.0	1.0	.8
9	3.0	.....	1.9	3.0	1.5	1.0	2.0	3.0	.7
10	3.0	.....	2.0	3.4	1.5	1.0	2.0	2.9	.7
11	3.0	.....	2.0	3.2	1.4	1.0	2.2	2.2	.7
12	3.0	.....	1.9	2.9	1.4	0.9	1.5	1.6	.7
13	3.3	.....	1.9	2.7	1.3	.9	1.2	1.2	.7
14	2.8	.....	1.9	2.5	1.3	.9	1.1	1.3	.6
15	2.4	1.8	1.8	2.5	1.2	1.0	1.5	1.2	.6
16	5.3	2.0	1.8	2.5	1.2	1.0	1.6	1.1	.6
17	5.0	1.9	1.8	2.5	1.1	1.0	1.7	1.0	.6
18	3.7	1.8	1.8	2.4	1.1	1.1	1.8	1.5	.7
19	3.2	1.8	1.7	2.3	1.1	1.1	1.9	1.3	.7
20	3.0	1.9	1.6	2.2	1.2	1.0	2.0	1.6	.7
21	2.9	1.9	1.7	2.1	1.2	1.0	2.4	2.0	.7
22	3.0	2.0	1.8	2.0	1.1	1.0	1.0	2.0	.7
23	4.0	2.0	1.7	2.0	1.4	1.0	1.0	2.0	.8
24	3.5	2.0	1.8	2.0	1.3	0.9	1.2	1.9	.7
25	3.0	1.9	1.8	1.9	1.1	.9	1.1	1.8	.7
26	2.7	1.8	1.7	1.9	1.0	.8	1.0	1.4	.7
27	2.5	1.8	10.0	1.9	1.2	.8	1.0	2.0	.7
28	2.3	1.8	11.9	1.8	1.3	.8	1.2	2.4	.7
29	2.3	.....	8.0	1.8	1.3	.7	2.5	2.0	.8
30	2.3	.....	7.4	1.7	1.3	.7	2.0	1.7	.8
31	2.3	.....	8.7	.....	1.3	.....	1.4	1.5	.....

NOTE.—River frozen February 5 to 14.

Rating table for Miami River at Dayton, Ohio, for 1905 and 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.50	220	1.80	1,160	3.10	3,250	4.80	8,300
0.60	260	1.90	1,260	3.20	3,490	5.00	9,000
0.70	310	2.00	1,370	3.30	3,740	5.20	9,720
0.80	360	2.10	1,490	3 40	4,000	5.40	10,450
0.90	420	2.20	1,620	3.50	4,270	5.60	11,190
1.00	480	2 30	1,750	3.60	4,540	5.80	11,940
1.10	550	2.40	1,890	3.70	4,820	6.00	12,700
1.20	620	2.50	2,040	3.80	5,110	7.00	16,700
1.30	700	2.60	2,210	3.90	5,400	8.00	20,900
1.40	780	2.70	2,390	4.00	5,700	9.00	25,200
1.50	870	2.80	2,590	4.20	6,320	10.00	29,600
1.60	960	2.90	2,800	4.40	6,960	11.00	34,100
1.70	1.060	3.00	3,020	4.60	7,620		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 7 discharge measurements made during 1905 and 1906. It is well defined between gage heights 1.0 feet and 4.0 feet. The extension above 7.0 feet is approximate.

Monthly discharge of Miami River at Dayton, Ohio, for 1905 and 1906.

[Drainage area, 2,450 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile	Depth in inches.
1905.					
April 16-30	7,960	620	2,430	.992	.55
May	26,500	620	4,720	1.93	2.22
June	5,400	620	1,550	.633	.71
July	1,060	310	519	.212	.24
August	5,700	220	1,300	.531	.61
September	9,360	420	2,860	1.17	1.30
1906.					
January	10,100	1,490	3,810	1.56	1.80
February	1,750	1,000	1,240	.506	.53
March	38,200	870	5,270	2.15	2.48
April	23,000	1,060	4,300	1.76	1.96
May	1,160	480	749	.306	.35
June	620	310	479	.196	.22
July	3,020	420	951	.388	.45
August	3,020	310	1,030	.420	.48
September	550	260	342	.140	.16

NOTE.—Daily discharge during frozen period estimated. Values are rated as follows: 1905, excellent, except July, which is good; January, April, May, July, and August, 1906, excellent; February, March, June, and September, 1906, good.

KENTUCKY RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Kentucky River drains into the Ohio from the south about halfway between Cincinnati, Ohio, and Louisville, Ky. The data collected in this basin are valuable for water-power purposes.

KENTUCKY RIVER AT FRANKFORT, KY.

This station was established March 18, 1905, and discontinued July 21, 1906. It is located at the Government dam on the Kentucky River in the lower part of Frankfort, Ky., about 1 mile below the city highway bridge. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 70.

The following discharge measurement was made April 16, 1906:

Width, 374 feet; area, 3,890 square feet; gage height, 8.12 feet; discharge, 10,800 second-feet.

Daily gage height, in feet, of Kentucky River at Frankfort, Ky., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	7.0	7.3	7.4	17.5	6.4	7.0	6.2
2	6.9	7.45	7.8	14.5	6.3	7.0	6.1
3	7.0	7.5	9.8	12.7	6.4	7.1	6.0
4	8.3	7.55	10.8	10.0	6.6	6.6	5.9
5	8.8	7.3	10.3	8.9	6.8	6.4	5.8
6	8.1	7.0	10.2	8.3	6.8	6.1	5.8
7	7.7	6.85	9.3	8.0	6.8	6.1	6.1
8	7.5	6.8	8.5	8.0	7.8	6.0	5.9
9	7.3	6.6	8.1	7.9	7.7	5.9	5.8
10	7.1	6.45	7.8	7.8	7.5	5.9	5.8
11	7.0	6.4	7.6	7.8	7.5	5.9	5.9
12	7.2	6.4	7.4	8.0	7.2	5.9	6.2
13	7.7	6.4	7.3	8.0	6.9	5.8	6.2
14	9.2	6.4	7.9	7.9	6.8	6.5	6.0
15	10.2	6.4	8.3	7.5	6.6	6.4	6.0
16	10.3	6.4	10.2	7.8	6.4	6.4	5.9
17	9.9	6.4	10.4	8.5	6.4	6.3	6.5
18	9.2	6.35	9.6	8.4	6.2	6.3	6.7
19	8.6	6.35	9.0	7.9	6.1	6.4	6.5
20	8.0	6.3	9.6	7.5	6.1	6.3	6.2
21	7.8	6.3	9.3	7.3	6.1	6.2	6.5
22	7.5	6.5	8.8	7.1	6.0	6.1	.....
23	8.0	6.9	8.4	6.95	5.9	5.9	.....
24	8.05	7.3	8.0	6.85	5.9	6.2	.....
25	7.6	8.0	8.0	6.8	5.85	6.1	.....
26	7.3	7.7	8.4	6.7	6.0	6.0	.....
27	7.1	7.5	9.4	6.5	5.9	6.0	.....
28	7.0	7.3	9.3	6.4	5.85	6.1	.....
29	6.9	.....	9.3	6.4	7.0	6.2	.....
30	6.8	.....	14.3	6.4	6.7	6.2	.....
31	6.9	.....	21.1	.....	6.4	.....	.....

SALT RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Salt River drains into the Ohio from the south about 20 to 30 miles below Louisville, Ky. The data collected in this basin are valuable for water-power purposes.

ROLLING FORK OF SALT RIVER AT NEW HAVEN, KY.

This station was established June 16, 1905, and discontinued March 31, 1906. It is located on the only two-span steel railroad bridge in New Haven, Ky., about one-fourth mile from the business section of the city. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 72.

Daily gage height, in feet, of Rolling Fork of Salt River at New Haven, Ky., for 1906.

Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.
1	.....	1.9	7.2	17	4.5	1.4	5.7
2	.....	1.7	7,7	18	3.5	1.3	4.0
3	5.8	1.6	13.2	19	3.0	1.4	5.9
4	7.2	1.6	16.0	20	2.7	1.2	7.2
5	5.7	1.7	7.5	21	.....	1.3	6.8
6	3.7	1.5	4.7	22	11.1	1.7	4.5
7	2.7	1.1	3.9	23	13.6	2.8	3.7
8	2.5	1.1	3.5	24	8.3	2.5	4.2
9	2.4	1.4	3.4	25	5.3	.....	5.7
10	2.0	1.2	3.6	26	3.7	2.4	5.3
11	2.1	1.3	3.3	27	3.2	3.7	8.7
12	2.4	1.3	2.9	28	.....	7.3	9.0
13	3.6	1.4	2.9	29	2.4	.....	10.3
14	.....	1.6	3.5	30	2.1	.....	17.1
15	7.0	1.6	5.3	31	2.1	.....	18.2
16	4.7	1.5	8.1				

WABASH RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The drainage basin of the Wabash embraces an area of about 33,000 square miles, distributed as follows: In Ohio, 400 square miles; in Indiana, 24,350 square miles; in Illinois, 8,250 square miles. It drains, therefore, slightly more than two-thirds of Indiana, the area of the State being 35,910 square miles. Of the portion in Indiana, about one-half is embraced in the drainage areas of East and West White rivers. By including these drainage areas with the Wabash, the entire basin has nearly symmetrical, broadly ovate form. Not including the White River system, the Wabash basin is an unsymmetrical, elongated tract, curving around White River.

The length of the valley occupied by the Wabash is about 450 miles, but the length of the stream is fully 500 miles, for the river in its lower course makes several oxbow curves within the valley. The source of the river is about 1,000 feet above tide, while its mouth at low water is but 311 feet. The average fall, if we estimate the stream to have a length of 500 miles, is therefore about 16.5 inches per mile. The rate of descent is far from uniform, being much more rapid in the upper portion than in the lower. There are also many rapids, separated by pools or sluggish portions of the stream. The elevation of the stream is accurately determined at many points, but in the absence of a careful measurement of the length of the stream the rate of fall is only approximately known. The section above the point where the river enters the old lake outlet, estimated to have a length of 100 miles, has a fall of about 300 feet, or 3 feet per mile. Railway levels and canal surveys, at the point where the river joins the old lake outlet, show its elevation to be nearly 700 feet above sea level, the altitudes reported varying between 696 and 699 feet.

The following table gives the elevation and fall at various points:

Table of altitudes and distances along Wabash River.

Location.	Estimated distance.	Altitude.	Fall per mile.
	Miles.	*Feet.*	*Inches.*
Source	0.0	1,000.0	0.0
Huntington	100.0	699.0	36.0
Mouth of Salamonie River	15.0	667.0	25.6
Mouth of Mississinewa River	20.0	633.0	20.4
Logansport	20.0	583.0	30.0
Lafayette	50.0	506.0	18.5
Attica	25.0	487.0	9.1
Covington	20.0	470.0	10.2
Terre Haute	55.0	447.7	4.9
State Line	14.6	440.6	5.8
Hutsonville, Ill	29.0	424.6	6.6
Vincennes	46.4	398.8	6.7
Mouth of White River	32.5	376.5	8.2
Grayville, Ill	28.0	365.0	4.9
Mouth of Little Wabash River	46.0	323.0	11.0
Mouth of Wabash River	16.0	311.0	9.0

WABASH RIVER AT LOGANSPORT, IND.

This station was established April 27, 1903, and was discontinued July 21, 1906. It is located at the Cicott Street Bridge, about 1 mile from the center of the city of Logansport, Ind., $1\frac{3}{4}$ miles from the Wabash Railroad station, $1\frac{1}{2}$ miles from the Pennsylvania station, four blocks from the street-car line, and 1,000 feet below the mouth of Eel River. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 74, where are given also references to publications that contain data for previous years. The data collected at this station are valuable for water-power purposes.

Discharge measurements of Wabash River at Logansport, Ind., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
February 9 [a]	Brennan and Kriegsman	486	991	2.02	1,270
March 10	E. F. Kriegsman	499	1,390	2.78	3,010
April 3	do	529	2,880	5.42	11,800
May 10	do	481	903	1.72	1,070

[a] Ice along the edges of the river.

Daily gage height, in feet, of Wabash River at Logansport, Ind., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	2.73	2.58	2.08	7.9	1.9	1.72	1.52
2	2.57	1.4	1.88	6.85	2.4	1.66	1.55
3	2.48	1.18	2.48	5.6	1.9	1.66	1.6
4	2.38	1.58	3.83	4.85	1.9	1.7	1.6
5	4.88	1.88	3.3	3.9	1.8	1.7	1.75
6	4.43	2.03	2.93	3.8	1.8	1.72	1.87
7	3.88	2.03	2.78	3.6	1.76	1.7	1.75
8	3.2	2.06	2.7	4.4	1.72	1.5	1.75
9	2.63	1.97	.....	6.7	1.76	2.7	1.69
10	2.0	1.88	2.78	7.15	1.73	2.4	1.6
11	2.18	1.83	2.68	5.9	1.66	2.06	1.86
12	2.38	1.78	2.58	4.85	1.65	1.8	1.8
13	2.18	1.83	2.53	4.8	1.6	1.86	1.83
14	2.15	1.88	2.41	4.7	1.72	1.8	1.82
15	2.08	2.08	2.28	5.9	1.72	1.76	1.8
16	2.68	2.18	2.23	5.25	1.8	1.72	1.8
17	2.88	2.23	2.18	3.8	1.68	1.7	1.8
18	3.18	1.88	2.08	3.4	1.6	1.72	1.8
19	3.08	1.73	1.93	3.3	1.6	1.66	1.8
20	2.88	1.78	1.98	2.86	1.4	1.6	1.8
21	3.88	1.78	1.98	.....	1.43	1.6	1.8
22	8.21	1.83	2.03	2.6	1.53	1.72	1.8
23	6.88	1.78	2.08	2.4	1.52	1.36	1.78
24	5.88	1.88	1.88	2.3	1.56	.....	.....
25	4.88	2.08	1.88	2.2	1.76	1.19	.....
26	4.13	2.38	1.98	2.2	1.5	1.19	.....
27	3.88	2.71	8.48	2.2	1.5	1.3	.....
28	3.68	2.58	9.03	2.1	1.6	1.37	.....
29	3.03	.....	8.38	2.15	1.44	1.4	.....
30	2.88	.....	8.18	2.1	1.47	1.57	.....
31	.....	.....	8.03	.....	1.84	.....	.....

NOTE.—Flow was not greatly affected by ice conditions.

Rating table for Wabash River at Logansport, Ind., for 1906.

Gage height	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.20	310	2.30	1,900	3.40	4,690	5.00	9,770
1.30	400	2.40	2,110	3.50	4,980	5.20	10,480
1.40	500	2.50	2,330	3.60	5,270	5.40	11,210
1.50	610	2.60	2,560	3.70	5,570	5.60	11,950
1.60	730	2.70	2,800	3.80	5,870	5.80	12,710
1.70	860	2.80	3,050	3.90	6,170	6.00	13,500
1.80	1,000	2.90	3,310	4.00	6,480	7.00	17,600
1.90	1,160	3.00	3,580	4.20	7,110	8.00	22,100
2.00	1,330	3.10	3,850	4.40	7,750	9.00	26,800
2.10	1,510	3.20	4,130	4.60	8,410	9.10	27,280
2.20	1,700	3.30	4,410	4.80	9,080		

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1903 to 1906. It is well defined.

Monthly discharge of Wabash River at Logansport, Ind., for 1906.

[Drainage area, 3,160 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile	Depth in inches.
January	23,000	1,330	5,280	1.67	1.92
February	2,820	294	1,320	.418	.44
March	26,900	1,130	5,720	1.81	2.09
April	21,600	1,510	7,360	2.33	2.60
May	2,110	500	863	.273	.31
June	2,800	302	876	.277	.31
July 1–23	1,110	634	930	.294	.25

NOTE.—Values for 1906 are excellent.

WABASH RIVER AT TERRE HAUTE, IND.

This station was established February 25, 1905, and was discontinued July 20, 1906. It is located at the Vandalia Line railway bridge, near the city waterworks. There are no tributaries nor any islands, falls, or dams in the river near the station. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 77, where are given also references to publications that contain data for previous years. The data collected at this station are valuable in connection with water-power, water-supply, and sewage-disposal problems.

Discharge measurements of Wabash River at Terre Haute, Ind., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
February 16 [a]	Brennan and Kriegsman	482	3,790	4.40	6,710
March 28	E. F. Kriegsman	606	10,700	15.84	40,600
March 31	do	714	13,000	19.20	62,800
April 18	do	580	8,520	12.02	25,500
April 19	do	564	7,740	10.80	22,200
April 20	do	557	6,790	9.30	19,300
April 20	do	557	6,650	8.92	18,200
April 21	do	552	6,2.0	7.95	16,800
April 21	do	549	5,950	7.65	16,200
April 23	do	541	5,190	6.35	13,200
June 9	do	535	4,500	4.98	11,400

[a] Partial ice conditions.

Daily gage height, in feet, of Wabash River at Terre Haute, Ind., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	4.68	8.22	5.02	19.8	3.88	5.72	1.08
2	4.72	7.28	4.88	19.22	3.8	4.22	1.22
3	4.85	6.0	7.38	18.45	3.78	3.5	1.35
4	5.88	5.58	9.9	17.7	3.75	2.88	1.32
5	6.5	5.15	10.78	16.8	3.78	2.88	1.38
6	7.35	4.55	10.48	15.22	3.52	3.2	1.7
7	7.85	2.45	9.28	12.9	3.3	3.12	1.72
8	7.18	2.35	8.48	10.75	3.1	2.52	1.62
9	5.82	2.7	8.3	14.22	2.95	4.22	1.6
10	4.78	2.78	8.18	15.02	2.9	5.55	1.52
11	3.85	2.92	7.82	15.1	2.82	4.52	1.42
12	4.02	3.02	7.28	15.3	2.72	4.08	1.35
13	3.62	3.2	6.75	15.42	2.62	3.38	1.32
14	3.58	3.72	6.38	14.95	2.52	2.92	1.32
15	3.55	4.42	5.98	12.85	2.45	2.6	1.25
16	3.75	4.15	5.58	12.52	2.35	2.32	1.22
17	3.82	3.4	5.28	12.75	2.28	2.12	1.4
18	3.88	3.12	4.98	12.25	2.15	1.98	1.75
19	3.95	3.6	4.82	10.7	2.12	1.82	1.7
20	4.65	4.02	4.55	9.1	2.08	1.75	1.42
21	5.72	4.2	4.35	7.9	2.02	1.75	.....
22	13.68	3.78	4.42	6.95	1.92	1.7	.....
23	15.95	3.82	4.6	6.28	1.9	1.68	.....
24	16.82	3.78	4.52	5.72	1.85	1.6	.....
25	17.12	4.18	4.48	5.38	1.9	1.5	.....
26	17.38	5.0	6.35	5.05	1.98	1.42	.....
27	17.22	5.22	14.28	4.78	1.9	1.3	.....
28	16.25	5.3	15.88	4.48	2.12	1.28	.....
29	14.12	.....	16.42	4.25	2.08	1.2	.....
30	11.18	.....	17.02	4.05	1.88	1.15	.....
31	9.3	.....	18.95	.....	4.32	.....	.....

NOTE.—Ice gorge at railroad bridge, a short distance above the gaging section, February 7 to 18. The flow at the gaging section was probably affected by ice on only February 15 and 16.

Rating table for Wabash River at Terre Haute, Ind., for 1905 and 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.00	2,050	2.50	4,510	4.00	7,620	7.00	14,700
1.10	2,180	2.60	4,700	4.20	8,060	8.00	17,200
1.20	2,320	2.70	4,900	4.40	8,500	9.00	19,800
1.30	2,460	2.80	5,100	4.60	8,940	10.00	22,500
1.40	2,610	2.90	5,300	4.80	9,380	11.00	25,300
1.50	2,770	3.00	5,500	5.00	9,830	12.00	28,400
1.60	2,940	3.10	5,700	5.20	10,300	13.00	31,800
1.70	3,110	3.20	5,900	5.40	10,780	14.00	35,500
1.80	3,280	3.30	6,100	5.60	11,260	15.00	39,500
1.90	3,450	3.40	6,310	5.80	11,740	16.00	43,700
2.00	3,620	3.50	6,520	6.00	12,220	17.00	48,100
2.10	3,790	3.60	6,740	6.20	12,700	18.00	52,700
2.20	3,970	3.70	6,960	6.40	13,200	19.00	57,400
2.30	4,150	3.80	7,180	6.60	13,700	20.00	62,100
2.40	4,330	3.90	7,400	6.80	14,200		

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1905 and 1906. It is well defined.

Monthly discharge of Wabash River at Terre Haute, Ind., for 1905 and 1906.

[Drainage area, 12,200 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
1905.					
March	39,500	7,620	16,400	1.34	1.54
April	25,000	3,650	10,700	.877	.98
May	48,100	7,400	19,400	1.59	1.83
June	15,400	4,330	9,240	.757	.84
July	9,270	2,640	5,250	.430	.50
August	5,100	2,250	3,420	.280	.32
September	10,100	2,610	4,980	.408	.46
October	9,650	1,920	3,950	.324	.37
November	17,200	2,640	4,840	.397	.44
December	22,100	4,470	9,880	.810	.93
1906.					
January	49,800	6,630	19,600	1.61	1.86
February	17,800	4,240	8,050	.660	.69
March	57,200	8,390	19,000	1.56	1.80
April	61,200	7,730	29,500	2.42	2.70
May	8,320	3,360	4,910	.402	.46
June	11,500	2,250	5,010	.411	.46
July 1–20	3,200	2,150	2,680	.220	.16

NOTE.—The 1905 monthly discharge has been recomputed on the basis of the above rating table, which gives better results for medium and high stages.

Values for February 15 and 16, 1906, reduced on account of ice conditions on those days. Discharge during the remainder of the winter period considered unaffected by ice conditions. Values for 1905 and 1906 are excellent.

The following table gives the horsepower (80 per cent efficiency) per foot of fall that may be developed at different rates of discharge and shows the number of days on which the flow and the corresponding horsepower were respectively less than the amounts given in the columns for "discharge" and "horsepower."

Discharge and horsepower table for Wabash, Terre Haute, Ind., for 1905 and 1906.

Discharge in second-feet.	Horsepower; 80 per cent efficiency per foot fall.	Number of days of deficient flow.	
		1905. [a]	1906. [b]
1,980	180	1	.....
2,200	200	6	1
2,750	250	28	18
3,300	300	57	31
3,850	350	82	45
4,400	400	101	51
4,950	450	124	59

[a] March to December.
[b] January to July 20.

NOTE.—The minimum flow during the period covered by the above table was 1,920 second-feet, giving 175 horsepower per foot of fall on one day in October, 1905.

TIPPECANOE RIVER NEAR DELPHI, IND.

This station was established March 14, 1903, and was discontinued July 20, 1906. It is located at the highway bridge at Springboro, Ind. The nearest railroad station is Delphi, 5 miles east of Springboro. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 80, where are given also references to publications that contain data for previous years. The data collected at this station are valuable for water-power purposes.

Discharge measurements of Tippecanoe River at Delphi, Ind., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
February 10 [a]	Brennan and Kriegsman	272	522	3.86	1,450
March 10	E. F. Kriegsman	335	790	4.74	3,320
April 3	do	325	779	4.62	3,090
May 9	do	257	361	3.27	962

[a] Slush and cake ice running.

Daily gage height, in feet, of Tippecanoe River near Delphi, Ind., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	3.75	5.17	4.18	5.47	3.49	3.1	3.0
2	3.73	4.8	4.76	5.25	3 45	3.04	3.02
3	3.7	4.2	5.34	4.97	3.57	3.0	3.0
4	3.72	4.16	5.27	4.63	3.51	2.99	2.99
5	3.78	4.09	5.21	4.37	3.44	2.97	2.97
6	3.74	4.02	4.99	4.6	3.43	3.04	2.96
7	3.69	3.96	4.96	4.5	3.4	3.0	2.94
8	3.66	3.93	4.89	4.42	3.33	2.95	2.9
9	3.61	3.9	4.83	5.7	3.27	3.1	2.88
10	3.58	3.87	4.82	5.27	3.25	3.08	2.85
11	3.55	3.84	4.79	5.06	3.21	3.11	2.84
12	3.52	3.81	4.76	4.89	3.19	3 32	2.87
13	3.47	3.78	4.72	4.56	3.22	3 26	2.9
14	3.43	3.76	4 68	4.63	3 18	3.17	2.81
15	3.57	3.68	4.66	5.17	3.16	3.13	2.85
16	3.51	3.64	4.59	4.95	3.15	3.1	2.98
17	3.48	3.61	4.37	4.8	3.14	3.04	2.97
18	3.46	3.66	4.19	4.67	3.11	3.0	2.9
19	3.42	3.64	3.94	4 43	3.09	2.99	2.84
20	4.73	3.6	3.88	4.37	3 08	3.0	2.82
21	5.8	3.57	3.75	4.19	3.05	2.95	.....
22	6.12	3.52	3.73	4.0	3 03	2.96	.....
23	6.36	3.48	3.7	3.96	3.1	2.94	.....
24	6.39	3.45	3.75	3.91	3.15	2 93	.....
25	6.3	4.4	3.78	3.84	3.13	2.93	.....
26	6.15	4.33	4.12	3.76	3.11	2.9	.....
27	6.1	4.28	6.18	3.65	3 07	2 87	.....
28	6.0	4.21	6.0	3.6	3.05	2.85	.....
29	5.85	.....	5.94	3.57	3.03	2.95	.....
30	5.57	.....	5.86	3.53	3.1	3.02	.....
31	5.25	.....	5.71	.....	3.15	.....	.....

NOTE.—Flow slightly affected by ice conditions February 5 to 10.

Rating table for Tippecanoe River near Delphi, Ind., for 1904 to 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.80	390	3.70	1,620	4.60	3,090	5.50	4,860
2.90	510	3.80	1,770	4.70	3,270	5.60	5,070
3 00	630	3.90	1,930	4.80	3,450	5.70	5,280
3.10	760	4.00	2,090	4.90	3,640	5 80	5,490
3 20	890	4.10	2,250	5 00	3,830	5.90	5,700
3.30	1,030	4.20	2,410	5.10	4,030	6.00	5,910
3.40	1,170	4.30	2,580	5.20	4,230	6.20	6,350
3.50	1,320	4.40	2,750	5.30	4,440	6.40	6.790
3.60	1,470	4.50	2,920	5.40	4,650		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 28 discharge measurements made during 1903 to 1906. It is well defined.

Monthly discharge of Tippecanoe River near Delphi, Ind., for 1906.

[Drainage area, 1,890 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	6,770	1,200	3,100	1.64	1.89
February	4,170	1,240	1,930	1.02	1.06
March	6,310	1,620	3,400	1.80	2.08
April	5,280	1,360	2,960	1.57	1.75
May	1,420	670	916	.485	.56
June	1,060	450	663	.351	.39
July 1–20	660	460	528	.279	.21

NOTE.—Correction made in daily discharge values for February 5 to 10 on account of ice conditions. Values for 1906 are excellent.

The following table gives the horsepower (80 per cent efficiency) per foot of all that may be developed at different rates of discharge, and shows the number of days on which the flow and the corresponding horsepower were, respectively, less than the amounts given in the columns for "discharge" and "horsepower."

Discharge and horsepower table for Tippecanoe River near Delphi, Ind., for 1903 to 1906.

Discharge in second-feet.	Horsepower, 80 per cent efficiency, per foot fall.	Number of days of deficient flow.			
		1903.	1904.	1905.	1906.[a]
275	25	.....	1	.....	.....
330	30	.....	9	.....	.....
385	35	.....	12	.....	.....
440	40	.....	43	59	2
495	45	.....	67	59	10
550	50	.....	105	63	14
660	60	22	156	84	36
770	70	66	172	111	54
880	80	117	183	125	66
990	90	136	191	146	71
1,100	100	158	200	160	74
1,320	120	197	210	185	86

[a] January 1–July 20.

NOTE.—The minimum flow during the period covered by the above table was 269 second-feet, giving 24 horsepower per foot of fall, on one day in August, 1904.

WEST BRANCH OF WHITE RIVER AT INDIANAPOLIS, IND.

This station was established May 6, 1904, and was discontinued July 21, 1906. It is located in the central portion of the city, on the bridge of the Cleveland, Cincinnati, Chicago and St. Louis Railway. The waterworks canal, which draws water from the river about 7 miles above the gaging station for the city supply and for power purposes, very seriously modifies the low-water flow of the river, as it takes at least 25 per cent of the low-water flow. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 83, where are given also references to publications that contain data for previous years. The data collected at this station are valuable for water-power, water-supply, and sewage-disposal purposes.

Discharge measurements of West Branch White River at Indianapolis, Ind., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
February 14	Brennan and Kriegsman	227	1,160	7.80	765
February 28	E. F. Kriegsman	221	1,200	8.00	1,000
March 30	do	331	3,050	13.64	10,500
March 31	do	331	3,700	16.00	18,000
June 9	do	226	1,110	7.78	643

Daily gage height, in feet, of West Branch White River at Indianapolis, Ind., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	8.45	8.5	7.95	16.45	7.85	8.75	7.1
2	8.25	8.3	8.3	14.55	7.8	8.6	7.1
3	8.5	7.9	8.8	12.4	7.8	8.4	7.1
4	10.6	7.85	9.3	11.15	7.75	7.9	7.4
5	11.85	7.7	9.45	10.7	7.8	8.2	7.15
6	10.85	7.55	9.0	10.35	7.7	8.0	7.25
7	9.7	7.6	8.55	10.0	7.65	8.0	7.2
8	8.2	7.5	8.5	9.9	7.6	7.85	7.15
9	8.3	7.6	8.6	12.5	7.55	7.8	7.1
10	8.2	7.55	8.8	13.0	7.55	7.7	7.1
11	8.3	7.55	8.95	12.0	7.6	7.65	7.15
12	8.5	7.6	9.2	11.0	7.55	7.5	7.4
13	8.4	7.6	9.45	10.4	7.55	7.45	7.15
14	8.25	7.65	9.4	10.75	7.5	7.45	7.05
15	8.35	7.75	9.35	11.55	7.45	7.4	7.05
16	9.5	7.85	9.1	11.35	7.3	7.35	7.1
17	10.1	7.6	9.3	10.4	7.3	7.3	7.05
18	9.9	7.6	9.45	9.8	7.35	7.3	7.05
19	9.4	7.65	9.5	9.4	7.5	7.25	7.05
20	9.1	7.7	9.2	9.1	7.4	7.25	7.05
21	8.8	7.8	8.9	8.9	7.4	7.25	6.95
22	11.1	7.9	8.8	8.75	7.35	7.35	.....
23	12.0	7.95	8.65	8.55	7.4	7.3	.....
24	11.35	8.0	8.5	8.45	7.4	7.3	.....
25	10.5	8.2	8.45	8.3	7.4	7.25	.....
26	9.7	8.4	8.35	8.2	7.35	7.15	.....
27	9.3	8.35	14.7	8.15	7.35	7.15	.....
28	9.0	8.0	15.45	8.0	7.5	7.1	.....
29	8.9	.....	15.6	7.95	7.4	7.1	.....
30	8.8	.....	13.6	7.9	7.35	7.2	.....
31	8.6	.....	16.25	.....	7.65	.....	.....

NOTE.—Discharge probably unaffected by ice conditions.

Rating table for West Branch White River at Indianapolis, Ind., for 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
6.90	240	8.20	1,080	9.50	2,420	11.00	5,820
7.00	280	8.30	1,170	9.60	2,540	11.80	6,230
7.10	325	8.40	1,260	9.70	2,670	12.00	6,650
7.20	375	8.50	1,350	9.80	2,800	12.20	7,090
7.30	430	8.60	1,450	9.90	2,930	12.40	7,540
7.40	490	8.70	1,550	10.00	3,070	12.60	8,000
7.50	550	8.80	1,650	10.20	3,350	12.80	8,470
7.60	615	8.90	1,750	10.40	3,650	13.00	8,950
7.70	680	9.00	1,850	10.60	3,970	14.00	11,570
7.80	750	9.10	1,960	10.80	4,310	15.00	14,570
7.90	830	9.20	2,070	11.00	4,670	16.00	18,000
8.00	910	9.30	2,180	11.20	5,040	16.50	19,830
8.10	990	9.40	2,300	11.40	5,420		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 5 discharge measurements made during 1906 and on the form of the 1905 rating curve. It is not very well defined.

Monthly discharge of West Branch White River at Indianapolis, Ind., for 1906.

[Drainage area, 1,520 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	6,650	1,080	2,490	1.64	1.89
February	1,350	550	791	.521	.54
March	18,900	870	3,940	2.60	3.00
April	19,600	830	4,290	2.82	3.15
May	790	430	566	.372	.43
June	1,600	325	632	.416	.46
July 1–21	490	260	342	.225	.18

NOTE.—Values are rated as follows: January and February, good; March and April, excellent; May, June, and July, fair.

EEL RIVER AT CATARACT, IND.

This station was established August 6, 1903, and was discontinued March 31, 1906. It is located 6 miles from Cloverdale, Ind., and one-half mile northeast of Cataract, Ind. It is 300 feet above a dam, below which there is a fall of 35 feet. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 85, where are given also references to publications that contain data for previous years. The data collected are valuable for water-power purposes.

Daily gage height, in feet, of Eel River, at Cataract, Ind., for 1906.

Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.
1	2.8	2.9	3.2	17	4.0	2.9	2.8
2	3.0	2.7	3.3	18	4.1	2.8	2.7
3	3.2	2.6	3.4	19	4.2	2.7	2.7
4	3.4	.....	3.3	20	4.2	2.7	2.6
5	3.6	.....	3.3	21	4.1	2.6	2.6
6	3.7	.....	3.2	22	4.0	2.8	2.5
7	3.7	.....	3.2	23	4.0	2.9	2.5
8	3.7	.....	3.1	24	3.9	3.0	2.6
9	3.6	.....	3.0	25	3.9	2.9	2.7
10	3.6	2.7	3.0	26	3.8	2.9	3.3
11	3.6	2.7	3.1	27	3.7	2.9	4.1
12	3.6	2.7	3.1	28	3.6	3.0	4.4
13	3.6	2.6	3.0	29	3.4	.....	4.4
14	3.7	2.6	3.0	30	3.2	.....	4.6
15	3.8	2.8	2.9	31	3.0	.....	4.9
16	3.9	2.9	2.9				

NOTE.—River frozen February 4 to 9.

EAST BRANCH OF WHITE RIVER AT SHOALS, IND.

This station was established June 25, 1903, and was discontinued July 21, 1906. It is located at the highway bridge in the village of Shoals, Ind., 400 feet above the Baltimore and Ohio Southwestern Railroad bridge. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 86, where are given also references to publications that contain data for previous years. The data collected are valuable for water-power purposes.

Discharge measurements of East Branch of White River at Shoals, Ind., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
February 15[a]	Brennan and Kriegsman	341	943	64.90	2,550
March 1	E. F. Kriegsman	331	967	65.08	3,200
March 29	do	406	4,390	74.01	20,000
April 2	do	430	9,400	85.62	37,800
April 15	do	353	2,510	69.30	12,400

[a] Thin ice running.

Daily gage height, in feet, of East Branch of White River at Shoals, Ind., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	65.8	65.5	65.2	84.5	65.0	64.3	17	70.0	64.7	67.1	69.3	64.4	64.0
2	66.2	65.4	65.1	86.0	65.0	64.3	18	69.8	64.7	66.7	68.8	64.4	63.9
3	67.8	65.3	67.1	87.4	65.0	64.2	19	69.5	64.7	66.7	67.8	64.3	63.9
4	76.4	65.2	69.0	88.0	64.9	64.2	20	69.2	64.6	67.0	67.0	64.3	63.9
5	75.0	65.0	70.8	87.5	64.9	65.1	21	68.0	64.7	68.1	66.7	64.3	63.8
6	73.5	64.8	70.2	85.7	65.0	64.8	22	67.6	64.9	69.7	66.4	64.3	63.8
7	73.0	64.6	68.8	82.8	65.1	64.7	23	67.9	65.5	69.8	66.0	64.3	63.9
8	72.5	64.3	67.4	77.0	65.0	64.5	24	67.7	65.9	69.7	65.8	64.3	63.8
9	71.3	64.3	66.3	73.2	64.8	64.5	25	67.5	65.8	69.7	65.7	64.2	63.8
10	69.5	64.4	66.6	72.0	64.7	64.7	26	67.1	65.5	70.0	65.6	64.2	63.8
11	67.8	64.5	66.6	71.0	64.6	64.6	27	66.7	65.3	70.7	65.4	64.2	63.8
12	66.6	64.7	66.6	70.5	64.4	64.4	28	66.3	65.2	73.7	65.3	64.2	63.8
13	66.4	64.7	66.6	70.0	64.5	64.3	29	66.0	.....	74.4	65.2	64.1	63.8
14	66.2	64.7	66.7	69.8	64.5	64.2	30	65.8	.....	78.2	65.1	64.1	63.8
15	67.5	64.7	66.9	69.5	64.5	64.1	31	65.6	.....	82.5	.....	64.1	.....
16	69.1	64.8	67.0	69.2	64.4	64.0							

NOTE.—Slight ice conditions during part of February, but flow probably was not much affected thereby.

Rating table for East Branch of White River at Shoals, Ind., for 1905 and 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
63.80	880	65.00	2,920	66.20	6,360	67.80	9,700
63.90	1,000	65.10	3,180	66.30	6,580	68.00	10,080
64.00	1,130	65.20	3,460	66.40	6,800	68.20	10,460
64.10	1,270	65.30	3,750	66.50	7,020	68.40	10,840
64.20	1,410	65.40	4,050	66.60	7,240	68.60	11,220
64.30	1,560	65.50	4,360	66.70	7,460	68.80	11,590
64.40	1,720	65.60	4,670	66.80	7,680	69.00	11,950
64.50	1,890	65.70	4,980	66.90	7,900	70.00	13,750
64.60	2,070	65.80	5,280	67.00	8,100	71.00	15,400
64.70	2,260	65.90	5,580	67.20	8,500	72.00	17,000
64.80	2,460	66.00	5,860	67.40	8,900	73.00	18,500
64.90	2,680	66.10	6,120	67.60	9,300	74.00	20,000

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1903 to 1906. It is well defined between gage heights 63.2 feet and 65.4 feet. Above gage height 72.0 feet the rating curve is a tangent, the difference being 150 per tenth.

Monthly discharge of East Branch of White River at Shoals, Ind., for 1906.

[Drainage area, 4,900 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	23,600	4,670	11,000	2.24	2.58
February	5,580	1,560	2,920	.596	.62
March	32,800	3,180	11,600	2.37	2.73
April	41,000	3,180	16,700	3.41	3.80
May	3,180	1,270	1,980	.404	.47
June	3,180	880	1,400	.285	.32

NOTE.—Discharge values were not corrected for the effect of ice conditions. Values for 1906 are excellent.

TENNESSEE RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Tennessee River is formed by the junction of the French Broad and the Holston, about 4 miles above Knoxville, Tenn. It flows southwestward, crossing into Alabama about 40 miles below Chattanooga, Tenn., and, after crossing the northern part of Alabama, again enters Tennessee in Harding County. It then flows northward, crossing Tennessee and Kentucky, and enters Ohio River at Paducah, about 40 miles above Cairo. Its principal tributary on the north is Clinch River, which enters it near Kingston, Roan County, Tenn. The principal tributaries on the south are Hiwassee and Little Tennessee rivers. The Hiwassee rises in the northern part of Georgia and flows into the Tennessee about 30 miles above Chattanooga. Its principal tributaries are the Okoee and Nottely. Little Tennessee River rises in the northeast corner of Georgia, flows across the southwestern part of North Carolina, and enters the Tennessee near Loudon, Tenn. Its principal tributary is the Tuckasegee. French Broad River rises in the western part of North Carolina. Its principal tributaries are the Pigeon and the Nolichucky. Holston River rises in the western part of Virginia. Its principal tributary is Watauga River.

FRENCH BROAD RIVER AT HORSESHOE, N. C.

This station was established October 4, 1904, and was discontinued March 31, 1906. It is located at the steel highway bridge at Horseshoe, N. C. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 89, where are given also references to publications that contain data for previous years.

Discharge measurements of French Broad River at Horseshoe, N. C., for 1904 to 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1904.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 18	B. S. Drane	82	241	0.86	396
August 18	do	82	285	1.51	529
October 3	do	81	192	.51	290
December 7	do	81	318	1.91	584
1905.					
April 12	B. S. Drane	81	439	3.10	888
June 22	do	81	522	3.84	1,160
August 29	do	81	488	3.60	1,110
November 11	W. E. Hall	81	259	1.37	415
1906.					
March 6	W. E. Hall	81	613	4.62	1,410
March 6	do	81	613	4.62	1,420

Daily gage height, in feet, of French Broad River at Horseshoe, N. C., for 1906.

Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.
1	3.6	6.7	3.6	17	4.4	4.0	5.5
2	3.4	6.3	3.4	18	4.2	3.8	4.9
3	7.1	5.7	3.7	19	4.2	3.8	7.0
4	12.7	5.5	5.5	20	3.9	3.6	9.9
5	13.0	5.2	5.4	21	3.8	3.8	6.8
6	7.5	5.0	4.8	22	8.2	5.5	5.9
7	5.9	4.9	4.4	23	16.0	4.2	5.5
8	5.4	4.8	4.6	24	16.0	4.0	4.9
9	5.0	4.6	4.8	25	14.0	3.9	4.8
10	4.5	4.4	4.5	26	10.0	3.8	4.6
11	4.2	4.2	4.3	27	7.8	3.8	4.5
12	5.5	4.4	4.0	28	7.2	3.7	4.6
13	5.0	4.4	3.8	29	7.1	.....	4.5
14	5.5	4.3	4.0	30	7.0	.....	7.8
15	4.8	4.2	7.3	31	6.9	.....	8.8
16	4.6	4.2	7.2				

Rating table for French Broad River at Horseshoe, N. C., 1904 to 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.30	242	1.50	473	2.70	785	3.90	1,165
0.40	258	1.60	496	2.80	815	4.00	1,200
0.50	275	1.70	519	2.90	845	4.20	1,270
0.60	292	1.80	542	3.00	875	4.40	1,340
0.70	310	1.90	566	3.10	905	4.60	1,410
0.80	328	2.00	590	3.20	935	4.80	1,480
0.90	347	2.10	615	3.30	965	5.00	1,550
1.00	367	2.20	640	3.40	995	5.20	1,630
1.10	387	2.30	665	3.50	1,025	5.40	1,710
1.20	408	2.40	695	3.60	1,060	6.00	1,950
1.30	429	2.50	725	3.70	1,095		
1.40	451	2.60	755	3.80	1,130		

NOTE.—The above table is applicable only for open-channel conditions. It is based on eight discharge measurements made during 1904, to 1906. It is well defined between gage heights 0.5 foot and 5.0 feet. Above 5.0 feet the rating curve is a tangent, the difference being 80 per tenth.

Monthly discharge of French Broad River at Horseshoe, N. C., 1904 to 1906.

[Drainage area, 325 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
1904.					
October	275	242	256	0.788	0.91
November	710	250	346	1.06	1.18
December	1,950	284	480	1.48	1.71
1905.					
January	3,630	301	918	2.82	3.25
February	3,110	473	1,190	3.66	3.81
March	1,630	725	994	3.06	3.53
April	1,130	615	751	2.31	2.58
May	2,910	695	1,280	3.94	4.54
June	3,630	554	1,050	3.23	3.60
July	5,630	935	1,960	6.03	6.95
August	3,870	815	1,610	4.95	5.71
September	1,200	542	732	2.25	2.51
October	2,310	496	643	1.98	2.28
November	519	408	449	1.38	1.54
December	3,310	429	1,400	4.31	4.97
The year	5,630	301	1,080	3.33	45.27
1906.					
January	5,950	995	2,380	7.32	8.44
February	2,230	1,060	1,390	4.28	4.46
March	3,510	995	1,700	5.23	6.03

NOTE.—Values for 1904 to 1906 are good.

FRENCH BROAD RIVER NEAR ASHEVILLE, N. C.

This station is located at the steel highway bridge known as Smith Bridge, about 1 mile below the Southern Railway depot at Asheville, N. C., and near the end of the Patton avenue line of the Asheville Street Railway Company. The United States Weather Bureau maintains a station at this place, and furnishes gage height records to the United States Geological Survey. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 90, where are given also references to publications that contain data for previous years.

Discharge measurements of French Broad River near Asheville, N. C., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 1	W. E. Hall	314	1,100	0.43	2,140
April 16	O. P. Hall	336	1,830	2.42	6,360
June 16	W. E. Hall	342	2,400	3.87	10,600

Daily gage height, in feet, of French Broad River near Asheville, N. C., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.3	2.0	0.4	1.8	0.6	0.1	0.5	0.8	2.2	3.4	0.7	0.7
2	.2	1.8	.4	1.6	.5	.5	.3	.9	2.0	3.4	.6	.6
3	.3	1.6	.5	1.0	.5	.5	.5	.8	1.7	4.3	.5	.5
4	4.0	1.2	2.0	1.0	.5	.4	.7	.7	1.1	5.3	.5	.5
5	3.8	1.1	1.4	.8	.5	.4	.7	.6	1.6	4.9	.5	.5
6	2.9	1.0	1.0	.8	.5	1.4	.7	.5	2.0	4.5	.5	.4
7	1.4	1.0	.6	.7	.6	.8	.5	.8	1.5	3.6	.4	.4
8	1.2	1.0	.6	.7	.5	.4	.3	.7	1.3	3.2	.3	.4
9	1.0	.9	1.0	.6	.3	.4	1.0	.3	1.0	2.6	.3	.4
10	.7	.8	.8	.9	.3	.8	.5	.2	.7	2.3	.2	.4
11	.3	.6	.6	.7	.2	.7	.3	.2	.6	2.0	.2	1.6
12	1.0	.7	.5	.5	.2	.6	.2	.1	.7	1.8	.2	1.1
13	1.1	.9	.5	.5	.2	1.8	.2	.1	1.5	1.7	.2	.8
14	1.3	.7	.5	.6	.1	3.6	.2	1.0	.8	1.5	.1	.6
15	1.1	.6	1.0	3.2	.1	3.5	1.4	1.1	.6	1.4	.1	.5
16	1.0	.5	2.2	2.6	.1	4.2	2.1	.8	.5	1.3	.1	.5
17	.8	.6	1.4	1.6	.1	3.4	1.6	.8	.4	1.3	.1	.6
18	.7	.6	1.0	1.2	.1	3.5	2.5	1.0	.7	1.4	2.0	1.2
19	.7	.6	.9	1.0	.0	2.0	2.9	1.4	5.7	2.6	5.0	.9
20	.5	.5	2.6	.9	.0	1.5	2.1	1.0	5.1	2.0	4.1	.9
21	.5	.5	2.0	.8	.0	1.1	1.5	1.4	4.7	1.6	3.6	.9
22	.8	1.1	1.5	.8	.0	.4	1.5	.7	4.0	1.4	3.1	.8
23	7.8	1.8	1.1	.7	−0.1	.9	2.5	1.0	2.8	1.3	3.0	.7
24	7.0	.6	1.0	.6	−0.1	.9	1.6	.8	2.6	1.3	1.5	.6
25	5.0	.6	.9	.5	−0.2	1.4	1.1	.8	2.1	1.2	1.1	.5
26	3.6	.5	.8	.5	.0	1.1	1.1	.6	2.1	1.1	1.0	.5
27	3.5	.5	.8	.5	1.2	.7	1.4	.9	2.1	1.0	.9	.4
28	2.1	.5	.8	.5	1.0	.8	1.1	2.6	2.2	.9	.9	.4
29	2.2	.....	.9	.5	.6	.6	.7	2.5	3.5	.9	.9	.4
30	2.1	.....	1.5	.8	.3	.6	.8	2.8	3.5	.8	.8	.4
31	2.0	.....	2.2	.....	.1	.....	.7	3.2	.....	.8	.....	1.6

Rating table for French Broad River near Asheville, N. C., for 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
−0.20	1,330	1.00	3,170	2.20	5,730	3.80	10,370
−0.10	1,460	1.10	3,350	2.30	5,980	4.00	11,040
0.00	1,590	1.20	3,540	2.40	6,240	4.20	11,730
0.10	1,730	1.30	3,730	2.50	6,500	4.40	12,430
0.20	1,870	1.40	3,930	2.60	6,770	4.60	13,150
0.30	2,020	1.50	4,130	2.70	7,040	4.80	13,880
0.40	2,170	1.60	4,340	2.80	7,320	5.00	14,650
0.50	2,330	1.70	4,660	2.90	7,600	5.20	15,420
0.60	2,490	1.80	4,780	3.00	7,890	5.40	16,200
0.70	2,650	1.90	5,010	3.20	8,480	5.60	17,000
0.80	2,820	2.00	5,240	3.40	9,090	5.80	17,800
0.90	2,990	2.10	5,480	3.60	9,720		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 11 discharge measurements made during 1904 to 1906. It is well defined between gage heights −1.0 foot and +5.0 feet. Above gage height 5.40 the rating curve is a tangent, the difference being 400 per tenth.

Monthly discharge of French Broad River near Asheville, N. C., for 1906.

[Drainage area, 987 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	25,800	1,870	6,020	6.10	7.03
February	5,240	2,330	3,010	3.05	3.18
March	6,770	2,170	3,400	3.44	3.97
April	8,480	2,330	3,210	3.25	3.63
May	3,540	1,330	2,010	2.04	2.35
June	11,700	1,730	4,080	4.13	4.61
July	7,600	1,870	3,440	3.49	4.02
August	8,480	1,730	3,330	3.37	3.88
September	17,400	2,170	5,780	5.86	6.54
October	15,800	2,820	6,050	6.13	7.07
November	14,600	1,730	3,820	3.87	4.32
December	4,340	2,170	2,610	2.64	3.04
The year	25,800	1,330	3,900	3.94	53.64

NOTE.—Values for 1906 are excellent.

TENNESSEE RIVER NEAR KNOXVILLE, TENN.

This station is located at the Gay street or county highway bridge. Gage heights are furnished by United States Weather Bureau. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 96, where are given also references to publications that contain data for previous years.

Discharge measurements of Tennessee River near Knoxville, Tenn., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 23	O. P. Hall	773	4,920	3.03	13,400
June 15	do	880	6,670	5.45	24,900
October 19	F. A. Murray	839	4,950	2.78	12,500

Daily gage height, in feet, of Tennessee River near Knoxville, Tenn., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.1	6.6	2.7	5.4	2.2	1.7	1.9	6.5	9.3	7.0	2.2	2.9
2	1.9	6.0	2.6	5.0	2.5	2.0	1.7	4.7	7.1	5.8	2.1	2.8
3	1.9	5.3	2.7	4.4	2.5	2.1	1.6	4.3	5.1	5.4	2.0	2.6
4	3.5	4.6	3.2	3.9	3.0	2.0	1.5	4.7	4.5	7.7	2.0	2.6
5	7.4	4.0	3.8	3.5	3.7	2.0	2.2	4.3	4.8	8.4	1.9	2.5
6	7.3	3.7	4.0	3.4	4.9	1.9	1.9	3.7	7.4	8.1	1.8	2.5
7	5.5	3.6	3.4	3.4	6.1	2.4	1.8	3.3	8.4	8.1	1.8	2.5
8	3.9	3.4	3.1	3.5	7.3	2.2	1.9	3.1	5.9	6.7	1.8	2.4
9	3.7	3.1	2.9	3.8	6.3	1.9	2.4	3.0	5.2	5.7	1.7	2.4
10	3.3	2.9	2.9	5.2	4.6	1.6	2.4	2.4	4.3	4.8	1.7	2.4
11	2.9	2.8	2.8	5.2	3.8	1.5	2.2	2.3	3.6	4.1	1.7	2.2
12	2.8	2.6	2.6	4.4	3.4	1.7	1.9	2.1	3.1	3.7	1.8	2.4
13	3.0	2.6	2.4	3.7	3.0	1.7	1.6	2.1	3.4	3.4	2.3	2.8
14	3.7	2.6	2.3	3.3	2.7	3.0	1.4	2.3	3.1	3.1	2.7	2.5
15	4.2	2.7	3.4	3.8	2.5	5.6	2.1	3.1	2.8	2.9	2.4	2.4
16	4.9	2.7	7.3	6.6	2.3	5.4	2.1	4.2	2.5	2.7	2.1	2.3
17	4.9	2.7	8.0	8.1	2.1	5.9	3.8	5.2	2.2	2.6	2.0	2.3
18	4.3	2.7	6.5	5.9	2.0	5.0	6.5	4.7	2.0	2.5	2.3	3.3
19	3.9	2.5	4.9	4.7	1.9	4.0	5.0	5.0	1.9	2.7	10.0	3.8
20	3.7	2.4	4.5	4.0	1.9	3.3	5.2	4.2	10.9	4.2	23.0	4.3
21	3.5	2.3	5.2	3.6	1.8	3.0	4.8	4.1	7.9	8.5	17.7	3.9
22	3.2	2.6	4.9	3.4	1.9	2.7	4.6	3.9	6.7	7.2	11.4	3.8
23	4.7	3.0	4.2	3.0	1.7	2.7	5.0	3.7	5.8	5.2	7.5	3.7
24	20.1	3.1	3.9	2.9	1.6	2.7	4.7	4.1	5.0	4.2	5.7	3.5
25	18.1	3.0	3.6	2.7	1.5	3.2	3.9	5.2	4.3	3.7	4.8	3.1
26	9.9	2.8	3.5	2.5	1.4	3.6	3.2	3.9	4.1	3.3	4.2	2.6
27	7.9	2.8	3.6	2.6	1.4	3.2	3.0	3.2	3.6	3.0	3.8	2.1
28	7.3	2.7	4.0	2.3	2.2	3.0	2.8	5.8	3.3	2.8	3.5	3.5
29	7.2	.....	4.0	2.3	3.0	2.5	3.2	4.4	3.7	2.6	3.3	10.3
30	7.0	.....	4.2	2.2	2.5	2.1	3.1	7.7	4.6	2.4	3.1	10.9
31	6.7	.....	4.6	.....	2.0	.....	5.6	9.8	.....	2.3	.....	9.8

Rating table for Tennessee River near Knoxville, Tenn., for 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.40	6,590	2.80	12,360	4.20	18,240	6.20	26,660
1.50	6,970	2.90	12,780	4.30	18,660	6.40	27,520
1.60	7,360	3.00	13,200	4.40	19,080	6.60	28,380
1.70	7,760	3.10	13,620	4.50	19,500	6.80	29,240
1.80	8,170	3.20	14,040	4.60	19,920	7.00	30,100
1.90	8,580	3.30	14,460	4.70	20,340	8.00	34,400
2.00	9,000	3.40	14,880	4.80	20,760	9.00	38,900
2.10	9,420	3.50	15,300	4.90	21,180	10.00	43,600
2.20	9,840	3.60	15,720	5.00	21,600	11.00	48,500
2.30	10,260	3.70	16,140	5.20	22,440	12.00	53,700
2.40	10,680	3.80	16,560	5.40	23,280	13.00	59,200
2.50	11,100	3.90	16,980	5.60	24,120	14.00	65,000
2.60	11,520	4.00	17,400	5.80	24,960	15.00	71,000
2.70	11,940	4.10	17,820	6.00	25,800	16.00	77,000

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1899 to 1906. It is well defined up to gage height of 24 feet. Above gage height 14.0 feet the rating curve is a tangent, the difference being 600 per tenth.

Monthly discharge of Tennessee River near Knoxville, Tenn., for 1906.

[Drainage area, 8,990 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	102,000	8,580	25,300	2.81	3.24
February	28,400	10,300	14,400	1.60	1.67
March	34,400	10,300	17,100	1.90	2.19
April	34,800	9,840	17,200	1.91	2.13
May	31,400	6,590	12,800	1.42	1.64
June	25,400	6,970	12,600	1.40	1.56
July	28,000	6,590	13,500	1.50	1.73
August	42,600	9,420	18,400	2.05	2.36
September	48,000	8,580	21,200	2.36	2.63
October	36,600	10,300	20,300	2.26	2.61
November	119,000	7,760	20,700	2.30	2.57
December	48,000	9,420	15,800	1.76	2.03
The year	119,000	6,590	17,400	1.94	26.36

NOTE.—Values for 1906 are excellent.

TENNESSEE RIVER AT CHATTANOOGA, TENN.

This station was established in 1879, at the foot of Lookout street, just below Chattanooga Island, by the Signal Corps of the United States Army, but since July 1, 1891, it has been in charge of the Weather Bureau. Gage heights are furnished to the Geological Survey through L. M. Pindell. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 99, where are given also references to publications that contain data for previous years.

Discharge measurements of Tennessee River at Chattanooga, Tenn., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 9	F. A. Murray	1,120	13,100	8.36	52,800
May 23	O. P. Hall	1,040	7,690	3.40	19,800
June 21	do	1,080	9,810	5.45	31,300
October 17	F. A. Murray	1,080	10,100	5.59	31,900

Daily gage height, in feet, of Tennessee River at Chattanooga, Tenn., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.5	9.6	5.3	14.8	4.9	4.1	4.6	7.7	13.0	13.9	4.5	6.3
2	5.1	9.1	5.2	12.4	4.8	3.8	4.2	9.0	11.7	19.2	4.4	6.2
3	5.0	8.8	5.5	10.6	4.8	4.1	3.9	9.5	10.3	19.3	4.3	5.7
4	8.3	8.3	8.2	9.2	4.9	4.3	3.7	8.2	8.9	17.9	4.2	5.6
5	12.0	7.7	9.4	8.3	5.1	4.3	3.5	7.6	7.7	13.8	3.9	5.5
6	12.9	7.0	8.6	7.5	5.5	4.3	3.5	7.9	7.9	13.6	3.9	5.3
7	12.1	6.5	7.7	7.1	6.0	4.1	3.7	7.3	9.1	15.3	3.9	5.3
8	10.9	6.1	7.2	6.9	7.2	3.9	3.7	6.9	10.4	15.4	3.8	5.4
9	9.1	5.8	6.7	6.9	8.2	3.9	4.4	6.2	10.4	13.4	3.7	5.5
10	8.5	5.6	6.3	7.4	8.9	3.8	5.4	5.8	9.3	11.4	3.6	5.3
11	7.6	5.3	5.9	8.6	8.3	3.6	5.5	5.5	9.2	9.9	3.5	5.2
12	7.0	5.0	5.7	9.3	7.0	3.2	5.2	5.2	8.8	8.6	3.5	5.6
13	6.7	4.8	5.4	8.7	6.1	3.2	4.5	4.9	8.0	7.6	3.5	5.6
14	6.9	4.7	5.1	8.1	5.5	4.4	4.7	4.7	7.0	7.0	3.7	5.5
15	6.9	4.7	5.7	8.4	5.1	5.4	6.7	5.1	6.2	6.4	4.0	5.4
16	7.4	4.6	7.3	8.7	4.8	7.8	8.7	6.3	5.7	6.0	4.1	5.3
17	8.0	4.6	9.9	9.4	4.5	9.2	7.9	7.3	5.2	5.7	4.4	5.1
18	8.9	4.5	10.6	10.1	4.2	8.6	9.3	7.2	4.9	5.6	4.4	5.8
19	8.7	4.5	10.4	10.2	4.0	7.7	14.2	7.6	4.8	7.0	8.2	8.5
20	8.0	4.4	10.7	8.9	3.8	6.8	15.0	7.7	6.1	7.1	22.1	9.2
21	7.5	4.1	10.6	7.7	3.7	6.0	10.8	7.7	8.1	6.9	31.6	8.9
22	7.3	4.9	9.7	7.0	3.6	5.5	10.3	7.3	11.1	7.0	33.3	9.3
23	8.7	5.5	8.9	6.5	3.5	5.1	12.0	6.9	10.3	8.9	31.0	8.4
24	12.4	6.0	8.1	6.0	3.5	4.9	13.7	6.5	9.2	8.4	22.0	7.7
25	17.4	5.8	7.4	5.7	3.4	6.0	12.3	6.5	8.5	7.4	13.0	7.3
26	21.4	5.5	6.9	5.4	3.3	6.6	9.7	7.1	7.7	6.6	9.7	6.6
27	18.9	5.3	6.7	5.2	3.3	6.7	8.1	7.3	7.0	6.0	8.6	6.1
28	13.4	5.2	6.9	5.3	3.7	6.2	7.5	6.7	6.6	5.6	7.7	5.8
29	11.1	.....	7.6	5.6	3.9	5.5	7.2	6.5	5.9	5.2	7.2	5.9
30	10.2	.....	9.6	5.3	4.1	5.0	6.6	7.7	6.1	4.9	6.8	10.1
31	10.1	.....	13.7	.....	4.6	.....	7.0	9.7	.....	4.7	.....	16.3

Rating table for Tennessee River at Chattanooga, Tenn., for 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
3.20	17,920	4.00	22,360	4.80	27,070	5.60	32,120
3.30	18,460	4.10	22,940	4.90	27,680	5.70	32,780
3.40	19,000	4.20	23,520	5.00	28,300	5.80	33,450
3.50	19,550	4.30	24,100	5.10	28,920	5.90	34,120
3.60	20,100	4.40	24,690	5.20	29,550	6.00	34,800
3.70	20,660	4.50	25,280	5.30	30,180	7.00	41,600
3.80	21,220	4.60	25,870	5.40	30,820	8.00	48,400
3.90	21,790	4.70	26,470	5.50	31,470		

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1893 to 1906. It is well defined up to gage height of 20 feet. Above gage height 6.0 feet the rating curve is a tangent, the difference being 680 per tenth.

Monthly discharge of Tennessee River at Chattanooga, Tenn., for 1906.

[Drainage area, 21,400 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	140,000	28,300	60,600	2.83	3.26
February	59,300	24,700	34,100	1.59	1.66
March	87,200	28,900	47,300	2.21	2.55
April	94,600	29,600	48,700	2.28	2.54
May	54,500	18,500	28,600	1.34	1.54
June	56,600	17,900	30,400	1.42	1.58
July	96,000	19,600	44,300	2.07	2.39
August	60,000	26,500	41,800	1.95	2.25
September	82,400	27,100	49,600	2.32	2.59
October	125,000	26,500	58,900	2.75	3.17
November	220,000	19,600	56,300	2.63	2.93
December	105,000	28,900	40,100	1.87	2.16
The year	220,000	17,900	45,100	2.10	28.62

NOTE.—Values for 1906 are excellent.

DAVIDSONS RIVER NEAR DAVIDSONS RIVER, N. C.

This station was established May 19, 1904. It is located at English Bridge, about 2 miles from Davidsons River, N. C., and about 500 feet above the mouth of Avery Creek. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 101, where are given also references to publications that contain data for previous years.

Measurements of Davidsons River near Davidsons River, N. C.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1906.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 6	W. E. Hall	67	124	1.25	129
June 15	do	77	236	2.74	1,020

Daily gage height, in feet of Davidsons River near Davidsons River, N. C., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.05	1.45	1.1	1.5	1.1	1.05	1.25	1.4	1.6	2.1	1.2	1.2
2	1.0	1.4	1.1	1.45	1.1	1.2	1.5	1.4	1.5	2.6	1.2	1.2
3	2.5	1.35	1.9	1.4	1.1	1.3	1.65	1.45	1.45	3.2	1.2	1.2
4	1.9	1.3	1.45	1.35	1.1	1.25	1.6	1.4	1.4	2.5	1.2	1.15
5	1.55	1.3	1.3	1.3	1.1	1.65	1.45	1.4	1.95	2.1	1.15	1.15
6	1.4	1.3	1.25	1.3	1.1	1.5	1.4	1.45	1.75	2.1	1.15	1.15
7	1.3	1.25	1.2	1.25	1.1	1.3	1.35	1.42	1.6	1.9	1.15	1.25
8	1.25	1.25	1.35	1.25	1.05	1.2	1.3	1.35	1.55	1.8	1.15	1.15
9	1.25	1.25	1.25	1.3	1.05	1.15	1.4	1.3	1.75	1.75	1.1	1.1
10	1.2	1.2	1.2	1.25	1.05	1.55	1.3	1.3	1.4	1.65	1.1	1.5
11	1.15	1.2	1.2	1.2	1.0	1.45	1.25	1.25	1.35	1.65	1.1	1.35
12	1.25	1.25	1.15	1.2	1.0	1.75	1.25	1.2	1.35	1.6	1.1	1.3
13	1.25	1.2	1.15	1.2	1.0	3.5	1.2	1.3	1.4	1.55	1.1	1.2
14	1.3	1.2	1.15	1.7	1.0	2.2	1.2	1.25	1.3	1.5	1 1	1.2
15	1.2	1.2	1.7	1.7	1.0	2.5	2.15	1.4	1.3	1 5	1.1	1.15
16	1.25	1.15	1.35	1.5	1.0	2.1	1.85	1.3	1.3	1.45	1.15	1.1
17	1.2	1.15	1.3	1.4	.95	2.0	1.95	1.6	1.25	1.45	1.15	1.25
18	1.15	1.15	1.25	1.35	.95	1.8	1.85	1.5	2.7	1.7	2 85	1.25
19	1.15	1.1	1.6	1.3	1.0	1.7	1.7	1.6	3.0	1.55	2 45	1.25
20	1.15	1.1	1.5	1.3	1.0	1.6	1.6	1.5	2.0	1.5	1.8	1.25
21	1.15	1.45	1.4	1.25	.95	1.5	1.5	1.4	1.8	1.45	1.6	1.2
22	4.1	1.25	1.35	1.25	.95	1.45	1.45	1.35	1.7	1.4	1.5	1.2
23	2.6	1.15	1.3	1.2	.95	1.4	1.4	1.35	1.85	1.4	1.4	1.15
24	2.05	1.15	1.25	1.2	.95	1.45	1.4	1.45	1.75	1.35	1.4	1.2
25	1.8	1.15	1.25	1.2	.9	1.4	1.4	1.35	1.8	1.35	1.3	1.85
26	1.75	1.1	1.2	1.15	1.7	1.35	1.65	1.45	1.7	1.3	1.3	1.9
27	1.6	1.2	1.3	1.15	1.6	1.3	1.7	1.4	1.75	1.3	1.3	1.95
28	1.55	1.1	1.2	1.15	1.4	1.25	1.65	1.35	2.0	1.3	1.25	1.2
29	1.5	.....	1.75	1.15	1.25	1.25	1.5	1.5	2.5	1.25	1.2	1.1
30	1.5	.....	2.0	1.15	1.15	1.25	1.45	1.5	2.6	1.25	1.2	1.2
31	1.5	.....	1.7	.....	1.1	.....	1.4	1.8	.....	1.25	.....	1.95

Rating table for Davidsons River near Davidsons River, N. C., for 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.90	60	1.50	210	2.10	520	2.70	985
1.00	79	1.60	250	2.20	590	2.80	1,075
1.10	100	1.70	295	2.30	660	2.90	1,170
1.20	122	1.80	345	2.40	735	3.00	1,265
1.30	147	1.90	400	2.50	815	3.20	1,460
1.40	176	2.00	460	2.60	895	3.40	1,660

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1904 to 1906. It is well defined between gage heights 0.7 foot and 1.3 feet. Above gage height 3.1 feet the rating curve is a tangent, the difference being 100 per tenth.

Monthly discharge of Davidsons River near Davidsons River, N. C., for 1906.

[Drainage area, 41 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft per sq. mile.	Depth in inches.
January	2,360	79	297	7.24	8.35
February	193	100	130	3.17	3.30
March	460	100	177	4.32	4.98
April	295	111	152	3.71	4.14
May	295	60	102	2.49	2.87
June	1,760	90	293	7.15	7.98
July	555	122	226	5.51	6.35
August	400	122	189	4.61	5.32
September	1,260	134	356	8.68	9.68
October	1,460	134	325	7.93	9.14
November	1,120	100	191	4.66	5.20
December	430	100	162	3.95	4.55
The year	2,360	60	217	5.28	71.86

NOTE.—Values are rated as follows: January, June, September, and October, good; remaining months, excellent.

NORTH FORK OF MILLS RIVER AT PINKBED, N. C.

This station was established May 18, 1904. It is located at the wagon bridge in the village of Pinkbed, N. C. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 105, where are given also references to publications that contain data for previous years.

Discharge measurements of North Fork of Mills River at Pinkbed, N. C., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet*	*Sec.-ft.*
June 14	W. E. Hall	38	81	2.22	351
September 15	do	39	40	1.19	92
September 15	do	39	41	1.19	93

Daily gage height, in feet, of North Fork of Mills River at Pinkbed, N. C., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.9	1.45	1.0	1.5	1.05	0.9	1.2	1.1	1.5	2.3	1.25	1.25
2	.9	1.4	.95	1.4	1.0	1.1	1.15	1.1	1.4	2.3	1.2	1.2
3	2.2	1.35	1.5	1.3	1.0	.9	1.15	1.15	1.3	3.1	1.2	1.2
4	2.0	1.35	1.3	1.25	1.0	1.1	1.1	1.1	1.25	2.8	1.2	1.2
5	1.55	1.3	1.1	1.3	1.0	1.2	1.1	1.1	1.45	2.45	1.2	1.2
6	1.4	1.25	1.1	1.25	1.0	1.1	1.1	1.1	1.45	2.3	1.2	1.15
7	1.3	1.25	1.1	1.2	1.0	1.0	1.1	1.1	1.4	2.1	1.2	1.15
8	1.2	1.2	1.1	1.15	1.0	1.0	1.1	1.1	1.3	1.95	1.15	1.15
9	1.1	1.15	1.1	1.1	1.0	1.0	1.2	1.1	1.4	1.85	1.15	1.15
10	1.1	1.1	1.05	1.1	.95	1.0	1.1	1.05	1.35	1.8	1.15	1.15
11	1.1	1.1	1.0	1.1	.95	1.1	1.1	1.0	1.25	1.7	1.1	1.15
12	1.2	1.15	1.0	1.1	.9	1.2	1.1	1.0	1.2	1.65	1.1	1.15
13	1.15	1.1	1.0	1.1	.9	3.7	1.05	1.0	1.2	1.6	1.1	1.1
14	1.2	1.1	1.0	1.3	.9	2.4	1.05	1.1	1.3	1.55	1.1	1.1
15	1.15	1.1	1.5	1.8	.9	3.7	1.5	1.1	1.2	1.55	1.1	1.1
16	1.15	1.05	1.15	1.5	.85	2.3	1.45	1.1	1.2	1.5	1.1	1.1
17	1.1	1.05	1.1	1.4	.75	2.1	1.3	1.1	1.15	1.5	1.1	1.1
18	1.1	1.05	1.05	1.3	.75	1.9	1.4	1.1	2.0	1.55	1.4	1.1
19	1.1	1.05	1.6	1.3	.7	1.7	1.6	1.1	3.1	1.6	2.6	1.1
20	1.05	1.00	1.4	1.25	.8	1.6	1.55	1.05	2.2	1.55	1.7	1.15
21	1.05	1.3	1.4	1.2	.8	1.5	1.4	1.15	1.9	1.5	1.6	1.15
22	4.0	1.1	1.35	1.15	.8	1.5	1.4	1.1	1.8	1.45	1.5	1.15
23	3.0	1.05	1.2	1.15	.8	1.4	1.3	1.05	1.7	1.4	1.5	1.1
24	2.2	1.0	1.1	1.1	.8	1.4	1.2	1.05	1.65	1.4	1.4	1.1
25	1.9	1.0	1.1	1.1	.75	1.35	1.2	1.0	1.7	1.4	1.35	1.1
26	1.8	1.0	1.1	1.1	1.6	1.3	1.2	1.0	1.6	1.35	1.3	1.1
27	1.6	1.1	1.15	1.1	1.1	1.3	1.2	1.05	1.65	1.3	1.3	1.1
28	1.55	1.0	1.1	1.1	1.05	1.25	1.15	1.5	1.8	1.3	1.3	1.1
29	1.5	.....	1.55	1.05	1.0	1.2	1.1	1.6	2.4	1.3	1.25	1.1
30	1.5	.....	1.8	1.05	.9	1.2	1.1	1.7	2.4	1.25	1.25	1.1
31	1.5	.....	1.6	.....	.9	.....	1.1	1.8	.....	.....	.....	1.8

Rating table for North Fork of Mills River at Pinkbed, N. C., for 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.70	35	1.60	175	2.50	440	3.40	830
0.80	45	1.70	200	2.60	475	3.50	880
0.90	56	1.80	225	2.70	515	3.60	930
1.00	68	1.90	250	2.80	555	3.70	990
1.10	81	2.00	280	2.90	595	3.80	1,050
1.20	95	2.10	310	3.00	640	3.90	1,110
1.30	110	2.20	340	3.10	685	4.00	1,170
1.40	130	2.30	370	3.20	730		
1.50	150	2.40	405	3.30	780		

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1904 to 1906. It is fairly well defined between gage heights 0.5 foot and 1.2 feet.

Monthly discharge of North Fork of Mills River at Pinkbed, N. C., for 1906.

[Drainage area, 24 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	1,170	56	185	7.71	8.89
February	140	68	88.6	3.69	3.84
March	225	62	102	4.25	4.90
April	225	74	102	4.25	4.74
May	175	35	61.5	2.56	2.95
June	990	56	193	8.04	8.97
July	175	74	100	4.17	4.81
August	225	68	92.0	3.83	4.42
September	685	88	190	7.92	8.84
October	685	102	221	9.21	10.62
November	475	81	119	4.96	5.53
December	225	81	90.4	3.77	4.35
The year	1,170	35	129	5.03	72.86

NOTE.—Values for 1906 are good.

SOUTH FORK OF MILLS RIVER NEAR SITTON, N. C.

This station was established May 18, 1904. It is located at Sycamore Church, about 1 mile below Sitton's mill, Sitton, N. C. The conditions at this station and the bench marks are described in Water Supply Paper No. 169, page 107, where are given also references to publications that contain data for previous years.

Discharge measurements of South Fork of Mills River near Sitton, N. C., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 14	W. E. Hall	55	183	3.38	730
September 15	do	50	100	1.61	174
September 15	do	50	97	1.61	170

Daily gage height, in feet, of South Fork of Mills River near Sitton, N. C., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.15	1.8	1.35	2.0	1.45	1.3	1.55	1.6	2.15	3.0	1.65	1.65
2	1.15	1.75	1.35	1.85	1.4	1.5	1.5	1.55	1.9	3.8	1.6	1.6
3	3.0	1.65	2.3	1.75	1.4	1.9	1.7	1.6	1.85	5.2	1.6	1.6
4	2.55	1.6	1.9	1.7	1.4	1.7	1.65	1.6	1.75	4.0	1.6	1.6
5	2.0	1.6	1.7	1.65	1.35	2.1	1.55	1.5	2.6	3.2	1.6	1.55
6	1.75	1.55	1.6	1.6	1.35	2.0	1.5	1.5	2.35	3.3	1.55	1.6
7	1.6	1.5	1.55	1.6	1.35	1.7	1.5	1.55	2.2	2.8	1.55	1.6
8	1.5	1.5	1.7	1.55	1.3	1.55	1.65	1.45	2.0	2.65	1.5	1.55
9	1.4	1.5	1.55	1.55	1.3	1.7	1.65	1.4	1.9	2.5	1.5	1.5
10	1.4	1.45	1.5	1.55	1.3	2.1	1.5	1.4	1.8	2.35	1.5	1.75
11	1.35	1.45	1.5	1.5	1.3	1.85	1.45	1.35	1.7	2.3	1.5	1.8
12	1.5	1.5	1.45	1.5	1.3	2.4	1.4	1.3	1.7	2.25	1.5	1.6
13	1.4	1.45	1.4	1.45	1.25	5.8	1.4	1.4	1.8	2.1	1.45	1.6
14	1.5	1.45	1.4	2.5	1.25	3.7	1.9	1.55	1.7	2.05	1.45	1.55
15	1.4	1.45	2.05	2.3	1.25	4.2	2.4	1.5	1.65	2.0	1.45	1.5
16	1.4	1.4	1.7	1.9	1.25	3.7	2.1	1.45	1.6	1.95	1.45	1.5
17	1.35	1.4	1.6	1.8	1.2	2.85	2.1	1.9	1.6	2.0	1.55	1.65
18	1.3	1.4	1.55	1.7	1.2	2.45	2.1	1.75	4.0	2.35	4.0	1.6
19	1.3	1.35	2.35	1.6	1.2	2.3	2.35	1.55	4.8	2.2	3.9	1.55
20	1.3	1.35	2.0	1.6	1.2	2.1	2.1	2.7	3.2	2.05	2.65	1.6
21	1.25	1.5	1.8	1.55	1.2	2.0	2.0	1.9	2.65	2.0	2.3	1.6
22	5.6	1.5	1.7	1.55	1.2	1.9	1.85	1.8	2.5	1.95	2.1	1.55
23	4.3	1.4	1.65	1.5	1.15	1.8	1.75	1.6	2.3	1.9	2.0	1.5
24	2.9	1.4	1.6	1.5	1.15	1.8	1.7	1.75	2.3	1.9	1.9	1.5
25	2.45	1.4	1.55	1.45	1.15	1.8	1.65	1.55	2.35	1.85	1.85	1.6
26	2.4	1.35	1.5	1.4	1.8	1.8	1.9	1.65	2.2	1.8	1.8	1.9
27	2.2	1.4	1.55	1.45	2.25	1.65	1.75	1.75	2.25	1.8	1.75	1.6
28	2.0	1.35	1.55	1.4	1.8	1.7	1.65	2.4	2.45	1.75	1.7	1.5
29	1.9	.....	2.2	1.4	1.5	1.6	1.6	2.9	3.9	1.7	1.7	1.4
30	1.85	.....	2.6	1.4	1.4	1.6	1.55	2.3	3.4	1.7	1.65	1.4
31	1.85	.....	2.25	.....	1.35	.....	1.55	2.6	.....	1.7	.....	3.2

Rating table for South Fork of Mills River near Sitton, N. C., for 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.10	90	1.90	250	2.70	480	3.50	780
1.20	107	2.00	275	2.80	515	3.60	825
1.30	125	2.10	300	2.90	550	3.70	870
1.40	145	2.20	325	3.00	585	3.80	915
1.50	165	2.30	355	3.10	620	3.90	960
1.60	185	2.40	385	3.20	660	4.00	1,005
1.70	205	2.50	415	3.30	700	4.20	1,100
1.80	225	2.60	445	3.40	740	4.40	1,200

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1904 to 1906. It is well defined between gage heights 0.7 foot and 1.7 feet. Above gage height 4.1 feet the rating curve is a tangent, the difference being 50 per tenth.

Monthly discharge of South Fork of Mills River near Sitton, N. C., for 1906.

[Drainage area, 40.5 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	1,800	98	306	7.56	8.72
February	225	135	161	3.98	4.14
March	445	135	216	5.33	6.14
April	415	145	197	4.86	5.42
May	340	98	137	3.38	3.90
June	1,900	125	378	9.33	10.41
July	385	145	218	5.38	6.20
August	550	125	222	5.48	6.32
September	1,400	185	403	9.95	11.10
October	1,600	205	414	10.22	11.78
November	1,000	155	200	6.42	7.16
December	660	145	197	4.86	5.60
The year	1,900	98	259	6.40	86.89

NOTE.—Values for 1906 are excellent.

NOLICHUCKY RIVER NEAR GREENEVILLE, TENN.

This station was established May 7, 1903. It is located at Jones's bridge, 5 miles southeast of Greeneville, Tenn. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 112, where are given also references to publications that contain data for previous years.

Discharge measurements of Nolichucky River near Greeneville, Tenn., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 25	O. P. Hall	267	764	0.60	1,060
October 20	F. A. Murray	275	1,490	3.21	6,020
October 20	do	275	1,460	3.06	5,770

Daily gage height, in feet, of Nolichucky River near Greeneville, Tenn., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.6	2.35	1.0	2.0	0.95	0.6	0.7	1.1	3.0	2.55	1.0	1.15
2	.55	2.1	1.0	1.7	1.0	.7	.7	1.2	2.25	2.6	.95	1.1
3	55	1.85	1.05	1.5	1.05	.95	.6	2.7	1.9	3.4	.95	1.05
4	3.8	1.65	2.15	1.35	1.5	.7	.7	2.0	3.2	4.4	.9	1.05
5	2.0	1.6	1.5	1.25	3.1	.7	1.0	2.1	3.25	2.9	.9	1.0
6	1.45	1.5	1.35	1.25	3.0	.6	.7	1.5	2.65	2.4	.85	1.0
7	1.15	1.35	1.2	1.4	2.95	.6	.75	1.35	2.1	2.5	.8	1.0
8	1.0	1.25	1.15	1.25	2.45	.6	.95	1.15	2.1	2.0	.8	1.0
9	1.0	1.2	1.25	1.2	1.9	.5	.9	1.05	1.9	1.9	.8	.9
10	.85	1.15	1.15	1.4	1.65	.6	1.1	.95	1.5	1.65	.75	.9
11	.7	1.1	1.0	1.5	1.45	.55	.75	.8	1.4	1.5	.75	1.0
12	.9	1.05	.95	1.25	1.3	.5	.6	.75	1.8	1.35	1.1	1.2
13	1.35	1.2	.95	1.15	1.2	1.0	.55	.8	1.35	1.3	.95	1.0
14	1.15	1.3	.9	1.1	1.1	3.5	.5	1.3	1.3	1.25	.8	.95
15	1.7	1.35	1.0	5.0	1.0	1.5	.55	1.9	1.2	1.2	.75	.9
16	1.4	1.45	3.2	2.8	1.0	2.9	1.8	1.65	1.0	1.15	.75	.9
17	1.3	1.3	2.2	2.1	.9	2.0	1.8	2.6	1.0	1.3	.75	.9
18	1.2	1.15	1.75	1.8	.9	1.5	1.85	2.2	1.2	1.5	1.0	1.35
19	1.25	1.1	1.55	1.6	.85	1.2	1.35	1.8	8.2	3.5	9.5	1.35
20	1.2	1.05	1.7	1.45	.8	1.1	1.7	1.65	4.0	3.2	5.6	1.2
21	1.1	1.0	1.7	1.3	.8	1.0	1.9	1.6	2.7	3.0	3.2	1.3
22	1.0	1.25	1.5	1.25	.7	.95	1.5	1.7	2.6	1.9	2.35	1.35
23	15.2	1.5	1.4	1.2	.7	.95	1.5	1.5	2.2	1.75	2.0	1.25
24	4.6	1.3	1.3	1.1	.65	.8	1.3	1.35	1.9	1.65	1.75	1.0
25	3.0	1.2	1.35	1.0	.6	1.9	1.0	1.2	1.5	1.5	1.6	.75
26	2.5	1.2	1.35	1.0	.6	1.5	1.2	1.05	1.5	1.4	1.5	.8
27	2.5	1.3	1.35	.95	.9	1.05	1.8	2.2	1.4	1.3	1.4	1.0
28	2.3	1.2	1.4	.9	1.45	.8	1.1	2.1	2.25	1.2	1.3	4.3
29	2.25	.....	1.4	.9	.95	.7	1.3	2.8	2.55	1.15	1.25	4.0
30	2.3	.....	1.45	.85	.8	.65	1.25	4.1	3.2	1.1	1.2	2.9
31	2.3	.....	2.5	.....	.7	.....	1.1	5.4	.....	1.05	.....	2.3

Rating table for Nolichucky River near Greeneville, Tenn., for 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.50	940	1.10	1,740	1.60	2,580	2.10	3,540
0.60	1,060	1.20	1,900	1.70	2,760	2.20	3,750
0.70	1,180	1.30	2,060	1.80	2,950	2.30	3,960
0.80	1,310	1.40	2,230	1.90	3,140	2.40	4,180
0.90	1,450	1.50	2,400	2.00	3,340	2.50	4,400
1.00	1,590						

NOTE.—The above table is applicable only for open-channel conditions. It is based on three discharge measurements made during 1906 and on the general form of previous curves. There has been considerable change in the conditions of flow at this station, but the above rating is fairly good. Above gage height 2.3 feet the rating curve is a tangent, the difference being 220 per tenth.

Monthly discharge of Nolichucky River near Greeneville, Tenn., for 1906.

[Drainage area, 1,100 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	32,300	1,000	3,760	3.42	3.94
February	4,070	1,590	2,180	1.98	2.06
March	5,940	1,450	2,360	2.15	2.48
April	9,900	1,380	2,460	2.24	2.50
May	5,720	1,060	2,110	1.92	2.21
June	6,600	940	1,840	1.67	1.86
July	3,140	940	1,820	1.65	1.90
August	10,800	1,240	3,070	2.79	3.22
September	16,900	1,590	4,020	3.65	4.07
October	8,580	1,660	3,370	3.06	3.53
November	19,800	1,240	2,850	2.59	2.89
December	8,360	1,240	2,270	2.06	2.38
The year	32,300	940	2,680	2.43	33.04

NOTE.—Values for 1906 are good.

SOUTH FORK OF HOLSTON RIVER AT BLUFF CITY, TENN.

This station, originally established by the United States Weather Bureau, is located at the highway bridge at Bluff City, Tenn. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 115, where are given also references to publications that contain data for previous years.

Discharge measurements of South Fork of Holston River at Bluff City, Tenn., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 26	O. P. Hall	170	437	0.85	666
October 24	F. A. Murray	248	778	2.39	1,760
October 24	do	248	683	2.13	1,440

Daily gage height, in feet, of South Fork of Holston River at Bluff City, Tenn., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.0	2.6	1.1	2.5	1.1	0.7	0.6	2.3	2.5	1.0	1.2	1.4
2	.9	2.3	1.1	2.1	1.2	.7	.6	2.0	1.8	1.0	1.1	1.3
3	.9	2.0	1.1	1.9	1.2	.7	.5	1.9	1.6	1.2	1.0	1.2
4	3.3	1.8	1.5	1.8	1.9	.6	.9	1.7	2.8	1.2	1.0	1.2
5	3.2	1.8	1.4	1.6	2.7	.6	.9	2.4	3.2	1.7	1.0	1.2
6	2.4	1.7	1.3	1.6	3.6	.7	.8	2.1	2.3	1.6	1.0	1.1
7	1.9	1.6	1.3	2.6	3.8	.5	.6	1.8	2.3	2.0	.9	1.2
8	1.7	1.6	1.2	2.3	3.2	.5	.5	1.5	2.0	2.1	.9	1.2
9	1.5	1.4	1.2	2.1	2.6	.5	.6	1.4	1.6	1.7	.9	1.1
10	1.2	1.4	1.2	2.2	2.2	.5	.6	1.5	1.5	1.5	.9	1.1
11	1.2	1.2	1.1	2.0	2.0	1.1	.6	1.9	1.3	1.3	1.1	1.2
12	1.3	1.2	1.0	1.8	1.7	.9	.5	1.5	2.4	1.2	2.4	1.3
13	1.7	1.2	1.0	1.7	1.7	.7	.5	2.2	1.7	1.0	2.0	1.2
14	2.2	1.2	1.0	1.6	1.6	.7	.4	2.3	1.3	1.0	1.7	1.2
15	2.7	1.3	1.5	4.0	1.4	.7	.4	3.4	1.2	.9	1.4	1.1
16	2.5	1.3	3.5	4.0	1.4	.8	.6	2.5	1.0	.8	1.4	1.1
17	2.3	1.2	2.9	3.0	1.2	1.1	.7	3.0	.9	.9	1.3	1.1
18	2.1	1.2	2.3	2.6	1.3	1.2	1.3	2.4	.9	.8	1.4	2.7
19	2.1	1.2	2.0	2.1	1.3	1.0	1.2	1.9	.9	1.3	4.8	2.4
20	1.9	1.1	2.4	1.9	1.4	1.4	.9	1.5	.8	6.0	5.8	2.2
21	1.8	1.1	2.5	1.7	1.2	1.6	1.1	1.8	.8	4.0	3.7	2.0
22	1.7	1.4	2.3	1.6	1.1	1.3	1.6	2.1	1.0	3.0	3.0	2.0
23	10.0	1.5	2.0	1.6	1.0	1.0	1.9	1.7	1.5	2.5	2.3	1.9
24	5.6	1.4	1.8	1.6	.9	.8	1.6	1.9	2.0	2.2	2.3	1.3
25	3.8	1.3	1.8	1.4	.9	1.1	1.3	1.9	1.5	1.9	1.9	1.7
26	3.1	1.3	1.6	1.4	.8	1.8	1.2	1.5	1.3	1.7	1.4	1.7
27	2.7	1.3	1.7	1.3	.9	1.5	1.5	1.3	1.0	1.6	1.6	1.7
28	2.9	1.3	1.9	1.2	.9	1.1	1.6	1.3	1.0	1.5	1.6	3.0
29	2.8	.....	2.0	1.2	1.0	.9	1.3	1.2	.9	1.5	1.5	5.5
30	2.7	.....	1.9	1.2	.9	.8	3.0	2.0	1.0	1.3	1.4	4.3
31	2.6	.....	2.1	.....	.8	.....	3.0	2.9	.....	1.2	.....	3.3

Rating table for South Fork of Holston River at Bluff City, Tenn., for 1905 and 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Ft.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.20	235	1.40	870	60	2,070	3.80	3,800
0.30	265	1.50	950	70	2,190	3.90	3,980
0.40	300	1.60	1,030	80	2,310	4.00	4,160
0.50	340	1.70	1,120	.90	2,430	4.20	4,530
0.60	385	1.80	1,210	3.00	2,550	4.40	4,910
0.70	435	1.90	1,310	3.10	2,680	4.60	5,310
0.80	485	2.00	1,410	3.20	2,820	4.80	5,730
0.90	540	2.10	1,520	3.30	2,970	5.00	6,180
1.00	600	2.20	1,630	3.40	3,120	5.20	6,650
1.10	665	2.30	1,730	3.50	3,280	5.40	7,130
1.20	730	2.40	1,840	3.60	3,450	5.60	7,630
1.30	800	2.50	1,950	3.70	3,620	5.80	8,130

NOTE.—The above table is based on discharge measurements made during 1904–1906. It is well defined between gage heights 0.5 foot and 3.5 feet. Above gage height 5.4 feet the rating curve is a tangent, the difference being 250 per tenth.

Monthly discharge of South Fork of Holston River at Bluff City, Tenn., for 1906.

[Drainage area, 828 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	18,600	540	2,390	2.89	3.33
February	2,070	665	946	1.14	1.19
March	3,280	600	1,190	1.44	1.66
April	4,160	730	1,480	1.79	2.00
May	3,800	485	1,140	1.38	1.59
June	1,210	340	572	.691	.77
July	2,550	300	715	.864	1.00
August	3,120	730	1,410	1.70	1.96
September	2,820	485	1,060	1.28	1.43
October	8,630	485	1,330	1.61	1.86
November	8,130	540	1,480	1.79	2.00
December	7,380	665	1,420	1.71	1.97
The year	18,600	300	1,260	1.52	20.76

NOTE.—Values for 1906 are good.

HOLSTON RIVER AT AUSTINS MILLS, TENNESSEE.

This station is maintained in cooperation with the United States Weather Bureau, by which the gage readings are furnished. It is located at the Southern Railway bridge at Austins Mills, near Rogersville, Tenn. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 117, where are given also references to publications that contain data for previous years.

The following discharge measurement was made October 25, 1906:

Width, 386 feet; area, 1,980 square feet; gage height, 2.98 feet; discharge, 4,600 second-feet.

Daily gage height, in feet, of Holston River at Austins Mills, Tennessee, for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.1	4.0	2.4	3.4	2.3	1.9	2.0	4.8	4.5	2.9	2.1	2.5
2	2.0	3.8	2.3	3.4	2.3	1.9	1.9	3.9	3.8	2.6	2.0	2.4
3	1.9	3.5	2.3	3.2	2.3	1.9	1.7	3.7	3.1	2.6	2.0	2.4
4	3.3	3.1	2.4	3.0	2.7	1.9	1.7	3.4	3.1	2.9	1.9	2.3
5	4.6	3.0	2.8	2.8	3.8	1.9	1.8	3.3	3.8	3.2	1.9	2.3
6	3.8	3.0	2.7	2.8	4.1	1.9	1.8	3.1	5.6	3.7	1.9	2.3
7	3.2	2.9	2.5	3.1	5.4	2.2	1.8	2.8	4.2	3.6	1.8	2.3
8	2.7	2.7	2.4	3.4	5.2	2.1	1.8	2.6	4.1	3.6	1.8	2.4
9	2.6	2.6	2.4	3.2	4.2	2.0	1.8	2.5	3.4	3.2	1.7	2.3
10	2.5	2.4	2.4	3.9	3.5	2.0	1.8	2.6	3.1	2.8	1.7	2.2
11	2.3	2.4	2.3	3.6	3.3	1.9	2.0	2.5	2.8	2.6	1.8	2.2
12	2.5	2.3	2.3	3.2	3.2	1.8	1.8	2.6	2.7	2.4	2.6	2.4
13	2.6	2.2	2.2	3.0	2.9	2.0	1.7	2.5	2.9	2.3	3.2	2.4
14	3.2	2.2	2.2	2.8	2.8	1.9	1.7	3.0	2.6	2.2	2.8	2.3
15	3.7	2.3	3.2	2.9	2.6	2.6	1.7	3.2	2.4	2.2	2.5	2.3
16	3.9	2.2	4.5	5.8	2.5	2.3	1.7	4.3	2.3	2.1	2.4	2.2
17	3.7	2.4	4.6	4.7	2.5	2.5	2.5	3.5	2.2	2.0	2.3	2.2
18	3.3	2.3	3.8	3.9	2.4	2.4	2.8	4.2	2.0	2.0	2.3	2.8
19	3.2	2.3	3.4	3.4	2.4	2.4	2.9	3.4	2.0	2.1	7.2	3.6
20	3.1	2.2	3.2	3.0	2.4	2.4	2.4	3.3	3.6	6.7	11.5	3.3
21	2.9	2.2	3.4	2.8	2.4	2.4	2.2	3.1	2.9	6.3	7.2	3.2
22	2.7	2.2	3.3	2.8	2.3	2.4	2.4	3.2	2.8	4.5	5.0	3.2
23	3.9	2.7	3.1	2.7	2.3	2.3	2.9	3.5	2.9	3.8	4.2	3.1
24	15.0	2.7	3.0	2.6	2.4	2.1	2.8	3.9	2.8	3.3	3.6	3.0
25	6.2	2.5	2.9	2.5	2.1	2.1	2.5	3.8	3.0	3.0	3.3	2.8
26	4.6	2.5	2.8	2.4	2.0	2.4	2.4	3.1	2.6	2.8	3.0	2.4
27	4.3	2.5	3.0	2.4	2.0	2.7	2.4	2.8	2.4	2.7	3.0	2.5
28	4.6	2.4	3.1	2.3	2.0	2.3	3.1	2.9	2.3	2.4	2.9	3.3
29	4.5	.....	3.2	2.3	2.2	2.1	2.6	3.8	2.3	2.4	2.8	6.8
30	4.1	.....	3.2	2.4	2.2	2.0	5.2	5.1	3.5	2.3	2.6	6.8
31	4.0	.....	3.1	.....	2.0	.....	6.2	4.4	.....	2.2	.....	5.4

Rating table for Holston River at Austins Mills, Tennessee, for 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.70	1,700	2.60	3,660	3.50	6,100	4.40	9,120
1.80	1,900	2.70	3,900	3.60	6,410	4.50	9,490
1.90	2,100	2.80	4,150	3.70	6,720	4.60	9,860
2.00	2,310	2.90	4,410	3.80	7,040	4.70	10,240
2.10	2,520	3.00	4,670	3.90	7,370	4.80	10,620
2.20	2,740	3.10	4,940	4.00	7,710	4.90	11,010
2.30	2,960	3.20	5,220	4.10	8,050	5.00	11,400
2.40	3,190	3.30	5,510	4.20	8,400	5.20	12,200
2.50	3,420	3.40	5,800	4.30	8,760	5.40	13,000

NOTE.—The above table is applicable only for open-channel conditions. It is based on 7 discharge measurements made during 1904 to 1906. It is well defined between gage heights 1.0 foot and 6.0 feet. Above gage height 5.0 feet the rating curve is a tangent, the difference being 400 per tenth.

Monthly discharge of Holston River at Austins Mills, Tennessee, for 1906.

[Drainage area, 3,060 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	51,400	2,100	7,550	2.47	2.85
February	7,710	2,740	3,790	1.24	1.29
March	9,860	2,740	4,580	1.50	1.73
April	14,600	2,960	5,180	1.69	1.89
May	13,000	2,310	4,400	1.44	1.66
June	3,900	1,900	2,660	.869	.97
July	16,200	1,700	3,440	1.12	1.29
August	11,800	3,420	5,900	1.93	2.22
September	13,800	2,310	5,040	1.65	1.84
October	18,200	2,310	5,060	1.65	1.90
November	37,400	1,700	5,970	1.95	2.18
December	18,600	2,740	4,960	1.62	1.87
The year	51,400	1,700	4,880	1.59	21.69

NOTE.—Values for 1906 are excellent.

WATAUGA RIVER NEAR ELIZABETHTON, TENN.

This station was established May 11, 1903. It is located on the Virginia and Southwestern Railway bridge at Siam, about 4 miles from Elizabethton, Tenn. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 119, where are given also references to publications that contain data for previous years.

The following discharge measurement was made October 22, 1906:

Width, 213 feet; area, 1.080 square feet; gage height, 3.17 feet; discharge, 1.970 second-feet.

Daily gage height, in feet, of Watauga River near Elizabethton, Tenn., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.65	2.6	1.85	2.8	1.7	1.5	1.7	2.4	4.1	4.2	1.8	1.7
2	1.6	2.5	1.8	2.7	1.7	1.5	1.65	2.6	3.0	4.2	1.75	1.7
3	1.6	2.3	1.8	2.6	1.7	1.5	1.6	2.5	2.7	4.5	1.7	1.8
4	3.6	2.2	2.6	2.1	2.0	1.5	1.6	2.4	3.0	4.3	1.7	1.8
5	2.8	2.1	2.6	2.0	3.0	1.45	1.55	2.35	4.0	3.2	1.7	1.75
6	2.6	2.0	2.5	2.2	3.5	1.45	1.55	2.3	3.9	2.9	1.7	1.8
7	2.4	2.0	2.4	2.2	3.4	1.4	1.5	2.0	3.7	2.7	1.65	1.8
8	2.3	2.0	2.8	2.0	3.0	1.45	1.5	1.8	3.5	2.4	1.65	1.6
9	2.0	2.0	2.6	2.0	2.9	1.45	2.2	1.7	3.4	2.2	1.6	1.6
10	1.7	2.0	2.5	1.9	2.7	1.4	1.7	1.65	3.2	2.1	1.6	1.6
11	1.7	1.95	1.9	1.9	2.5	1.4	1.5	1.6	3.0	2.0	1.75	1.6
12	1.8	1.95	1.7	1.85	2.0	3.0	1.5	1.6	2.8	1.9	2.0	1.6
13	2.0	1.9	1.7	1.8	1.9	3.5	1.45	1.8	2.4	1.9	2.0	1.6
14	2.9	1.9	1.7	1.8	1.85	3.0	1.4	2.0	2.2	1.9	1.9	1.6
15	2.6	2.1	2.6	5.0	1.8	2.8	3.0	2.3	1.9	1.9	1.75	1.6
16	2.6	2.0	3.0	3.6	1.8	2.7	2.6	2.6	1.85	1.8	1.65	1.6
17	2.5	1.9	2.4	3.4	1.7	2.7	2.4	4.2	1.8	1.8	1.6	1.65
18	2.4	1.8	2.4	3.0	1.65	2.6	2.0	2.7	1.7	1.9	2.0	2.1
19	2.2	1.8	2.3	2.5	1.6	2.4	1.8	2.6	5.0	6.0	7.0	2.0
20	2.2	1.9	2.3	2.4	1.6	2.3	2.0	2.3	4.2	5.6	4.6	2.0
21	2.1	2.4	2.2	2.2	1.55	2.0	2.3	2.3	2.7	4.0	3.4	1.9
22	7.3	2.4	2.3	2.15	1.5	1.7	2.2	2.3	3.1	3.15	2.9	1.85
23	7.4	2.1	2.4	2.1	1.5	1.65	2.0	2.3	3.0	2.7	2.6	1.8
24	4.8	2.1	2.4	2.1	1.5	2.4	1.9	2.2	2.8	2.6	2.5	1.8
25	3.6	2.0	2.35	2.0	1.45	2.55	1.85	2.2	2.5	2.4	2.4	1.8
26	3.1	2.0	2.2	1.9	1.4	2.2	1.8	2.4	2.3	2.3	2.3	1.85
27	2.9	1.9	2.1	1.8	1.8	2.0	2.9	2.6	2.15	2.2	2.15	1.9
28	2.9	1.9	2.0	1.8	1.9	1.9	2.3	4.5	2.15	2.0	2.0	3.2
29	2.8	.....	2.0	1.8	1.7	1.8	2.2	6.8	4.7	1.9	1.9	4.4
30	2.8	.....	3.4	1.75	1.6	1.7	2.1	5.4	4.3	1.85	1.7	3.9
31	2.7	.....	2.9	.....	1.55	.....	2.4	5.3	.....	1.8	.....	3.6

Rating table for Watauga River near Elizabethton, Tenn., for 1905 and 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.20	205	2.40	1,010	3.60	2,330	5.60	5,200
1.30	250	2.50	1,100	3.70	2,460	5.80	5,520
1.40	300	2.60	1,190	3.80	2,590	6.00	5,840
1.50	355	2.70	1,285	3.90	2,720	6.20	6,180
1.60	410	2.80	1,385	4.00	2,850	6.40	6,520
1.70	470	2.90	1,490	4.20	3,110	6.60	6,860
1.80	535	3.00	1,600	4.40	3,390	6.80	7,200
1.90	605	3.10	1,710	4.60	3,670	7.00	7,540
2.00	680	3.20	1,825	4.80	3,970	8.90	9,340
2.10	755	3.30	1,945	5.00	4,270	9.00	11,240
2.20	835	3.40	2,070	5.20	4,570		
2.30	920	3.50	2,200	5.40	4,880		

NOTE.—The above table is based on discharge measurements made during 1904-6. It is well defined between gage heights 1.4 feet and 3.7 feet.

Monthly discharge of Watauga River near Elizabethton, Tenn., for 1906.

[Drainage area, 408 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	8,260	410	1,640	4.02	4.64
February	1,190	535	732	1.79	1.86
March	2,070	470	959	2.35	2.71
April	4,270	502	1,000	2.45	2.73
May	2,200	300	728	1.78	2.05
June	2,200	300	765	1.87	2.09
July	1,600	300	668	1.64	1.89
August	7,200	410	1,300	3.19	3.68
September	4,270	470	1,750	4.29	4.79
October	5,840	535	1,560	3.82	4.40
November	7,540	410	1,020	2.50	2.79
December	3,390	410	776	1.90	2.19
The year	8,260	300	1,070	2.63	35.82

NOTE.—As values for 1906 are based on the only measurement made during the year they should be rated as fair, but it is probable that good would be a better rating.

LITTLE TENNESSEE RIVER AT JUDSON, N. C.

This station was established in June, 1896. It is located on the Southern Railway bridge about one-fourth mile from Judson, N. C. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 122, where are given also references to publications that contain data for previous years.

Discharge measurements of Little Tennessee River at Judson, N. C., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
February 10	O. P. Hall	147	445	3.82	1,860
April 13	do	155	508	4.18	2,630
June 9	do	144	378	3.30	1,480
November 5	do	152	433	3.72	1,820
November 6	do	152	424	3.70	1,810

Daily gage height, in feet, of Little Tennessee River at Judson, N. C., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.75	4.5	3.7	5.1	4.0	4.6	3.4	4.7	5.1	9.4	3.85	4.15
2	3.3	4.4	3.6	4.8	4.1	4.6	3.3	4.75	5 2	7.6	3.8	4.1
3	3.55	4.2	3.75	4.55	4.1	3.65	3.3	4.45	4.1	8.0	3.8	4.05
4	4.3	4.2	3.75	4.4	4.1	3.6	4.6	5.0	4.15	8.0	3.8	4.0
5	8.0	4.2	4.2	4.3	4.1	3.65	3.9	4.5	4.25	7.0	3.75	3.9
6	6.0	4.1	3.95	4.25	3.75	3.9	4.6	4.95	4.4	7.9	3.7	4.0
7	4.7	4.0	3.8	4.15	3.2	3.5	3.95	4.55	4.4	6.9	3.65	4.2
8	4.5	4.0	3.95	4.15	3.85	3.4	3.95	4.25	4.5	6.0	3.6	3.5
9	4.6	3.9	3.9	4.0	3.75	3.3	3.8	4.0	4.25	5.7	3.6	3.9
10	4.25	3.8	3.8	5.0	3.65	3.2	3.8	4.0	4.0	5.5	3.6	3.9
11	4.1	3.8	3.7	4.55	3.2	3.2	3.65	4.0	3.9	5.2	3.8	4.8
12	4.75	3.8	3.6	4.5	3.1	3.4	3.9	4.8	4.5	5.0	3.75	4.3
13	4.4	3.8	3.6	4.2	3.6	3.8	3.8	4.85	3.2	4.9	3.5	4.1
14	4.4	3.8	3.6	4.15	3.5	5.0	6.1	4.85	3.9	4.8	3.55	4.0
15	4.3	3.7	4.8	5.0	3.35	5.3	6.3	4.25	3.8	4.7	3.6	3.95
16	4.3	3.6	5.6	5.0	3.4	5.1	6.3	5.5	3.75	4.6	3.5	3.75
17	4.4	3.55	4.6	4.9	3.35	4.6	6.3	4.0	3.6	4.5	3.6	4.1
18	4.4	3.65	4.25	4.65	3.25	4.2	6.8	4.4	3.5	4.45	5.4	5.3
19	4.1	3.65	4.45	4.65	3.3	4.0	5.0	4.5	7.1	5.5	13.5	4.7
20	4.0	3.5	6.0	4.45	3.3	3.9	3.15	4.5	6.6	4.8	7.7	4.7
21	4.0	3.5	5.1	4.15	3.3	3.75	6.2	4.75	5.8	4.6	6.1	4.5
22	4.7	3.9	5.7	4.2	3.25	3.7	5.4	4.1	5.0	4.5	5.5	4.5
23	9.0	3.6	4.45	4.1	3.2	5.5	4.2	4.1	5 0	4.4	5.1	4.2
24	7.0	3.5	4.3	4.0	3.1	4.4	4.85	5.2	4.9	4.3	4.9	4.1
25	5.9	3.6	4.3	4.0	3.15	4.3	4.25	4.4	4.75	4.25	4.7	3.0
26	5.5	3.5	4.25	3.9	3.2	4.2	4.5	4.2	4.7	4.2	4.5	3.1
27	5.4	3.55	4.2	3.85	4.7	3.75	4.5	4.2	4.6	4.1	4.4	3.0
28	5.2	3.6	4.25	4.15	3.8	4.6	4.5	4.3	4.6	4.05	4.3	4.5
29	5.0	.....	4.2	4.0	3.4	3.5	4.0	4.5	7.3	4 0	4.25	4.5
30	4.8	.....	5.1	4.0	3.4	3.5	4.5	6.2	12.0	4.0	4.2	4.5
31	4.65	.....	5.9	.....	3.3	.....	4.5	6.2	.....	3.9	.....	6.0

Rating table for Little Tennessee River at Judson, N. C., for 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
3.00	1,000	4.20	2,580	5.40	4,920	7.20	9,670
3.10	1,100	4.30	2,750	5.50	5,150	7.40	10,290
3.20	1,200	4.40	2,920	5.60	5,380	7.60	10,930
3.30	1,310	4.50	3,100	5.70	5,620	7.80	11,600
3.40	1,430	4.60	3,280	5.80	5,860	8.00	12,300
3.50	1,550	4.70	3,470	5.90	6,110	8.20	13,030
3.60	1,680	4.80	3,660	6.00	6,360	8.40	13,800
3.70	1,820	4.90	3,860	6.20	6,870	8.60	14,600
3.80	1,960	5.00	4,060	6.40	7,390	8.80	15,400
3.90	2,110	5.10	4,270	6.60	7,930	9.00	16,200
4.00	2,260	5.20	4,480	6.80	8,490	10.00	20,700
4.10	2,420	5.30	4,700	7.00	9,070	11.00	25,500

NOTE.—The above table is applicable only for open-channel conditions. It is based on 5 discharge measurements made during 1906 and on the general form of the 1905 curve. It is well defined between gage heights 3.0 feet and 11.0 feet. Above gage height 10.0 feet the rating curve is a tangent, the difference being 480 per tenth.

Monthly discharge of Little Tennessee River at Judson, N. C., for 1906

[Drainage area, 675 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	16,200	1,310	4,080	6.04	6.96
February	3,100	1,550	2,010	2.98	3.10
March	6,360	1,680	2,940	4.36	5.03
April	4,270	2,030	2,900	4.30	4.80
May	3,470	1,100	1,650	2.44	2.81
June	5,150	1,200	2,420	3.59	4.00
July	8,490	1,150	3,450	5.11	5.89
August	6,870	2,260	3,380	5.01	5.78
September	30,300	1,200	4,490	6.65	7.42
October	18,000	2,110	5,380	7.97	9.19
November	37,500	1,550	4,050	6.00	6.69
December	6,360	1,000	2,650	3.93	4.53
The year	37,500	1,000	3,280	4.86	66.20

NOTE.—Values for 1906 are good.

LITTLE TENNESSEE RIVER AT M'GHEE, TENN.

This station was established in 1904 by the United States Weather Bureau. It is located at the Louisville and Nashville Railroad bridge, about one-third mile south of McGhee Station, Tenn. During 1905–6 discharge measurements have been made by the Geological Survey, and gage-height records have been furnished by the Weather Bureau. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 125, where are given also references to publications that contain data for previous years.

Discharge measurements of Little Tennessee River at McGhee, Tenn., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
February 14	O. P. Hall	464	1,330	3.84	4,910
April 21	do	477	1,730	4.62	7,230
June 14	do	502	2,430	5.74	11,000
November 1	do	458	1,290	3.81	4,770

Daily gage height, in feet, of Little Tennessee River at McGhee, Tenn., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.8	4.8	3.7	6.2	4.0	3.3	3.8	4.9	6.1	13.3	3.8	4.7
2	3.7	4.7	3.6	5.6	4.2	4.1	3.6	5.1	5.7	8.5	3.8	4.5
3	4.0	4.5	4.0	5.2	4.1	4.3	3.5	4.9	5.2	9.3	3.8	4.6
4	12.5	4.4	6.7	4.9	4.5	3.7	3.8	5.5	4.6	9.4	3.7	4.6
5	7.6	4.3	5.0	4.7	4.2	3.9	4.4	5.5	5.1	8.0	3.6	4.4
6	6.0	4.3	4.5	4.7	4.1	3.9	3.8	5.0	5.6	7.2	3.6	4.3
7	5.2	4.2	4.2	4.9	4.5	3.8	4.4	5.0	5.3	8.7	3.6	4.9
8	4.8	4.1	4.2	4.5	4.3	3.6	5.0	4.5	5.2	7.1	3.6	4.5
9	5.6	4.0	4.3	4.6	4.0	3.4	5.3	4.3	5.0	6.3	3.6	4.3
10	4.6	3.9	4.2	7.1	3.9	3.3	4.4	4.2	6.0	5.8	3.5	4.3
11	4.4	3.7	4.1	5.6	3.8	3.3	3.9	4.1	5.1	5.5	3.6	4.9
12	4.8	3.7	4.0	5.0	3.7	3.6	4.0	3.9	5.3	5.2	4.0	5.0
13	5.0	3.9	3.9	4.8	3.7	3.7	3.9	3.9	5.1	5.1	3.6	4.6
14	4.8	3.8	3.8	4.6	3.6	5.8	3.6	4.0	4.3	4.9	3.5	4.4
15	4.7	3.8	5.5	7.7	3.5	5.5	8.2	4.8	4.2	4.8	3.5	4.3
16	4.7	3.7	7.5	6.6	3.4	7.6	6.4	4.9	3.3	4.7	3.5	4.3
17	4.5	3.6	5.5	5.6	3.4	5.6	6.0	4.5	3.2	4.5	3.5	4.3
18	4.4	3.6	5.0	5.3	3.4	4.8	9.3	4.4	3.1	4.5	4.3	7.8
19	5.0	3.6	4.8	5.0	3.4	4.9	7.7	4.9	6.7	6.2	22.2	5.9
20	4.6	3.5	7.0	4.8	3.4	4.4	6.5	4.7	7.5	5.1	20.4	5.4
21	4.4	3.5	5.9	4.7	3.4	4.1	6.5	4.9	5.9	4.9	10.0	5.3
22	4.3	4.5	5.3	4.6	3.3	4.0	8.0	4.5	5.5	4.7	8.2	5.2
23	14.0	4.0	5.0	4.4	3.3	3.9	7.7	4.4	5.3	4.5	7.1	4.7
24	9.2	3.8	4.7	4.2	3.2	4.9	6.2	4.3	5.3	4.4	6.5	4.6
25	6.9	3.7	4.8	4.2	3.2	5.5	5.5	5.0	5.0	4.3	5.9	4.1
26	6.2	3.7	4.6	4.1	3.2	5.5	5.0	4.5	4.9	4.2	5.6	3.9
27	6.2	3.7	4.8	4.1	4.0	4.7	5.2	4.5	4.6	4.1	5.4	4.2
28	5.8	4.0	5.0	4.2	4.1	4.4	5.0	5.1	4.7	4.0	5.2	4.9
29	5.5	.....	4.8	4.4	4.1	4.1	4.5	4.8	5.0	4.0	5.0	7.7
30	5.2	.....	5.8	4.1	3.7	4.0	5.2	5.7	8.9	3.9	4.8	6.3
31	5.0	.....	7.6	.....	3.5	.....	5.0	7.2	.....	3.9	.....	6.5

Rating table for Little Tennessee River at McGhee, Tenn., for 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
3.10	3,200	4.40	6,500	5.70	10,320	8.00	17,520
3.20	3,420	4.50	6,780	5.80	10,620	8.20	18,180
3.30	3,650	4.60	7,060	5.90	10,920	8.40	18,840
3.40	3,890	4.70	7,350	6.00	11,220	8.60	19,500
3.50	4,130	4.80	7,640	6.20	11,840	8.80	20,160
3.60	4,380	4.90	7,930	6.40	12,460	9.00	20,820
3.70	4,630	5.00	8,220	6.60	13,080	10.00	24,220
3.80	4,890	5.10	8,520	6.80	13,700	11.00	27,720
3.90	5,150	5.20	8,820	7.00	14,320	12.00	31,320
4.00	5,410	5.30	9,120	7.20	14,960	13.00	35,020
4.10	5,680	5.40	9,420	7.40	15,600	14.00	38,820
4.20	5,950	5.50	9,720	7.60	16,240	15.00	42,620
4.30	6,220	5.60	10,020	7.80	16,880		

NOTE.—The above table is applicable only for open-channel conditions. It is based on 11 discharge measurements made during 1903 to 1906 and one made in 1901. It is well defined between gage heights 2.2 feet and 5.0 feet. Above gage height 13.0 feet the rating curve is a tangent, the difference being 380 per tenth.

Monthly discharge of Little Tennessee River at McGhee, Tenn., for 1906.

[Drainage area, 2,470 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec. ft. per sq. mile.	Depth in inches.
January	38,800	4,630	10,600	4.29	4.95
February	7,640	4,130	5,340	2.16	2.25
March	16,200	4,380	8,200	3.32	3.83
April	16,600	5,680	8,320	3.37	3.76
May	6,780	3,420	4,780	1.94	2.24
June	16,200	3,650	6,570	2.66	2.97
July	21,800	4,130	9,380	3.80	4.38
August	15,000	5,150	7,590	3.07	3.54
September	20,500	3,200	9,010	3.65	4.07
October	36,200	5,150	11,000	4.45	5.13
November	70,000	4,130	11,300	4.57	5.10
December	16,900	5,150	8,140	3.30	3.80
The year	70,000	3,200	8,350	3.38	46.02

NOTE.—Values for 1906 are excellent.

TUCKASEGEE RIVER AT BRYSON, N. C.

This station was originally established in June, 1896, at the Southern Railway bridge about 3 miles above Bryson, N. C., just below Governor Island post-office, but was abandoned March 25, 1897, on account of the poor section. The present station was established November 7, 1897, at the highway bridge in the town of Bryson, N. C. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 128, where are given also references to publications that contain data for previous years.

Discharge measurements of Tuckasegee River at Bryson, N. C., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
February 10	O. P. Hall	190	951	1.78	1,370
April 17	do	190	1,130	2.67	2,830
June 9	do	190	888	1.63	1,180
November 6	do	190	866	1.68	1,230

Daily gage height, in feet, of Tuckasegee River at Bryson, N. C., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.6	2.2	1.6	2.7	2.0	1.55	1.65	2.2	2.5	3.8	1.75	1.95
2	1.6	2.15	1.6	2.45	1.9	2.5	1.6	2.4	2.25	4.8	1.75	1.9
3	5.5	2.0	3.6	2.3	2.1	1.5	2.0	2.3	2.4	4.6	1.7	2.0
4	3.6	1.95	2.3	2.2	2.0	1.7	2.1	2.2	2.4	3.9	1.7	1.9
5	2.9	2.0	2.0	2.15	1.9	1.9	1.8	2.0	3.2	3.5	1.7	1.85
6	2.5	1.95	1.9	2.3	2.0	1.9	2.1	2.1	2.6	4.2	1.7	2.3
7	2.3	1.9	1.85	2.1	2.0	1.7	1.9	2.0	2.4	3.4	1.65	1.9
8	2.2	1.85	2.0	2.05	1.9	1.6	2.0	1.9	2.2	3.1	1.65	1.8
9	2.05	1.8	1.9	2.5	1.8	1.6	1.9	1.7	2.1	2.9	1.6	1.8
10	1.9	1.8	1.8	2.4	1.7	1.7	1.65	1.7	2.0	2.7	1.6	2.2
11	1.9	1.75	1.75	2.25	1.7	1.7	1.65	1.7	1.9	2.5	1.9	2.3
12	2.1	1.85	1.7	2.15	1.7	1.65	1.6	1.65	2.0	2.4	1.7	2.0
13	2.0	1.8	1.7	2.1	1.7	3.7	1.6	1.6	2.0	2.45	1.7	1.9
14	2.1	1.8	1.9	3.75	1.65	2.2	2.4	1.9	1.8	2.3	1.7	1.9
15	2.0	1.75	3.45	3.3	1.6	3.6	2.6	2.2	1.8	2.2	1.6	1.9
16	2.1	1.7	2.5	2.8	1.6	2.5	2.2	2.0	1.75	2.2	1.6	1.9
17	1.9	1.65	2.2	2.6	1.6	2.2	2.7	2.0	1.7	2.15	1.75	3.0
18	2.3	1.65	2.1	2.4	1.55	2.0	3.35	2.4	4.2	3.0	5.0	2.6
19	2.0	1.65	2.5	2.3	1.55	2.0	2.7	2.1	4.6	2.4	10.0	2.3
20	2.0	1.6	2.7	2.2	1.5	1.9	2.4	2.0	3.1	2.35	4.2	2.3
21	2.0	2.0	2.4	2.2	1.5	1.8	2.5	2.1	2.7	2.2	3.4	2.3
22	4.3	1.8	2.3	2.1	1.55	1.8	2.7	2.0	2.6	2.1	2.9	2.2
23	5.0	1.7	2.15	2.0	1.5	1.75	2.5	2.0	2.8	2.0	2.8	2.2
24	3.4	1.7	2.2	2.0	1.45	2.6	2.5	2.3	2.5	2.0	2.5	2.0
25	3.0	1.65	2.1	1.95	1.4	2.2	2.2	2.0	2.4	1.9	2.4	2.05
26	3.1	1.6	2.0	1.9	1.5	1.9	2.1	2.0	2.25	1.9	2.25	2.0
27	2.75	1.85	2.4	1.9	2.0	1.9	2.0	2.1	2.3	1.85	2.2	2.0
28	2.6	1.6	2.2	1.9	2.4	1.8	2.0	2.3	2.4	1.8	2.1	2.9
29	2.5	.....	2.5	1.9	1.9	1.8	2.1	2.7	4.4	1.8	2.0	2.6
30	2.4	.....	4.2	1.85	1.7	1.7	2.1	3.6	6.2	1.8	2.0	2.55
31	2.3	.....	3.0	.....	1.6	.....	2.0	2.8	.....	1.8	.....	4.0

Rating table for Tuckasegee River at Bryson, N. C., 1904 to 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.90	380	2.00	1,660	3.10	3,670	4.40	6,920
1.00	460	2.10	1,810	3.20	3,890	4.60	7,530
1.10	550	2.20	1,970	3.30	4,110	4.80	8,160
1.20	650	2.30	2,130	3.40	4,330	5.00	8,800
1.30	750	2.40	2,300	3.50	4,560	5.20	9,475
1.40	860	2.50	2,480	3.60	4,800	5.40	10,250
1.50	980	2.60	2,660	3.70	5,040	5.60	11,125
1.60	1,100	2.70	2,850	3.80	5,290	5.80	12,100
1.70	1,230	2.80	3,050	3.90	5,540	6.00	13,200
1.80	1,370	2.90	3,250	4.00	5,800	6.20	14,360
1.90	1,510	3.00	3,460	4.20	6,350	6.40	15,520

NOTE.—The above table is based on discharge measurements made during 1904 to 1906. It is well defined to gage height 3 feet. Above gage height 6.0 feet the rating curve is a tangent, the difference being 580 per tenth.

Monthly discharge of Tuckasegee River at Bryson, N. C., for 1906.

[Drainage area, 662 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	10,700	1,100	2,870	4.34	5.00
February	1,970	1,100	1,390	2.10	2.19
March	6,350	1,100	2,190	3.31	3.82
April	5,160	1,440	2,170	3.28	3.66
May	2,300	860	1,300	1.96	2.26
June	5,040	980	1,750	2.64	2.94
July	4,220	1,100	1,930	2.92	3.37
August	4,800	1,100	1,900	2.87	3.31
September	14,400	1,230	3,070	4.64	5.18
October	8,160	1,370	2,960	4.47	5.15
November	36,400	1,100	3,230	4.88	5.44
December	5,800	1,370	2,040	3.08	3.55
The year	36,400	860	2,230	3.37	45.87

NOTE.—Values for 1906 are excellent.

HIWASSEE RIVER AT MURPHY, N. C.

This station was established July 26, 1896. It is located at the highway bridge, Murphy, N. C., about 80 feet above the Louisville and Nashville Railroad bridge and one-half mile above the mouth of Valley River. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 130, where are given also references to publications that contain data for previous years.

Discharge measurements of Hiwassee River at Murphy, N. C., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
February 9	O. P. Hall	169	425	5.78	902
April 11	do	172	473	6.17	1,310
April 11	M. R. Hall	172	471	6.17	1,400
April 16	do	176	559	6.68	2,060
June 7	O. P. Hall	170	426	5.61	847
November 7	do	170	414	5.63	799

Daily gage height, in feet, of Hiwassee River at Murphy, N. C., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.6	6.1	5.5	6.7	5.75	5.4	5.4	6.4	6.65	9.0	5.7	6.0
2	5.6	6.05	5.5	6.45	5.75	6.7	5.4	6.4	6.3	7.6	5.7	6.0
3	5.85	5.95	5.65	6.25	5.75	5.65	5.4	6.2	6.15	7.8	5.7	6.0
4	8.2	5.9	6.15	6.15	5.85	5.8	5.65	6.3	6.1	7.8	5.65	5.95
5	6.9	5.9	5.9	6.1	5.75	5.85	5.4	6.1	6.1	7.2	5.65	5.9
6	6.45	5.85	5.75	6.05	5.7	5.8	5.4	6.0	5.95	7.4	5.65	5.9
7	6.25	5.85	5.7	6.0	6.15	5.6	5.5	6.25	5.9	7.2	5.65	6.1
8	6.1	5.8	5.9	5.95	5.85	5.5	5.35	5.9	6.4	6.85	5.6	5.95
9	6.05	5.8	5.8	5.95	5.7	5.5	5.75	5.8	5.85	6.6	5.6	5.9
10	6.2	5.75	5.75	6.35	5.7	5.4	5.4	5.7	5.85	6.5	5.6	5.9
11	5.9	5.7	5.7	6.25	5.65	5.4	5.4	5.65	5.75	6.35	5.6	6.7
12	6.3	5.7	5.65	6.1	5.65	5.55	5.45	5.6	6.7	6.25	5.75	6.3
13	6.05	5.7	5.65	6.05	5.65	5.75	5.4	5.6	5.9	6.15	5.6	6.15
14	6.05	5.65	5.65	6.0	5.6	6.2	5.35	6.3	5.7	6.1	5.6	6.1
15	5.95	5.65	7.6	7.4	5.55	6.15	6.9	7.4	5.7	6.05	5.55	6.05
16	5.95	5.65	6.95	6.75	5.5	6.55	6.45	6.25	5.65	6.0	5.6	5.95
17	5.85	5.6	6.4	6.45	5.5	6.1	8.2	5.9	5.6	6.0	5.65	6.1
18	5.95	5.6	6.2	6.25	5.5	5.85	6.45	5.95	5.05	5.95	6.6	7.15
19	5.95	5.55	6.2	6.15	5.45	5.75	5.95	6.0	7.0	6.5	15.8	6.6
20	5.85	5.55	7.2	6.05	5.45	5.7	6.4	6.25	6.35	6.2	8.2	6.65
21	5.85	5.65	6.65	6.0	5.4	5.55	6.45	6.1	6.25	6.1	7.2	6.5
22	5.95	5.7	6.4	5.95	5.45	5.1	6.3	6.2	6.3	6.05	6.95	6.35
23	9.5	5.6	6.25	5.9	5.4	5.45	6.2	5.95	6.25	6.0	6.6	6.2
24	7.5	5.6	6.1	5.85	5.35	6.2	6.05	6.1	6.3	5.95	6.45	6.1
25	6.6	5.6	6.1	5.8	5.35	5.95	5.85	6.0	6.15	5.9	6.3	6.1
26	6.7	5.55	6.1	5.8	5.45	6.0	6.05	5.8	6.1	5.85	6.25	6.0
27	6.65	5.55	6.1	5.8	6.25	5.65	5.85	6.05	6.05	5.8	6.2	6.0
28	6.25	5.5	6.05	6.85	5.65	5.55	5.75	5.8	5.95	5.75	6.15	6.75
29	6.35	.....	6.05	5.9	5.55	5.6	5.7	6.4	7.1	5.75	6.1	7.6
30	6.25	.....	6.5	5.85	5.45	5.5	6.3	8.7	9.6	5.75	6.05	6.9
31	6.2	.....	7.2	.....	5.4	.....	5.85	7.4	.....	5.75	.....	7.8

Rating table for Hiwassee River at Murphy, N. C., for 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
5.00	310	5.90	1,010	6.80	2,370	7.70	4,180
5.10	365	6.00	1,130	6.90	2,550	7.80	4,400
5.20	425	6.10	1,260	7.00	2,740	7.90	4,620
5.30	490	6.20	1,400	7.10	2,930	8.00	4,840
5.40	560	6.30	1,540	7.20	3,130	8.20	5,280
5.50	635	6.40	1,690	7.30	3,330	8.40	5,720
5.60	715	6.50	1,850	7.40	3,540		
5.70	800	6.60	2,020	7.50	3,750		
5.80	900	6.70	2,190	7.60	3,960		

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1900 to 1906. It is well defined between gage heights 5.0 feet and 6.8 feet. Above gage height 8.0 feet the rating curve is a tangent, the difference being 220 per tenth.

Monthly discharge of Hiwassee River at Murphy, N. C., for 1906.

[Drainage area, 410 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	8,140	715	1,760	4.29	4.95
February	1,260	635	830	2.02	2.10
March	3,960	635	1,410	3.44	3.97
April	3,540	900	1,410	3.44	3.84
May	1,470	525	749	1.83	2.11
June	2,190	365	912	2.22	2.48
July	5,280	560	1,150	2.80	3.23
August	6,380	715	1,520	3.71	4.28
September	8,360	338	1,570	3.83	4.27
October	7,040	850	1,950	4.76	5.49
November	22,000	715	1,990	4.85	5.41
December	4,400	1,010	1,630	3.98	4.59
The year	22,000	338	1,410	3.43	46.72

NOTE.—Values for 1906 are excellent.

HIWASSEE RIVER AT RELIANCE, TENN.

This station was established August 17, 1900. It is located at the Louisville and Nashville Railroad bridge at Reliance, Tenn. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 132, where are given also references to publications that contain data for previous years.

Discharge measurements of Hiwassee River at Reliance, Tenn., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
February 13	O. P. Hall	317	1,990	1.88	2,090
April 20	do	326	2,210	2.27	3,000
June 13	do	330	2,270	2.38	3,440
November 2	do	319	2,040	1.92	2,240

Daily gage height, in feet, of Hiwassee River at Reliance, Tenn., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.85	2.35	1.7	3.1	2.05	1.5	1.7	2.9	3.0	5.4	1.95	2.3
2	1.8	2.25	1.7	2.25	2.0	1.75	1.6	3.1	2.6	3.9	1.95	2.25
3	1.95	2.2	2.1	2.5	1.95	2.0	1.6	2.85	2.4	4.5	1.9	2.25
4	6.3	2.1	2.8	2.4	2.1	1.8	1.75	2.75	2.35	4.2	1.9	2.25
5	3.6	2.05	2.3	2.3	2.0	1.9	1.75	2.5	2.25	4.2	1.9	2.3
6	2.9	2.05	2.1	2.2	1.95	2.15	1.6	2.3	2.65	3.4	1.9	2.1
7	2.5	2.0	2.0	2.15	2.0	1.9	1.55	2.7	2.25	4.0	1.85	2.5
8	2.3	2.0	2.05	2.2	2.05	1.75	1.65	2.3	2.25	3.4	1.85	2.2
9	2.7	1.95	2.15	2.5	1.95	1.65	1.65	2.15	2.25	3.0	1.8	2.15
10	2.35	1.9	2.0	3.4	1.9	1.5	1.75	2.0	2.25	2.8	1.8	2.1
11	2.2	1.85	1.9	2.45	1.85	1.5	1.55	1.95	2.2	2.35	1.85	3.2
12	2.3	1.85	1.85	2.5	1.8	1.5	1.65	1.9	2.65	2.25	2.0	2.3
13	2.35	1.9	1.85	2.3	1.8	2.05	1.65	1.85	2.25	2.0	1.85	2.4
14	2.3	1.85	1.85	2.25	1.75	2.8	2.3	1.85	2.15	2.4	1.8	2.3
15	2.2	1.85	3.0	3.65	1.7	2.5	5.0	2.25	2.0	2.3	1.85	2.25
16	2.2	1.8	3.6	3.1	1.65	3.6	3.2	2.3	1.95	2.3	1.85	2.2
17	2.15	1.75	2.85	2.6	1.65	2.7	2.9	2.0	1.85	2.25	1.9	2.25
18	2.1	1.75	2.45	2.5	1.6	2.3	5.4	2.0	1.85	2.4	2.7	3.9
19	2.35	1.75	2.45	2.4	1.6	2.1	3.7	2.0	3.5	3.4	15.2	3.0
20	2.15	1.7	4.0	2.2	1.55	2.0	3.1	2.35	2.9	2.35	7.0	2.85
21	2.05	1.8	3.2	2.25	1.55	1.9	3.0	2.6	2.5	2.4	4.1	2.75
22	2.4	2.0	2.6	2.2	1.55	1.8	4.1	2.15	2.85	2.3	3.5	2.65
23	6.9	1.85	2.5	2.1	1.55	1.7	3.3	2.3	2.55	2.25	3.1	2.55
24	4.0	1.8	2.4	2.05	1.5	1.75	2.75	2.25	2.85	2.2	2.9	2.4
25	3.2	1.75	2.35	2.0	1.45	2.5	2.5	2.3	2.5	2.2	2.7	2.3
26	2.25	1.75	2.35	2.0	1.6	2.2	2.4	2.25	2.4	2.15	2.6	2.35
27	2.9	1.8	2.2	2.1	2.4	2.6	2.4	2.0	2.25	2.1	2.5	2.2
28	2.7	1.8	2.2	2.2	1.9	1.9	2.1	2.1	2.25	2.0	2.4	2.4
29	2.6	.....	2.3	2.3	1.75	1.85	2.0	2.05	2.25	2.05	2.35	4.2
30	2.5	.....	2.9	2.05	1.65	1.7	2.4	3.8	5.2	2.0	2.3	3.3
31	2.4	.....	3.2	.....	1.55	.....	2.35	3.9	.....	2.0	.....	3.8

Rating table for Hiwassee River at Reliance, Tenn., 1904 to 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.70	380	1.70	1,725	2.60	4,090	3.50	7,300
0.80	460	1.80	1,940	2.70	4,410	3.60	7,690
0.90	550	1.90	2,165	2.80	4,745	3.70	8,080
1.00	655	2.00	2,400	2.90	5,090	3.80	8,475
1.10	770	2.10	2,650	3.00	5,445	3.90	8,875
1.20	895	2.20	2,915	3.10	5,805	4.00	9,280
1.30	1,030	2.30	3,190	3.20	6,170	4.20	10,090
1.40	1,180	2.40	3,480	3.30	6,540	4.40	10,910
1.50	1,345	2.50	3,780	3.40	6,915	4.60	11,730
1.60	1,525						

NOTE.—The above table is based on 12 discharge measurements made during 1904-5 and 1 measurement made in 1901. It is well defined between gage heights 0.7 foot and 2.3 feet. Above gage height 4.2 feet the rating curve is a tangent, the difference being 410 per tenth.

Monthly discharge of Hiwassee River at Reliance, Tenn., for 1906.

[Drainage area, 1,180 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	21,200	1,940	4,810	4.08	4.70
February	3,330	1,720	2,200	1.86	1.94
March	9,280	1,720	3,680	3.12	3.60
April	7,880	2,400	3,580	3.03	3.38
May	3,480	1,260	1,940	1.64	1.89
June	7,690	1,340	2,540	2.15	2.40
July	15,000	1,430	4,090	3.47	4.00
August	8,880	2,050	3,540	3.00	3.46
September	14,200	2,050	3,970	3.36	3.75
October	15,000	2,400	4,990	4.23	4.88
November	55,200	1,940	5,580	4.73	5.28
December	10,100	2,650	4,160	3.53	4.07
The year	55,200	1,260	3,760	3.18	43.35

NOTE.—Values for 1906 are excellent.

VALLEY RIVER AT TOMOTLA, N. C.

This station was established June 29, 1904. It is located at a footbridge about 250 feet below a public-road ford at Tomotla, N. C., and 5 miles above Murphy, N. C. A new gage for 1906 is at the right end of the footbridge. The lower 5.4 feet consists of a sloping section bolted to solid rock. The upper end is vertical and is fastened to the bridge abutment. An additional bench mark, consisting of a circle cut in solid rock under the right bank near the end of the footbridge,was established, having an elevation of 4.5 feet above the zero of the gage. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 135, where are given also references to publications that contain data for previous years.

Discharge measurements of Valley River at Tomotla, N. C., in 1904 to 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1904.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
December 15	M. R. Hall	55	101	1.10	69
1905.					
April 17	Olin P. Hall	58	150	1.79	204
June 16	M. R. Hall	55	125	1.42	125
June 16	O. P. Hall	56	125	1.42	118
October 13	do	55	110	1.20	78
1906.					
February	O. P. Hall	59	154	1.75	217
April 12	M. R. Hall	60	195	2.42	426
April 12	O. P. Hall	60	195	2.43	423
June 8	do	58	140	1.54	175
November 5	do	58	138	1.57	171

Daily gage height, in feet, of Valley River at Tomotla, N. C., 1905 and 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.												
1	1.4	1.3	2.1	1.85	2.45	1.75	2.3	1.4	1.5	1.05	1.15	1.45
2	1.4	1.4	2.1	1.85	2.25	1.65	2.2	1.4	1.4	1.05	1.05	1.6
3	1.4	1.4	2.0	1.85	2.05	1.65	1.8	1.3	1.4	1.55	1.05	7.75
4	1.4	1.5	1.9	1.75	1.95	1.55	1.8	1.3	1.4	1.35	1.05	3.55
5	1.5	1.7	1.9	1.75	1.85	1.55	1.6	1.3	1.4	1.25	1.05	2.65
6	1.9	2.4	1.9	1.85	1.85	1.45	2.0	1.3	1.3	1.15	1.05	2.35
7	1.9	2.1	1.8	1.85	2.15	1.45	1.8	1.4	1.3	1.15	1.25	1.95
8	1.7	3.1	1.8	2.05	2.05	1.45	1.6	1.8	1.3	1.15	1.15	3.35
9	1.5	7.9	2.6	2.35	1.95	1.35	1.6	1.5	1.3	1.15	1.15	4.55
10	1.6	3.7	2.8	2.05	1.95	1.35	1.8	2.0	1.3	1.35	1.15	2.75
11	1.8	2.9	2.5	1.85	1.85	1.35	2.1	1.8	1.3	2.55	1.15	2.45
12	7.5	2.9	2.3	2.45	1.85	1.25	9.6	2.3	1.2	1.75	1.15	2.35
13	3.7	3.9	2.2	2.05	1.85	1.25	4.2	2.6	1.2	1.35	1.15	2.35
14	2.7	3.3	2.1	1.95	1.85	1.35	2.6	3.2	1.2	1.15	1.05	2.25
15	2.5	2.7	2.0	1.85	2.15	1.35	2.4	2.1	1.2	1.15	1.05	2.35
16	2.1	2.6	2.0	2.15	3.15	1.35	2.2	2.8	1.2	1.15	1.05	2.35
17	1.9	2.4	1.9	1.85	2.45	1.35	2.4	2.2	1.2	1.15	1.05	2.25
18	1.7	2.2	1.85	1.85	2.25	1.35	2.2	1.8	1.2	1.05	1.05	2.15
19	1.7	2.7	1.8	1.85	2.05	1.35	2.1	1.6	1.2	1.25	1.15	2.15
20	1.6	7.6	2.2	1.75	1.95	1.35	2.0	1.6	1.2	1.15	1.55	2.15
21	1.6	5.4	3.4	1.75	2.05	1.45	1.8	1.5	1.1	1.15	1.35	2.75
22	1.6	3.9	2.5	1.95	2.05	1.45	1.8	1.6	1.1	1.15	1.25	2.35
23	1.5	3.1	2.2	1.85	2.35	1.65	1.7	1.8	1.1	1.15	1.15	3.75
24	1.4	2.9	2.3	1.85	2.35	1.45	1.7	2.9	1.1	1.15	1.15	3.55
25	1.3	2.7	2.3	1.85	2.05	1.35	1.7	1.8	1.1	1.15	1.45	2.75
26	1.2	2.5	2.1	2.05	1.95	1.45	1.6	1.7	1.1	1.85	1.35	2.35
27	1.1	2.3	2.1	1.95	1.85	1.45	1.6	1.6	1.1	1.55	1.25	2.25
28	1.1	2.2	2.0	1.85	1.85	1.45	1.5	1.6	1.0	1.25	1.35	2.15
29	1.1	.....	2.3	2.85	1.85	2.85	1.5	1.5	1.1	1.15	1.75	2.15
30	1.2	.....	2.1	3.15	1.85	2.85	1.5	1.5	1.1	1.15	1.65	2.05
31	1.4	.....	1.9	.....	1.75	.....	1.5	1.4	.....	1.15	.....	2.05
1906.												
1	1.85	2.25	1.85	2.4	1.95	1.35	1.7	2.1	1.9	3.0	1.7	2.1
2	1.95	2.15	1.95	2.2	1.9	2.5	1.7	3.2	1.8	3.0	1.7	2.1
3	4.6	2.15	3.2	2.1	1.85	1.5	1.65	2.6	1.8	3.0	1.7	2.0
4	4.8	2.05	2.35	2.3	2.3	1.5	1.6	2.4	1.8	2.8	1.65	2.0
5	3.1	2.05	2.15	2.8	2.0	1.4	1.7	2.1	1.75	3.0	1.65	2.1
6	2.75	2.05	2.05	2.4	2.0	1.4	1.7	2.2	2.9	6.0	1.6	2.8
7	2.45	1.95	2.05	2.1	2.0	1.35	1.9	2.3	2.6	4.0	1.55	2.4
8	2.25	1.95	2.25	2.2	1.9	1.3	1.7	2.1	2.1	3.4	1.55	2.1
9	2.15	1.85	2.05	4.6	1.9	1.3	1.6	2.1	2.0	3.0	1.5	2.1
10	2.15	1.85	1.95	3.4	1.85	1.25	1.6	2.0	1.9	2.6	1.5	2.8
11	2.15	1.85	1.85	2.8	1.8	1.25	1.55	2.0	1.8	2.4	1.5	2.6
12	2.35	1.85	1.85	2.6	1.8	2.0	1.55	2.0	1.75	2.2	1.6	2.4
13	2.25	1.75	1.95	2.4	1.75	2.0	1.5	2.0	1.7	2.1	1.6	2.3
14	2.25	1.75	2.45	2.4	1.75	2.5	4.8	2.0	1.6	2.05	1.7	2.2
15	2.25	1.75	3.8	2.4	1.7	4.4	4.0	2.1	1.5	2.0	1.8	2.3
16	2.25	1.65	2.85	2.3	1.65	3.2	3.0	1.9	1.6	2.0	1.8	2.5
17	2.35	1.65	2.45	2.3	1.6	3.0	3.6	1.9	2.6	2.1	1.8	4.1
18	2.45	1.65	2.25	2.25	1.55	2.4	4.5	1.8	2.4	2.8	4.5	3.2
19	2.35	1.65	3.4	2.25	1.55	2.2	3.3	1.9	2.0	2.4	17.3	3.6
20	2.25	1.75	3.1	2.2	1.5	2.0	3.0	2.1	2.1	2.2	6.0	3.0
21	2.25	2.25	2.65	2.2	1.5	2.5	2.4	2.0	2.3	2.1	4.0	2.9
22	2.35	1.95	2.45	2.1	1.45	2.0	2.2	1.9	2.3	2.0	3.6	2.8
23	5.6	1.75	2.25	2.05	1.45	2.0	2.2	1.8	3.2	2.0	3.2	2.6
24	4.2	1.75	2.15	2.05	1.4	3.0	2.1	1.8	2.8	1.9	3.0	2.6
25	3.4	1.65	2.05	2.0	1.4	2.4	2.0	1.75	2.4	1.9	2.9	2.5
26	2.65	1.65	2.05	2.0	1.6	2.0	1.9	1.8	2.3	1.8	2.8	2.5
27	2.65	1.85	2.15	2.0	1.5	1.9	2.4	3.0	2.4	1.8	2.7	2.8
28	2.45	1.85	2.45	2.3	1.45	1.8	2.0	2.6	2.6	1.75	2.6	4.0
29	2.45	.....	2.45	2.1	1.45	1.8	1.8	2.2	2.8	1.75	2.5	4.0
30	2.35	.....	3.8	2.0	1.4	1.6	2.5	2.0	5.0	1.7	2.4	3.6
31	2.25	.....	3.4	.....	1.4	.....	2.2	1.9	.....	1.7	.....	3.8

NOTE.—Gage heights for 1905 have been corrected for error in gage datum found in 1906.

Rating tables for Valley River at Tomotla, N. C.

JANUARY 1 TO DECEMBER 31, 1905.[a]

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.00	50	1.90	230	2.80	530	3.70	960
1.10	66	2.00	260	2.90	570	3.80	1,015
1.20	82	2.10	290	3.00	610	3.90	1,075
1.30	100	2.20	320	3.10	655	4.00	1,135
1.40	118	2.30	350	3.20	700	4.20	1,260
1.50	138	2.40	380	3.30	750	4.40	1,390
1.60	158	2.50	415	3.40	800	4.60	1,520
1.70	180	2.60	450	3.50	850	4.80	1,660
1.80	205	2.70	490	3.60	905	5.00	1,800

JANUARY 1 TO DECEMBER 31, 1906.[b]

1.20	92	2.10	315	3.00	635	3.80	1,040
1.30	112	2.20	345	3.10	680	3.90	1,100
1.40	134	2.30	375	3.20	725	4.00	1,160
1.50	156	2.40	405	3.30	775	4.20	1,285
1.60	180	2.50	440	3.40	825	4.40	1,415
1.70	205	2.60	475	3.50	875	4.60	1,545
1.80	230	2.70	515	3.60	930	4.80	1,680
1.90	255	2.80	555	3.70	985	5.00	1,820
2.00	285	2.90	595				

[a] This table is applicable only for open-channel conditions. It is based on four discharge measurements made during 1905. It is well defined between gage heights 1.0 feet and 2.0 foot. Above gage height 4.6 feet the rating curve is a tangent, the difference being 70 per tenth.

[b] This table is applicable only for open-channel conditions. It is based on five discharge measurements made during 1906. It is well defined between gage heights 1.2 feet and 3.0 feet. Above gage height 4.7 feet the rating curve is a tangent, the difference being 70 per tenth.

Monthly discharge of Valley River at Tomotla, N. C., for 1905 and 1906.

[Drainage area, 106 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
1905.					
January	3,550	66	302	2.85	3.29
February	3,830	100	766	7.23	7.53
March	800	205	314	2.96	3.41
April	678	192	265	2.50	2.79
May	678	192	282	2.66	3.07
June	550	91	154	1.45	1.62
July	5,020	138	420	3.96	4.56
August	700	100	222	2.09	2.41
September	138	50	86.4	.815	.91
October	432	58	102	.962	1.11
November	192	58	85.2	.804	.90
December	3,720	128	559	5.27	6.08
The year	5,020	50	296	2.80	37.68
1906.					
January	2,240	242	574	5.42	6.25
February	360	192	250	2.36	2.46
March	1,040	242	446	4.21	4.85
April	1,540	285	419	3.95	4.41
May	375	134	204	1.92	2.21
June	1,420	102	325	3.07	3.42
July	1,680	156	434	4.09	4.72
August	725	217	325	3.07	3.54
September	1,820	156	393	3.71	4.14
October	2,520	205	483	4.56	5.26
November	10,400	156	803	7.58	8.46
December	1,220	285	562	5.30	6.11
The year	10,400	102	435	4.10	55.83

NOTE.—Values for 1905 and 1906 can be considered only fair, owing to discrepancies between the gage readings, probably due to daily fluctuations from stored water.

OKOEE RIVER AT M'CAYS, TENN.

This station was established March 21, 1903. It is located at a suspension footbridge just below McCay's ferry at McCays, Tenn., near the Georgia-Tennessee boundary, and one-half mile below the railroad bridge of the Louisville and Nashville Railroad. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 138, where are given also references to publications that contain data for previous years.

Discharge measurements of Okoee River at McCays, Tenn., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
February 12	O. P. Hall	153	544	1.63	925
April 18	do	156	616	1.98	1,130
June 11	do	152	501	1.33	733
November 3	do	153	525	1.57	848

Daily gage height, in feet, of Okoee River at McCays, Tenn., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.4	2.1	1.5	2.75	1.8	1.4	1.3	2.3	2.1	3.25	1.6	1.9
2	1.3	2.0	1.5	2.4	1.75	2.45	1.35	2.35	2.0	3.75	1.6	1.9
3	4.4	1.9	2.7	2.1	1.9	1.65	1.6	2.1	1.9	3.5	1.6	1.9
4	4.4	1.9	2.45	2.1	2.05	1.55	1.5	2.05	1.85	3.1	1.55	1.8
5	2.8	1.9	1.8	2.0	1.75	1.75	1.35	1.85	2.2	2.75	1.5	1.85
6	2.4	1.8	1.6	2.0	1.7	1.55	1.3	2.2	2.05	3.7	1.5	1.95
7	2.05	1.8	1.6	1.9	1.65	1.4	1.5	1.85	1.9	3.05	1.5	1.9
8	2.0	1.7	1.8	1.9	1.8	1.35	1.55	1.85	1.9	2.75	1.5	1.7
9	2.0	1.7	1.7	2.6	1.7	1.4	1.7	1.8	1.8	2.5	1.45	1.7
10	1.95	1 6	1.6	2.2	1.65	1.35	1.4	1.7	2.4	2.4	1.4	2.65
11	1.9	1.5	1.6	2.0	1.65	1.45	1.35	1.7	1.9	2.3	1.6	2.75
12	2.0	1.6	1.5	2.0	1.6	1.4	1.5	1.65	2.1	2.2	1.5	2.2
13	1.95	1.6	1.5	1.9	1.6	4.0	1.3	2.3	1.8	2.2	1.5	2.05
14	1.9	1.6	1.65	2.2	1.5	2.65	4.3	2.3	1.75	2.1	1.5	1.85
15	1.8	1.5	4.8	2.7	1.5	3.8	2.85	2.2	1.65	2.0	1.5	1.8
16	1.85	1.5	2.6	2.1	1.45	2.15	2.15	2.1	1.6	2.0	1.5	1.85
17	1.7	1.5	2.15	2.05	1.45	1.8	3.8	1.65	1.5	2.0	1.6	2.05
18	1.8	1.4	2.15	1.9	1.4	1.85	4.4	1.8	1.5	2.45	7.0	2.1
19	1.7	1.45	3.6	1.9	1.4	1.7	2.95	1.95	3.4	2.3	18.5	2.05
20	1.65	1.45	3.4	1.9	1.4	1.65	2.65	2.15	2.3	2.0	8.0	2.25
21	1.65	1.9	2.7	1.8	1.35	1.5	2.55	1.9	1.95	1.9	3.2	2.1
22	3.8	1.65	2.45	1.8	1.35	1.45	3.3	1.9	2.05	1.9	2.95	1.95
23	6.5	1.5	2.25	1.8	1.3	1.4	3.6	2.15	2.05	1.85	2.55	1.95
24	3.2	1.5	2.1	1.7	1.3	3.8	2.3	2.05	2.3	1.8	2.4	1.9
25	2.8	1.5	2.05	1.7	1.2	1.8	2.1	1.95	2.0	1.8	2.3	1.8
26	2.7	1.4	2.05	1.65	2.0	1.65	2.55	1.8	1.9	1.8	2.2	1.8
27	2.8	1.55	2.1	2.0	1.9	1.5	2.15	1.7	1.8	1.7	2.2	1.7
28	2.4	1.4	2.1	2.9	1.5	1.5	2.0	1.7	1.8	1.7	2.1	2.2
29	2.4	.....	2.25	2.0	1.4	1.5	2.35	3.6	3.1	1.6	2.0	2.25
30	2.3	.....	3.0	1.9	1.3	1.4	2.55	3.3	4.6	1.6	1.9	2.1
31	2.2	.....	2.8	.....	1.3	.....	2.2	2.5	.....	1.6	.....	4.4

OKOEE RIVER NEAR DUCKTOWN, TENN.

Rating table for Okoee River at McCays, Tenn., for 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.20	640	2.30	1,315	3.40	2,075	5.00	3,360
1.30	695	2.40	1,380	3.50	2,150	5.20	3,540
1.40	750	2.50	1,445	3.60	2,225	5.40	3,730
1.50	810	2.60	1,510	3.70	2,300	5.60	3,930
1.60	870	2.70	1,580	3.80	2,375	5.80	4,130
1.70	930	2.80	1,650	3.90	2,450	6.00	4,330
1.80	990	2.90	1,720	4.00	2,530	6.20	4,530
1.90	1,055	3.00	1,790	4.20	2,690	6.40	4,740
2.00	1,120	3.10	1,860	4.40	2,850	6.60	4,960
2.10	1,185	3.20	1,930	4.60	3,015	6.80	5,180
2.20	1,250	3.30	2,000	4.80	3,185	7.00	5,400

NOTE.—The above table is applicable only for open-channel conditions. It is based on 4 discharge measurements made during 1906 and on the general form of the earlier curves. It is well defined between gage heights 1.0 foot and 3.5 feet. Above gage height 6.5 feet the rating curve is a tangent, the difference being 110 per tenth.

Monthly discharge of Okoee River at McCays, Tenn., for 1906.

[Drainage area, 374 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	4,850	695	1,450	3.88	4.47
February	1,180	750	896	2.40	2.50
March	3,180	810	1,280	3.42	3.94
April	1,720	900	1,160	3.10	3.46
May	1,150	640	853	2.28	2.63
June	2,530	722	1,050	2.81	3.14
July	2,850	695	1,300	3.48	4.01
August	2,220	900	1,170	3.13	3.61
September	3,020	810	1,200	3.21	3.58
October	2,340	870	1,330	3.56	4.10
November	18,000	750	1,920	5.13	5.72
December	2,850	930	1,180	3.16	3.64
The year	18,000	640	1,230	3.29	44.80

NOTE.—Values for 1906 are excellent.

ELK RIVER NEAR ELKMONT, ALA.

This station was established June 24, 1904. It is located at the wagon bridge near Wilson's store, about 5 miles east of Elkmont, Ala., and 3 miles below the bridge of the Louisville and Nashville Railroad. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 141, where are given also references to publications that contain data for previous years.

Discharge measurements of Elk River near Elkmont, Ala., in 1905 and 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1905.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 12	W. E. Hall	235	629	2.71	1,380
June 19	F. A. Murray	232	590	2.51	1,160
September 30	do	201	360	1.51	315
November 28	W. E. Hall	202	414	1.81	461
1906.					
March 22	W. E. Hall	233	847	3.58	2,800
May 10	F. A. Murray	230	508	2.41	1,050
June 23	O. P. Hall	221	400	1.75	463
October 26	F. A. Murray	231	606	2.53	1,190
October 26	do	231	605	2.54	1,210
December 11	W. E. Hall	230	583	2.50	1,200

Daily gage height, in feet, of Elk River near Elkmont, Ala., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.8	3.85	2.7	8.6	2.75	2.5	1.75	2.9	2.0	13.3	2.2	2.3
2	3.9	3.5	3.0	6.8	2.6	2.8	1.7	2.7	2.0	9.8	2.2	2.4
3	6.3	3.3	8.7	5.3	2.6	2.7	1.65	2.55	2.0	13.3	2.15	2.5
4	5.6	3.3	10.7	4.8	2.7	2.6	1.85	2.5	2.15	11.3	2.15	2.55
5	4.9	3.25	5.9	4.6	2.6	3.0	1.7	2.45	2.2	8.3	2.15	2.55
6	4.4	3.15	4.8	4.4	2.65	2.5	1.9	2.6	2.2	12.3	2.1	2.5
7	4.4	3.1	4.1	4.2	2.85	2.4	1.7	2.1	2.1	10.0	2.1	2.7
8	4.4	3.0	3.9	3.8	2.75	2.2	1.8	2.0	2.0	8.2	2.15	2.7
9	4.3	2.9	3.7	3.4	2.5	2.15	1.75	2.0	2.1	5.9	2.15	2.5
10	4.0	2.9	3.55	4.2	2.4	2.4	1.8	1.9	2.3	5.1	2.15	2.5
11	4.0	2.85	3.35	4.0	2.3	2.2	1.7	2.0	4.3	4.4	2.1	2.5
12	7.0	2.8	3.15	3.8	2.3	2.05	1.6	2.2	3.0	4.0	2.1	4.4
13	6.0	2.8	3.05	3.4	2.15	2.5	2.2	2.9	2.4	4.0	2.1	4.4
14	5.5	2.75	4.4	3.2	2.2	2.35	3.5	3.4	2.4	3.9	2.05	4.4
15	5.0	2.75	7.1	3.3	2.3	2.5	3.2	3.4	2.3	3.8	2.07	4.5
16	5.0	2.7	5.6	3.2	2.2	2.1	2.35	3.65	2.2	3.15	2.1	6.3
17	5.5	2.6	4.6	3.05	2.2	2.05	2.7	3.1	2.1	3.1	2.15	9.6
18	4.6	2.55	4.4	3.0	2.1	2.0	3.0	2.9	2.0	3.0	2.2	8.0
19	5.0	2.5	4.1	2.95	2.0	1.9	3.3	2.6	7.9	3.15	3.8	6.7
20	4.6	2.5	4.0	2.8	2.0	1.8	2.7	2.45	4.2	3.1	6.8	5.6
21	4.4	2.5	3.9	2.7	1.9	1.8	3.35	2.2	3.0	3.0	6.3	5.0
22	9.1	2.55	3.7	2.6	2.4	1.8	3.0	2.0	3.85	2.9	5.8	4.9
23	12.5	2.6	3.4	2.8	1.9	1.8	2.8	2.2	5.8	2.8	4.2	4.4
24	14.0	2.6	3.3	2.6	1.9	1.75	3.5	2.3	4.0	2.7	3.8	3.75
25	11.4	2.65	3.2	2.55	1.85	2.1	3.3	2.4	3.4	2.6	3.5	3.5
26	7.5	2.75	3.1	2.5	4.0	1.9	2.85	2.5	4.5	2.5	3.5	3.35
27	5.9	2.8	3.75	3.8	3.2	1.9	2.55	2.4	3.4	2.5	3.1	3.2
28	5.1	2.8	4.8	3.15	3.05	1.8	2.35	2.3	7.6	2.2	3.0	4.4
29	4.7	.....	5.3	3.25	3.15	1.8	4.0	2.2	16.4	2.2	2.8	5.7
30	4.6	.....	11.5	2.9	3.1	1.75	3.7	2.1	18.5	2.3	2.5	6.0
31	4.5	.....	5.6	.....	2.7	.....	3.25	2.0	.....	2.3	.....	11.2

Rating table for Elk River near Elkmont, Ala., for 1905 and 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.50	315	2.60	1,270	3.70	3,030	5.60	7,520
1.60	375	2.70	1,400	3.80	3,220	5.80	8,080
1.70	440	2.80	1,530	3.90	3,420	6.00	8,640
1.80	510	2.90	1,670	4.00	3,620	6.20	9,210
1.90	585	3.00	1,820	4.20	4,040	6.40	9,790
2.00	660	3.10	1,970	4.40	4,490	6.60	10,380
2.10	740	3.20	2,130	4.60	4,950	6.80	10,980
2.20	830	3.30	2,300	4.80	5,430	7.00	11,600
2.30	930	3.40	2,480	5.00	5,930	8.00	14,800
2.40	1,040	3.50	2,660	5.20	6,450		
2.50	1,150	3.60	2,840	5.40	6,980		

NOTE.—The above table is applicable only for open-channel conditions. It is based on discharge measurements made during 1904 to 1906. It is well defined between gage heights 1.2 feet and 4.0 feet. Above gage height 7.0 feet the rating curve is a tangent, the difference being 320 per tenth.

Monthly discharge of Elk River at Elkmont, Ala., for 1906.

[Drainage area, 1,700 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
January	34,000	3,220	8,740	5.14	5.93
February	3,320	1,150	1,660	.976	1.02
March	26,000	1,400	5,860	3.45	3.98
April	16 700	1,150	3,430	2.02	2.25
May	3,620	548	1,220	.718	.83
June	1,820	475	848	.499	.56
July	3,620	375	1,370	.806	.93
August	2,940	585	1,200	.706	.81
September	48,100	660	5,580	3.28	3.66
October	31,800	830	7,960	4.68	5.40
November	11,000	700	2,160	1.27	1.42
December	25,000	930	5,350	3.15	3.63
The year	48,400	375	3,782	2.22	30.42

NOTE.—Values are rated as follows: February and March, 1905, and January, September, and October, 1906, good: remainder of 1905 and 1906, excellent.

DUCK RIVER AT COLUMBIA, TENN.

This is an old Weather Bureau station that has not been maintained continously. Discharge measurements were made during 1904 and gage heights have been regularly recorded since October 21, 1904. The station is located at the highway bridge two blocks north of the public square at Columbia, Tenn. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 143, where are given also references to publications that contain data for previous years. A new gage, established June 17, 1905, is set at the same datum with the old gage of the United States Weather Bureau, which is a vertical timber 38 feet long bolted to the downstream side of the right-bank pier.

Discharge measurements of Duck River near Columbia, Tenn., 1901 to 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1901.					
February 9	M. R. Hall	138	1,100	3.60	2,420
April 19	do	175	2,380	11.90	9,500
1904.					
May 21	J. M. Giles	85	610	.70	299
August 18	do	115	755	.70	287
August 18	do	115	725	.70	284
October 21	do	79	139	.44	130
October 21	do	79	144	.40	158
1905.					
April 14	W. E. Hall	115	772	1.21	533
June 16	F. A. Murray	134	823	1.63	756
June 17	do	136	863	1.97	1,040
June 20	do	121	772	1.34	599
September 29	do	86	95	.60	135
November 27	W. E. Hall	115	718	.77	237
1906.					
March 23	W. E. Hall	120	847	1.90	951
May 11	F. A. Murray	116	752	1.02	412
May 11	do	116	752	1.00	434
June 25	O. P. Hall	112	713	0.94	348
October 27	F. A. Murray	119	761	1.12	465
October 27	do	119	761	1.10	451
December 12	W. E. Hall	115	749	1.15	478

Daily gage height, in feet, of Duck River near Columbia, Tenn., for 1906.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.6	2.55	1.3	9.4	2.0	1.6	0.55	2.15	0.85	8.2	0.9	1.55
2	2.55	2.3	1.35	6.2	1.65	2.0	.6	1.6	.75	9.9	.95	1.45
3	3.3	2.15	8.2	4.7	1.45	1.5	.8	1.15	.65	13.9	.85	1.35
4	5.5	1.95	8.2	3.8	1.35	1.2	.8	1.15	.6	12.4	.85	1.3
5	4.6	1.7	4.4	3.0	1.3	1.15	.7	1.05	.75	9.8	.8	1.25
6	3.7	1.6	2.9	3.4	1.3	1.25	.65	1.15	1.6	15.2	.85	1.25
7	3.0	1.6	2.75	3.4	1.35	1.15	.7	0.95	1.05	13.0	.8	1.2
8	2.8	1.55	2.6	2.8	1.25	1.1	1.5	0.8	.85	8.3	.8	1.3
9	3.6	1.45	2.45	3.8	1.15	1.0	.95	0.8	.85	5.4	.8	1.2
10	3.2	1.35	2.3	3.4	1.15	.85	.75	1.3	1.95	3.9	.75	1.2
11	3.4	1.3	1.95	2.7	1.05	.9	.7	1.3	2.55	3.0	.8	1.2
12	7.6	1.25	1.85	2.35	.9	.85	.65	2.35	4.0	2.5	.8	1.15
13	7.4	1.2	1.75	2.25	.8	1.1	.6	2.3	2.45	2.25	.8	1.1
14	5.8	1.2	2.15	2.65	.8	1.1	1.7	2.3	1.65	1.85	.85	1.1
15	4.6	1.2	2.75	2.0	.9	1.0	1.2	1.6	1.25	1.6	.95	1.15
16	4.0	1.2	2.95	1.85	.75	.9	1.0	1.55	.95	1.35	.85	1.6
17	3.6	1.15	2.75	1.8	.8	.85	10.3	1.4	.85	1.4	1.15	10.4
18	3.0	1.05	2.55	1.6	.8	.8	10.4	1.25	.8	1.55	10.6	13.5
19	2.9	1.1	2.4	1.5	.75	.8	4.9	1.5	.95	1.6	13.3	8.4
20	2.65	1.1	2.4	1.45	.7	.8	3.6	1.25	1.2	1.8	9.8	6.2
21	2.5	1.1	2.25	1.4	.65	.75	4.0	1.2	2.4	1.7	7.2	5.1
22	13.8	1.2	2.05	1.4	.6	.65	3.4	1.2	3.1	1.55	5.2	4.6
23	26.4	1.25	1.9	1.3	.6	.7	2.5	2.85	7.5	1.4	3.7	3.7
24	24.2	1.3	1.75	1.3	.6	.95	2.5	2.35	4.2	1.25	3.0	3.2
25	9.6	1.3	1.7	1.2	.8	.75	2.3	1.75	2.65	1.15	2.75	2.95
26	5.8	1.3	1.6	1.15	2.5	.75	1.8	2.1	3.1	1.1	2.3	2.5
27	4.8	1.3	10.4	4.1	2.75	.65	1.4	1.7	2.7	1.1	2.05	2.2
28	3.9	1.3	11.0	3.1	2.25	.6	1.15	1.25	6.2	1.05	1.85	2.5
29	3.4	.....	17.2	3.2	2.05	.55	1.2	1.15	20.9	0.95	1.8	4.2
30	3.0	.....	22.6	2.05	1.6	.5	2.1	1.05	9.9	1.0	1.65	6.8
31	2.75	.....	17.1	.....	1.15	.....	3.6	0.95	.....	0.95	.....	17.9

Rating tables for Duck River near Columbia, Tenn.

OCTOBER 21, 1904, TO DECEMBER 24, 1904.[a]

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.30	80	0.60	222	0.90	408	2.00	1,200
0.40	122	0.70	280	1.00	475	2.50	1,600
0.50	170	0.80	342	1.50	825		

DECEMBER 25, 1904, TO DECEMBER 31, 1906.[b]

0.40	60	1.20	510	2.00	1,080	2.80	1,730
0.50	100	1.30	580	2.10	1,160	2.90	1,815
0.60	145	1.40	650	2.20	1,240	3.00	1,900
0.70	195	1.50	720	2.30	1,320	3.10	1,990
0.80	250	1.60	790	2.40	1,400	3.20	2,080
0.90	310	1.70	860	2.50	1,480		
1.00	375	1.80	930	2.60	1,560		
1.10	440	1.90	1,005	2.70	1,645		

[a] This table is applicable only for open-channel conditions. It is based on 5 discharge measurements made during 1904 and on the form of the 1905–6 curve.

[b] This table is applicable only for open-channel conditions. It is based on discharge measurements made during 1901, 1905, and 1906. It is well defined between gage heights 0.5 foot and 4.0 feet. Above gage height 4.0 feet it is based on a discharge measurement at gage height 11.90 made in 1901. Above gage height 3.00 feet the rating curve is a tangent, the difference being 90 per tenth.

Monthly discharge of Duck River near Columbia, Tenn., for 1904 to 1906.

[Drainage area, 1,260 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Sec.-ft. per sq. mile.	Depth in inches.
1904.					
October 21–31	170	80	133	0.106	0.04
November	280	80	137	.109	.12
December	14,000	101	1,730	1.37	1.58
1905.					
January	11,800	310	1,990	1.58	1.82
February	14,700	80	4,210	3.34	3.48
March	17,800	755	3,080	2.44	2.81
April	1,360	250	621	.493	.55
May	25,600	440	3,500	2.78	3.20
June	9,460	280	1,960	1.56	1.74
July	8,380	170	1,210	.960	1.11
August	2,980	100	654	.519	.60
September	3,340	100	387	.307	.34
October	3,340	80	1,050	.833	.96
November	685	145	307	.244	.27
December	9,460	510	3,050	2.42	2.79
The year	25,600	80	1,830	1.46	19.67
1906.					
January	23,000	1,480	4,430	3.51	4.05
February	1,520	408	675	.536	.56
March	19,500	580	3,600	2.86	3.30
April	7,660	475	1,800	1.43	1.60
May	1,690	145	543	.431	.50
June	1,080	100	350	.286	.32
July	8,560	122	1,400	1.11	1.28
August	1,770	250	731	.580	.67
September	18,000	145	2,040	1.62	1.81
October	12,900	342	3,160	2.51	2.89
November	11,200	222	1,790	1.42	1.58
December	15,300	440	2,640	2.10	2.42
The year	23,000	100	1,930	1.53	20.98

NOTE.—Values are rated as follows: October, 1904, to March, 1905, May and December, 1905, and January, March September, October, and December, 1906, good; all remaining months, excellent.

MISCELLANEOUS MEASUREMENTS IN TENNESSEE RIVER DRAINAGE BASIN.

The following is a list of miscellaneous discharge measurements made in Tennessee River drainage basin during 1906:

French Broad River at Oldtown, Tenn.—This was originally one of the temporary stations established in connection with the general hydrographic study of the southern Appalachian region. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 93, where are given also references to publications that contain data for previous years.

The following discharge measurement was made May 25, 1906:

Width, 379 feet; area, 1,600 square feet; gage height, 1.67 feet; discharge, 2,010 second-feet.

Swannanoa River at Biltmore, N. C.—This station was established May 21, 1904, for the purpose of making miscellaneous measurements. It is located at the Biltmore, N. C., terminal of the Asheville-Biltmore electric railway line, about three-fourths mile above the mouth of Swannanoa River. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 95, where are given also references to publications that contain data for previous years.

The following discharge measurement was made April 16, 1906:

Width, 80 feet; area, 266 square feet; gage height, 2.35 feet; discharge, 617 second-feet.

Avery Creek at Davidsons River, N. C.—This station was established May 19, 1904, for the purpose of making miscellaneous measurements. It is located about one-fourth mile above the junction of Avery Creek with Davidsons River and a less distance from the regular gaging station on the latter stream. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 104, where are given also references to publications that contain data for previous years.

The following measurement was made June 15, 1906:

Width, 23 feet; area, 42 square feet; gage height, 2.80 feet; discharge, 169 second-feet.

Pigeon River at Newport, Tenn.—This station is located at the highway bridge in the eastern part of Newport, Tenn., 1 mile from the railroad station and 1 mile above the dam of the Newport Flouring Mill, out of reach of backwater. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 110, where are given also references to publications that contain data for previous years.

The following discharge measurement was made May 24, 1906:

Width, 186 feet; area, 608 square feet; gage height, 1.34 feet; discharge, 663 second-feet.

Doe River at Elizabethton, Tenn.—This station was established May 22, 1904, for the purpose of making miscellaneous measurements. It is located at the covered wagon bridge in the town of Elizabethton, Tenn. The conditions at this station and the bench marks are described in Water-Supply Paper No. 169, page 121, where are given also references to publications that contain data for previous years.

The following discharge measurement was made October 23, 1906:

Width, 129 feet; area, 281 square feet; gage height, 1.63 feet; discharge, 318 second-feet.

Little Tennessee River at Almond, N. C.—This station is located at a suspension footbridge across Little Tennessee River, about one-fourth mile above its junction with Nantahala River and about 300 feet from the station at the Southern Railway bridge on Nantahala River. The section is about 200 feet wide; the bed is very rough and the current moderately swift. Gage heights for discharge measurements are determined by measuring down from a bench mark, which consists of 3 nails driven in the upstream side of an elm tree on the left bank of river, 20 feet upstream from the footbridge; elevation, 8.00 feet above gage datum.

The following discharge measurement was made June 9, 1906:

Width, 187 feet; area, 398 square feet; gage height, 2.27 feet; discharge, 938 second-feet.

Nantahala River at Almond, N. C.—This station is located at the Southern Railway bridge crossing Nantahala River about one-fourth mile above its junction with Little Tennessee River. Discharge measurements are made from the railroad bridge. The section is about 160 feet wide and is shallow and very swift, but fairly good for measurements. Only low-water measurements are made and the gage heights are determined from a bench mark, there being no gage. The bench mark is the center of the bolt or pin connecting the intermediate post and the floor beam at the middle of the left span on the upstream side of the bridge; elevation, 15.00 feet above gage datum.

The following discharge measurement was made June 8, 1906:

Width, 121 feet; area, 166 square feet; gage height, 1.12 feet; discharge, 649 second-feet.

Fightingtown Creek at McCays, Tenn.—This station was established August 27, 1904, for the purpose of making miscellaneous measurements. It is located about one-half mile above the mouth of the creek, which flows into Okoee River about one-half mile below the gaging station on Okoee River at McCays, Tenn. The conditions at

this station and the bench marks are described in Water-Supply Paper No. 169, page 140, where are given also references to publications that contain data for previous years.

The following discharge measurements were made in 1906:

April 19: Width, 43 feet; area, 164 square feet; gage height, 2.85 feet; discharge, 241 second-feet. June 12: Width, 40 feet; area, 130 square feet; gage height, 2.25 feet; discharge, 129 second-feet.

Paint Rock River near Paintrock, Ala.—This station is located at the highway bridge 2¾ miles south of Paintrock, Ala., and about 400 feet above the Southern Railway bridge. The conditions at this station and the bench marks are described in Water-Supply Paper No. 128, page 149.

Discharge measurements of Paint Rock River near Paintrock, Ala., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 12	F. A. Murray	63	248	1.31	118
June 26	O. P. Hall	65	222	1.13	87
October 29	F. A. Murray	64	266	1.51	155

Flint River at Brownsboro, Ala.—This station is located at the highway bridge about one-fourth mile west of Brownsboro, Ala., and 100 feet below a 6-foot milldam. The conditions at this station and the bench marks are described in Water-Supply Paper No. 128, page 150.

Discharge measurements of Flint River at Brownsboro, Ala., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 12	F. A. Murray	140	450	1.89	224
June 22	O. P. Hall	140	398	1.65	158
October 29	F. A. Murray	144	454	2.01	237

LOWER EASTERN MISSISSIPPI RIVER DRAINAGES.

The streams flowing into Mississippi River from the east below the mouth of the Ohio are in the main comparatively small. In the lower portion they are practically a network of bayous. The following pages contain the results of data collected in the lower eastern Mississippi River drainage by the United States Geological Survey during 1906:

YAZOO RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Yazoo River rises in the northwestern part of Mississippi. It flows southward just west of the central portion of the State and enters Mississippi River just above Vicksburg.

TALLAHATCHIE RIVER AT BATESVILLE, MISS.

This station was established on June 15, 1906. It is located at the county highway bridge 1 mile west of Batesville and about 2 miles below the crossing of the Illinois Central Railroad. The bridge from which discharge measurements are made is a single steel span 220 feet long, with wooden approaches at both ends.

Both banks will overflow at high floods, sometimes beyond the ends of the bridge approaches. The bed is mostly firm sand, and the current is fairly good. An island about 300 feet below the station divides the river into two channels, the combined width of which appears to be less than that of the river above, making the water swifter.

The boxed-chain gage is bolted to the upstream lower chord in the third panel from the left bank; length of chain, 29.96 feet. The gage is read once a day by J. S. Goff.

The reference point is the top of the downstream end of the third floor beam from the left-bank end of the bridge; elevation, 27 feet above gage datum.

Discharge measurements of Tallahatchie River at Batesville, Miss., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 17	W. E. Hall	140	679	4.13	1,020
June 15	M. R. Hall	135	507	2.92	584
September 20	do	128	393	2.33	468

Daily gage height, in feet, of Tallahatchie River at Batesville, Miss., for 1906.

Day.	June.	July.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Sept.	Oct.	Nov.	Dec.
1		2.8		9.0	3.1	14.2	17	2.85	5.2		11.0	3.0	13.7
2		3.8		10.6	3.1	13.0	18	2.8	5.1		7.8	2.95	13.3
3		2.75		12.2	3.1	11.1	19	2.8	4.6		5.2	2.95	13.1
4		2.75		13.0	3.1	8.3	20	2.8	4.8	2.3	4.0	9.0	13.1
5		2.7		13.6	3.0	6.5	21	2.8	5.1	2.45	4.0	18.0	13.1
6		2.7		14.1	3.0	6.8	22	2.85	4.7	4.0	4.0	18.6	13.0
7		2.7		14.0	3.0	7.0	23	2.8	4.3	3.9	3.6	18.2	13.2
8		2.8		14.0	3.0	6.9	24	2.8	3.5	3.8	3.8	18.1	13.1
9		2.9		13.9	3.0	7.0	25	2.9	3.2	3.3	3.6	17.9	13.0
10		2.85		13.4	3.0	8.0	26	3.5	2.8	3.2	3.6	17.4	12.7
11		2.9		13.3	3.0	8.0	27	2.9	2.75	3.1	3.6	16.9	12.6
12		3.0		13.3	3.0	7.8	28	2.85	2.6	10.0	3.2	16.5	12.1
13		3.4		13.6	3.0	7.6	29	2.8	2.5	9.6	3.2	16.0	9.6
14		3.0		13.3	3.0	7.7	30	2.8	2.6	8.6	3.2	15.0	8.3
15	2.9	2.8		13.0	3.0	8.0	31		2.55		3.2		8.6
16	2.85	3.5		12.0	3.0	11.0							

YALOBUSHA RIVER AT GRENADA, MISS.

This station was established on June 14, 1906. It is located in the western part of Grenada at the county highway bridge, about one-half mile from the depot and the same distance below the cross-

ing of the Illinois Central Railroad. The bridge from which measurements are made is 260 feet long, there being a main span of 160 feet across the river and two short spans of 50 feet each on the right bank.

Both banks of the river are high and not liable to overflow. The current is fairly swift and regular. The bed is sandy and is liable to shift, but conditions below the station will probably cause the rating to remain constant.

The boxed chain gage is bolted to a special timber, which is itself bolted to the intermediate post and diagonal brace on the downstream side of the bridge in the fourth panel from the left bank; length of chain, 40.71 feet.

The reference point is the top of the downstream corner of a plate near bridge floor on the right side of the intermediate post at downstream end of the third floor beam from the left bank: elevation, 37.94 feet above gage datum.

Discharge measurements of Yalobusha River at Grenada, Miss., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 19	W. E. Hall	118	1,190	11.20	4,190
May 2	do	80	136	1.85	280
June 14	M. R. Hall	79	132	1.52	232
September 19	do	78	121	1.22	137
September 19	do	78	120	1.22	134

Daily gage height, in feet, of Yalobusha River at Grenada, Miss., for 1906.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	June.	July.	Aug	Sept.	Oct.	Nov.
1	.....	2.3	1.2	1.0	13 3	1.4	17	3.3	4.3	.....	1.2	2.7	1.35
2	.....	2.2	.....	.9	13.8	1.4	18	2.5	4.1	.....	1.0	2.35	.....
3	.....	1 5	.....	.9	13.4	1.4	19	2.3	4.2	.....	1.2	2.1	.....
4	.....	1.4	.....	.9	12.8	1.45	20	1.9	4.3	.....	1.2	2.0	.....
5	.....	1.1	.....	2.8	18.3	1.4	21	1.7	4.1	.....	1.5	1.9	.....
6	.....	1.1	.....	3.3	18.8	1.35	22	1.5	3.7	.....	1.9	1.8	.....
7	.....	1.3	.....	2.8	17.9	1.35	23	1.4	3.2	.....	1.35	1.7	.....
8	.....	1.3	.....	2.8	17.6	1.35	24	1.3	3.9	.....	1.8	1.65	.....
9	.....	1.3	.....	2.3	16.6	1.35	25	1.4	3.2	.....	1.55	1.6	.....
10	.....	1.2	.....	1.9	15.3	1.35	26	2.1	2.3	1.5	2.45	1.55	.....
11	.....	2.0	.....	1.7	13.4	1.35	27	1.3	1.8	1.9	11.0	1.5	.....
12	.....	2.7	.....	1.4	8.6	1.35	28	1.2	1.6	1.5	14.4	1.45	.....
13	.....	2.8	.....	1.3	7.0	1.35	29	1.1	1.4	1.2	13.7	1.45	.....
14	1.5	2.7	.....	1.3	6.5	1.35	30	1.1	1.3	1.1	12.5	1.4	.....
15	2.2	2.7	.....	1.2	4.4	1.35	31	.....	1.3	1.0	.....	1.4	.....
16	4.0	2.4	.....	1.1	3.2	1.35							

HOMOCHITTO RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Homochitto River drains a small area in the southwestern part of the State of Mississippi. It rises in the southwestern part of Copiah County and flows in a southwesterly direction into Mississippi River. The United States Geological Survey maintains one station on this river at Rosetta, Miss.

HOMOCHITTO RIVER AT ROSETTA, MISS.

This station was established June 16, 1906. It is located at the Yazoo and Mississippi Valley Railroad bridge in the town of Rosetta.

The river at high stages will overflow the right bank under the bridge trestle and will overflow left bank under the trestle and through short opening in the embankment. The bed of the river is sand and may shift considerably.

The chain gage is attached to the downstream guard rail at the first floor beam from the right end of the bridge; length of chain from end of weight to marker, 34.79 feet. The gage is read once a day by William Z. Taylor.

The reference point is the top of the extreme downstream end of the first floor beam from the right-bank pier; elevation, 30 feet above gage datum.

Discharge measurements of Homochitto River at Rosetta, Miss., in 1906.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 30	W. E. Hall	125	846	5.75	704
June 16	M. R. Hall	96	451	3.51	308
September 22	do	92	476	3.78	391

Daily gage height, in feet, of Homochitto River at Rosetta, Miss., for 1906.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	3.75	3.5	3.0	4.8	3.7	17	3.5	5.5	3.9	3.2	3.9	.....
2	.....	3.5	3.4	3.15	4.3	3.6	18	3.4	7.0	3.7	3.1	4.7	.....
3	.....	5.4	3.3	3.1	6.0	3.6	19	3.5	7.8	3.6	3.0	4.65	.....
4	.....	4.35	4.2	3.6	5.9	3.7	20	3.6	6.1	3.6	2.95	4.4	.....
5	.....	3.9	5.5	4.5	6.8	3.6	21	3.1	4.5	3.5	4.35	4.2	.....
6	.....	3.5	4.7	5.0	9.9	3.6	22	3.2	6.8	3.9	3.5	4.6	.....
7	.....	3.0	3.7	4.4	8.9	3.5	23	3.3	6.8	3.6	3.0	4.1	.....
8	.....	3.25	3.6	4.0	8.3	3.5	24	3.35	4.8	4.0	3.8	4.0	.....
9	.....	3.4	3.7	3.7	8.8	3.5	25	3.15	4.1	3.1	3.3	3.9	.....
10	.....	5.5	3.2	3.4	7.0	3.6	26	3.7	3.8	4.5	3.6	3.9	.....
11	.....	5.6	3.1	3.3	6.1	3.6	27	3.6	3.7	4.7	3.9	3.7	.....
12	.....	5.9	3.0	6.2	5.5	3.5	28	3.6	3.7	4.55	6.4	3.7	.....
13	.....	7.8	3.3	3.95	5.3	.....	29	3.95	4.9	3.7	8.8	3.8	.....
14	.....	6.6	3.5	3.4	5.0	.....	30	3.6	4.4	3.2	4.9	3.8	.....
15	.....	5.6	3.4	3.4	4.9	.....	31	.....	3.9	3.1	.....	3.7	.....
16	3.5	6.0	3.1	3.3	4.7	.....							

INDEX.

CLASSIFICATION OF THE PUBLICATIONS OF THE UNITED STATES GEOLOGICAL SURVEY.

[Water-Supply Paper No. 205.]

The publications of the United States Geological Survey consist of (1) Annual Reports; (2) Monographs; (3) Professional Papers; (4) Bulletins; (5) Mineral Resources; (6) Water-Supply and Irrigation Papers; (7) Topographic Atlas of United States, folios and separate sheets thereof; (8) Geologic Atlas of United States, folios thereof. The classes numbered 2, 7, and 8 are sold at cost of publication; the others are distributed free. A circular giving complete lists can be had on application.

Most of the above publications can be obtained or consulted in the following ways:

1. A limited number are delivered to the Director of the Survey, from whom they can be obtained, free of charge (except classes 2, 7, and 8), on application.

2. A certain number are delivered to Senators and Representatives in Congress, for distribution.

3. Other copies are deposited with the Superintendent of Documents, Washington, D. C., from whom they can be had at practically cost.

4. Copies of all Government publications are furnished to the principal public libraries in the large cities throughout the United States, where they can be consulted by those interested.

The Professional Papers, Bulletins, and Water-Supply Papers treat of a variety of subjects, and the total number issued is large. They have therefore been classified into the following series: A, Economic geology; B, Descriptive geology; C, Systematic geology and paleontology; D, Petrography and mineralogy; E, Chemistry and physics; F, Geography; G, Miscellaneous; H, Forestry; I, Irrigation; J, Water storage; K, Pumping water; L, Quality of water; M, General hydrographic investigations; N, Water power; O, Underground waters; P, Hydrographic progress reports.

Series P.—The hydrographic progress reports contain the results of stream measurements. A report is issued for every calendar year, containing the results of data collected during that year. These reports were first published as a part of the Director's annual report or as a bulletin; they are now published as water-supply and irrigation papers. The following is a list, by years, of the publications containing the progress reports of stream measurements (* means out of stock). A detailed index of these reports (1888–1903) is published as Water-Supply Paper No. 119.

1888. Tenth Annual Report, Part II*.
1889. Eleventh Annual Report, Part II*.
1890. Twelfth Annual Report, Part II*.
1891. Thirteenth Annual Report, Part III*.
1892. Fourteenth Annual Report, Part II*.
1893. Bulletin No. 131*.
1894. Bulletin No. 131*; Sixteenth Annual Report, Part II*.
1895. Bulletin No. 140*.
1896. Water-Supply Paper No. 11*; Eighteenth Annual Report, Part IV*.
1897. Water-Supply Papers Nos. 15* and 16*; Nineteenth Annual Report, Part IV*.
1898. Water-Supply Papers Nos. 27* and 28*; Twentieth Annual Report, Part IV*.
1899. Water-Supply Papers Nos. 35*, 36*, 37*, 38*, and 39*; Twenty-first Annual Report, Part IV*.
1900. Water-Supply Papers Nos. 47, 48, 49, 50, 51, and 52; Twenty-second Annual Report, Part IV.
1901. East of Mississippi River, Water-Supply Papers Nos. 65* and 75*.
West of Mississippi River, Water-Supply Papers Nos. 66 and 75*.

1902. East of Mississippi River, Water-Supply Papers Nos. 82 and 83.
West of Mississippi River, Water-Supply Papers Nos. 84 and 85.
1903. East of Mississippi River, Water-Supply Papers Nos. 97 and 98.
West of Mississippi River, Water-Supply Papers Nos. 99 and 100.
1904. East of Mississippi River, Water-Supply Papers Nos. 124, 125, 126, 127, 128, and 129.
West of Mississippi River, Water-Supply Papers Nos. 130, 131, 132, 133, 134, and 135.
1905. East of Mississippi River, Nos. 165*, 166*, 167, 168*, 169, 170, and 171.
West of Mississippi River, Nos. 171, 172*, 173*, 174, 175*, 176, 177, and 178.
1906. East of Mississippi River, Nos. 201, 202, 203, 204, 205, 206, and 207.
West of Mississippi River, Nos. 207, 208, 209, 210, 211, 212, 213, and 214.

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JULY, 1907.